

SANSA Matjiesfontein

A - Main Building, B - Gate House, C - Generator Building

Matjiesfontein

Western Cape

Architectural Specification

SMFN-SVA-A-SP-01-101 Rev D

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SVA International

The Link, 8th Floor

19 DF Malan Street, Foreshore

Cape Town

www.svarchitects.com

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A GENERAL REQUIREMENTS

A.100 FORMAT OF SPECIFICATION

A.101 Format

- a. The Specification is made up of Sections A to Z.
- b. Sections A and Z provide general requirements applicable to Sections B to Y. Sections B to Y detail particular requirements specific to individual trades or elements of the Works.
- c. The types of Specification are as follows:
 - 1). Descriptive: Shows the design intent and performance requirements with which the Contractor, and/ or his sub-contractor must comply when completing the Detailed Design.
 - 2). Prescriptive: Provides detailed materials and workmanship requirements reflecting the Architect's design solution.
 - 3). Performance Specification: Gives the performance criteria that the Contractor shall satisfy utilising appropriate materials, methods and techniques.
- d. Read the Specification in conjunction with other contract documentation.

The note: "or similar equal approved", means that alternative proposals by Contractors shall meet the performance and design intent criteria (ie. Color, texture, appearance) of that product specified in this specification document. The onus rests with the Contractor to prove that such alternatives are in fact similar and equal for Architects approval.

A.102 Standard System of Measuring Building Work Section Categories

- a. A Section List:
 - 1). A100 Format of Specification
 - 2). A200 Description of the Project
 - 3). A300 Contractors Responsibilities
 - 4). A400 Submittals
 - 5). A500 Performance Requirements and Data
 - 6). A600 Quality Control
 - 7). A700 Owner's Requirements
- b. Prescriptive Section List:
 - 1). H10 Brickwork/ Blockwork
 - 3). H40 Brickwork/ Blockwork Accessories
 - 4). J40 Flexible Sheet Tanking/ Damp-Proof Membranes
 - 5). J41 Built-Up Reinforced Bitumen Roofing

- 6). L21 Timber Doors
- 7). L71 Sundry Proofing Work/ Fire Stops
- 8). M10 Plasterboard Partitions
- 9). M11 Plasterboard Bulkheads and Ceilings
- 10). M30 Demountable Suspended Ceilings
- 11). O10 Signs/ Notices
- 12). O20 Ironmongery
- 13). Q21 Metal Doors
- 14). Q72 Fixed Utilitarian Access Systems
- 15). S10 Ceramic/ Stone/ Mosaic Tiling
- 16). T60 Sanitary Appliances/ Fittings
- 17). W10 General Glazing And Mirrors
- 18). X10 Painting/ Clear Finishes
- 19). Y10 Concrete/ Brick/ Kerbs/ Edgings/ Channels
- 20). Y25 Slab/ Brick/ Set/ Cobble Block Pavings
- 21). Y40 Fencing/ Gates

c. Descriptive Section List:

- 1). F10 In Situ Concrete Mixes/ Casting/ Curing
- 2). F20 Formwork For In Situ Concrete
- 3). F41 Worked & Applied Finishes to In Situ Concrete (Architectural Requirements)
- 5). P10 Structural Steel Members
- 6). Q11 Glazed Curtain Walling
- 7). Q12 Shopfronts
- 8). Q20 Metal Windows/ Rooflights/ Screens/ Louvres
- 9). Q22 Metal Stairs/ Balustrades/ Ladders
- 11). R10 Screeds And Toppings
- 12). R20 Plastered/ Rendered/ Roughcast Coatings
- 13). T10 Rainwater Pipework/ Gutters
- 14). T40 Fire Hose Reels And Equipment
- 16). Y50 Site/ Street Furniture/ Equipment

d. Z Section List:

- 1). Z10 Joinery/ Timber/ Timber Products
- 2). Z11 Metalwork

- 3). Z12 Preservative/ Fire Retardant Treatment
- 4). Z15 Holes/ Chases/ Recesses for Services
- 5). Z20 Fixings/ Adhesives
- 6). Z21 Mortars
- 7). Z22 Sealant Joints
- 8). Z25 Glass and Coatings
- 9). Z30 Metalwork Finishes
- 10). Z31 Powder Coatings
- 11). Z33 Anodising
- 12). Z36 Gaskets

A.103 Supplemental Information

a. Refer to the requirements of the following client documents as appropriate:

1). Types:

- a). Health and Safety Requirements.
- b). Fire Strategy Report.
- c). Contract Drawings.
- d). Structural/ Engineer's Drawings.
- e). Movement and Tolerance Requirements.

2). Consultants responsible for above mentioned documents:

- a). Architects: SVA International.
- b). Structural Engineers: Ekcon
- c). Civil Engineers: Ekcon
- d). Mechanical Engineers: Ekcon
- e). Electrical Engineers: CAI
- f). Quantity Surveyors: The Thynkbox
- g). Fire and Plumbing: Ekcon.

A.104 Definitions

a. The following definitions apply to the Specification:

- 1). "Specification": This document, comprising Sections A-Z inclusive.
- 2). "Design": The visual intent prepared by the Architect for Tender purposes, represented by the Contract Drawings and the Specification.
- 3). "Detailed Design": That prepared by the Contractor, and/ or his sub-contractor, represented by the Working Drawings and Contractor's, and/ or subcontractor's, specifications in relation to work to be executed in terms of a

provisional sum, described in the bill of quantities as a design, supply and installation item.

- 4). "Contract Drawings": Drawings issued by the Architect, representing the Design for Tender purposes.
- 5). "Construction Drawings": Drawings issued by the Principal Agent, or other duly authorized design consultant, as a contract instruction to the Contractor, for construction purposes.
- 6). "Shop Drawings/ Working Drawings": Drawings representing the Design, prepared by the Contractor (or his sub-contractor) based upon the Contract Drawings, maintaining the design intent.
- 7). "As-built Drawings": Drawings produced by the Contractor, and/ or his subcontractor, where required, which show the Works as finally constructed.
- 8). "Testing Authority": Competent accredited independent testing body or association, subject to acceptance by the Architect.
- 9). "Works": The extent of work to be executed by the contractor described in the contract documents and contract instructions, which includes free issue, and materials and goods. Work or installations to be executed by direct contractors and others responsible to the employer are excluded.
- 10). 'Inspection': Inspection carried out by the Architect of materials, components, equipment and installation of the Works. Such inspection shall be limited to an inspection of the visual appearance only.
- 11). 'A(a)cccepted, A(a)ccceptance or A(a)ccceptable': Materials, components, equipment and installations accepted by the Architect shall be based upon Inspections (as defined above).
- 12). 'To be agreed': To be agreed with the Architect prior to work commencing.

A.200 DESCRIPTION OF THE PROJECT

A.201 Overall Project Description

- a. SANSA Matjiesfontein Office Building (Main Building), Generator Building, Gatehouse.

A.300 CONTRACTOR'S RESPONSIBILITIES

GENERAL, SAFETY, PROGRAMME

A.301 General Requirements

- a. Comply with the provisions of the Occupational Health and Safety Act, 1993 (Act No

85 of 1993) and any regulations promulgated in terms of that Act or the Factories Machinery and Building Works Act of 1941.

b. The Contractor shall, before establishing on site, appoint and submit to the Architect in writing the name(s) of the person(s) who is/ are the responsible person(s) in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) and the regulations promulgated in terms of the Act within 14 days from being appointed.

A.302 Safety

a. From date of site handover to the Contractor until the completed work is handed back to the Owner, the Contractor shall be responsible for maintaining safe working conditions on site.

b. The Contractor shall be responsible in terms of the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) and the regulations promulgated in terms of the Act or Factories, Machinery and Buildings Work Act, whichever is applicable.

c. The Contractor shall be responsible for supplying and installing the required safety signs as determined by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993) and the regulations promulgated in terms of the Act or Factories, Machinery and Building Works Act, whichever is applicable, both during the construction phase and for the completed Works.

d. All safety signs shall comply with the requirements of the latest edition of SANS 1186-1 as applicable.

A.303 Programme

a. The Contractor shall submit his programme of work to the Architect in accordance with the tender and contract conditions.

Green Star Requirements

A.304 Rating

a. No Rating requirement.

A.305 Compliance

a. No Compliance requirements. However, best practice principles to be applied.

A.306 Paints, Varnishes and Protective Coatings

a. Any paint used in an internal application, and applied on site, must meet the TVOC Content Limits outlined in Table IEQ-13.1 and must not contain any added lead in the form of driers or pigments.

b. The (sub)-contractor is required to:

1). Ensure all paints are to be compliant with the TVOC levels in Table IEQ-13.1

- 2). Obtain approval of the design team before substituting any paint products.
- 3). Undertake a final audit to ensure that the correct products have been applied.
- 4). Prepare a “contractor compliance report” listing all the products used within the project, the application, suppliers and compliance with Table IEQ-13.1
- 5). Provide manufacturers product datasheet(s) nominating the TVOC limits of each paint product. VOC datasheet required for each product to confirm the maximum Total Volatile Organic Compound (TVOC) value is below the maximum limit in Table IEQ-13.1.
 - a). Laboratory test report or test certificate - Issued by an ISO/IEC 17025 certified testing laboratory stating the product name, maximum TVOC value in grams per litre of mixed ready-to-use product, inclusive of tints, and the testing method used; OR
 - b). Material Safety Data Sheets (MSDS) - Stating the maximum TVOC value in grams per litre of mixed ready-to-use product, inclusive of tints, and the testing method used; OR
 - c). Indicative Manufacturer prepared TVOC data sheet - Prepared by the manufacturer stating the maximum TVOC value in grams per litre of mixed ready-to-use product, inclusive of tints, either:
 - i. Experimentally as described in 'Laboratory test report or test certificate; OR
 - ii. Theoretically with the subtotal of the known VOC values of the product’s raw material components calculated by the manufacturer stated and signed on their letterhead.
- 6). Where the TVOC content of individual components is not known, it must be determined experimentally by one of the following testing methods as appropriate:
 - a). ISO Method 17895 (2005), for a material with a presumed VOC content < 1%;
 - b). ISO Method 11890-2 (2006), for a material with a presumed VOC < 15%;
 - c). ISO Method 11890-1 (2007), for a material with a presumed VOC content > 15%;
 - d). ASTM D3960, which is comprised of four individual testing procedures that measures TVOC (D2369) as well as density (D1475), water content (D4017), but not excluding exempt compounds (D4457).

Table 1 - Table IEQ-13.1 TVOC Content of Paints, Varnishes and Protective Coatings

Product Type/Sub Category Max TVOC content

(g/L of ready-to-use product)

Ceilings - interior flat	14
Walls and ceilings - interior semi-gloss	16
Walls and ceilings – interior low sheen	16
Walls and ceilings - interior flat washable	16
Trim - gloss, semi-gloss, satin, varnishes, wood stains	75
Timber and binding primers	30
Latex primer for galvanized iron and zincalume	60
Interior latex undercoat	65
Interior sealer + general wall & ceiling primer (incl. general primers)	65
One and two pack performance coatings for floors	140
Any solvent-based coatings whose purpose is not covered in table (incl. epoxy flooring).	200

A.307 Adhesives and Sealants

a. All adhesives and Sealants used in an internal application, and applied on site, must meet the TVOC Content Limits outlined in Table IEQ-13.2, which includes exposed and concealed applications and cover at least the following applications:

- 1). Floor Coverings – including carpets and tile adhesives.
- 2). Wall Coverings – including wallpaper and tile adhesives.
- 3). Ceiling and soffit coverings – including adhesives for laminated ceiling tiles or bonded insulation; and
- 4). Skirting board applications.

b. The (sub)-contractor is required to:

- 1). Ensure all adhesives and sealants are to be compliant with the TVOC levels in Table IEQ-13.2
- 2). Obtain approval of the design team before substituting any adhesives and sealants products.
- 3). Undertake a final audit to ensure that the correct products have been applied.
- 4). Prepare a “contractor compliance report” listing all the products used within

the project, the application, suppliers and compliance with Table IEQ-13.2.

5). Provide Manufacturers product datasheet(s) nominating the TVOC limits of each adhesives and sealants product. VOC datasheet required for each product to confirm the maximum Total Volatile Organic Compound (TVOC) value is below the maximum limit in Table IEQ-13.1.

a). Laboratory test report or test certificate - Issued by an ISO/IEC 17025 certified testing laboratory stating the product name, maximum TVOC value in grams per litre of mixed ready-to-use product, inclusive of tints, and the testing method used; OR

b). Material Safety Data Sheets (MSDS) - Stating the maximum TVOC value in grams per litre of mixed ready-to-use product, inclusive of tints, and the testing method used; OR

c). Indicative Manufacturer prepared TVOC data sheet - Prepared by the manufacturer stating the maximum TVOC value in grams per litre of mixed ready-to-use product, inclusive of tints, either:

i. Experimentally as described in 'Laboratory test report or test certificate';
OR

ii. Theoretically with the subtotal of the known VOC values of the product's raw material components calculated by the manufacturer stated and signed on their letterhead.

6). Where the TVOC content of individual components is not known, it must be determined experimentally by one of the following testing methods as appropriate:

a). ISO Method 17895 (2005), for a material with a presumed VOC content < 1%;

b). ISO Method 11890-2 (2006), for a material with a presumed VOC < 15%;

c). ISO Method 11890-1 (2007), for a material with a presumed VOC content > 15%;

d). ASTM D3960, which is comprised of four individual testing procedures that measures TVOC (D2369) as well as density (D1475), water content (D4017), but not excluding exempt compounds (D4457).

Table 2 - Table IEQ-13.2 Total TVOC Content of Adhesives and Sealants

Indoor carpet adhesive 50

Carpet pad adhesive 50

Wood floor and Laminate adhesive 100

Rubber flooring adhesive 60

Sub-floor adhesive 50

Ceramic tile adhesive 65

Cove base adhesive 50

Drywall and Panel adhesive 50

Multipurpose construction adhesive 70

Structural glazing adhesive 100

Architectural sealants, including sealants used to enhance the fire and water-proofing properties.

250

A.308 Carpet and Flooring Requirements

a. All flooring must meet the TVOC Content Limits outlined in Table IEQ-13.3. Flooring covering includes, but not limited to, vinyl sheet, vinyl composite tiles (VCT), rubber, linoleum, cork, carpet tiles.

b. The (sub)-contractor is required to:

- 1). Ensure all flooring to be compliant with the TVOC levels in Table IEQ-13.2
- 2). Obtain approval of the design team before substituting any flooring products.
- 3). Undertake a final audit to ensure that the correct products have been applied.
- 4). Prepare a “contractor compliance report” listing all the products used within the project, the application, suppliers and compliance with Table IEQ-13.3.
- 5). Provide Manufacturers product datasheet(s) nominating the TVOC limits of each flooring product. VOC datasheet required for each product to confirm the maximum Total Volatile Organic Compound (TVOC) value is below the maximum limit in Table IEQ-13.1.

a). Laboratory test report or test certificate - Issued by an ISO/IEC 17025 certified testing laboratory stating the product name, maximum TVOC value in grams per litre of mixed ready-to-use product, inclusive of tints, and the testing method used; OR

b). Material Safety Data Sheets (MSDS) - Stating the maximum TVOC value in grams per litre of mixed ready-to-use product, inclusive of tints, and the testing method used; OR

c). Indicative Manufacturer prepared TVOC data sheet - Prepared by the manufacturer stating the maximum TVOC value in grams per litre of mixed ready-to-use

product, inclusive of tints, either:

i. Experimentally as described in 'Laboratory test report or test certificate;

OR

ii. Theoretically with the subtotal of the known VOC values of the product's raw material components calculated by the manufacturer stated and signed on their letterhead.

6). Where the TVOC content of individual components is not known, it must be determined experimentally by one of the following testing methods as appropriate:

a). ISO Method 17895 (2005), for a material with a presumed VOC content < 1%;

b). ISO Method 11890-2 (2006), for a material with a presumed VOC < 15%;

c). ISO Method 11890-1 (2007), for a material with a presumed VOC content > 15%;

d). ASTM D3960, which is comprised of four individual testing procedures that measures TVOC (D2369) as well as density (D1475), water content (D4017), but not excluding exempt compounds (D4457).

Table 3 - Table IEQ-13.3 Total TVOC Content of Flooring products

ASTM D5116 (Carpets and other flooring products):

Total VOC limit 0.5 mg/m² per hour

4-PC (4-Phenylcyclohexene) limit 0.05mg/m² per hour

A.309

Glare Control

a. All blinds are to be fit to all vision glazing and have a visual light transmittance (VLT) of <10%.

b. Blinds are to allow for easy user control and adjustment by all affected occupants.

c. Manufacturer's Data Sheet(s) (or equivalent) are to be provided indicating the type and VLT properties of the blinds/ screens.

A.310

Occupant Amenity Water

a. All Sanitary fittings must be specified to be less or meet the low flowrates as set out below:

Table 4 - New Table

Efficient Fixtures and Fittings Flush / flowrate

Dual Flush Toilet (3/6 ltr flush)

Low flow/waterless urinals (0-1 ltr/flush)

Low flow sensor taps (5 l/min)

Low flow showers (6-9 ltr/min)

A.311 Insulant ODP

a. All building fabric insulation in walls, roof, floor, window frames, spandrel panels, doors, cavity closures, and lintels are required to have an ozone depleting potential of zero. No ozone-depleting substances are to be associated with either the manufacture or the composition of all thermal insulants in the project.

CONTRACTOR/ SUBCONTRACTOR RESPONSIBILITIES UNDER THE
DIFFERENT SPECIFICATION TYPES

Descriptive Type Specification

A.312 Design Responsibility

- a. Complete the Detailed Design keeping the function, visual requirements, performance and intent of the Design.
- b. Provide, with the Tender, detailed proposals, showing compliance with the design intent and confirm the provision of fully warranted systems and guarantees of goods acceptable to the Architect.
- c. The Contractor's Proposals to include full supporting documentation to facilitate a full technical appraisal.
- d. Tenders may be modified and amended prior to Contract award to reflect the agreed final scope of the Works, materials and systems selected to reflect the design intent.
- e. Provide submittals outlined in each particular trade section.
- f. Do not start any portion of the Works without acceptance of submittals by the Architect.
- g. Be responsible for the final selection and proper installation of products and associated parts, using them solely for the purpose intended by the manufacturer.
- h. The completion of all testing to certify compliance with the specification and Contract Documents.
- i. Provide necessary warranties.
- j. Provide relevant documents for Building Control and other Statutory Authorities when instructed by the Architect.
- k. When requested, provide calculations and any other relevant information to the Architect for submission to and approval by the Local Authorities. Make any changes required by the local authorities, following submissions, to the satisfaction of the Architect.

A.313 Contractor's Proposals

- a. The Contractor's Proposals will be reviewed during the Tender Evaluation period. Attend evaluation meetings as required and make necessary changes and alterations prior to Contract award.
- b. The Contractor's Proposals to include:
 - 1). Detailed drawings of systems, typical details and principal interfaces.
 - 2). Working Drawing programme.
 - 3). Samples.
 - 4). Technical specifications of proposed systems and products.
 - 5). Details of guarantees and warranties.
 - 6). Summary of deviations from/ non-compliance with the Tender.

A.314 Completing the Detailed Design

- a. Represent the Detailed Design on the Working Drawings.
- b. Comply with all relevant Codes of Practice, Standards, Fire Regulations, Building Regulations and local Building Codes, Safety Regulations and any other regulations applicable to the Works, together with all relevant Statutory Rules, Regulations, Byelaws and other enforceable instruments applicable to both the design and execution of the Works.
- c. Provide a programme for the Detailed Design showing all tasks, submissions and Working Drawings.
- d. Do not alter the Contract Specification without the Architect's prior written consent.
- e. Use materials, fixings and sealant of suitable sizes, thicknesses, types and locations.
- f. Allow for all necessary movement and tolerances in the Detailed Design.
- g. Include descriptions of relevant structural performance principles of the Works; including how and where loads are transmitted to the primary structure and the accommodation of tolerances.
- h. Detail all fixing requirements to interfacing elements of the Works, to be accepted by the Architect prior to starting installation.
- i. Co-ordinate all interfaces.
- j. The Architect's review of Working Drawings will relate to visual performance and functional matters only.

A.315 **Additional Supplemental Information**

- a. Provide any additional information in respect of the Detailed Design, materials, systems, methods, installation and procedures as required by the Architect after

Contract award.

b. Submit any additional information necessary to show compliance with the Specification to the Relevant Authorities.

A.316

Material Preferences

a. Use materials of sufficient quality, size, thickness and type.

b. Where the choice of a particular material, type of construction, dimension, size or thickness is indicated in the Specification or on the Design Drawings, or a particular method of construction is implied, satisfy yourself/ itself that the choice indicated satisfies the design intent and performance requirements. If they are considered inadequate or inappropriate, make alternative proposals at the time of Tender.

c. Acceptance of alternative proposals does not relieve the Contractor from responsibility to provide suitable materials, parts and assemblies fit for the purpose intended by the manufacturer and in compliance with the Contract Documents.

d. If, with the Tender, no such alternative proposal is submitted to any of the preferences indicated in the Tender Documents, then the solutions proposed in the Specification and on the Design Drawings shall be deemed to be accepted, as fit for the intended purpose, by the Contractor.

e. Final surface finish of similar materials to remain visually consistent, including colour and texture, regardless of orientation or natural grain.

f. Where proprietary products are used provide any modification, additional bracing, reinforcing, suitable fixings, etc. to ensure that the products meet the requirements of the Specification.

A.317

Detailed Design, Manufacturing and Installation Tolerances

a. The Specification together with the related Contract Drawings indicate the dimensional tolerances (hereafter referred to as 'tolerances') required during Detailed Design, manufacture, sub-assembly, setting out and installation of the Works.

b. The Working Drawings to indicate clearly methods of achieving manufacturing and construction tolerances.

c. Advise any tolerance omissions, inconsistencies, or incompatibilities.

d. Check site dimensions critical to the Works, in sufficient time to enable corrective action to be taken.

e. Inform the Architect of any work that does not meet the specified tolerances.

f. The Works to be free from deformation and not be subject to warping, twisting and/ or perishing, remaining stable, firm, free from vibrations, knocking, rattles and/ or

whistles, squeaks or other such noises.

g. In the event of there being any discrepancy in the values of existing datum reference points, datum levels, buildings, foundations or other features to which the Works are related, determine and report such a discrepancy and obtain written instructions before proceeding.

h. Permissible tolerances to be progressively checked up to handover. Where two or more different tolerances can be derived by calculation and/ or from the Design Drawings for the same dimension, the least tolerance to apply. Tolerances not to be cumulative.

Prescriptive Type Specification

A.318 Contractor's Undertaking

- a. Comply with all material and workmanship requirements.
- b. Provide everything necessary for the execution and completion of the Works in accordance with the Contract Documents, more specifically the Contract Drawings and Specification. Deliver the Works complete and ready for use.
- c. Where necessary, provide technical information and details to show compliance with the Contract.
- d. No portion of the Works to start without acceptance of the appropriate submittals.
- e. If additional bracing, reinforcing or fixings are necessary to ensure a safe installation, provide notice to the Architect prior to start of any part of the Works. Convey any concerns that the manufacturers may have expressed regarding the suitability of products specified.
- f. Alternative products may be proposed but such proposals must be accepted by the Architect in writing before proceeding. For such alternative products, provide full technical literature to show that proposals are of a standard at least equal to that specified and show compatibility with the design.

Performance Type Specification

A.319 General Contractor's Requirements and Responsibilities

- a. Provide suitable goods, products and techniques to meet the specified performance criteria.

A.320 Detailed Requirements

- a. Demonstrate compliance at the time of Tender.
- b. Ensure that all products and systems are fit for the intended purpose.

A.321 Contractor's Proposals

- a. A statement confirming compliance with the Specification, showing how the Works will be carried out and which products will be incorporated.
- b. Include details of warranties and guarantees.

A.400 SUBMITTALS

A.401 Procedure

- a. No portion of the Works to start without acceptance of the required submittals.
- b. Provide a final schedule indicating the dates on which submittals will be available for inspection.
- c. Provide submittals in accordance with the following:
 - 1). Deliver submittals to premises identified by the Architect.
 - 2). Individually identify each submittal for the project element.
 - 3). Include all relevant information with each submittal.
 - 4). Identify submittals that differ from the requirements of the design.
- d. Submission of Working Drawings/ Shop Drawings/ Documents:
 - 1). Allow 21 days between the first submission of a Working Drawing and receipt of A or B status confirmation. Failure to achieve status A or B, as described in clause A. 411(e) below, to be at the Contractor's risk.
 - 2). Provide a list of Working Drawings/ Shop Drawings proposed.
- e. Incorporate into the contract submittals reviewed and altered during the Tender evaluation period.

A.402 Tender Submittals

- a. Provide, at the time of Tender, the submittals listed in the Specification and a Noncompliance Report stipulating any deviations/ non-compliance with the specification or Design Drawings.

A.403 Tender Submittals

- a. Provide a method statement supported by plans, sections, elevations and typical details of all buildings and external Works, maintaining the design intent.
- b. Provide detailed specifications to show compliance with the Specification for materials and workmanship including structural and services elements.
- c. The Contractor's Proposals to be agreed prior to Contract award.

A.404 Post Contract Submittals

- a. After Contract award provide Working Drawings/ Shop Drawings, samples, mock-ups,

prototypes, quality benchmarks, calculations, test reports and other relevant data.

A.405 General Samples

- a. Samples to include various natural materials, fabricated items, equipment, devices, appliances or parts thereof, as may be required to satisfy the visual appearance and technical requirements of the Design.
- b. Review samples for their visual characteristics and where moving or operating elements are involved, the Architect to be given the opportunity to review working samples.
- c. Provide samples where a range of colour, graining, texture and other characteristics is anticipated.
- d. Where custom colours are specified, samples to be submitted illustrating precise colours, textures, patterns and finishes for review by the Architect.

A.406 Tender Samples

- a. Samples provided with the Tender or during the evaluation period.
- b. Provide the samples, listed in the Specification, required to verify visual appearance and/ or quality.
- c. Deliver tender samples to the Architect's office showing type and quality of material proposed for use in the Works.
- d. Final agreed Tender samples will be labelled and kept by the Architect as a record of materials agreed for Contract.

A.407 Control Samples (Post Contract)

- a. Provide samples during the completion of the Detailed Design for checking against the Tender samples to ensure that quality and type have been maintained.
- b. The samples listed in the Specification to be kept as a record of materials to be incorporated in the Works and used as references for controlling consistency throughout installation.
- c. Provide samples of materials in their final form.

A.408 Mock-ups

- a. During Detailed Design provide mock-ups for inspection as described in the Specification.
- b. Mock-ups need not use final materials to be incorporated in the Works but should adequately represent the design.
- c. Mock-ups to confirm visual intent including colour, size, fit and co-ordination.

A.409**Prototypes**

- a. Prior to manufacture of elements of the Works, construct off Site (or on Site if specifically requested by the Architect) full scale three-dimensional sections as described in the Specification utilising final specified materials but not necessarily final production techniques.
- b. Prototypes to be tested to demonstrate system performance of the maximum applied loads, climatic conditions and structural movements.
- c. Prototypes to be used as a Quality Assurance 'Hold Point'.
- d. Indicative Manufacture of materials/ products for use in the Works not to start until receipt of the Architect's written acceptance of the prototypes.
- e. Produce Working Drawings/ Shop Drawings for the prototypes.
- f. Where tests are specified, carry out or arrange for the testing by an approved independent test authority.
- g. Any changes required to be recorded on As-built Drawings to show their final construction.

A.410**Quality Benchmarks**

- a. Upon start of installation, erect complete sections of elements of the Works, where described in the Specification, for acceptance of the Architect. Use these as a quality benchmark for the remainder of the Works until Practical Completion.
- b. Do not start installations in other areas of that particular element until the Architect has examined, accepted and visually recorded the quality benchmark. Carry out any alterations or adjustments required in order to achieve an acceptable quality.
- c. Upon receipt of acceptance, fully protect the quality benchmark. Use, from time to time, to check and monitor quality of materials and workmanship incorporated in the remaining areas of the Works, or where specifically stated for further testing. Remove and replace all protection for such purposes.

A.411**Working Drawings/ Shop Drawings**

- a. Provide Working Drawings/ Shop Drawings, as required by the Contract Documents.
- b. The Working Drawings/ Shop Drawings will be reviewed for compliance with visual, performance and Contract requirements.
- c. The Working Drawings/ Shop Drawings review will not relieve the Contractor of his responsibility for errors, or for supplying components and materials to the full satisfaction of the Architect.
- d. Working Drawings/ Shop Drawings to be fully dimensioned in metric, to an agreed

scale appropriate to the detail, and include:

- 1). Full size details and graphic representation describing materials, components and equipment, construction, finishes, provision for movements, fabrication and erection tolerances.
- 2). Layouts, locations and assemblies of all types of construction detail and junctions, details of materials, method of jointing, details of all Site connections and fixing and sealing methods, finishes and all pertinent information related to:
 - a). Method of fabrication and construction.
 - b). Proper relation to adjoining work.
 - c). Finishes.
 - d). Amplification of details.
 - e). Minor changes to the Design to suit actual conditions.
- e. Submit Working Drawings/ Shop Drawings in accordance with the Contract Documents and do not start fabrication of components until formally returned by the Architect with either 'A' or 'B' stamped on each of the Working Drawings/ Shop Drawings. Ensure that space is left clear on each of the Working Drawings/ Shop Drawings for stamping by the Architect. The following drawing inspection codes to be used when returning the Working Drawings/ Shop Drawings to the Contractor:
 - 1). Drawing stamped 'Category A' - Fabrication, manufacture or construction may proceed in accordance with the drawing submitted.
 - 2). Drawing stamped 'Category B' - Fabrication, manufacture or construction may proceed in accordance with the drawings submitted subject to the Contractor taking necessary action based on the Architect's comments and all annotations added to the returned drawings. Unless indicated to the contrary on such drawings, the work to comply with the Contract Documents. To achieve 'Category A' status, the required number of copies of amended drawings to be sent to the Architect.
 - 3). Drawings stamped 'Category C' - No work to be fabricated, manufactured or constructed. Submit new drawings to the Architect for review until resubmission is not required.
- f. The Architect's final comment on the Working Drawings/ Shop Drawings (Category A) will be conditional upon receipt of all documentation, certification, acceptances in respect of anchorages, fire stop assemblies, samples, mock-ups and test reports, etc. as defined in the Specification.

- g. When preparing the Working Drawings/ Shop Drawings consult the current Architect, Structural and Services Contract Drawings, adjusting the Working Drawings/ Shop Drawings to allow for any changes to Site tolerances and/ or discrepancies where applicable.
- h. Utilise manufacturer's standard details as appropriate ensuring compliance with the design intent.
- i. Annotate the Working Drawings/ Shop Drawings in English and title in the manner determined for the Contract, with the title block fully indicating the part of the Works to which they apply.
- j. Treat as confidential information contained in any of the Contract Drawings and do not utilise for any purpose other than for the Works.
- k. No Working Drawings/ Shop Drawings acceptable if produced to a reduced size.
- l. Submit Working Drawings/ Shop Drawings in two polyester printed copies and two electronic format copies.

A.412

Other Submittals

- a. Product Data: Provide technical information detailing the characteristics of each system, system part or material incorporated in the Works. Include material schedules and manufacturer's literature.
- b. Certifications: Provide independently certified reports verifying compliance of each element or part with the requirements of the Contract Drawings and Specification. These reports to include the chemical and physical properties of various building materials.
- c. QA/ QC Programme: Provide a programme to satisfy the requirements of the Specification, the Contract conditions or any other documents referred to in the Contract Documentation.
- d. Pre-construction Testing Reports:
 - 1). Provide technical reports recording test results for systems, parts and materials as required by the Contract Drawings, the Specification, the Architect or a testing laboratory, prior to start of installation.
 - 2). The reports to state compliance with the technical requirements of the Specification and include, where appropriate, test certificates.
- e. Maintenance/ Operation Manuals: Manuals prepared by the Contractor for the Client/ building user's maintenance and operation of the various building systems and/ or parts thereof.

f. Supplementary Product Literature: Such literature may include manufacturer's catalogue information, product specifications, standard illustrations, diagrams and standard details. The supplementary product literature to describe physical characteristics such as size, weight, finish, material analysis, electrical requirements and other information such as load tables, test results, assessments and industry quality standards.

g. Technical Calculations: Technical engineering calculations which document technical performance of various systems, system components and/ or materials, as required by the Contract Drawings and Specifications.

h. All submittals provided to be written in the English language.

A.413 Review of Submittals

a. The submittals will be reviewed for visual and performance compliance and if acceptable, stamped or marked in accordance with the project procedure. Submittals that are incomplete or erroneous, or which are not required, will be returned and a new submittal made as necessary

A.500 PERFORMANCE REQUIREMENTS AND DATA

A.501 Performance Requirements

a. The Works to comply with the performance criteria stated in the Specification and the Contract Documents.

b. Stated performance criteria sets the minimum standards with which the Detailed Design shall comply.

c. No warranty or representation is given by the Architect as to the accuracy of the Contract Drawings or the adequacy or buildability of details shown. Such warranties only relate to Construction Drawings. Should the Contractor adopt the details or arrangements indicated on the Contract Drawings it shall be deemed that he has checked their buildability and performance in terms of this Specification, all relevant Regulations and codes of practice, and manufacturers' recommendations for any products referred to.

d. Where relevant South African National Standards, British Standards, BS codes of practice, or Agrément Certificates applicable to the design exists, the recommendations and requirements of such documents to be considered a minimum standard for the Works.

Design and Service Life

A.502 Design Life of Building

a. The design life of the building to be a minimum period 60 years.

A.503 Service Life of Parts

a. The design life of the Works is to be as stated above; however, it is recognised that various elements/ parts have varying 'service life' (i.e. actual period of time during which no excessive expenditure is required on operation, maintenance or repair of a component or construction – as recorded in use).

b. Primary components are all components with a predicted service life not less than the design life of the building without the need for maintenance other than regular cleaning.

c. Secondary components are all components with a predicted service life of design life equal to the element being specified, assuming regular cleaning and maintenance. Secondary components shall be capable of easy replacement without progressive dismantling of adjacent elements.

d. Confirm the predicted service life (i.e. the service life predicted from recorded performance or accelerated tests) and maintenance requirements of the parts of the Works for review by the Architect and provide detailed information at Tender Stage.

e. Use materials solely for the purpose intended by the manufacturer and which satisfy the requirements of the Specification and the Contract Documents.

f. Premature deterioration is not acceptable.

Structural

A.504 Movements

a. The Detailed Design, fabrication and installation to take into account all tolerances and movements of the building structure in both permanent and temporary conditions.

b. Movements include the application of dead, live and wind loads plus moisture, shrinkage, deflections, creep, seismic and thermal effects, that may occur during the fixing, final installation or lifetime of the Works.

c. The Works to withstand all movements of the building structure under all design loads or combination of loads without damage or any reduction in performance.

d. Fixings to be capable of providing adequate restraint and with adjustment to suit building movement and prevent system/ installation failure.

e. Movement joints to accommodate the maximum movement that can be derived from the specified and determined design loads and movements and to meet all the performance requirements of the Specification.

- f. The Works to resist torsional stresses, static and dynamic design loads without causing permanent deformation of components or the failure of systems and materials and to transmit such loads safely to the points of support.
- g. Refer to the Movement and Tolerance requirements produced by the Structural Engineer.

A.505 Dead and Live Loads

- a. Withstand the following loads without any deterioration or reduction in performance:
 - 1). Accommodate the component and final assembly dead load.
 - 2). The various loads imposed by other trades or derived from any fittings or services fixed to, pass through or connect to the Works. Provide strengthening and support work as required.
- b. Take special care to identify and design for any situation not clearly defined in SANS 10160 where it is believed that the geometry of the building may cause increased pressure due to vortex or eddy conditions.
- c. Calculate maximum gust wind pressure in accordance with SANS 10160.
- d. Impact loads, or transferred impact loads, that occur during the service life of the Works, without deterioration in performance and without sustaining non-repairable damage.
- e. Loads imposed during replacement of components.
- f. When calculating loads the worst combination to be considered.

A.506 Deflections

- a. The Works, when carrying full design loads, not to exceed the deflection limits specified within the relevant Work Section of this document.
- b. The Works not to deflect under loading in any way that is detrimental to any part or adjacent structural or building element.
- c. All parts, couplings and fixings to be capable of accommodating deflections without permanent distortion, deformation or failure.
- d. The Works to accommodate differential structural movements arising from adjacent structures.
- e. Reduce the magnitude of the allowable deflections if they are detrimental to any part of the Works, its support structure or internal finishes.

A.507 Wind Loads

- a. The Works to withstand without permanent deformation, the effects of wind loads where appropriate (e.g. external conditions or internal areas subject to external wind

pressure).

b. Refer to the Wind Tunnel Test Report prepared by the Engineer.

A.508 Preceding Work

a. At the appropriate time check all preceding work, including checking line, level and fixing points and report immediately to the Architect if any is considered to be unsuitable. Propose remedial action if so requested by the Architect.

b. Prior to manufacture of parts/ elements, where possible, inspect the Site and check measurements of the preceding Works while completing the Working Drawings.

Coordinate

all Site dimensions.

A.509 Vibration

a. Make sure that the Works withstand all vibration caused by traffic, aircraft, equipment effects or any other shocks, slamming, strains, stresses and movement imposed, avoiding deterioration or fracture of any element, both during construction and after installation.

Environmental Conditions

A.510 Generally

a. Make sure that the Works conform to all aspects of the Specification and Contract Documents, taking into account all local environmental conditions prevailing at Site.

b. Allow for the fact that the Works will be erected in all extremes of weather conditions throughout the year.

Durability

A.511 General Requirements

a. Ensuring that the Works complies with the relevant requirements of SANS 10400.

b. Use materials in the Works that suit the design and service life of the building.

A.600 QUALITY CONTROL

General Quality Assurance, Quality Control, Testing

A.601 General

a. Set up, document and maintain a quality assurance and quality control system, able to be checked to the satisfaction of the Architect, that all materials and workmanship, whatever their sources, meet the requirements of the Specification and Contract Documents. Should the Contractor or any of his sub-contractors be certified to the SANS 9000 family of standards then monitor these Works accordingly.

b. Define the quality programme in a quality control manual or similar document in which

the organisation systems, inspection and test plan procedures are fully described to ensure that all essential inspection requirements are determined and satisfied throughout all phases of the design and construction of the Works.

c. Establish a tolerance quality control manual to cover all aspects of tolerance compliance relating to the Works. Prepare a quality control proposal for submission to the Architect for acceptance. This shall describe, in detail, the various types of quality control checks to be carried out during each stage of the Works; what means and methods to be used; which personnel to be employed, together with their qualifications, and how each type of tolerance check is to be recorded and kept for future reference.

A.602 Testing and Inspection

a. Where required, engage an accredited independent testing specialist, as agreed with the Architect, to verify that the requirements of the Contract have been satisfied.

b. Make the following minimum provisions available to the Architect at all times:

1). Suitably qualified personnel using appropriate validated equipment.

2). All necessary access and facilities for inspection and testing in fabrication shops and on Site.

3). Regularly calibrated equipment for the purposes of load measuring.

c. Maintain the following:

1). Tests and inspection results during all stages of manufacture, assembly and installation of components.

2). Certificates relating to the materials used in the work, as confirmation of tests carried out in accordance with the relevant standards and codes.

3). Records of all inspections and tests performed to substantiate conformity with the Specification and Contract Documents, including those carried out by subcontractors and sub-suppliers.

d. Should any test reveal defective material and/ or workmanship, immediately carry out any remedial work and/ or re-testing, including that of a special nature, under instruction from the Architect.

e. Indicate on the Contract Programme the exact timing of all testing, procedural trials and trial assemblies, in order to allow the Architect the opportunity of attending.

f. If the Architect is of the opinion that the Works do not conform to the requirements of this document, the Contract Documents or to the details indicated on the Working

Drawings, then special tests to be carried out to establish the case.

Statutory Regulations

A.603

Standards

- a. South African National Standards to be the governing standards for the Works.
- b. Only where expressly stated in the Specification are other National Standards to be applicable to the Works.
- c. All reference to standards, regulations and requirements of statutory bodies mean the latest published editions at the time of Contract award.
- d. Where such standards, regulations and requirements are amended after Contract award and affect the Contractor's responsibilities during the course of the Works, immediately inform the Architect in writing.
- e. If unable to comply with the governing standards or regulations and proposing to substitute other National Standards, inform the Architect within the summary of deviations from the Specification.
 - 1). Provide fully detailed reasons for being unable to comply, together with any design and/ or technical implications.
 - 2). Failure to provide such notification prior to Contract award shall be deemed acceptance of the governing standards or regulations and later notification shall be invalid.

A.604

Building Codes and Regulations

- a. All materials, components, equipment and workmanship to comply with Local Authority Codes and Building Regulations, South African National Standards, and any other regulations applicable to the Works, together with all relevant Statutory Rules, Regulations, Bye-Laws and other enforceable instruments in both the design and execution of the installation.
- b. Unless stated otherwise, South African National Standards to apply to the Building Design and Materials as listed herein.

Safety and Protection

A.605

Regulations

- a. Give full consideration to the health and safety of operatives when completing the Detailed Design, manufacturing, installing or operating and maintaining the Works.
- b. The Working Drawings only to incorporate methods of manufacture, installation, maintenance and use that are safe and comply with all Health and Safety requirements.

- A.606** **Damage Anticipation**
- a. Anticipate the possible sources of damage to the Works and take active and positive protective measures to maintain them in pristine condition until full Practical Completion. The acceptance of responsibility for making good in the event of damage is not considered adequate.
- A.607** **Protective Devices**
- a. Provide necessary protective devices to protect all goods and materials incorporated into the Works, at all stages through to Practical Completion, against damage arising from but not limited to weather conditions, construction, other contractors, warping, distortion, abrasion and other conditions which could have an adverse effect on any goods and/ or materials used in the Works.
- A.608** **Protective Measures**
- a. Provide full details of the protective measures proposed for use at each of the following five stages:
- 1). Manufacture and packaging of goods and materials at off-Site locations.
 - 2). Shipment to Site and unloading.
 - 3). Storage on Site and movement to point of installation or construction.
 - 4). Installation/ construction.
 - 5). Completion to handover.
- A.609** **Packing and Crating**
- a. Where parts/ components are delivered to the Site in packages or crates, then each package or crate to be labelled on the outside giving the reference and quantity of the contents so that deliveries can be accepted at the Site without the necessity of breaking open any package.
- b. Carefully remove all protection from the Works immediately before Practical Completion and leave the Works perfectly clean and fit for immediate use.
- A.610** **Protection of Glazed Elements**
- a. All elements of framework and associated beads and strips to be stored on Site such that they are not damaged, distorted or weathered unevenly.
- b. All finished components to be carefully packed in stillages or crates such that they are suitably separated and protected to prevent scratching, scuffing or other surface damage.
- c. All glass panes, sealant and gaskets to be stored on Site in accordance with their manufacturer's written recommendations.

A.611 Earth Bonding

- a. Effectively bond to earth all extraneous conductive parts of the Works.
 - 1). An extraneous conductive part is defined as being that part which is liable to transmit a potential, including earth potential, and not forming part of the electrical installation.
 - 2). Each component is to constitute an extraneous conductive part.
- b. The Works to be electrically continuous as required by the latest edition of the IEE (Institution of Electrical Engineers) Regulations.
- c. Provide equipotential bonding to ensure that the various exposed conductive parts and extraneous conductive parts as defined by the IEE Regulations are at a substantially equal potential.
- d. Earthing connecting to comply with SANS 10142, SANS 10199, SANS 10200 and SANS 10292.

A.612 Electrolytic Protection

- a. At all locations where different metals are assembled together, ensure that electrolytic corrosion does not occur and that the necessary protection is provided where needed, in both temporary and permanent conditions.

A.613 Corrosion Protection

- a. Take protective measures to avoid any corrosion or any deleterious effects caused by manufacturing, finishing, transportation, storage and installation of materials.
- b. Ensure full resistance to any corrosion for components that are secured or bolted to each other, paying particular attention to the surface damage caused by such bolting or securing.
- c. Ensure full resistance in repair of corrosion protection to cope with the Site cutting of components, especially at boundary and external conditions.
- d. The minimum requirements for the corrosion protection system for all steelwork to conform to SANS 10120-3 HC and SANS 1200 HC.
- e. Allow for protection against all corrosion arising from exposure to seawater, nonsaline water, soil, high humidity, low or high temperatures, chemical acids and alkalis, abrasion and impact, fungi and bacteria.
- f. Take particular care with delivery and storage on Site, particularly if storage is prolonged. On no account store or use materials or components beyond the manufacturer's expiry date.

A.614 Fire Protection

- a. Fire performance in terms of fire resistance of elements and structure to be determined in accordance with the SANS 10177 and the National Building Regulations.
- b. Non-combustible materials to be as defined in SANS 10177 and the Building Regulations.
- c. Materials of limited combustibility to be as defined in SANS 10177.
- d. Internal surfaces and linings requiring to be rated in terms of 'surface spread of flame' to be rated for performance by the method specified in the Building Regulations.
- e. Composite products and synthetic materials requiring to be fire rated to be subject to the limitations specified in SANS 10177.
- f. Supply test certificates to demonstrate that all materials meet the above requirements.
- g. Ensure compliance with all Statutory Authorities' and Fire Services' requests/ recommendations.

Maintenance, Training and Replacement Materials

A.615 General

- a. Replaceable materials/ components to be maximised.
- b. Materials to be capable of simple maintenance/ repair and integration with other maintenance systems.

A.616 Maintenance Manual

- a. One month before programmed completion/ practical completion of the Works prepare and submit three copies and one electronic copy of the Maintenance Manual required to maintain the Works.

A.617 Training of User's Personnel

- a. Prior to Practical Completion of the Works, provide skilled staff/ operatives to instruct the user's staff on the correct and efficient operation and maintenance of all systems, components, plant, equipment and controls as detailed in the Maintenance Manual.

A.618 Replacement Materials

- a. Where required by the Contract, provide replacement materials upon completion of the Works.
- b. All replacement materials to be of identical quality to those installed in the Works.

A.619 Health and Safety File

- a. Provide information as required by the Safety Health and Environmental Officer for inclusion in the Health and Safety File.

As Built Drawings

A.620

As Built Drawings

- a. The Contractor shall at all times keep a set of updated as-built drawings on site.
- b. On completion of the Works the Contractor shall produce and provide the Architect with a set of as-built drawings consisting out of three paper prints and one electronic copy per drawing.

General Materials Requirements

A.621

Standard of Materials and Quality

- a. Materials to be new, unless otherwise specified, carefully selected and of the best merchantable quality.
- b. Materials are to comply with the appropriate South African National Standard or British Standard where not provided for in the SANS.
- c. All materials to be acceptable to the Architect.

A.622

Alternative Materials

- a. Be responsible for the supply and installation of materials, all in accordance with specified standards.

A.623

Health Hazards

- a. No proposed materials to be a potential health hazard. Maintain a full, up-to-date knowledge of all current published research and legislation in this respect.

A.624

Deleterious Materials

- a. Do not use the following materials in the Works unless it can be demonstrated that they are safe during manufacture, installation and use and that their suitability is ensured:
 - 1). Asbestos or asbestos-containing products.
 - 2). Lead where the metal or its corrosive products may be directly ingested, inhaled or absorbed. Applications of lead such as roofing, flashings, rainwater goods and copper alloy fittings containing lead which are specifically required are acceptable.
 - 3). Lead based paints and primers.
 - 4). Urea formaldehyde.
 - 5). Materials which generally comprise mineral fibres, either man-made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less, or which contain any fibres not sealed, encapsulated, or otherwise stabilised to ensure that fibre migration is prevented. Products

that may contain these fibres include insulation, fire protection and air filters. For all mineral wool insulation products, test evidence must be available and produced confirming that the materials fulfil the requirements of European Directive 97/69/EC and consequently are not classified as a possible human carcinogen.

A.625 Sustainable Sources of Timber

- a. Procure all softwood timbers and all temperate hardwoods from sustainable sources.
- b. All plywood used in the Works to be from softwood or temperate hardwoods from sustainable sources.

Workmanship

A.626 Skilled Personnel

- a. Execute the work using persons skilled in the processes to be adopted. Where requested, provide such documentation necessary to demonstrate an individual's ability to carry out the work to which he has been assigned.

A.627 Suitability of Structure

- a. Before commencing any part or element of the Works, survey the structure, checking line, level and fixing points and report immediately to the Architect if the structure is considered to be unsuitable. If the structure is unsuitable, propose remedial action.

A.628 Setting Out

- a. Ensure accurate setting out in accordance with the Contract Documents.

A.629 Compatibility

- a. Ensure that all materials and processes employed in the Works are compatible with each other. Store all materials and associated components in a clean dry area, in accordance with the manufacturer's written recommendations.

A.630 Manufacturer's Instructions

- a. Where proprietary systems are specified and included in the Works, ensure that the method of building or installing is strictly in accordance with the manufacturer's printed instructions and that copies of all such documentation are supplied to the Architect prior to start of the Works.

A.631 Visual Inspection

- a. All finished surfaces to be subject to visual inspection and acceptable to the Architect.

A.632 Suppliers

- a. Be responsible for all materials, components and equipment supplied or manufactured by sub-contractors or suppliers, until the end of the warranty period

defined in the Contract.

A.633 Covering Up

a. No work to be covered up without agreement by the Architect. Afford reasonable notice and full opportunity for the examination and measurement of any work that is about to be covered up.

A.63 4 Cutting

a. All methods, principles, details, etc. for Site cutting of components to be submitted as part of the Contractor's method statement to the Architect for review. No manufacture to start until it can be demonstrated that all proposed techniques have been reviewed by the Architect.

b. Cutting of metal products to be straight and free from burrs and all joints to be flush, without gaps or imperfections. If base metal is exposed, protect the surface to the same level of protection as stated in the Specification and Contract Documents.

A.635 Deterioration

a. Treat/ select all materials to prevent any damage from all possible combinations of atmospheric deterioration, corrosion, wet rot, dry rot, fungi, mould and all other deleterious effects, including atmospheric pollution and pH factor of the adjacent elements.

b. Ensure that no chemical or electrolytic action takes place where dissimilar metals and/ or materials are used together.

c. No materials to discolour, crack or otherwise be damaged by the worst possible combination of environmental conditions identified herein.

d. With materials subject to surface treatment, give special attention to the substrate to ensure that the preparation is compatible with the surface treatment.

e. Ensure that all superficial dust and friable materials are removed and that adequate protection is provided during the process of the surface treatment and finishes to prevent contamination by dust and other debris.

f. No materials used in the manufacture of the Works to be liable to infestation attack by micro-organisms, fungi, insects or other vermin, nor provide harbourage for same.

A.636 Line and Level

a. All components to be installed such that they are plumb or horizontal and line up with adjacent components, in all directions, taking account of the allowable tolerances as defined in the Project Common Tolerance and Movements Document.

A.637 Method Statements

a. Prepare a detailed method statement describing the sequence and methods to be employed in carrying out this work, identifying proposed solutions regarding workmanship which affects the fabrication, holding, storing and handling, setting-out, Site assembly, bolting, joining and welding of components and the protection of the metalwork against corrosion. Such notes to be clearly written on the Working Drawings to be used for Site fixing.

A.700 EMPLOYERS REQUIREMENTS – MANUALS

Maintenance Manuals

A.701 General

- a. Prepare the manual in the format as agreed with the Architect.
- b. Content:
 - 1). The Maintenance Manual shall incorporate all maintenance systems and give details of the operation and required maintenance of all items, components and systems comprising the Works.
 - 2). This information shall be supplied for the Architect's review in the following format:
 - a). Specially written information shall be on A4 size pages with typed text using double spacing and in a format agreed prior to submission.
 - b). Drawn information shall generally be on A1 size sheets.
 - c). Standard published information shall be carefully selected and edited to include only those items installed. Where editing is not appropriate, the relevant items shall be typed out and included.

A.702 Submission of Manual

- a. Submit the manual in draft for approval as directed by the Architect.
- b. One month before programmed completion/ the issue of the Taking-Over Certificate prepare and deliver to the Architect three bound copies and one electronic copy in Word format of the approved maintenance manual.
- c. Demonstrate its usage to the Building Maintenance Manager.

A.703 Usage

- a. The manual is designed to make information needed for maintenance available to non-specialist people.
- b. It shall tabulated and cross referenced to make access to information easy.

- c. It shall be illustrated with drawings and reference the as-built drawings.
- d. It shall form the product reference for future replacements.

A.704 Products and Components

- a. Component Information: -Provide the following information for every item, component and/ or system.
 - 1). Certified manufacturing certificate.
 - 2). Full description giving any special features. A full breakdown of the parts and the catalogue number of the constituent parts.
 - 3). The guarantee period of any element or material where in excess of the warranty required by the Specification and Contract Documents.
- b. Detail the finishes/ coatings of the as installed components.
- c. Provide names, addresses and phone numbers of all manufacturer's and suppliers.

A.705 Servicing Components, Materials and Assemblies

- a. Maintenance Procedures: The Maintenance Manual shall include fully comprehensive details in respect of:
 - 1). Cleaning procedures for all elements of the Works.
 - 2). Replacement procedures.
 - 3). Regular cyclical maintenance procedures (avoiding damage).
 - 4). Repair procedures in the event of damage.
- 5). Cleaning and Lubrication:
 - a). Provide all necessary information regarding materials for cleaning and treating surfaces, including the frequency and method of washing required to maintain performance and appearance.
 - b). Provide a list of all methods and materials which shall not be used in cleaning and treating surfaces.
 - c). Recommend methods and materials for adjusting and lubricating mechanisms and moving parts.
- b. Service Life:
 - 1). Provide in tabulated format materials, components, fabricated elements, finishes and coatings, grouped by service life.
 - 2). Recommend dates for replacement to pre-empt failure, loss of function or visual deterioration.
 - 3). Service Intervals:
 - a). List intervals, or specific dates, and describe work needed to be done to

maintain appearance and function as intended, to achieve durability and predicted service life.

A.706 Replacement Instructions

- a. Describe in detail the construction of each fabricated element.
- b. Provide method statements and detailed instructions for:
 - 1). Dismantling and re-assembling in situ of elements.
 - 2). Removal and replacement with a duplicate element.
 - 3). The replacement of short life materials and components.

A.707 Guarantees, Warranties

- a. Include copies of all guarantees, warranties, manufacturer's assurances and certified test results.

A.708 Names and Addresses

- a. Provide contact names, company names, addresses telephone and fax numbers for all sub-contractors and suppliers engaged upon the Works.
- b. Indicate the nature and extent of their work

A.709 Training of User's Maintenance Personnel

- a. Prior to Practical Completion of the Works provide skilled staff/ operatives to instruct the user's staff on the correct and efficient operation and maintenance of all systems, components, plant, equipment and controls as detailed in the Maintenance Manual.
- b. Provide a programme and schedule of training requirements, prior to completion of the Works, stating the minimum amount of time which is required for the skilled staff to train the user's staff.
- c. Throughout the training period remain responsible for the operation and maintenance of the Works.
- d. Where such training cannot be carried out prior to Practical Completion of the Works due to the nature of the equipment, return to Site at a later mutually agreed date to complete the training period.

END OF SECTION

- F10** **INSITU CONCRETE MIXES/ CASTING/ CURING**
- a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.
- F10.100** **PRODUCTS, SYSTEMS AND MATERIALS**
- Specification and Scope**
- F10.101** **Descriptive Works**
- a. Complete the Detailed Design, manufacture, supply, install and warrant that the works comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.
- b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.
- c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.
- F10.102** **Section Coverage**
- a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:
- 1). In situ concrete.
- F10.103** **Supporting Specifications**
- a. All in situ concrete work shall comply with the requirements of SANS 2001-CC1 supplemented by the Specification.
- b. Where a conflict arises between SANS 2001-CC1 and the Specification, the Specification shall take precedence.
- c. All materials, mixing, placing, curing and workmanship shall comply with SANS 2001-CC1.
- F10.104** **CON-741: Precast Concrete Stormwater Channels to Engineers Detail**
- a. Precast concrete stormwater channels as shown on the Civil Engineers documentation.
- F10.105 I** **CC-111: In-Situ Reinforced Concrete Ground Bearing Slab to Engineers Detail**
- a. In-situ reinforced concrete ground bearing slab as shown in the Structural Engineer's

documentation.

- F10.106** **ICC-211: In-situ Reinforced Concrete Strip Foundation to Engineers Detail**
a. In-situ reinforced concrete strip foundation as shown in the Structural Engineer's documentation.
- F10.107** **ICC-241: In-situ Reinforced Concrete Column Foundation to Engineers Detail**
a. In-situ reinforced concrete column foundation as shown in the Structural Engineer's documentation.
- F10.108** **ICC-295: Piles to Engineers Detail**
a. Piles as described in the Structural Engineers documentation.
- F10.109** **ICC-296: Pile Caps to Engineers Detail**
a. Pile capes as described in the Structural Engineers documentation.
- F10.110** **ICC-461: In-situ Reinforced Concrete Roof Slab to Engineers Detail**
a. In-situ concrete roof slab as shown in the Structural Engineer's documentation.
- F10.111** **ICC-511: Post Tensioned Concrete Slab to Engineers Detail**
a. Post tensioned concrete slab as shown in the Structural Engineer's documentation.
- F10.112** **ICC-611: In-situ Reinforced Concrete Wall to Engineers Detail**
a. In-situ reinforced concrete wall as shown in the Structural Engineer's documentation.
- F10.113** **ICC-613: In-situ Reinforced Concrete Shear Wall to Engineers Detail**
a. In-situ reinforced concrete shear wall as shown in the Structural Engineer's documentation.
- F10.114** **ICC-711: In-situ Reinforced Concrete Beam to Engineers Detail**
a. In-situ reinforced concrete beam as shown in the Structural Engineer's documentation.
- F10.115** **ICC-713: In-situ Reinforced Concrete Transfer Beam to Engineers Detail**
a. In-situ reinforced concrete transfer beam as shown in the Structural Engineer's documentation.
- F10.116** **ICC-715: In-situ Reinforced Concrete Capping Beam to Engineers Detail**
a. In-situ reinforced concrete capping beam as shown in the Structural Engineer's documentation.
- F10.117** **ICC-717: In-situ Reinforced Concrete Upstand Beam to Engineers Detail**
a. In-situ reinforced concrete upstand beam as shown in the Structural Engineer's documentation.
- F10.118** **ICC-719: In-situ Reinforced Concrete Column to Engineers Detail**
a. In-situ reinforced concrete columns as shown in the Structural Engineer's

documentation.

F10.119 ICC-911: In-situ Reinforced Concrete Stormwater Channel to Engineers Detail

a. In-situ reinforced concrete Stormwater channel as shown in the Structural Engineer's documentation.

F10.120 ICC-913: In-situ Reinforced Concrete Rainwater Catchpit to Engineers Detail

a. In-situ reinforced concrete rainwater catchpit as shown in the Structural Engineer's documentation.

F10.121 RST-111: Concrete Retaining Wall to Engineers Detail

a. Reinforced concrete retaining wall including waterproofing membrane, drainage layer, geotextile layer and fin drain system as shown on the Structural Engineer's documentation.

F10.122 STR-112: In-situ Reinforced Concrete Stairs to Engineers Detail

a. In-situ reinforced concrete stairs as shown on the Structural Engineer's documentation.

F10.123 STR-114: In-situ Reinforced Concrete Ramp to Engineers Detail

a. In-situ reinforced concrete ramp as shown in the Structural Engineer's documentation.

F10.200 QUALITY AND WORKMANSHIP

Submittals

F10.201 Response

a. Provide submittals in accordance with the requirements of Section A of this Specification.

Samples and Quality Benchmarks

F10.202 Samples

- a. Provide trial mixes four weeks prior to commencement of the contract using the cement and aggregates from the proposed sources.
- b. Provide test results of cube strength at 7 and 28 days.

F10.203 Benchmark Requirements

- a. Provide the following quality benchmarks:
 - 1). First 10m of each type in locations to be agreed.

Testing

F10.204 Strength Testing of Concrete Mix

- a. The test cubes in accordance with SANS 5863, tests to conform to SANS 2001-CC1.
- b. Materials, composition of mixes and production of concrete, sampling and testing to

conform to SANS 10100-2 unless otherwise specified.

c. Prepare and test cubes in accordance with the Structural Engineer's instructions.

F10.205 Slump Tests

a. The test specimen slump, taken in accordance with SANS 5862-1, shall fall within the limits set in SANS 2001-CC1 or as defined by the Structural Engineer.

F10.206 Acceptance Criteria for Strength Concrete

a. Acceptance Criteria shall be as stated in SANS 2001-CC1.

b. Test samples for ready mixed concrete shall be taken at the site.

Quality Assurance/ Quality Control

F10.207 Quality Assurance/ Quality Control

a. Laboratory testing shall be carried out by an accredited laboratory or a recognised testing institution.

b. The Contractor shall maintain on Site:

1). A competent technician or a person deemed sufficiently experienced in concrete technology to deal with all matters regarding sampling, recording, monitoring and testing of aggregate, materials and concrete.

c. The Contractor shall maintain:

1). Statistical information:

a). Monthly reports to be submitted of statistical information with regard to 7 and 28 day compressive strength, 7/28 day ratio's, standard deviation and target strength.

d. Monthly report:

1). The preparation of a comprehensive monthly report incorporating all tests and records.

e. Slump tests:

1). These records shall be included with the monthly reports.

f. Final records:

1). Submission of a complete report encompassing all monthly reports at the end of the project in electronic format.

Accuracy

F10.208 Accuracy

a. Comply with the requirements of SANS 10155.

b. Unless stated otherwise, accuracy to be to Degree of Accuracy II.

c. Floors that are self-finished or to receive sheet or tile finishes shall not exceed the

following maximum deviations:

- 1). 5mm under a 3m straightedge.
 - 2). 2mm under a 1m straightedge.
- d. Floors to receive a screed shall not exceed a maximum deviation of 10mm under a 3m straightedge.

Measurement of Materials

F10.209 Measurement

- a. Measure cement by mass.
- b. Measure aggregates by mass.
- c. Measure water by mass or volume. Make allowance for the moisture content of the aggregates.

Materials

F10.210 Cement

- a. To comply with SANS 50197.
- b. Only ordinary Portland cement, as specified may be used. Should the contractor wish to use any other type of cement, he shall obtain the Architect's prior written approval.

F10.211 Cement Extenders

- a. To comply with SANS 1491.

F10.212 Coarse Aggregate

- a. To comply with SANS 1083 graded 20mm to 5mm.
- b. Allow stockpile to stand for 12 hours before using to allow excess water to drain.
- c. Determine free water content of aggregates daily in accordance with SANS 5855.

F10.213 Fine Aggregate

- a. To comply with SANS 1083.
- b. Allow stockpile to stand for 12 hours before using to allow excess water to drain.
- c. Determine free water content of aggregates daily in accordance with SANS 5855.

F10.214 Lightweight Aggregates

- a. To comply with SANS 794.

F10.215 Expansive Alkali-Aggregate Reaction

- a. Do not use alkali reactive aggregates with high alkali cements.

F10.216 Water

- a. Shall be clean, fresh water free from vegetable or organic matter, earth, clay mineral salts, acid or alkaline substances in either suspension or solution.

Durability

F10.217

Durability

a. Exposure conditions are classified: Moderate.

1). The maximum water/ cement ratio for concrete under moderate conditions is 0,60.

2). The maximum water/ cement ratio for concrete slabs in contact with the ground under very severe conditions is 0,45.

b. Cement content:

1). Not less than 280kg/m³ for all grades of concrete mixes other than mass concrete.

2). Not more than 500kg/m³ for all grades of concrete mixes.

F10.218

Admixtures:

a. Only use admixtures that have been tested and accepted in mix designs.

F10.219

Pumped Concrete

a. Use pumped concrete only with the written permission of the Architect.

b. Provide full details of the designed mix to be used.

F10.220

Ready Mixed Concrete

a. To be to the prescribed mix specified for the type of work.

b. To comply with SANS 878.

c. Cement contents higher than those specified in SANS 10100 will be accepted.

d. Retain all delivery notes for inspection.

Mixing and Placing

F10.221

Making Concrete Generally

a. Use only admixtures accepted by the Architect.

b. Control water content of concrete and allow for moisture content of aggregate to give a consistent quality and workability.

c. Ensure concrete is sufficiently workable so that it can easily be worked into corners and angles of formwork and around reinforcement.

F10.222

Making No-fines Concrete

a. Control water content of concrete and allow for moisture content of aggregate to give a consistent smooth grout.

b. Ensure that all aggregate is completely coated with the grout before discharge from the mixer.

F10.223

Mixing Concrete

- a. Make sure that all equipment is clean and free from hardened concrete.
- b. Do not mix more material than the rated volume of the mixer.
- c. Machine mix each batch dry for three minutes before addition of the water.
- d. Use only admixtures accepted by the Architect.

F10.224 Placing and Compacting

- a. Ingredients must not segregate and free water must not collect on the surface during placing.
- b. Ensure that all surfaces on to which concrete is to be placed are clean, with no debris, tying wire clippings, fastenings or free water.
- c. Place in final position within 20 minutes of mixing.
- d. Place while plastic enough for full compaction. Do not add water or retemper mixes.
- e. Place in layers no thicker than can be compacted with the equipment being used.
- f. Do not discharge from an excessive height, through reinforcement or other obstructions that will cause uneven dispersal, segregation or loss of ingredients. Use suitable chutes or trunking to place concrete.
- g. Place concrete in layers (maximum depth 450mm) and work layers together to form a consistent whole.
- h. Fully compact to full depth (until air bubbles cease to appear on the top surface), around reinforcement, cast-in accessories, into corners of formwork and at joints.
- i. Place in final position in one continuous operation up to construction joints. Avoid formation of cold joints.
- j. Do not use vibrators to make concrete flow horizontally into position, except to achieve full compaction under void formers, cast in accessories and at vertical joints.
- k. Record time, date and location of pours.
- l. Place and compact lightweight aggregate concretes to prevent flotation of coarse aggregate and formation of excessive blowholes.

F10.225 Placing Concrete on Hardcore

- a. Before placing structural concrete (not blinding concrete) on hardcore or other absorbent substrates, lay either:
 - 1). Polythene sheet, 250 microns thick or Building paper and lap edges 150mm.

F10.226 Maximum Panel Size

- a. Lay concrete in panels not larger than 20m² in area and not exceeding 4.5m in width.

F10.227 Construction Joints

- a. The position of construction joints to be agreed with the Structural Engineer.

- b. Brush and spray surface while concrete is still green.
- c. Remove surface laitance and expose aggregate finish. Obtain acceptance for any other method.
- d. Clean reinforcement and accessories of mortar from previous concrete placement operations.
- e. Moisten surface of previously placed concrete.
- F. Surface to be clean and damp when fresh concrete is placed against it.

F10.228 Slip Joints

- a. Provide between masonry walling and in situ concrete slabs and beams according to the Structural Engineer's details.

F10.229 Work below Ground Level

- a. Cast vertical faces of strip footings, bases and slabs against faces of excavation. Ensure that the faces are accurate and stable, and prevent contamination of the concrete.

F10.230 Site Constructed Formwork

- a. Construct accurately and robustly to produce finished concrete to the required dimensions.
- b. Formed surfaces must be free from twist and bow. All intersections, lines and angles to be square, plumb and true.
- c. Construct (including joints between forms and completed work), to prevent loss of grout. Use seals when necessary. Secure tight against adjacent concrete to prevent formation of steps.
- d. Fix inserts or box out as required in correct positions before placing concrete. Form all holes and chases. Do not cut hardened concrete without acceptance.
- e. Smooth Formwork shall have inner faces of new plywood faced shuttering boards, which are thoroughly cleaned after each use. Concrete finish must be suitable for painting; surface honeycombing, fins and irregularities shall be made good and repaired.
- f. Smooth and Fair Formwork shall have inner faces lined to produce a finished face free of projections, indentations and blowholes. Concrete must be uniform in colour and no patching will be allowed.

Holes, Chases and Recesses

F10.231 Holes, Chases and Recesses

- a. Do not cut or chase reinforced concrete.

- b. Comply with the requirements of Section Z15.
- c. Provide pipe sleeves, boxing or void formers where required.

Curing

F10.232

Curing

- a. Prevent surface evaporation from concrete.
- b. Either spray with water and cover with polythene sheeting or use a proprietary curing compound applied in accordance with the manufacturer's instructions.
- c. Cure structural concrete for 5 days.
- d. Protect concrete from shock, indentation and physical damage.

F10.233

Liquid Membrane Curing Compound

- a. Propose the type of curing compound to be used to the acceptance of the Structural Engineer prior to 1st use.
- b. Apply to concrete surface in accordance with manufacturer's recommendations.
- c. Apply sealer using brush, roller or low pressure airless sprayer in single coat at coverage rate recommended by manufacturer.

F10.234

Resin Based Liquid Curing Compound

- a. Propose the type of curing compound to be used to the acceptance of the Structural Engineer prior to 1st use.
- b. Apply to concrete surface in accordance with manufacturer's recommendations.
- c. Apply sealer using low pressure airless sprayer in single coat at coverage rate recommended by manufacturer.

Storage of Material

F10.235

Cement

- a. Store in a weatherproof structure clear of the ground.
- b. Do not store for more than six weeks before using.
- c. Portable silos can be used for bulk storage of cement.

F10.236

Aggregates

- a. Store to avoid mixing aggregates of different nominal sizes.
- b. Make sure that segregation is minimised and contamination of aggregates avoided.

F10.237

Water

- a. Store to avoid mixing aggregates of different nominal sizes.

Protection

F10.238

Protection of the Works

- a. The protective measures used shall not in any way permanently mark or damage

the concrete finishes.

b. Protect concrete from construction traffic, weather, or mechanical damage for 14 days after placing.

c. Provide raised runways for traffic areas.

d. Provide full and adequate protection for the works, until Practical Completion of the project, against staining, damage or accidental spillage of liquids that may discolour the concrete finishes.

Prescribed Mix Concrete

F10.239 Concrete for Non-structural Blinding and Backfilling Class 'A' [7MPa]

a. Ordinary prescribed mix 1:4:8 to SANS 2001-CC1.

b. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.

c. Coarse and fine aggregate: SANS 1083.

d. Nominal maximum size of aggregate: 38mm.

F10.240 Concrete for Foundations, Oversite Slabs and Manholes Class 'B' [15MPa]

a. Ordinary prescribed mix 1:3:6 to SANS 2001-CC1.

b. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.

c. Coarse and fine aggregate: SANS 1083.

d. Nominal maximum size of aggregate: 19mm.

F10.241 Concrete for Reinforced Structural Work Class 'C' [25MPa]

a. Ordinary prescribed mix 1:2:4 to SANS 2001-CC1.

b. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.

c. Coarse and fine aggregate: SANS 1083.

d. Nominal maximum size of aggregate: 19mm.

F10.242 Concrete for Columns and Beams Class 'D' [30MPa]

a. Ordinary prescribed mix 1:1½:3 to SANS 2001-CC1.

b. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.

c. Coarse and fine aggregate: SANS 1083.

d. Nominal maximum size of aggregate: 19mm.

F10.243 Concrete for Severe Exposure Class 'E' [40MPa]

a. Ordinary prescribed mix 1:1:2 to SANS 2001-CC1.

- b. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.
- c. Coarse and fine aggregate: SANS 1083.
- d. Nominal maximum size of aggregate: 19mm.

Strength Designed Concrete Mixes

F10.244

General

- a. Be responsible for the design of the mix, and proportion of the constituents to produce the desired strength and characteristics.
- b. The cement/water ratio appropriate to the exposure conditions shall be as SANS 2001- CC1.

F10.245

Concrete for Non-structural Blinding and Backfilling [7MPa/38mm]

- a. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.
- b. Coarse and fine aggregate: SANS 1083.
- c. Nominal maximum size of aggregate: 19mm.

F10.246

Concrete for Foundations, Oversite Slabs and Manholes [20MPa/19mm]

- a. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.
- b. Coarse and fine aggregate: SANS 1083.
- c. Nominal maximum size of aggregate: 19mm.

F10.247

Concrete for Columns and Beams [30MPa/19mm]

- a. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.
- b. Coarse and fine aggregate: SANS 1083.
- c. Nominal maximum size of aggregate: 19mm.

F10.248

Concrete for Severe Exposure [40MPa/19mm]

- a. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – do not blend extenders on site.
- b. Coarse and fine aggregate: SANS 1083.
- c. Nominal maximum size of aggregate: 19mm.

F10.249

Pumped Concrete

- a. Use pumped concrete only with the written permission of the Architect.
- b. Provide full details of the designed mix to be used.

F10.250

Ready Mixed Concrete

- a. To be to the prescribed mix specified for the type of work.
- b. To comply with SANS 878.
- c. Cement contents higher than those specified in SANS 10100 will be accepted.
- d. Retain all delivery notes for inspection.

No Fines Concrete

F10.251 Structural No-Fines Concrete

- a. To be to the prescribed mix 1:8.
- b. Cement: CEM I Portland cement 42.5N to SANS 50197 CEM II Portland Fly Ash Cement 32.5N – no site blending of extenders is permitted.
- c. Coarse aggregate: SANS 1083.
- d. Single sized aggregate: 19mm.

F10.252 No-Fines Concrete for Grading Concrete Roof to Falls

- a. To be to the prescribed mix 1:12.
- b. Cement: CEM I Portland cement 42.5N to SANS 50197 CEM II Portland Fly Ash Cement 32.5N – no site blending of extenders is permitted.
- c. Coarse aggregate: SANS 1083.
- d. Single sized aggregate: 19mm.

Mixing and Placing

F10.253 Making Concrete Generally

- a. Use only admixtures accepted by the Architect.
- b. Control water content of concrete and allow for moisture content of aggregate to give a consistent quality and workability.
- c. Ensure concrete is sufficiently workable so that it can easily be worked into corners and angles of formwork and around reinforcement.

F10.254 Making No-fines Concrete

- a. Control water content of concrete and allow for moisture content of aggregate to give a consistent smooth grout.
- b. Ensure that all aggregate is completely coated with the grout before discharge from the mixer.

F10.255 Mixing Concrete

- a. Make sure that all equipment is clean and free from hardened concrete.
- b. Do not mix more material than the rated volume of the mixer.
- c. Machine mix each batch dry for three minutes before addition of the water.
- d. Use only admixtures accepted by the Architect.

F10.256 Placing and Compacting

- a. Ingredients must not segregate and free water must not collect on the surface during placing.
- b. Ensure that all surfaces on to which concrete is to be placed are clean, with no debris, tying wire clippings, fastenings or free water.
- c. Place in final position within 20 minutes of mixing.
- d. Place while plastic enough for full compaction. Do not add water or retemper mixes.
- e. Place in layers no thicker than can be compacted with the equipment being used.
- f. Do not discharge from an excessive height, through reinforcement or other obstructions that will cause uneven dispersal, segregation or loss of ingredients. Use suitable chutes or trunking to place concrete.
- g. Place concrete in layers (maximum depth 450mm) and work layers together to form a consistent whole.
- h. Fully compact to full depth (until air bubbles cease to appear on the top surface), around reinforcement, cast-in accessories, into corners of formwork and at joints.
- i. Place in final position in one continuous operation up to construction joints. Avoid formation of cold joints.
- j. Do not use vibrators to make concrete flow horizontally into position, except to achieve full compaction under void formers, cast in accessories and at vertical joints.
- k. Record time, date and location of pours.
- l. Place and compact lightweight aggregate concretes to prevent flotation of coarse aggregate and formation of excessive blowholes.

F10.257 Placing Concrete on Hardcore

- a. Before placing structural concrete (not blinding concrete) on hardcore or other absorbent substrates, lay either:
 - 1). Polythene sheet, 250 microns thick or Building paper and lap edges 150mm.
 - 2). 50mm dry compacted sand.

F10.258 Maximum Panel Size

- a. Lay concrete in panels not larger than 20m² in area and not exceeding 4.5m in width.

F10.259 Construction Joints

- a. The position of construction joints to be agreed with the Architect.
- b. Brush and spray surface while concrete is still green.
- c. Remove surface laitance and expose aggregate finish. Obtain acceptance for any other method.

d. Clean reinforcement and accessories of mortar from previous concrete placement operations.

e. Apply bonding agent in accordance with manufacturer's recommendations.

f. Moisten surface of previously placed concrete.

g. Surface to be clean and damp when fresh concrete is placed against it.

F10.260 Slip Joints

a. Provide between masonry walling and in situ concrete slabs and beams.

b. To consist of two layers of oil tempered hardboard covering the bearings with the smooth surfaces in contact with each other.

F10.261 Work below Ground Level

a. Cast vertical faces of strip footings, bases and slabs against faces of excavation. Ensure that the faces are accurate and stable, and prevent contamination of the concrete.

F10.262 Site Constructed Formwork

a. Construct accurately and robustly to produce finished concrete to the required dimensions.

b. Formed surfaces must be free from twist and bow. All intersections, lines and angles to be square, plumb and true.

c. Construct (including joints between forms and completed work), to prevent loss of grout. Use seals when necessary. Secure tight against adjacent concrete to prevent formation of steps.

d. Fix inserts or box out as required in correct positions before placing concrete. Form all holes and chases. Do not cut hardened concrete without acceptance.

e. Smooth Formwork shall have inner faces of new plywood faced shuttering boards, which are thoroughly cleaned after each use. Concrete finish must be suitable for painting; surface honeycombing, fins and irregularities shall be made good and repaired.

f. Smooth and Fair Formwork shall have inner faces lined to produce a finished face free of projections, indentations and blowholes. Concrete must be uniform in colour and no patching will be allowed.

Holes, Chases and Recesses

F10.263 Holes, Chases and Recesses

a. Do not cut or chase reinforced concrete.

b. Comply with the requirements of Section Z15.

c. Provide pipe sleeves, boxing or void formers where required.

Curing

F10.264

Curing

- a. Prevent surface evaporation from concrete.
- b. Either spray with water and cover with polythene sheeting or use a proprietary curing compound applied in accordance with the manufacturer's instructions.
- c. Cure structural concrete for 5 days.
- d. Protect concrete from shock, indentation and physical damage.

F10.265

Liquid Membrane Curing Compound

- a. Apply to concrete surface in accordance with manufacturer's recommendations.
- b. Apply sealer using brush, roller or low pressure airless sprayer in single coat at coverage rate recommended by manufacturer.

F10.266

Resin Based Liquid Curing Compound

- a. Apply to concrete surface in accordance with manufacturer's recommendations.
- b. Apply sealer using low pressure airless sprayer in single coat at coverage rate recommended by manufacturer.

Storage of Material

F10.267

Cement

- a. Store in a weatherproof structure clear of the ground.
- b. Do not store for more than six weeks before using.
- c. Portable silos can be used for bulk storage of cement.

F10.268

Aggregates

- a. Store to avoid mixing aggregates of different nominal sizes.
- b. Make sure that segregation is minimised and contamination of aggregates avoided.

F10.269

Water

- a. Store to avoid mixing aggregates of different nominal sizes.

Protection

F10.270

Protection of the Works

- a. The protective measures used shall not in any way permanently mark or damage the concrete finishes.
- b. Protect concrete from construction traffic, weather, or mechanical damage for 14 days after placing.
- c. Provide raised runways for traffic areas.
- d. Provide full and adequate protection for the works, until Practical Completion of the

project, against staining, damage or accidental spillage of liquids that may discolour the concrete finishes.

END OF SECTION

- F20 FORMWORK FOR IN SITU CONCRETE**
- a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.
- F20.100 PRODUCTS, SYSTEMS AND MATERIALS**
- Specification and Scope**
- F20.101 Descriptive Works**
- a. Complete the Detailed Design, manufacture, supply, install and warrant that the works comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.
- b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.
- c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.
- F20.102 Scope**
- a. This section of the Specification when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:
- 1). Formwork for casting of in-situ concrete.
- F20.103 CON-243: Smooth Off Shutter Finish F3**
- a. Comply with the requirements for Degree of Accuracy I, as prescribed by the Principle Agent, of SANS 2001-CC1 and compaction.
- b. Smooth-special finish shall be achieved by using Formboard or hardboard in large panel sheets to produce an even smooth joint free surface.
- c. Joints to be sealed with gaskets, rubber, flexible foamed polyurethane or other material permitted by the Architect.
- d. Deviations to be less than 3mm under a 1m straight surface to be free from discolouration due to grout leakage.
- e. Abrupt irregularities to be not greater than 2mm. Gradual irregularities, expressed as maximum permissible deviation from a 1m straightedge, to be not greater than 3mm.
- f. The surface to be free from discolouration caused by contamination from a release

agent, grout leakage or other sources.

g. Cover spacers: No cover spacers to be visible, nor cause rust marks.

h. Generally, surfaces to be free of voids, honeycombing, segregation and other defects.

Voids to be kept to an absolute minimum whilst ensuring compliance with other requirements of the Specification. The following criteria to be observed:

- 1). No blowholes larger than 5mm in diameter to be permitted. There to be no more than 3 such holes in any square metre of surface area. The surface to be free of voids, honeycombing, segregation and other defects.
- 2). The concrete to have a consistent, uniform, matt, light coloured face.
- 3). The concrete to be free of surface blemishes visible to the eye at 3m.
- 4). No repairs are permitted to the formwork without acceptance. Damaged panels to be replaced with material of the same performance and to be grout washed to blend in with the existing panels.
- 5). No water or grout loss to be permitted. Marks no larger than 50mm in any dimension acceptable.
- 6). Making good: Apart from the making good allowed for in the Structural Engineer's specification, making good to be minimal and consistent to an accepted sample. As far as possible the finished surface to be achieved without making good. The improvement of the surface finish by the Contractor (e.g. filling noticeable surface blemishes) to be agreed with the Architect, prior to any work being carried out. Blowholes to be filled and all irregularities stoned off. After at least three weeks curing, the visible facework to be rubbed down to produce a smooth, even surface. Continuity of personnel for making good, where required, to be provided by the Contractor, to the complete satisfaction of the Architect.
- i. Arises to be as detailed on the Contract Drawings.
- j. Formwork tie holes to be in an accepted regular pattern, or as indicated on the Contract Drawings, filled with an exactly matching prepared cement/ fine aggregate paste to an accepted sample as specified. Nail spacing to be to an agreed regular layout co-ordinated with tie hole centres.
- k. Where rebates or features are shown, these are to be the panel joints; no other joints are permissible. The design of panel joints, rebates, striking pieces and other elements are the responsibility of the Contractor but to be subject to the acceptance of the Architect. Features to be bedded on mastic, but no mastic is permitted on the

finished facework.

F20.104 RFS-191: Off Shutter Concrete Soffit - Finish F3

a. The off shutter concrete soffit shall have 'CON-243: Off Shutter Finish F3' finish as described in this Section and to the acceptance of the Architect. This system is an integral part of the project design and a high degree of accuracy is required.

1). Finish: To be agreed.

2). Agree a sample panel in another part of the works with the Architect for his approval.

F20.200 QUALITY AND WORKMANSHIP

Submittals

F20.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

F20.202 Control Samples

a. Complete a 5m sample area of each type of formwork and finish.

F20.203 Benchmark Requirements

a. The first 10m area of the finished work in location to be agreed.

Performance Requirements

F20.204 Design of Formwork

a. Design and construct formwork to withstand combinations of:

1). Total weight of formwork, reinforcement and wet concrete.

2). Construction loads including dynamic loading.

3). Imposed wind loading.

Accuracy

F20.205 Accuracy

a. Comply with the requirements of SANS 10155.

b. Unless stated otherwise degree of accuracy to be II.

Formwork Construction

F20.206 Generally

a. Renewable Sources: Any timber used must be from renewable and sustainable sources and types of timber, including plywood. The Contractor must provide written confirmation on all types of timber, including country of origin, before starting on Site.

b. Deflection: Design formwork to limit any deflection, ensuring that it is rigid enough

to prevent high amplitude vibration during compaction. Allow no variation in stiffness which will produce differences in vibration across the form face.

c. Ensure that there are no splits, cracks or other defects in the formwork. The faces and edges of formwork to be clean and the formwork face to be free of projecting nails.

d. Repair formwork that has been previously used, and reseal the edge before it is erected. Formwork, which in the opinion of the Contractor, has deteriorated to an extent such that it will not produce the specified finish must not be used for that class or a higher class of finish.

e. Construct accurately and robustly to produce finished concrete to the required finish and dimensions.

f. Formed surfaces must be free from twist and bow. All intersections, lines and angles to be square, plumb and true.

g. Smooth and Special-Smooth Formwork shall have inner faces lined to produce a finished face free of projections, indentations and blowholes.

h. Formwork to be firmly supported; with individual panels rigid. Joints between formwork panels, stop ends and adjoining concrete to be tight and not permit grout loss.

i. Formwork to be cut in such a manner that reinforcement and built-in components passing through are maintained in position; the joint to be tight and not permit grout loss. Installation of built-in components to be accurate, at least within the tolerances for that element of the works.

j. Formers for profiled formwork, chamfers, splays, rebates, curved troughs and other features to be rigidly and evenly fixed to the formwork along the complete length, to not permit grout loss and to provide a finish indistinguishable from the main formwork.

k. Formwork ties and components to be fixed in such a manner that they do not touch any reinforcement or built-in components. Formwork ties and components to fit tightly against formwork faces and not permit grout loss.

l. Formwork panels for all finishes to be the same size unless otherwise specified and to form a regular pattern consented to by the Architect. The lines of joints between panels to form smooth lines consistent with the surface geometry and as indicated on the Contract Drawings, subject to the acceptance of the Architect.

m. Nails and holes left by formwork ties and components in concrete surfaces to be in line horizontally and vertically and to form a regular pattern, accepted by the Architect or as indicated on the Contract Drawings.

n. Unless otherwise permitted by the Architect, chamfers to be provided for all external angles of 90° or less in concrete surfaces with plain or fine finishes as indicated on the Contract Drawings.

o. Formwork for curved concrete surfaces not to be made up of a series of facets, unless indicated on the Contract Drawings.

p. Formwork to be protected from spillages, rust marks, stains or any other debris or harm whatsoever.

F20.207 Insert and Holes

a. Fix inserts or box out as required in correct positions before placing concrete.

b. Form all holes and chases; do not cut hardened concrete without approval.

F20.208 Cambers

a. Construct formwork to provide upward cambers.

1). 0.2% of span for roof beams and slabs.

2). 0.1% of span for floor beams and slabs.

3). 0.4% of the projection for cantilevered beams and slabs.

b. Make allowance for the deflection of formwork under the weight of newly placed concrete.

F20.209 Joints in Formwork

a. Joints in formwork, including joints between forms and completed work to prevent grout loss:

1). The Contract Drawings indicate areas where formwork joints are featured.

Ensure that all joints are left clean and true to the pattern shown.

2). The overall jointing patterns to be maintained and be regular throughout the project.

3). Setting-out drawings are required, by preparation of Shop Drawings/ Working Drawings by the Contractor, for all areas of concrete of Special off-form finish. For Smooth-special finished concrete, Shop Drawings/ Working Drawings are required showing formwork layout, details and temporary works. Details to include all features, bolt spacing, nail spacing, etc. All panels to be separately detailed; typical details not acceptable.

4). Alignment of rebates and mould levelling, especially to the side of the moulds, to be levelled to give a finished surface of ± 1 mm from the adjacent panel or joint.

5). Construct formwork, including joints in form linings and between forms and completed work to prevent loss of grout, using seals when necessary. Secure

formwork tight against adjacent concrete to prevent formation of steps.

F20.210 Cleaning Formwork

- a. Remove all rubbish, chippings, shavings, sawdust or dirt from formwork before concreting in.
- b. Clean inner faces of new plywood faced shuttering boards that are to provide Smooth-Special finish after each use. Concrete finish must be suitable for painting; make good and repair surface honeycombing, fins and irregularities.
- c. Treat all formwork with release agent in accordance with the manufacturer's recommendations in order to achieve the required finish.
- d. Ensure that reinforcement of concrete at construction joints is not contaminated with release oil, to the satisfaction of the Architect.
- e. Use retarding agent only with the Architect's agreement.

Propping

F20.211 Propping Generally

- a. Provide adequate propping to prevent deflection and damage to the structure.
- b. Prop from bearings strong enough to provide proper support.
- c. Provide continuous support along centre spans of profiled sheet formwork.

Preparation

F20.212 Preparation of Formwork

- a. Clean off all concrete residue from previous use of shutter.
- b. Treat surfaces in touch with wet concrete with a thin coat of non-staining mineral oil.
- c. Timber forms are to have the face thoroughly wet with water immediately prior to the placing of the concrete.

F20.213 Release Agent

- a. Use only types that are suitable for the formwork and required finishes.
- b. Use the identical type throughout the entire area of any one finish.
- c. Apply evenly to formwork faces.
- d. Use the minimum amount to obtain a clean release.
- e. Do not allow release agent to touch reinforcement or hardened concrete.

Striking of Formwork

F20.214 Removal of Formwork

- a. Removal of formwork shall comply with the requirements of SANS 2001-CC1.
- b. Do not remove formwork until concrete is strong enough to support its own weight and any loads imposed upon it.

- c. Formwork to remain for the following periods in days according to general temperature: (CEM 1 42.5N).
- 1). Beam sides and walls: Normal = 0.75; Cool = 1.25; Cold = 1.52.
 - 2). Slabs with props left: Normal = 4; Cool = 5.5; Cold = 7.
 - 3). Beam soffits with props left under: Normal = 7; Cool = 9.5; Cold = 12.
 - 4). Slab props: Normal = 10; Cool = 13.5; Cold = 17.
 - 5). Beam props: Normal = 14; Cool = 17.5; Cold = 21.
- d. Carefully remove formwork to avoid shock or damage to the concrete.
- e. The Contractor remains at all times responsible for the safe removal of the forms and supports.
- f. The propping may be required simultaneously on more than one level directly underneath one another.
- g. The requirements for continuous propping and/or back-propping shall be calculated to a theoretical model that is acceptable to the engineer, details of calculations to be submitted for the Structural Engineer's approval.
- h. The requirements for winter in terms of removal of formwork and curing, shall apply once the daily average temperature between the highest and lowest recorded temperatures measured by a thermometer placed on the slab concerned, is 12°C or less.

END OF SECTION

**F41 WORKED + APPLIED FINISHES TO IN SITU CONCRETE
(ARCHITECTURAL REQUIREMENTS)**

a. Read in conjunction with Sections A and other related sections of the Specification, Preliminaries and Contract Conditions.

**F41.100 PRODUCTS, SYSTEMS AND MATERIALS
Specification and Scope**

F41.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

F41.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Worked finishes to cast insitu concrete.
- 2). Polished concrete

F41.103 Tamped Finish

a. Tamp the surface of the poured concrete with the edge of a board or beam to give an even texture of parallel ribs.

F41.104 Brushed Finish

a. Brush the surface of the poured concrete with a stiff broom or wire brush while still green to produce a lightly textured surface finish.

F41.105 Wood Float Finish

a. Wood float surface at intervals to give a smooth even coarse texture without ridges or steps.

b. Degree of Accuracy: 5mm under a 3m straightedge.

F41.106**Steel Trowelled Finish (Hand)**

- a. Float the concrete to an even surface with no ridges or steps, then immediately commence curing as specified in the Structural Engineer's specification.
- b. When the concrete is suitably stiff, hand trowel to give a uniform, smooth, but not polished surface, free from trowel marks and other blemishes and suitable to receive floor finishes by others.

F41.107**Power Trowelled Finish**

- a. Float the concrete to an even surface with no ridges or steps, then immediately commence curing as specified in the Structural Engineer's specification.
- b. When the concrete is suitably stiff, power trowel to give a uniform, smooth but not polished surface, free from trowel marks and other blemishes and suitable to receive the specified flooring material (by others).
- c. Surface flatness: Not to exceed 1.5mm under a 1.5m straightedge.
- d. Resume specified curing without delay.
- e. Protect the surface from construction traffic until the flooring material is laid. If, because of inadequate finishing or protection, the surface of the concrete is not suitable to receive the specified flooring material, it to be made good by application of a smoothing compound, to the satisfaction of the Architect.

Polished Concrete**F41.107****FF02: Polished Concrete - Walkways and Office**

- a. Ground and polished decorative concrete overlay. Installation shall be homogeneous with the concrete slab/ surface bed from the mass concrete pour.
 - 1). Indicative supplier: World of Decorative Concrete, or acceptable equivalent.
 - 2). Composition:
 - a). 30% 13mm Granite.
 - b). 40% 13mm Villiersdorp.
 - c). 30% 13mm Hornfell.
 - d). White tinted.
 - 3). Thickness: To be agreed.
 - 4). Concrete strength: Min 30Mpa.
 - 5). Finish: Seven stage grinding and polishing as recommended by the supplier and to the acceptance of the Architect through sampling.
 - 6). Panel size and jointing: In accordance with the suppliers published

recommendations to the acceptance of the Architect.

F41.108 FF02: Polished Concrete - Kitchens and Ablutions

a. Ground and polished decorative concrete overlay. Installation shall be homogeneous with the concrete slab/ surface bed from the mass concrete pour.

1). Indicative supplier: World of Decorative Concrete, or acceptable equivalent.

2). Composition:

a). 30% 9mm Granite.

b). 70% 13mm Hornfell.

c). Grey Cement.

3). Thickness: To be agreed.

4). Concrete strength: Min 30Mpa.

5). Finish:

a). All surfaces excluding shower zone: Seven stage grinding and polishing as recommended by the supplier and to the acceptance of the Architect through sampling.

b). Shower zone: Three stage grinding and polishing with acid edge as recommended by the supplier and to the acceptance of the Architect through sampling.

6). Panel size and jointing: In accordance with the suppliers published recommendations to the acceptance of the Architect.

F41.109 JNT-921: Movement Joint to Polished Concrete

a. Type: Ultra high performance facade and structural sealant.

1). Indicative manufacturer: BASF or acceptable equivalent.

2). Indicative product: MasterSeal HY 495 or acceptable equivalent.

3). Surface preparation and application: In accordance with the manufacturers

F41.200 QUALITY AND WORKMANSHIP

Submittals

F41.201 Response

a. Provide submittals in accordance with the requirements of Section A of the

Specification.

F41.202 Previous Principal Contractor's Benchmarks

a. Provide the following details of project benchmarks of previous projects:

- 1). Type of building.
- 2). Location.
- 3). Date work carried out.
- 4). The name of the Architect.
- 5). The name of the Client.

F41.203 Post Contract Samples

a. Post contract samples shall be as follows:

- 1). 2000mm x 1000mm sample of all types of finished in situ concrete in location (s) to be agreed.

F41.204 Mock-ups

a. Not required.

F41.205 Prototypes

a. Not required.

F41.206 Benchmark Requirements

a. The following quality benchmarks shall be provided in locations to be agreed with the Architect, in Accordance with Section A of the Specification:

- 1). 2000mm x 2000mm section of finished in situ concrete on Site.

Structural Performance Requirements

F41.207 General

a. For structural performance requirements, refer to the Structural Engineers documentation.

Timing and Preparation

F41.208 Timing

a. Carry out finishing operations prior to final setting of the concrete whilst suitably stiff.

F41.209 Preparation

- a. Do not wet surface of concrete to assist workability.
- b. Do not sprinkle cement onto surface.
- c. Float concrete to an even surface with no ridges or steps.
- d. Commence curing as specified in Section F10.
- e. Resume specified curing without delay after completing finishing operation.

Material Quality

F41.210 Colour Consistency

a. The consistency of the concrete colour is deemed to be of great importance on the project. Select all suppliers, materials and all methods to ensure the specified finish and consistency, including but not limited to the following.

1). The main plant shall have a consistent supply to achieve the specified finish, to acceptance.

2). The back-up plant shall be selected to achieve an equivalent supply.

3). Cement, fines and other aggregates shall achieve consistent concrete colour.

b. Agree with the Architect the colour range that shall be acceptable, based on the on-Site mock-up or other benchmarks or samples which shall then become the colour standard for the project.

c. Colour consistency problems, for example inherent colour variation, aggregate transparency or loss or movement of water shall be avoided and appropriate measures taken. These shall include but be limited to:

1). Ensuring the continuity of supply from one source for the duration of the works.

(Note: Any back-up plant shall have an equivalent supply.

2). Batching the concrete precisely and mixing thoroughly.

3). Bracing or stiffening the formwork to reduce flexibility.

4). Ensuring that the formwork face material has a uniform absorbency.

Workmanship

F41.211 Compaction

a. Comply with the requirements of the Structural Engineer's documentation.

b. Ensure that compaction tools are capable of providing constant uniform compaction rates and ensure that concrete is compacted equally throughout.

F41.212 Making Good

a. No making good will be permitted without prior acceptance by the Architect.

F41.213 Monitoring Requirements

a. As soon as possible after any concrete has been deemed as unacceptable within the requirements of the Specification, submit proposals to the Architect for the removal and reconstruction of that section of the works. This requirement applies to all elements of the works.

F41.214 Batching, Mixing and Transport

a. Extreme care shall be taken to ensure that accurate and consistent batching and mixing is carried out to achieve the specified quality of finish, e.g. added water shall

allow for the moisture content of the aggregate to achieve a similar slump for each mix.

b. Proposals shall be submitted with the Tender, together with a demonstration of the proposed methods of practice by constructing the full size quality control prototype.

c. Consideration shall be given to the use of a dedicated main mixing and batching plant to avoid contamination of the mix. A stand-by back-up plant that is capable of providing equivalent mix and batching facilities shall also be available. The use or otherwise of such a plant shall be stated in the Contract documentation.

F41.215 Day Joints

a. Submit Shop Drawings/ Working Drawings showing proposed day joint locations, together with details of proposed methods of construction for agreement with the Architect.

Cleaning and Protection

F41.216 Cleaning

a. Clean-up and remove debris and acid runoff daily.

F41.217 Protection of the Works

a. Provide full and adequate protection against the effects of weather for the worked finished in situ concrete works until the finish has fully hardened.

b. Provide full and adequate protection for the concrete, against damage, until Practical Completion of the building.

c. The protective measures used shall not in any way permanently mark or damage the concrete finishes.

END OF SECTION

H10**BRICK WALLING**

a. To be read in conjunction with Sections A and other related sections of the Specification, the Preliminaries and Contract Conditions.

H10.100**PRODUCTS, SYSTEMS AND MATERIALS****H10.101****Prescriptive Works**

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

H10.102**Section Coverage:**

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Cavity brick walling.
- 2). Solid common brick walling.
- 3). Solid face brick walling.

Cavity Walls**H10.103****W02: 280mm Clay Common Brick Cavity Wall Plastered and Painted Both Sides**

a. Standard: SANS 227 and SANS 2001 CM1.

1). Type: 280mm common clay brick cavity wall, in two half brick skins plastered and painted on both sides.

2). Supplier: Corobrik or similar and equal approved.

3). Skins:

a). Clay common Non-Facing Plastered (NFP).

b). Compressive strength: As deemed necessary by the Structural Engineer.

c). Working size: 222 x 106 x 73mm.

d). Bond: Half lap stretcher.

e). Joints: Raked out to receive plastered finish as described in Section R20 and painted as described in Section X10 of this Specification.

4). Cavity: 60mm.

- 5). Mortar:
 - a). As Section Z21
 - b). Type: Cement: sand.
 - c). Mix:
 - i. 1:4 cement/ sand, below ground.
 - ii. 1:6 cement/ sand, above ground.
- 6). Accessories: Welded wire bed joint ladder reinforcement, cavity ties, cavity trays, head restraints, starters, and lintels, as shown on the Contract Drawings.

H10.104 W02: 280mm Clay Solid Common Brickwork Plastered and Painted One Side and Bagged the Other

- a. Standard: SANS 227 and SANS 2001 CM1.
 - 1). Type: 280mm common clay brick cavity wall, in two half brick skins plastered and painted one side and bagged external.
 - 2). Supplier: To be agreed.
 - 3). Skins:
 - a). Clay common Non-Facing Plastered (NFP).
 - b). Compressive strength: As deemed necessary by the Structural Engineer.
 - c). Working size: 222 x 106 x 73mm.
 - d). Bond: Half lap stretcher.
 - e). Joints: Raked out to receive plastered finish as described in Section R20 and painted as described in Section X10 of this Specification.
 - 4). Cavity: 60mm.
 - 5). Mortar:
 - a). As Section Z21
 - b). Type: Cement: sand.
 - c). Mix:
 - i. 1:4 cement/ sand, below ground.
 - ii. 1:6 cement/ sand, above ground.
 - 6). Accessories: Welded wire bed joint ladder reinforcement, cavity ties, cavity trays, head restraints, starters, and lintels, as shown on the Contract Drawings.
 - 5). External skin:
 - a). Indicative Supplier: Corobrik or similar and equal approved.
 - b). Indicative Product: Non-Facing Plastered (NFP)(ROK).

- c). Compressive strength: 32MPa.
- d). Average size: 222 x 106 x 73mm.
- e). Bond: Half lap stretcher.
- f). Joints: flush.
- 6). Internal skin:
 - a). Clay common Non-Facing Plastered (NFP).
 - b). Supplier: Corobrik or similar and equal approved.
 - c). Compressive strength: As deemed necessary by the Structural Engineer.
 - d). Working size: 222 x 106 x 73mm.
 - e). Bond: Half lap stretcher.
 - f). Joints: Raked out to receive plastered finish as described in Section R20 and painted as described in Section X10 of this Specification.
- 7). Cavity: 60mm.
- 8). Mortar:
 - a). As Section Z21
 - b). Type: Cement: sand.
 - c). Mix:
 - i. 1:4 cement/ sand, below ground.
 - ii. 1:6 cement/ sand, above ground.
- 9). Accessories: Welded wire bed joint ladder reinforcement, cavity ties, cavity trays, head restraints, starters, and lintels, as shown on the Contract Drawings.

H10.105 W01: 330mm Clay Common Brick Cavity Wall Plastered and Painted Both Sides

- a. Standard: SANS 227 and SANS 2001 CM1.
- 1). Type: 330mm common clay brick cavity wall, in two half brick skins plastered and painted on both sides.
- 2). Supplier: To be agreed.
- 3). Skins:
 - a). Clay common Non-Facing Plastered (NFP).
 - b). Compressive strength: As deemed necessary by the Structural Engineer.
 - c). Working size: 222 x 106 x 73mm.
 - d). Bond: Half lap stretcher.
 - e). Joints: Raked out to receive plastered finish as described in Section R20 and painted as described in Section X10 of this Specification.

- 4). Cavity: 110mm.
- 5). Mortar:
 - a). As Section Z21
 - b). Type: Cement: sand.
 - c). Mix:
 - i. 1:4 cement/ sand, below ground.
 - ii. 1:6 cement/ sand, above ground.
- 6). Accessories: Welded wire bed joint ladder reinforcement, cavity ties, cavity trays, head restraints, starters, and lintels, as shown on the Contract Drawings.

Solid Brick Walling

H10.106 W04: 110mm Clay Solid Common Brickwork Plastered and Painted Both Sides

- a. Standard: SANS 227 and SANS 2001 CM1.
 - 1). Type: 110mm solid common brick wall plastered and painted both sides..
 - 2). Indicative Supplier: Corobrik or similar and equal approved.
 - 3). Brick skin:
 - a). Clay common Non-Facing Plastered (NFP) bricks.
 - b). Compressive strength: As deemed necessary by the Structural Engineer.
 - c). Working size: 222 x 106 x 73mm.
 - d). Bond: Half lap stretcher.
 - e). Joints: Raked out to receive plastered finish as described in Section R20 and painted as described in Section X10 of this Specification.
 - 4). Mortar:
 - a). As Section Z21
 - b). Type: Cement: sand.
 - c). Mix:
 - i. 1:4 cement/ sand, below ground.
 - ii. 1:6 cement/ sand, above ground.
 - 5). Accessories: Welded wire bed joint ladder reinforcement, head restraints, starters, and lintels, as the shown on the Contract Drawings.

H10.107 W03: 230mm Clay Solid Brickwork Plastered and Painted Both Sides

- a. Standard: SANS 227 and SANS 2001 CM1.
 - 1). Type: 230mm solid common brick wall, in two half brick skins plastered and painted both sides.
 - 2). Indicative Supplier: Corobrik or similar equal approved.

- 3). Brick skins:
 - a). Clay common Non-Facing Plastered (NFP) bricks.
 - b). Compressive strength: As deemed necessary by the Structural Engineer.
 - c). Working size: 222 x 106 x 73mm.
 - d). Bond: Half lap stretcher.
 - e). Joints: Raked out to receive plastered finish as described in Section R20 and painted as described in Section X10 of this Specification.
- 4). Mortar:
 - a). As Section Z21
 - b). Type: Cement: sand.
 - c). Mix:
 - i. 1:4 cement/ sand, below ground.
 - ii. 1:6 cement/ sand, above ground.
- 5). Accessories: Welded wire bed joint ladder reinforcement, head restraints, starters, and lintels, as the shown on the Contract Drawings.

H10.200 QUALITY AND WORKMANSHIP

Submittals

H10.201 Pre-contract Samples

- a. Not required.

H10.202 Post-contract Samples

- a. In accordance with Section A, post contract samples of the following shall be provided:

- 1). 3 No. samples of each brick type.

H10.203 Control Samples

- a. Provide the following control samples:

- 1). 3 No. samples of each brick type.

H10.204 Sample Panels

- a. Prior to commencement of the works, a sample panel of each type of walling, with all options of mortar specified, in panel sizes of nominally 1000mm x 1000mm shall be built on site. The sample panels shall be constructed in an agreed location using randomly selected masonry units but rejecting any that are damaged. Acceptance from the Architect shall be obtained prior to commencement of construction for that type. If a panel is rejected, construct other sample panels of each type until acceptance is obtained from the Architect.

- H10.205 Mock-ups**
a. Not required.
- H10.206 Prototypes**
a. Not required.
- H10.207 Benchmark Requirements**
a. The following quality benchmarks shall be provided in locations to be agreed with the Architect, in accordance with Section A:
1). First 10m² of each type incorporating accessories as listed in Section H40 of the Specification where possible.
- Testing**
- H10.208 Testing Clay Masonry**
a. All sampling and testing shall be carried out in accordance with SANS 227.
b. Additional testing and sampling shall be performed if the materials do not comply with the Specification.
- H10.209 Mortar Testing**
a. Carry out tests to determine the compressive strength of mortars as described within Section Z21 of the Specification.
- H10.210 Consistency of Fair-faced Work**
a. Agree with the manufacturer and the Architect, methods of ensuring the supply of masonry units to remain visible is of a consistent, even colour/ texture range, batch to batch and within batches.
b. Check each delivery for consistency of appearance with previous deliveries and with accepted samples or reference panels; do not use if variation is excessive.
c. Mix units from different packs/ pallets and deliveries which vary in colour to avoid undesirable variations, patches, horizontal stripes and racking back marks in the finished work.
- Holes, Recesses and Chases**
- H10.211 General**
a. Comply with the requirements of Section Z15.
- Structural Performance Requirements**
- H10.212 General**
a. Comply with the structural requirements of SANS 10164.
- H10.213 Specific Movements and Deflections**
a. Refer to the Structural Engineer's Specification and Structural Movements and Tolerances Report.

b. Accommodate all tolerances and movements of the building structure, including dead, live, seismic and wind loads plus moisture, shrinkage, creep and thermal effects, without damage or any reduction in the performance of the works.

c. Expansion and movement joints shall accommodate the appropriate range of movement.

d. The Contractor to be responsible for determining the requirement for and location of movement joints, whether indicated on the Contract Drawings or not.

Environmental Performance Requirements

H10.214 Thermal Movement

a. The service temperature range for components of the works to be taken as -25°C and +90°C.

b. Thermal movements shall not result in audible noise.

H10.215 Moisture Movement

a. Changes in moisture content of components shall not affect the works.

b. Expansion of absorbed or retained moisture caused by freezing shall not affect the works.

H10.216 Mortar

a. Comply with the requirements of Section Z21

H10.217 Cement/ Sand Mortar Mix Proportions:

a. To SANS 10164.

b. Class 1: 1:4 Cement: Sand: Highly stressed masonry, work below ground, severe exposure.

c. Class 2: 1:6 Cement: Sand: Normal load bearing masonry, severe/moderate exposure.

d. Class 3: 1:9 Cement: Sand: Single storey load bearing masonry, moderate/sheltered exposure.

Workmanship

H10.218 Site Control

a. Site installation shall be carried out in accordance with SANS 10164, SANS 10249 and SANS 10145.

b. Materials shall be clean and built uniform and level within the tolerances specified.

c. Quoins and jambs shall be plumbed as the work proceeds. The head of walls shall be laid level.

d. Damaged material shall not be used.

e. Materials shall only be cut by power-driven masonry saw, wet hosed down to remove any slurry, and then dried prior to laying. No cut faces shall be exposed unless agreed with the Architect.

f. Where areas of the works incorporate service openings, the reveal edges of these shall be treated as fair-faced.

g. Provide head restraints as required in accordance with Section H40 of the Specification, fixed to top courses, which consist of full size, uncut units only. No cut materials that reduce the structural or fire-rating integrity of the wall shall be used.

H10.219

Laying

a. Wet bricks well two hours before laying.

b. Place on a full bed of mortar, properly jointed with other work, to correct lines and levels. Perpend joints shall be aligned plumb within vertical tolerance.

c. Keep courses level and evenly spaced using gauge rods. Vertical and horizontal joints to be equal and of uniform thickness.

d. Mortar shall be applied to obtain full vertical perpend joints. Slushing of perpend joints or furrowing of bed joints is not permitted.

e. Intersections, external corners and internal corners shall be fully bonded, except where indicated otherwise.

f. Grout all joints in the foundation walls with 3:1 liquid cement mortar to eradicate crevices.

g. Do not shift or tap units after mortar has taken initial set. Where adjustment is necessary, mortar shall be removed and replaced.

h. Excess mortar shall be removed as the work proceeds.

i. Point joints as the work proceeds. Where coloured mortar is specified, rake out joints and point after walls are complete.

j. Overhand laying shall be avoided unless dictated by the confines of the Site and accepted by the Architect.

k. Walls shall be racked back when raising quoins and other advanced work. Tothing is not permitted.

l. The gauge shall be based on the combined height of four courses of masonry unit plus bed joint with a tolerance of ± 2 mm.

m. Build in lugs and grout all pressed steel door frames with cement mortar as the work proceeds. Frames to be plumb and without twist.

n. Rake out joints to a depth of 30mm for flashings and repoint later in 1:3 cement: mortar.

o. Start facework not less than 150mm below finished levels externally.

H10.220

Bed Joint Reinforcement

a. Place throughout the building:

1). 3 courses above concrete footings, below window cills, above door and window heads and at wall plate level to gable ends.

2). Otherwise at every fourth course.

3). Internal half brick walls to be reinforced at every course to the eighth course and three courses above all openings.

H10.221 Cavity Walls

- a. Bond leaves together with wall ties as described in Section H40.
- b. Evenly space ties, generally at 800mm centres horizontally, staggered in alternate courses and at 400mm centres vertically, unless specified otherwise.
- c. Both leaves of cavity walls shall be brought to the same level at:
 - 1). Every course containing vertical twist type ties or other rigid ties.
 - 2). Every third tie course for double triangular/ butterfly ties.
 - 3). Courses in which lintels are to be bedded.
- d. Maintain the specified cavity.
- e. Cavities shall be kept clear of excess mortar and debris by placing battens in cavity. These shall be cut slightly narrower than the cavity width, supported on wall ties and raised between levels by attaching wires at the ends.
- f. Fill cavities up to 225mm below ground level with clean mix concrete.
- g. Provide weep holes at 900mm centres at base of cavity and above all openings.

H10.222 Backfill

- a. Do not backfill until the wall is at least seven days old.
- b. Carry out backfilling equally to each side of the wall.

H10.223 Height of Lifts

- a. Do not carry any portion of the work more than 1200mm above another section, rake back between levels.
- b. Complete each lift of facework in one period of operation.
- c. Build no part of a wall more than 1500mm high in one day, unless permitted by the Architect.

H10.22 4 Vertical Control Joints

- a. Refer to the Contract Drawings to derive the standard joint details and locations.
- b. Refer also Section H40 of the Specification.
- c. The works shall be divided into panels separated by vertical control joints, which shall be located such that the length of each panel is generally 6m, or as shown on the Contract Drawings.
- d. Vertical control joints shall coincide with the structural support elements where possible, and shall utilise proprietary sleeved tie anchors, as specified in Section H40 of the Specification. Those not shown on the Contract Drawings shall be at junctions with a column or different material. Restrict control joints to the corner of abutting walls where possible.
- e. Control joint fillers, sealants and/ or fire stops shall be in accordance with the respective manufacturer's written instructions or written recommendations.

- H10.225 Joints in Mortar**
- a. Generally all masonry shall be well buttered with mortar before being laid and filled at each course.
 - b. All mortar joints shall be of a thickness consistent in appearance and density.
 - c. Tooling of joints shall be carried out while the mortar is thumbprint hard. Any excess mortar that extrudes from the joints of fair-faced units shall be cut away as work proceeds and not smeared on the face of the works. No washing or scrubbing of the finished face with proprietary cleaners or acids shall be allowed. To avoid staining of the surface of the works, smears shall be removed by gentle brushing off with a soft brush and water only.
- H10.226 Keyed Finish**
- a. Rake out joints to a nominal depth of 10mm to receive render/ plaster or tile finishes as shown on the Contract Drawings.
- H10.227 Bond Beam Course**
- a. Provide two course deep reinforced bond beam as top courses to all loadbearing walls.
 - b. Provide expanded metal strip 150mm wide immediately below beam to retain concrete fill.
 - c. Beam reinforced as per Architect's detail and filled with 25Mpa concrete.
- H10.228 Bonding to Steel and Concrete**
- a. Secure masonry walls to structural steel with anchors or to concrete with dovetail slots and anchors or anchor strips as specified.
 - b. Position anchors at 450 millimetres overall centres vertically on columns or walls.
 - c. Install anchors in full bed of mortar.
 - d. Do not place in same course as horizontal joint reinforcement.
- Bagged Finish**
- H10.229 PLS-115: Bagged Finish**
- a. While mortar joints are soft, rub the whole of the wall surface with wet rough sacking to obtain an even surface texture.
 - b. Add extra mortar as required to obtain a consistent finish.
- Curing and Protection**
- H10.230 Curing**
- a. Maintain all walls in a damp condition for at least 24 hours after laying.
- H10.231 Protection**
- a. Cover up and protect finished work from damage by subsequent operations.
 - b. Prevent soiling of the fair-faced surfaces.

c. Clean off any traces of mortar as the work proceeds.

H10.232 Service Penetrations

a. Service penetrations through the works shall be provided as required and the fire integrity of the works maintained in compliance with the relevant South African Standards.

H10.233 Fire and Smoke Stopping

a. All fire and smoke stops shall be positively fixed in position in such a manner that they shall not become dislodged in the event of fire. The fixing shall secure the stop in position for a period at least equal to that required for the compartment wall or floor against which the fire works abut.

H10.234 Site Storage, Handling and Transportation

a. Deliver material to Site suitably packaged to prevent damage and contamination, clearly identified with type, grade, date of manufacture, etc. Do not remove labels or packaging until time for use. Inspect materials before use and reject any that are cracked, damaged or contaminated.

1). Masonry Units:

a). Store masonry units in stable stacks clear of the ground and clearly identified by type, strength, grade, etc. Protect from adverse weather, moisture, staining and contamination with earth and other foreign materials and keep clean and dry. Allow air to circulate around units.

b). All components shall be stacked, before and after delivery on Site, in such a manner that they are not damaged in any way through excessive stresses or by atmospheric deterioration, paying particular attention to the finished surfaces.

c). Handle brick units on pallets or flat-bed wheel barrows.

2). Mortar Materials:

- a). Store in a weatherproof structure clear of the ground.
- b). Portable silos can be used for bulk storage of cement.
- c). Protect packaged materials against contamination and moisture.
- d). Stockpile and handle aggregates to prevent contamination from foreign materials.
- e). Store admixtures to prevent contamination or damage from excessive temperature changes.
- f). Keep water free of harmful materials.

H10.235 Site Dimensions

- a. Take site dimensions as necessary to ensure a proper fit between the masonry and adjacent work and to achieve specified erection tolerances.

H10.236 Setting out

- a. Be responsible for the true and proper setting out of the works, the correctness of position, levels, dimensions and alignment of all walling including openings.
- b. Before work begins on Site submit proposed methods for dimensional setting out and crosschecking with other trades to satisfy the required accuracy.
- c. All controlling dimensions, especially at interface with surrounding elements, shall be observed. All dimensions shall be checked on Site.
- d. Setting-out shall be taken from grid lines as shown on the Contract Drawings.
- e. Allow for all necessary formers to achieve required opening sizes and tolerances.

H10.237 Lintel Bearings

- a. Carefully predetermine setting out to ensure that full units occur below lintel ends and ensure that all materials are fully bonded or tied together.

H10.238**Tolerances**

a. Comply with the requirements of Code of Practice SANS 10155.

b. Alignment and Levelling:

1). Length:

a). Up to 5m: +/- 10mm.

b). 5m to 10m: +/- 15mm.

c). Over 10m: +/- 20mm.

2). Height:

a). Up to 3m: +/- 5mm.

b). 3m to 6m: +/-15mm.

c). Over 6m: +/- 20mm.

3). Straightness in any 5m length: 10mm (non-cumulative).

4). Vertically in any 1m height: 3mm (non-cumulative).

5). Vertically in any 3m height: 10mm (non-cumulative).

c. Notwithstanding the provisions of SANS 10155 and the tolerances above, tolerances shall be reduced when, for the purposes of fit and/ or appearance, the tolerances within SANS 10155 would fail to meet the design intent and dimensional criteria required by the works.

H10.239**Adverse Weather**

a. Do not use frozen materials.

b. Do not lay bricks/ blocks when the air temperature is at or below 3°C unless mortar has a minimum temperature of 4°C when laid and walling is protected. Do not lay mortar on frozen or frost covered surfaces.

c. Maintain temperature of the work above freezing until mortar has fully hardened.

d. Rake out and replace mortar damaged by frost. When instructed, rebuild damaged work.

e. All newly erected work shall be protected from precipitation and drying out too rapidly in hot/ dry conditions by covering thoroughly at all times when work is not proceeding.

H10.240 Final Clean

a. Clean down all work immediately prior to completion or prior to the handing over of any part of the work and leave clean, to the acceptance of the Architect.

b. Do not use wire brushes, acid type cleaning agents or other cleaning compounds with caustic or harsh constituents.

END OF SECTION

H31 PRECAST CONCRETE LINTELS

a. To be read in conjunction with Sections A and other related sections of the Specification, Preliminaries and Contract Conditions.

H31.100 SCOPE, SUBMITTALS, TESTING AND PERFORMANCE

Specification and Scope

H31.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

H31.102 Section Coverage:

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Precast concrete lintels.

b. Ensure that all interfaces are fully co-ordinated prior to commencement.

Lintels

H31.103 MAC-231: Pre-Stressed Concrete Lintel

a. Pre-stressed precast concrete lintel with weather drip formed in plaster, as shown on the Contract Drawings.

- 1). To SANS 1504.
- 2). Manufacturer: To the acceptance of the Architect.
- 3). Product: Pre-stressed concrete lintels:
 - a). Size: To be agreed.
 - b). Length: As shown on the Contract Drawings, 3000mm maximum.
 - c). Strength: 35Mpa at 28 days.
 - d). Finish: Plastered as described in Section R20 of this Specification and as shown on the Contract Drawings.

Precast Concrete

H31.104 Generally

- a. Precast concrete to comply with the requirements of SANS 2001-CC1.

H31.200 QUALITY AND WORKMANSHIP

H31.201 Response

- a. Provide submittals in accordance with the requirements of Section A of the Specification.

H31.202 Pre-contract Samples

- a. Not required.

H31.203 Post Contract Samples

- a. In accordance with Section A, post contract samples of the following shall be provided:

- 1). 1 No. full size lintel of each type.

H31.204 Mock-ups

- a. Not required.

H31.205

Prototypes

- a. Not required.

H31.206

Benchmark Requirements

- a. The following quality benchmarks to be provided in locations to be agreed with the Architect, in accordance with Section A of the Specification:

- 1). First precast concrete lintel of each type to be incorporated into the works.

Testing

H31.207

Testing Requirements

- a. Include for testing by an accredited independent testing specialist, or provide independently certified test data to demonstrate compliance with the Specification.

Structural Performance

H31.208

Structural

- a. Refer to Section A of the Specification.

H31.209

Loadings

- a. The work shall be capable of accommodating imposed loads.

Accuracy

H31.210

Accuracy

- a. Comply with the requirements of SANS 10155.
- b. Unless stated otherwise accuracy to be to Degree of Accuracy II. Material

Quality

H31.211

Lintels

- a. Provide suitable precast concrete lintels to SANS 1504.

- b. Provide suitable pre-stressed concrete lintels to SANS 1504.
- c. Provide reinforcement conforming to the following:
 - 1). To accommodate dead load weight of walls above structural openings.
 - 2). To run continuously along the length.
 - 3). To be completely surrounded by concrete.
- d. Concrete of 30MPa, 10mm nominal maximum aggregate size thoroughly compacted by vibration.
- e. Finish fair-faced to match accepted samples.

H31.212 Concrete

- a. Constituent materials to comply with SANS 2001-CC1.

H31.213 Aggregates

- a. Aggregates to comply with SANS 1083.
- b. Aggregates to achieve a drying shrinkage of concrete not exceeding 0.075% when tested to SANS 6085.

H31.214 Chlorides

- a. The total chloride ion content of the constituents of each mix, expressed as a percentage by weight of cement (including GGBS or PFA if used) in the mix, is not to exceed 0.4. Admixtures containing calcium chloride shall not to be used.

H31.215 Reinforcement

- a. Reinforcement to be in accordance with the Structural Engineer's documentation.
- b. To SANS 920 and/ or SANS 1024, cut and bent to SANS 282.
- c. Reinforcement to be of metal compatible with the metal of any fixings and accessories that may make contact.

d. Reinforcement to be clean and free of corrosive pitting, loose millscale, loose rust, ice, oil, and other substances which may adversely affect the reinforcement, concrete or bond between the two at time of placing concrete.

e. Reinforcement to be fixed accurately and securely using tying wire, accepted steel clips, or tack welding if permitted. Wire or clips are not to encroach into the concrete cover.

Finishes

H31.216

Facing Mixes

a. Exactly the same ingredients and batch proportions to be used for all components required to have the same finish.

b. Carefully control materials, batching and mixing to ensure consistency of colour and appearance.

H31.217

Quality of Finish

a. The quality of finishes to match the accepted samples and to be consistent throughout the works. Components having arrises or faces, which are broken, chipped, cracked, crazed, honeycombed, irregular, inconsistent, stained or otherwise marred such that their appearance or performance is significantly impaired shall not be accepted. Workmanship

H31.218

Moulds

a. Constructed accurately to give straight, square and true components. Permissible deviations on length +0, -6mm, other dimensions ± 3 mm.

b. Maintained in clean, sound condition and inspected carefully for defects before each reuse.

c. Discarded rather than repaired and reused if this would impair the surface appearance of the components.

- d. Constructed to prevent loss of grout.
- e. Manufactured to permit demoulding without damage to the components.
- f. Coated evenly with a suitable release agent, which is not to be allowed to touch the reinforcement.

H31.219 Casting and Curing

- a. Concrete to be thoroughly compacted by vibration.
- b. Components shall not demould prematurely.
- c. Prevent damage to and distortion of immature components from movement, vibration, overloading, physical shock, rapid cooling and thermal shock shall be prevented.
- d. Components shall be protected from sun and drying winds until they are at least 5 days old.
- e. Components shall not be delivered to Site until at least 14 days after casting.

H31.220 Inspection

- a. All completed components to be carefully inspected and checked by the Architect for compliance with the Specification before installation.

H31.221 Damaged Components

- a. Damaged units are not to be repaired without prior acceptance by the Architect. Such acceptance will not be given where the components are badly damaged or where the proposed repair shall impair performance.

H31.222 Laying of Lintels

- a. Precast concrete lintels shall be laid on a full bed of mortar used for adjacent work with a bearing of not less than 150mm, unless specified otherwise. If packing is required slate is to be used.

b. Pre-stressed concrete: Bed on mortar used for adjacent work with bearing of not less than 150mm unless specified otherwise. Adequately prop at no more than 1200mm centres during construction of walling above. Retain prop in position for not less than 14 days, or until mortar has matured, whichever is longer.

c. Units to be accurately true to line and level.

d. Faces exposed to view shall be kept as finished work, clean with no mortar encroachment. Rubbing to remove marks or stains shall not be permitted.

H31.223

Support of Existing Works

a. Where new lintels are to support existing structures, the top joint is to be filled with semi-dry mortar, hard packed and well rammed to ensure full load transfer after removal of temporary supports.

END OF SECTION

H40

ACCESSORIES/ SUNDRY ITEMS FOR BRICK WALLING

a. Read in conjunction with Sections A and other related sections of the Specification, the Preliminaries and Contract Conditions.

H40.100

SCOPE, SUBMITTALS, TESTING AND PERFORMANCE

Specification and Scope

H40.101

Prescriptive Works

- a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.
- b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.
- c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

H40.102

Section Coverage:

- a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:
 - 1). Wall ties.
 - 2). Column ties/ starter strips.
 - 3). Head restraint.
 - 4). Bed joint reinforcement.
 - 5). Damp-proof courses.
 - 6). Movement Joints.
 - 7). Cavity trays.
 - 8). Weepholes.
 - 9). Cavity drips.

Wall Ties

H40.103**MAC-112: Butterfly Cavity Wall Ties**

a. To SANS 28.

- 1). Indicative Manufacturer: Joluka (Pty) Ltd or similar equal approved.
- 2). Indicative Product: Galvanised wire butterfly wall ties.
- 3). Type: Butterfly or Modified PWD type.
- 4). Material: Galvanised steel.
- 5). Length: To suit width of cavity as recommended by the manufacturer.

H40.104**MAC-114: Vertical Twist Cavity Wall Ties**

a. To SANS 28.

- 1). Indicative Manufacturer: Joluka (Pty) Ltd or similar equal approved.
- 2). Indicative Product: Galvanised vertical twist wall ties.
- 3). Type: Vertical twist wall ties.
- 4). Material: Galvanised steel.
- 5). Size: To suit the cavity width.

Column Ties/ Starter Strips**H40.105****MAC-120: Wall Starters/ Connector Strip**

a. To SANS 3575.

- 1). Indicative Manufacturer: Mitek South Africa Ltd or similar equal approved.
- 2). Indicative Product: eCo Tibond 40mm wide x 1.6mm thick hot dip galvanised lug system.
- 3). Type: Galvanised steel wall starter strip.
- 4). Material finish: Hot dipped galvanised mild steel.
- 5). Length: 305mm.

H40.106**MAC-162: Angle Cleat Head Restraint**

a. Galvanised mild steel angle cleat head restraint.

- 1). Indicative Manufacturer: To the acceptance of the Architect.
- 2). Indicative Product: Galvanised mild steel 75 x 100mm angle 3mm thick.

- a). Length: 200mm long.
- b). Fixing: fixed to underside of soffit at 1200mm centres staggered either side of wall.
- 3). Joint filler: 10mm non-combustible mineral wool board.
- 4). Placement: Full no gaps.

H40.107

MAC-165: Debonded Internal Head Restraint

- a. Galvanised mild steel debonded internal head restraint.
 - 1). Indicative Manufacturer: To the acceptance of the Architect.
 - 2). Indicative Product: 30mm wide x 3mm thick galvanised mild steel bent tie strip with debonded plastic cover.
 - a). Length: 200mm long.
 - b). Fixing: shot fired to underside of soffit at 1200mm centres and debonded end built into centre joint of double skin wall.
 - 3). Joint filler: 10mm non-combustible mineral wool board.
 - 4). Placement: Full no gaps.

Soft Joints

H40.108

MAC-168: Soft Joint at Top Of Wall

- a. Type: Compressible closed cell, cross-linked expanded Polyethylene joint filler.
 - 1). Indicative Manufacturer: Sondor Industries or similar equal approved.
 - 2). Indicative Product: Jointex.
 - a). Thickness: To suit the joint height.
 - b). Width: To suit the width of the wall.
 - c). Installation: As recommended by the manufacturer to the acceptance of the Architect.

Reinforcement

H40.109**MAC-412: Galvanised Bed Joint Reinforcement**

a. To SANS 190 Part II.

1). Indicative Manufacturer: BRC Mesh Reinforcing (Pty) Ltd or similar equal approved.

2). Indicative Product: Brickforce welded wire bed joint ladder reinforcement.

3). Material: hard drawn mild steel light galvanising.

4). Wires size: 2.8mm diameter, cross wires at 300mm centres.

5). Width: 150mm for 230mm walls, 75mm for 110mm walls.

Movement Joints**H40.110****MAC-452: Movement Joint with Sealant**

a. Filler: Compressible closed cell, cross-linked expanded Polyethylene joint filler with sealant.

1). Indicative Manufacturer: Sondor industries Ltd or similar equal approved.

2). Product: Jointex board, or acceptable equivalent.

3). Installation: As recommended by the manufacturer to the acceptance of the Architect.

4). Sealant: Urethane.

a). Colour: To match mortar.

Damp-proof Course**H40.111****MAC-512:Damp-proof Course**

a. Self-adhesive modified bitumen damp-proof course membrane.

1). Indicative Manufacturer: abe Construction Chemicals or similar equal approved.

2). Indicative Product: abe peel & stick membrane.

3). Primer: bitu.prime.

a). Installation: In accordance with the manufacturers published recommendations and to the acceptance of the Architect.

b). Seal laps with cavity trays and/ or dpm's.

Cavity Trays

H40.112

MAC-532: Self-adhesive Cavity Tray

a. Type: Self-adhesive modified bitumen damp-proof course membrane.

1). Indicative Manufacturer: abe Construction Chemicals or similar equal approved.

2). Indicative Product: abe peel & stick membrane.

3). Primer: bitu.prime.

a). Placement to provide a free draining and watertight installation.

b). Seal laps with dpm's.

c). Installation: In accordance with the manufacturers published recommendations and to the acceptance of the Architect.

Weepholes

H40.113

MAC-831: Weepholes

a. Form with plastics perpend units to manufacturers recommendations.

1). Position at not greater than 930mm centres immediately above 10mm of cavity, external opening and stopped DPCs.

2). Provide not less than two weepholes over openings.

3). Colour: To match mortar.

Cavity Drip

H40.114

MAC-882: L-shaped Cavity Wall PVC Drip

a. Indicative Manufacturer: To the acceptance of the Architect.

b. Indicative Product: L-shaped PVC cavity wall drip.

1). Size: 25 x 25mm.

2). Fixing: Silicone and mechanically fix with corrosion resistant frame anchors to underside of concrete soffit at 600mm centres to the acceptance of the Structural Engineer.

H40.200 QUALITY AND WORKMANSHIP

Submittals

H40.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

H40.202 Pre-Control Samples

a. Not required.

H40.203 Post-Control Samples

a. In accordance with Section A, post-contract samples of the following shall be provided:

1). 3 No. of each accessory.

H40.204 Quality Benchmark Requirements

a. The following quality benchmarks shall be provided in locations to be agreed with the Architect, in accordance with Section A of the Specification:

1). The first installation of each element. Co-ordinate with requirements for benchmarks in Section H10 of the Specification.

Testing

H40.205 General

a. Provide independently certified test literature for each type of accessory. The test result data shall meet the requirements of the Specification.

b. Where test results for a material or product are not available, undertake testing to show compliance with the Specification at an independent testing laboratory as accepted by the Architect.

c. The provision of test data shall not relieve the Principal Contractor of any responsibility

with regard to the performance and integrity of materials and products used within the works.

Performance Requirements

H40.206

General

a. Comply with the requirements for brick/ block walling as specified in Section H10 of the Specification.

b. Comply with general performance requirements specified in Section A of the Specification.

Material Quality

H40.207

Accessories Generally

a. Use items suitable for the application and capable of accommodating differential movement between elements as necessary. Increase frequency of ties as necessary to withstand loading and properly restrain insulation.

b. Fully protect all exposed ends of wall ties from damage with adequate protection during construction.

Workmanship

H40.208

Generally

a. Unless specified otherwise, the works shall be installed in accordance with the manufacturer's written recommendations and all relevant South African Standards.

H40.209

Concrete Cavity Fill

a. Cavities shall be filled with concrete up to 225mm below ground level DPC, with concrete as described in Section F10 of the Specification.

H40.210

Templates

a. Where frames are not to be built in as the work proceeds, openings using rigid templates shall be formed and accurately fabricated to the required size.

H40.211**Cleanliness**

- a. Ties and DPCs shall be kept free from debris and mortar. Adequate precautions shall be taken to ensure jointing, fixings, DPCs and other like are installed in a neat and workmanlike manner.
- b. Keep any insulation dry and free from mortar droppings, grout and other debris during the course of construction.

General Installation**H40.212****Restraint Ties**

- a. Where the restraint tie does not have a proprietary debonding sleeve, one half of the length shall be debonded by wrapping with polyethylene sheet before building into the joint.

H40.213**Fixing Cavity Wall Ties**

- a. Ties shall be bedded into the bed joint of each leaf by not less than 50mm.
- b. Ties shall slope towards the exterior with the drip centred on cavity.
- c. Evenly space ties, generally at 800mm centres horizontally, staggered in alternate courses and at 400mm centres vertically, unless specified otherwise.
- d. Additional ties shall be provided to sides of openings, if required.
- e. Increase frequency of ties as necessary to withstand loading and properly restrain the walls.
- F. Protect all exposed ends of wall ties from damage during construction.

H40.214**Joint Reinforcement**

- a. Reinforcement shall be concealed within the joint.
- b. Width: Approximately 40-50mm less in width than the wall or leaf.
- c. Lay on an even bed of mortar in a continuous strip with 225mm laps at joints and full laps at angles.
- d. Keep back 20mm from the face of the external work, 12mm back from the face of the internal work and finish the mortar joint to normal thickness.

H40.215**Movement Joint with Sealant**

- a. Build in as the work proceeds ensuring no projections into cavities and correct depth of joint to receive sealant system. Thickness of filler to match design width of joint.
- b. Prepare joints and apply compatible sealant as Section Z22.

H40.216**Movement Joint without Sealant**

- a. Build in as the work proceeds, completely filling the joint but without projecting into cavities. Thickness of filler to match design width of joint.
- b. In case of fire resistant filler compress, insert and slide into place in open joint. Install with accessories or adhesives where recommended in writing by the manufacturer.

H40.217**Cavity Trays/ DPC**

- a. Lay in unjointed lengths with corners lapped full thickness of wall.
- b. Lap end joints a minimum of 150mm.
- c. Bed DPCs/ cavity trays on an even bed of fresh mortar, on no account bed them dry.
- d. Extend DPCs/ cavity trays through the full width of the wall, including any surface finish.
- e. Build in carefully in accordance with the manufacturer's recommendations to ensure a fully watertight installation.
- f. Overlap DPC at junction with DPM a minimum of 75mm.

H40.218**Weepholes**

- a. Open Perpend: Perpend at 900mm centres shall be left completely open in the brick/ block course immediately above the base of the cavity, external openings and stepped DPCs. Not less than two weepholes over openings shall be provided.

b. Circular Holes: 10mm diameter weepholes in the horizontal joint shall be neatly formed immediately above the base of the cavity, external openings and DPCs at 900mm centres coinciding with perpend. Holes shall not be blocked. Not less than two holes over openings shall be provided for.

c. Form with plastic perpend units to manufacturer's written recommendations immediately above the base of cavity, external openings and stepped DPCs. Provide not less than two weepholes over openings.

H40.219 Door Frame Installation

a. Set up door frames plumb and brace prior to building in.

H40.220 Beam Filling

a. At all junctions of walls and roof unless a closed eaves is specified.

b. Minimum width of filling to be half brick.

c. Cut neatly between trusses and carry up to underside of roof covering. Splay cut top and flush solid to underside of roof covering with 1:3 cement mortar 100mm wide.

H40.221 Fire Stopping

a. Fill joints around ends of timber built into walls with mortar to seal cavities from the interior of the building.

Storage of Material

H40.222 Storage of Materials

a. Stack 300mm above ground surface on uniform supports.

b. Protect with tarpaulin or similar covers, including sides and ends.

END OF SECTION

J40 FLEXIBLE SHEET TANKING/ DAMP-PROOF MEMBRANES

a. To be read in conjunction with Sections A and other related sections of the Specification, the Preliminaries and Contract Conditions.

J40.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

J40.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

J40.102 Section Coverage:

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Oversight damp-proof membranes.
- 2). Torch-on to planter boxes.
- 3). Polyurethane to parapet walls.

J40.103 General

a. All products to be in accordance with the manufacturer's current technical data sheet.

b. Prior to ordering, submit samples of all materials to be used, together with current technical data sheets and copies of relevant test certificates.

- 1). Materials used in conjunction with other waterproofing products, or where they

overlap, are to be compatible.

Damp-proof Membranes

J40.104 WP-02: Polyethylene Damp-proof Membrane - 250 Micron

a. Polyethylene Damp-proof Membrane to SANS 952 Type C.

- 1). Indicative manufacturer: To be agreed.
- 2). Indicative product: To be agreed.
- 3). Thickness: 250 Microns.
- 4). Laid in widest practical widths to minimise joints.
- 5). Laps: 100mm.
- 6). Turned up, dressed to load bearing walls and lapped with damp proof course.
- 7). Lap Bonding: Pressure sensitive tape as per manufacturer's recommendations.

J40.105 DPM: Polyethylene Damp-proof Membrane - 375 Micron

a. Polyethylene Damp-proof Membrane to SANS 952 Type C.

- 1). Indicative manufacturer: To be agreed.
- 2). Indicative product: To be agreed.
- 3). Thickness: 375 Microns.
- 4). Laid in widest practical widths to minimise joints.
- 5). Laps: 100mm.
- 6). Turned up, dressed to load bearing walls and lapped with damp proof course.
- 7). Lap Bonding: Pressure sensitive tape as per manufacturer's recommendations.

Torch-on to Planter Boxes

J40.106 WP-01: Waterproofing to Planter Boxes and Foundation walls

a. Dual layer system comprising first layer dual reinforced waterproofing membrane and second layer non-woven polyester reinforced membrane with anti-root additive

and protection layer. Both layers to be fully bonded by means of torch on fusion.

1). Indicative Manufacturer: SIKA Construction Chemicals or similar and equal approved.

2). Indicative Products:

a). Primer: Sika blackseal primer.

b). First layer torch-on: 3mm INDEX FIDIA POLYESTER.

c). Second layer: 4mm index defend H.

d). Bonding method: Fully sealed to primed surface to falls and cross falls by torch on fusion as per the manufacturers recommendations.

i. Side laps: Min. 100mm, all laps to be staggered.

ii. End laps: Min. 150mm, all laps to be staggered.

3). Drainage/ Protective board:

a). Horizontal: drain P with geotextile.

b). Vertical: drain G.

c). The general protection must be applied immediately upon completion of the water proofing treatment to avoid damage by others.

d). A filter bed of stone of various sizes to be laid immediately onto the protection system followed by the filter cloth and garden soil.

e). Only plants with shallow root systems are to be used as indicated on the Landscape Architects Documentation.

4). Outlets: Install outlets in accordance with the manufacturer's recommendations and to the acceptance of the Architect.

Polyurethane to Parapet Walls

J40.107

WP-03: Membrane Reinforced Cementitious Waterproofing

a. Membrane reinforced cementitious waterproofing

one-component waterborne liquid applied waterproofing membrane, highly elastic and UV resistant. Applied with membrane to parapet walls.

- 1) Indicative. Manufacturer: SIKA Construction Chemicals or similar equal approved.
- 2). Primer: Sika blackseal primer.
- 3). Indicative Product: Sikalastic 560 reinforced with the Sikalastic Reemat membrane
- 4). Surface preparation: Surfaces must be clean, dry and free of dust and dirt.
- 5). Application:
 - a). As recommended by the manufacturer.
 - b). Number of coats: 2 full coats. Allow to cure, approx. 2-4 hours between coats (temperature dependent). Apply the 2nd coat in a perpendicular direction to the 1st coat.
 - c). Application by brush or roller.
 - d). Coverage: 30 - 46 m²/1 L per coat.

J40.200 QUALITY AND WORKMANSHIP

Submittals

J40.201 Response

- a. Provide submittals in accordance with the requirements of Section A of the Specification.

J40.202 Pre-contract Samples

- a. Not required.

J40.203 Post-contract Control Samples

- a. In accordance with Section A, post-contract samples of the following shall be provided:
 - 1). 300 x 300mm samples of membrane.
 - 2). 300 x 300mm drainage/ protection board.

3). Accessories.

J40.204 Mock-ups

a. Not required.

J40.205 Prototypes

a. Not required.

J40.206 Benchmark Requirements

a. The following quality benchmarks shall be provided in locations to be agreed with the Architect, in accordance with Section A:

1). First structural bay of each type.

Certificate

J40.207 Certificate Requirements

a. Provide a certificate from the waterproofing material manufacturer that the work has been completed in accordance with the manufacturer's instructions.

Installation

J40.208 General

a. Comply with the code of practice requirements of SANS 10021.

b. Apply materials carefully to provide a completely impervious, continuous membrane.

Oversite Damp-proof Membranes

J40.209 Oversite Polyethylene Damp-proof Membrane

a. Blind hard-core bed with not less than 12mm of soft sand or pulverised fuel ash.

Consolidate to provide a smooth bed free from sharp projections.

b. Lay carefully to provide a fully watertight, continuous membrane.

c. Overlap joints 150mm and seal with 100mm wide pressure sensitive tape. Sheets

to be clean and dry at the time of jointing.

d. Fold membrane up against foundation walls and provide overlap with DPC.

e. Lay sheets neatly and tuck well into angles to prevent bridging.

f. Form folded welts at corners in upstands.

g. Fit closely against surrounding and intermediate walls and around service entries.

Tanking

J40.210 Bitumen Based Tanking Membranes

a. Make good voids, abrupt irregularities and honeycombed areas with a cement: sand render/or proprietary repair compound. All vertical surfaces to be smooth shutter finished.

b. Surfaces to be clean, free of laitance, dry and free of dust, frost, mould release agents and curing compounds at the time of installation.

c. Treat all concrete/masonry surfaces in accordance with the membrane manufacturer's requirements.

d. Seal penetrations with mastic.

e. Provide fillet or bevel at junction of vertical and horizontal surfaces using cast-in-situ cement mortar in configuration acceptable to membrane manufacturer.

f. Multilayer construction to be as follows:

1). Install materials in accordance with the manufacturer's recommendations.

2). All layers sealed to primed walls.

3). Apply a tack coat to all vertical surfaces, strictly in accordance with the manufacturer's instructions.

4). Lay all membranes without ripples or folds.

- 5). Install sheets in shingle fashion with edges and ends overlapped.
 - 6). Lay first layer lapped 75mm at all edges and ends, sealed with hot bitumen.
 - 7). Second layer laid shingle pattern lapped 450mm at edges and 150mm at ends
all sealed with hot bitumen.
 - 8). Final layer laid shingle pattern lapped 620mm at edges and 150mm at ends
all sealed with hot bitumen.
- g. Protect all vertical areas of the membrane with a protection board recommended by the membrane manufacturer, prior to backfilling.
 - h. This board to be spot bonded with dabs of compatible rubber based bitumen sealant.

J40.211 Torch-on Polymer Modified Bitumen Tanking Membranes

- a. Install materials in accordance with the manufacturer's recommendations.
- b. Surfaces to be clean, free of laitance, dry and free of dust, frost, mould release agents and curing compounds at the time of installation.
- c. Make good voids, abrupt irregularities and honeycombed areas with a cement: sand render/or proprietary repair compound. All vertical surfaces to be smooth shutter finished.
- d. Screeds to be lightly trowelled to give a smooth surface.
- e. Seal penetrations with mastic.
- f. Provide fillet or bevel at junction of vertical and horizontal surfaces using cast-in-situ cement mortar in configuration acceptable to membrane manufacturer.
- g. Application:
 - 1). Apply a bitumen primer coat as recommended by the membrane manufacturer to all vertical and horizontal surfaces, strictly in accordance with the

manufacturer's instructions.

2). Initial layer bonded to substrate as recommended by the membrane manufacturer.

3). Final layer bonded as recommended by the membrane manufacturer.

4). Install sheets in shingle fashion with edges and ends overlapped.

5). Side laps: 75mm sealed by torch-on fusion or as recommended by the membrane manufacturer.

6). End laps: 100mm sealed by torch-on fusion or as recommended by the membrane manufacturer.

h. Lay all membranes without folds and ripples.

i. Where two layer work is specified ensure that all laps are staggered.

j. Terminate edges of sheeting in raked out joints with bitumen mastic.

k. Protect all vertical areas of the membrane with a protection board recommended by the membrane manufacturer, prior to backfilling.

Junction and Finishing

J40.212 Junction of DPC with DPM

a. Clean away all mortar and debris from the DPC.

b. Overlap the DPM with the DPC a minimum of 75mm.

c. Fully lap and bond/seal membrane to DPC.

J40.213 Junction with Vertical Face

a. The works to be terminated in concrete or masonry by dressing the membrane up the vertical face and into a 20mm x 20mm rebate formed within the concrete or masonry joint.

Movement Joints

J40.214 Bonded Movement Joints

a. The works to be bonded with the structural movement joints, within the construction, to form a watertight joint.

b. Seal the rebate, using a gun-grade sealant, recommended by the waterproofing manufacturer.

Drainage Mats

J40.215 Sub Surface Drainage Mats

a. Install in accordance with manufacturer's written instructions with fabric top of core and flat side of core placed against waterproofing.

b. Lap ends of core and filter fabric 75 millimetres and secure in place.

c. Install mat with seams overlapped to shed water in direction of waterflow.

d. Extend and wrap fabric around foundation drainage pipe in accordance with mat manufacturer's recommendations.

e. Protect in-situ matting during backfill operations.

Protection Board

J40.216 Protection Board

a. Install protection board over membrane and retain in place in accordance with manufacturer's instructions.

Penetrations

J40.217 Penetrations

a. Give attention to the workmanship around penetrations such as columns, service and drainage pipes:

- 1). Form minimum 50mm x 50mm angle fillets at intersections between horizontal and vertical surfaces, using the membrane manufacturer's recommended bitumen putty.
- 2). Apply 300mm wide reinforcing strips (minimum) at all changes of direction and transitions between horizontal and vertical planes.
- 3). Wrap the final 300mm minimum wide ring of waterproofing membrane around the circumference of the column and chased into a 20mm x 20mm sealed rebate.

Storage

J40.218 Storage of Materials

- a. Keep primer, mastics and adhesives in dry area away from flames, sparks and excessive heat.
- b. Store material in a dry area out of direct sunlight.
- c. Cover materials and allow for adequate ventilation.

Protection and Cleaning

J40.219 Protection and Cleaning

- a. Protect damp-proof membranes and tanking from puncturing.
- b. Provide protection for the external vertical faces.
- c. Clean materials from surfaces where not needed

END OF SECTION

J41 BUILT-UP REINFORCED BITUMEN ROOFING

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

J41.100 PRODUCTS, SYSTEMS AND MATERIALS

J41.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

J41.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Torch-On Bitumen Waterproofing.
- 2). Bituminous aluminium paint.
- 3). Self-adhesive waterproofing.
- 4). Floor drain.

General

J41.103 General

a. All products to be in accordance with the manufacturer's current technical data sheet.

1). Materials used in conjunction with other waterproofing products, or where they overlap, are to be compatible.

Torch-on Waterproofing

J41.104

WP-05: Double Layer Torch-on Bitumen Waterproofing

a. Fully bonded membrane system, comprising a double layer hot applied (torch on fusion) non-woven polyester reinforced waterproofing membrane with reflective roof paint finish.

1). Indicative Manufacturer: Sika or similar and equal approved

2). Substrate: Sand cement screed laid to falls.

3). Indicative Primer: Sika Blackseal primer

4). Membrane:

APPLICATION

The torch on application would consist of the Sika Index Topgum Biarmato 3mm first layer and Sika Index Fidia AGR 4mm top layer.

1). Manufacturer: SIKA

2). Substrate: Sand cement screed laid to falls. Screed to fall in 1m zone around Pluvia outlets.

3). Primer: 1 coat Sika blackseal primer.

4). Membrane:

a). **First layer:** 3mm Sika Index Topgum Biarmato

bitumen polymer reinforced waterproofing.

b). **Second layer:** 4mm Sika Index Fidia AGR

polyester reinforced waterproofing.

i. Fully bonded by means of torch on fusion using propane gas.

ii. Side laps of 100mm.

iii. End laps of 150mm.

iv. First and second layer joints to be staggered.

v. Minimum of 150mm to protrude above finished ground level.

vi. Provide 100 x 100mm 4mm abe unigum P gussets at junctions of horizontal and vertical surfaces.

vii. Dress membrane up and bond to sides of penetrations. Form membrane collars and aluminium apron flashings.

viii. Outlets, pipe upstands to have a square meter of a.b.e Unigum P 4 mm bonded to the surface including their gussets prior to the commencement of the waterproofing application.

ix. Waterproofing to be fully dressed into drainage outlets, up and over parapets and under shopfront interfaces.

x. Where membrane is to be dressed up an upstand and be terminated with a cover flashing, the membrane shall pass the angle fillet by a minimum of 100mm.

5). Substrate preparation, priming, corner gussets and application in accordance with the manufacturers published recommendations and to the acceptance of the Architect.

6). Accessories: Edge trims and pipe collars.

7). Reflective roof paint finish where applicable: As indicated on the Contract Drawings and described later in this section.

FLAT ROOF material below WATERPROOFING:

Screed to fall:

30min -120max Cement screed

Sika 1 is to be added at a rate of 1.5lt per 50kg of cement

5). Substrate preparation, priming, corner gussets and application in accordance with the manufacturers published recommendations and to the acceptance of the Architect.

6). Accessories: Edge trims and pipe collars.

7). Reflective roof paint finish: As indicated on the Contract Drawings and described later in this section.

J41.105 WP01: Single Layer Torch-on Bitumen Waterproofing to Retaining Foundation Walls

a. Fully bonded membrane system, comprising a single layer hot applied (torch on fusion) non-woven polyester reinforced waterproofing membrane.

1). Indicative Manufacturer: Sika or similar equal approved.

2). Indicative Primer: 1 coat Sika blackseal primer.

3). Indicative Membrane: INDEX FIDIA POLYESTER 4mm

a). Fully bonded by means of torch on fusion using propane gas.

b). Side laps of 100mm.

c). End laps of 150mm.

d). Dress membrane up and bond to sides of penetrations. Form membrane collars and aluminium apron flashings.

e). Waterproofing to be fully dressed into drainage outlets and up and over parapets.

4). Substrate preparation, priming, corner gussets and application in accordance with the manufacturers published recommendations and to the acceptance of the Architect.

5). Accessories: Edge trims and pipe collars.

6). Reflective roof paint finish: As indicated on the Contract Drawings and described later in this section.

Bituminous Aluminium Paint

J41.106 Protective Bituminous Aluminium Paint

a. Reflective bitumen-based aluminium paint.

1). Indicative manufacturer: abe® Construction Chemicals or similar equal approved.

2). Indicative Product: Silvakote.

3). Surface preparation: Surfaces must be clean, dry and free of dust and dirt.

4). Application:

a). As recommended by the manufacturer.

b). Number of coats: 2 full coats.

c). Application by spray, roller or brush.

d). Coverage: 6 - 8 m²/1 L.

Self-Adhesive Waterproofing

Floor Drain

J41.108 DRN-111: Trafficable Floor Drain

a. Stainless steel flat grate trafficable floor drain with filter basket.

- 1). Indicative Manufacturer: To be agreed.
- 2). Indicative Product: To be agreed.
- 3). Material: Stainless steel.
- 4). Drain casing to be recessed into floor finish and mastic sealed to ensure watertight installation.
- 5). Flat stainless steel grating to suit the application and to the acceptance of the Architect.

Expansion Joints

J41.109

Expansion Joints

- a. Provide expansion joints in the roof covering, as recommended by the roof membrane manufacturer, to coincide with the building movement joints.

Flashings

J41.110

Flashings, Trims and Copings

- a. Aluminium flashings shall be formed from aluminium alloy sheets, fabricated from the most appropriate grade of material complying with EN 485, EN 515 and EN 572, in a temper suitable for the particular type of application and degree of forming to be used. In addition, the alloy shall be selected to satisfy the requirements of the chosen finishing process.
- b. Aluminium flashings shall be at least 1.6mm thick and sufficiently thick to provide a visually flat surface and to eliminate distortion and permanent deformation caused by solar radiation. Provide nominal 3m lengths between joints to achieve straightest runs possible.
- c. Flashings shall be natural anodised, unless otherwise specified.

d. Longitudinal joints shall have lapped or interconnecting joints, which shall be fully weather-sealed. Simple butt joints and butt straps will not be acceptable. Joints, sealants, etc. shall be designed to be capable of accommodating thermal movements of all flashings.

e. Electrical continuity shall be achieved between conductive parts. Provision shall be made for lightning protection integration requirements.

f. Aluminium flashings shall be treated with anti-drumming insulation on the hidden face.

Sealants

J41.111 Sealants

a. Sealants shall be compatible with all contact products and finishes and be selected from:

- 1). Silicone to SANS 1305.
- 2). Two-part polysulphide to SANS 110.
- 3). Polyurethane sealants to SANS 1077.

J41.200 QUALITY AND WORKMANSHIP

Submittals

J41.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

J41.202 Pre-contract Samples

a. Not required.

J41.203 Post-contract Control Samples

a. Provide samples of the following, including relevant trade literature and technical specifications:

1). Waterproof membrane and methods of attachment.

J41.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First structural bay of each type, in location to be agreed.

Structural Performance Requirements

J41.205 Specific Movements Loads and Deflections

a. Refer to the Structural Engineer's Specification and Structural Movements and Tolerances Report.

b. Accommodate all tolerances and movements of the building structure, including dead, live, seismic and wind loads plus moisture, shrinkage, creep and thermal effects, without damage or any reduction in the performance of the works.

c. Expansion and movement joints shall accommodate the appropriate range of movement.

d. The Contractor to be responsible for determining the requirement for and location of movement joints, whether indicated on the Contract Drawings or not.

e. The works to accommodate:

1). Known impact loads, or transferred impact loads, that occur during service life.

2). Loads imposed during maintenance.

J41.206 Wind Loads

a. Wind loading shall be accommodated safely, without detriment to the overall design, structural integrity and performance of the works.

b. Design Wind Pressures: Determine precise wind load values in accordance with SANS 10160.

c. Calculated pressure loads shall include the effect of internal air pressures within the building, taking into account the presence of significant openings, which might arise occasionally within the building enclosure.

Environmental Performance Requirements

J41.207 Thermal Movement

a. All components shall resist thermal movement resulting from the maximum and minimum surface temperature differentials occurring. The design shall cater for all temporary and permanent conditions envisaged for the works.

b. The service temperature range for components of the works to be taken as -10°C and +90°C.

c. Thermal movements shall not result in audible noise.

J41.208 Moisture Movement

a. The works shall withstand movement of the structure without permanent deformation or any reduction in the specified performance.

b. Changes in moisture content of components shall not affect the works.

c. Expansion of absorbed or retained moisture caused by freezing shall not affect the works.

J41.209 Condensation

a. Condensation shall not form within the slab or on the interior surfaces of the roof structure:

1). Vapour barrier shall be provided as necessary.

J41.210 Water Penetration Resistance

- a. Prevent water leakage through the works.
- b. Lay to sufficient falls to ensure effective disposal of water to outlets provided.

Fire

J41.211 Combustion

- a. Fire Resistance: The works shall incorporate materials of limited combustibility, which will not give off toxic fumes.

J41.212 Fire Penetration and Spread of Flame

- a. Materials shall provide a minimum fire penetration and surface spread of flame to SANS 10177.

Testing

J41.213 Waterproofing and Watertightness

- a. Test the watertightness of the roof using:
 - 1). A ponding test by ponding the entire roof area with water to a minimum depth of 50mm for a period of 48 hours to check the integrity of the membrane installation.
- b. Details of the system and a proposed method statement shall be submitted to the Architect for acceptance at least one month prior to the proposed testing on Site.
- c. Prior to testing, ensure that roofing work has been completed to a stage where the integrity of the membrane can be tested, that obvious defects have been made good and that the roof has been cleared of all materials, debris, dust, etc.
- d. Testing shall be carried out when all works to the roof areas are complete, including that of all associated and interfacing trades.

e. Externally cover and seal all outlets and protect against damage from water pressure with temporary kerbs. Do not use plugs to seal outlets.

f. Any area that cannot be flood tested shall be pressure hose tested.

g. On completion of testing, slowly drain roofs ensuring that outlets do not overload or flood.

h. If leaks occur, the water shall be drained completely and the membrane installation repaired and re-tested.

i. Any part of the works that is adversely affected shall be replaced or repaired to the satisfaction of the Architect.

J41.214 Performance under Testing

a. There shall be no leakage through the waterproof membrane at any time during the test.

b. At completion of the test there shall be no standing water in locations intended to remain dry.

c. Certify the waterproof integrity of the roof.

Warranty

J41.215 Warranty:

a. The waterproofing shall be warranted for a minimum period of 10 years.

b. The works shall be covered by a single source warranty, supported by component guarantees from manufacturers, for all materials and workmanship.

c. The warranty shall cover the entire roof assembly and be obtained for the full warranty period with an insurance company backing based upon a single whole term premium paid at the inception of the policy with no requirement for periodic renewal premiums.

Installation

J41.216 Torch-on Polymer Modified Bitumen Membranes

- a. Comply generally with SANS 10021.
- b. Install materials in accordance with the manufacturer's recommendations.
- c. Provide minimum falls of 1:60.
- d. Surfaces to be clean, free of laitance, dry and free of dust, frost, mould release agents and curing compounds at the time of installation.
- e. Treat all concrete/masonry surfaces in accordance with the membrane manufacturer's requirements.
- f. Make good voids, abrupt irregularities and honeycombed areas with a cement: sand render/or proprietary repair compound. All vertical surfaces to be smooth shutter finished.
- g. Screeds to be lightly trowelled to give a smooth surface.
- h. Provide minimum 50mm x 50mm cement mortar fillets at all wall and floor junctions.
- i. Apply a bitumen primer coat to all vertical and horizontal surfaces, strictly in accordance with the manufacturer's instructions.
- j. Lay all membranes without folds and ripples.
- k. Where two layer work is specified ensure that all laps are staggered.
- l. Terminate edges of sheeting in raked out joints with bitumen mastic and aluminium apron flashings.

Movement Joints

J41.217 Bonded Movement Joints

- a. The works to be bonded with the structural movement joints, within the construction,

to form a watertight joint.

b. Seal the rebate, using a gun-grade sealant, recommended by the waterproofing manufacturer.

Penetrations

J41.218

Penetrations

a. Particular attention to be given to the workmanship around penetrations such as columns, service and drainage pipes:

1). Form minimum 50mm x 50mm angle fillets at intersections between horizontal and vertical surfaces, using the membrane manufacturer's recommended bitumen putty.

2). Apply 300mm wide reinforcing strips (minimum) at all changes of direction and transitions between horizontal and vertical planes..

3). Place a star-cut panel of waterproofing membrane of the appropriate width around the base of the column ensuring the star-cut edges are securely wrapped around, to achieve a minimum lap of 150mm.

4). Form a 30mm x 30mm minimum angle fillet around the star-cut panel of the waterproofing membrane.

5). The final 300mm minimum wide ring of waterproofing membrane to be wrapped around the circumference of the column and chased into a 20mm x 20mm sealed rebate.

Edge Trims

J41.219

Fixing Edge Trims

a. Lay felt underlayer over upstand and leave free edge projecting 25 mm from wall or

fascia.

- b. Lengths of trim to be not more than 3 m. Set 5 mm clear from wall or fascia and fix through underlayer(s) with countersunk wood screws set 30 mm from ends of trims and at not more than 300 mm centres.
- c. Fit jointing sleeves fixed one side only and leave 3 mm gaps between ends of trim.
- d. Use corner pieces made for the purpose. Do not improvise.
- e. Prime contact surfaces of trim. Butt joint top layer of felt to rear edge of trim and bond 150 mm long pads of bitumen polymer felt over joints in trim.
- f. Cover strip fully bonded to trim and top layer and carried down over angle fillet to lap 75 mm on to roof.

Paint Finish

J41.220 Bituminous Aluminium Paint

- a. Allow roofing membrane to weather for 4-6 weeks.
- b. Remove all dust, dirt and debris.
- c. Apply two coats, by roller and brush allowing minimum 4 hours drying time between coats or as recommended by the paint manufacturer.

Storage of Materials

J41.221 Felt and Primer

- a. Deliver materials in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- b. Store materials in weather protected environment, clear of ground and moisture.
- c. Protect insulation from direct sunlight exposure.
- d. Stand roll materials on end.

Completion and Protection

J41.222 Roof Access

a. To prevent damage to the works, ensure that all finished areas of work are not used for the storage of materials, as building platforms or as access routes for other trades.

If any work by other trades is unavoidable, adequate and appropriate protection shall be provided for the entire construction period.

b. Where regular foot traffic is envisaged across the finished works, adequate and appropriate construction shall be employed to avoid any damage to the finishes.

J41.223 Protection

a. Protect roof covering / waterproofing from puncturing or damage by following trades.

END OF SECTION

K31 METAL PROFILED SHEET CLADDING/ COVERING

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

K31.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

K31.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

K31.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). External wall cladding.
- 2). Roof cladding.
- 3). Accessories.
- 4). Insulation.

Vertical Cladding

K31.103 SW01: Metal Profiled Vertical Sheet Cladding

a. Colour coated profiled steel vertical cladding.

1). Type: Colour coated galvanised sheet metal pierced fix profiled vertical cladding.

2). Supporting structure: Girths to the Structural Engineer's Details.

3). Indicative manufacturer: Safintra or equally approved

4). Indicative product: Safintra Saflok 700 - 0.53mm thick ColorPlus,

5). A certificate verifying compliance shall be issued by the manufacturer.

6). Profile: The profile shall be roll formed with 4 ribs and centres not exceeding 233mm and a cover width not exceeding 700mm

7). Colour: Raincloud

a). Outer colour: As shown on the Finishes Schedule.

b). Underside colour: As shown on the Finishes Schedule.

8). Attachment:

a). Sheeting fixed to steel girths at centres as shown on the Contract Drawings.

b). All fasteners/ fixings to suit the application and be as recommended by the sheeting manufacturer and to the acceptance of the Architect.

c). Sheeting rails to be as specified by the Structural Engineer.

9). Accessories: Abutment profiles, flashings, drip flashings and metal closers and to the acceptance of the Architect.

10). Installation shall be carried out by a Contractor approved by the sheeting manufacturer.

Roof Sheeting

K31.104

RF-01: Metal Profiled Concealed Fixed Roof Sheeting with insulation

- a. Concealed fix steel sheet roof cladding system.
 - 1). Type: 0.53mm thick standing seam metal double-interlocking concealed fix profiled roofing.
 - 2). Supporting structure: Purlins to the Structural Engineer's details.
 - 3). Manufacturer: Salfintra or equally approved
 - 4). Product: Salfintra Saflok 700 - 0.53mm thick ColorPlus,, or acceptable equivalent.
 - 5). A certificate verifying compliance shall be issued by the manufacturer.
 - 6). Profile: The profile shall be roll formed with 4 ribs and centres not exceeding 233mm and a cover width not exceeding 700mm
 - 7). Colour: Raincloud
 - a). Outer colour: As shown on the Finishes Schedule.
 - b). Underside colour: As shown on the Finishes Schedule.
 - 8). Fixing: concealed clips
 - a). Fixing shall be in strict accordance with manufacturer's recommendations and specifications.
 - b). Fixing shall be carried out by a Contractor approved by the sheeting manufacturer.
 - c). The sheets shall be fixed to every purlin by means of patented SAFLOK 700 clip, having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs.
 - 9). Flashings:
 - a). Flashings specifications shall be to the Global Roofing Solutions standards.
 - b). Flashings to be fixed to the sheeting with S10 brackets. or sliding brackets

at apex where roof sheets are 30m or longer.

c). Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet.

d). The trough shall be lipped at the eaves end to form a drip.

e). Transverse flashing flanges shall be notched to the sheet profile where necessary.

f). All these operations must be performed with special tools available from Global Roofing Solutions.

10). At the juncture between the roofing and the skylight, ensure that the entire installation is watertight and part of the required guarantee.

Accessories

K31.105 RFC-941: Barge Flashing

a. Barge flashing as shown on the Contract Drawings.

1). Thickness: 0.8mm.

2). Colour: As shown on the Finishes Schedule.

K31.106 RFC-943: Apex Flashing

a. Apex flashing as shown on the Contract Drawings.

1). Thickness: 0.8mm.

2). Colour: As shown on the Finishes Schedule.

K31.107 RFC-945: Back Flashing to Existing Sheet Metal Roof

a. Back flashing to existing sheet metal roof as shown on the Contract Drawings.

1). Thickness: 0.8mm.

2). Colour: As shown on the Finishes Schedule.

Insulation

K31.109 INS-123: 135mm Over Purlin Glasswool Insulation

a. Non-combustible, lightweight glass wool insulation with reinforced silver foil facing on one side and white foil facing on the other. Reflective silver layer to face the outside and to butt up against the underside of the roof sheeting firmly.

1). Indicative manufacturer: Saint Gobain, Isover South Africa (Pty) Ltd, Tel +27

(0) 86 047 6837, or acceptable equivalent.

2). Indicative product: Factorylite glass wool insulation with reinforced foil facing, or acceptable equivalent.

3). Thickness: 135mm.

4). Thermal performance, R value: $3.46\text{m}^2\text{K}/\text{W}$.

5). Straining wires at 300mm centres.

6). Installation to be strictly in accordance with the manufacturer's recommended procedures and details.

7). Support/ Fixing: Suspended below sheeting, over purlin after tensioning with hoop irons.

Isolating Tape

K31.110 Isolating Tape

a. A type recommended for the purpose by the manufacturer. Apply to those surfaces of supports that would otherwise be in contact with works or accessories after fixing.

Profile Fillers

K31.111 Profile Fillers

a. Type(s) supplied by the manufacturer accurately matching sheet profile and

perforated for ventilation and drainage of condensation at centres of crowns/ troughs as appropriate.

b. Width of fillers: Equal to width of supports unless specified otherwise.

c. Fill every profile above specified supports, bonding into position with adhesive recommended by the profile filler manufacturer.

K31.112 Fire Resisting Profile Fillers

a. Type(s) supplied by the manufacturer accurately matching sheet profile.

b. Width of fillers: Equal to width of supports unless specified otherwise.

c. Fill every profile above specified supports, bonding into position with adhesive recommended by the profile filler manufacturer.

Preformed Pipe Flashings

K31.113 Pipe Flashings

a. Manufacturer: New Aloe Fastening C.C. Tel: 011 835-2171/3.

b. Product: Dektite Pipe Flashing or other acceptable equivalent.

c. Install in accordance with the manufacturer's instructions.

d. Fix to decking with Teks self-drilling fasteners.

K31.114 RF-03: Metal Profiled Concealed Fixed Roof Sheeting without insulation

a. Concealed fix steel sheet roof cladding system.

1). Type: 0.53mm thick standing seam metal double-interlocking concealed fix profiled roofing.

2). Supporting structure: Purlins to the Structural Engineer's details.

3). Manufacturer: Safintra or equally approved

- 4). Product: Safintra Saflok 700 - 0.53mm thick ColorPlus,, or acceptable equivalent.
- 5). A certificate verifying compliance shall be issued by the manufacturer.
- 6). Profile: The profile shall be roll formed with 4 ribs and centres not exceeding 233mm and a cover width not exceeding 700mm
- 7). Colour: Raincloud
 - a). Outer colour: As shown on the Finishes Schedule.
 - b). Underside colour: As shown on the Finishes Schedule.
- 8). Fixing: concealed clips
 - a). Fixing shall be in strict accordance with manufacturer's recommendations and specifications.
 - b). Fixing shall be carried out by a Contractor approved by the sheeting manufacturer.
 - c). The sheets shall be fixed to every purlin by means of patented SAFLOK 700 clip, having spurs which will securely hold the sheets in position and lock-in the sidelap and both centre ribs.
- 9). Flashings:
 - a). Flashings specifications shall be to the Global Roofing Solutions standards.
 - b). Flashings to be fixed to the sheeting with S10 brackets. or sliding brackets at apex where roof sheets are 30m or longer.
 - c). Prior to flashings being fixed, all troughs at the apex shall be stop-ended to the full depth of the sheet.
 - d). The trough shall be lipped at the eaves end to form a drip.
 - e). Transverse flashing flanges shall be notched to the sheet profile where

necessary.

f). All these operations must be performed with special tools available from Global Roofing Solutions.

10). At the juncture between the roofing and the skylight, ensure that the entire installation is watertight and part of the required guarantee.

Accessories

K31.115 RFC-941: Barge Flashing

a. Barge flashing as shown on the Contract Drawings.

1). Thickness: 0.8mm.

2). Colour: As shown on the Finishes Schedule.

K31.116 RFC-943: Apex Flashing

a. Apex flashing as shown on the Contract Drawings.

1). Thickness: 0.8mm.

2). Colour: As shown on the Finishes Schedule.

K31.117 RFC-945: Back Flashing to Existing Sheet Metal Roof

a. Back flashing to existing sheet metal roof as shown on the Contract Drawings.

1). Thickness: 0.8mm.

2). Colour: As shown on the Finishes Schedule.

K31.118 QUALITY AND WORKMANSHIP

Submittals

K31.119 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

K31.120 Tender Samples

- a. Not required.

K31.121 Benchmark Requirements

- a. Provide the following quality benchmarks:

- 1). First 10m² of works of each type in location to be agreed.

Accuracy

K31.122 Installation Tolerances

- a. Line and level to be within 2mm of the specified level. The cumulative slope between the same locations on any panel not to exceed 1 in 1000.

- b. Comply with the requirements of SANS 10155.

Structural Performance Requirements

K31.123 Specific Movements Loads and Deflections

- a. Refer to the Structural Engineer's Specification and Structural Movements and Tolerances Report.

- b. Accommodate all tolerances and movements of the building structure, including dead, live, seismic and wind loads plus moisture, shrinkage, creep and thermal effects, without damage or any reduction in the performance of the works.

- c. Expansion and movement joints shall accommodate the appropriate range of movement.

- d. The Contractor to be responsible for determining the requirement for and location of movement joints, whether indicated on the Contract Drawings or not.

- e. The works to accommodate:

- 1). Known impact loads, or transferred impact loads, that occur during service life.
- 2). Loads imposed during maintenance.

K31.124 Wind Loads

- a. Wind loading shall be accommodated safely, without detriment to the overall design, structural integrity and performance of the works.
- b. Design Wind Pressures: Determine precise wind load values in accordance with SANS 10160.
- c. Calculated pressure loads shall include the effect of internal air pressures within the building, taking into account the presence of significant openings, which might arise occasionally within the building enclosure.

Environmental Performance Requirements

K31.125 Thermal Movement

- a. All components shall resist thermal movement resulting from the maximum and minimum surface temperature differentials occurring. The design shall cater for all temporary and permanent conditions envisaged for the works.
- b. The service temperature range for components of the works to be taken as -10°C and +90°C.
- c. Thermal movements shall not result in audible noise.

K31.126 Moisture Movement

- a. The works shall withstand movement of the structure without permanent deformation or any reduction in the specified performance.
- b. Changes in moisture content of components shall not affect the works.
- c. Expansion of absorbed or retained moisture caused by freezing shall not affect the

works.

K31.127 Condensation

a. Condensation shall not form within the slab or on the interior surfaces of the roof structure.

b. Vapour barrier shall be provided as necessary.

K31.128 Water Penetration Resistance

a. Prevent water leakage through the works.

b. Lay to sufficient falls to ensure effective disposal of water to outlets provided.

Fire

K31.129 Combustion

a. Fire Resistance: The works shall incorporate materials of limited combustibility, which will not give off toxic fumes.

K31.130 Fire Penetration and Spread of Flame

a. Materials shall provide a minimum fire penetration and surface spread of flame to SANS 10177.

Testing

K31.131 Testing

a. Pressure hose test the completed installation to ensure that water penetration onto internal surfaces, or into cavities not designed to be wetted, does not occur under site exposure conditions.

K31.132 Performance under Testing

a. There shall be no leakage through the roofing/ cladding at any time during the test.

b. At completion of the test there shall be no standing water in locations intended to

remain dry.

c. Certify the waterproof integrity of the roofing/ cladding.

Certificate

K31.133

Certificate

a. Provide certificate from the sheeting supplier confirming the thickness of hot dip galvanising.

Installation

K31.134

Workmanship

a. Comply with the requirements of SANS 10237.

b. Cut roofing sheets to give clean, true lines with no distortion. Remove burrs and any lubricant.

c. Cut openings in sheets for outlets, vent pipes, flues, etc., to the minimum size necessary.

d. Reinforce edges of all openings with trimming plates.

e. Drill all holes. Holes for main fixings to be 1.5mm larger than diameter of fastening unless self-drilling type with pilot points is used.

f. Remove all drilling swarf, dust and any other foreign matter before placing any membranes or insulation.

g. Lay sheets in single lengths where possible.

h. Provide side and head laps as recommended by sheeting manufacturer.

i. Lay side laps away from prevailing storm winds.

j. Paint two full coats of bituminous paint to all steelwork in contact with aluminium.

k. The finished work to be square, regular, true to line, level and plane, with a satisfactory

fit at all junctions.

Attachment

K31.135

Attachment

- a. Install all fixing bolts and anchors in accordance with the manufacturer's recommended procedures.
- b. Drill holes for primary fastenings 1.5mm larger than the diameter of the fastening unless self-drilling type with pilot point is used.
- c. Do not use Drive screws.
- d. Main fixings: Fix decking to every support through every second rib of profile. Fully support end caps.
- e. Side lap stitching: Stitch sheets together along all side laps in rib of profile at not more than 500mm centres with stitching screws and bonded washers.
- f. On completion check tightness of fixings and ensure that decking is not buckled or distorted.

Insulation

K31.136

Insulated Wall Lining

- a. Place vertically against girts.
- b. Support all edges with extruded H sections.
- c. Screw or pop rivet supports to girts.

K31.137

Foil/ Air Cushion Insulation

- a. To be installed before roof sheeting, over purlins.
- b. Install 14 gauge galvanised straining wires at 275mm centres.
- c. Fix to top purlin with hoop iron. Pull taut to eaves and fix with hoop iron.

- d. Allow 150mm overlap to each edge. Position straining wires to support overlaps.
- e. Replace torn or damaged sheets.

Fillers

K31.138

Profile Fillers

- a. Locate where shown on drawings and wherever necessary to close off corrugation cavities from the outside and inside of the building. Ensure a tight fit and leave no gaps.
- b. At sealed laps, bed profile fillers in sealant on top and bottom surfaces but do not obstruct channels for ventilation or condensation drainage.
- c. Close cavities at hips/ valleys with blocks cut from standard perforated profiled strips. Position blocks at right angles to troughs, equidistant from edge of sheet in sawtooth formation and bed in sealant on top and bottom surfaces. Ensure that seal is continuous from block to block.
- d. Fix in positions shown on the Shop Drawings/ Working Drawings, leaving no gaps and using an adhesive recommended by the profile filler manufacturer.

Lightning Protection and Earth Bonding

K31.139

General

- a. Bonding is required between individual sections of cladding, in accordance with SANS 10313.
- b. Ensure continuity between adjacent sections, both vertically and horizontally over the whole roofing/ cladding.
- c. Bonding between sections to have a minimum cross section of 50mm². Any bolts used for bonding to be of a minimum size of M10.

Protection

K31.140**Protection**

- a. Protect sheets adequately during fixing and up to Practical Completion against mechanical damage, corrosion and disfigurement.
- b. The works, when installed, not to be subject to warping or twisting, to be strictly rigid, firm, free from vibration, knocking, rattles, squeaks and other noises when subject to the worst combination of environmental conditions and wind loads.
- c. Do not use roof areas for storage of materials and provide protection from following trades.
- d. Use roof boards where access is required after completion.

Completion**K31.141****Completion**

- a. Examine all roofwork and cladding at completion; make good any gaps, holes and other defects.
- b. Leave the whole watertight and provide a guarantee against defects for one complete rainy season.

Storage**K31.142****Storage**

- a. Provide well ventilated covered storage.
- b. Adequately secure stored sheets/ panels to prevent wind and mechanical damage.
- c. Stack corrugated galvanised sheeting on end under cover.
- d. Store metal sheets and panels under cover to keep dry and prevent rust staining.
- e. Store on firm level bearers spaced at 900mm maximum centres. Limit height of stacks to avoid distortion.

- f. Store plastics sheets/ rooflights weather side up, under cover and on firm level bearers. Stack no higher than 1m. Prevent mechanical damage and solar overheating.
- g. Separate sheets and protect unfixed sheets from moisture.
- h. All finished components to be carefully packed in stillages or crates such that they are suitably separated and protected to prevent scratching, scuffing or other surface damage.
- i. Remove from the site all galvanised sheets affected by white rust.
- j. Protect all sheets during transport, storage and erection from damage.

END OF SECTION

K32 POLYCARBONATE SHEET COVERING

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

K32.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

K32.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

K32.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Polycarbonate roofing.

K32.103 RF-02: Polycarbonate Roof Cladding

a. Polycarbonate horizontal cladding system. The roofing contractor to design the support structure to meet the architectural design intent.

1). Background: As shown on the Contract Drawings.

2). Supporting structure: As shown on the Structural Engineer's documentation

and to be agreed with supplier.

3). Supplier: Safintra or equally approved.

4). Product: SUNLOCK (Suntuf 10000), or acceptable equivalent.

a). Panel type: Standing seam to match roof profile

b). Colour: Clear.

c). Panel size:

i. Width: 732mm.

ii. Thickness: 1-1.25mm.

iii. Length: As shown on the Contract Drawings.

5). Fixing:

a). as per supplier recommendation.

b). Apply sealing tape over the SUNTUF panel side-lap corrugation crests, where covered by the next panel.

c). Apply sealing tape along the bottom and top End-lap (if there is), along screws centreline or two tapes on both sides of screw centreline.

d). Pre-drill 10mm holes at crests where screws are positioned Start fastening the screws from the first side-lap (left) through the pre-drilled holes. Start fastening the screws on the lower edge purlin (End-lap), as shown in drawing (1). Fasten screws at the Mid purlins, at each corrugation crest, starting at the same side (2). Do not over-tighten

e). All fixing and joining to be in accordance with the manufacturers written recommendations and to the acceptance of the Architect.

6). Installation shall be carried out by a Contractor approved by the sheeting supplier.

Materials

Accessories

K32.104 Accessories

a. Cappings, closure pieces, flashings, trims, sills, gutters, fillers, spacers, tapes, sealants, fixings, etc., where not specified, to be types recommended by sheeting manufacturer.

Flashings

K32.105 Aluminium Flashings

a. Aluminium flashings to be fabricated from aluminium alloy sheets a minimum of 2mm thick sheet complying with EN 485, EN 515 and EN 573 in a grade and temper suitable for the particular type of application and degree of forming to be used, or Alucomat or acceptable equivalent.

b. Provide anti-drumming insulation on the protected face.

c. Thickness: aluminium sheet shall be sufficiently thick to provide a visually flat surface and to eliminate excessive distortion and permanent deformation caused by solar radiation.

d. Flashings to be polyester powder coated as Section Z31 of the Specification.

e. Externally exposed flashings to have continuation and interconnecting joints fully complying with the sealant manufacturer's written recommendations for movement joints; simple butt straps are not acceptable.

Isolating Tape

K32.106 Isolating Tape

a. A type recommended for the purpose by the manufacturer. Apply to those surfaces of supports that would otherwise be in contact with works or accessories after fixing.

Fasteners

K32.107 Fastenings Generally

a. Type(s), size(s), material(s) and finish(es) to be as recommended for the purpose by the cladding manufacturer.

K32.200 QUALITY AND WORKMANSHIP

Submittals

K32.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

K32.202 Tender Samples

a. Not required.

K32.203 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First 10m² of works of each type in location to be agreed.

Accuracy

K32.204 Installation Tolerances

a. Line and level to be within 2mm of the specified level. The cumulative slope between the same locations on any panel not to exceed 1 in 1000.

b. Comply with the requirements of SANS 10155.

Structural Performance Requirements

K32.205 Specific Movements Loads and Deflection

a. Refer to the Structural Engineer's Specification and Structural Movements and Tolerances Report.

b. Accommodate all tolerances and movements of the building structure, including dead, live, seismic and wind loads plus moisture, shrinkage, creep and thermal effects, without damage or any reduction in the performance of the works.

c. Expansion and movement joints shall accommodate the appropriate range of movement.

d. The Contractor to be responsible for determining the requirement for and location of movement joints, whether shown on the Contract Drawings or not.

e. The works to accommodate:

1). Known impact loads, or transferred impact loads, that occur during service life.

2). Loads imposed during maintenance.

K32.206 Wind Loads

a. Wind loading shall be accommodated safely, without detriment to the overall design, structural integrity and performance of the works.

b. Design Wind Pressures: Determine precise wind load values in accordance with SANS 10160, as agreed with the Structural Engineer.

c. Calculated pressure loads shall include the effect of internal air pressures within the building, taking into account the presence of significant openings, which might arise occasionally within the building enclosure.

Environmental Performance Requirements

K32.207 Thermal Movement

a. All components shall resist thermal movement resulting from the maximum and minimum surface temperature differentials occurring. The design shall cater for all temporary and permanent conditions envisaged for the works.

b. The service temperature range for components of the works to be taken as -10°C and +90°C.

c. Thermal movements shall not result in audible noise.

K32.208 Moisture Movement

a. The works shall withstand movement of the structure without permanent deformation or any reduction in the specified performance.

b. Changes in moisture content of components shall not affect the works.

c. Expansion of absorbed or retained moisture caused by freezing shall not affect the works.

K32.209 Condensation

a. Condensation shall not form within the slab or on the interior surfaces of the roof structure.

K32.210 Water Penetration Resistance

a. Prevent water leakage through the works.

b. Lay to sufficient falls to ensure effective disposal of water to outlets provided.

Fire

K32.211 Combustion

a. Fire Resistance: The works shall incorporate materials of limited combustibility, which will not give off toxic fumes.

K32.212 Fire Penetration and Spread of Flame

a. Materials shall provide a minimum fire penetration and surface spread of flame to SANS 10177.

Testing

K32.213 Testing

a. Pressure hose test the completed installation to ensure that water penetration onto internal surfaces, or into cavities not designed to be wetted, does not occur under site exposure conditions.

K32.214 Performance under Testing

- a. There shall be no leakage through the roofing/cladding at any time during the test.
- b. At completion of the test there shall be no standing water in locations intended to remain dry.
- c. Certify the waterproof integrity of the roofing/ cladding.

Warranties

K32.215 Warranties

- a. Provide 10 year warranties for materials and workmanship.

Installation

K32.216 Workmanship

- a. Comply with the requirements of SANS 10237.
- b. Cut openings in sheets for outlets, vent pipes, flues, etc., to the minimum size necessary.
- c. Reinforce edges of all openings with trims as recommended by the manufacturer to the acceptance of the Architect.
- d. Lay sheets in single lengths where possible.
- e. The finished work to be square, regular, true to line, level and plane, with a satisfactory fit at all junctions.

Attachment

K32.217 Attachment

- a. Install all fixing bolts and anchors in accordance with the manufacturer's recommended procedures.
- b. On completion check tightness of fixings and ensure that cladding is not buckled or distorted.

Protection

K32.218 Protection

- a. Protect sheets adequately during fixing and up to Practical Completion against mechanical damage, corrosion and disfigurement.
- b. The works, when installed, not to be subject to warping or twisting, to be strictly rigid, firm, free from vibration, knocking, rattles, squeaks and other noises when subject to the worst combination of environmental conditions and wind loads.
- c. Do not use roof areas for storage of materials and provide protection from following trades.
- d. Use roof boards where access is required after completion.

Completion

K32.219 Completion

- a. Examine all roofwork and cladding at completion; make good any gaps, holes and other defects.
- b. Leave the whole watertight and provide a guarantee against leakage defects for one complete rainy season.

Storage

K32.220 Storage

- a. Provide well ventilated covered storage.
- b. Adequately secure stored sheets/panels to prevent wind and mechanical damage.
- c. Store polycarbonate sheets and panels under cover to keep dry and prevent staining and soiling,
- d. Store on firm level bearers spaced at 900mm maximum centres. Limit height of stacks to avoid distortion.
- e. Store plastics sheets/ rooflights weather side up, under cover and on firm level bearers. Stack no higher than 1m. Prevent mechanical damage and solar overheating.
- f. Separate sheets and protect unfixed sheets from moisture.
- g. All finished components to be carefully packed in stillages or crates such that they are suitably separated and protected to prevent scratching, scuffing or other surface damage.
- h. Protect all sheets during transport, storage and erection from damage.

END OF SECTION

L21 **TIMBER DOORS/ FRAMES**

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

L21.100 **MATERIALS AND PRODUCTS**

L21.101 **Prescriptive Works**

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

L21.102 **Section Coverage**

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides requirements with respect to the following:

- 1). Semi-Solid timber doorsets - Timber frame.
- 2). Timber doorsets - Metal frame.
- 3). Fire resistant doorsets.

1. Semi-Solid Timber Doorsets - Timber Frame

L21.103 **DRT-111: Laminated semi-solid timber framed single leaf doorset - Timber Frame – D1**

- a. Laminated semi-solid timber single door with solid timber frame.
 - 1). As door type(s): D1 as shown on the Project Door Schedule.
 - 2). Size and configuration: As shown on the Project Door Schedule.
 - 3). Manufacturer: tbc
 - 4). Product: To be confirmed.
 - 5). SANS 545 classification:
 - a). Performance: Heavy duty.
 - b). Exposure: Internal
 - 6). Door leaf:
 - a). Type: Laminated semi-solid timber, flush panel, single door with hardwood edgings all round.
 - b). Configuration: Single leaf, single swing.
 - c). Material: To be confirmed.
 - d). Edges: 25mm concealed hardwood edge.
 - e). Thickness: 44mm.
 - f). Facing: *Rovere Valdweg Alevé* woodgrain laminate to all faces of door leaf.
 - g). Thickness: 0.7mm
 - 7). Frame: 44x69mm solid Light Oak frame to receive oil finish.
 - a). Rebates: 45 x 15mm.
 - b). Finish: Jax Oleum – Corn Silk
 - 8). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.103

DRT-112: Laminated semi-solid timber framed single leaf doorset - Timber Frame – D2

- a. Laminated semi-solid timber single door with solid timber frame.
 - 1). As door type(s): D2 as shown on the Project Door Schedule.
 - 2). Size and configuration: As shown on the Project Door Schedule.
 - 3). Manufacturer: To be confirmed.
 - 4). Product: To be confirmed.
 - 5). SANS 545 classification:
 - a). Performance: Heavy duty.
 - b). Exposure: Internal.
 - 6). Door leaf:
 - a). Type: Laminated semi-solid timber, flush panel, single door with hardwood edgings all round.
 - b). Configuration: Single leaf, single swing.
 - c). Material: To be confirmed.
 - d). Edges: 25mm concealed hardwood edge.
 - e). Thickness: 44mm.
 - f). Facing: *Rovere Valdweg Alevé* woodgrain laminate to all faces of door leaf.
 - g). Thickness: 0.7mm
 - 7). Frame: 44x69mm solid Light Oak frame to receive oil finish.
 - a). Rebates: 45 x 15mm.
 - b). Finish: Jax Oleum – Corn Silk
 - 9). Architrave: Custom architrave as shown on the Contract Drawings and the Project Door Schedule.

10). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

**L21.104 DRT-113: Laminated semi-solid timber framed single leaf doorset - Timber Frame
with fixed glass side panel – D6**

a. Laminated semi-solid timber, flush panel, single door with hardwood edgings all round. With solid timber frame to accommodate full height glass fixed panel.

1). As door type(s): D6 As shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: To be confirmed.

4). Product: To be confirmed.

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: Internal.

6). Door leaf:

a). Type: semi-solid timber, flush panel, single door with hardwood edgings all round.

b). Configuration: Single leaf, single swing.

c). Material: To be confirmed.

d). Edges: 25mm concealed hardwood edge.

e). Thickness: 44mm.

f). Facing: *Rovere Valdweg Aleve* woodgrain laminate to all faces of door leaf.

g). Thickness: 0.7mm

7). Frame:

a). 44x69mm solid Light Oak frame to receive oil finish. Frame to accommodate full height fixed glass panel.

b). Rebates: 45 x 15mm.

8). Finish: Jax Oleum – Corn Silk

9). Architrave: Custom architrave as shown on the Contract Drawings and the Project Door Schedule.

10). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.105

DRT-114: Laminated semi-solid timber framed single leaf doorset - Timber Frame – D10

a. Laminated semi-solid timber, flush panel, single door with hardwood edgings all round.

1). As door type(s): D10 as shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: To be confirmed.

4). Product: To be confirmed.

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: Internal.

6). Door leaf:

a). Type: Semi-solid timber, flush panel, single door with hardwood edgings all round.

b). Configuration: Single leaf, single swing.

c). Material: To be confirmed.

d). Edges: 25mm concealed hardwood edge.

e). Thickness: 44mm.

f). Facing: *Rovere Valdweg Aleve* woodgrain laminate to all faces of door leaf.

- g). Thickness: 0.7mm
- 7). Frame: 44x69mm solid Light Oak frame to receive oil finish.
 - a). Rebates: 45 x 15mm.
 - 8). Finish: Jax Oleum – Corn Silk
 - 9). Architrave: Custom architrave as shown on the Contract Drawings and the Project Door Schedule.
 - 10). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.
 - 11). Louvre:
 - a). Material: To be confirmed.
 - b). Finish: Powder coated, colour: RAL 7043.
 - c). Size: To be confirmed by Mechanical Engineer.

L21.106 DRT-115: Acoustic Laminated solid timber framed double leaf doorset - Timber Frame – D12

- a. Solid timber, sound stop dbl door with light oak edgings all round and Light Oak frame to receive oil finish.
 - 1). As door type(s): D12 as shown on the Project Door Schedule.
 - 2). Size and configuration: As shown on the Project Door Schedule.
 - 3). Manufacturer: To be confirmed.
 - 4). Product: To be confirmed.
 - 5). SANS 545 classification:
 - a). Performance: Heavy duty.
 - b). Exposure: Internal.
 - 6). Door leaf:

a). Type: Solid timber, flush panel, sound stop double door with Light Oak edgings all round.

b). Configuration: double leaf, single swing.

c). Material: To be confirmed.

d). Edges: 25mm concealed Light Oak edges all round.

e). Thickness: 44mm.

f). Facing: *Rovere Valdweg Aleve* woodgrain laminate to all faces of door leaf.

g). Thickness: 0.7mm

h). Acoustic rating: Rw 40 – Rw 45

i). Fire rating: Non-rated

7). Frame: 44x69mm solid Light Oak frame to receive oil finish.

a). Rebates: 45 x 15mm.

8). Finish: Jax Oleum – Corn Silk

9). Architrave: Custom architrave as shown on the Contract Drawings and the Project Door Schedule.

10). Ironmongery/accessories: As shown on the Project Ironmongery Schedule. Door to receive floor springs as per Architect's details and specification.

L21.107

DRT-116: Laminated semi-solid timber framed single leaf doorset - Timber Frame – D17

a. Laminated semi-solid timber single door with solid timber frame.

1). As door type(s): D17 as shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: tbc

- 4). Product: To be confirmed.
- 5). SANS 545 classification:
 - a). Performance: Heavy duty.
 - b). Exposure: Internal
 - c). Acoustic rating: Non-rated.
 - d). Fire rating: Non-rated.
- 6). Door leaf:
 - a). Type: Laminated semi-solid timber, flush panel, single door with hardwood edgings all round.
 - b). Configuration: Single leaf, single swing.
 - c). Material: To be confirmed.
 - d). Edges: 25mm concealed hardwood edge.
 - e). Thickness: 44mm.
 - f). Facing: *Rovere Valdweg Aleve* woodgrain laminate to all faces of door leaf.
 - g). Thickness: 0.7mm
- 7). Frame: 44x69mm solid Light Oak frame to receive oil finish.
 - a). Rebates: 45 x 15mm.
 - b). Finish: Jax Oleum – Corn Silk
- 8). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.108

DRT-117: Laminated semi-solid timber framed single leaf doorset - Timber Frame –

D18

- a). Laminated semi-solid timber single door with solid timber frame.

- 1). As door type(s): D18 as shown on the Project Door Schedule.
- 2). Size and configuration: As shown on the Project Door Schedule.
- 3). Manufacturer: To be confirmed.
- 4). Product: To be confirmed.
- 5). SANS 545 classification:
 - a). Performance: Heavy duty.
 - b). Exposure: Internal.
- 6). Door leaf:
 - a). Type: Laminated semi-solid timber, flush panel, single door with hardwood edgings all round.
 - b). Configuration: Single leaf, single swing.
 - c). Material: To be confirmed.
 - d). Edges: 25mm concealed hardwood edge.
 - e). Thickness: 44mm.
 - f). Facing: *Rovere Valdweg Aleve* woodgrain laminate to all faces of door leaf.
 - g). Thickness: 0.7mm
- 7). Frame:
 - a). 44x69mm solid Light Oak frame to receive oil finish.
 - b). Rebates: 45 x 15mm.
 - c). Finish: Jax Oleum – Corn Silk
- 8). Architrave: Custom architrave as shown on the Contract Drawings and the Project Door Schedule.

9). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

2. Timber Doorsets - Metal Frame

L21.109

L21.210 DRT-233: Semi-solid Timber Single Leaf Doorset - Metal Frame – D7

a. Laminated semi-solid timber, double door with hardwood edgings and GMS frame.

1). As door type(s): D7 As shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: To be confirmed.

4). Product: To be confirmed.

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: External.

6). Door leaf:

a). Type: Laminated semi-solid timber door with hardwood edgings all round.

b). Configuration: Double leaf, single swing.

c). Material: To be confirmed.

d). Edges: 10mm concealed hardwood edge.

e). Thickness: 44mm.

g). Facing: *Rovere Valdweg Alevel* woodgrain laminate

i). Thickness: 0.7mm.

7). Frame: 1.6mm GMS Pressed stressed frame to receive paint finish

8). Finish:

a). Primer: Factory applied primer for site decoration as shown in Section X10 of the Specification.

b). Finishing coat: RAL 7043.

11). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.110

DRT-211: Solid Timber Single Leaf ledge and brace escape Doorset - Metal Frame - D8

a. Varikust (VKF105) Acoustic solid timber, single door with steel frame by manufacturer

1). As door type(s): D8 As shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: Varikust

4). Product: VKF105

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: External.

c). Fire Rating: Non-rated

d). Acoustic Rating: Rw 48 dB

6). Door leaf:

a). Type: . Varikust (VKF105) Acoustic solid timber, single door

b). Configuration: Single leaf, single swing.

b). Material: To be confirmed.

c). Thickness: 44mm.

d). Finish:

i). External face: Primed and painted. Refer to Paint Specification Schedule for colour.

ii). Internal face: 0.7mm *Rovere Valdweg Aleve* woodgrain laminate

7). Frame: 1.6mm GMS pressed steel frame.

8). Finish:

a). Primer: Factory applied primer for site decoration as shown in Section X10 of the Specification.

b). Finishing coat: RAL 7043.

9). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

Ironmongery to be suitable for a fire escape door.

**L21.111 DRT-212: Swartland solid Meranti frame Ledge and Brace double door - Metal Frame
- D13**

a. Swartland solid Meranti subframe ledge and brace double door with GMS frame to receive painted finish.

1). As door type(s): D13 As shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: Swartland

4). Product: Cape Culture rage (code to be confirmed)

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: External.

c). Acoustic rating: Non-rated

d). Fire rating: Non-rated

6). Door leaf:

- a). Type: Solid timber ledge and brace double door with meranti subframe.
- b). Configuration: Double leaf, single swing.
- c). Material: To be confirmed.
- d). Thickness: 44mm.
- e). Facing: To receive painted finish. Colour as per Paint Schedule.
- 7). Frame: 1.6mm GMS frame.
- 8). Finish:
 - a). Primer: Factory applied primer for site decoration as shown in Section X10 of the Specification
 - b). Finishing coat: Paint to match RAL 7043
- 9). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.112 DRT-213: Solid core timber, single door - Metal Frame – D15

- a. Solid core timber, single door with GMS frame to receive painted finish.
 - 1). As door type(s): D15 As shown on the Project Door Schedule.
 - 2). Size and configuration: As shown on the Project Door Schedule.
 - 3). Manufacturer: To be confirmed.
 - 4). Product: To be confirmed.
 - 5). SANS 545 classification:
 - a). Performance: Heavy duty.
 - b). Exposure: Internal.
 - c). Acoustic rating: Non-rated
 - d). Fire rating: Non-rated

6). Door leaf:

a). Type: Solid-core timber, single door with painted finish.

b). Configuration: Single leaf, single swing.

c). Material: To be confirmed.

d). Thickness: 44mm.

e). Facing: To receive painted finish. Colour as per Paint Schedule.

7). Frame: 1.6mm pressed steel frame.

8). Finish:

a). Primer: Factory applied primer for site decoration as shown in Section X10 of the Specification.

b). Finishing coat: Paint to match RAL 7043.

9). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.113

DRT-214: Solid core timber, single door - Metal Frame – D16

a. Solid core timber, single door with GMS frame to receive painted finish.

1). As door type(s): D16 As shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: To be confirmed.

4). Product: To be confirmed.

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: External.

c). Acoustic rating: Non-rated

d). Fire rating: Non-rated

6). Door leaf:

- a). Type: Solid-core timber, single door with painted finish.
- b). Configuration: Single leaf, single swing.
- c). Material: To be confirmed.
- d). Thickness: 44mm.
- e). Facing: To receive painted finish. Colour as per Paint Schedule.
- 7). Frame: 1.6mm pressed steel frame.
- 8). Finish:
 - a). Primer: Factory applied primer for site decoration as shown in Section X10 of the Specification.
 - b). Finishing coat: Paint to match RAL 7043.
- 9). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.
- 10). Finish:
 - a). Primer: Factory applied primer for site decoration as shown in Section X10 of the Specification.
 - b). Finishing coat: Paint to match RAL 7043.9). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

3. Fire resistant doorsets.

L21.114 DRT-230: Class B Fire Resistant Flush Timber single Doorset - Metal Frame – D4

- a. Solid core timber, single door with GMS frame to receive painted finish.
 - 1). As door type(s): D4 As shown on the Project Door Schedule.
 - 2). Size and configuration: As shown on the Project Door Schedule.
 - 3). Manufacturer: To be confirmed.
 - 4). Product: To be confirmed.

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: Internal.

c). Acoustic rating: Non-rated

d). Fire rating: Class B to SANS 1253. Stability: 120 min integrity and insulation 60 min.

Intumescent fire seals to suit fire ratings.

6). Door leaf:

a). Type: Solid-core timber, single door with painted finish.

b). Configuration: Single leaf, single swing.

c). Material: To be confirmed.

d). Thickness: 44mm.

e). Facing: To receive painted finish. Colour as per Paint Schedule.

7). Frame: 1.6mm pressed steel frame.

8). Finish:

a). Primer: Factory applied primer for site decoration as shown in Section X10 of the Specification.

b). Finishing coat: Paint to match RAL 7043.

9). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.115

DRT-231: Class B Fire Resistant Flush Timber Double Doorset - Metal Frame – D5

a. Solid core timber, double door with GMS frame to receive painted finish.

1). As door type(s): D5 As shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: To be confirmed.

4). Product: To be confirmed.

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: Internal.

c). Acoustic rating: Non-rated

d). Fire rating: Class B to SANS 1253. Stability: 120 min integrity and insulation 60 min.

Intumescent fire seals to suit fire ratings.

6). Door leaf:

a). Type: Solid-core timber, single door with painted finish.

b). Configuration: Double leaf, single swing.

c). Material: To be confirmed.

d). Thickness: 44mm.

e). Facing: To receive painted finish. Colour as per Paint Schedule.

7). Frame: 1.6mm GMS frame.

8). Finish:

a). Primer: Factory applied primer for site decoration as shown in Section X10 of the Specification.

b). Finishing coat: Paint to match RAL 7043.

9). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.116

DRT-232: Class B Fire Resistant Flush Timber single Doorset - Timber Frame – D9

a. Laminated semi-solid timber single door with solid timber frame.

1). As door type(s): D9 as shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: tbc

4). Product: To be confirmed.

5). SANS 545 classification:

a). Performance: Heavy duty.

b). Exposure: Internal

c). Acoustic rating: Non-rated.

d). Fire rating: Class B to SANS 1253. Stability: 120 min integrity and insulation 60 min.

Intumescent fire seals to suit fire ratings.

6). Door leaf:

a). Type: Laminated semi-solid timber, flush panel, single door with hardwood edgings all round.

b). Configuration: Single leaf, single swing.

c). Material: To be confirmed.

d). Edges: 25mm concealed hardwood edge.

e). Thickness: 44mm.

f). Facing: *Rovere Valdweg Alevé* woodgrain laminate to all faces of door leaf.

g). Thickness: 0.7mm

7). Frame: 44x69mm solid Light Oak frame to receive oil finish.

a). Rebates: 45 x 15mm.

b). Finish: Jax Oleum – Corn Silk

8). Ironmongery/accessories: As shown on the Project Ironmongery Schedule.

L21.117

DRT-233: Class B Fire Resistant Flush Timber Double Doorset – D14

a. Semi-solid timber, double door with hardwood edgings all round.

1). As door type(s): D14 As shown on the Project Door Schedule.

2). Size and configuration: As shown on the Project Door Schedule.

3). Manufacturer: To be confirmed.

- 4). Product: To be confirmed.
- 5). SANS 545 classification:
 - a). Performance: Heavy duty.
 - b). Exposure: Internal.
 - c). Acoustic rating: Non-rated
 - d). Fire rating: Class B to SANS 1253. Stability: 120 min integrity and insulation 60 min.
Intumescent fire seals to suit fire ratings.
- 6). Door leaf:
 - a). Type: semi-solid timber, double door with hardwood edgings all round.
 - b). Configuration: Double leaf, single swing.
 - c). Material: To be confirmed.
 - d). Edges: 25mm concealed hardwood edge.
 - e). Thickness: 44mm.
 - f). Facing: 0.7mm *Rovere Valdweg Aleve* woodgrain laminate.
- 7). Frame: 1.6mm pressed steel frame.

Accessories

L21.118 Galvanised Fixing Cramps

- a. 375 x 38 x 2mm mild steel "L" shaped galvanised to Z275.
- b. One end turned up 75mm and fixed to timber frame with No.2 sherardized wood screws.
- c. Other end fishtailed and built into brickwork.

Fixings

L21.119 Nails to SANS 820

- a. Material: Mild steel.
- b. Type: Round wire.
- c. Protection: Galvanised.

L21.120 Screws to SANS 1171

- a. Material: Brass.
- b. Head type: Countersunk, cross recessed drive.
- c. Type: To be agreed.

Adhesives

L21.121 Adhesives

- a. PVA adhesives shall comply with SANS 1348.
- b. Phenolic, aminoplastic and polyurethane adhesives shall comply with SANS 1349.
- c. Adhesives used in the manufacture of all external joinery shall be suitable for Exposure Class 1 of SANS 10183.

L21.200 QUALITY AND WORKMANSHIP

Submittals

L21.201 Tender Response

- a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

L21.202 Pre-contract Control Samples

- a. Not required.

L21.203 Control Samples

- a. Provide the following control samples:

- 1). 300 x 300mm samples of all doors.
- 2). Door frame minimum 300mm of each type.
- 3). Typical ironmongery components in the proposed materials and finishes to include operating handle, hinge and locking device.

L21.204 Benchmark Requirements

a. Provide the following quality benchmarks:

- 1). First installed of each type, in location to be agreed provide the following quality benchmark.

Moisture Content

L21.205 Moisture Contents

- a. Maintain moisture content manufacture and storage within the range specified for the component.
- b. Produce joinery in humidity conditions resembling those of the finished building.

L21.206 Moisture Content of Timber

a. Adhere to the following moisture contents for timber.

- 1). Coastal regions: 15%.

Accuracy

L21.207 Accuracy

a. Comply with the following tolerances:

- 1). Thickness: +/-1,5mm.
- 2). Width: +/-2mm.
- 3). Length: +/-2mm
- 4). Cup: 3mm maximum.

5). Bow: 5mm maximum.

6). Twist: 6mm.

Installation

L21.208 General Requirements

- a. Install all elements in the correct position, within tolerance, and in the correct relationship to the building structure.
- b. Install all fixings in accordance with the manufacturer's recommended procedures.
- c. Keep materials dry until fixed.
- d. The finished work to be square, regular, true to line, level and plane, with a satisfactory fit at all junctions.

L21.209 Building In

- a. Components that are being built in must be braced and protected as necessary to prevent distortion and damage during erection of adjacent structure.

L21.210 Fire Resisting Doorsets

- a. Completely fill gap between frame and reveal with intumescent sealant.

L21.211 Fixing

- a. Plugged and screwed items to be screwed with appropriate size and length screws to fibre or plastic plugs placed in predrilled holes in the masonry or concrete.
- b. Fix DPC with galvanised clout nails to backs of all frames that are built into external openings.

L21.212 Fixing Centres

- a. When not predrilled, position at 150mm from the ends of jambs, at hanging points and at not more than 600mm centres.

L21.213 Hanging of Doors

- a. Mortice locks to fit snugly with face plate flush with the edge of the door.
- b. Internal doors to be hung on 1 pair 100mm steel hinges.
- c. Glazed doors to be hung on 1 pair 100mm brass hinges.
- d. External doors to be hung on a minimum of 1½ pairs of 100mm brass butt hinges fixed with brass screws.

L21.214 Adjustment of Door Size

- a. Do not trim more than 10mm from the stile of an exposed edge door.
- b. Do not trim more than 3mm from the stile of a concealed edge door.
- c. Do not trim more than 10mm from the top or bottom rails.

L21.215 Priming/ Sealing

- a. Before fixing components ensure that surfaces of timber that will be inaccessible after installation are primed or sealed as specified.

L21.216 Sealant Joints

- a. Sealant for frames to be gun applied acrylic sealant, silicone or mastic where required.

L21.217 Ironmongery

- a. Assemble and fix carefully and accurately using fasteners with matching finish supplied by ironmongery manufacturer.
- b. Prevent damage to ironmongery and adjacent surfaces.
- c. At completion check, adjust and lubricate as necessary to ensure correct functioning.

Installation Tolerances

L21.218 Generally

- a. At the time of handover the visual requirements of the works to be as follows:
 - 1). The works to be straight and flat.

- 2). Gaps to head and jambs of doors to frames to be 2mm all round.
 - 3). Thresholds to have a 7mm gap where located above a carpeted floor.
 - 4). The maximum variation from plumb to be plus or minus 1.5mm.
- b. Take responsibility for checking dimensions on Site.

Protection

L21.219

Protection

- a. Do not fit any doors and ironmongery whilst "wet" trades are still in progress.
- b. Protect all built-in work and ironmongery from dirt, stains and damage until Practical Completion.
- c. Protect doors and ironmongery during construction after fitting and care taken to.
- d. Doors and ironmongery to be kept away from abrasives, acids and other corrosive materials.
- e. Ensure that all door frames have protective coverings during storage and after installation to protect factory applied finishes.

Storage & Handling

L21.220

Storage

- a. Stack 300mm above ground surface on uniform supports.
- b. Protect with tarpaulin or similar covers including sides and ends.
- c. Do not deliver to site components that cannot be put immediately into suitably dry, floored and covered storage.
- d. Stack on bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

END OF SECTION

L61 GENERAL FIXTURES/ FURNISHINGS/ EQUIPMENT

a. To be read in conjunction with Sections A and Z, the Preliminaries and Contract Conditions.

L61.100 PRODUCTS AND MATERIALS

Specification and Scope

L61.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

L61.102 Section Coverage:

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Kitchen cupboard face
- 2). Reception desk cladding
- 3). Podium/Stage

b. Ensure that all interfaces are fully co-ordinated prior to commencement.

Shelving

L61.103 JN02: Joinery cupboard doors/reception desk face

a. High Pressure Decorative Plastic Laminate on substrate

1). Manufacturer: As shown on the Finishes Schedule.

2). Product: As shown on the Finishes Schedule.

3). Size and configuration as shown on the Contract Drawings.

4). Capacity: To be agreed.

5). Carcass face/ sides

a). Suitable core material, minimum 16mm thick.

b). Material: Melamine faced, chipboard.

c). Edges: 2mm thick melamine edge strips to match board finish

d). Colour: Light oak.

L61.104 JN03: Joinery cupboard carcass

1). Carcass/Shelves:

a). Suitable core material, minimum 16mm thick.

b). Material: Melamine faced, chipboard.

c). Edging: Matching 2mm PVC edges both sides.

d). Colour: grey.

Contract Drawings.

2). Installation: In accordance with the manufacturers published recommendations

and to the acceptance of the Architect.

L61.105 JN04: Joinery skirting

1). Skirting:

a). Suitable core material, minimum 22mm thick.

b). Material: solid pine hardwood.

c). Edging: high pressure laminate where exposed.

d). Colour: Light Oak.

Contract Drawings.

2). Installation: In accordance with the manufacturers published recommendations and to the acceptance of the Architect.

L61.106 JN05: Security desk

1). Desk counter top:

a). Suitable core material, minimum 30mm thick.

b). Material: High pressure laminate, chipboard.

c). Edging: High pressure laminate where exposed.

d). Colour: Light oak.

Contract Drawings.

2). Installation: In accordance with the manufacturers published recommendations and to the acceptance of the Architect.

L61.107 JN06: Joinery stage podium finish

1). Podium/stage surface and face:

a). Format 1900x190x6mm.

b). Material: Solid engineered timber.

2). Manufacturer: As shown on the Finishes Schedule.

3). Product: As shown on the Finishes Schedule.

4). Capacity: To be agreed.

a). Colour: White oak.

Contract Drawings.

5). Installation: In accordance with the manufacturers published recommendations and to the acceptance of the Architect.

Materials

Timber Generally

L61.108 Timber

a. To be free from decay and active insect attack with no knots wider than half the section width. No knots, pitch pockets, splits and shakes will be allowed on faces to be exposed in finished work.

Softwoods

L61.109 Softwood for Framing

- a. Shall comply with the general requirements of SANS 1783: Part 1.
- b. Surface finish: Planed.
- c. Wrought exposed woodwork to a smooth surface where exposed to view.
- d. Fixing: Countersunk, screwed and filled.

Hardwoods

L61.110 Hardwood

- a. To comply with SANS 1099.
- b. Species: To be agreed.
- c. Grade: Clear.
- d. Surface finish: Planed.
- e. Fixing: Countersunk, screwed and pelleted where exposed to view.

Fibreboards

L61.111 Medium Density Fibreboard

- a. Type: Medium Density Fibreboard to comply with SANS 540.
- b. Profile and thickness: As shown on the Contract Drawings.
- c. Provide a suitable balancing paint to backs of MDF.
- d. Fixing: Countersunk, screwed and filled.

L61.112 Standard Hardboard

- a. Manufactured to SANS 540: Part 1.
- b. Type: To be agreed.
- c. Thickness: To be agreed.
- d. Grade: Standard Grade.

Laminated Boards

L61.113 Plywood

- a. Manufactured to SANS 929.
- b. Type: To be agreed.
- c. Grade: Standard Grade.
- d. Exposure Class: To be agreed.
- e. Nominal thickness: As shown on the Contract Drawings.

L61.114 Marine Plywood

- a. The board to comply with BS 1088.
- b. Supplier/ Proprietary reference: To be agreed.
- c. Thickness/ Number of plies: To be agreed.
- d. Board Grade: To be agreed.
- e. Glue type: To be agreed.

Particleboards

L61.115 Chipboard

- a. Wood chipboard to comply with SANS 50312.
- b. Supplier/ Proprietary reference: To be agreed.
- c. Type: To be agreed.
- d. Thickness: To be agreed.

L61.116 Faced Chipboard

- a. Supplier/ Proprietary reference: To be agreed.
- b. Substrate: Wood chipboard to comply with SANS 50312.
- c. Decorative facing: To be agreed.
- d. Backing: To be agreed.
- e. Thickness: To be agreed.
- f. Finish: As shown on the Project Finishes Schedule.

Plastic Laminate Faced Panels

L61.117 High Pressure Decorative Plastic Laminate Panels

- a. Laminate to comply with SANS 4586: Part 2.
- b. High pressure laminate (HPL) grade to be as appropriate to conditions of use.
- c. Thickness: To be agreed.
- d. Core material: To be agreed.
- e. Core material thickness: To be agreed.
- f. Edge treatment:
 - 1). Laminate edges with solid grade plastic laminate to match face laminate in colour and texture.
 - 2). Edges, including rebated edges, to be fully lipped and bevelled on all sides to

avoid black lines.

g. Colour: As shown on the Project Finishes Schedule.

h. Underside of panel to have a balancing laminate.

i. Maintain moisture content at appropriate levels in relation to the core material and to suit the internal environmental conditions.

Adhesives

L61.119 Adhesives

a. PVA adhesives shall comply with SANS 1348.

b. Phenolic, aminoplastic and polyurethane adhesives shall comply with SANS 1349.

c. Adhesives used in the manufacture of all external joinery shall be suitable for Exposure Class 1 of SANS 10183.

Fixings

L61.120 Nails

a. To comply with the requirements of SANS 820.

L61.121 Screws

a. To comply with the requirements of SANS 1171.

L61.200 QUALITY AND WORKMANSHIP

Submittals

L61.201 Response

a. Provide submittals in accordance with the requirements of Section A of this Specification.

Samples and Quality Benchmarks

L61.202 Pre-contract Samples

a. Not required.

L61.203 Post-contract Samples

a. Provide the following post contract samples:

1). 300 x 300mm sample of each type.

L61.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First of each type installed, in location to be agreed.

Testing

L61.205 Test Requirements

a. Provide evidence/ testing data and reports to demonstrate that all materials/ products proposed have been tested to meet the standards specified herein.

Dimensions

L61.206 Maintain

a. Within tolerance the dimensions shown in the Contract Drawings and/ or Shop Drawings/ Working Drawings of timber sub-frames, material thicknesses, the dimensions of mullions and transoms.

Moisture Content

L61.207 Moisture Contents

a. Maintain moisture content during manufacture and storage within the range specified for the component.

b. Produce joinery in humidity conditions resembling those of the finished building.

L61.208 Moisture Content of Timber

a. Adhere to the following moisture contents for timber:

1). Coastal regions: 15%.

Structural Performance Requirements

L61.209 Rigidity/ Strength

a. The design and construction to be such that they remain rigid, free from play and permanent deformation caused by the normal use to which they are subjected.

b. The works to withstand all vibration to which they are subjected either directly or indirectly or any other such shocks, strains, stresses and movements that may be imposed.

Environmental Performance Requirements

L61.210 Moisture Resistance

a. All facings, adhesives, fixings and associated elements of the boarding to have moisture resistant properties to match core materials.

b. All timber to be subjected to controlled drying to ensure that the moisture content, if not otherwise specified, is suitable for the situation of the finished joinery.

c. Provide adequate storage for all joinery components to maintain them free from damage and in conditions suitable for their required moisture content. Do not deliver joinery to Site until components can be immediately unloaded into adequate storage or fixed in position.

General Installation

L61.211 Installation

a. Do not install the works before building is weathertight, wet trades have finished their work and the building is well dried out.

b. Before, during and after installation, temperature and humidity to be maintained at

levels approximating to those that will prevail after the building is occupied.

c. Do not cut, plane or sand prefinished surfaces except where shown on the Shop Drawings/ Working Drawings.

d. Fix securely using manufacturer's fixing components without causing distortions to frames, panels and/ or doors.

e. Doors and drawers to be accurately aligned and not binding. Adjust as necessary to ensure smooth operation.

f. Ironmongery to be checked, adjusted and lubricated as necessary to ensure correct functioning.

L61.212 Fixtures/ Furnishing Systems

a. Reinforcing to be provided as required to ensure a rigid and secure assembly.

Exposed surfaces to be free from dents, tool marks, warpage, buckle, glue and open joints. All joints, corners and mitres to be accurately fitted. Fastenings to be concealed.

Threaded connections to be made up tightly so that threads are entirely concealed.

b. Accurately cut and form the materials to the required shape and profile with all exposed surfaces free from irregularities and defects. Carefully fit and match all components before assembly to maintain continuity of line between them. Provide hairline joints between contact surfaces of non-welded joints, unless shown otherwise. Complete all cutting, drilling, welding, etc., before the application of final finishes.

c. Accurately align components and rigidly secure all non-moving joints by welding or fixing with machine screws or bolts. Reinforce joints and components as necessary to achieve the required strength and provide proper joint fixing. Ensure that no areas

of unfinished material are visible in the finished work. Drive in all exposed fasteners level and flush with the adjacent surfaces. Disassemble the works only to the extent necessary to facilitate transportation to Site.

L61.213 Installation Tolerances for Fixtures/ Furnishings

- a. A high degree of accuracy to be employed in the fabrication and installation of the works and support structures.
- b. At the time of completion, the visual requirements of the works are such that within any planning grid section the allowable tolerances are achieved.
- c. On-site dimensions:
 - 1). All dimensions to be checked on Site.
 - 2). The final design to accommodate all specified tolerances and differences between actual Site dimensions and dimensions shown on the Shop Drawings/ Working Drawings.
 - 3). The works to be erected in proper alignment in relation to established lines and grades as shown on the Shop Drawings/ Working Drawings. Account to be taken of the installation tolerance requirements of the panel system such that units are accurately located.

L61.214 Ironmongery

- a. Assemble and fix carefully and accurately using fastenings with matching finish supplied by the ironmongery manufacturer and prevent damage to ironmongery and adjacent surfaces. At completion, check, adjust and lubricate as necessary to ensure correct functioning.

L61.215 Protection

- a. Do not deliver components to Site until required and do not remove protective packaging/ coverings until immediately before required for fixing.
- b. Stack boards, panels and shelving flat on bearers and separate by spacers where necessary to prevent damage.

END OF SECTION

L71 INSULATION

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

L71.100 P PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

L71.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

L71.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Insulation.

b. Ensure that all interfaces are fully co-ordinated prior to commencement.

L71.103 INS-341: Polyisocyanurate Insulation Board

a. Performance: Capable of resisting permanent deformation or damage when subjected to expected concentrated loads.

1). Indicative Manufacturer: Rigifoam (Pty) Ltd or similar and equal approved.

- 2). Indicative Product: Lambdaboard.
- 3). All grades are to be ozone friendly and do not contain HCFC's.
- 4). Thickness: 60mm.
- 5). R- Value: 2.5 m².K/W.
- 6). Installation to be strictly in accordance with the manufacturer's recommended procedures and details.
 - a). Polyisocyanurate (PIR) insulation board and any proposed adhesives must be compatible.

L71.104

INS-342: Non-combustible flexible Glasswool Insulation

a. Performance: Odourless, inert and fully compatible with all standard building materials and components, will not promote corrosion of steel, copper or aluminium, will not breed or promote fungi, mould or bacteria, non-hygroscopic, Dust settlement will not hamper the products performance.

1). Indicative Manufacturer: Isover Saint-Gobain or similar and equal approved.

2). Indicative Product: Factorylite

(WMF (White Metalised Foil)

BMF (Black Metalised Foil)

3). All grades are to be ozone friendly and do not contain HCFC's.

4). Thickness: 135mm.

5). R- Value: 3.46 m².K/W.

6). Installation to be strictly in accordance with the manufacturer's recommended procedures and details.

a). Installing the blanket over purlins ensure that the straining wires are placed 300 mm apart.

L71.105

INS-343: Reflective foil insulation

a. Performance: Light grammage, double sided reflective foil laminate

incorporating layers of aluminium foil, high strength kraft paper and reinforcing scrim bonded together with a binder.

1). Indicative Manufacturer: Sisalation or similar and equal approved.

2). Indicative Product: Sisalation FR405 or similar equal approved

3). Thickness: 340 microns.

4). R- Value: 1.38 m².K/W.

5). Installation to be strictly in accordance with the manufacturer's recommended procedures and details.

a). Installing the blanket over purlins ensure that the straining wires are placed 300 mm apart.

L71.200

QUALITY AND WORKMANSHIP

Submittals

L71.201

Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples, Mock-ups, Prototypes and Quality Benchmarks

L71.202

Pre-contract Samples

a. Not required.

L71.203

Mock-ups

a. Not required.

L71.204 Prototypes

a. Not required.

L71.205 Benchmark Requirements

a. The following quality benchmarks shall be provided in accordance with Section A of the Specification:

1). First of each type installed in location to be agreed.

Testing

L71.206 Testing

a. All materials/ products shall have been tested to demonstrate their fire properties and mechanical strength performance.

b. Where the sub-contractor/ manufacturer is unable to provide independently certified test data demonstrating compliance with the specification, then testing of the prototypes/materials is to be undertaken.

L71.207 Testing Requirements

a. Include for testing by an accredited independent testing specialist or provide independently certified test data to demonstrate compliance with the Specification.

b. The provision of testing data or the carrying-out of tests does not relieve the Contractor of his responsibilities regarding the performance requirements, durability or service life requirements, etc.

L71.208 Cleaning

a. Upon completion of operations in each containable area of the project, remove overspray and fall out of materials from adjacent surfaces and clean exposed surfaces

to remove evidence of soiling.

END OF SECTION

M10 PLASTERBOARD DRY LININGS/ PARTITIONS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

M10.100 GENERAL

Specification and Scope

M10.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

M10.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Plasterboard linings.
- 2). Plasterboard partitions.

Plasterboard Dry Linings

M10.103 DW01: 90mm Plasterboard Partition System

a. Metal stud framework with top and bottom tracks as shown on the Contract Drawings.
Studs clad both sides with one layer of standard grade plasterboard.

- 1). Fire resistance: Not required.
- 2). Acoustic rating: 30 RwdB.
- 3). Framework:
 - a). Indicative Manufacturer: Saint-Gobain Isover or similar and equal approved.
 - b). Indicative Product: Drywall Ultrasteel studwork.
 - c). Material: Hot dipped galvanised mild steel.
 - d). Top and bottom track size: 63.5 x 0.4mm.
 - e). Stud size: 63.5 x 04mm.
 - f). Studwork centres: 600mm.
 - g). Head tracks to be adequately braced to ensure structural rigidity and support of the ceiling.
- 4). Insulation: Not required.
- 5). Plasterboard:
 - a). Indicative Manufacturer: Saint-Gobain Isover or similar and equal approved.
 - b). Indicative Product: Gyproc Rhinoboard standard grade plasterboard, or acceptable equivalent.
 - c). Standard: To comply with SANS 266.
 - d). 1 No. layers plasterboard to each side of studwork.
 - e). Thickness: 12.5mm.
 - f). Edge profile: Tapered edge.
 - g). Fixing:
 - i. 25mm drywall screws into studs, at maximum 220mm centres with top most screw fixed 25mm from bottom of track flange.

ii. Wafer head drywall screws for channel to bracket fixings.

6). Jointing: All joints to be taped and filled for seamless jointing.

7). Finish:

a). 3mm lightweight retarded hemi hydrate gypsum plaster as Section R20 of this Specification.

b). Painted as Section X10 and on the Finishing Schedule.

M10.104 DW02: 120mm 120min Fire Rated Secure Plasterboard Partition installed above walls to underside of roof soffit

a. Metal stud framework with top and bottom tracks as shown on the Contract Drawings.

Studs clad both sides with two layers of fire resistant plasterboard and galvanised steel sheet between the layers.

1). Fire resistance: 120 minutes for complete partition assembly when tested to SANS 10177.

2). Acoustic rating: 51 RwdB.

3). Framework:

a). Indicative Manufacturer: Saint-Gobain Isover or similar and equal approved.

b). Indicative Product: Drywall Ultrasteel studwork, or acceptable equivalent.

c). Material: Hot dipped galvanised mild steel.

d). Top and bottom track:

i. Size: 63.5 x 35mm.

ii. Fixing: As shown on the Contract Drawings and to the acceptance of the Structural Engineer.

iii. Deflection Head Detail to be used on top track. Ensure allowance for

deflection between top track and gypsum board fillers as

recommended by the drywall manufacturer.

e). Stud size: 63.5 x 35mm.

f). Studwork centres: 600mm.

4). Plasterboard:

a). Indicative Manufacturer: Saint-Gobain Isover or similar and equal approved.

b). Indicative Product: Gyproc RhinoBoard FireStop board, or acceptable equivalent.

c). Standard: To comply with SANS 266.

d). 2 No. layers of plasterboard to each side of studwork with staggered joints

e). Thickness: 12.5mm.

f). Galvanised steel sheet sandwiched between layers of gypsum board.

g). Edge profile: Tapered edge.

h). Apply fibre scrim tape to taper edged joints and skim joints.

i). Fixing:

i. 25mm drywall screws into studs, at maximum 220mm centres with top most screw fixed 25mm from bottom of track flange.

ii. 41mm drywall screws into studs, at maximum 220mm centres to outer boards.

iii. Wafer head drywall screws for channel to bracket fixings.

5). Steel sheet: 0,5mm thick galvanised steel sheet to SANS 3575.

6). Jointing: To meet the service conditions and to the acceptance of the Architect.

7). Finish: To be agreed.

8). Provide intumescent and acoustic rated sealant to perimeter condition of

partition to the acceptance of the Architect.

M10.105 DW03: 90-120mm Plasterboard Partition System With Glasroc x board for external applications

a. Two sets of metal stud framework with top and bottom tracks as shown on the Contract

Drawings. Exterior of studs clad both sides with one layers of standard grade

Plasterboard internal and HDPE membrane on Glasroc X Board external.

1). Fire resistance: Not required.

2). Acoustic rating: 45 RwdB.

3). Framework:

a). Type: Two sets of framework on vibration isolation pads installed parallel to each other with two layers of standard grade plasterboard fixed to both external sides.

b). Indicative Manufacturer: Saint-Gobain Isover or similar and equal approved.

c). Indicative Product: Drywall Ultrasteel studwork.

d). Material: Hot dipped galvanised mild steel.

e). Top and bottom track size: 63.5 x 0.4mm.

f). Stud size: 63.5 x 04mm.

g). Studwork centres: 600mm.

h). Bracing channels between twin frames as shown on the Contract Drawings.

i). Head tracks to be adequately braced to ensure structural rigidity and support of the ceiling.

4). Insulation:

- a). Indicative Manufacturer: 102mm Saint-Gobain Isover or similar and equal approved.
 - b). Indicative Product: Cavitylite.
 - c). Nominal density: 14kg/m³.
 - d). Acoustic fleece insulation to fill entire cavity.
- 5). Plasterboard:
- a). Indicative Manufacturer: Saint-Gobain Isover or similar and equal approved.
 - b). Indicative Product: Gyproc Rhinoboard standard grade plasterboard, or acceptable equivalent.
 - c). Standard: To comply with SANS 266.
 - d). one layer plasterboard to external sides of studwork with staggered joints.
 - e). Thickness: 12.5mm.
 - f). Edge profile: Tapered edge.
 - g). Apply fibre scrim tape to taper edged joints and skim joints.
 - h). Fixing:
 - i. 25mm drywall screws into studs, at maximum 220mm centres with top most screw fixed 25mm from bottom of track flange.
 - ii. 42mm drywall screws into studs, at maximum 220mm centres to outer boards.
 - iii. Wafer head drywall screws for channel to bracket fixings.
- 6). Acoustic door (where required): 50mm x 50mm steel H-frame post fixed to floor slab and horizontal steel support.
- 7). Jointing: To meet the service conditions and to the acceptance of the Architect.

8). Internal Finish:

a). 3mm lightweight retarded hemi hydrate gypsum plaster as Section R20 of this Specification.

b). Painted as Section X10 and on the Finishing Schedule.

9). External Finish:

a). Polyethylene (HDPE) membrane

b). 1.6mm galvanized mild steel flat mesh on 12.5 external glasroc x board with reinforced render finish.

10). Provide intumescent and acoustic rated sealant to perimeter condition of partition to the acceptance of the Architect.

M10.200 QUALITY AND WORKMANSHIP

Submittals

M10.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

M10.202 Pre-contract Samples

a. Not required.

M10.203 Post-contract Control Samples

a. Provide the following control samples:

1). 500 x 500mm sample of all plasterboard types.

2). 500mm lengths of all metal framing components.

3). Access panels, grilles, etc.

4). All fixing types.

5). All insulation material.

M10.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First structural bay of each type of partition system, in locations to be agreed.

General Installation

M10.205 Storage and Accuracy

a. Store all materials on Site in accordance with the manufacturer's written recommendations.

b. Verify dimensions and levels of the structure before installation commences.

c. Install the works square, regular to line, to give level soffits free from undulations and lipping.

M10.206 Setting Out

a. Where possible set out with single lengths across the width of the room.

b. Arrange panels symmetrically from the centre line of the room.

c. Where necessary, narrow panels are to be at the ends.

Tolerances

M10.207 Installation Tolerances

a. The partition or dry lining shall be installed vertically, deviation from vertical to be a maximum of 2mm.

b. Maintain the planning grid and distribute tolerances equally to achieve the following:

1). Straight lines and flat planes in all directions.

2). A final finished surface position within 5mm of its notional position.

- c. All dimensions to be checked on Site prior to commencement of installation.
- d. The installation to accommodate all required tolerances including differences between actual Site dimensions and dimensions shown on the Contract Drawings.
- e. Take account of the installation tolerance requirements such that repetitive units are accurately located, relative to gridlines.
- f. Erect in alignment and in relation to established lines and grades as shown on the Contract Drawings.
- g. The maximum variation in height of any part of the works from given datum to be 2mm.
- h. The maximum offset in plane, level or section between any two adjacent sections to be 2mm.
- i. The maximum variation in plan over a distance of 1800mm not to exceed 2mm.

M10.208 Fixing Requirements

- a. The fixing, jointing and finishing of the works, where not specified otherwise, to be as recommended by the board manufacturer.
- b. Boards to be fixed only in areas that have been made weathertight.
- c. Screw fix with self-locating drywall screws to metal furring channels or by cadmium plated clout headed nails to timber brading at 150mm centres.
- d. Fastenings to be evenly spaced in straight lines, in pairs across joints and set in from edge of board to prevent damage.
- e. Boards to be cut neatly and accurately without damage to core or tearing of paper facing. Keep cut edges to a minimum and position at internal angles wherever possible, with masked bound edges of adjacent boards at external corners.
- f. Fix boards securely and firmly to suitably prepared and levelled backgrounds, with

heads of fastenings set in a depression, without breaking the paper or the gypsum core. Finishes to appear flush, smooth and flat with surfaces free from bowing and abrupt changes of level. Damaged boards not to be used.

Flush Joints

M10.209 Taping and Finishing

- a. Cut edges of boards to be lightly sanded to remove paper burrs with a PVA sealer applied to exposed cut edges and any other plaster surface to which tape is applied.
- b. Fill joints and gaps, cover with continuous lengths of tape and fully bed. Where joints are to be covered with finish, feather out to provide a smooth seamless surface.
- c. Nail and screw depressions to be filled with joint filler to provide a flush and smooth surface.
- d. On completion of joint, angle and spotting treatments a surface finish to be applied to provide a continuous, consistent finish to the surface of boards.

Protection

M10.210 Protection

- a. Protect finished partition from damage or disfiguration by following trades.

Storage and Handling

M10.211 Storage

- a. Store on a level surface on bearers at 400mm centres.
- b. Protect with tarpaulin or similar covers, including sides and ends.
- c. Sheets to be conditioned on site in accordance with the manufacturer's recommendations.
- d. Carry sheets on edge.

END OF SECTION

M11 PLASTERBOARD BULKHEADS AND CEILINGS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

M11.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

M11.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

M11.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Plasterboard ceilings.
- 2). Plasterboard bulkheads.

M11.103 CT-01: Suspended Plasterboard Ceiling with render finish

a. Proprietary suspended monolithic plasterboard ceiling system including concealed suspension system, carriers, fastenings and accessories.

- 1). To comply generally with the requirements of EN 520, EN 12524.

- 2). Background: As shown on the Contract Drawings.
- 3). Nominal Zone: As shown on the Contract Drawings.
- 4). Fire resistance: Non-rated.
- 5). Acoustic rating: Non-rated.
- 6). Linings:
 - a). Indicative Manufacturer: Gyproc (Pty) Ltd or similar and equal approved.
 - b). Indicative Product: Rhinoboard standard grade plasterboard.
 - c). Gypsum plaster ceiling board manufactured to SANS 266.
 - d). Edge profile: Tapered edge.
 - e). Thickness: 12.5mm.
- 7). Jointing: Self-adhesive glass fibre tape and quick setting joint filler.
- 8). Support system:
 - a). Donn T37K main tees installed at maximum 1200mm centres.
 - b). The main tees shall be suspended using Donn Galvanised angle 25mm x 25mm at 1200mm centres along the length of the main tee.
 - c). Donn T32K cross tees should be installed at 300mm centres.
 - d). Additional cross tees should be fixed to the main tees using Donn Angle Cleats.
 - e). Metal main tees, cross tees and hangers are to be fabricated from hot-dip zinc coated and iron zinc alloy coated sheet steel.
 - f). Spacing: As recommended in writing by the ceiling grid manufacturer and closer where the configuration of the bulkhead requires.
 - g). Supporting frames: Brace well to ensure structural rigidity and support of

the ceiling.

9). Fixing: 25mm Drywall self-tapping screws.

10). Finish:

a). 2 coats of **Amoriguard A-Gain** as per manufactures recommendation.

b). Sealed as in Section X10 and on the Finishing Schedule.

11). Perimeter trim: 25mm Shadowline, Ref: SM25.

12). Provide movement joints in ceilings at 10000mm centres.

13). Other: Allow for all penetrations and additional supports necessary at the location of penetrations, as shown on the Contract Drawings.

M11.104 CT-02: Suspended Plasterboard Ceiling - Moisture Resistant

a). Proprietary suspended monolithic moisture resistant plasterboard ceiling system including concealed suspension system, carriers, fastenings and accessories.

1). To comply generally with the requirements of EN 520, EN 12524.

2). Background: As shown on the Contract Drawings.

3). Nominal Zone: As shown on the Contract Drawings.

4). Fire resistance: Non-rated.

5). Acoustic rating: Non-rated.

6). Linings:

a). Indicative Manufacturer: Gyproc (Pty) Ltd or similar and equal approved.

b). Indicative Product: Rhinoboard moisture resistant plasterboard.

c). Gypsum plaster ceiling board manufactured to SANS 266.

d). Edge profile: Tapered edge.

e). Thickness: 12.5mm.

- 7). Jointing: Self-adhesive glass fibre tape and quick setting joint filler.
- 8). Support system:
- a). Donn T37K main tees installed at maximum 1200mm centres.
 - b). The main tees shall be suspended using Donn Galvanised angle 25mm x 25mm at 1200mm centres along the length of the main tee.
 - c). Donn T32K cross tees should be installed at 300mm centres.
 - d). Additional cross tees should be fixed to the main tees using Donn Angle Cleats.
 - e). Metal main tees, cross tees and hangers are to be fabricated from hot-dip zinc coated and iron zinc alloy coated sheet steel.
 - f). Spacing: As recommended in writing by the ceiling grid manufacturer and closer where the configuration of the bulkhead requires.
 - g). Supporting frames: Brace well to ensure structural rigidity and support of the ceiling.
- 9). Fixing: 25mm Drywall self-tapping screws.
- 10). Finish:
- a). 2 coats of **Amoriguard A-Gain** as per manufactures recommendation.
 - b). Sealed as in Section X10 and on the Finishing Schedule.
- 11). Perimeter trim: 25mm Shadowline, Ref: SM25.
- 12). Provide movement joints in ceilings at 10000mm centres.
- 13). Other: Allow for all penetrations and additional supports necessary at the location of penetrations, as shown on the Contract Drawings.

M11.105**CT-03: Suspended Plasterboard Ceiling**

a. Proprietary suspended monolithic plasterboard ceiling system including concealed suspension system, carriers, fastenings and accessories.

1). To comply generally with the requirements of EN 520, EN 12524.

2). Background: As shown on the Contract Drawings.

3). Nominal Zone: As shown on the Contract Drawings.

4). Fire resistance: Non-rated.

5). Acoustic rating: Non-rated.

6). Linings:

a). Indicative Manufacturer: Gyproc (Pty) Ltd or similar and equal approved.

b). Indicative Product: Rhinoboard standard grade plasterboard.

c). Gypsum plaster ceiling board manufactured to SANS 266.

d). Edge profile: Tapered edge.

e). Thickness: 12.5mm.

7). Jointing: Self-adhesive glass fibre tape and quick setting joint filler.

8). Support system:

a). Donn T37K main tees installed at maximum 1200mm centres.

b). The main tees shall be suspended using Donn Galvanised angle 25mm x 25mm at 1200mm centres along the length of the main tee.

c). Donn T32K cross tees should be installed at 300mm centres.

d). Additional cross tees should be fixed to the main tees using Donn Angle Cleats.

e). Metal main tees, cross tees and hangers are to be fabricated from hot-dip

zinc coated and iron zinc alloy coated sheet steel.

f). Spacing: As recommended in writing by the ceiling grid manufacturer and closer where the configuration of the bulkhead requires.

g). Supporting frames: Brace well to ensure structural rigidity and support of the ceiling.

9). Fixing: 25mm Drywall self-tapping screws.

10). Finish:

a). 3mm lightweight retarded hemi hydrate gypsum plaster, Rhinolite as described in Section R20.

b). Painted as in Section X10 and on the Finishing Schedule.

11). Perimeter trim: 25mm Shadowline, Ref: SM25.

12). Provide movement joints in ceilings at 10000mm centres.

13). Other: Allow for all penetrations and additional supports necessary at the location of penetrations, as shown on the Contract Drawings.

M11.106 CT-04: Suspended Plasterboard Ceiling - Moisture Resistant

a. Proprietary suspended monolithic moisture resistant plasterboard ceiling system including concealed suspension system, carriers, fastenings and accessories.

1). To comply generally with the requirements of EN 520, EN 12524.

2). Background: As shown on the Contract Drawings.

3). Nominal Zone: As shown on the Contract Drawings.

4). Fire resistance: Non-rated.

5). Acoustic rating: Non-rated.

6). Linings:

- a). Indicative Manufacturer: Gyproc (Pty) Ltd or similar and equal approved.
- b). Indicative Product: Rhinoboard moisture resistant plasterboard.
- c). Gypsum plaster ceiling board manufactured to SANS 266.
- d). Edge profile: Tapered edge.
- e). Thickness: 12.5mm.
- 7). Jointing: Self-adhesive glass fibre tape and quick setting joint filler.
- 8). Support system:
 - a). Donn T37K main tees installed at maximum 1200mm centres.
 - b). The main tees shall be suspended using Donn Galvanised angle 25mm x 25mm at 1200mm centres along the length of the main tee.
 - c). Donn T32K cross tees should be installed at 300mm centres.
 - d). Additional cross tees should be fixed to the main tees using Donn Angle Cleats.
 - e). Metal main tees, cross tees and hangers are to be fabricated from hot-dip zinc coated and iron zinc alloy coated sheet steel.
 - f). Spacing: As recommended in writing by the ceiling grid manufacturer and closer where the configuration of the bulkhead requires.
 - g). Supporting frames: Brace well to ensure structural rigidity and support of the ceiling.
- 9). Fixing: 25mm Drywall self-tapping screws.
- 10). Finish:
 - a). 3mm lightweight retarded hemi hydrate gypsum plaster, Rhinolite as described in Section R20.

b). Painted as in Section X10 and on the Finishing Schedule.

11). Perimeter trim: 25mm Shadowline, Ref: SM25.

12). Provide movement joints in ceilings at 10000mm centres.

13). Other: Allow for all penetrations and additional supports necessary at the location of penetrations, as shown on the Contract Drawings.

M11.107 CT-05: External Suspended Plasterboard Ceiling with render finish

a. Proprietary suspended monolithic plasterboard ceiling system including concealed suspension system, carriers, fastenings and accessories.

1). To comply generally with the requirements of EN 520, EN 12524.

2). Background: As shown on the Contract Drawings.

3). Nominal Zone: As shown on the Contract Drawings.

4). Fire resistance: 60 min.

5). Acoustic rating: 45 db.

6). Linings:

a). Indicative Manufacturer: Gyproc (Pty) Ltd or similar and equal approved.

b). Indicative Product: Rhinoboard standard grade plasterboard.

c). Gypsum plaster ceiling board manufactured to SANS 266.

d). Edge profile: Tapered edge.

e). Thickness: 12.5mm.

7). Jointing: Self-adhesive glass fibre tape and quick setting joint filler.

8). Support system:

a). Donn T37K main tees installed at maximum 1200mm centres.

b). The main tees shall be suspended using Donn Galvanised angle 25mm x

25mm at 1200mm centres along the length of the main tee.

c). Donn T32K cross tees should be installed at 300mm centres.

d). Additional cross tees should be fixed to the main tees using Donn Angle Cleats.

e). Metal main tees, cross tees and hangers are to be fabricated from hot-dip zinc coated and iron zinc alloy coated sheet steel.

f). Spacing: As recommended in writing by the ceiling grid manufacturer and closer where the configuration of the bulkhead requires.

g). Supporting frames: Brace well to ensure structural rigidity and support of the ceiling.

9). Fixing: 25mm Drywall self-tapping screws.

10). Finish:

a). Polyethylene (HDPE) membrane

b). 1.6mm galvanized mild steel flat mesh on 12.5 external glasroc x board with reinforced render finish.

c). 2 coats of **Amoriguard A-Gain** as per manufactures recommendation.

d). Sealed as in Section X10 and on the Finishing Schedule.

11). Perimeter trim: 25mm Shadowline, Ref: SM25.

12). Provide movement joints in ceilings at 10000mm centres.

13). Other: Allow for all penetrations and additional supports necessary at the location of penetrations, as shown on the Contract Drawings.

M11.108 CT-06: Suspended Acoustic Lay in ceiling tile 600x600mm - MINERVA A

a. Acoustic ceiling system

- 1). To comply generally with the requirements of EN 520, EN 12524.
- 2). Background: Roof soffit.
- 3). Nominal Zone: As shown on the Contract Drawings.
- 4). Fire rating: A2-s1, d0.
- 5). Acoustic rating: Up to Class C.
- 6). Linings:
 - a). Indicative Manufacturer: Gyproc (Pty) Ltd or similar and equal approved.
 - b). Indicative Product: MINERVAL A, or acceptable equivalent.
 - c). 600x600x12mm lay-in ceiling tile.
 - d). Edge: Square edge.
 - e). Thickness: 12mm.
- 7). Jointing: exposed T grid system
- 8). Support system:
 - a). Install Gypframe D38FR Main Tees main tees installed at maximum 1200mm centres.
 - b). The main tees shall be suspended using Gyproc Hanger Strap/ Gyproc Suspension Wire fixed to Main Tee web using 2 steel pop-rivets or one Gyproc Wafer-Head Tek screw.
 - c). Hangers to be at maximum 400 mm from perimeter wall.
 - d). Install Gypframe D38FR Cross Tee (1200 mm long) (locally manufactured, recycled content, ISO 9001 & 14001 certification) at 600 mm c/c to create a 600 mm x 600 mm ceiling grid.
 - e). Metal main tees, cross tees and hangers are to be fabricated from hot-dip zinc coated and iron zinc alloy coated sheet steel.
 - f). Spacing: As recommended in writing by the ceiling grid manufacturer and

closer where the configuration of the bulkhead requires.

g). Supporting frames: Brace well to ensure structural rigidity and support of the ceiling.

Speciality Suspended Ceilings

M11.109 CT-07: Suspended Acoustic Lay in ceiling tile 1200x600mm - MINERVAL A

a. Acoustic ceiling system

1). To comply generally with the requirements of EN 520, EN 12524.

2). Background: Roof soffit.

3). Nominal Zone: As shown on the Contract Drawings.

4). Fire rating: A2-s1, d0.

5). Acoustic rating: Up to Class C.

6). Linings:

a). Indicative Manufacturer: Gyproc (Pty) Ltd or similar and equal approved.

b). Indicative Product: MINERVAL A, or acceptable equivalent.

c). 1200x600x12mm lay-in ceiling tile.

d). Edge: Square edge.

e). Thickness: 12mm.

7). Jointing: exposed T grid system

8). Support system:

a). Install Gypframe D38FR Main Tees main tees installed at maximum 1200mm centres.

b). The main tees shall be suspended using Gyproc Hanger Strap/ Gyproc Suspension Wire fixed to Main Tee web using 2 steel pop-rivets or one Gyproc Wafer-Head Tek screw.

c). Hangers to be at maximum 400 mm from perimeter wall.

d). Install Gypframe D38FR Cross Tee (1200 mm long) (locally manufactured, recycled content, ISO 9001 & 14001 certification) at 600 mm c/c to create a 1200 mm x 600 mm ceiling grid.

e). Metal main tees, cross tees and hangers are to be fabricated from hot-dip zinc coated and iron zinc alloy coated sheet steel.

f). Spacing: As recommended in writing by the ceiling grid manufacturer and closer where the configuration of the bulkhead requires.

g). Supporting frames: Brace well to ensure structural rigidity and support of the ceiling.

Speciality Suspended Ceilings

M11.109 120 Minute Fire Rated Ceiling

a). Proprietary suspended monolithic calcium silicate cement board ceiling system including concealed suspension system, carriers, fastenings and accessories.

1). To comply generally with the requirements of EN 14306, EN 12524.

2). Background: As shown on the Contract Drawings.

3). Nominal Zone: As shown on the Contract Drawings.

4). Fire rating: 120 minutes.

5). Acoustic rating: Non-rated.

6). Linings:

a). Indicative Manufacturer: Marley Building Systems or similar and equal approved.

b). Indicative Product: Promatect-H calcium silicate cement boards, or acceptable equivalent.

c). Manufactured in accordance with BS EN 14306.

- d). Edge: Square edge.
- e). Thickness nominal: 9mm.
- 7). Jointing:
 - a). All joints to be filled for seamless jointing.
 - b). 10mm wide joints between the board and perimeter sealed with Promaseal-A-sealant.
- 8). Support system:
 - a). Indicative Manufacturer: Marley Building Systems or similar and equal approved.
 - b). Indicative Product: PromaStud51 Primary lipped channels with PromaStud51 cross channels.
 - i. Material: Galvanised mild steel.
 - ii. Suspension depth as shown on the Contract Drawings.
 - iii. Primary lipped channels: PromaStud51 at 600 or 610mm centres.
 - iv. Cross channels: PromaStud51 positioned at board joints.
 - v. Clearance between the perimeter angles and primary channels must be at least 20mm for expansion 50mm x 50mm x 0.8mm angle to be fixed around perimeter at 400mm centers with all steel anchors.
 - vi. Supporting frames to be well braced to ensure structural rigidity and support of the ceiling.
- 9). Fixing: Boards fixed directly to channels and perimeter angles, stagger joints between base and face layers.
 - a). Base layer: M4 steel self-tapping screws, minimum 25mm-long, 200mm centres.

b). Face layer: M4 steel self-tapping screws, minimum 32mm-long, 200mm centres.

10). Insulation (within void):

a). Type: Mineral wool laid in staggered formation.

b). Thickness: 2No. 40mm layers.

c). Density: 100kg/m³.

11). Finish: To be agreed.

12). Provide movement joints in ceilings at 10000mm centres.

13). Other: Allow for all penetrations and additional supports necessary at the location of penetrations, as shown on the Contract Drawings.

M11.200 QUALITY AND WORKMANSHIP

Submittals

M11.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

M11.202 Pre-contract Samples

a. Not required.

M11.203 Post-contract Control Samples

a. Provide the following control samples:

1). 500 x 500mm sample of all plasterboard types.

2). 500mm lengths of all metal framing components.

3). Access panels, grilles, etc.

4). All fixing types.

M11.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First structural bay of each type of ceiling system, in locations to be agreed.

General Installation

M11.205 Storage and Accuracy

a. Store all materials on Site in accordance with the manufacturer's written recommendations.

b. Verify dimensions and levels of the structure before installation commences.

c. Install the works square, regular to line, to give level soffits free from undulations and lipping.

M11.206 Setting Out

a. Where possible set out with single lengths across the width of the room.

b. Arrange panels symmetrically from the centre line of the room.

c. Where necessary, narrow panels are to be at the ends.

M11.207 Fixing Requirements

a. The fixing, jointing and finishing of the works, where not specified otherwise, to be as recommended by the board manufacturer.

b. Boards to be fixed only in areas that have been made weathertight.

c. Fix brandering/ furring channels securely with additional bracing and stiffening as necessary to give a rigid system resistant to wind uplift.

d. Provide additional support to short edges of butt jointed sheets and around ceiling access doors.

- e. Fix sheets at right angles to brandering/ furring channels with cut sheets along walls.
- f. Screw fix with self-locating drywall screws to metal furring channels or by cadmium plated clout headed nails to timber brandering at 150mm centres.
- g. Fastenings to be evenly spaced in straight lines, in pairs across joints and set in from edge of board to prevent damage.
- h. Boards to be cut neatly and accurately without damage to core or tearing of paper facing. Keep cut edges to a minimum and position at internal angles wherever possible, with masked bound edges of adjacent boards at external corners.
- i. Fix boards securely and firmly to suitably prepared and levelled backgrounds, with heads of fastenings set in a depression, without breaking the paper or the gypsum core. Finishes to appear flush, smooth and flat with surfaces free from bowing and abrupt changes of level. Damaged boards not to be used.

Flush Joints

M11.208 Taping and Finishing

- a. Cut edges of boards to be lightly sanded to remove paper burrs with a PVA sealer applied to exposed cut edges and any other plaster surface to which tape is applied.
- b. Fill joints and gaps, cover with continuous lengths of tape and fully bed. Where joints are to be covered with finish, feather out to provide a smooth seamless surface.
- c. Nail and screw depressions to be filled with joint filler to provide a flush and smooth surface.
- d. On completion of joint, angle and spotting treatments a surface finish to be applied to provide a continuous, consistent finish to the surface of boards.

Protection

M11.209 Protection

- a. Protect finished ceiling from damage or disfiguration by following trades.

Storage

M11.210 Storage

- a. Store on a level surface on bearers at 400mm centres.
- b. Protect from damp and bad weather.
- c. Sheets to be conditioned on site in accordance with the manufacturer's recommendations.
- d. Carry sheets on edge.

END OF SECTION

M30 DEMOUNTABLE SUSPENDED CEILINGS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

M30.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

M30.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

M30.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Lay in mineral fibre acoustic tile ceilings systems.

b. Ensure that all interfaces are fully co-ordinated prior to commencement.

M30.105 CT-08: 1800x600x40mm Ecophon Solo Baffle Suspended with wire

a. The system should consist of glass fiber acoustic free-hanging units hanging vertically from the suspension system.

1). Tiles:

- a). Indicative Manufacturer: Saint Gobain Ecophon or similar and equal approved.
- b). Indicative Product: Ecophon Focus Ds, or acceptable equivalent.
- c). Panel size: 1800 x 600 x 40mm.
- d). Fire rating: A2-s1, d0.
- e). Acoustic rating: Class A sound absorption.
- f). Edges: Bevelled edge.
- g). Indicative Finish: Proprietary Akutex FT surface coating on both sides. Edges factory painted after cutting.
- h). Colour: RAL 9010 White Frost.

2). Suspension system:

- a). Supporting structure: Connect T24 Main Runner, Connect Adjustable wire hangers, Connect Baffle Profile, Connect Profile Connector and Connect Guiding Pin..
- b). Suspension depth: As shown on the Contract Drawings.
- c). Type: Framed hanging suspension system selected from the manufacturer's standard range.
- d). Connector: Connect Adjustable wire hanger or Connect grid system.

3). Perimeter trim: To be agreed.

- 4). Tiles to incorporate penetrations to receive downlighters, smoke detectors, PA speakers, sprinkler heads or other service penetrations required where shown on the Contract Drawings. Allow for additional supports necessary at the location of penetrations to receive such fittings.

5). Maintenance: Daily dusting and vacuum cleaning. Weekly wet wiping.

M30.200 QUALITY AND WORKMANSHIP

Submittals

M30.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

M30.202 Pre-contract Samples

a. Not required.

M30.203 Post-contract Samples

a. Provide the following control samples:

- 1). Paint finishes as specified.
- 2). Support system.
- 3). Samples of panels, grilles, trims, etc.
- 4). All fixing types.

M30.204 Benchmark Requirements

a. Provide the following quality benchmarks:

- 1). First structural bay of each type in location to be agreed.

Testing

M30.205 Testing

a. All materials/ products shall have been tested to demonstrate their fire properties and acoustic performance.

b. Where the sub-contractor/ manufacturer is unable to provide independently certified test data demonstrating compliance with the specification, then testing of the

prototypes/ materials is to be undertaken.

M30.206 Test Requirements

a. Provide evidence of independent tests carried out to demonstrate that the products comply with the Specification or carry out such tests necessary to demonstrate compliance.

b. Such tests to demonstrate compliance in respect of the following criteria:

- 1). Fire resistance.
- 2). Air leakage.
- 3). Acoustic integrity.
- 4). Structural stability.

Durability

M30.207 Components

a. The works not to deteriorate under normal usage provided regular cleaning and maintenance is carried out in accordance with the manufacturer's recommendations.

b. All visible elements of the works (e.g. panels, trims, tiles) to be replaceable.

M30.208 Demountability

a. Visible elements of the works to be interchangeable and removable for maintenance purposes.

b. All ceilings' panels and support systems to be demountable within the supporting framework for access to the services void above.

General

M30.209 Conditions

a. Do not install material until the building is weathertight.

b. Ensure that services above ceilings are completed.

Ceilings

M30.210 Setting Out

a. Unless otherwise stated set out to ensure that edge tiles are never less than half in width or length.

b. Joints between panels to be consistent, square and flush.

M30.211 Tolerances

a. Grid dimensions as shown on the Contract Drawings to be maintained ± 1 mm.

b. Finished ceiling levels to be as shown on the Contract Drawings ± 2 mm in 1000mm length.

c. Deflection of the works due to self-weight not to exceed $L/400$ for spans up to 1200mm

and $L/500$ for spans up to 1800mm.

d. Grid creep across any ceiling not to exceed 1.5mm in a 10m length.

e. Panel to panel lipping or plan offset not to exceed 0.5mm and be non-cumulative across any ceiling.

M30.212 Suspended Grid

a. Set out accurately, free from undulations and lipping, with all lines and joints straight and parallel to the planning grid.

b. Install square, regular to line, level and plane within specified tolerances.

c. Fix securely with additional bracing and stiffening as necessary to provide a rigid system.

d. Light fittings, grilles, fire and smoke barriers, etc. to be in the correct positions relative

to the ceiling grid, prior to commencing installation. Common setting-out points to be used.

e. Install the suspension system for the works in accordance with the manufacturer's recommendations.

M30.213 Movement Joints

a. Movement joints to be as shown on the Contract Drawings.

b. Provide movement joints as appropriate for the area of ceiling and/ or to coincide with movement joints in the surrounding structure.

M30.214 Fire Stopping

a. Seal all gaps at junctions with walls, cavity barriers, ducts, pipes and other penetrations using tightly packed mineral wool, intumescent sealant or other fireproof material to prevent penetration of smoke and flame.

Workmanship

M30.215 Galvanised Strap and Angles

a. Fix with steel pop rivets to suspended grid.

Protection

M30.216 Protection

a. Protect edges and arrises from mechanical damage.

b. Protect finished ceilings from dirt and following trades.

M30.217 Remedial Works

a. Repair all damage when directed by the Architect.

b. All remedial works to surface finishes only to be accepted if a perfect match is achieved. Failure to comply with this requirement will require replacement of the

component.

END OF SECTION

a. To be read in conjunction with Sections A and Z, the Preliminaries and Contract Conditions.

M31.100 PRODUCTS, SYSTEMS AND PRODUCTS

Specification and Scope

M31.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

M31.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the works, which include, inter alia, the following:

- 1). Raised flooring system.

b. Ensure that all interfaces are fully co-ordinated prior to commencement.

Raised Access Flooring

M31.103

FF04: Raised Access Floor

a. The raised access floor shall comply with the requirements of SANS 52825 except where otherwise called for in this Specification. The raised access floor is to be manufactured under the integrated quality assurance requirements of ISO 9002.

1). Indicative supplier: As shown on the Finishes Schedule.

2). Indicative product: Super tec access flooring system, or acceptable equivalent.

3). Type: Fully accessible.

4). Grade: SANS 1549 Class C Heavy duty, sealed at the perimeter.

a). Final grading to be established once actual floor loadings have been confirmed.

5). Sub-floor: Paint concrete subfloor with two coats of PVA floor sealer of contrasting colour tinted sealer, recommended by the raised flooring manufacturer, to all concrete and masonry surfaces within the floor void.

6). The raised access floor system will be capable of withstanding various duty static/ dynamic loads experienced in the Computer/ Data Rooms equipment environments

7). Provide pedestals to support the finished floor up to 500-600mm above the structural slab.

8). Provide proprietary bridging details over large areas of ducting as indicated on the Mechanical and Electrical Services Drawings.

9). A corrosion resistant nut shall be provided which shall allow for adjustment of the pedestal assembly over a range of 50 mm (25 mm up and 25 mm down) without rotation of the pedestal head. The nut shall have an anti-rotation and vibration-proof feature.

10). For a freestanding system the pedestal head shall have locating studs on which the access floor panels positively locate as well as locating tabs and ridges which positively position and self-align the pedestal head with the access floor panel.

11). For a system in which the panels are screwed down at their corners the pedestal head shall have four threaded holes to accept the panel fasteners as well as locating tabs and ridges which positively position and self-align the pedestal head with the access floor panel.

12). For a stringer system the pedestal head shall be designed so as to receive snap-on stringers

13). Stringers shall be manufactured from a minimum 20 gauge steel channel section with a snap-on attachment to the pedestal. Each stringer shall be surface treated and have a corrosion-resistant finish and be provided with a factory-applied and conductive bonded gasket on the top surface.

14). Panels:

a). Floor Panel size: nominally 600 x 600 mm.

b). The maximum thic:35mm.

c). Galvanised steel encased, high density, cementitious core material.

d). For a system in which the panels are screwed down at their corners the

access floor panel shall be provided with four corrosion resistant captured fasteners.

e). The fasteners shall bolt through the panel and clamp the panel to the pedestal heads.

f). The panels shall be able to be removed by releasing the four fasteners.

g). For a freestanding system the access floor panels shall provide for positive engagement with the pedestal at all four corners.

h). Finish: Anti-static HPL.

15). Pedestals:

a). Grid: 600mm x 600mm.

b). Adjustable electro zinc plated pedestals, +/-20mm.

c). Life expectancy: 50 years.

d). All pedestal bases shall be adhered to the sub-floor.

e). The adhesive shall be non-toxic, waterproof and non-soluble when cured

f). The pedestal and the adhesive shall be capable of resisting a horizontal force of 10 kg applied at a height of 300 mm from the sub-floor when the adhesive has cured.

g). Edge Sealer: Rigid plastic or Class 0 rated aluminium foil self-adhesive tape.

h). Guaranteed electrical continuity.

i). Guaranteed to disperse static electricity.

16). Accessories:

a). Plastic floor grommet covers to be provided in positions indicated on the

Electrical Services Drawings and be cut into middle of one quadrant of tile.

b). Floor socket outlet boxes to be located as indicated on the Electrical Services Drawings.

c). Installation and final setting out of service outlets to be strictly in accordance with the manufacturer's recommendations.

17). Other Requirements:

a). Where pedestals cannot be positioned at the perimeter of the concrete provide a 1.5mm nominal galvanised steel plate, mechanically fixed to floor at all such perimeters.

b). Provide 10mm sealed expansion joints at the perimeters.

c). Provide seals at perimeter and abutment conditions maintaining the integrity of the works.

d). Earth bonding of the works as indicated on the Contract Drawings.

e). Seal all gaps at the junction of the works with the walls with fireproof material to prevent penetration of smoke and flame.

f). Seal all cut encapsulated panels with sealant or welding material to prevent egress of water into the core material as recommended by the panel manufacturer.

Materials

M31.104 Plywood Overlay

a. Marine grade plywood to SANS 929.

b. Durability class to be suitable for frequent wetting and suitable for wet bedding materials associated with ceramic/ stone tiling bedding.

M31.105 Sealants

a. Sealants to be silicone to SANS 1305 and applied in accordance with Section Z22 of the Specification.

a. Adhesives to be those recommended by the floor tile manufacturer for the particular covering material and the panel substrate.

M31.200 QUALITY AND WORKMANSHIP

Submittals

M31.201 Response

a. Provide submittals in accordance with the requirements of Section A of this Specification.

Samples and Quality Benchmarks

M31.202 Pre-contract Samples

a. Not required.

M31.203 Post-contract Samples

a. Provide samples of the following, including relevant trade literature and technical specifications:

- 1). 1 No. floor panel.
- 2). Floor pedestal.
- 3). Perimeter plenum with floor grille.

M31.204 Benchmarks

a. Provide the following quality benchmarks in accordance with Section A:

- 1). First 9m² of each type in location to be agreed.

Performance Requirements

M31.205 Structural Load Performance

a. Comply with the requirements of SANS 52825.

M31.206 Specific Movements

a. Withstand all deflections and tolerances of the building without damage or any reduction in the performance of the works or cracking of applied tiling.

b. Withstand static and dynamic design loads without causing deformation of components or the failure of members and transmit such loads safely to the points of support.

M31.207 Floor Loads

a. Comply generally with the MOB PF2 PSU/ SPU 'Performance Specification for Raised Access Floors'.

Environmental

M31.208 Raised Floor Air Leakage Tests

a. An independent testing laboratory to perform the tests, to the acceptance of the Architect.

b. The works not to exceed the following leakage rates:

1). Floor surface 1.5 litres/m²/second at 50N/m² test pressure.

2). Floor void 0.9 litres/m²/second at 50N/m² test pressure.

Fire

M31.209 Cavity Barriers

a. All concealed spaces below the works to have firebreaks in accordance with the Building Regulations.

b. Fire resistance to SANS 10177.

c. Integrity/ insulation: 30 minutes.

M31.210 Fire Stopping

a. Seal all gaps at junctions of the works with walls, cavity barriers, ducts, pipes, other floors at different levels, etc. with fireproof material to prevent penetration of smoke and flame.

Acoustic Performance

M31.211 Specific Acoustic Requirements

a. Provide sound insulation within the floor void to satisfy a 50Rw dB rating directly below the acoustic rated partitions.

b. Airborne sound insulation to be to SANS 717 measured in accordance with SANS 140.

M31.212 Preparation

a. Mark out: pedestal positions in advance of the services installation. Ensure no conflict in location.

b. Before commencing work, check all fixtures around which panels are to be cut or over which supports are to bridge to ensure that they are complete.

c. Clean and seal the sub-floor before the installation commences.

d. Surfaces to be sealed are to be clean, dry and free from dust, grease and other contaminants.

e. Paint two coats of contrasting colour tinted sealer, recommended by the raised flooring manufacturer, to all concrete and masonry surfaces within the floor void.

f. Apply the first coat before the pedestals are erected and the second coat towards the end of the floor installation.

M31.213**Installation of the Raised Floors**

- a. Refer to the Contract Drawings for setting-out requirements.
- b. Co-ordinate pedestals/ supports with the services requirements and Structural Engineer's requirements for raised structures/ beams.
- c. Ensure that the installed works remain free from undulations, steps, ridges, bumps, ripples, rocking and lipping.
- d. Make sure that bay divisions and movement joints are accommodated in the design and co-ordinated with wall joints and other elements.
- e. Accommodate all changes in level of substrates and ensure that the required finished floor datum level is achieved.
- f. Install the works such that movements over the floor or changes in temperature do not result in audible 'creaking', 'squeaking' or 'slip-stick' noise.
- g. Floor Panels:
 - 1). Keep cutting of panels to a minimum and locate in unobtrusive locations.
 - 2). Use oversize panels to ensure that cut panels are not less than half in width, particularly at doorways, thresholds, perimeters, etc. and provide suitable panel support arrangements which will not create a hazard to pedestrians.
 - 3). All cut panels adjacent to door thresholds, lift lobbies and other openings to have an additional pedestal support at mid span.
- h. Plywood overlay:
 - 1). Ensure that fastenings do not protrude above the surface of the board.

Fastenings to be of a type recommended for the purpose by the fastenings manufacturer.

2). Tape joints to provide a sound base for ceramic bedding and tiling over (by others). All perimeters and all junctions with adjacent construction.

i. Pedestals:

1). Pedestals to be fixed plumb using both mechanical fixings and epoxy resin adhesive.

2). Bonded pedestals to remain rigid and firmly secured to the sub-floor.

j. Cavity Barriers:

1). Locate firebreaks on the line of the required compartments as indicated on the plan area.

2). All openings into the void and through any cavity barriers to be fire stopped to hour(s) fire resistance and provide a complete barrier to smoke and flame.

3). Subdivide floor voids into areas not exceeding 400m² with cavity barriers.

4). Fix barriers securely to the sub-floor with no gaps to providing an effective barrier to smoke and flame.

5). Screw down access panels above cavity barriers or otherwise firmly secure.

k. Sealed Plenum System:

1). Ensure airtightness at all perimeter conditions, including seals around services' penetrations at core walls.

2). Include for air testing the complete void of all areas of the building on a zone by zone basis.

3). Any failure of the raised floor or floor voids found on testing will require retesting.

l. The floor system to remain stable when groups of panels are removed for access or maintenance or any other reason.

M31.214 Installation Tolerances

- a. Difference in height between adjacent finished panels not to exceed 1.0mm after the application of the specified load and not to exceed 3.25mm between the edge of any panel being subjected to the static loadings specified and any adjacent unloaded panel.
- b. Deviation due to twisting under no load conditions of any corner in relation to the other three not to exceed 1.0mm over a 600mm module.

M31.215 Floor Coverings

- a. Bond coverings to a smooth and level panel substrate covering the entire top surface area of the panel.
- b. Joints in the material within one panel are not acceptable.
- c. The bond to remain effective for the design life of the covering materials.
- d. Where the panels are to be lifted by means of a lifting device applying force to the covering, the adhesion between the covering and the panel to be adequate for panels of up to 20kg to be lifted without causing any failure or weakening of the bond.

M31.216 Sealing of Cut Panels

- a. Seal all exposed cut edges of panels with Class 0 rated aluminium foil self-adhesive tape.

M31.217 Perimeters

- a. Ensure sufficient lateral stability to enable the works to be independent of abutting elements.
- b. Provide a 10mm gap at all abutments and fill with resilient closed cell filler before fixing skirting, cover strips, etc.

M31.218 **Changes of Level**

- a. Ramps and Steps: Construct to accepted details to achieve performance requirements specified for the associated works.
- b. Ensure that airtightness is maintained at steps, ramps, etc. as specified and as indicated on the Contract Drawings

M31.219 **Air Plenum Barriers**

- a. Air plenum barriers to comprise rigid or semi-rigid non-porous sheets with smooth non-dusting surfaces and complying with the hygrothermal and surface spread of flame requirements.
- b. Fix air plenum barriers securely between the sub-floor and the works, as indicated on the Shop Drawings/ Working Drawings. All edges and joints to be effectively sealed.

M31.220 **Panel Lifting Devices**

- a. Upon completion, provide two sets of lifting devices suitable for each of the floor finishes installed. One set to be used by others requiring access to the void and the other for handing over to the Architect at Practical Completion.

M31.221 **Post Installation Examination**

- a. After completion of the mechanical and electrical installation and other associated work:
 - 1). Thoroughly inspect the floor installation for defects and prepare a schedule for submittal to the Architect.
 - 2). Thoroughly clean all accessible areas of the sub-floor and apply a further coat of sealer to all accessible areas.

M31.222 Movement Joints

a. The works to accommodate all movement joints in the building structure without compromising the integrity, appearance or performance, in any way, of the panels or their supports.

b. Refer to the Structural Engineer's specifications and drawings for locations and types of movement joints and accommodate the works accordingly.

Protection and Finishing

M31.223 Protection/ Finishing Vinyl Flooring

a. At Practical Completion of the works, or when otherwise agreed with the Architect, clean all areas of vinyl flooring. Cleaning agents for the purpose to be accepted by the vinyl flooring and incorporated products' manufacturers:

1). Wash floor using mops dampened with water containing neutral detergent.

Thoroughly rinse with clean water and allow to dry.

2). Apply two coats of buffable or semi-buffable polish of a type recommended by the covering manufacturer.

b. Provide a protection layer consisting of a fleece separation layer and plywood overlay, or acceptable equivalent, to remain in place for the duration of the works. Submit details of the protection system for acceptance by the Architect.

c. Return to remove protection layers and clean the vinyl flooring at Practical Completion of the project.

END OF SECTION

N12 TROWELLED RESIN FLOORING

a. To be read in conjunction with Sections A and other related sections of the

Specification, the Preliminaries and Contract Conditions.

N12.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

N12.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

N12.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the works, which include the following:

1). Resin flooring.

N12.103 Particular Interfaces

a. Complete the Detailed Design of all interfaces with adjoining trades prior to commencement of manufacture.

b. Ensure that all interfaces are fully co-ordinated prior to commencement.

Resin Flooring

N12.104 FF03 - Epoxy Resin Flooring

a. Solvent free, coloured, resin based smooth self-levelling floor topping system.

1). Concrete or screed substrates must be sound and of sufficient compressive strength (minimum 25 N/ mm²).

2). The substrate must be clean, dry and free of all contaminants such as dirt, oil, grease, coatings and surface treatments, etc. Preparation in accordance with the manufacturer's recommendations.

3). Apply by an approved Contractor and in strict accordance with the manufacturers published recommendations.

4). Primer:

a). Manufacturer: Sika SA, Tel +27 (0) 31 792 6500.

b). Product: Sikafloor - 263 SL ZA, or acceptable equivalent.

c). Apply in strict accordance with the manufacturers published recommendations.

5). Finishing coat: Sikafloor - 66 ZA

a). Manufacturer: Sika SA, Tel +27 (0) 31 792 6500.

b). Product: Sikafloor-263 SL, or acceptable equivalent.

c). Thickness: 2mm.

d). Colour: Dusty Grey RAL 7037.

6). Skirting: Sikafloor-29 Purcem coving mortar with Sikafloor-31 applied over, to create a backrolled skirting 100mm high.

N12.105

FLF-723 Resin Floor Finish - FF-03

a. Polyurethane, non-slip final flooring wear layer applied to screed.

1). Manufacturer: Sika SA, Tel +27 (0) 31 792 6500.

- 2). Product: Sikafloor- PurCem, or acceptable equivalent.
- 3). Substrate: Screed as shown on the Contract Drawings.
- 4). Preparation and primer: In strict accordance with the manufacturers published recommendations.
- 5). Resin:
 - a). Type: Heavy duty, high strength, easy trowel, polyurethane floor system.
 - b). Thickness: 6mm.
 - c). Colour: Dusty Grey.
 - d). Slip resistance: Minimum PTV 36.
- 6). Joints/ fullbore outlets: To receive Sikaflex Pro-3 polyurethane sealant.
- 7). Skirting: Sikafloor-29 Purcem coving mortar with Sikafloor-31 applied, to create a skirting 150mm high.

N12.106 FLF-723 Resin Floor Finish - FF-12

- a. Polyurethane, non-slip final flooring wear layer applied to power floated concrete surface.
 - 1). Manufacturer: Sika SA, Tel +27 (0) 31 792 6500.
 - 2). Product: Sikafloor- PurCem, or acceptable equivalent.
 - 3). Substrate: Power floated concrete surface as shown on the Contract Drawings.
 - 4). Preparation and primer: In strict accordance with the manufacturers published recommendations.
 - 5). Resin:
 - a). Type: Heavy duty, high strength, easy trowel, polyurethane floor system.
 - b). Thickness: 6mm.

- c). Colour: Dusty Grey.
- d). Slip resistance: Minimum PTV 36.
- 6). Joints/ fullbore outlets: To receive Sikaflex Pro-3 polyurethane sealant.
- 7). Skirting: Sikafloor-29 Purcem coving mortar with Sikafloor-31 applied, to create a skirting 150mm high.

N12.107 Movement Joints

- a. Provide structural movement joints to accommodate the following:
 - 1). Primary movement joints: Stainless steel/ aluminium extrusions as recommended by the manufacturer.
 - 2). Control joints: Movement centre joints recommended in writing by the manufacturer and generally comprising the following:
 - a). Neoprene inserts of a colour to match the coating system.
 - b). Aluminium metal side plates generally to manufacturer's written recommendations.

N12.200 QUALITY AND WORKMANSHIP

Submittals

N12.201 Response

- a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples, Mock-ups, Prototypes and Quality Benchmarks

N12.202 Post-contract Samples

- a. In accordance with Section A, provide post contract samples of the following:
 - 1). 300 x 300mm sample of agreed colour in specified finish.

N12.203 Mock-ups

a. Not required.

N12.204 Prototypes

a. Not required.

N12.205 Benchmark Requirements

a. Provide the following quality benchmarks in accordance with Section A:

1). First structural bay of each type in location to be agreed.

Testing

N12.206 Test Requirements

a. Provide evidence/ testing data and reports to demonstrate that all installations have been tested to meet the standards specified herein.

b. Where evidence cannot be provided by the manufacturer, arrange for tests to be carried out to comply with the requirements of the Specification to the satisfaction of the Architect.

c. The provision of testing data or the carrying out of tests does not relieve the Contractor of his responsibility regarding the performance requirements, durability or service life requirements, etc.

N12.207 Slip Resistance Testing

a. Testing for slip resistance to comply with the following documents:

1). 'The assessment of pedestrian slip risk' by The Health and Safety Executive (latest published version).

2). 'The assessment of floor slip resistance, the UK Slip Resistance Group guidelines' by The UK Slip Resistance Group (latest published version).

b. Testing to be performed at an independent UKAS accredited laboratory accredited to perform the specified test methods.

c. Pendulum Test: Test internal flooring in both dry and wet conditions using the TRL Pendulum Tester in accordance with BS 7976 and the recommendations of the UK Slip Resistance Group to obtain the pendulum test value (PTV) specified.

d. Roughness Test: Test internal flooring using a surface roughness meter, in accordance with the recommendations of the UK Slip Resistance Group, to obtain the surface roughness (Rz) value specified.

e. Test samples must include any surface sealer to be applied to the finished flooring.

f. Submit test results in both wet and dry conditions to the Architect for acceptance prior to ordering.

N12.208 Slip Resistance

a. When tested using the TRL Pendulum Tester, internal flooring to achieve the following pendulum test value (PTV):

1). Wet: Not less than 26 PTV.

2). Dry: Not less than 67 PTV.

b. When tested using the surface roughness meter, internal flooring to achieve the following surface roughness (Rz) value:

1). Not less than 20 μm Rz.

N12.209 Weather Conditions

a. Do not apply coating in wet weather when the temperature is below 5°C.

b. Do not apply coating in direct sunlight.

c. Protect coating from rain for at least 24 hours after application.

N12.210 Suitability of Bases

a. Ensure that before starting work:

1). Bases are flat enough to permit specified levels and flatness of finished surfaces, considering the permissible minimum and maximum thicknesses of the works.

2). Bases are clean and free from dirt, dust, grease and oil. Remove droppings of cement mixtures and surface contamination during application.

3). Bases are dry to accept the works and achieve the specified requirements.

N12.211 Application of Coating

a. Apply coating as follows and strictly in accordance with the manufacturer's instructions:

1). The works to be applied by a recommended and experienced applicator, having a minimum of 10 years experience with specified type (not similar) of flooring system. The applicator shall have a valid certificate to the SANS 9000 family of standards.

N12.212 Movement Joints

a. Design bay divisions and movement joints in flooring to co-ordinate with wall joints and other elements. Check and agree locations shown on the Specification.

N12.213 Texture and Colour

a. Ensure uniformity of texture and colour through the work.

N12.214 Warranty

a. On completion, provide a warranty to guarantee that the full design, construction durability and performance of the complete works meet all aspects of the Specification

and Contract Drawings.

END OFSECTION

N20 CARPET FLOORS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

N20.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

N20.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Design Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

N20.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Design Drawings, provides particular requirements with respect to the following:

- 1). Carpet floor tiles.
- 3). Entrance matting.

Carpet Floor Tiles

N20.103 FF01: Carpet Floor Tiles

a. Commercial heavy duty, structured needlepunch carpet tiles. Laid in accordance with SANS 10186.

b. Carpet tiles with needle punched pile.

c. Manufactured to SANS 1415.

- d. Location: As shown on the Design Drawings.
- e. Background: Power floated concrete surface bed.
- f. Preparation: Make good as specified.
- g. Carpet tiles:
 - 1). Indicative manufacturer: KBAC flooring, or acceptable equivalent.
 - 2). Indicative product: Vanguard collection Canvas Carpet Tiles, or acceptable equivalent.
 - a). Size: 500 x 500mm.
 - b). Thickness: 7mm. To be agreed.
 - c). Colour: Dusky Blue.
 - d). Laying pattern: stacked.
 - e). Backing: To be agreed.
 - f). Fire Classification: To be agreed.
 - h. Method of laying: As recommended by the manufacturer and to the acceptance of the Architect.
 - i. Underlay: To be agreed.
 - j. Accessories: Threshold strips and 75mm aluminium skirting.

N20.107

FLF: Entrance Matting

- a. Heavy duty internal entrance mat in recessed mat well.
 - 1). Indicative supplier: Coba Africa, or acceptable equivalent.
 - 2). Matt inlay:
 - a). Indicative product: Dm Aluminium Entrance Matting, or acceptable equivalent.
 - b). Part number: DMA010002.
 - c). Material: Aluminium channels with carpet inserts.
 - d). Backing: High density PE60.
 - e). Height: 12mm.
 - f). Colour: Charcoal.
 - g). Size and configuration: Cut to size.
 - 3). Mat well frame:
 - a). Product: To be agreed.
 - b). Size and configuration: To be agreed.
 - 4). Installation: In accordance with the manufacturers published recommendation and to the acceptance of the Architect.

N20.110 Flooring Adhesive

- a. Adhesive to be of the type recommended by the flooring manufacturer.
- b. Apply strictly in accordance with manufacturer's recommendations to a dry surface.

Floor Dressing

N20.111 Floor wash Detergent

- a. To SANS 825.
- b. Type: Neutral.

N20.112 Floor Dressing

- a. To SANS 1042.
- b. Manufacturer: To be agreed.
- c. Product: To be agreed.
- d. Type: [Water based polymer].
- e. Apply in accordance with manufacturer's recommendations to a dry surface.

N20.200 QUALITY AND WORKMANSHIP

Submittals

N20.201 Response

- a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

N20.202 Pre-contract Samples

- a. Not required.

N20.203 Post-contract Control Samples

- a. Provide the following control samples:
 - 1). 300 x 300mm tiling/ sheeting samples.
 - 2). All edge trims and covers.

3). Movement joint material, minimum 300mm.

N20.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First 10m² of each type, in location to be agreed.

Performance Requirements

N20.205 Adhesive Fixed Carpeting

a. Maintain the performance requirements of the installation for a minimum of seven years' continuous use of service without a significant loss of appearance.

b. For comparative purposes the adhesive fixed carpeting would be classified as suitable for "Extra Heavy Duty".

c. Provide test data to show compliance with the Specification.

N20.206 Static properties

a. Electrical resistance: the carpet is to achieve resistances for the following humidities:

1). Minimum resistance: 5 x 10⁵ ohms at 30% and at 40% RH.

2). Maximum resistance: 2 x 10¹⁰ ohms at 30% and at 40% RH.

3). Arrange an on-site test to determine the antistatic resistance of the floor covering as described in the PSA MOB document for Platform Floors, clause T43.00 or similar on-site test.

4). Following the test, produce a test report for submission. Do not clean in a manner that would remove anti-static properties.

b. Stroll test: Test the carpet using the stroll test as described in BS EN 1815 to demonstrate that the level of static propensity does not exceed 2.0 kV.

Workmanship

N20.207 General

a. Comply with Code of Practice SANS 10070 for the installation of flexible floor coverings and SANS 10186 for carpets.

b. Do not lay coverings until humidity of wet laid bases is less than 70%.

c. Glue directly to the floor, using suitable adhesives compatible with the Specification.

d. All bases to be rigid, dry, sound, smooth and free from grease, dirt and other

contaminants before coverings are applied.

- e. The materials to be delivered to Site in original packaging, clearly marked with the batch number.
- f. Finished coverings to be accurately fitted, tightly jointed, securely bonded, smooth and free from air bubbles, rippling, adhesive marks and stains.
- g. Roll floor finish with a suitable roller to ensure complete adhesion.
- h. Before, during and after laying, the temperature and humidity to be maintained at the approximate levels that will prevail after the building is occupied.

Conditioning

N20.208

Conditioning

- a. Before laying commences thoroughly condition materials by unpacking and separating in the spaces where they are to be laid.
- b. Maintain resilient flooring rolls in an upright position, unroll carpet and keep flat on a supporting surface.
- c. Minimum conditioning time and temperature to be as recommended by manufacturer.

Setting Out

N20.209

Setting Out

- a. The setting out of the pattern to be agreed with the Architect before ordering the floor finish materials.
- b. Tiles:
 - 1). Set out from centre of room to ensure that edge tiles are more than 50% of full tile width and tiles along opposite edges are of equal size.
 - 2). Tiles to be laid with continuous joints in both directions.
- c. Sheet Material:
 - 1). Seams to run parallel to the length of the area.
 - 2). Pile to face away from incident light and downwards on stairways.
- d. Joints to be made on the centre line of the door leaf unless specified otherwise.

N20.210

Adhesive

- a. Primer to be used where recommended by the adhesive manufacturer and allowed

to dry thoroughly before applying adhesive.

b. Spread the adhesive evenly, pressing down firmly and rolling (if recommended) to ensure full contact and a good bond overall.

c. Remove all surplus adhesive from exposed faces of coverings as the work proceeds.

N20.211 Seams

a. Accurately match patterns at seams.

b. Seams to be cut in to ensure a tight joint, without gaps, and be bonded, to the manufacturer's instructions.

c. Adhesive to be completely set before commencing welding of coverings.

d. A neat, smooth, strongly bonded seam joint to be formed flush with finished surface.

e. Seam welding to be hot welding with matching vinyl rod.

N20.212 Doorways

a. Make joint on centre line of door leaf unless specified otherwise.

Skirting

N20.213 Skirting

a. Close fit to floors and walls.

b. Tightly butt at heading joints, mitre at internal angles and dress round external angles.

Finishing

N20.215 Protection

a. Protect the finished flooring and skirtings by dust sheets or other non staining material from dirt and mechanical damage.

Storage

N20.216 Storage

a. Provide a clean, warm, dry and well ventilated store.

b. Store rolls standing up and packs of tiles as recommended by the manufacturer.

c. Keep in original packing until ready for laying.

END OF SECTION

O10 SIGNS/ NOTICES

a. To be read in conjunction with Sections A and other related sections of the Specification, the Preliminaries and Contract Conditions.

O10.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

O10.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

Specification and Scope

O10.102 Section Coverage:

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Illuminated signs.
- 2). Non-illuminated signs.
- 3). Surface fixed signage.

b. Ensure that all interfaces are fully co-ordinated prior to commencement.

Signs/ Notices

Illuminated Directional Signs

O10.104 S GN-110: External Surface Fixed Lettering – Gatehouse Building Sign

a. Surface mount Landlord name sign as show on the Contract Drawings.

1). Size and configuration: As shown on the Contract Drawings.

2). Location: Gatehouse Entrance

3). Signage letters:

a). Material(s):

i. Front faces: White translucent acrylic.

ii. Side and back faces: White solid material. Acrylic or powder coated aluminium. To be agreed.

iii. Framing: Galvanised mild steel.

b). Font: As shown on the Contract Drawings.

c). Height: 650mm (uppercase).

d). Width: 6200mm overall.

e). Finish: Powder Coated, Qualicoat Class 2 as in Section Z31 of this Specification.

f). Colour: White.

4). Horizontal fixing rails:

a). Material: Galvanised mild steel.

b). Finish: Powder Coated, Qualicoat Class 2 as in Section Z31 of this Specification.

c). Colour: As specified by the Architect.

5). Fixing: Concealed fixed to fixing rails to Specialist detail and the acceptance

of the Architect.

6). Illumination: As shown on the Electrical Engineer's documentation.

O10.105 SGN-111: External Surface Fixed Lettering – Main Building Sign

a. Surface mount building name sign as show on the Contract Drawings.

1). Location: Main Building Entrance Feature Wall

2). Size and Configuration: As shown on the Contract Drawings.

3). Signage letters:

a). Material(s):

i. Front faces: White translucent acrylic.

ii. Side and back faces: White solid material. Acrylic or powder coated aluminium. To be agreed.

iii. Framing: Galvanised mild steel.

b). Font: As shown on the Contract Drawings.

c). Height: 700mm (uppercase).

d). Width: 7300mm overall.

e). Finish: Powder Coated, Qualicoat Class 2 as in Section Z31 of this Specification.

f). Colour: White.

4). Horizontal fixing rails:

a). Material: Galvanised mild steel.

b). Finish: Powder Coated, Qualicoat Class 2 as in Section Z31 of this Specification.

c). Colour: As specified by the Architect.

5). Fixing: Concealed fixed to fixing rails to Specialist detail and the acceptance of the Architect.

6). Illumination: As shown on the Electrical Engineer's documentation.

O10.118 SGN-112: Internal Door Plate Signage

a. Door mount signage as shown on the Contract Drawings.

1). Signage type(s): BH.

2). Size and configuration as shown on the Contract Drawings.

3). Type: Aluminium plate and vinyl lettering signage.

4). Plate:

a). Material: Aluminium.

b). Height: 60mm.

c). Thickness: 2mm.

d). Finish: Metallic powder Coated, Qualicoat Class 1 as in Section Z31 of this Specification.

e). Colour: To be agreed.

5). Vinyl lettering:

a). Thickness: 5mm.

b). Depth: 3mm.

6). Vinyl lettering:

a). Font: Helvetica.

b). Height: 25mm.

c). Colour: White.

d). Fixing: To Specialist detail and the acceptance of the Architect.

Materials and Components

O10.119 Fixings Generally

- a. All fixings selected to be suitable for their intended purpose and adequate to comply with the performance requirements. Fixings not to be visible.
- b. All bolts, screws, nuts and anchors to be of adequate strength for their designed purpose.
- c. All necessary and appropriate fasteners and fixings to be supplied.
- d. Fixings to conform to all statutory requirements in respect of strength and type.
- e. Prevent bi-metallic corrosion between dissimilar metals.
- f. Use fixings, which are suited to the stresses, movements and vibrations in use without allowing any wobble, creaks or deflection of any fixtures or fittings.
- g. Fix items that require accessibility or removal with screws, bolts and hinges.
- h. Access panels to be removable independently of any other panels.
- i. Design to withstand all vibrations caused by traffic, aircraft, wind effects or any other such shocks, strains, stresses and movements including the operation of smoke detectors and any mechanical ventilation devices that may be imposed by the users. Suitable devices for absorbing or damping any such vibration to be included.
- j. Design so as not to transmit any drumming noise as a result of vibration, shocks or stress. Use sound deadening material in all areas.

O10.120 Acrylic Sheet

- a. The acrylic used for the signs:
 - 1). To be cast, colourless, clear and break resistant.
- b. Ensure good resistance to dilute acids, limited resistance to organic solvents and

good resistance to alkalis.

Fabrication

O10.121 Manufacturing Tolerances

a. Glass and Acrylic Tolerances:

1). Manufactured glass/ acrylic sizes not to exceed ± 1 mm on each straight length and diagonal.

2). After final processing, the deviation in flatness at any peak not to exceed 0.13mm and the difference between adjacent peaks not to exceed 0.08mm.

Where bow tolerance and wave tolerance differ, the stricter requirements to prevail.

b. Metal Tolerances:

1). Sheet length, width and diagonal dimensions not to exceed ± 1 mm.

2). Metal and glass to be smooth and flat. The required flatness criterion to be 1:1000 gradient. Permitted deviation of panel widths and lengths not to be in excess of ± 2 mm.

c. Submit a detailed list of tolerances to which the work is to be fabricated within the requirements of the Specification, for the overall geometric requirements.

d. The dimensional and detailed provisions intended to accommodate the construction tolerances of surrounding elements, in order to ensure that all aspects of the works relate satisfactorily to the project as a whole, to be stated and shown on the Shop Drawings/ Working Drawings.

O10.200 QUALITY AND WORKMANSHIP

Submittals

O10.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

O10.202 Pre-contract Samples

a. Not required.

O10.203 Control Samples

a. Provide the following post contract samples:

- 1). 300 x 300mm sign of each type in specified colour.
- 2). Font and lettering/ Numbering sample.
- 3). Fixing and seals.

O10.204 Benchmark Requirements

a. Provide the following quality benchmarks:

- 1). First sign/ notice of each type installed, in location to be agreed.

Testing

O10.205 Test Requirements

a. Provide evidence/ testing data and reports to demonstrate that all materials/ products proposed have been tested to meet standards specified herein.

Structural Performance Requirements

O10.206 Movements

- a. Provide full structural calculations.
- b. Accommodate all specified static and dynamic design loads likely to be imposed without causing permanent deformation of components or the failure of members or

components. Such loads to be transmitted safely to the points of support.

O10.207 Dead Loads

a. Accommodate the following dead loads without any reduction in performance:

- 1). The works' own dead loads without causing deflections or movements.
- 2). Vertical deflection of any supporting member.

O10.208 Live Loads

a. All loads resulting from movement and horizontal applied loads acting on the surface of the works arising from maintenance and cleaning operations.

b. A horizontal load of 1.75kN/m to cantilevered floor signs.

Durability

O10.209 Impact and Abrasion Resistance

a. Resist impacts from hand-held objects without any noticeable change to the surface appearance. Also resist abrasion from cleaning methods and maintenance systems without any noticeable change in surface appearance.

Installation

O10.210 General

a. Ensure that the final appearance of the works is of a uniform quality.

Contractor's Supplemental Information

O10.211 Photometric Data

a. Supply complete photometric data for the fittings, including optical performance rendered by an independent testing laboratory approved and licensed by the British Standards Institution (BSI). Data to be developed according to methods of the International Commission of Illumination (CIE) and include the following:

1). Coefficients of utilization:

a). Luminance control table with data presented numerically and graphically,

showing maximum luminance of the fitting measured at the shielding

angles. Readings to be taken both crosswise and lengthwise in the case

of fluorescent fittings or in fittings with an asymmetric distribution.

b). Candela distribution data presented graphically and numerically in 5°, 10°,

15°, etc. Data developed for up and down quadrants normal, parallel and

at 22.5°, 45° and 67.5° to lamps if light output is asymmetric.

c). Zonal lumens stated numerically as shown in the photometric specification.

Tolerances

O10.212 Signs/ Notices Tolerances

a. A high degree of accuracy is required in the fabrication and installation of the works and support structure.

b. On-site Dimensions:

1). Take responsibility for checking all dimensions on Site.

2). Accommodate any given tolerances and differences between actual Site

dimensions and dimensions shown on the Contract Drawings.

END OF SECTION

O20 IRONMONGERY

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

O20.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

O20.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

O20.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings and Ironmongery Schedule, provides particular requirements with respect to the following:

1). Ironmongery.

Ironmongery Supply

O20.103 Prescribed Manufacturer

a. Manufacturer/ Supplier: To be agreed.

b. Location and Requirements: Refer to the Ironmongery schedule.

O20.200 QUALITY AND WORKMANSHIP

Submittals

O20.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

O20.202 Pre-Contract Control Samples

a. Not required.

O20.203 Control Samples

a. Provide the following control samples:

- 1). Samples of each type of ironmongery in specified finish.
- 2). A complete sample board of standard items. The exact extent to be agreed.

O20.204 Benchmark Requirements

a. Provide the following quality benchmarks:

- 1). First item of ironmongery installed, of each type, in location to be agreed.

Hinges

O20.205 Hinges

a. Hinges shall be of the strength class to suit the door weight, duty, number of hinges.

b. All butt hinges shall be template drilled, shall have removable or fixed pins and shall incorporate stainless steel bearing washers or self-lubricating bearings as specified.

c. External hinges shall be brass.

O20.206 Door Closing Devices

a. All closers shall be from a suite of matching closers from one manufacturer, offering

a complete range of optional functions, such as mechanical and/or electromagnetic stand open and delayed closing.

b. Unless otherwise stated, closers shall have the following features:

- 1). Hydraulic control from 180°.
- 2). Be thermo-constant.
- 3). Separate adjustable closing speed.
- 4). Separate adjustable latching speed.
- 5). Separate sweep and latch valve.
- 6). Self-adjusting backcheck.
- 7). Fully adjustable delayed closing function.

c. Spring strength and delayed action functions shall be fully adjustable by means of an Allen key, or acceptable equivalent, for ease of use.

d. Overhead closers shall:

- 1). Be matched to the sizes and weights of doors.
- 2). Override latches and/or door seals when fitted.
- 3). Hold unlatched doors shut under normal working conditions.

e. Overhead closers for fire doors shall:

- 1). Be fixed with bolt-through fixings with threaded male shaft/female sleeve. Size M5 minimum. Flat square end and torc head.
- 2). Have arms of iron, steel or other metal with melting point not less than 800°C.

O20.207 Locks, Cylinders and Keys

a. Unless otherwise specified, keyed locks shall be of the pin tumbler, cylinder type, with a minimum of 6 pins.

- b. Where cylinders are fitted with an inside turn this shall be with an easi-grip pattern.
- c. All keys shall be labelled and handed over upon completion to the Architect, in sealed containers.
- d. Cylinders shall conform to SANS 4.
- e. Locks and latches shall comply with SANS 4.

O20.208 Lever Handles

- a. Lever handles shall comply with SANS 4.
- b. Lever handles shall be round in section, minimum 19mm diameter, and be safety shape in form.
- c. The lever handle shall rotate freely on a ball race type bearing contained in a 25mm diameter cup welded to the rose or back plate to give minimal wear and friction.
- d. All roses shall have a minimum 3mm thickness and be bored and countersunk with star drilling to accept countersunk back-to-back fittings.

O20.209 Floor Springs

- a. Floor springs shall be heavy-duty, fully adjustable, hydraulic check types.
 - 1). All floor springs throughout the works shall be from a single suite of matching units, from one manufacturer.
 - 2). Unless otherwise stated, floor springs shall have the following features:
 - a). Fully reversible, non-handed and suitable for single or double action wood or metal doors, using compatible fittings, with concealed fixing top plates to match other ironmongery and with no visible manufacturer's markings.
 - b). Closing speed adjustable from 2 to 30 seconds.
 - c). All floor springs on fire rated doors shall incorporate delayed closing and

the door, when opened to 90° or beyond, shall stand open for an adjustable period up to not less than 60 seconds before closing.

d). All floor springs to non-fire rated doors shall have a mechanical stand open at 90° in either direction.

e). Opening/ closing through 90° in either direction, with check control from any angle between 85° and closed.

f). Overload protection, to prevent damage from forced closing.

g). Special reinforced galvanised main boxes allowing vertical, longitudinal and transverse adjustment after installation, with waterproof seal.

O20.210 Door Selectors

a. Suitable selectors shall be provided if both leaves of a pair of rebated edge doors have closers or rebated latchbolts, etc.

b. The selectors shall not obstruct other ironmongery or affect the fire ratings of the doors.

c. On doors opening outwards, spring type, under-frame fixing selectors shall be used. If doors open inwards, rebate or face fixing types shall be used

O20.211 Door Bolts

a. Bolts shall be provided at the top and bottom of one leaf of the locking double doors.

b. Top bolts shall have suitable plates or keeps and bottom bolts shall have easy clean sockets. Unless otherwise required, top bolts shall be 300mm long and bottom bolts 225mm.

c. Bolts generally shall be of a high quality flush type, with dovetail returns to resist door damage.

d. Bolts shall have projecting slides where escape may be required and lever action in other locations.

e. Bolts to plant room and duct doors shall be of a good quality anodised aluminium surface type. Where doors open outward, top bolts shall be necked types, to allow proper fixings.

f. Indicator bolts to WC cubicles shall be of a mortice type, unless door and frame details are unsuitable, when a surface type shall be permitted. They shall have red/white outside indicator and coin operated emergency releases.

O20.212 Doorstops

a. Suitable stops shall be provided where required to protect doors, hardware or surfaces.

b. Doorstops shall have robust holders matching other ironmongery on the door and rubber inserts.

O20.213 Emergency Exit Devices

a. Emergency exit devices operated by a lever handle or push pad shall comply with BS EN 179.

b. Horizontal panic exit devices shall comply with BS EN 1125.

c. Electronically controlled panic exit systems shall comply with prEN 13633.

d. Electronically controlled emergency exit systems shall comply with prEN 13637.

e. Emergency exit devices shall be suitable for any size of door leaf up to 1220mm x 2440mm as standard and with horizontal activating bars which operate when pushed or pulled downwards, at any point on their effective length. They shall have catches, which automatically hold bolts in the withdrawn position on operation and release

them when fully closed.

f. Panic devices generally shall be of mortice types (with concealed latches or vertical bolts) finished identically to other ironmongery and incorporating security anti-thrust devices. In transformer rooms or the like, rim mounted enamelled steel panic devices shall be acceptable.

O20.214 Door Plates

- a. Push or kick plates shall be 1.5mm thick.
- b. Plates shall be fixed with suitable countersunk screws located 5mm from the edges, with one screw at each corner and screws at equal centres, not more than 240mm apart, at top and bottom edges. Check sizes of all kick, mid rail or trolley plates on Site before ordering.

O20.215 Sundries

- a. Hat and coat hooks shall be acceptable to the Architect, with at least two fixing points.
- b. Flush pulls, pull handles and drawer pulls shall be from accepted, suitably sized units, from the same range as the door hardware.

Materials

O20.216 Stainless Steel

- a. All stainless steel shall be austenitic grade non-magnetic 1.4301 8CR/18NI minimum, to BS EN 10095 and BS EN 10051.
- b. Bolting: Material for stainless steel bolts shall be type 1.4301 S15 stainless steel.
- c. Bolt strength shall be equivalent to grade 4.6 bolts. Washers for stainless steel bolts shall be formed from type 1.4301 stainless steel.

d. Finishes to Stainless Steel Elements: Stainless steel ironmongery shall be satin stainless steel finished as specified in the Ironmongery Schedule and shall be consistent in colour and texture both individually and collectively. The accepted finish shall be established on the basis of reference samples provided to the Architect.

e. Door stiles and rails shall be morticed and adequately reinforced to receive hinges, strikes, locksets, closers, floor bolts and all other ironmongery items on the Ironmongery Schedule.

O20.217 Aluminium

- a. Aluminium shall be HE9-TF alloy to BS EN 485 + A1.
- b. Each exposed surface shall be hand polished, then anodised to BS EN 12373: Part 1, Grade AA15, 15 microns thick.

Finish

O20.218 Chrome Plating

- a. Polished chrome plated steel finish shall be in accordance with BS EN 12540.
- b. Back of house hinges generally shall have satin chrome plated steel finish as scheduled.

Installation

O20.219 Generally

- a. Door hardware locations from finished floor level to centre-line of hardware to be as follows, unless noted otherwise:
 - 1). Lever handles/knobs: 1000mm.
 - 2). Push plate/pull handle: 1070mm.
 - 3). Cylinder pull: 1200mm.

4). Provide ironmongery for each door in separate, clearly labelled packs.

O20.220 Hinges

a. Provide three butt hinges to fire doors, external doors and doors with closers, unless specified otherwise.

O20.221 Fixings

a. Supply all items of door ironmongery complete with matching screws to the type and length recommended by the manufacturer and suitable for fixing to wood or metal, as appropriate to suit the door leaf and frame. All other visible fixings to have countersunk heads.

O20.222 Door Closers

- a. Must be matched to the sizes and weights of doors.
- b. Override latches and/or door seals when fitted.
- c. Hold unlatched doors shut under normal working conditions.

O20.223 Installation

- a. Ironmongery to be installed and checked for correct operation. Each item to be maintained and protected against damage by other trades.
- b. Co-ordinate the ironmongery works with other trades and form holes, mortices, chases, etc; reinforce and prepare hollow constructions to receive ironmongery; provide wiring, conduits, accessories, etc. for electrical items; protect ironmongery during construction; remove fixed items before finishing or painting as required.

Completion

O20.224 Completion

a. On completion adjust, clean and lubricate all ironmongery in accordance with the

manufacturer's recommendations.

O20.225 Key Handover

- a. At Practical Completion, account for and adequately label all keys.
- b. Provide the Architect with an itemised schedule and retain a duplicate schedule as a receipt.
- c. The master keys to be issued by the cylinder/key supplier direct to the Architect.

END OF SECTION

P10 STRUCTURAL STEEL MEMBERS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

P10.100 PRODUCTS AND MATERIALS

Specification and Scope

P10.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

P10.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Profiled primary steelwork of the size shown on the Contract Drawings.

2). Cold rolled and hollow section mild steel structural framing of the size shown on the Contract Drawings.

3). Provide shop drawings for the acceptance of the Structural Engineer.

P10.103 PMF-111: Galvanised Mild Steel SHS Column to Engineers Detail

1). Galvanised mild steel SHS column as shown in the Structural Engineer's documentation.

P10.105 PMF-121: Mild Steel SHS Beam to Engineers Detail

1). Mild steel SHS beam as shown in the Structural Engineer's documentation.

Fixings

P10.106 Bolted Connections

a. Structural Connections: Grade 8.8 bolts, M20, hole diameter 22mm.

b. High Strength Friction Grip Connections: Grade 8.8S bolts, M24.

c. Hand railing, stair connections: Grade 4.8 bolts, M16, hole diameter 18mm.

P10.107 Bolts, Screws, Nuts

a. Manufactured to SANS 1700.

1). Size and thickness: Structural Engineer's design.

2). Corrosion protection: To be agreed.

P10.108 High Strength Friction Grip Bolts and Nuts

a. Manufactured to SANS 1700.

1). Size and thickness: Structural Engineer's design.

2). Corrosion protection: To be agreed.

P10.109 Flat and Tapered Steel Washers

a. Manufactured to SANS 1700.

1). Size and thickness: Structural Engineer's design.

2). Corrosion protection: To be agreed.

P10.110 Mild Steel Rivets

a. Manufactured to SANS 1700.

1). Size and thickness: Structural Engineer's design.

2). Corrosion protection: To be agreed.

P10.200 QUALITY AND WORKMANSHIP

Submittals

P10.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Benchmarks

P10.202 Benchmarks

a. Submit samples of welding to the Structural Engineer for acceptance and to set the benchmark for following work.

b. Submit samples of all coatings to the Structural Engineer for acceptance and to set the benchmark for following work.

Structural Engineer Supporting Specifications

P10.203 Supporting Specifications

a. All steelwork shall comply with the requirements of SANS 2001 - CS1, HA and HC supplemented by the Specification.

b. Where a conflict arises between National Standards and the Specification, the Specification shall take precedence.

c. Design of structural steelwork shall comply with SANS 10162.

Shop Drawings/ Working Drawings

P10.204 Shop Drawings

- a. Comply with the requirements of Section A400.
- b. The contractor shall furnish the Architect with Shop Drawings/ Working Drawings within two weeks of having received the Contract Drawings.
- c. The Architect will check the drawings for conformity with design requirements and will return the drawings with additions and corrections, if any, within one week of having received them.
- d. Detailed checking of shop details for dimensional accuracy and installation fit will not be done by the Architect.

Handling and Storage

P10.205 Handling and Storing Coated Steelwork

- a. Use methods and equipment that minimise chafing, chipping and other damage to coated components.
- b. Ensure an adequate drying/ curing period for each coat before handling.
- c. Use suitable packings, lashings, lifting harnesses, nylon slings, rubber protected chains and chocks, etc.
- d. Stack coated components clear of the ground, separated by timber chocks, so that ponding does not occur.

Accuracy

P10.206 Accuracy

- a. Comply with the requirements of SANS 10155.

b. Unless stated otherwise accuracy to be to Degree of Accuracy II.

Inspection/ Testing of Steelwork

P10.207 Inspection

a. Permit the Architect, and/ or an appointed independent inspection authority, to inspect

the work at all reasonable times and at all places where it is being carried out.

b. Provide all facilities, hand tools, lighting, etc. as necessary to ensure adequate inspection.

P10.208 Test certificates

a. Test certificates pertaining to the steel to be used shall be submitted to the Architect by the contractor before fabrication commences.

P10.209 Quality Assurance

a. Quality Assurance is to comply with the requirements of Section A600.

P10.210 Testing of Welds

a. Testing of welds to be in accordance with SANS 2001 - CS1.

b. Non-destructive testing of welds to conform to AWS D1.1.

c. The following additional tests are to be undertaken:

1). Visual Inspection: All welds.

2). UT or X-ray tests: 0% of the length of all butt welds and site welds.

3). Dye Penetrant tests: 10% of all welds.

4). Magnetic Particle tests: 10% of all base plate welds.

Shop Fabrication

P10.211 General Requirements

- a. Inform the Structural Engineer when fabrication is due to start. Do not fabricate steelwork for which the drawings have not been checked and accepted by the Structural Engineer.
- b. Fabrication to comply with SANS 2001 - CS1.
- c. Structures are to be shop welded and site bolted.
- d. Do not use sections that are heavily pitted or rusted.
- e. Before fabricating, ensure that the surface condition of steel that is to be coated complies with requirements specified for cleaning.
- f. Cutting: The edges of flame-cut plates shall be ground smooth.
- g. Welding:
 - 1). Metal arc method to SANS 9692, SANS 9956 to form fully fused joints with mechanical properties not less than those of the parent metal.
 - 2). All welders shall be coded welders in accordance with SANS 2001 - CS1.
 - 3). The contractor shall produce evidence acceptable to the Architect that welding procedures and welders have been tested in accordance with the requirements of American Welding Society Standard AWS D1.1.
- h. Minimum welds to be 6mm continuous fillet welds.
- i. Make cuts and holes neatly and accurately. Remove burrs, sharp edges and dross caused by flame cutting.
- j. Gusset plates to be minimum 10mm thick plate.
- k. Bracing and end connections to have a minimum of two bolts.
- l. Fabricator to provide all nuts, bolts and washers for erection, bagged and labelled with drawing number.

m. Shop Inspection: Give 10 working days' notice to the Structural Engineer before commencing fabrication.

P10.212 Sealed Hollow Sections

a. Seal bolt holes and ends of hollow sections to prevent access of moisture.

P10.213 Additional Welds

a. Do not place any welds (including tack welds) not shown on the Contract Drawings, without acceptance from the Structural Engineer, even for temporary attachment or repair of faulty plates.

P10.214 Finishing Welds

a. Carefully dress welds to remove slag by light hammering, wire brushing or other methods that do not deform the surface of the weld.

b. All visible welds shall be smooth and flush.

P10.215 Overhead Welding

a. No overhead welding shall be carried out without the acceptance of the Structural Engineer.

Shop Applied Protective Coatings

P10.216 Coating Materials

a. Ensure that coating materials are from one manufacturing batch.

b. Check that all coating materials to be used are recommended by their manufacturers for the particular surface and conditions of exposure, and that they are compatible with each other.

c. Ensure that coating materials are obtained from only one manufacturer acceptable to the Structural Engineer unless specified otherwise. Inform the Structural Engineer

of the selected manufacturer at an early date.

d. All paint shall be delivered at the workshop in the original containers which display the manufacturer's name and trade mark as well as the SANS mark.

P10.217 Preparation Materials and Ancillaries

a. Preparation, materials and ancillaries shall be of the types recommended by their manufacturers and the protective coating manufacturer for the surfaces being prepared.

P10.218 Shop Priming of General Structural Steelwork

a. Cleaning:

1). Remove oil and grease by solvent wiping.

b. Manual scraping and wire-brushing:

1). This treatment shall normally be applied in all circumstances except if and where blast-cleaning is specified.

2). Prior to treatment, the steel surface shall be cleaned of dirt and grease.

3). Heavier layers of rust shall be removed by chipping.

4). All loose mill scale, rust and foreign matter shall be removed by very thorough scraping, wire-brushing, machine-brushing, grinding, etc.

5). Finally the surface shall be cleaned by vacuum cleaner, with clean dry compressed air, or with a clean brush.

6). The surface shall have a pronounced metallic sheen with an appearance equal to or better than that shown on the prints designated ST 3 in SIS 05 59 00 or ISO 8501.

c. Abrasive Blast cleaning:

1). Abrasive blast to a near white finish in accordance with SA 2½ of ISO 8501:

Part 1 to obtain a surface profile of 45 - 65 microns.

d. Prime: Within four hours of surface cleaning apply one coat zinc phosphate to SANS

1319 to a DFT 50 microns.

e. Surfaces in contact with each other after assembly or erection shall receive the primer beforehand, except for faying surfaces for friction-grip fasteners.

P10.219 Galvanising

a. All cutting, welding and drilling shall be completed before galvanising. Provide all necessary vents and drain holes in accepted locations and seal to acceptance after galvanising.

Erection of Steelwork

P10.220 Before Commencing Erection

a. Not less than 7 days before proposed start date, check foundations and other structures to which steelwork shall be attached for accuracy of setting. Report any inaccuracies and defects to the Structural Engineer without delay.

b. Obtain the permission of the Structural Engineer to commence erection.

P10.221 Erection of Steelwork

a. Position members accurately, using steel packs of adequate area as necessary to achieve a true line and level.

b. Fix securely using washers under bolt heads and nuts.

c. Use suitably tapered, correctly aligned washers under bolt heads and nuts that bear on sloping surfaces.

d. Bolts: To be according to detail drawings.

e. Where exposed steelwork is partially embedded or encased in concrete, apply two coats of an approved rubber/ bituminous coating locally to steel/ concrete junction.

P10.222 Column Bases

a. Levels: Adjust using steel shims or folding wedges no larger than necessary.

b. Location of shims/ wedges: Position symmetrically around perimeter of base plate.

Do not use a single central pack.

c. Give notice: If space beneath any column base is less than, or over 25mm greater than, the specified dimension.

d. Accuracy of erection: Check, and correct errors before filling and bedding beneath bases and carrying out other adjacent work.

P10.223 Mortar Bedding of Column Bases

a. Bolt pockets: Completely fill with neat cement slurry.

b. Spaces beneath base plates: Completely fill as follows.

1). Spaces 25 - 50mm deep: 1:1 cement: sand mortar, just fluid enough to pour.

Tamp well as filling proceeds.

2). Spaces 50 - 80mm deep: 1:2 cement: sand mortar, just damp. Tamp well against properly fixed supports as filling proceeds.

P10.224 Proprietary Grouting of Column Bases

a. Preparation:

1). Remove all grease, oil, laitance etc.

2). Scarify concrete surfaces to provide a good mechanical key and wash well with water.

- b. Mix grout in accordance with the manufacturer's recommendations.
- c. Mix and place grout in one continuous operation, do not re-temper.
- d. Completely fill all bolt pockets and spaces beneath base plates tamping as filling proceeds.
- e. Cure exposed grout faces with wet hessian or curing compound.

P10.225 Modifications

- a. Inform the Structural Engineer of any defects due to detailing or fabrication errors.
- b. Obtain acceptance of methods of rectification before starting modification or remedial work.

P10.226 Preparation for Site Welding of Shop Painted Steelwork

- a. Blast clean and mask weld areas before coating surrounding areas. If more than one coat is applied to surrounding areas, step each 30mm back from the edge of the preceding coat. Remove the masking immediately before welding.
- b. Alternatively, prepare and shop paint weld areas as specified, then grind off to the bare steel immediately before welding.

Remedial Work

P10.227 Remedial Work to Coatings

- a. Completely remove all areas of blistering, peeling, flaking, cracking and lack of adhesion. Prepare and re-apply all coats as instructed.
- b. Inadequate Dry Film Thickness: Rub down and apply further coats as instructed.
- c. Mechanical Damage: Locally cut back, prepare and re-apply all coats to give a continuous flat finish.
- d. Where damage exposes bare metal thoroughly clean and prime section.

e. Damage to coatings or subsequent surface preparation has exposed bare metal, ensure that it is thoroughly cleaned and primed within two hours.

P10.228 Repairing of Damaged Galvanised Coatings

a. The repair of damaged surfaces is to be to a procedure agreed with the Structural engineer prior to starting.

b. The damaged surface must be thoroughly cleaned and if welding has been carried out all slag must be removed preferably by the use of a chisel hammer.

c. Three methods are available for restoring protection to the damaged area:

1). Zinc spraying.

2). Zinc based solders.

3). Zinc rich paints.

Site Treatment of Steelwork

P10.229 Site Painting of Steelwork - General

a. No painting on the site shall be done in inclement weather or when humidity or frost is liable to cause wet or damp conditions on the surface to be painted.

b. No painting shall be done if the temperature falls below 7°C.

c. Welded seams shall be thoroughly steel-brushed before painting. Permission shall be obtained from the Architect before slag residue may be neutralized with acids or alkalis.

d. After erection of the steelwork, the specified paint system shall be reinstated in all areas where it has been damaged. All fasteners shall also be treated in accordance with the specified paint system.

P10.230 Site Painting of Steelwork Final Coat

- a. All paint shall be delivered at the site in the original containers which display the manufacturer's name and trade mark as well as the SABS mark.
- b. The coating system shall be from one manufacturer only acceptable to the Structural Engineer. The paint manufacturer's instructions shall be strictly adhered to.
- c. All structural steel which is not visible, e.g. purlins, rafters and trusses, shall receive only the primer coat. All visible steel shall receive the full appropriate paint system treatment.
- d. Remove all surface defects likely to be detrimental to the protective painting system.
- e. Before coating, degrease as recommended by paint manufacturer.
- f. The paint system shall be applied in accordance with the specifications given in table 3. below. Application may be by brush, roller or sprayed.
- g. Final coats:
 - 1). Apply two coats of high gloss enamel paint to SANS 630 or Structural Steel paint to SANS 684 to a DFT of 25 - 40 microns per coat.
 - 2). Second coat to be applied within 48 hours of the first coat.

P10.231 Treatment of Site Welded Joints in Painted Steelwork

- a. After welding, and without delay, remove all scale and weld spatter from the weld areas by grinding or chipping, abrade to remove all traces of rust, wash with clean water and allow to dry.
- b. Prime without delay and apply a further coating to the weld areas to match the surrounding painted areas.

P10.232 Bolted Joints (Non-friction Grip)

- a. Where the steelwork is to be shop painted, ensure that the full shop specification is

applied to joint faces.

b. Immediately before assembling bolted joints in externally exposed steelwork, apply

a further coat of primer and bring the surfaces together while still wet.

c. Before applying Site coatings to externally exposed steelwork, seal all crevices to

bolts and joint perimeters with compatible mastic.

P10.233 Friction Grip Joints in Shop Painted Steelwork

a. After final tightening of bolts, and without delay, thoroughly degrease and clean the bare steel at the joint edges and prime as specified.

b. Seal all crevices to bolts and joint perimeters with compatible mastic.

c. Apply further coatings to the surrounding areas to match the adjacent shop painted areas before applying specified Site coatings.

P10.234 Uncoated Fastenings

a. After erection, thoroughly degrease and clean and, without delay, apply coatings to match the surrounding shop painted areas before applying specified Site coatings.

P10.235 Galvanised Fastenings

a. After erection, thoroughly degrease and wash with clean water, apply a suitable etch primer to a DFT of 35 microns before applying specified site coatings within 72 hours.

Protection

P10.236 Protection

a. Adequately protect freshly applied surface coatings from damage.

END OF SECTION

Q12 SHOPFRONTS

a. To be read in conjunction with Sections A and other related sections of the Specification, the Preliminaries and Contract Conditions.

Q12.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

Q12.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

Q12.102 Section Coverage:

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Shopfronts.

Q12.103 Interfaces

- a. Complete the Detailed Design of all interfaces with adjoining trades prior to commencement of manufacture.
- b. Ensure that all interfaces are fully co-ordinated prior to commencement.
- c. Make sure that all interfaces maintain the acoustic, thermal and weather-tightness requirements of the building.

Q12.104 SF-02: Internal/External Glazed Shopfront System with Cill

- a. An aluminium, clip in bead, gasket glazed shop front system with internal cill to Contractor's design and supply and Architect approval.
 - 1). Shopfront type: SF02 as shown on the Contract Drawings.
 - 2). Configuration and dimensions: As shown on the Contract Drawings.
 - 3). Supporting structure: Insitu concrete floor, floor slab soffits and any other as shown on the Contract Drawings.
 - 4). Framing members:
 - a). Material: Thermally broken/ separated aluminium with steel inserts/ reinforcement as necessary.
 - b). Depth of mullions: As shown on the Contract Drawings.
 - c). Finish:
 - i. Powder coated, Qualicoat Class 2 as in Section Z31 of this Specification.
 - ii. Colour: Ral 7043.
 - d). Configuration: As shown on the Contract Drawings.
 - e). The contractor shall ensure the adequacy of the framing within the bulkhead

at the shop front head to withstand any imposed loads that may be applied.

5). External cover caps:

a). Material: Aluminium, face width as shown on the Contract Drawings.

b). Finish:

i. Powder coated, Qualicoat Class 2 as in Section Z31 of this

Specification.

ii. Colour: Ral 7043.

6). Glazing:

a). Conform to SANS 10137 and SANS 10400 Part N.

b). Type: As shown on the Contract Drawings.

7). Cill:

a). Material: Aluminium.

b). Finish:

i. Powder coated, Qualicoat Class 2 as in Section Z31 of this

Specification.

ii. Colour: Ral 7043.

8). The shopfront subcontractor is responsible for maintaining the waterproofing,

the thermal and acoustic integrity of the enclosing structure by sealing the

shopfront to the floor, soffit and adjacent substrate, acoustic and thermal

barriers.

9). Sealants to be in accordance with Section Z22 of this Specification.

Q12.105 SF-01: External Glazed Shopfront System with Double Side Hung Doors and Cill

a). An aluminium, clip in bead, gasket glazed shop front system with internal cill to

Contractor's design and supply and Architect approval.

- 1). Shopfront type: SF01 as shown on the Contract Drawings.
- 2). Configuration and dimensions: As shown on the Contract Drawings.
- 3). Supporting structure: Insitu concrete floor, floor slab soffits and any other as shown on the Contract Drawings.
- 4). Framing members:
 - a). Material: Thermally broken/ separated aluminium with steel inserts/ reinforcement as necessary.
 - b). Depth of mullions: As shown on the Contract Drawings.
 - c). Finish:
 - i. Powder coated, Qualicoat Class 2 as in Section Z31 of this Specification.
 - ii. Colour: Ral 7043.
 - d). Configuration: As shown on the Contract Drawings.
 - e). The contractor shall ensure the adequacy of the framing within the bulkhead at the shop front head to withstand any imposed loads that may be applied.
- 5). External cover caps:
 - a). Material: Aluminium, face width as shown on the Contract Drawings.
 - b). Finish:
 - i. Powder coated, Qualicoat Class 2 as in Section Z31 of this Specification.
 - ii. Colour: Ral 7043.
- 6). Shopfront glazing:

- a). Conform to SANS 10137 and SANS 10400 Part N.
 - b). Type: As shown on the Contract Drawings.
- 7). Double side hung glazed aluminium entrance doors and frame:
- a). Door openings shall not be located over construction joints.
 - b). Size and configuration as shown on the Contract Drawings.
 - c). Material: Aluminium with steel inserts/reinforcement as necessary.
 - d). Finish:
 - i. Powder coated, Qualicoat Class 2 as in Section Z31 of this Specification.
 - ii. Colour: Ral 7043.
 - e). The edges of the door leaves shall have easily exchangeable brush seals to ensure good air tightness.
 - f). Door glazing:
 - i. Conform to SANS 10137 and SANS 10400 Part N.
 - ii. Type: As shown on the Contract Drawings.
 - g). Ironmongery: As shown on the Project Ironmongery Schedule and described in Section O20 of the Specification.
- 8). Cill:
- a). Material: Aluminium.
 - b). Finish:
 - i. Powder coated, Qualicoat Class 2 as in Section Z31 of this Specification.
 - ii. Colour: Ral 7043.

9). All moving parts requiring lubrication shall have grease caps, which can easily be maintained and shall not cause oil drips during operation.

10). The shopfront subcontractor is responsible for maintaining the waterproofing, the thermal and acoustic integrity of the enclosing structure by sealing the shopfront to the floor, soffit and adjacent substrate, acoustic and thermal barriers.

11). Sealants to be in accordance with Section Z22 of this Specification.

Q12.200 QUALITY AND WORKMANSHIP

Design

Q12.201 Design Services

a. The Contractor shall employ the services of a specialist cladding engineering practice for the design, dimensioning and checking of the structural integrity of the contractor's shopfront design.

b. The Contractor shall nominate a Professional Engineer to be responsible for his design and the preparation of any calculations etc. on his behalf, and shall provide proof of adequate Professional Indemnity Insurance for the design work undertaken.

c. The Contractor must indemnify the Owner, the Architect and other employer's agents against defects which may arise out of the design, supply and installation of these works for a period of not less than 30 years.

Q12.202 Design proposals

a. Preliminary Contract Drawings indicate intent. Other reasonable proposals will be considered.

b. To ensure position and alignment of all parts and features as shown on preliminary

Contract Drawings.

- c. To accommodate deviations in the primary support structure.
- d. Primary support structure: Before commencing installation of shopfront system, carry out survey sufficient to verify that required accuracy of erection can be achieved.
- e. Give notice: If the structure will not allow the required accuracy or security of erection.

Accuracy

Q12.203 Fabrication Accuracy

- a. Overall frame dimensions:
 - 1). Length of member: up to 2 500 long +0 -1.5mm over 2 500 long +0 -3.0mm.
 - 2). Straightness: up to 2 500 long 1.5mm over 2 500 long 3.0mm.
 - 3). Squareness: Difference in length of diagonals.075% of design dimension or 3.0mm whichever is the lesser.
 - 4). Bow: The centre section of the element not to bow by more than the lesser of 3mm or 0.075% of the length of the element measured from a straight line between the ends of the element
- b. Straightness: Any surface or edge not to deviate by more than +1.5mm from a 2m straightedge placed against it in a direction parallel to the long axis of the element.
- c. Flatness: Any surface not to deviate by more than +1.5mm from a 2m straightedge placed against it in any direction.
- d. Twist: No section of the element to be twisted by more than 1° from the section at either end of the element.
- e. Position of members within framing:
 - 1). Position of mullions and transoms: $\pm 1.5\text{mm}$.

Q12.204 Installation Accuracy

- a. Conform to SANS 10137 and SANS 10400 Part N.

Submittals

Q12.205 Tender Response

- a. Provide tender submittals in accordance with the requirements of Section A.400 of the Specification.

- b. Submit a design response with the Tender proposal, to include all profiles of typical conditions, with dimensions.

- c. The Tender design response shall include:

- 1). List of Tests included.
- 2). QA/ QC programme.
- 3). List of proposed Site Drawings/ Working Drawings
- 4). Summary of deviations from the Specification.
- 5). Outline technical specifications reflecting proposed materials/ systems, etc.
- 6). A detailed list of tolerances to which the works shall be installed, as a minimum

the statement of tolerances shall include the following:

- a). Thickness.
- b). Position on plan.
- c). Level.
- d). Alignment.
- e). Joints between panels.
- f). Diagonal.

g). Eccentricity.

h). Inclination.

7). A list of proposed suppliers and sub-contractors intended to be used.

Samples Prototypes and Quality Benchmarks

Q12.206 Control Samples (Post Contract)

a. Provide the following control samples:

- 1). 300mm length of each type of framing with a minimum of one joint.
- 2). All proposed gasket types, extrusions, etc. including at least one joint.
- 3). Patch fittings.
- 4). Glass samples 300 x 300mm of all specified glass types.
- 5). Samples of fastening devices and anchors, etc.
- 6). Typical bolts and exposed fixings.
- 7). Proposed types of finish.

Q12.207 Prototype Requirements

a. Provide the following prototypes:

- 1). Full size storey high x 3000mm long prototype, of each type of shopfront including all fixings and jointing for testing purposes.
- 2). Refer to testing requirements specified.

Q12.208 Benchmark and Certification Requirements

a. Provide the following quality benchmarks:

- 1). Provide a Certificate of Conformance that the powder coating has been carried out in strict accordance with SANS 1796.
- 2). Provide a Certificate of Conformance that the glazing has been carried out in

strict accordance with SANS 10137.

3). First completed full height bay of each type in a location to be agreed with the Architect.

4). Provide a copy of the façade sub-contractor's current AAAMSA membership certificate.

Testing

Q12.209 Testing of Prototypes

a. Where the sub-contractor is unable to provide independently certified test data demonstrating compliance with the Specification, then testing of the prototypes is to be undertaken.

b. Mount in suitable test rigs reflecting suitable conditions of attachment and support.

c. Give 7 days notice prior to the erection, testing and dismantling of the prototype.

d. Allow the manufacturer's recommended curing of all sealants prior to test commencement.

e. Wash all external faces with a mild additive-free detergent and rinse prior to test commencement. Cleaning method to be approved in writing by manufacturers of glass, aluminium, sealants and ironmongery.

f. Carry out tests using an appropriate independent laboratory.

g. Test for air permeability, water leakage, and wind load resistance, plus structural loading tests to demonstrate that building movements are accommodated without degrading the performance.

h. Details of the testing procedures to be provided for review and comment prior to release for manufacture.

Q12.210 Structural Silicone Testing and Maintenance

a. General:

1). Comply with requirements of the Specification with respect to the testing of the structural silicone application.

2). Provide the Architect with documentary evidence that the selection of sealant takes into account any relevant recommendations by the sealant manufacturer as to the use of the sealant.

3). Compatibility: Submit to the Architect test certificates to confirm compatibility of the sealant used with all substrate materials including aluminium, finishes, glass coatings, glass interlayers, gaskets, setting blocks, backing rods, double glazed unit primary and secondary seals, structural glazing tape etc. These certificates shall relate to tests carried out by the sealant manufacturer.

b. Submit to the Architect adhesion test data of production samples as tested in accordance with ASTM C 794. These shall establish adhesion performance over the temperatures specified in the Specification.

1). Where the structural silicone bonds glass to cladding framework, the weakest element in the line of stress shall have a minimum strength of 600kPa or 6 times the design strength, whichever is the greater in accordance with ETAG 01/ 015 or ETAG 002 documents which set out the requirements for use of structural silicone. This criterion shall be proven with a statistical confidence of 99% for each combination of substrate and design conditions, provide a report from the sealant manufacturer for the tests performed in the following manner.

2). Assemble and fully cure under production conditions (not laboratory conditions)

a minimum of 12 samples. Each sample shall be a minimum of 150mm long.

The sample shall be made of actual substrate material, i.e. glass with actual coatings (low E and/ or fittings), aluminium sections with finishes, etc. The joint geometry shall be accepted by the Architect.

a). Double-sided tape or other spacer material shall be installed such that it does not add to the silicone joint strength.

b). Weather seals shall not be installed on the samples.

c). After full cure the samples shall be totally immersed in tap water at room temperature for 7 days.

d). Samples shall be tested in a tensometer 25 hours after removal from the water immersion tank.

e). Each sample shall be subjected to a tensile load test. The crosshead speed shall be 50mm per minute. Continue testing until failure occurs or until 830kPa or 6 times the design load, whichever is the greater, is applied to the samples. Report the maximum stress and mode of failure including percentage area of cohesive failure and any area of voids in the sealant for each sample. Adhesive failure area or void cross section area parallel to the substrate face greater than 20% is unacceptable.

f). A statistical analysis of results shall indicate a design stress of not less than 600kPa or 6 times the design stress of the sealant, whichever is the greater, with a confidence of 99% over the temperature range as described in the Specification.

g). If the sample set does not meet the requirements of the above criteria, the design of the failed element shall be revised and subjected to a re-test.

This procedure shall continue until the above requirements have been met.

h). Prepare a report of the above testing. No fabrication shall commence until the results have been accepted by the Architect.

i). Retain all test results with regard to the structural silicone glazing for a minimum period of 15 years from project completion. These shall be made available to the Architect on request.

c. Maintenance:

1). Document an on-going inspection/ maintenance programme for the structural silicone and employ accepted Testing Authorities to carry out these inspections which shall include the following:

a). Cleaning: Specify detergents acceptable to the glass and double glazed unit manufacturer, etc, and methods.

b). Inspection: Provide forms to be filled out periodically, each pre-dated with the inspection date and an adequate quantity for the design life of the building. The form shall state the full procedure for the inspection.

c). Sample Cut-out: Provided forms for periodic cut-out of structural seals and weather seals to check Shore hardness and tensile properties of the seal.

d). Each of the procedures shall clearly state pass/ fail criteria and indicate action required when a failure is obtained as a result. The Testing Authority shall be required to produce a report based on its findings and recommendations for any remedial works to the Architect.

Q12.211 Air Permeability/ Infiltration

a. The Detailed Design shall comply with the requirements of AAAMSA/ SANS 613 performance category A2.

Q12.212 Weather and Water Penetration Resistance

a. The Detailed Design shall comply with the requirements of AAAMSA/ SANS 613 performance category A2.

Q12.213 Wind Resistance Tests

a. The Detailed Design shall comply with the requirements of AAAMSA/ SANS 613 performance category A2.

Q12.214 Soft Body Impact

a. Soft body impact tests to be carried out in accordance with SANS 10160.
1). A glazing unit may break but only in a safe fashion as described in SANS 1263: Part 1 but in addition any balustrade or glazing unit that protects a drop of more than 750 mm may crack but must maintain integrity as a barrier after cracking.

Q12.215 Off-Site Test

a. Testing Authority to witness the installation and dismantling of prototypes, record any variations to the agreed details including the extent of water penetration.
b. All tests in sequence to be certified to the satisfaction of the Testing Authority.
c. If any modification is made to the prototype, repeat testing as detailed in the relevant CWCT procedures. However, if any modification is undertaken that, in the opinion of the independent testing authority or witness, invalidates earlier test results, the sequence to commence again at the first test. This requirement is not applicable to glass breakage during the wind resistance safety test when replacement of the pane

of glass may be carried out without restarting sequence.

Q12.216 Acoustic Testing - Initial Advance Test

a. The Contractor is to identify the glass configurations and incorporate any acoustically enhanced configurations that may be necessary to meet the Specification.

b. Immediately following the appointment of the Shopfront Contractor, the Contractor is to arrange laboratory acoustic tests of the proposed glass configurations using similar framing to that intended, with similar dimensions and mass per metre run of framing. These prototypes will not be used as visual samples and will not include glass coatings or heat treatments, but are to be used to confirm compliance with the specified acoustic data.

c. From initial results of acoustic testing, provide detailed acoustic assessment of each cladding type for review.

d. As an alternative to testing the appointed acoustic consultant may approve a glazing system based on its components, construction, seals, installation and workmanship.

Q12.217 Site Hose Testing

a. Site water hose test to be carried out in accordance with the recommendations of CWCT Standard and Guide to Good Practice, Test Methods for Curtain Walling Section 7. The area to be tested shall be equal to 25% of the joints to each façade.

Q12.218 Testing of Fixings

a. As the work proceeds, allow for bolts as required by the Structural Engineer to be proof load tested.

1). The specific test methods and number of tests to be appropriate to the scope design and complexity of the project.

2). As a minimum each type of anchor or fixing to have at least 10 No. tests carried out to destruction.

3). The actual number of tests to be performed and the test conditions to be determined by a construction professional based on the approval test data and available technical performance data available for the particular fixing(s).

4). The type of test (shear, pull-out) to be dictated by the nature of the anchor/ fixing (i.e. support and/ or gravity). Where appropriate, for instance, tests to be performed in different loading directions to simulate positive and negative wind loading with a gravity load applied.

Q12.219 Results and Certificates

- a. Tests and inspection results to be submitted immediately they are available.
- b. Maintain, until the end of the defects liability period, records of all inspections and tests performed, material certification, inspection and test plans, drawings, and any other documentation to substantiate conformity with the Specification.

Structural Performance Requirements

Q12.220 General

- a. Ascertain all dead, live loads and movements imposed on the works as scheduled in Section A of this Specification.
- b. Accommodate all tolerances and movements of the building structure, including dead, live, seismic and wind loads plus moisture, shrinkage, creep and thermal effects.
- c. The works to resist all specified static and dynamic design loads likely to be encountered without causing permanent deformation of components or the failure

of fixings, panels or seals and to transmit such loads safely to the points of support.

Q12.221 Structural Movements

a. Refer to Structural and Tolerances data/ requirements prepared by the Structural Engineer.

Q12.222 Specific Movements

a. The works shall withstand all movement of the building structure and cladding support structure under all design loads or combination of loads without damage or reduction in performance.

b. Expansion and movement joints shall accommodate the appropriate range of movement.

c. The Contractor to be responsible for determining the requirement for and location of movement joints, whether shown on the Contract Drawings or not.

Q12.223 Specific Live Loads

a. The works shall be capable of accommodating the following specific live loads without any reduction in performance:

1). Horizontally applied loads acting on the surface of any component. The works shall sustain safely, without reduction in performance and without permanent deformation to any component, a static 1kN load applied normal to the curtain wall surface over an area of 0.1m x 0.1m at any point at a height of 1.3m above finished floor level or such lesser height as may be more critical and a nominal horizontal load of 1kN/m at a height of 1.3m on any part of the framing.

2). A horizontal line load applied to the works, due to the occupants, in accordance with SANS 10160.

3). Known impact loads, or transferred impact loads, that occur during service life.

4). Loads imposed during replacement.

5). Horizontal and vertical loads of similar magnitude to those which are imposed upon adjacent or attached elements.

Q12.224 Wind Loads

a. Wind loading shall be accommodated safely, without detriment to the overall design, structural integrity and performance of the works.

b. Design Wind Pressures: 1.15kPa overall unfactored building loading thus excluding the normally included 1.3 combination factor. This excludes the shape factors for localized sections. (Design pressure to be confirmed by Structural Engineer)

c. Calculated pressure loads shall include the effect of internal air pressures within the building, taking into account the presence of significant openings, which might arise occasionally within the building enclosure.

d. Internal wind loads will be a minimum of 600 Pa or other greater force determined by the Project Engineer.

e. Should there be a discrepancy between the above stated figures and that of the Engineers Wind Loading Report, the Wind Loading Report will take precedence.

Q12.225 Deflections

a. The maximum allowable deflection of any glass framing element of the works when carrying full design loads must not exceed 15mm or 1/175 of its length measured along the framing element of single glazed applications whichever is the lesser value,

and 1/300 of its length of double glazed applications.

b. No elements to deflect under loading in any way that is detrimental to any element of the works or adjacent structure.

c. All components, supports and fixings to be capable of accommodating the above deflection without permanent distortion, deformation or failure.

d. Accommodate differential structural movements in backing structures as relevant.

Refer to the Structural Engineer's Specification.

e. The magnitude of the allowable deflections to be reduced if they are detrimental to any part of the works.

Environmental Performance Requirements

Q12.226 Thermal Movement

a. The design shall cater for all temporary and permanent conditions envisaged for the works.

b. The service temperature range for components of the works to be taken as -10°C and +80°C. Manufacturer to provide assurance that the components will survive such temperature variations for the warranty period.

c. The works shall be capable of accommodating changes in dimension and shape of its components resulting from the varying surface temperatures without any reduction in the specified performance.

d. Thermal movements shall not result in audible noise.

Q12.227 Moisture Movement

a. Resist movement without permanent deformation or any reduction in the specified performance:

1). Due to changes in the moisture content of the works' components, resulting from variations in the moisture content of the air.

2). Due to the expansion of absorbed or retained moisture caused by freezing.

b. Control the flow of any water within the system and direct such water to the outside.

Q12.228 Thermal Performance

a. Provide for measurement by an internationally accredited laboratory to international standards.

Q12.229 Thermal Stress

a. Provide a thermal stress evaluation from the glass manufacturer for every glazing condition and aspect.

b. Provide a thermal safety warranty for the glazing panels installed which are exposed to direct sunlight.

Q12.230 Capillarity

a. Eliminate water migration, due to capillarity, to the inside of the building.

Q12.231 Weather and Water Penetration Resistance

a. The works to be weatherproof and watertight ensuring the prevention of water leakage onto the internal face of the works.

b. The works to remain weatherproof and watertight under all conditions with due allowance made for deflections and movements.

c. Cavities are to be drained and ventilated to the exterior. Wet applied seals for the purpose of preventing the ingress of water is not acceptable. All seals and gaskets shall be "dry".

d. Fixed joints to remain rigid and accommodate all thermal, building structure or other

movements and any applicable loads without compromising watertightness.

Durability Performance Requirements

Q12.232 Service Life

- a. The assembly must be durable with maintenance listed below and identified in the Maintenance Manual prepared by the cladding sub-contractor.
- b. Simple adjustment of components subject to wear.
- c. Lubrication of hinges and other moving parts.
- d. Removal of dust and dirt from internal parts of curtain walling, window frames, door frames etc.
- e. External Cleaning of exposed surfaces.

Q12.233 Primary and Secondary Components

- a. Primary Components – service life 60 years.
- b. The following components shall be considered primary components:
 - 1). Main framework, rails, structural connections.
 - 2). Fastenings, pressure plates.
 - 3). Fire/ smoke stops, acoustic barriers, flashings.
 - 4). Concealed sealants.
 - 5). Inaccessible fixings.
- c. Secondary Components – service life 30 years.
- d. The following components shall be considered secondary components:
 - 1). Glazed units with a minimum warranty period of 10 years.
 - 2). Glazing gaskets, silicone weather seals etc.
 - 3). Exposed sealants and fixings.

e. Secondary components shall be capable of replacement without dismantling the works.

f. The predicted service life of secondary components shall be stated and guidance on the required maintenance provided.

Q12.234 Impact and Abrasion Resistance

a. Resist abrasion from cleaning methods and maintenance systems without noticeable change in surface appearance. Generally, surfaces to be sufficiently hard (including glass coatings) to resist all reasonable impacts from hand-held objects without any noticeable change to the surface appearance.

b. Impact tests to be carried out to all assemblies adjacent to pedestrian areas in accordance with the recommendations of SANS 10160. Tests shall conform to category B requirements.

c. The extent of any damage determined through testing to be recorded and, where possible, quantified. Samples shall also be submitted to the Architect.

Q12.235 Demountability

a. Elements of the works to be individually and independently removable ensuring access for maintenance and/ or replacement of glazed units in the event of breakage.

b. The removal of glazed units is not to affect the performance or safety of any part of the works and a method statement is to be provided for acceptance.

c. On site application of structural silicone seals is not permitted. Only structural silicone applied in accordance with manufacturer's instructions at the glaziers works is acceptable.

Corrosion

Q12.236 Corrosion

- a. Provide suitable means of isolation, using isolating tape, plastics washers, or other suitable means to prevent corrosion between dissimilar metals/ materials.
- b. Prevent electrical connectivity between dissimilar metals to avoid corrosion as recommended in PD 6484.
- c. Passivate, by an approved procedure, all stainless steel fixings that are welded.

Fire Performance Requirements

Q12.237 General

- a. All elements to be non-combustible or not easily ignitable with low flame spread characteristics, and not produce excessive quantities of smoke or toxic gases.

Q12.238 Surface Spread of Flame

- a. All materials used internally to comply with the requirements of the fire safety strategy and BS 9999 when tested to the relevant parts of BS 476 or BS EN 13501.

Guarantee

Q12.239 Manufacturer's Guarantee

- a. Provide from the shopfront manufacturer a written guarantee in respect of all manufacturing, installation and components of the glazing that the performance criteria are to be satisfied for the full design life of the works, as stated in the specification, provided always that the maintenance has been carried out as specified.

Q12.240 Thermal Stress

- a. Glass panes/ units: Must have adequate resistance to thermal stress generated by

orientation, shading, solar control and construction.

b. Provide a thermal stress evaluation from the glass manufacturer for every glazing condition and aspect.

c. Provide a thermal safety warranty for the glazing panels installed which are exposed to direct sunlight.

Glass

Q12.241

Glass Generally

a. To be produced to SANS 50572 and safety glazing to be marked to SANS 1263: Part1.

b. Comply with section Z25 of this specification package.

c. Provide all glass from a single supplier unless agreed otherwise with the Architect.

d. The glass supplier must:

1). Provide accepted internationally recognised laboratory tests that show that the glass meets the acoustic requirements of this specification.

2). Provide written confirmation that all laminated glass products have been analysed for the project specific conditions, and confirm that the selected products are safe with respect to thermal stresses.

3). Ensure that any specific edge treatment required must be incorporated in this written confirmation, and must be incorporated into the glass processing procedures.

4). Provide a 10 year warranty against thermal stress cracking.

e. Glass scratches and blemishes - the inspection will be viewed at a minimum distance of three metres under normal lighting conditions, i.e. Reasonable lighting conditions under which the installation is normally viewed. If the installation will be normally

viewed from a further distance, then this distance will be used for the inspection.

Normal viewing excludes viewing from areas only accessible for cleaning or maintenance. Glass may be rejected if when inspected under the conditions described above, scratches, flaws, stains, or any other visible defect that mar the aesthetic appearance of the glass is visible or may cause structural or latent defects which may cause the installation to fail within the ten year warranty period will cause the product to be rejected.

f. Edges must be inspected prior to installation and any edge damage to be evaluated to assess possible thermal cracking. Any vented edges must be treated to prevent cracks from running. Such failure will be defined as a latent defect and will be for the account of the glazier.

g. Exposed edges of toughened glass to be polished in accordance with the Architects requirements and approved by sample submission.

h. Glazing must be wind and water-tight under all conditions with full allowance made for deflections and other movements.

i. Handling Glass and Framed glazing units.

1). Glass and framed glazing units must be handled in a manner designed and proven to protect the glass and framed glazing units prior to and during installation.

2). The glazier must supply with the tender submission a manual detailing the cutting, handling, glazing and transport methods including the relevant training and experience of the personnel to be employed.

3). The Architect reserves the right to audit the glazier to determine adherence to

the manual prior to the award of the glazing sub contract.

Frames

Q12.242

General

a. Frames to be manufactured from extruded aluminium, material alloy 6063-T6. The Site Drawings/ Working Drawings to show final extrusion details maintaining visual requirements.

a. All corners to be mitred, flush, flat and true.

c. Frames to be fully gasketed with vulcanised corners where in the same plane and forming the air and vapour barrier. No butting on Site to be permitted.

d. Frames to be factory-glazed, delivered and installed in one piece.

e. Frames to safely and securely retain the glass by means of a combination of dry gaskets, structural silicone and/ or adequate aluminium/ stainless steel locating pieces.

f. All framing to utilise the minimum cross section necessary to maintain rigidity and performance.

g. Framing to include a glazing chamber separated by two seals, one outside the glazing chamber the other at the back. The glazing chamber to be drained to the outside.

Aluminium

Q12.243

Aluminium

a. Aluminium extrusions shall be 6063 or 6261 tempered T5 or T6 to BS EN 515.

b. Aluminium sheet shall be alloy 1200, 3004 or 5251 in accordance with BS EN 485 + A1 and of appropriate temper.

Gaskets

Q12.244 Gasket requirements

- a. Gaskets to SANS 635.
- b. Material:
 - 1). Noncellular rubber to BS 4255-1.
 - 2). Cellular rubber to ASTM C 509.
- c. Continuity: Outer gaskets of single front sealed curtain walling systems and inner gaskets of drained and ventilated or pressure equalized curtain walling systems must be formed in a complete frame with sealed joints. Vulcanized rubber gaskets must have factory moulded corner joints.
- d. Durability: Resistant to oxidation, ozone and UV degradation.

Flashings and Closures

Q12.245 Aluminium Flashings

- a. Aluminium flashings to be fabricated from aluminium alloy sheets a minimum of 2mm thick sheet complying with BS EN 485 + A1, BS EN 515 and BS EN 573 in a grade and temper suitable for the particular type of application and degree of forming to be used, or Alucobond or acceptable equivalent.
- b. Provide anti-drumming insulation on the protected face.
- c. Thickness: aluminium sheet shall be sufficiently thick to provide a visually flat surface and to eliminate excessive distortion and permanent deformation caused by solar radiation.
- d. Flashings to be polyester powder coated.
- e. Externally exposed flashings to have continuation and interconnecting joints fully complying with the sealant manufacturer's written recommendations for movement

joints: simple butt straps are not acceptable.

Q12.246 Aluminium Closures and fillers

- a. Aluminium fillers and visible closers shall be formed from aluminium alloy sheets, fabricated from a minimum of 2mm thick sheet complying with BS EN 485 + A1, BS EN 515 and BS EN 573, in a grade and temper suitable for the particular type of application and degree of forming to be used, or Alucobond or acceptable equivalent.
- b. The alloy shall be selected to satisfy the requirements of the chosen finishing process.
- c. Provide anti-drumming insulation on the protected face.
- d. Thickness: aluminium sheet shall be sufficiently thick to provide a visually flat surface and to eliminate excessive distortion and permanent deformation caused by solar radiation.
- e. Closures and fillers to receive polyester powder coating finish to match the relevant adjacent metal cladding. Exact type of finish and colour shall be agreed with the Architect

Joints

Q12.247 Movement Joints

- a. Movement joints to be detailed on Site Drawings/ Working Drawings. Accommodate all movements of the joint to maintain weather resistance and water tightness.
- b. Vertical movement joints to match the standard glazing system joint. Material used at the movement joint locations not to be thermally broken.

Additional Support Structure

Q12.248 Supports

- a. Provide any structural steel cladding support structure necessary, having due regard

for any requirements in excess of structural steel shown on the Structural Engineer's Drawings, Façade Engineers drawings and also any requirements shown on the Contract Drawings.

Fixings/ Accessories

Q12.249 Fixings Requirements

- a. Concealed fixing brackets fabricated from mild steel to be hot dip galvanised to SANS 121 after fabrication, with a coating mass of not less than 450 g/m².
- b. Any sheet steel, cleats, angles, etc. used in the fixing assemblies to comply with SANS 1431 and rolled sections shall be used wherever practicable or appropriate. Steel sections used to be hot dip galvanised after all cutting, drilling for holes and welding has been completed.
- c. All visible fixing brackets for the works to comprise components of high grade austenitic stainless steel exterior quality, grade 1.4401.
- d. Fixing bolts, nuts and screws to be manufactured from austenitic stainless steel complying with grade 1.4301 or 1.4401.
- e. Bolts, screws, nuts and washers used for curtain walling/ cladding assemblies and fixing to the structure shall be of adequate strength for their purpose and to be austenitic stainless steel, grade 1.4401.

Q12.250 Fixing Directly to Concrete Structure

- a. Provide to the main contractor all items to be cast in, ensure that they are correctly positioned prior to pouring concrete and check they remain in position during the concrete pouring and after removal of shuttering.
- b. Provide and install all fixing devices, including framing, bearing brackets, movement

fixings, etc. and carry out all necessary preparation work such as drilling, plugging, screwing, bolting, cutting for anchor bolts or sockets to be cast in, making good, including grouting-in of anchor bolts, and fixing whatsoever necessary.

c. All fixings to be stainless steel, minimum grade 1.4401 and be to the requirements of the Building Control Officer.

d. Submit details of all fixings for review and acceptance by the Architect.

Q12.251 Fixings

a. Refer to Section Z20 for fixings generally.

b. Mechanical fixings: Aluminium complying with BS EN 755: Parts 1-9, BS EN 573: Parts 3 and 4, BS EN 515 and BS EN 12020: Parts 1 and 2 for brackets, rivets and shear pins.

c. Fixing anchors shall be of dimensions not less than those recommended by their manufacturers.

d. Fixing anchors shall be capable of adequate three-dimensional adjustment to accommodate building structure and cladding fabrication/ installation tolerances.

Accessories

Q12.252 Accessories Generally

a. Cappings, closure pieces, fillers, spacers, tapes, sealants, fixings, etc., where not specified, shall be types recommended in writing by the manufacturer.

Q12.253 Acoustic Sealants

a. The contractor is to submit details of all jointing to adjacent elements for approval by the Acoustic Consultant.

Lightning Protection and Earth Bonding

Q12.254 General

- a. Bonding is required between individual sections of the works, in accordance with SANS 61312, to ensure continuity between adjacent sections, both vertically and horizontally over the whole façade. Bonding between sections shall have a minimum cross section of 50mm². Any bolts used for bonding shall be of a minimum size of M10.
- b. Bonding between the works and structural steelwork shall be carried out at intervals at no greater than 10m horizontally and 20m vertically. The first level of bonding to the structural steelwork shall be at the highest floor level of each part of the building.
- c. Provide studs/ bolts on the cladding for subsequent connection.
- d. All straps/ connections shall be concealed.
- e. No straps shall be fixed along copings.

Q12.255 Workmanship

- a. All surfaces to receive glazing to be clean, dry and free from grease at time of priming/ sealing and glazing. Prime/ seal rebates before glazing. No on site structural glazing will be allowed unless in a suitable closed building and to methods approved by the Architect.
- b. All glazing shall be executed according to SANS 10137.

Installation Tolerances

Q12.256 Installation Tolerances

- a. The works shall be erected plumb and true in proper alignment and relation to established lines and grades as shown on the Site Drawings/ Working Drawings. The erected system shall present true and accurate lines and flat planes.
- b. At the time of handover the visual requirements of the works are as follows:

1). The cladding panels shall be horizontal/ vertical and geometrically shaped as shown on the Contract Drawings.

2). All joints shall be of equal size and at equal centres, according to specified tolerances, unless shown otherwise on the Contract Drawings.

3). The works shall present true and accurate straight lines and flat panels within the plane of the elevations and geometry.

c. Account shall be taken of the installation tolerance requirements of the works:

1). Setting out: $\pm 3\text{mm}$ relative to grid lines.

2). Straightness: $1/1000$ of the length of any individual visible member.

3). Squareness: Maximum 2mm difference in diagonals.

4). Twist: Maximum 3mm, one corner outside the plane containing the other three corners.

5). Flatness: 1mm under a 1 metre straightedge.

6). Steps between surfaces of adjacent panels: 2mm maximum.

d. Joints between panels: The actual width of any joint shall not deviate from the nominal width by more than $\pm 1\text{mm}$ of the joint width, whichever is the lesser. Any variation shall be equally distributed with no sudden changes. The misalignment between joints shall not exceed 1mm.

e. Level: The works shall be within $\pm 2\text{mm}$ of the specified level. The cumulative slope between the same locations on any panel shall not exceed 1 in 1000.

f. Plumbness: The works shall be erected such that no point on any panel is more than 1mm from its theoretical vertical plane. The cumulative slope between the same locations on any panel shall not exceed 1 in 1000. The vertical plane of the works

shall be within ± 1 mm of the theoretical plan position.

g. A method statement shall be submitted with the Tender detailing proposals for achieving the specified tolerances. This shall demonstrate that a clear understanding of the construction programme, the effects of the building structure and construction method and the fabrication method of the panels is possessed.

h. Allowance for sufficient analysis of the erection sequence shall be made, thus ensuring and satisfying the Architect that the installation tolerances stated above shall be met.

i. The dimensional and detailed provisions intended to accommodate the construction tolerances of surrounding elements in order to ensure that all aspects of the works relate satisfactorily to the works as a whole shall be stated and shown on the Site Drawings/ Working Drawings.

j. All tolerances stated shall be measured and monitored at a mean temperature to be agreed with the Architect.

k. A very high degree of accuracy is required in the fabrication and installation of the works and their support structure.

l. A full understanding of the behaviour of the building structure, its movements and its effects on the works is required. Full knowledge of the roof construction sequence, its predicted building behaviour during construction and its relationship with the works construction is also necessary.

m. Dimensional Checking: Before work begins on Site the proposed method of dimensional setting-out and crosschecking with adjacent trades and elements, to satisfy the accuracy requirements, shall be submitted to the Architect. The checking

of any setting-out or of any line or level by the Architect, or his representative, shall not in any way relieve the Contractor of his responsibility for the correctness thereof.

n. Alternative Tolerances: Alternative tolerances to those specified may be permitted at the Architects discretion, provided they are agreed in advance of the manufacture of components.

o. The Site Drawings/ Working Drawings shall provide for sufficient tolerance in the assembly of the works in order to accommodate manufacturing tolerances of other interfacing elements.

p. Work shall be within the tolerances stated herein and no revisions to the tolerances to cater for inadequate control shall be permitted.

q. Full details shall be submitted to the Architect for review of the proposed methods for achieving and constantly monitoring the installation tolerances during all stages of the work. Detailed records of the constant control and tolerances achieved shall be submitted to the Architect.

r. Personnel, equipment and instruments necessary to effectively control tolerances shall be provided. For recording purposes a reference temperature for measurements shall be established, preferably the mean value over a period of time.

s. The works, when installed, shall not be subject to warping or twisting, shall be strictly rigid, firm, free from vibration, knocking, rattles, squeaks and other noises when subject to the worst combination of environmental conditions and wind loads.

Q12.257 **Generally**

a. The works shall be manufactured with continuous profiles being free from marks, defects, flaws, steps, waves or damage of any nature.

- 1). Dimensions and levels of the structure shall be verified.
- 2). The framing members for the works shall be set out and installed in the correct position, within tolerance, and in the correct relationship to the building structure.
- 3). The gaps between the panels and mullion structure are constant.
- 4). All fixing bolts and anchors shall be installed in accordance with the manufacturer's recommended procedures.
- 5). Internally, the protection shall remain in place until the works are complete. All protective measures shall be replaced following any inspections by the Architect.
- 6). Isolating tape, plastics washers, or other suitable means to prevent bi-metallic corrosion to be provided between dissimilar metals.
- 7). The works shall be square, regular to line, level and plane, with all junctions fitting to the stated tolerances.
- 8). All glass shall be installed to give the necessary edge cover and clearance to ensure a permanent and safe installation.
- 9). All glass shall be capable of replacement. A method statement shall be provided showing the method of removing damaged glass and any associated metal framework and installing new components.
- 10). The installation of all works shall be carried out in accordance with the manufacturer's written recommendations and acceptable good practice.

Joints

Q12.258 Movement Joints

- a. Movement joints are shown on the Contract Drawings.
- b. The works accommodate all movement of the joints in a manner that does not compromise the panels' integrity or appearance.

Fixings

Q12.259 Use of Fixings

- a. The fixings shall be adequate to comply with the requirements of the Specification.

The Architect may require revised positioning of the system in the future and the selection of fixings shall ensure that this flexibility is available.

- b. All bolts, screws, nuts and anchors shall be of adequate strength for their intended purpose and manufactured from the specified grade of stainless steel in the

Specification.

- c. All necessary fasteners and fixings shall be provided for the works and associated flashings and closures.

- d. All fixings shall conform to all statutory requirements in respect of strength and type.

- e. Adequate measures shall be taken to prevent bi-metallic corrosion between dissimilar metals and to isolate aluminium components from cementitious surfaces.

- f. Fixings, within the aluminium framing components, shall not be visible unless shown on the Contract Drawings.

- g. Visible fixings shall be restricted to the assembly of the aluminium elements to the support steelwork using types described on the Contract Drawings.

- h. The gaps between the panels and mullion structure to be constant.

Protection

Q12.260 Protection

- a. Protect from harmful splashes, scratching and weld spatter.

Q12.261 Cleaning

- a. Clean all glass immediately prior to handover.

Storage and Handling

Q12.262 Storage

- a. Stack 300mm above ground surface on uniform supports.
- b. Protect with tarpaulin or similar covers, including sides and ends.
- c. Do not deliver to site components that cannot be put immediately into suitably dry, floored and covered storage.
- d. Stack finished components on bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.
- e. All glass panes, sealants and gaskets shall be stored on Site in accordance with the manufacturer's written recommendations.

END OF SECTION

Q20 METAL WINDOWS/ LOUVRES

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

Q20.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

Q20.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but

shall remain fully responsible for the Detailed Design and performance of the works.

Q20.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract

Drawings, provides particular requirements with respect to the following:

1). Aluminium windows.

2). Metal louvres.

Windows

Q20.103 WNA-111: Aluminium Framed Window

a. Aluminium framed fixed window as shown on the Contract Drawings.

1). As window type(s): As shown on the Window Schedule.

2). Size and configuration: As shown on the Contract Drawings and the Window Schedule.

3). Exposure category: Exterior.

4). Performance Class: AAAMSA performance class A4.

5). Glazing details:

a). Conform to SANS 10137 and SANS 10400 Part N.

b). Colour and type as shown on the Contract Drawings and the Window Schedule.

c). Aluminium glazing beads with neoprene gaskets.

6). Finish as delivered:

a). Powder coated, Qualicoat Class 2 as in Section Z31 of this Specification.

b). Colour: To be agreed.

7). Fixings:

- a). All fixings and fastenings shall be compatible with aluminium and the powder coat finish.
- b). Frames to be installed such that they are securely anchored, sealed and undamaged.
- c). Fixings shall meet the specified performance class of the window.

Louvres

Q20.104 LVR-111: Fixed Metal Louvres

- a. External envelope aluminium louvres in unitised frame.
 - 1). Louvre wall type: LW01 as shown on the Contract Drawings and Façade Drawings.
 - 2). Size and configuration: As shown on the Contract Drawings.
 - 3). Material: Aluminium.
 - 4). Louvre blade: Refer to the Façade Specification.
 - 5). Finish: To be agreed.
 - 6). Provide bird/ rodent proof wire mesh to inner face of louver panel, where specified.
 - 7). Framework/ support:
 - a). Type: To Contractor's design and supply and to Architect approval.
 - b). Finish: To be agreed.
 - 8). Fixings: To Contractor's design and to Architect approval.

Q20.105 LVR-113: Aluminium Ventilation Louvres

- a. Fixed panel aluminium louvres and support framework.
 - 1). Indicative Manufacturer: To be agreed.

- 2). Indicative Product: To be agreed.
- 3). Size and configuration: As shown on the Contract Drawings.
- 4). 4. Material: Aluminium.
- 5). Louvre blades:
 - a). Profile as shown on the Contract Drawings.
- 6). Framework:
 - a). Size and configuration: As shown on the Contract Drawings.
 - b). Material: Aluminium.
 - c). Finish: To be agreed.
- 7). Provide rodent proof wire mesh to inner face of louver panel, where specified.
- 8). Finish:
 - a). Powder coated, Qualicoat Class 2 as in Section Z31 of this Specification.
 - b). Colour: To be agreed.
- 9). Fixing to structure:
 - a). All fixings and fastenings shall be compatible with aluminium and the powder coat finish.
 - b). Frames to be installed such that they are securely anchored, sealed and undamaged.
 - c). Fixings shall meet the specified performance class of the louvre.

Q20.200 QUALITY AND WORKMANSHIP

Accuracy

Q20.201 Fabrication Accuracy

- a). Comply with the requirements of SANS 10155.

b. All finished metal surfaces to be flat and free from undulations and irregularities.

c. Permissible deviations overall frame dimensions:

1). Length of member; up to 2500mm long +0, -1.5mm, over 2500mm long

+0, -3.0mm.

2). Straightness; up to 2500mm long 1.5mm, over 2500mm long 3.0mm.

3). Difference in length of diagonals: 3mm.

d. Position of members within frame:

1). Positions of mullions and transoms; ± 1.5 mm.

2). Fitting of moving components into frames; ± 1.5 mm.

Q20.202 Installation Accuracy

a. Comply with the requirements of SANS 10155 Category II.

Submittals

Q20.203 Response

a. Provide submittals in accordance with the requirements of Section A of the

Specification.

Prototypes, Samples and Quality Benchmarks

Q20.204 Prototype Requirements

a. Not required.

Q20.205 Pre-contract Control Samples

a. Not required.

Q20.206 Post-contract Control Samples

a. Provide the following control samples, if different from tender response sample

submission or Pre-contract control sample submission:

1). Samples of framing, cill and louvre blade members, minimum 300mm long, in the proposed quality, colour and finish.

2). Glass samples of each proposed type, 500 x 500mm minimum size.

3). Typical ironmongery components in the proposed materials and finishes to include operating handle, hinge and locking device.

Q20.207 Benchmarks

a. Provide the following quality benchmarks:

1). The first fully installed and accepted installation of each type, in locations to be agreed.

Testing

Q20.208 Test Requirements

a. Include for testing by an accredited independent testing specialist or provide independently certified test data to demonstrate compliance with the performance requirements of the Specification.

Q20.209 Soft Body Impact

a. Carry out Soft Body impact tests in accordance with the recommendations of SANS 10160.

Q20.210 Site Hose Testing

a. Site water hose test to be carried out in accordance with the recommendations of CWCT Standard for Systemised Building Envelope and Guide to Good Practice, Test Methods for Curtain Walling Section 7.

Performance Requirements

b. Comply with the following specific performance requirements.

Structure

Q20.211 General

a. Take notice of the Structural Engineers report on the anticipated plastic, shrinkage and creep deflections of the floor slabs and other anticipated building movements that the installation must accommodate.

b. When calculating loads the worst combinations shall be considered, taking account of the fact that the pressure coefficients at various locations may determine more than one design criterion.

Q20.212 Wind Loads

a. Generally the works shall be designed to withstand without permanent deformation, the effects of wind loads.

b. The works shall not depart from fixings under the design wind loads.

c. The design wind load is to be calculated in accordance with SANS 10160.

Q20.213 Deflections

a. The maximum allowable deflection of any element of the works when carrying full design loads not to exceed 15mm or 1/175 of its length, whichever is the lesser value.

b. All components, supports and fixings to be capable of accommodating the above deflection without permanent distortion, deformation or failure.

c. Accommodate differential structural movements in supporting structures.

Q20.214 Inertial Loads

a. The works shall be capable of accommodating inertial loads arising due to the acceleration/ deceleration of moving sections including opening lights of the building or enclosure.

Environmental

Q20.215 Thermal Loads

a. The works shall be designed to accommodate thermal movement resulting from the maximum and minimum surface temperatures as follows:

1). The service temperature range for components of the works shall be taken as

-10°C and +80°C.

2). The design shall cater for all temporary and permanent conditions arising during the works.

3). Thermal movements shall not result in audible noise.

Q20.216 Moisture Movement

a. The works shall withstand movement without permanent deformation or any reduction in the specified performance:

1). Due to changes in the moisture content of their components, resulting from variations in the moisture content of the air.

2). Due to the expansion of absorbed or retained moisture caused by freezing.

Q20.217 Atmospheric Conditions

a. All works shall be fully capable of resisting the prevailing atmospheric conditions.

Q20.218 Air Permeability/ Infiltration

a. The Detailed Design shall prevent airflow from the outside to the inside of the building through joints/ junctions, etc. to avoid areas of concentrated airflow.

b. The works shall resist the passage of air such that its air leakage rates, if measured in accordance with AAAMSA Performance Test shall not be exceeded in both the initial and repeat tests.

- c. The works shall have a maximum air infiltration rate of: 0.75 l/s/m of mating surface at a pressure differential of 75Pa.
- d. Air leakage shall be distributed and not concentrated at any one location.
- e. Provide actual air leakage results from tests for acceptance.

Q20.219 Condensation

- a. Condensation shall not form, either on internal or external surfaces of framing members, glazing, solid panels, or interstitially within the construction of infill panels forming a part of the works, such that it may lead to damage or staining.
- b. Interstitial cavities within the construction, where condensation may occur, shall be adequately drained and ventilated to the outside, such that the formation of such condensation is not detrimental to the performance nor causes damage or staining of the works.

Q20.220 Capillarity

- a. The Detailed Design, gaskets, seals, etc. shall take into account and eliminate any possibility of water migration to the inside of the building due to capillarity, to the satisfaction of the Architect.

Q20.221 Weather and Water Penetration Resistance

- a. The works shall be absolutely weatherproof and watertight, ensuring the prevention of water leakage onto the internal face of the works when tested in accordance with AAAMSA Performance Test.
- b. The works shall have no water leakage when tested at a pressure of 400Pa and at a flow rate of 0.05 l/s/m².
- c. The works, including flashings and junctions with adjacent parts of the building, shall

be fully weatherproof and watertight under all conditions with full allowance made for deflections and other movements.

d. The Detailed Design and construction of the works shall be such that all rigid or fixed joints shall remain rigid and accommodate all thermal, building structure or other movements and any applicable loads without compromising their watertightness.

e. All movement joints shall also be finally designed and constructed to accommodate such loads or movements without compromising the glazing's watertightness.

Q20.222 Local Factors

a. Visit the Site in order to become familiar with local requirements. Local microclimatic conditions shall be taken into account and grades of materials assessed as suitably durable for the location shall be selected.

b. An assessment of microclimatic conditions shall be made with due allowance for any factors likely to have an adverse effect upon materials intended for the Contract. More appropriate materials shall be substituted if adverse effects are predicted.

Acoustic

Q20.223 Acoustic Requirements

a. To be agreed.

Q20.224 Acoustic Sealant

a. All jointing between window frames and the main structure are to be sealed airtight with non-setting mastic both sides of the joint.

Durability

Q20.225 General

a. The performance criteria shall be satisfied for the full 60 year design life of the works,

as stated in the Specification, provided always that the maintenance as specified by the manufacturer has been carried out.

b. Provide a manual giving recommendations for periodic maintenance.

Q20.226 Impact and Abrasion Resistance

a. Generally, surfaces shall be sufficiently hard to resist impacts from hand-held objects without any noticeable change to the surface appearance.

b. The works shall resist abrasion from cleaning methods and maintenance systems without any noticeable change in surface appearance.

Q20.227 Demountability

a. Elements of the works shall be individually and independently removable ensuring access for maintenance.

b. The removal of units shall not affect the performance or safety of any other part of these, or adjacent, works.

Fire

Q20.228 General

a. All elements of the works shall be either non-combustible or not easily ignitable with low flame spread characteristics and shall not produce excessive quantities of smoke or toxic gases.

Thermal Stress

Q20.229 Thermal Stress

a. Provide a thermal stress evaluation from the glass manufacturer for every glazing condition and aspect.

b. Provide a thermal safety warranty for the glazing panels installed which are exposed

to direct sunlight.

Certification

Q20.230 Certification

- a. Prior to commencing work on site provide a copy of the AAAMSA Performance Test Certificate from the supplier of the aluminium products.
- b. Provide a copy of the sub-contractor's current AAAMSA membership certificate.
- c. Provide an AAMSA Glass and Glazing Certificate confirming that the glazing has been carried out in strict accordance with SANS 10137 and SANS 10400.
- d. Provide a AFSA Certificate of Conformance that the powder coating has been carried out in strict accordance with SANS 1796 and that the powder conforms to SANS 1578.

Guarantee

Q20.231 Metalwork Manufacturer's Guarantee

- a. The Metalwork Manufacturer is to provide a written guarantee that the performance criteria will be satisfied for the full design life of the works, as stated in the specification, provided always that the maintenance has been carried out as specified.

Q20.232 Powder Coating Manufacturer's Guarantee

- a. Make available to the Architect, fully documented and signed copies of the Powder Manufacturer's Marine Guarantee for the coating process. The duration of the guarantees to be a minimum of 15 years against peeling and discolouration.

Fixings

Q20.233 Metric Bolts Nuts and Screws

- a. To comply with SANS 1700: Part 5.

Steel

Q20.234

Steel

a. All steel shall be approved commercial quality and unless otherwise specified shall be cleaned in accordance with SANS 10064 and given one complete coat of zinc chromate primer complying with SANS 679 before delivery to site.

Aluminium

Q20.235

Aluminium

a. Aluminium extrusions shall be 6063 or 6261 tempered T5 or T6 to BS EN 515.
b. Aluminium sheet shall be alloy 1200, 3004 or 5251 in accordance with BS EN 485 + A1 and of appropriate temper.

Stainless Steel

Q20.236

Stainless Steel

a. All steel described as stainless steel shall be AISI Type 304, fixed with stainless steel screws.

Corrosion Protection

Q20.237

Corrosion Protection of Steel

a. All steel described as galvanised shall be hot dip galvanised after fabrication.

Q20.238

Corrosion Protection of Aluminium

a. Before fixing, apply two coats of bitumen solution or an approved mastic impregnated tape, to surfaces of aluminium components that will come into contact with blockwork or cement based products.
b. Isolate aluminium components from cement or treated timber surfaces.

Accessories

Q20.239

Supports

a. Provide a structural steel support structure, as necessary, having due regard for any requirements in excess of the structural steel shown on the Structural Engineer's Drawings. The structural steelwork to comply with the Structural Engineer's Steelwork Specification, including protective coatings.

Installation

Q20.240 General Requirements

- a. Install all elements in the correct position, within tolerance, and in the correct relationship to the building structure.
- b. Install all fixings in accordance with the manufacturer's recommended procedures.
- c. Keep materials dry until fixed.
- d. The finished work to be square, regular, true to line, level and plane, with a satisfactory fit at all junctions.

Q20.241 Fixing Centres

- a. When not predrilled, position at 150mm from the ends of jambs, at hanging points and at not more than 600mm centres.

Q20.242 Fixing Ironmongery

- a. Assemble and fix carefully and accurately using fastenings with matching finish supplied by ironmongery manufacturer.
- b. Prevent damage to ironmongery and adjacent surfaces. At completion check, adjust and lubricate as necessary to ensure correct functioning

Q20.243 Fixing Window Inserts

- a. Clean glazing rebate of the pre-cast window unit and the contact surface of the anodized and galvanized inserts with white spirit.
- b. Clean contact surfaces of powder coated frames with a primer recommended by the sealant manufacturer.
- c. Apply an even bead of non-ascetic silicone sealant against the central flange of the insert,
- d. Press insert into rebate, prop in position until initial cure of sealant has taken place.
- e. When sealant is hard trim off excess.

Q20.244 Sealant Joints

- a. Sealant for frames to be gun applied acrylic sealant, silicone or mastic where required.
- b. Prepare joints and apply sealant as Section Z22.
- c. Finish triangular fillets with a flat or slightly convex profile.

Q20.245 Fire Resisting Frames

- a. Completely fill gap between frame and reveal with Intumescent sealant.

Q20.246 Backfilling Steel Frames

- a. After fixing completely fill the back of all steel sections with a waterproof cement fillet.

Installation Tolerances

Q20.247 Generally

- a. At the time of handover the visual requirements of the works to be as follows:
 - 1). The works to be straight and flat.
 - 2). Gaps to head and jambs of doors to frames to be 3mm all round.
 - 3). Thresholds to have a 7mm gap where located above a carpeted floor.

4). The maximum variation from plumb to be plus or minus 1.5mm.

b. Take responsibility for checking dimensions on Site.

Protection

Q20.248

Protection

a. Leave all protective coatings and films in place until Practical completion.

b. Protect finished work from damage by following trades.

Storage and Handling

Q20.249

Storage

a. Stack 300mm above ground surface on uniform supports.

b. Protect with tarpaulin or similar covers, including sides and ends.

c. Do not deliver to site components that cannot be put immediately into suitably dry, floored and covered storage.

d. Stack on bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

END OF SECTION

Q21 METAL DOORS/ SHUTTERS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

Q21.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

Q21.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

Q21.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Steel doors.

2). Roller shutter doors.

Steel Doors

Q21.103 DRS-151: Transformer Room Door Louvred - Single

a. Transformer room doors and frame louvred, to suit 230mm wall for plant areas to SANS 727 and SANS 1129.

1). Indicative Manufacturer: To be agreed.

2). Type: To be agreed.

3). Size and configuration: As shown on the Contract Drawings and the Project Door Schedule.

4). Frame: Galvanised mild steel double rebated frame with cleats for building in.

5). Material: 1.6mm rolled mild steel with stiffeners.

6). Louvres: Louvred vents lined internally with insect mesh screen.

7). Ironmongery/ Accessories: 100mm heavy duty flanged stainless steel hinges.

8). Finish as delivered: Galvanised.

9). Finish:

a). Paint: Refer to paint for galvanised steel in Section X10 of this Specification.

b). Colour: As per project finishing schedule.

10). Fixing: Built into brickwork with lugs as supplied.

Roller Shutters

Q21.104 GRS-331: Electrically Operated Vertical Roller Shutter Door

a. Electrically operated with manual override switch galvanised mild steel roller shutter with interlocking solid slats, overhead box, hand chain, canopy, accessories and fixings.

- 1). Indicative Manufacturer: Serranda, or acceptable equivalent.
- 2). Size: As shown on the Project Door Schedule.
- 3). Material: 1.2mm thick galvanised mild steel.
- 4). Slat depth: 75mm.
- 5). Counterbalance: Helical coil springs.
- 6). Operation:
 - a). Electrical motor operation through reduction gears, remote push button starter, limit switch assembly and an electro-magnetic brake.
 - b). Roller Shutters activated by Push-Button Station Control.
 - c). Provide an emergency hand crank operation for use in the event of power failure.
- 7). Accessories: Canopy: 1.2mm mild steel.
- 8). Factory finish as delivered: Powder coated.
- 9). The doors/ frames/ guides shall be unaffected by microorganisms, mildew, insects, vermin nor provide harbourage for same.
- 10). Roller shutter to incorporate locking device.
- 11). Accessories:
 - a). 1.2mm mild steel canopy.
 - b). Fixing lugs for building-in.

Fixings

Q21.105 Metric Bolts Nuts and Screws

- a. To comply with SANS 1700: Part 5.

Steel

Q21.106

Steel

a. All steel shall be approved commercial quality and unless otherwise specified shall be cleaned in accordance with SANS 10064 and given one complete coat of zinc chromate primer complying with SANS 679 before delivery to site.

Aluminium

Q21.107

Aluminium

a. Aluminium extrusions shall be 6063 or 6261 tempered T5 or T6 to BS 1474.
b. Aluminium sheet shall be alloy 1200, 3004 or 5251 in accordance with BS 1470 and of appropriate temper.

Stainless Steel

Q21.108

Stainless Steel

a. All steel described as stainless steel shall be AISI Type 304, fixed with stainless steel screws.

Corrosion Protection

Q21.109

Corrosion Protection of Steel

a. All steel described as galvanised shall be hot dip galvanised after fabrication.

Q21.200

QUALITY AND WORKMANSHIP

Accuracy

Q21.201

Fabrication Accuracy

a. Comply with the requirements of SANS 10155.
b. All finished metal surfaces to be flat and free from undulations and irregularities.
c. Permissible deviations overall frame dimensions:
1). Length of member; up to 2500mm long +0, -1.5mm, over 2500mm long

+0, -3.0mm.

2). Straightness; up to 2500mm long 1.5mm, over 2500mm long 3.0mm.

3). Difference in length of diagonals: 3mm.

d. Position of members within frame:

1). Positions of mullions and transoms; ± 1.5 mm.

2). Fitting of moving components into frames; ± 1.5 mm.

Q21.202 Installation Accuracy

a. Comply with the requirements of SANS 10155 Category II.

Submittals

Q21.203 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Prototypes, Samples and Quality Benchmarks

Q21.204 Prototype Requirements

a. Not required.

Q21.205 Pre-contract Control Samples

a. Not required.

Q21.206 Post-contract Control Samples

a. Provide the following control samples, if different from tender response sample submission or Pre-contract control sample submission:

1). Samples of framing, cill and roller shutter slats, minimum 300mm long, in the proposed quality, colour and finish.

2). Door samples of each proposed type, 500 x 500mm minimum size.

3). Typical ironmongery components in the proposed materials and finishes to include operating handle, hinge and locking device.

Q21.207 Benchmarks

a. Provide the following quality benchmarks:

1). The first fully installed and accepted installation of each type, in locations to be agreed.

Installation

Q21.208 General Requirements

a. Install all elements in the correct position, within tolerance, and in the correct relationship to the building structure.

b. Install all fixings in accordance with the manufacturer's recommended procedures.

c. Keep materials dry until fixed.

d. The finished work to be square, regular, true to line, level and plane, with a satisfactory fit at all junctions.

Q21.209 Corrosion Protection

a. Before fixing, apply two coats of bitumen solution or an approved mastic impregnated tape, to surfaces of aluminium components that will come into contact with blockwork.

Q21.210 Fixing Centres

a. When not predrilled, position at 150mm from the ends of jambs, at hanging points and at not more than 600mm centres.

Q21.211 Fixing Ironmongery

a. Assemble and fix carefully and accurately using fastenings with matching finish supplied by ironmongery manufacturer.

b. Prevent damage to ironmongery and adjacent surfaces. At completion check, adjust and lubricate as necessary to ensure correct functioning.

Q21.212 Sealant Joints

a. Sealant for frames to be gun applied acrylic sealant, silicone or mastic where required.

b. Prepare joints and apply sealant as Section Z22.

c. Finish triangular fillets with a flat or slightly convex profile.

Q21.213 Fire Resisting Frames

a. Completely fill gap between frame and reveal with Intumescent sealant.

Q21.214 Backfilling Steel Frames

a. After fixing completely fill the back of all steel sections with a waterproof cement fillet.

Installation Tolerances

Q21.215 Generally

a. At the time of handover the visual requirements of the works to be as follows:

- 1). The works to be straight and flat.
- 2). Gaps to head and jambs of doors to frames to be 3mm all round.
- 3). Thresholds to have a 7mm gap where located above a carpeted floor.
- 4). The maximum variation from plumb to be plus or minus 1.5mm.

b. Take responsibility for checking dimensions on Site.

Protection

Q21.216 Protection

a. Leave all protective coatings and films in place until Practical completion.

b. Protect finished work from damage by following trades.

Storage and Handling

Q21.217 Storage

- a. Stack 300mm above ground surface on uniform supports.
- b. Protect with tarpaulin or similar covers, including sides and ends.
- c. Do not deliver to site components that cannot be put immediately into suitably dry, floored and covered storage.
- d. Stack on bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

END OF SECTION

Q22 METAL BALUSTRADES/ HANDRAILS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

Q22.100 PRODUCTS SYSTEMS AND MATERIALS

Specification and Scope

Q22.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but

shall remain fully responsible for the Detailed Design and performance of the works.

Q22.102 Section Coverage:

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Metal balustrades and handrails.

Balustrades

Q22.103 BAL-211: Mild Steel Balustrade and Handrail

a. Painted mild steel handrail on mild steel balustrade with rod infill.

- 1). Layout and configuration as shown on the Contract Drawings.

- 2). Loadings as BS 6399: Part 1.

- 3). Support posts:

- a). Posts: 50mm diameter tubular mild steel tubular posts, drilled with 20mm diameter holes to receive infill rails at centres shown on the Contract Drawings.

- b). Post Centres: Posts to be fixed at centres as shown on the Contract Drawings.

- c). Post Cap: 50mm Diameter mild steel machined cap, as indicated on the Contract Drawings. All edges to be polished to provide no sharp edges.

- 4). Handrail:

- a). 50mm diameter tubular mild steel ramped and wreathed as necessary to provide a smooth continuum throughout its entire travel, as shown on the Contract Drawings.

- b). Open ends of handrails to be capped and welded.

c). Fixing: 10mm diameter mild steel connecting pin welded to top of support post and bottom face of handrail.

5). Infill:

a). 20mm Diameter mild steel rod infill at 100mm centres fixed to support post as indicated on the Contract Drawings.

6). Fixing of posts:

a). Posts to be fixed into core drilled pockets in reinforced concrete slab or staircase, filled level with cementitious non shrinking grout, as shown on the Contract Drawings and in accordance with the Structural Engineer's documentation.

b). Post to floor finish junction to be finished off with a mild steel base plate 75mm diameter x 10mm thick all edges polished smooth, fixed to base of post using a proprietary high strength mild steel fixative as recommended by steel supplier and to the acceptance of the Architect.

7). All welds to be ground perfectly smooth to present a visually jointless appearance.

8). Finish: Painted as shown in Section X10 of the Specification.

Handrails

Q22.104

HDR-131: Wall Mounted Mild Steel Handrail

a. Stainless steel handrail on wall mounted bracket.

1). Layout and configuration as shown on the Contract Drawings.

2). Handrail:

a). 50mm diameter tubular mild steel ramped and wreathed as necessary to

provide a smooth continuum throughout its entire travel, in accordance with the Contract Drawings.

b). Open ends of handrails to be capped and welded.

3). Wall bracket:

a). 12mm mild steel gooseneck support bracket welded to bottom face of handrail.

b). Bracket to have 50mm diameter x 5mm mild steel base plate fixed with M20 galvanised mild steel lug epoxied into wall, all in accordance with the Structural Engineer's specification.

4). All welds to be ground perfectly smooth to present a visually jointless appearance.

5). Finish: Painted as shown in Section X10 of the Specification.

Q22.105 HDR-151: Wall Mounted Stainless Steel Handrail

a. Stainless steel handrail on wall mounted bracket.

1). Layout and configuration as shown on the Contract Drawings.

2). Handrail:

a). 50mm diameter tubular stainless steel ramped and wreathed as necessary to provide a smooth continuum throughout its entire travel, in accordance with the Contract Drawings.

b). Open ends of handrails to be capped and welded.

3). Wall bracket:

a). 12mm stainless steel gooseneck support bracket welded to bottom face of handrail.

b). Bracket to have 50mm diameter x 5mm stainless steel base plate fixed with M20 galvanised mild steel lug epoxied into wall, all in accordance with the Structural Engineer's specification.

4). All welds to be ground perfectly smooth to present a visually jointless appearance.

5). Finish: To be agreed.

Q22.106

General:

a. All proposed fixings are to be to the acceptance of the Structural Engineer before installation.

b. Tubular section wall thickness to be designed to accommodate the required live and dead loads as indicated.

c. All exposed work shall be so finished that no corners, fixings or joints shall provide sharp edges that may cause injury.

d. All stainless steel is to be 1.4301 (304) grade, no alternatives will be allowed.

e. All exposed stainless steel to be 180 grit, brush finish,

f. All welds are to be ground perfectly smooth to present a visually jointless appearance.

g. All support posts are to be vertical.

h. Wherever possible angle deviations to be made by means of radius curves, using mandrel bending.

i. Mitre joints will be allowed where space constraints render bending impractical.

j. All open ends of tubular sections to be capped and welded.

k. All curved on plan handrails to be rolled to required radii to match site condition.

l. All mild steelwork to comply with SANS 1200H and 10120, unless stated otherwise.

- m. Fabrication of steelwork to be in accordance with the Specification.
- n. Check the fit for accuracy before and after making permanent connections in frames and other structural elements, which are assembled before delivery to Site.
- o. Welding procedures to be such that distortion is reduced to a minimum and local distortion rendered negligible in the final fabrication.
- p. No welds other than those shown on the Shop Drawings/ Working Drawings, even for temporary attachments or repairs, are acceptable unless agreed in advance by the Architect.
- q. Vent holes in hollow sections to be sealed in a manner to prevent the ingress of moisture.
- r. External visible lines and depressions caused by the internal welding of hollow section steelwork to be positioned in the works so as to be non-visible.

Material

Q22.107

Mild Steel

- a. All mild steelwork to comply with SANS 1431, unless stated otherwise.
- b. Fabrication of steelwork to be in accordance with SANS 2001 - CS1.

Q22.108

Aluminium

- a. Fabricate all extruded aluminium alloy members from the appropriate grade of aluminium alloy.
- b. Fabrication of aluminium to be in accordance with SANS 1200 HE.
- c. Unless specified otherwise, aluminium sheeting to be a minimum of 3mm thick.
- d. Protect exposed aluminium with low tack adhesive film during construction and prior to handover.

Q22.109 Stainless Steel

a. Unless otherwise specified, stainless steel to be austenitic, non-magnetic, using either grade (1.4301) or grade (1.4401).

Q22.200 QUALITY AND WORKMANSHIP

Design

Q22.201 Design

a. Design and detail the structural steelwork in accordance with SANS 10162, the National Building Regulations and SANS 10400.

b. Loading requirements: To the requirements of SANS 10160.

Submittals

Q22.202 Response

a. Submit drawings with the Tender indicating proposed types, conditions and solutions.

b. The Tender design response to include:

1). Material samples.

2). List of Tests included.

3). QA/ QC programme.

4). List of proposed Shop Drawings/ Working Drawings.

5). Summary of deviations from the Specification.

6). Outline technical specification reflecting proposed materials/ systems, etc.

7). A list of proposed suppliers and sub-contractors intended to be used.

Samples and Quality Benchmarks

Q22.203 Pre-contract Control Samples

a. Provide the following control samples:

- 1). Typical balustrade.
- 2). 500mm length of handrail.

Q22.204 Post-contract Control Samples

a. Provide the following control samples:

- 1). Typical balustrade.
- 2). 500mm length of handrail.

Q22.205 Benchmark Requirements

- a. Provide the following quality benchmarks:
- b. First installed of each type in location to be agreed.

Structural Performance Requirements

Q22.206 General

- a. Ascertain all dead, live loads and movements imposed on the works as scheduled in Section A of this Specification.
- b. Accommodate all tolerances and movements of the building structure, including dead, live, seismic and wind loads plus moisture, shrinkage, creep and thermal effects.
- c. The works to resist all specified static and dynamic design loads likely to be encountered without causing permanent deformation of components or the failure of fixings, or handrails and to transmit such loads safely to the points of support.

Q22.207 Structural Movements

- a. Refer to Structural and Tolerances data/requirements prepared by the Structural Engineer.

Q22.208 Specific Live Loads

a. The works shall be capable of accommodating the following specific live loads without

any reduction in performance:

- 1). The works shall sustain safely, without reduction in performance and without permanent deformation to any component, a concentrated load of 1kN acting in any direction at any position on the handrail and a distributed load of 1.5kN/m applied at the top of the handrail and acting outwards.
- 2). Known impact loads, or transferred impact loads, that occur during service life.
- 3). Loads imposed during replacement.
- 4). Horizontal and vertical loads of similar magnitude to those which are imposed upon adjacent or attached elements.

Q22.209 Deflections

a. The maximum allowable deflection of any handrail element when carrying full design loads must not exceed 15mm or 1/175 of its length measured along the handrail element whichever is the lesser value.

b. No elements to deflect under loading in any way that is detrimental to any element of the works or adjacent structure.

c. All components, supports and fixings to be capable of accommodating the above deflection without permanent distortion, deformation or failure.

d. Accommodate differential structural movements in backing structures as relevant.

Refer to the Structural Engineer's Specification.

Q22.210 Soft Body Impact

- a. Soft body impact tests to be carried out in accordance with SANS 10160.

Environmental Performance Requirements

Q22.211 Thermal Movement

- a. The design shall cater for all temporary and permanent conditions envisaged for the works.
- b. The service temperature range for components of the works to be taken as -0°C and +50°C. Manufacturer to provide assurance that the components will survive such temperature variations for the warranty period.
- c. Thermal movements shall not result in audible noise.

Durability Performance Requirements

Q22.212 Service Life

- a. The assembly must be durable for the 60 year service life, with maintenance listed below and identified in the Maintenance Manual prepared by the cladding subcontractor.
- b. Simple adjustment of components subject to wear.
- c. Removal of dust and dirt from internal parts
- d. Cleaning of exposed surfaces.

Q22.213 Impact and Abrasion Resistance

- a. Resist abrasion from cleaning methods and maintenance systems without noticeable change in surface appearance.
- b. Generally, surfaces to be sufficiently hard to resist all reasonable impacts from handheld objects without any noticeable change to the surface appearance.
- c. Impact tests to be carried out to all assemblies adjacent to pedestrian areas in

accordance with the recommendations of SANS 10160. Tests shall conform to category B requirements.

Q22.214 Demountability

- a. Elements of the works to be individually and independently removable ensuring access for maintenance and/ or replacement of elements in the event of damage.
- b. The removal of elements is not to affect the performance or safety of any part of the works and a method statement is to be provided for acceptance.

Results and Certificates

Q22.215 Results and Certificates

- a. Tests and inspection results to be submitted immediately they are available.
- b. Maintain, until the end of the defects liability period, records of all inspections and tests performed, material certification, inspection and test plans, drawings, and any other documentation to substantiate conformity with the Specification.

Certification

Q22.216 Certification

- a. Prior to commencing work on site provide a copy of a valid SASSDA Certificate of Approval for the manufacture, supply and installation of stainless steel balustrades and handrail systems.
- b. Provide a copy of the sub-contractor's current SASSDA membership certificate.
- c. Provide material certificates to ASTM A 554.

Accuracy

Q22.217 Fabrication Accuracy

- a. Overall dimensions:

- 1). Length of member: Up to 2 500 long +0 -1.5mm over 2 500long +0 -3.0mm.
 - 2). Straightness: up to 2 500 long 1.5mm over 2 500long 3.0mm.
 - 3). Squareness: Difference in length of diagonals 0.075% of design dimension or 3.0mm whichever is the lesser.
 - 4). Bow: The centre section of the glazed element not to bow by more than the lesser of 3mm or 0.075% of the length of the element measured from a straight line between the ends of the element.
- b. Straightness: Any surface or edge not to deviate by more than +1.5mm from a 2m straightedge placed against it in a direction parallel to the long axis of the element.
 - c. Flatness: Any surface not to deviate by more than +1.5mm from a 2m straightedge placed against it in any direction.
 - d. Twist: No section of the element to be twisted by more than 1° from the section at either end of the element.

Q22.218 Installation Accuracy

- a. Comply with the requirements of SANS 10155 Category II.

Fixings

Q22.219 Generally

- a. Fixings to be fit for their intended purpose.
- b. All bolts, screws, nuts and anchors to be of adequate strength for their intended purpose and be manufactured from the specified grade of material.
- c. Fixings to conform to all statutory requirements in respect of strength and type.
- d. Visible fixings to comprise round-headed bolts.
- e. Unless otherwise specified, adhere to the following basic requirements:

1). Use fixings that are suited to the likely stresses, movements and vibrations in use without allowing any wobble, creaks or deflection of any fixtures or fittings.

2). Items that require accessibility or removal to be fixed with bolts.

Manufacture

Q22.220

Manufacture

a. Unless otherwise specified, welds to visible areas of stainless steel to be ground smooth to achieve a seamless surface.

b. Remove heat tints using light abrasives, pickling paste, wire brushing or similar to achieve continuity with the specified finish.

c. Areas difficult to access to be manually finished if necessary.

d. Stainless steel fasteners, bolts, screws, nuts and other fixings to be either grade A2 or grade A4 to BS EN ISO 3506: Parts 1 and 2. Select the property class of fastenings to meet the performance requirements specified.

e. Stress corrosion or cracking not to occur. Undertake necessary precautions in the fabrication and installation of stainless steel elements/materials, avoiding the simultaneous presence of any of the following:

1). Tensile stresses.

2). Residual stresses after cold working or welding.

3). Aggressive local environmental conditions.

4). Metal temperatures that in conjunction with the above may induce stress corrosion cracking.

Fabrication

Q22.221

Tolerances

a. In addition to the general requirements of the Specification:

1). Employ a high degree of accuracy in the fabrication of the works and their support structure.

2). Handrails to be attached to glass balustrades in such a manner that, should a glass pane fracture, the handrail will remain in position.

3). Tolerances for fabrication:

a). Deviations in length, width and diagonal dimension tolerances not to exceed 1mm.

b). The twist and warping not to cause any point to be more than 0.5mm out of plane.

Durability

Q22.222 Impact and Abrasion Resistance

a. Generally, surfaces to be sufficiently hard (including glass coatings) to resist all reasonable impacts from hand-held objects without any noticeable change to the surface appearance. Resist abrasion from cleaning methods and maintenance systems without noticeable change in surface appearance.

Bi-metallic Corrosion

Q22.223 Generally

a. Adequate measures to be taken to prevent bi-metallic corrosion between dissimilar metals and to isolate aluminium components from cementitious surfaces.

b. Direct contact between aluminium or aluminium alloys and treated timber to be avoided, unless with the prior acceptance of the Architect.

Workmanship

Q22.224 **Generally**

- a. The works to be installed in the correct position, within tolerance, and in the correct relationship to the building structure.
- b. Install all fixing bolts in accordance with the manufacturer's recommended procedures.
- c. Keep protection in place until all the works are complete. Replace all protective measures following any inspections.
- d. Acceptance to be received from the Architect before drilling or cutting parts of the structure, other than where shown on the Shop Drawings/ Working Drawings.
- e. Isolating tape, plastic washers, or other suitable means to prevent bi-metallic corrosion to be provided between dissimilar metals, or between preservation treated timber and metal.
- f. The works to be square, regular to line, level and plane, with all junctions fitting to the stated tolerances.

Q22.225 **Installation Tolerances**

- a. Joints: The width of any joint not to deviate from the nominal width by more than 1mm. Equally distribute any variation, with no sudden changes.
- b. Adjacent elements of stairs/ balustrades not to deviate from either their intended horizontal or vertical alignment by more than 2mm.

Storage and Handling

Q22.226 **Storage**

- a. Protect with tarpaulin or similar covers, including sides and ends.
- b. Do not deliver to site components that cannot be put immediately into suitably dry,

floored and covered storage.

c. Stack finished components on bearers, separated with spacers to prevent damage by and to projecting elements.

d. Provide a method statement indicating transport, handling and storage of the elements that will minimise the risk of damage. This is to be submitted and approved by the Architect.

Protection

Q22.227

Protection

a. Protect completed work against damage, dirt, moisture and other deleterious substances.

b. Protect from damage by subsequent trades.

END OF SECTION

R10 **SCREEDS AND TOPPINGS**

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

R10.100 **PRODUCTS AND MATERIALS**

Specification and Scope

R10.101 **Descriptive Works**

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but

shall remain fully responsible for the Detailed Design and performance of the works.

R10.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Bonded Cement Sand Screeds.
- 2). Granolithic Screeds.

Bonded Screeds

R10.103 SCR-111: Bonded Cement Sand Screed

a. Bond the screed to the concrete substrate using a proprietary bonding agent or 1:1 cement: sand grout.

- 1). The screed thickness to be as shown on the Contract Drawings, laid to falls/ level.
- 2). Screed mix proportions to be:
 - a). Cement and sand in the ratio of 1 to 3½.
 - b). Fine plaster sand to be in the ratio of 1 to 4-5 of total aggregate. The proportions of fine to coarse aggregate to be 40/60 and be adjusted to facilitate trowelling.
- 3). Trowel the surface finish to receive bedding of applied floor finish as indicated on the Contract Drawings.
- 4). Minimum thickness: 15mm.
- 5). Maximum thickness: 40mm.

Granolithic Screeds

R10.104 SCR-511: Granolithic Screed

- a. The granolithic screed to be untinted and sealed:
- 1). Bonded to the substrate.
 - 2). The screed thickness to be as shown on the Contract Drawings, laid to falls/
level.
 - 3). Screed mix proportions to be:
 - a). Cement: Fine Sand: Coarse Sand: Fine Granite Aggregate to be in the
ratio of 1:1:2:1.
 - b). Granite aggregate to pass a 5mm sieve.
 - 4). Finish: Trowelled smooth to a polished surface with reeded strips to thresholds
and steps.
 - 5). Thickness: minimum 25mm to floors and treads, 12mm to vertical surfaces or
as shown on the Contract Drawings.
 - 6). Skirting: To be agreed.
 - 7). Lay in panels not exceeding 6m².
 - 8). Provide vee joints between adjacent bays.
 - 9). Coloured granolithic screed to be laid in two coats, in one operation with the
tinting pigment mixed into the finishing coat.
 - 10). Cure granolithic Screed for seven days.

Skirtings

R10.105 SKR-431: Rectangular Granolithic Skirting

- a. The granolithic skirting to be untinted and sealed.
- 1). Bonded to the substrate.
 - 2). Screed mix proportions to be:

- a). Cement: Fine Sand: Coarse Sand: Fine Granite Aggregate to be in the ratio of 1:1:2:1.
- b). Granite aggregate to pass a 5mm sieve.
- 3). Finish: Troweled smooth to a polished surface.
- 4). Thickness: 12mm to vertical surfaces or as shown on the Contract Drawings.
- 5). Hight: 12mm.
- 6). Finish: Epoxy coating.
- 7). Cure granolithic skirting for seven days before coating.

Materials

R10.106 Cement

- a. Cement: CEM I Portland cement 42.5N to SANS 50197. or CEM IIA Portland Fly Ash Cement 32.5N.

R10.107 Fine Aggregate

- a. Fine aggregate: To SANS 1083, with not more than 10% passing sieve size 150 microns.
- b. Where a smooth finish is required, use a mixture of 4 parts crusher sand sieved as in a) and one part clean plaster sand.

Angle Trim

R10.108 Aluminium Threshold Angle Trim.

- a. Size: 30 x 30 x 3mm aluminium angle trim.
- b. Fixing: Plugged and screwed to concrete floor slab.

R10.200 QUALITY AND WORKMANSHIP

Submittals

R10.201

Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

R10.202

Pre-Contract Samples

a. Movement joint and edge restraints, minimum 300mm long.

R10.203

Post-Contract Samples

a. Movement joint and edge restraints, minimum 300mm long.

R10.204

Benchmark Requirements

a. Provide the following quality benchmarks:

1). First structural bay of each screed type, in location to be agreed.

Accuracy

R10.205

Levels of Floor Screeds

a. The permissible deviation in level of surface of screeds (allowing for thickness of coverings) and toppings from datum to be 5mm.

R10.206

Flatness of Floor Screeds

a. No sudden irregularities to occur. The variation in gap under a straightedge placed anywhere on the surface to be not more than the following:

1). Screeds to receive dust sealer: 5mm under a 3m straightedge.

2). Screeds to receive sheet or tile finishes bedded in adhesive.

a). 5mm under a 3m straightedge.

b). 2mm under a 1m straightedge.

3). Enclosed staircases: 2mm under a 1m straightedge.

Structural Performance Requirements

R10.207 General

- a. All screeds are to withstand all movements of the structure under all design loads or combination of loads as specified in the Structural Engineer's specifications and Deflection/ Movement Reports, without any damage, cracking or breaking up of the screeding.
- b. All screeds are to accommodate all structural expansion joints and construction control joints.
- c. Expansion and movement joints shall accommodate the appropriate range of movement.
- d. The Contractor to be responsible for determining the requirement for and location of movement joints, whether indicated on the Contract Drawings or not.

Testing

R10.208 Impact and Strength

- a. Adhesion tests to be carried out over the area of screeding works, all in accordance with the recommendations of the Cement and Concrete Institute.
- b. Material to pass a strength test utilising a BRE screed tester.
- c. Randomly select test positions at least 3 every 20m², corridors tested every 5m.
- d. The maximum depth of penetrations not to exceed 3mm indentation.

Workmanship

R10.209 Workmanship

- a. The screed not to be altered to accommodate other trades unless such work is clearly specified on the Contract Drawings.

- 1). Do not add cement to the surface of screeds.
- 2). Ensure that all screeds are thoroughly compacted.

Suitability of Bases

R10.210 Bonded Screeds

- a. Bases to be flat enough to permit the specified levels and flatnesses of finished surfaces, considering the permissible minimum and maximum thicknesses of the screed.
- b. Completely remove the mortar matrix from the surface of the slab to expose coarse aggregate over the entire area of the hardened base of the slab using abrasive blasting or, for in situ slabs only, pneumatic scabbling. Remove dust and debris.
- c. Wet bases for several hours before laying screed. Remove free water, then brush in recommended bonding agent or cement slurry.
- b. Lay screed while slurry is still wet to ensure a good bond.

Screeds

R10.211 Screed Preparation and Installation

- a. Mechanically scarify and chemically clean floor screed to remove dust.
- b. Mix screeds in a concrete mixer, lay semi-dry.
- c. Cure screeds using polythene sheeting.
- d. Support polythene sheeting above screed with timber battens for the first 24 hours.

Batching

R10.212 Batching Requirements

- a. Ensure that proportions of mixes made with dense aggregates are specified by weight and are batched by weight. Volume batching only to be permitted on the basis of the

previously established weight: volume relationship(s) of the particular materials,
using accurate gauge boxes.

Mixing

R10.213 Mixing Requirements

- a. Admixtures used are not to contain calcium chloride.
- b. Water content of mixes to be the minimum necessary to achieve full compaction and low enough to prevent excessive water being brought to the surface during compaction.
- c. Mix materials thoroughly to a uniform consistency. Mixes other than non-fines to be mixed in a suitable mechanical mixer.
- d. Use material while sufficiently plastic for full compaction.

Adverse Weather

R10.214 Weather Requirements

- a. Do not lay screeds unless their surface temperature is maintained above 5°C for not less than 4 days thereafter.
- b. In hot weather reduce the time between operations with water retaining admixtures added to ensure that premature drying does not take place.

Joints in Screeds

R10.215 Joint Requirements

- a. Screeds to be cast continuously, as far as possible without defined joints, using 'wet screeds' between strips or bays. The positions of bay joints, as shown on the Shop Drawings/ Working Drawings, to be confirmed and co-ordinated as follows.
 - 1). Where the location of bay joints are not shown on the Contract Drawings, obtain

acceptance from the Architect before starting work.

2). Forms, where applicable, to be square edged with surfaces securely fixed. Wet material to be compacted thoroughly at edges to give level, closely abutted

joints with no lipping.

3). Alternatively, screeds to be cast continuously, bay joints being formed with proprietary dividing strips.

4). The structural movement joint covers to be fixed in accordance with the detailed Contract Drawings and floor plans, closely following the manufacturer's written recommendations and installation guidelines.

5). Be responsible for the installation and performance of all floor interfaces and seek confirmation of movement and loading requirements.

6). Structural movement joints to be situated immediately over or cantilevered in relation to the structural joints in the slab.

7). Joints to be installed in lengths of 4 metres with the minimum length at the end of runs being at least 1 metre. At joins, joint covers to either be invisibly spliced or joint sections staggered such that the joint is continuously linked.

8). The horizontal width of the movement joint to be set at the time of installation, taking account of thermal expansion at the time of installation.

9). Movement joint covers to be affixed to the base (and upstands) by means of expanding bolt anchors at centres recommended by the movement joint manufacturer. All anchor bolts to be zinc plated.

10). Movement joint covers to be affixed such that the upper surface of the joint finishes flush with the top of adjacent floor finishes.

Timing

R10.216 General

a. All finishing operations to be carried out at optimum times in relation to the setting and hardening of the material. Surfaces not to be wetted to assist surface working.

Cement not to be sprinkled onto surface.

On-Site Finishes

R10.217 Trowelled Finish to Receive Applied Floor Finishes

a. Screed to be floated to an even surface with no ridges or steps.

b. Screed to be hand or power trowelled to give a uniform smooth appearance, but not a polished surface. It shall be free from trowel marks and other blemishes and be suitable to receive the specified flooring material as per the Specification.

c. Adequately protect the surface from construction traffic.

d. If the surface of the screed is not suitable to receive the specified flooring material, make good by application of a smoothing compound.

R10.218 Trowelled Finish for Wearing Surface

a. Float to an even surface with no ridge or steps.

b. Successively hand or power trowel at intervals, applying sufficient pressure to close the surface, to give a uniform smooth finish free from trowel marks and other blemishes.

R10.219 Stair Treads

a. Steel trowel to give a smooth hard finish.

b. Provide reeded finish 100mm wide to within 50mm of ends of each tread.

Curing

R10.220 Curing Requirements

a. Immediately after laying, protect the screed surface from wind, draughts and strong sunlight.

b. As soon as the screed/ topping has set, cover with polythene sheeting for not less than 5 days.

Protection

R10.221 Protection

a. Protect finished screed from mechanical damage.

Storage of Materials

R10.222 Cement

a. Store in a weatherproof structure clear of the ground.

b. Do not store for more than six weeks before using.

c. Portable silos can be used for bulk storage of cement.

R10.223 Fine Aggregate

a. Store to avoid contamination.

END OF SECTION

R20 PLASTERED/ RENDERED/ ROUGHCAST COATINGS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

R20.100 PRODUCTS AND MATERIALS

Specification and Scope

R20.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

R20.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract

Drawings, provides particular requirements with respect to the following:

- 1). Cement sand renders.
- 2). Gypsum plaster.

Cement Sand Renders

R20.104 WF01: Internal and external render applied to walls and ceilings (AMORIGUARD)

1). Surface preparation

a). Lightly sand down all surfaces to provide a sound smooth surfaces. Clean all dust, grease and dirt. Scrape off all loose material and cement splashes.

b). Rake out and fill all cracks, other than hairline cracks, greater than 0.5mm and fill with Amoriguard Skim/Filler, sand smooth and dust off.

c). All substrates must be dry before painting with a moisture content not exceeding 12%, as measured with an approved moisture meter.

2). Priming

Apply one coat of Amoriguard A Gain exterior filler to prepared surfaces. Ensure total coverage of the substrate. (trowel application)

3). Finishing coats

Apply 2 coats of **Amoriguard A-Gain**. Ensure total coverage of the substrate Spread Rate approximately 5-8m²/litre.

Gypsum Plaster

R20.105 PLS-131: Skim Coat Gypsum Plaster

a. Type: Pre-mixed lightweight retarded hemi-hydrate gypsum plaster.

1). Indicative Manufacturer: Saint-Gobain Gyproc or similar equal approved.

- 2). Indicative Product: Rhinolite or similar equal approved.
- 3). Thickness: 3-6mm thick, applied in one coat.
- 4). Finish: Trowelled smooth with a polished finish.
- 5). Provide all necessary accessories, beads and stops.
- 6). Substrate preparation: Adhere to the published recommendations of the AAC block manufacturer.

R20.106 PLS-151: Skim Coat Board Finish Gypsum Plaster

a. Type: Pre-mixed lightweight retarded hemi-hydrate gypsum plaster.

- 1). Indicative Manufacturer: Saint-Gobain Gyproc or similar equal approved.
- 2). Product: Rhinolite, or similar equal approved.
- 3). Thickness: 3-6mm thick, applied in one coat.
- 4). Finish: Trowelled smooth with a polished finish.
- 5). Provide all necessary accessories, beads and stops.

Materials

R20.107 Cement

- a. Cement: CEM I Portland cement 42.5N to SANS 50197.
- b. Masonry cement to SANS 50413 strength 12.5N

R20.108 Plaster Sand

- a. Plaster sand to conform to SANS 1090 with a continuous grading from 1.18mm to 0.075mm.

Preparation Materials

R20.109 PVA Bonding Agent

- a. Polyvinyl acetate emulsion to be only used in dry conditions, and as specified by the

manufacturer.

R20.110 PVA Sealer

a. Sealer of polyvinyl acetate emulsion to be used as recommended by the coating material manufacturer.

R20.200 QUALITY AND WORKMANSHIP

Submittals

R20.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

R20.202 Pre-contract Samples

a. Not required.

R20.203 Control Samples (Post-contract)

a. Provide the following control samples:

- 1). All accessories.
- 2). A 5m² sample of the Resin Bonded plaster finish to the agreed texture.

R20.204 Benchmark Requirements

a. Provide the following quality benchmarks:

- 1). First structural bay or 10m² of each type of coating, in location to be agreed.

Accuracy

R20.205 Accuracy

a. Plaster rendered backings to have maximum deviation under 2m straightedge of 3mm.

Structural Performance Requirements

R20.206

General

a. All Coatings are to withstand all movements of the structure under all design loads or combination of loads as specified in the Structural Engineer's specifications and

Deflection/ Movement Reports, without any damage, cracking or breaking up.

b. All Coatings are to accommodate all structural expansion joints and construction control joints.

c. Expansion and movement joints shall accommodate the appropriate range of movement.

d. The Contractor to be responsible for determining the requirement for and location of movement joints, whether indicated on the Contract Drawings or not.

R20.207

Specific Live Loads

a. The works to be capable of accommodating the following live loads without any reduction in performance.

1). Horizontally applied loads acting on the surface of any component. The works to sustain safely, without reduction in performance and without permanent deformation to any component, a static 500N load applied horizontally through a square of 100mm sides on any part of the framing.

2). A horizontal line load applied to the works, due to the occupants, in accordance with SANS 10160.

Environmental Performance Requirements

R20.208

Thermal Movement

a. The service temperature range for components of the works to be taken as -10°C

and +90°C.

b. Thermal movements shall not result in audible noise.

R20.209 Moisture Movement

a. Changes in moisture content of components shall not affect the works.

b. Expansion of absorbed or retained moisture caused by freezing shall not affect the works.

Workmanship

R20.210 Mixing of Materials

a. No admixtures containing calcium chloride to be used.

b. Mix materials thoroughly to a uniform consistency in a suitable mechanical mixer.

c. Use materials while sufficiently plastic to ensure full compaction.

R20.211 Background Preparation

a. Hack surfaces to provide a key and clean down.

b. Wet surfaces thoroughly before applying finishing plaster/ render.

c. Apply a slush coat of 2:1 grout to concrete surfaces before plastering and allow to set.

R20.212 Application

a. Provide appropriate corrosion resistant bead stops at all external angles and stop ends unless specified otherwise.

b. All angles to be plumb, true and straight.

c. Plaster single surfaces in one operation.

d. Each coat to be applied firmly to achieve good adhesion in one continuous operation between angles and joints.

e. Form knife joints with arrised edges through full thickness at movement joints.

f. Allow each coat to dry out thoroughly to ensure that drying shrinkage is substantially complete before applying the next coat.

Finishes

R20.213 Smooth Finish

a. Finish with a steel trowel or float to produce a tight, matt, smooth surface with no hollows, abrupt changes of level or trowel marks.

Curing

R20.214 Drying Out

- a. Prevent evaporation from the surface of external render for 5 days.
- b. Dampen as required during this time by spraying with water.

Protection

R20.215 Protection

- a. Protect newly applied external coatings against rain for the first 48 hours.
- b. Protect edges and arrises from mechanical damage.

Storage of Materials

R20.216 Cement

- a. Store in a weatherproof structure clear of the ground.
- b. Do not store for more than six weeks before using.
- c. Portable silos can be used for bulk storage of cement.

R20.217 Fine Aggregate

- a. Store to avoid contamination.

R20.218 Gypsum Plaster

- a. Store in a weatherproof and damp-proof structure clear of the ground.

END OF SECTION

S10 CERAMIC/ PORCELAIN TILING

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

S10.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

S10.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

S10.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Ceramic tiling.

2). Porcelain tiling.

Wall Tiling

S10.103

Standards

a. Comply with the requirements of SANS 10107.

S10.104

Wall Tiling Background Preparation

a. New Interior Rendered Walls.

1). Allow all new rendered walls to cure for at least 14 days. Ensure that the

surfaces are clean and free of all traces of dust, loose particles and any other

surface contaminants.

2). The rendering must be firmly attached to the substrate and must be integrally

sound (no crumbling or cracking) and must be of a quality and consistency

suitable for tiling. All defective areas must be removed and the floor made good

before proceeding.

3). For woodfloated surfaces commence tiling but for steel floated surfaces apply

a key to the surface using a latex admixture and cement slurry, applied in

accordance with the manufacturer's recommendations. The tiling must

commence 4 – 6 hours after applying the keycoat.

4). Indicative Product: Tal Keycoat or acceptable equivalent.

S10.105

WF-08: 1200 x 600mm Porcelain Wall Tiling

a. Porcelain wall tiling.

b. Indicative Manufacturer/ supplier: Tactile or similar equal approved.

c. Indicative Product: Mirage Glocal Collection Absolute GC06, or acceptable equivalent.

d. Colour: Absolute GC06.

e. Finish: To be agreed.

f. Size(s): 1200 x 600mm.

g. Thickness: 6mm.

1). The Contractor is to allow for a difference in the tile adhesive thickness, to ensure that tiles of differing thickness can be laid together to achieve the same finished plane.

h. Background: Sand cement render.

i. Bedding:

1). The sub-contractor is to obtain written acceptance of the proposed adhesive from the tile manufacturer, prior to any works proceeding.

2). Type: Thick bed cement based powder adhesive, thickness within range recommended by the manufacturer.

3). Indicative Manufacturer: *Tactile* or similar equal approved.

4). Indicative Product: To be agreed.

5). Mixing:

a). Mix thoroughly as recommended by the manufacturer.

b). Mix ratio as recommended by the manufacturer.

6). Application: All in accordance with the adhesive manufacturer's recommendations and instructions.

j. Corner protectors to be provided at positions shown on the Contract Drawings.

k. Grouting:

1). The sub-contractor is to obtain written acceptance of the proposed grout from

the tile manufacturer, prior to any works proceeding.

2). Type: Cement based powder grout in accordance with the tile manufacturer's recommendations.

3). Indicative Manufacturer: *Tactile* or similar equal approved.

4). Indicative Product: Ultracolor Plus Black (120) Grout, or acceptable equivalent.

5). Joint width: 3mm.

6). Mixing:

a). Mix thoroughly as recommended by the manufacturer.

7). Colour: Black.

8). Application: All in accordance with the grouting manufacturer's recommendations and instructions.

S10.106 WF-03: 3240 x 1620mm Porcelain Wall Tiling

a. Porcelain wall tiling.

b. Indicative Manufacturer/ supplier: Artmar Natural Stone or similar equal approved.

c. Indicative Product: Infinity Tile, or acceptable equivalent.

d. Colour: Royal Peacock

e. Finish: MB 20

f. Size(s): 3240 x 1620. Cut to size as required.

g. Thickness: 6mm.

1). The Contractor is to allow for a difference in the tile adhesive thickness, to ensure that tiles of differing thickness can be laid together to achieve the same finished plane.

h. Background: Sand cement render.

i. Bedding:

1). The sub-contractor is to obtain written acceptance of the proposed adhesive from the tile manufacturer, prior to any works proceeding.

2). Type: Thick bed cement based powder adhesive, thickness within range recommended by the manufacturer.

3). Indicative Manufacturer: Infinity or similar equal approved.

4). Indicative Product: To be agreed.

5). Mixing:

a). Mix thoroughly as recommended by the manufacturer.

b). Mix ratio as recommended by the manufacturer.

6). Application: All in accordance with the adhesive manufacturer's recommendations and instructions.

j. Corner protectors to be provided at positions shown on the Contract Drawings.

k. Grouting:

1). The sub-contractor is to obtain written acceptance of the proposed grout from the tile manufacturer, prior to any works proceeding.

2). Type: Cement based powder grout in accordance with the tile manufacturer's recommendations.

3). Indicative Manufacturer: Norcros SA (Pty) Ltd or similar equal approved.

4). Indicative Product: Tal Wall and Floor Grout, or acceptable equivalent.

5). Joint width: To be agreed.

6). Mixing:

a). Mix thoroughly as recommended by the manufacturer.

b). Mix ratio 6litres Tal Bond to 20kg grout.

7). Colour: To be agreed.

8). Application: All in accordance with the grouting manufacturer's recommendations and instructions.

Wall Movement Joints

S10.107

Wall Tile Movement Joints

a. Intermediate movement joints to be provided at positions shown on the Contract Drawings.

1). Type: 3mm wide expanded closed cell polyethelene former with sealant.

2). Indicative Manufacturer: Norcros SA (Pty) Ltd or similar equal approved.

3). Joint former: TAL Sealmaster Cord to suit application, or acceptable equivalent.

4). Indicative Sealant: Tal Goldstar Sealmaster 1000, or acceptable equivalent.

5). Colour: To be agreed.

6). Preparation and application to be as recommended by sealant manufacturer.

7). Joints to extend through tiles and bedding to substrate.

Products

S10.108

Cement

a. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM IIA Portland Fly Ash Cement 32.5N.

S10.109

Fine Aggregate

a. Fine aggregate: To SANS 1083, with not more than 10% passing sieve size 150 microns.

Expansion/ Movement Joints

S10.110 Perimeter Expansion Joints

- a. 6mm wide Joints shall extend through tiles and bedding to substrate.
- b. Joints shall coincide with any movement joints left in the substrate.

S10.111 Proprietary Movement Joint

- a. Material: To be agreed.
- b. Size to be agreed.
- c. Profile to be acceptable to the Architect.
- d. Fixing shall be bedded in cement and sand/ screwed to plugs at 600mm centres, to exact finished level of floor.

S10.112 Sealant Movement Joints

- a. Sealant movement joints shall be provided where necessary:
 - 1). The colour shall be agreed.
 - 2). Preparation and application shall be as per the Specification, Section Z22.

Joints shall extend through tiles and bedding to substrate. Joints shall coincide with any movement joints left in the substrate.

S10.113 Preformed Strip/ Section Movement Joints

- a. Where shown on the Contract Drawings, preformed strip/ section movement joints to be provided and fixed in accordance with the manufacturer's written recommendations.

Fabrication

S10.114 Tolerances

- a. Tile sizes stated in the Specification are nominal and the actual sizes required to meet the joint sizes, etc. to be determined.

b. Tiles to be manufactured with the tolerance of $\pm 0.5\text{mm}$.

S10.115 Damage

a. Tiles that are chipped, scratched, damaged or have any other physical imperfections are not to be used in the works.

S10.200 QUALITY AND WORKMANSHIP

Submittals

S10.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

S10.202 Pre-contract Control Samples

a. Not required.

S10.203 Post-contract Control Samples

a. Provide the following control samples:

- 1). 300 x 300mm range of samples.
- 2). Grout sample.
- 3). Movement joint material, minimum 300mm.

S10.204 Benchmark Requirements

a. Provide the following quality benchmarks:

- 1). First 10m^2 of each type, in location to be agreed.

Testing

S10.205 Test Requirements

a. Include for testing by an accredited independent testing specialist or provide

independently certified test data to demonstrate compliance with the Specification.

S10.206 Impact Testing

a. Carry out impact tests to establish the soundness of all screeded substrates. Testing to include both light tap and heavy weight impact using 4kg, in compliance with the BRE screed tester. Alternative substrate testing methods may be put forward for consideration and acceptance by the Architect.

S10.207 Sealant Testing

a. Staining: Test in accordance with BS 3712: Part 2. Perform test on each type of tiling in contact with sealant.

b. Adhesion: Test elastomeric sealant for peel strength in accordance with BS 3712: Part 4.

Accuracy

S10.208 Level of Floor Tiling

a. The permissible deviation in level for tiling shall be ± 2 mm of the stated datum.

b. The works shall be installed to finish flat, flush and true to adjacent finished floor levels, free from step, ramp or other misalignment.

S10.209 Flatness of Floor Tiling

a. Sudden irregularities to the finished surfaces shall not occur, the variation in gap under a 3000mm straightedge placed anywhere on the surface shall be not more than 2.0mm.

S10.210 Level of Tiling across Joints

a. The maximum deviation between tile surfaces either side of a joint, including movement joints, to be:

1). 1mm for joints less than 6mm wide.

2). 2mm for joints 6mm or greater.

Performance Requirements

S10.211 Performance Requirements

a. Comply with the general performance criteria of Section A, clause series 500 and the following specific performance requirements.

Structural

S10.212 General

a. Refer to Section A.

S10.213 Specific Movements

a. Detail, manufacture and install the works to accommodate all movements of the substrates without damage or any reduction in the performance of the works. The Contractor to be responsible for determining the requirement for and location of movement joints, whether indicated on the Contract Drawings or not.

b. Provide all necessary movement joints to accommodate the movements to which the tiling is expected to be subjected, whether indicated on the Contract Drawings or not.

c. Show all control joints on the Shop Drawings/ Working Drawings, subject to acceptance by the Architect.

d. Ensure that movement joint thicknesses are adequate.

e. Provide a method statement for the installation of all the works, taking into account movements of the structural slab including:

1). Dimensional setting out and joints alignment.

2). Floor services including trunking to be incorporated in the bedding build-up.

3). Construction tolerances.

4). Movement joints, bay joints and relief joints.

5). Full adhesion.

6). Full bed without hollows.

7). Cracking to grouted joints not acceptable.

f. A full understanding of the behaviour of the building structure, its movements and its effects upon the works is required.

g. The works not to deflect under loading in any way that is detrimental to any element of the works or adjacent structural or building elements.

S10.214 Specific Dead Loads

a. Accommodate the following loadings without damage being caused or any reduction in performance:

1). Dead loads: 3kN/m^2 .

S10.215 Specific Live Loads

a. The works to be capable of accommodating the following live loads without any reduction in performance:

1). Imposed live loads: $5\text{kN/m}^2 + 1\text{kN/m}^2$ (where partitions are located).

2). Point loads: 10kN.

Environmental

S10.216 Thermal Movement

a. The works to be capable of withstanding differential surface temperatures including those induced under a heating and cooling cycle without any progressive or

permanent reduction in the specified performance. The thermal coefficients of the works and the adjoining structure to be established as the design caters for all thermal movement, including temperature range induced by underfloor heating and cooling pipework.

S10.217 Moisture Movement

a. The works to withstand the following movement without permanent deformation or any reduction in the specified performance:

1). Due to changes in the moisture content of its components, resulting from variations in the moisture content of the air. Refer also to BS 8297, BS 8298 and BS 8110: Part 2.

2). Due to drying shrinkage of building components, both short term and long term to BS 8297 and BS 8298.

Workmanship

S10.218 Background Suitability

a. Before the commencement of tiling the background and bases to be sufficiently flat to permit specified flatness of finished surfaces.

b. Form movement joints in scratch or floated coats over movement joints in backing.

c. In situ concrete shall be scrubbed with water containing detergent to complete removal of mould, oil, surface retarders and other materials incompatible with the bedding. It shall then be rinsed with clean water and allowed to dry, unless specified otherwise.

S10.219 Setting Out

a. Joints in floors to be parallel to the main axis of the space or specified features.

Square tiles continuously in both directions. Rectangular tiles [stretcher] pattern.

- b. Joints on walls to be truly horizontal, vertical and in alignment around corners.
- c. Cut tiles to be kept to the minimum, as large as possible and in unobtrusive locations.
- d. Ensure that movement joints in sub-structure are maintained in tile layout.

S10.220 Laying and Fixing

- a. Comply with SANS 10107.
- b. Cut tiles neatly and accurately.
- c. Ensure that the adhesive is compatible with the background/ base, if recommended by the adhesive manufacturer prime first.
- d. Fix tiles so that there is adhesion over the whole of the background/ base and tile backs.
- e. Clean surplus bedding material from joints and face of tiles.
- f. Allow no unintended colour/ shade variation within the tiles for use in each area/ room, permissible variegated tiles to be evenly distribute.
- g. Before bedding material sets, make adjustments as necessary to give true, regular appearance to tiles and joints when viewed under final lighting conditions.
- h. Make all cuts with a diamond tipped wet-saw and all exposed cut edges to receive an arris to match uncut tiles. Proprietary tile cutting machines can be used if acceptance is received from the Architect.
- i. All tile to be bedded fully in accordance with the manufacturer's instructions.

S10.221 Thin Bed Adhesive Bedding

- a. Allowed background to dry out thoroughly.
- b. Apply floated coat of adhesive and trowel to a ribbed profile using the recommended

notched trowel.

c. Apply thin, even coat of adhesive to backs of dry tiles. Press tiles firmly onto bed adhesive with a twisting sliding action to give finished bedding thickness of 3mm.

S10.222 General Grouting

a. Do not apply grout until the bedding material has hardened sufficiently. The joints to be a minimum of 5mm deep and free from dust and debris. All joints to be completely filled, tooled to an accepted profile and wiped down to leave free from blemishes.

b. The grout joints to be 'washed' joints. Grouting to be washed out to the bottom line of the arris.

c. Polish wall tiling with a dry cloth when joints are hard.

Finishing and Protection

S10.223 Finishing and Protection

a. Tiles that are chipped, scratched, damaged or have any other physical imperfections to be replaced.

b. When all grouting has hardened wash down tiling and polish tiled areas with a dry cloth to remove grouting residue.

c. Protect corners and arrises against mechanical damage.

END OF SECTION

T10 RAINWATER PIPEWORK/ GUTTERS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

T10.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

T10.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but

shall remain fully responsible for the Detailed Design and performance of the works.

T10.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Specification, provides particular requirements with respect to the following:

- 1). Rainwater downpipes.
- 2). Rainwater gutters.

T10.103 DP-00: HDPE Rainwater Pipework

a. HDPE rainwater down pipes.

- 1). Indicative Manufacturer: To be agreed.
- 2). Indicative Product: To be agreed.
- 3). Nominal sizes: As shown Contract Drawings.
- 4). Accessories: As recommended by the manufacturer.
- 5). Method of jointing: Push fit/ solvent weld.
- 6). Method of fixing: To be agreed.

T10.200 QUALITY AND WORKMANSHIP

Submittals

T10.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

T10.202 Pre-contract Control Samples

a. Not required.

T10.203 Post-contact Control Samples

a. Provide the following control samples:

1). Minimum 300mm of each type of downpipe/ gutter in specified finish.

T10.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First complete installation, in location to be agreed.

Fixing

T10.205 Installation Generally

a. Install pipework to ensure the complete discharge of rainwater from the building without leaking.

b. Obtain all components for each type of pipework from the same manufacturer, unless specified otherwise.

c. Avoid contact between dissimilar metals and other materials, which would result in electrolytic corrosion.

d. All fixings/ fastenings to be plated, sherardised, galvanised or stainless steel, suitable for the purpose and background, and compatible with the material being fixed.

e. The number of fixings and type to be able to support the rainwater disposal system operating at full capacity without any movement or leakage.

f. When rainwater downpipes discharge onto soft landscape provide rainwater shoes to open bottoms.

T10.206 Rainwater Outlets

a. Outlets to be securely fixed before connecting pipework.

b. Junctions between outlets and pipework to accommodate all movement in the structure and pipework.

T10.207 Fixing Pipework

- a. Fix securely at specified centres, plumb and/ or true to line.
- b. Fix branches and low gradient sections with uniform and adequate falls to drain efficiently.
- c. Fix externally socketed pipes/ fittings with sockets facing upstream.
- d. Isolate from structure where pipes pass through walls or floors with sleeves.
- e. Fix in accordance with the manufacturer's instructions.

T10.208 Jointing Pipework

- a. Joint using materials, fittings and techniques that will make effective and durable connections.
- b. Joint differing pipework systems with adaptors recommended by the manufacturer(s).
- c. Cut ends of pipes to be clean and square with burrs and swarf removed. Chamfer pipe ends before inserting into ring seal sockets.
- d. Ensure that jointing or mating surfaces are clean, and where necessary lubricated, immediately before assembly.
- e. Form junctions using fittings intended for the purpose ensuring that jointing material does not project into bore of pipes, fittings and appliances.
- f. Remove surplus flux/ solvent/ cement/ sealant from joints.

T10.209 Electrical Continuity

- a. Ensure electrical continuity at all joints in metal pipes with flexible couplings that are to be earth bonded.

Protection

T10.210 Protection

- a. Adequately protect pipework from damage and distortion during construction.
- b. Fit purpose made temporary caps to prevent ingress of debris.

END OF SECTION

T40 FIRE HOSE REELS AND EQUIPMENT

- a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

T40.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

T40.101 Descriptive Works

- a. Complete the Detailed Design, manufacture, supply, install and warrant that the works comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.
- b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.
- c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but

shall remain fully responsible for the Detailed Design and performance of the works.

T40.102 Section Coverage:

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Fire fighting equipment.

T40.103 General

a. The supplier of the fire fighting appliances shall have membership of the Fire Protection Association of Southern Africa.

b. All fire fighting equipment shall comply with the requirements of the Local Authority Fire Officer.

c. Provide fire fighting equipment and accessories from one manufacturer, unless otherwise accepted by the Architect.

d. All fire fighting equipment shall be SANS compliant.

T40.104 FPE-111: Fire Hose Reel to Fire Engineers Detail

a. Fire hose reels as shown on the Fire Engineers documentation.

T40.105 FPE-121: Dry Powder Type Fire Extinguisher to Fire Engineers Detail

a. Dry powder type fire extinguishers as shown on the Fire Engineers documentation.

T40.106 FPE-123: Carbon Dioxide Type Fire Extinguisher to Fire Engineers Detail

a. Carbon dioxide type fire extinguishers as shown on the Fire Engineers documentation.

T40.107 FPE-125: Fire Blanket to Fire Engineers Detail

a. Fire blanket as shown on the Fire Engineers documentation.

T40.108 FPE-131: Fire Hydrant Valve to Fire Engineers Detail

- a. Fire hydrant valve as shown on the Fire Engineers documentation.

T40.200 QUALITY AND WORKMANSHIP

Samples and Quality Benchmarks

T40.201 Pre-Contract Control Samples

- a. Provide the following control samples:

- 1). One of each appliance used.

T40.202 Post-Contract Control Samples

- a. Provide the following control samples, if different from the Pre-contract control submission:

- 1). One of each appliance used.

T40.203 Benchmark Requirements

- a. Provide the following quality benchmarks:

- 1). First appliance of each type installed, in location to be agreed.

Installation

T40.204 General

- a. Install items included in this section in locations and at mounting heights indicated, or if not indicated, at heights to comply with applicable regulations of governing authorities.

- b. Use non-ferrous or stainless steel fastenings unless otherwise specified.

- c. Noggings, bearers, etc. required to support fire fighting appliances and fittings to be accurately positioned and securely fixed.

Protection

T40.205 Protection

- a. Leave protective coverings, tapes etc. on appliances during installation.
- b. Protect completed installation from use and damage.

Handover

T40.206 Handover

- a. Immediately before handover, remove protective coverings, tapes, etc. and check for damage and defects.
- b. Test for satisfactory operation and replace all damaged or defective components/ accessories.

T40.207 Cleaning

- a. Flush out the whole installation and clean all fixtures and fittings immediately before handing over.

END OF SECTION

T60 SANITARY APPLIANCES/ FITTINGS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

T60.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

T60.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

T60.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). WC suites.
- 2). Urinals.
- 3). Washbasins.
- 4). Sinks.
- 5). Showers.
- 6). Disability provisions.
- 7). Vanities.
- 8). Accessories

Materials

T60.103

Generally

a. All fixtures to be free from imperfections, true to line, angles, curves and colours, smooth, watertight and complete in every respect.

b. All fixtures to be of vitreous ware shall be fired vitreous chinaware of the best quality, non-absorbent and burned so that the whole mass is thoroughly fused and vitrified, producing a material, white in colour, which when fractured shows a homogeneous mass, close grained and free from pores.

c. One manufacturer to supply all fixtures, unless specified otherwise.

T60.104

Sealant Pointing

a. Sealant to be silicone based to SANS 1305, Type B with fungicide.

WC Suites

T60.105

SAN-111: Vitreous China Wall Hung WC Pan

a. White vitreous wall hung WC set, and dual flush actuator with concealed cistern.

1). Supplier: CP&B, cape plumbing & bathroom supplies or similar equal approved.

2). WC Pan and seat:

a). Indicative Product – WC pan: D-Neo Wall Mount Pan Rimless and with Durafix -

Ref:2577090000 or similar equal approved.

b). Indicative Seat Product - Seat & cover: D-Neo, removable,white – Ref : 0021690000

or similar equal approved.c). Sealant: As described in section Z22.

3). Concealed cistern and actuator plate:

a). Product – Cistern: Geberit Kombifix element for wall-hung WC, 109 cm, with Sigma

concealed cistern 8 cm - Ref: 110.798.00.1. or similar equal approved.

b). Indicative Product – Actuator Plate: Geberit Sigma10 actuator plate for stop-and-go

flush: Plate and button: black, Design ring: bright chrome-plated. Ref: 115.758.KM.5 or

similar equal approved.

T60.106

SAN-112: Vitreous China Wall Hung WC Pan - Paraplegic

a. White vitreous wall hung WC and seat, and dual flush remote actuator with concealed

cistern.

1). Supplier: CP&B, cape plumbing & bathroom supplies or similar equal approved.

2). WC Pan and seat:

a). Indicative Product - Seat & cover: Geberit Selnova Comfort WC seat, barrier-free,

antibacterial, fastening from above: Soft-closing mechanism=no, Quick-release

hinges=no, Fastening=from above, white. Ref: 501.559.01.1 or similar equal approved.

b). Indicative Product – WC pan: Geberit Selnova Comfort wall-hung WC, Premium,

washdown, large projection, semi-shrouded, barrierfree, Rimfree: T=70cm, white. Ref:

501.559.01.1 or similar equal approved.

c). Sealant: As described in section Z22.

3). Concealed cistern with remote actuator and cover plate:

a). Indicative Product - Cistern: Geberit Kombifix element for wall-hung WC, 109 cm, with Sigma concealed cistern 8 cm - Ref: 110.798.00.1 or similar equal approved.

i. Indicative Product – Remote Actuator: Geberit Type 01 remote flush actuation, pneumatic, for dual flush, for Sigma concealed cistern 8 cm, concealed actuator, protruding: white alpine. Ref: 116.045.11.1 or similar equal approved.

ii. Indicative Product – Cover Plate: Geberit Sigma cover plate: white, Material designation-Plastic. Ref: 115.768.11.1 or similar equal approved.

Urinals

T60.107

SAN-211: Vitreous China Wall Hung Urinal

a. White vitreous china, wall-mounted urinal and trap with electronic flushing.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531 0914.

2). Urinal:

a). Indicative Product: Urinal ME by Starck rimless white concealed inlet.

3). Trap:

a). Indicative Product – Urinal trap: Outlet siphon with syphonic action horizontal outlet, 0,5 l flush Ref: 0051130000 or similar equal approved.

b). Indicative product – Water inlet: Water inlet mechanism 1/2" for urinals with back supply; Ref: 6958000000 or similar equal approved.

4). Electronic flush control and cover plate:

a). Indicative Product – Flush Control: Geberit installation set with nipple made of brass, for urinal flush control, universal; Ref: 116.004.00.1 or similar equal approved.

b). Indicative Product – Urinal flush cover plate - Geberit urinal flush control with electronic flush actuation, mains operation, Type 30 cover plate: black. Ref: 116.027.KM.1 or similar equal approved.

T60.108 SAN-212: Urinal Division

a. Wall-mounted urinal division.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies or similar equal approved.

2). Indicative Product: Geberit urinal division: white; Ref: 110000000. or similar equal approved.

Basins and Washbowls

T60.109 SAN-311: Surface Mounted Wash Basin

a. White vitreous china, surface mounted wash hand basin with tap hole with waste, trap and mixer tap.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies or similar equal approved.

2). Basin:

a). Indicative Product - Basin: Sotran 530mmx450mm stone lay-on washbasin, organic shape, with tap hole bench; Ref: to be confirmed

3). Waste and Trap:

a). Indicative Product – Waste clicker: 32 mm Pop Up Basin Waste-Unslotted; Ref:P8640 or similar equal approved.

b). Indicative Product – Trap : Gio 32x32mm round heavy duty bottle trap (includes rubber bung); Ref: A186 or similar equal approved.

4). Tap:

a). Indicative Product – Tap : Hans Grohe Vernis Blend 2-h.conc.basin mix.fs; Ref: 71576000 13622180 or similar equal approved.

b). Indicative product: HG 2-hole basin mix.basic set conc.DN15. Ref: 13622180 13622180 or similar equal approved.

5). Floor Drain:

a). Herbish HB125v floor drain with adj flange (vertical outlet). Ref: HB125V-50 or similar equal approved.

T60.110

SAN-312: Wall Hung Wash Basin – Generator building Cubicles

a. White vitreous china, wall hung wash hand basin with waste, trap and mixer tap.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531 0914.

2). Basin:

a). Indicative Product - Basin: Handrinse basin 36 cm D-Code white with of, with tp, th right punched; Ref: 07053600082 or similar equal approved.

i. Indicative Product – Fixing Bolts: Fixation Bolts M10 (Set); Ref: FB001. or similar equal approved.

3). Waste and Trap:

a). Indicative Product: Gio fixation bolts set for basin and other; Ref: 1845

b). Indicative Product - Trap: Gio 32x32mm round heavy duty bottle trap (includes rubber bung); Ref: A186 or similar equal approved.

4). Tap:

a). Indicative Product: Geberit self-closing tap type 26: bright chrome-plated; Ref:

115.721.21.1 or similar equal approved.

b). Indicative product: HG 2-hole basin mix.basic set conc.DN15. Ref: 13622180

13622180 or similar equal approved.

5). Floor Drain:

a). Herbish HB125v floor drain with adj flange (vertical outlet). Ref: HB125V-50 or similar equal approved.

T60.111

SAN-313: Wall Hung Barrier Free Wash Basin - Paraplegic

a. White vitreous china, wall hung barrier free wash hand basin with waste, trap and mixer tap.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531 0914.

2). Basin:

a). Indicative Product - Sink: Washbasin 60 cm D-Code Med white w/o of, with tp, w/o th; Ref: 23116000702 or similar equal approved.

b). Indicative Product - Fixing Bolts: Gio fixation bolts set for basin and other; Ref: 1845 or similar equal approved.

3). Waste and Trap:

a). Indicative Product – Waste Clicker: 32 mm Pop Up Basin Waste-Unslotted. Ref: P8640 or similar equal approved.

b). Indicative Product: Gio 32x32mm round heavy duty bottle trap (includes rubber bung); Ref: A186 or similar equal approved.

4). Tap:

a). Indicative Product: Geberit washbasin tap Brenta, deck-mounted, mains operation,

with exposed function box, bright chrome-plated; Ref: 116.171.21.1 or similar equal approved.

b). Indicative product: HG 2-hole basin mix.basic set conc.DN15. Ref: 13622180
13622180 or similar equal approved.

5). Floor Drain:

a). Herbish HB125v floor drain with adj flange (vertical outlet). Ref: HB125V-50 or similar equal approved.

Sinks

T60.112

SAN-314: Stainless Steel Slop Hopper Sink

a. Stainless steel slophopper sink and elbow action mixer.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531
0914.

2). Sink

a). Indicative Product: CH Slop Hopper-Spun Flush Cone; Ref: 2630035-004 or similar equal approved.

3). Mixer:

a). Indicative Product: Elbow Action Sink Mixer W/T std offset; Ref: MD00022 or similar equal approved.

T60.113

SAN-315: Stainless Steel Single Bowl Sink - Kitchens

a. Stainless steel single bowl sink with trap and swivel spout with angle valve.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531
0914.

2). Sink and trap:

a). Indicative Product - Sink: Cascade CDX611 single bowl. Includes 1 x 90mm basket strainer waste fitting, 925 x 500 x 169mm satin stainless steel.; Ref: 1990032 or similar equal approved.

i. Indicative Product: TrapMate - 40mm P-trap with basin and sink fittings; Ref: 111214 or similar equal approved.

3). Swivel spout and angle valve:

a). Indicative Product – Kitchen Mixer: hansgrohe HG Decor KM 260 7 l 1j chr. RSA; Ref: 31820223 or similar equal approved.

i. Indicative Product - Valve: Benkiser 1/2" x 1/2" angle valve BK; Ref: 5188DR or similar equal approved.

Showers

T60.114 SAN-411: Shower Head, Arm, Mixer and Drain

a. Shower with head, arm, mixer and set, with drain.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531 0914.

2). Head and Arm:

a). Indicative Product – Shower head: HG Shower Head D250 - Black Matt; Ref: UV0660018046 or similar equal approved.

b). Indicative Product – Arm: HG Shower Arm 410- black matt; Ref: UV0670028046 or similar equal approved.

c). Indicative product: HG basic set iBox universal 2 concealed; Ref: 01500180 or similar equal approved.

3). Mixer and Installation Set:

a). Indicative Product - Mixer: HG Vernis Blend shower m.conc.fs MB Exp. Ref: 71649670
or similar equal approved.

b). Indicative Product: Hansgrohe Talis shower basic set DN15; Ref: 13620180 or similar
equal approved.

4). Drain:

a). Indicative Product - Drain: Sarah-Lee Horizontal(Blue) - Complete with Black Grid.
Ref: HTSL-50/75HB or similar equal approved.

b). Indicative Product – Shower Tray: to later specify

Disability Provisions

T60.115 SAN-511: Grab Rail

a. Wall-mounted grab rail.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531
0914.

2). Indicative Product: Grab Rail - CNTX PAR Paraplegic Grab Rail. Ref: 2510012 or
similar equal approved.

T60.116 SAN-512: Grab Rail – Straight Grab Rail

a. Wall-mounted grab rail.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531
0914.

2). Indicative Product: Grab Rail - CNTX600 Straight Grab Rail. Ref: 2510005 or similar
equal approved.

T60.117 SAN-611: Vanity Slab

a. Womag vanity slab on mild steel framework.

1). Vanity slab:

a). Material: Womag *Concreto Cloud Phoenix* engineered stone top with bevelled edges.

b). Finish: To be agreed.

c). Profile and configuration: As shown on the Contract Drawings.

d). Size: 600mm deep, length as shown on the Contract Drawings.

e). Thickness: 20mm.

f). Cut outs: As shown on the Contract Drawings.

2). Fascia:

a). Material: Solid timber.

b). Species: Ashwood.

c). Finish and sealant: To be agreed.

d). Size and configuration: As shown on the Contract Drawings.

e). Thickness: As shown on the Contract Drawings.

3). Framework:

a). Size and configuration: As shown on the Contract Drawings.

b). 50 x 50 x 6mm welded mild steel framework.

c). All welds to be ground smooth.

d). Fixing: Bolted to walls to Structural Engineer's Documentation.

e). Finish: Primed to receive site decoration as shown on the Contract

Drawings.

Accessories

T60.118 SAN-710: Sanitary Bins

a. Stainless Steel Waste bin wall mounted

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531 0914.

2). Indicative Product: Rodan RODX605 Waste bin wall mounted, 355 x 168 x 460mm satin stainless steel or similar equal approved.

T60.119 SAN-711: Toilet Roll Holder

a. Stainless Steel lockable toilet roll holder wall mounted

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531 0914.

2). Indicative Product: RODX672 Double Toilet Roll Holder or similar equal approved.

T60.120 SAN-712: Soap Dispenser

a. Satin Stainless Steel Wall mounted electronic soap dispenser

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531 0914.

2). Indicative Product: Rodan RODX625 satin ss soap dispenser or similar equal approved.

T60.121 SAN-713: Hand Dryer

a. Stainless Steel wall mounted electronic hot air dryer.

1). Indicative Supplier: CP&B, cape plumbing & bathroom supplies, Tel: +27 (0) 21 531 0914.

2). Indicative Product: 210x290mm V Dry Hot Air Dryer 701401 or similar equal approved.

T60.200 QUALITY AND WORKMANSHIP

Submittals

T60.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

T60.202 Pre-contract Control Samples

a. Not required.

T60.203 Post-contact Control Samples

a. Provide the following control samples:

1). One of each appliance used.

T60.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First appliance of each type installed, in location to be agreed.

Installation

T60.205 General

- a. Assemble and fix appliances and accessories so that surfaces designed to falls drain as intended.
- b. Use non-ferrous or stainless steel fastenings unless otherwise specified.
- c. Noggings, bearers, etc. required to support sanitary appliances and fittings to be accurately positioned and securely fixed.
- d. On tiled backgrounds, other than splash backs, ensure that:
 - 1). Tiling is complete before fixing appliances.
 - 2). Fixings do not over stress tiles.

T60.206

Appliances

- a. WC seats and lids to be fixed with nonferrous fixing bolts and to be stable when raised.
- b. Bed wc suite to floor with 1:4 cement sand mortar mix.
- c. Surround Squat type WC pan and trap in 100mm thick 15Mpa (class B) concrete.
- d. Fix in accordance with the manufacturers published recommendations and to the acceptance of the Architect.
- e. Cisterns:
 - 1). Cistern operating components to be as recommended by the cistern manufacturer. The ball valve to match pressure of water supply.
 - 2). Fix cistern at the height recommended by the manufacturer unless otherwise specified or shown on the Contract Drawings.
 - 3). Fix overflow pipe to falls and locate to give visible warning of discharge.
- f. Fix taps securely, making a watertight seal with the appliance.

g. Place hot tap to left and cold tap to right as viewed by the user of the appliance.

h. Bed wastes/ overflows in waterproof jointing compound and fix with a resilient washer between appliance and backnut.

Protection

T60.207

Protection

a. Leave protective coverings, tapes etc. on appliances during installation.

b. Protect completed installation from use, damage and the ingress of debris.

Handover

T60.208

Handover

a. Immediately before handover, remove protective coverings, tapes, etc. and check for damage and defects.

b. Test for satisfactory operation and replace all damaged or defective components/ accessories.

T60.209

Cleaning

a. Flush out the whole installation and clean all fixtures and fittings immediately before handing over.

END OF SECTION

W10 **MIRRORS**

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

W10.100 **PRODUCTS, SYSTEMS AND MATERIALS**

W10.101 **Prescriptive Works**

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

W10.102 **Section Coverage**

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Mirrors.

Glass Generally

W10.103 Glass Generally

- a. To be produced to SANS 50572 and SANS 1263.
- b. Provide all mirrors from a single supplier unless agreed otherwise by the Architect.
- c. Mirrors to be free from bubbles, inclusions, cracks, rippling, dimples and other defects.

Mirrors

W10.104 SAN 714: Wall Mounted Mirror

- a. 976x766mm organic shaped bathroom mirror
 - 1). Indicative Supplier: Bathroom Bizarre, Tel: +27 (0) 11 372 4000 or other.
 - 2). Indicative manufacturer: Oro Art Mirror or similar equal approved.
 - 3). Indicative product:
 - a). Frame: 1.5mm Rod iron frame. Powder coated Matt Black
 - b). Glass: 6mm clear glass.
 - c). Shape: Organic shape (or as described by manufacturer)
 - d). Supplier code: SKU: A0000977 or similar equal approved

W10.200 QUALITY AND WORKMANSHIP

Submittals

W10.201 Response

- a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

W10.202 Pre-contract Control Samples

- a. Not required.

W10.203 Post-contract Control Samples

a. Provide the following control samples:

1). Minimum 150 x 150mm of each type of mirror.

W10.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First completed installation of each type in a location to be agreed with the

Architect.

Installation

W10.205 Workmanship

a. Ensure that mirrors, surrounds, primers, etc., which are to be used together are compatible.

b. Mirrors delivered to Site to be of the required size. No cutting or nipping of glass allowed on Site.

W10.206 Fixing Mirrors

a. Allow 3mm airspace behind in area of high humidity.

b. Fix with chromium plated mirror screws.

c. Provide compressible polyethylene sleeves and washers to isolate mirror from screw fixing.

d. Support mirrors larger than 1m² with additional clips to bottom edge.

e. Avoid distorting or stressing mirrors during fixing.

Cleaning

W10.207 Cleaning

a. Clean and polish mirrors on completion.

Protection

W10.208

Protection

- a. Do not use lime or alkaline materials.
- b. Protect from harmful splashes, mechanical damage, scratching and weld spatter.

END OF SECTION

X10 PAINTING/ CLEAR FINISHING

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

X10.100 PRODUCTS, SYSTEMS AND MATERIALS

Specification and Scope

X10.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

X10.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Render to plastered walls.

2). External and internal paints.

3). Sealers and epoxies.

4). Road marking paints.

X10.103

General preambles

a). Unless otherwise specified, all paints are to be Paintsmiths, Midas and/or Earthcote brands as supplied through a Paintsmiths Store. All paints must conform to the specifications in the document.

b). All containers delivered to site must be unopened, and used as supplied unless otherwise specified.

c). All surfaces must be prepared correctly to the highest standard and manufacturer's recommendations.

d). Surfaces are to be completely dry and free of all surface contamination.

Specified primer coats are to be applied prior to filling. Fill all surface defects with suitable filling material and allow to dry. Sand flush with surrounding surface and dust off.

c). Colour samples of all finishing coats must be approved prior to ordering for the contract. Wet samples or sample boards must be retained for the duration of the contract.

e). The quality of all plasterwork, screeds and concrete must comply with the relevant SABS Code of Practice.

Spread rates for the products in the specifications are only approximate as the condition and porosity of substrates can vary substantially.

All overcoating and full drying times quoted are a guide under normal conditions

and can vary depending on the environment and prevailing weather conditions.

DO NOT use any products containing Ammonia to clean paint surfaces.

All substrates must be dry before painting, with a moisture content not exceeding

12%, as measured with an approved moisture met

1). Scope of works

Specification for the external & internal Painting of the Sassa Building,

Maijtiesfontien.

2). Workmanship

All workmanship to be executed according

to the best practices, to the entire satisfaction, of the client or authorized agent.

3). Paints and products

All paints and products etc. are to be those manufactured or supplied by Midas

Paints Tygervalley and applied in accordance with the manufacturer's instructions.

4). Indemnity

The Contractor shall indemnify the Specifier from any claim capable of being made

against him either under statute or common law in respect of damage to any person

or property arising out of the execution of the contract.

5). Limits and restrictions

The Contractor must acquaint himself with any limitations or restrictions which may

be imposed by the local or other authorities in regard to access to site of transport of

materials to and from site and allow for any additional expense involved thereby.

6). Prior inspection

All surfaces referred to in the specification are to be inspected by the Contractor to

establish before commencement of any work that they are thoroughly clean and to ensure that all substrate irregularities which would otherwise impair the quality of finish is eliminated prior to the application of finishes.

7). Colour requirements

The Contractors must establish colour requirements of the Specifier. If requested the Contractor will, at no extra cost, provide “brush outs” of sample colours on site for approval by the owner and must obtain detailed explanation and directions, on site, of a general colour scheme to be provided, before commencement of work.

8). Cleaning of site

The Contractor is at his own expense to touch up where necessary and make good any damage to the structure, fitting or decorations, resulting from his operation

External walls render plaster

X10.104

WF01: Concrete render to Plastered Walls (AMORIGUARD)

Exterior plastered walls

1). Surface preparation

a). Lightly sand down all surfaces to provide a sound smooth surfaces. Clean all dust, grease and dirt. Scrape off all loose material and cement splashes.

b). Rake out and fill all cracks, other than hairline cracks, greater than 0.5mm and fill with Amoriguard Skim/Filler, sand smooth and dust off.

c). All substrates must be dry before painting with a moisture content not exceeding 12%, as measured with an approved moisture meter.

2). Priming

Apply one coat of Amoriguard A Gain exterior filler to prepared surfaces. Ensure total coverage of the substrate. (trowel application)

3). Finishing coats

Apply 2 coats of **Amoriguard A-Gain**. Ensure total coverage of the substrate Spread Rate approximately 5-8m²/litre.

Exterior tops of exposed plastered walls

1). Surface preparation

Lightly sand down all surfaces to provide sound smooth surfaces. Clean down all dust, grease and dirt. Scrape off all loose material and cement splashes.

2). Priming

Apply one coat of Amoriguard A Gain exterior filler to prepared surfaces. Ensure total coverage of the substrate. (trowel application)

3). Intermediate coating

Apply two coats of Midas Fiberforce Always lay off coating with a good quality paint brush. Spread rate approximately 3m²/litre. Important: Allow 6 hours minimum drying time between coats.

4). Finishing coats

Apply two coats of Mattseal as supplied, of approved colour.

X10.105 WF02: External and internal paints

General preambles

Unless otherwise specified, all paints are to be Midas Earthcote brands as supplied through a Midas Earthcote Store. All paints must conform to the specifications in the document.

All containers delivered to site must be unopened and used as supplied unless otherwise specified.

- All surfaces must be prepared correctly to the highest standard and manufacturer's recommendations.

Surfaces are to be completely dry and free of all surface contamination. Specified primer coats are to be applied prior to filling. Fill all surface defects with suitable filling material and allow them to dry. Sand flush with surrounding surface and dust off.

Where specified, seal the junctions of plaster, brickwork or sills to the window frames and door frames, other protrusions and junctions of plaster mouldings to main structures with Midas SINGLE PACK POLYURETHANE SEALANT before painting. (Allow 72 hours curing time before overcoating).

Where specified, seal the junctions of skirting boards, cornices, sills to the window frames and door frames and all other junctions to walls with an acrylic sealant before painting. (Allow to dry through before overcoating).

All subsequent coatings are to be dry in depth before overcoating. All masking and drop-sheeting for protecting adjacent surfaces should be supplied by the painting contractor.

Primers and undercoats must be tinted, where specified, to match the finishing coats as closely as possible, but with a sufficient difference in colour to be able to distinguish between the coats. Grey undercoats should be applied under dark topcoats.

Colour samples of all finishing coats must be approved prior to ordering for the contract.

Wet samples or sample boards must be retained for the duration of the contract.

Once dry, lightly sand each coat of enamel paint and varnish before applying the next coat.

Remove all ironmongery, light fittings, cover plates and other removable fittings before commencing painting. Re-fix after completion. Protect all other surfaces not being painted. Do not paint when conditions are unsuitable, e.g. in dusty conditions, sand storms, under insufficient light or in direct sunlight, during inclement weather, or on wet or damp surfaces.

Spread rates for the products in the specifications are only approximations as the condition and porosity of substrates can vary substantially.

Important: The quality of all plasterwork, screeds and concrete must comply with the relevant SABS Code of Practice.

X10.106 Interior plastered walls

1). Surface preparation

Lightly sand down all surfaces to provide sound smooth surfaces. Clean down all surface dust, grease and dirt. Scrape off all loose material and cement splashes.

Rake out all cracks, other than hairline cracks, greater than 0.5mm, blow holes or other minor defects and fill with Midas SKIM-FILL INTERIOR. Repair damaged plasterwork using Midas PLASTER REPAIR as recommended.

Important: All substrates must be dry before painting, with a moisture content not exceeding 12%, as measured with an approved moisture meter.

2). Priming

Apply one coat of Midas MIDAMAX 190 to prepared surfaces, tinted to suit final colour.

Ensure total coverage of the substrate. Spread rate approximately 6m²/litre.

Important: Allow 4 hours minimum drying time before overcoating with finishing coats.

Alternatively: For a smooth finish to floated plastered surfaces, apply a scraper coat of Midas SKIM-FILL INTERIOR. *The application of the SKIM-FILL will also eliminate any need for filling and there will be no need to apply a primer coat to the surfaces.*

Apply one scraper coat of Midas SKIM-FILL INTERIOR. Lightly sand surfaces before applying the finishing coats. Spread rate approximately 2 - 3m²/kg depending on the roughness/texture of the surface.

Important: Allow 4 - 8 hours minimum drying time between the application of the finishing coats.

3). Intermediate coat

Apply one coat of Midas ALKALI RESISTANT PRIMER or Midas MASONRY PRIMER to prepared surfaces. Ensure total coverage of the substrate. Spread rate approximately 8m²/litre.

4). Finishing coats

Apply two coats of Midas MIDALUX 230 or MIDALUX 240 as supplied, of approved colour. Spread rate approximately 8m²/litre/coat.

Important: Allow 4 hours minimum drying time between coats.

X10.107 Interior concrete surfaces

1). Surface preparation

Lightly sand down all surfaces to provide sound smooth surfaces. Clean off all dust, grease and dirt. Scrape off all loose material and cement splashes.

Rake out and fill all cracks, other than hairline cracks, greater than 0.5mm and fill with Midas SKIM-FILL INTERIOR. Repair damaged concrete and any holes in the concrete using Midas PLASTER REPAIR.

IMPORTANT: All substrates must be dry before painting, with a moisture content not exceeding 12%, as measured with an approved moisture meter.

2). Priming

Apply one coat of Midas ALKALI RESISTANT PRIMER to prepared surfaces. Ensure total coverage of the substrate. Spread rate approximately 8m²/litre.

Important: Allow 12 hours minimum drying time before overcoating with finishing coats.

X10.108 Interior fairfaced brickwork

1). Surface preparation

Lightly sand down all surfaces to provide sound smooth surfaces. Clean off all dust, grease and dirt. Scrape off all loose material and cement splashes.

Rake out and fill all cracks, other than hairline cracks, greater than 0.5mm and fill with Midas SKIM-FILL INTERIOR. Repair damaged brickwork and any holes in the brickwork using Midas PLASTER REPAIR.

Important: All substrates must be dry before painting, with a moisture content not exceeding 12%, as measured with an approved moisture meter.

2). Priming

Apply one coat of Midas PLASTER PRIMER to prepared surfaces. Ensure total coverage of the substrate. Spread rate approximately 8m²/litre.

Important: Allow 12 hours minimum drying time before overcoating with finishing coats.

3). Finishing coats

Apply two coats of Midas MIDALUX 240 as supplied, of approved colour. Spread rate approximately 8m²/litre/coat.

Important: Allow 4 hours minimum drying time between coats

X10.109 Interior (cretestone) concrete or plasterboard ceilings

1). Surface preparation

Lightly sand down all surfaces to provide sound smooth surfaces. Clean down all dust, grease and dirt. Scrape off all loose material and skim/cement splashes or runs. Wipe down with a damp cloth to remove all surface powder and dust. After priming, as specified, fill all surface defects with Midas SKIM-FILL INTERIOR sand flush with surrounding substrate and dust off.

Important: All substrates must be dry before painting, with a moisture content not exceeding 12%, as measured with an approved moisture meter.

2). Priming

Apply one coat of Midas PLASTER PRIMER or Midas MASONRY PRIMER to prepared surfaces. Spread rate approximately 6m²/litre

Important: Allow 12 hours minimum drying time before overcoating with finishing coats.

3). Finishing coats

Apply two coats of Midas MIDAMA 190 or MIDAMAX 200 as supplied, of approved colour. Spread rate approximately 7m²/litre/coat.

Important: Allow 4 hours minimum drying time between coats.

X10.110 Interior galvanised metal

1). Surface preparation:

Prepare surfaces by thoroughly sanding down to remove all white or surface rust, where necessary.

2). Cleaning

Wash off all oil and grease using Midas GALVANISED IRON PRE-CLEANER and scrubbing pad to achieve a water break-free surface. Wash down entire surface with clean water to remove degreaser and all dust and surface dirt and wipe clean.

3). Priming

Apply one coat of Midas METALPRIME GREY to prepared surfaces. Ensure total coverage of substrate. Spread rate approximately 8m²/litre.

Important: Allow a minimum of 6 hours drying before overcoating with undercoat.

4). Undercoating

Apply one coat of Midas UNIVERSAL UNDERCOAT. Ensure total coverage of primer.

Spread rate approximately 8m²/litre.

Important: Allow 16 hours minimum drying time before overcoating with finishing coats.

5). Finishing coats

Apply two coats of Midas MIDACOAT SATIN as supplied, of approved colour. Allow to

dry, sand lightly between coats and wipe clean. Spread rate approximately

8m²/litre/coat.

Important: Allow 16 hours minimum drying time between coats

X10.111 Exterior plastered walls

1). Surface preparation

Lightly sand down all surfaces to provide sound smooth surfaces. Clean down all dust, grease and dirt. Scrape off all loose material and cement splashes.

Rake out and fill all cracks, other than hairline cracks, greater than 0.5mm and fill with Midas SKIM-FILL EXTERIOR. Repair damaged plasterwork using Midas PLASTER REPAIR, as recommended.

Important: All substrates must be dry before painting, with a moisture content not exceeding 12%, as measured with an approved moisture meter.

2). Priming

Apply one coat of Midas PLASTER PRIMER to prepared surfaces. Ensure total coverage of the substrate. Spread rate approximately 8m²/litre.

Important: Allow 12 hours minimum drying time before overcoating with finishing coats.

3). Finishing coats

Apply two coats of Midas MIDALUX 230 or MIDALUX 240 as supplied, of approved colour.

Spread rate approximately 8m²/litre/coat.

Important: Allow 4 hours minimum drying time between coats.

X10.112 Exterior concrete soffits

1). Surface preparation

Lightly sand down all surfaces to provide sound smooth surfaces. Clean down all dust, grease and dirt. Scrape off all loose material and cement splashes.

Rake out and fill all cracks, other than hairline cracks, greater than 0.5mm and fill with Midas SKIM-FILL EXTERIOR. Repair damaged concrete using Midas PLASTER REPAIR, as recommended.

Important: All substrates must be dry before painting, with a moisture content not exceeding 12%, as measured with an approved moisture meter.

2). Priming

Apply one coat of Midas MASONRY PRIMER to prepared surfaces. Ensure total coverage of the substrate. Spread rate approximately 8m²/litre.

Important: Allow 12 hours minimum drying time before overcoating with finishing coats.

3). Finishing coats

Apply two coats of Midas MIDAFELT 220 as supplied, of approved colour. Spread rate approximately 8m²/litre/coat.

Important: Allow 4 hours minimum drying time between coats.

X10.113 Exterior tops of exposed plastered walls

1). Surface preparation

Lightly sand down all surfaces to provide sound smooth surfaces. Clean down all dust, grease and dirt. Scrape off all loose material and cement splashes.

Rake out and fill all cracks, other than hairline cracks, greater than 0.5mm and fill with Midas SKIM-FILL EXTERIOR. Repair damaged plasterwork using Midas PLASTER REPAIR, as recommended.

Important: All substrates must be dry before painting, with a moisture content not exceeding 12%, as measured with an approved moisture meter.

PRIMING Apply one coat of Midas MASONRY PRIMER to prepared surfaces. Ensure total coverage of the substrate. Spread rate approximately 8m²/litre.

Important: Allow 12 hours minimum drying time before overcoating with finishing coats.

2). Intermediate coating

Apply one coat of Midas FIBREFORCE. Always lay off coating with a good quality paint brush. Spread rate approximately 3m²/litre

3). Finishing coats

Apply two coats of Midas MIDALUX 230 as supplied, of approved colour. Spread rate approximately 8m²/litre/coat.

Important: Allow 4 hours minimum drying time between coats.

X10.114 Exterior timber to be painted

1). Surface preparation

Treat all knots and other resinous areas with knotting compound. Prime all nail and screw

heads with Midas WOODPRIME RED and stop with wood stopping. If necessary, flush fill all suitably primed grain with Midas WOOD GRAIN FILLER.

Thoroughly sand woodwork to an overall smooth finish, sanding in the direction of the grain and rounding off all sharp edges, and dust off.

All exterior wooden frames to be primed all round, as specified, prior to fixing.

All window rebates and glazing beads to be primed and undercoated prior to glazing.

2). Priming

Apply one coat of Midas WOODPRIME (White) to prepared surfaces. Ensure total coverage of the substrate. Spread rate approximately 8m²/litre.

3). Undercoating

Apply one coat of Midas UNIVERSAL UNDERCOAT. Ensure total coverage of primer. Spread rate approximately 8m²/litre.

Important: Allow 16 hours minimum drying time before overcoating with finishing coats.

4). Finishing coats

Apply two coats of Midas MIDAFLOW GLOSS as supplied, to approved colour. Allow to dry, sand lightly between coats and wipe clean. Spread rate approximately 8m²/litre/coat.

Important: Allow 16 hours minimum drying time between coats.

X10.115 Exterior galvanised metal

1). Surface preparation

Prepare surfaces by thoroughly sanding to remove all white or surface rust, where necessary.

2). Cleaning

Wash off all oil and grease using Midas GALVANISED IRON PRE-CLEANER and scrubbing pad to achieve a water break-free surface. Wash down entire surface with clean water to remove degreaser and all dust and surface dirt and wipe clean.

3). Priming

Apply one coat of Midas METALPRIME GREY to prepared surfaces. Ensure total coverage of substrate. Spread rate approximately 8m²/litre.

Important: Allow a minimum of 6 hours drying before overcoating with undercoat.

4). Undercoating

Apply one coat of Midas UNIVERSAL UNDERCOAT. Ensure total coverage of primer.

Spread rate approximately 8m²/litre.

Important: Allow 16 hours minimum drying time before overcoating with finishing coats.

5). Finishing coats

Apply two coats of Midas MIDAFLOW GLOSS as supplied, of approved colour. Allow to

dry, sand lightly between coats and wipe clean. Spread rate approximately

8m²/litre/coat.

Important: Allow 16 hours minimum drying time between coats.

Sealers and Epoxies

X10.114

SLR-01: Exterior timber Sealer

1). Surface preparation

- a) Ensure that all 6 sides are coated
- b) Ensure that surfaces are clean, dry and sound.
- c) Moisture content measured with a Doser Hygrometer B 2 scale A1-A5 (or equivalent), depending on the wood type, must be <14 % before
- d) painting.

- e) Sand wood to a smooth finish with 150-220 grit paper in the direction of the grain depending on the smoothness required. Sharp edges
- f) must be rounded off. Dust off. Ensure that sharp edges are well rounded.
- g) Wash knots and resinous areas with Plascon Lacquer Thinner (ILS 1).
- h) Apply Plascon Woodcare Knot Seal (PK 2) to all knots and resinous areas. Allow 1 hour to dry.
- i) Stopping: Fill holes and other surface imperfections with Plascon Woodstopping (BS) to match the colour of the wood. Allow 1 hour to
- j) dry and sand smooth in the direction of the wood grain. Dust off. Product: Woodcare Wood Preservative or equally approved
- k) Application: brush/roller
- l) Reducer mineral turpentine

2). Priming

Apply one coat to prepared surfaces. Ensure total coverage of the substrate. Spread rate approximately theo:17.20m²/litre, prac:8.30m²/litre.

4). Finishing coats

Apply two coats of as specified, to approved colour. Allow to dry, sand lightly between coats and wipe clean. Spread rate approximately theo:17.20m²/litre, prac:8.30m²/litre /coat.

Important: Allow 24 hours minimum drying time between coats.

X10.114 PNT-411: Sealer to Internal and External Pre-cast Concrete Surfaces (Glazecoat)

a. Before painting commences, all problems shall be repaired in accordance with the paint manufacturer's recommendations.

1). Ensure that surfaces are sound and free from dust, dirt, grease and oil. Surfaces must be thoroughly dry - no more than 12% moisture content.

2). Do not apply if, through age, the surface is powdery or friable.

3). New Surfaces:

a). New brick and stonework must be allowed to weather (dry out) for 1-2 months.

b). Any loose residue such as builder's plaster must be removed with a diluted water/hydrochloric acid dilution (20:1).

c). Hose down the surface thoroughly and allow drying for 24 - 48 hours.

4). Aged Surfaces:

a). Any dirt and debris, such as loose plaster, efflorescence, grease and oil must be removed by washing the surface with a strong solution of Dulux Pre-Paint Sugar Soap. Rinse surface thoroughly and allow for 24 - 48 hours drying.

b). Replace/repair pointing where necessary.

c). Mould instructions. To kill lichen and algae growth, scrub with one of the following solutions: either 4:1 water/HTH (chlorine), or 4:1 water/JIK (sodium hypochlorite). Ensure that the areas are completely saturated, and allow the solution to react for a minimum of four (4) hours. Rinse the complete wall surface thoroughly with clean water.

5). 1st and 2nd Coat sealer:

a). Indicative Manufacturer: ICI Dulux (Pty) Ltd, Tel: +27 (0) 11 861 1000.

b). Indicative Product: Dulux Trade Glazecoat.

c). 2No coat sealer, spreading rate 12 m²/ litre.

i. 1st coat, thinned 15% with water to aid penetration.

- ii. Apply a 2nd coat for added protection and higher film-build.
- iii. Up to 2 litres water per 5 litre of Dulux Trade Glazecoat may be added to reduce the gloss level.
- iv. Application method - Ready for use with brush or roller. A short-nap mohair roller is preferred. Heavy pile and foam rollers can create aeration problems.
- v. Not recommended for floors.
- d). Recoating time 4hrs.

X10.115 PNT-451: Epoxy Wall Coating

- a. Solvent free, high chemical resistant wall coating with surface tissue.
 - 1). Concrete substrates must be sound, clean, dry and free of all contaminants such as dirt, oil, grease, coatings and surface treatments, etc.
 - 2). New concrete should cure for 28 days in order for it to dry sufficiently to take the coating system.
 - 3). All cementitious surfaces must be acid etched or grit blasted to remove laitance in order for the epoxy systems to adhere properly. After this process the surface must be thoroughly rinsed and dried.
 - 4). The joint edges (50 to 100 mm) are to be well sanded with an 80 grit paper.
 - 5). Apply in strict accordance with the manufacturers published recommendations.
 - 6). 1st coat:
 - a). Indicative Manufacturer: abe Construction Chemicals, Tel +27 (0) 21 505 2800.
 - b). Indicative Product: abe.cote SF 217.
 - c). Apply to entire surface and while wet layup the surface tissue “fibasilgenmat”.

d). Surface tissue supplier: Vivian Regina, Tel +27 (0) 11 813 4147.

7). 2nd and 3rd topcoats:

a). Indicative Manufacturer: abe Construction Chemicals, Tel +27 (0) 21 505 2800.

b). Indicative Product: abe.cote SF 217.

c). Resin uptake on the “fibasil-genmat” is approximately 250 mls/m².

Road Marking Paint

X10.116

PNT-711: Solvent Based External Road Marking Paint

a. Before painting commences, all problems shall be repaired in accordance with the paint manufacturer’s recommendations.

1). Bituminous road surface and cement floor surfaces should be clean, dry and free from loose gravel, sand, oil, grease and other contaminants.

2). Smooth surfaces can be profiled by sand blasting to achieve a paintable surface. Sand of an appropriate quality should be used - river sand is not suitable.

3). Alternatively cement floors may be acid etched with a solution of hydrochloric acid to remove laitance, uncured cement, etc as follows:

a). On steel or power floated concrete (very smooth), use one volume of hydrochloric acid to two volumes of water.

b). More than one application may be necessary to achieve a paintable surface.

4). On wood floated concrete (rough), use one volume hydrochloric acid to four volumes of water. Allow the acid solution to react for 15 minutes and then wash away all acid with copious amounts of water. Remove excess water and allow

to thoroughly dry. Moisture content to be not greater than 12%.

5). Do not apply during cold (below 10°C) or wet weather.

6). 1No coat road marking paint:

a). Indicative Manufacturer: ICI Dulux (Pty) Ltd, Tel: +27 (0) 11 861 1000.

b). Indicative Product: Dulux Albertono Solvent Based Road Marking Paint.

c). Minimum wet film thickness 380µm, as recommended by manufacturer.

Materials

b. All surfaces to be coated must be thoroughly cleaned and irregularities in the substrate made good.

X10.117 Source of Materials

a. Coating materials to be obtained from one source.

b. All materials used to be as recommended for the intended application.

X10.200 QUALITY AND WORKMANSHIP

Submittals

X10.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

X10.202 Pre-contract Control Samples

a. Not required.

X10.203 Control Samples

a. Provide the following control samples:

1). 300 x 300mm sample to specified substrate.

X10.204 Benchmark Requirements

a. Provide the following quality benchmarks:

- 1). First 10m² of each type, in location to be agreed

Repair work to Walls

X10.205 Repairs to Cracks

a. Cracks 0.2mm to 2mm:

- 1). Rake out with a scraped blade.
- 2). Remove dust and debris.
- 3). Fill with pure acrylic, paintable, flexible crack filler.

b. Cracks over 2mm:

- 1). Open out with a carborundum disc into a V shape minimum 3mm wide.
- 2). Remove dust and debris.
- 3). Wet the crack and fill with damp 1:4 cement/ sand mortar properly compacted into the cracks.

X10.206 Repairs to Mortar Joints

- a. Scrape out unsound mortar.
- b. Point solidly with 1:3 cement: sand mortar properly compacted into the joints.

Preparation

X10.207 Preparation Generally

- a. Materials used in preparation to be types recommended by their manufacturers and the coating manufacturer for the situation and surfaces being prepared.
- b. Apply in strict accordance with the manufacturer's specification.
- c. Apply oil based stoppers/ fillers after priming. Apply water based stoppers/ fillers

before priming unless recommended otherwise by manufacturer. Patch prime water based stoppers/ fillers when applied after priming.

d. Ensure that doors and opening windows, etc., are "eased" as necessary before coating. Prime any resulting bare areas.

e. Plastered surfaces and fibre cement boards to be washed down and allowed to dry completely.

f. Unfinished concrete surfaces clean with 1:4 solution of spirit of salts: water.

g. All floors where painting is to be carried out to be swept clean, walls dusted down and unpainted surfaces protected.

X10.208 Efflorescence

a. Remove surface salts and other loose material with a stiff brush or coarse dry cloth.

b. Leave for 48 hours and repeat process if further efflorescence occurs.

c. Sand glossy surfaces to provide a key for finish.

X10.209 Ironmongery

a. Remove from surfaces to be coated and refix on completion. Do not remove hinges unless instructed to do so.

X10.210 Previously Uncoated Timber

a. Ensure that large and loose knots are removed and made good with sound timber of the same species. Sand down flush.

b. Ensure that surfaces are clean and remove all oil, grease and excessive natural oils with suitable solvents.

c. Sand to a smooth, even finish with arrises rounded or eased.

d. Remove resinous bleeding by heat, apply two coats of knotting to resinous areas

and all knots and allow to dry.

e. Ensure that head of fasteners are countersunk sufficiently to hold stopping/ filling.

Fill nail and screw holes, joints, cracks, holes, depressions, open or coarse grain with matching coloured stopper/ filler worked well in and finished off flush with surface.

Sand smooth and remove dust.

f. Sand down to remove all plaster stains pencil marks and other blemishes from timber that is to be oiled or stained.

X10.211 Uncoated Masonry/ Render

a. Remove dirt, surface deposits, loose and flaking material with a stiff brush.

b. Fill holes and cracks flush with surface, rub down.

X10.212 Unpainted Plaster

a. Remove dirt and surface deposits with a stiff brush.

b. Rub down to remove nibs, trowel marks and plaster splashes.

c. Lightly rub over trowelled glossy plaster with worn abrasive paper.

d. Fill depressions, holes and cracks and lightly rub down flush with surface.

X10.213 Unpainted Plasterboard

a. Fill imperfections and/ or minor damage to leave a smooth, blemish free surface.

b. Prime 'H' strips and screw heads with oil based primer.

X10.214 Unpainted Fibre Cement Boards

a. Wash with clean water and allow to dry thoroughly.

b. Prime 'H' strips and screw heads with oil based primer.

X10.215 Steel Generally

a. Wash with white spirit/ degreaser to remove dirt and grease.

b. Surface preparation: Clean, disc sand and wire brush to remove rust and scale to ST2 of ISO 8501: Part 1.

c. Prime surfaces as soon as possible after blast cleaning, and in any case within four hours.

X10.216 Structural Steel

a. Wash with white spirit/ degreaser to remove dirt and grease remove oil and grease by solvent wiping.

b. Abrasive blast to a near white finish in accordance with Sa 2½ of ISO 8501: Part 1 to obtain a surface profile of 45 - 65 microns.

c. Prime surfaces as soon as possible after blast cleaning, and in any case within four hours.

X10.217 Pre-primed Steel

a. Wash with white spirit/ degreaser to remove dirt and grease.

b. Remove any defective primer rust and loose scale back to bare metal and patch prime to match existing.

X10.218 Galvanised Surfaces

a. Wash with white spirit/ degreaser to remove dirt and grease.

b. Rinse with clean water and repeat until a water break free surface is obtained.

c. If metal coating is defective obtain instructions before proceeding.

Coating

X10.219 Painting Generally

a. Operatives must be appropriately skilled and experienced in the use of specified materials and methods of application.

b. Do not use materials that show any bittiness when applied. Do not thin or intermix unless specified or recommended otherwise. If materials are found to have been thinned without authorization, the Architect may require the application of additional coats.

c. Apply priming as soon as possible on the same day as preparation is completed. Ensure that coats are of adequate thickness and suit surface porosity.

d. Adjacent coats of the same material must be of a different tint to ensure that each coat provides complete coverage.

e. Apply coatings to clean, dust free, suitably dry surfaces in dry atmospheric conditions and after any previous coats have hardened. Lightly abrade between coats as necessary.

f. Apply coatings evenly to give a smooth finish of uniform colour, free from brush marks, nibs, sags, runs and other defects. Cut in neatly and cleanly. Do not splash or mark adjacent surfaces.

g. Keep all surfaces clean and free from dust during coating and drying. Adequately protect completed work from damage.

X10.220 Concealed Joinery Surfaces

a. Inaccessible parts of joinery constructions are to be primed and/ or coated before assembly.

b. Where one or more additional coats are specified to be applied, they must be applied to all surfaces, including those that will be concealed when incorporated into the building.

X10.221 External Joinery

- a. Coat both sides and all edges of exterior woodwork.
- b. Varnish or paint bottom edges of doors before hanging.

Completion

X10.222

Completion

- a. Ensure that opening lights and other moving parts move freely. Remove all masking tape and temporary coverings.

Protection

X10.223

Protection

- a. Adequately protect all surfaces that are not to be coated.
- b. Protect all surfaces from dust and damp.
- c. Where doors are delivered to site in a finished condition, provide all necessary protection to the doors when applying coatings to the frames.

Storage

X10.224

Storage

- a. Deliver the materials to Site in original packing, clearly marked with batch number.
- b. Store materials in a clean, warm, dry, well-ventilated place. Keep in their original packing until conditioning commences.

END OF SECTION

Y10 CONCRETE KERBS/ CHANNELS

a. Read in conjunction with Sections A and Z, other related sections of the Specification, the Preliminaries and Contract Conditions.

Y10.100 PRODUCTS SYSTEMS AND MATERIALS

Specification and Scope

Y10.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

Y10.102 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

Y10.103 Scope

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Precast concrete kerbs.
- 2). Precast concrete channel.

Kerbs

Y10.104 EHL-311: Half-battered Precast Concrete Kerbing - Fig. 4

a. To comply with SANS 927, Figure 4.

- 1). Material: Precast concrete.
- 2). Colour: Natural.
- 3). Size: 250 x 150mm.
- 4). Joints: Class 1, narrow sand cement mortar.

Y10.105 EHL-313: Rectangular Precast Concrete Edging - Fig. 11

a. To comply with SANS 927, Figure 11.

- 1). Material: Precast concrete.
- 2). Colour: Natural.
- 3). Size: 150 x 75mm.
- 4). Joints: Class 1, narrow sand cement mortar.

Channels

Y10.106 EHL-331: Tapered Precast Concrete Channel - Fig. 14

a. To comply with SANS 927, Figure 14.

1). Material: Precast concrete.

2). Colour: Natural.

3). Size: 125 x 300mm.

4). Joints: Class 1, narrow sand cement mortar.

Y10.200 QUALITY AND WORKMANSHIP

Samples and Quality Benchmarks

Y10.201 Pre-Contract Control Samples

. Not required.

Y10.202 Post Contract Control Samples

a. Provide the following control samples, if different from the Pre-contract control submission:

1). 3 No. of each type in specified finish and colour.

Y10.203 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First completed 3m of each type in location to be agreed.

Accuracy

Y10.204 Generally

a. Comply with the requirements of SANS 10155.

b. Unless stated otherwise, accuracy to be to Degree of Accuracy II

c. Allow no sudden irregularities.

d. Kerb and cover levels to be $\pm 10\text{mm}$ from the specified levels with no adverse slope.

e. Each unit to be level with the adjacent unit $\pm 2\text{mm}$.

Mortar

f. Comply with the requirements of Section Z21.

Y10.205 Cement/Sand Mortar Mix Proportions:

a. To SANS 10164.

b. Class 1: 1:4 Cement: Sand.

Y10.206 Masonry Cement/Sand Mortar Mix Proportions

a. Class 1: 1:3 Masonry cement: Sand.

Y10.207 Mortar Bed

a. Bedding thickness minimum 10mm.

Sealant Joint

Y10.208 Sealant Filled Movement Joints

a. Joints to be at centres to extend through haunching.

b. Joint Filler: Compressible cellular rubber or plastic built in as the work proceeds.

c. Joint width: 12mm.

d. Sealant: Polysulphide sealant to comply with SANS 110.

1). Colour: To be agreed.

e. Build in barrier (joint breaker) as recommended by the sealant manufacturer.

Y10.209 Joint Filler

a. Material: Closed cell polyethylene foam,

b. Oversize: 30 percent to 50 percent larger than joint width

c. Compatible with sealant.

Workmanship

Y10.210 Laying Generally

- a. Excavate foundation trenches for kerbs and channels, compact trench bottom and fill with 100mm Class B concrete.
- b. Bed units in mortar, true to line and level along the top and front/exposed faces on accurately cast foundations with 10mm mortar filled joints
- c. Secure with a continuous haunching of concrete placed after bedding has set.
- d. Keep exposed faces of units clean and free from concrete and mortar droppings.
- e. Where necessary, cut units neatly and accurately to give neat junctions.

Y10.211 Drainage Channels

- a. Set out so as to avoid ponding or backfill.
- b. Lowest point to be 6mm above drainage outlet.
- c. Provide 12mm wide sealant filled movement joints at 20m intervals.
- d. Remove silt and other debris from the entire system immediately before Practical Completion.
- e. Safely dispose of washings and any detritus material without discharging it into sewers or watercourses.

Y10.212 Narrow Mortar Joints

- a. Butter ends of units with bedding mortar as laying proceeds to completely fill joints. Tightly butt to a thickness of 3mm and clean off surplus mortar immediately.

Y10.213 Tooled Mortar Joints

- a. Butter ends of units with bedding mortar as laying proceeds to completely fill joints to a thickness of 6mm. Tool to a neat flush profile.

Protection

Y10.214

Protection

- a. Adequately protect kerbs, edgings and drainage channels from damage.

END OF SECTION

Y25 SLAB/ BRICK/ SETT/ COBBLE BLOCK PAVINGS

a. Read in conjunction with Sections A and Z, other related sections of the Specification the Preliminaries and Contract Conditions.

Y25.100 PRODUCTS AND MATERIALS

Specification and Scope

Y25.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

Y25.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

- 1). Concrete block paving.
- 2). Clay brick pavers.

Concrete Pavers

Y25.103 EHL-241: Precast Concrete Pavers

a. Precast concrete pavers for pedestrian traffic to SANS 1058..

- 1). Indicative Manufacturer: To be agreed.

- 2). Indicative Product: To be agreed.
- 3). To SANS 541 Hydraulically pressed.
- 4). Colour: To be agreed.
- 5). Size: To be agreed.
- 6). Thickness: 60mm.
- 7). Finish: To be agreed.
- 8). Joints: To be agreed.
- 9). Bond/ Pattern: To the acceptance of the Architect.
- 10). Granular sub-base as the Structural Engineer's specification
- 11). Bedding method: Sand bedding.
- 12). Nominal thickness of bed: 50mm.
- 13). Concrete pavers to achieve the following minimum results:
 - a). Mass per paver not less than 17.0kg.
 - b). Compressive Strength not less than 25-45 Mpa.

Clay Pavers

Y25.104

EHL-243: Clay Brick Pavers

- a. Clay pavers for pedestrian traffic to SANS 1575.
 - 1). Indicative Manufacturer: To be agreed.
 - 2). Indicative Product: To be agreed.
 - 3). Size: To be agreed.
 - 4). To SANS 1575.
 - 5). Thickness: 80mm.
 - 6). Colour: To be agreed.

- 7). Bond/ Pattern: As shown on the Contract Drawings.
- 8). Features: To be agreed.
- 9). Granular sub-base as the Structural Engineer's specification.
- 10). Bedding method: As shown on the Contract Drawings.
- 11). Nominal thickness of bed: To be agreed.

Materials

Y25.105 Sand for Bedding

- a. Naturally occurring, clean, sharp sand or crushed rock graded as for laying coarse sand to requirements of SANS 1200 MJ.
- b. Clay, silt and fine dust content not more than 3% by mass.
- c. Free from deleterious salts, contaminants and cement.
- d. Obtain from only one source and ensure that all sand supplied has consistent grading.
- e. Maintain at an even moisture content of 6% \pm 2%, which shall give maximum compaction during any laying period.

Y25.106 Sand for Jointing

- a. Clean dry sand graded to requirements of SANS 1200 MJ.
 - 1). 100% passing a 1.18mm sieve.
 - 2). 50% passing a 0,075mm sieve.
- b. Sand not to stain paving blocks.

Y25.107 Concrete for Gap Filling 30MPa

- a. Ordinary prescribed mix to SANS 2001 - CC1.
- b. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – no site blending of extenders is permitted.

- c. Coarse and fine aggregate: SANS 1083.
- d. Nominal maximum size of aggregate: 9mm.

Y25.108 Mortar for Jointing and Bedding Rigid Paving

- a. Mortar: As Section Z21, mix: class 1, 1:4 Portland Masonry cement: sand.

Y25.109 Underground Service Ducts

- a. See Section Z15 for ducts and accessories.

Y25.200 QUALITY AND WORKMANSHIP

Submittals

Y25.201 Response

- a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

Y25.202 Pre-contract Control Samples

- a. Not required.

Y25.203 Post-contract Control Samples

- a. Provide the following control samples:
 - 1). 3 No. samples of each type of brick/ block.
 - 2). Jointing sand sample.

Y25.204 Benchmark Requirements

- a. Provide the following quality benchmarks:
 - 1). Following agreement of samples, an area of 25m² of each type of material, in locations to be agreed.

Y25.205 Service Penetrations

- a. Ensure that provisions are made for service penetrations through the works and that such provisions are co-ordinated with works by others.

Storage

Y25.206 Storage of Materials

- a. Materials to be open stacked to permit ventilation and to be protected from rain and rising damp.
- b. Cements to be stored off the ground, under cover and away from damp in such a manner as to enable them to be used in order of delivery.
- c. Sands to be stored separately, according to type, on clean, hard, dry standings and protected from contamination.

Accuracy

Y25.207 Accuracy

- a. Deviation of finished surface from designated levels to be +10-15mm under a 3m straightedge.
- b. Deviation in line not to exceed 15mm in 3m.
- c. Do not allow sudden irregularities.
- d. The difference in level between adjacent bricks/ pavers to be no more than 2mm.

Installation

Y25.208 Damage

- a. Do not use materials that are chipped, scratched, damaged or have any other physical imperfections in the works.

Y25.209 Laying Generally

- a. Ensure that sub-bases are suitably accurate and to specified gradients before laying

paving.

b. Make up levels with selected fill in 100mm layers compacted to agreed mod.AASHTO

density.

c. Bed paving slabs neatly and accurately to avoid rocking.

d. Cut paving slabs neatly with a masonry saw.

Y25.210

Sand Bedding

a. Lay and compact sand to give the specified final thickness using one of the following methods:

1). Either: Lay and compact using a vibrating plate and loosen the top 10mm using a rake.

2). Or, lay and compact as above, then screed out a further 10mm of loose sand.

b. Do not deliver bedding sand to the working area over uncompacted paving.

c. Do not leave areas of bedding exposed; proceed with laying paving immediately.

d. Supply paving material to laying face over newly laid paving but stack at least 1m back from laying face. Do not allow plant to traverse areas of uncompacted paving.

e. Bedding layer tolerances, after final compaction:

1). 50mm nominal thickness: +15/-20mm.

2). 30mm nominal thickness: +12/-0mm.

Y25.211

Narrow Sand Filled Joints for Sand Bedded Paving

a. Place slabs/ flags squarely with minimum disturbance to bedding, laying away from previously laid slabs/ flags.

b. Lay slabs/ flags with a joint width of 2 - 5mm. Do not use mechanical force to obtain tight joints.

c. Brush clean dry sand over the joints, then bed down the slabs/ flags using a plate vibrator.

d. Refill the joints with sand and repeat the process until the joints are completely filled.

Y25.212 Mortar Bedding and Jointing for Brick Paving

a. Set out carefully and adjust joint widths to reduce cutting to a minimum.

b. Bedding and jointing mortar: 1:4 masonry cement: sand.

c. Apply a thin slurry (1 - 3mm) of neat cement or 1:1 cement: soft sand over the freshly laid mortar bed immediately prior to laying the bricks.

d. Wet bricks as necessary, butter the joint faces and press down firmly to give a level surface with 10mm regular joints.

e. Tool joints to the specified profile and clean mortar from brick face without delay.

f. Immediately after laying, cover paving with polyethylene sheeting for not less than three days.

Protection

Y25.213 Protection from Traffic

a. Paving bedded on mortar to be kept free from pedestrian traffic for 4 days.

b. Restrict access to paved areas to prevent damage from Site traffic and plant.

END OF SECTION

Y40 FENCING/ GATES

a. Read in conjunction with Sections A and Z, other related sections of the Specification the Preliminaries and Contract Conditions.

Y40.100 PRODUCTS AND MATERIALS

Specification and Scope

Y40.101 Prescriptive Works

a. Supply, deliver, install and warrant that the works are in strict compliance with the materials and workmanship requirements of the Specification.

b. Where required to prepare drawings these shall be limited to final detailing of components, systems, etc. shown on the Contract Drawings, necessary to demonstrate their safe installation.

c. Where alternative products are offered by the Contractor and accepted by the Architect, provide full supporting documentation in respect of the complete system or installation.

Y40.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Metal fencing.

Y40.103 EFN-221: Open Mesh Panel Fencing

a. Proprietary high tensile mesh fencing system.

1). Fence:

a). Size and configuration as shown on the Contract Drawings.

b). Indicative Manufacturer: Cochrane International, Tel: +27 (0) 11 593 0400.

- c). Indicative Product: ClearVu Invisible Wall.
- d). Category III fencing system.
- e). Height: 1800mm.
- 2). Panels:
 - a). High density pressed mesh panel.
 - b). Size: 3297 x 1800mm.
 - c). Aperture size: 75.2 x 12.7mm.
 - d). Panel reinforcement: 4 x 50mm “V” formation horizontal recessed bands.
 - e). 2 x 70mm flanges to sides.
 - f). 2 x 30mm flanges to top and bottom.
- 3). Posts: 65mm tapered posts reducing to 45mm, depth 85mm.
- 4). Foundations: 600 x 400mm square, 15Mpa concrete.
- 5). Finish:
 - a). Marine fusion bond.
 - b). Colour: To be confirmed.
- 6). All fixtures and fittings, together with site installation, to be in accordance with the fence manufacturer’s recommended details and specifications.

Concrete

Y40.104

Concrete Grade 15MPa

- a. Ordinary prescribed mix to SANS 2001 - CC1.
- b. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – no site blending of extenders is permitted.
- c. Coarse and fine aggregate: SANS 1083.

d. Nominal maximum size of aggregate: 19mm.

Y40.200 QUALITY AND WORKMANSHIP

Submittals

Y40.201 Response

a. Provide submittals in accordance with the requirements of Section A of the Specification.

Samples and Quality Benchmarks

Y40.202 Pre-Contract Control Samples

a. Not required.

Y40.203 Post-Contract Control Samples

a. Provide the following control samples:

1). Minimum 3.0m of full height fencing.

Y40.204 Benchmark Requirements

a. Provide the following quality benchmarks:

1). First completed 10m run of fence including each type of gate.

Accuracy

Y40.205 Installation Tolerances

a. The work shall be fabricated and detailed in accordance with the following requirements:

1). Installation tolerances for fencing:

a). Spacing of uprights: To dimensions specified ± 15 mm relative to building grid locations.

b). Horizontal alignment: ± 15 mm relative to agreed datum.

c). Plumbness: ± 5 mm over height of uprights.

Installation

Y40.206 Setting Out

a. Set out and erect works:

1). In straight lines or smoothly flowing curves as shown on the Contract Drawings.

2). With the tops of posts following the profile of the ground.

3). With posts set rigid, plumb and to specified depth, or greater where necessary, to ensure adequate support.

4). With correct fastenings and all components fixed.

Y40.207 Setting Posts in Concrete

a. Concrete to be 15Mpa.

b. Excavate holes neatly and with vertical sides.

c. Position post/strut centrally and fill hole with concrete to 70mm below ground level.

d. Well ram concrete as filling proceeds.

e. When set cover concrete with excavated material well rammed.

Y40.208 Exposed Concrete Foundations

a. Compact until air bubbles stop appearing.

b. Trowel top smooth to a weathered profile to shed water.

Y40.209 Damage to Finished Surfaces

a. Touch up paintwork as per the finishing manufacturer's recommendations to equal the finished surface in terms of appearance and durability.

Y40.210 Damage to Galvanised Surfaces

a. Touch up minor damage with two coats of zinc rich paint.

b. Apply sufficient material to ensure a coating at least equal to the original DFT.

END OF SECTION

Y50 SITE/ STREET FURNITURE/ EQUIPMENT

a. Read in conjunction with Sections A and Z, other related sections of the Specification the Preliminaries and Contract Conditions.

Y50.100 PRODUCTS AND MATERIALS

Specification and Scope

Y50.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

Y50.102 Section Coverage

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Street furniture.

b. Ensure that all interfaces are co-ordinated before commencement.

Y50.103 SFE-711: Planters to Landscape Architects Detail

a. Planters as shown on the Landscape Architects documentation.

Y50.200 QUALITY AND WORKMANSHIP

Samples and Quality Benchmarks

Y50.201 Pre-Contract Samples

a. Not required.

Y50.202 Post Contract Control Samples

a. Provide the following post contract samples, if different from the Pre-contract control submissions:

1). Sample of each planter specified.

Y50.203 Benchmarks

a. Provide the following quality benchmarks:

1). First installed of each type, in location to be agreed.

Installation

Y50.204 Setting components in Concrete

a. Form neat foundation holes with vertical sides and cover bottom with a 50mm layer of concrete.

b. Accurately position and securely support components.

c. Unless shown otherwise, finish concrete foundations, bedding and haunching at an appropriate depth below ground level to provide adequate support and to receive overlying soft landscape or paving finishes.

d. Fill holes with concrete to not less than the specified depth, ensuring full compaction

as filling proceeds.

e. Maintain any temporary support and prevent disturbance for at least 48 hours.

f. Concrete foundations exposed to view to be compacted until air bubbles cease to appear on the upper surface, then weathered to shed water and trowelled smooth.

Y50.205 Setting in Earth

a. Form holes as small as practicable to allow refilling. Accurately position and securely support components. Refill with earth, well rammed as filling proceeds.

Y50.206 Building In

a. Accurately position and securely support components. Set in mortar and point neatly to match adjacent walling. Maintain any temporary support and prevent disturbance of components for at least 48 hours.

Y50.207 Site Painting

a. Prepare surfaces and apply finishes as soon as possible after fixing.

Y50.208 Erection Generally

a. Coat all internal and external surfaces of aluminium and steel posts below and up to 150mm above ground level, with two coats of bituminous paint, unless other applied surface finish is specified.

b. Isolate dissimilar metals to protect electrolytic corrosion.

c. Steel components must not be drilled, cut or welded after galvanising

END OF SECTION

Z10 JOINERY/ TIMBER/ TIMBER PRODUCTS

a. To be read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z10.100 MATERIALS AND FABRICATION

Timber/ Wood

Z10.101 General

- a. Graded hardwood to comply with SANS 457.
- b. Graded softwood to comply with SANS 1783.
- c. Maintain within tolerance the dimensions shown in the Contract Drawings and/ or Shop Drawings/ Working Drawings of timber sub-frames, material thicknesses, the dimensions of mullions and transoms.
- d. Materials and components to be durable and comply with the minimum standards set out in the Specification, together with the relevant standards.
- e. For each material or component obtain the total quantity from the same supplier or manufacturer.
- f. All support systems to be of adequate thickness and strength, not only to meet the structural requirements, but also to eliminate any risk of distortion in the finished surfaces.
- g. Provide protection until handover to avoid any blemishes on the finished elements.
- h. Paint or seal exposed timber and woodwork prior to applying the finished coating system where specified, all in accordance with the relevant standards. Concealed framework for units to be protected and sealed in all conditions. Treat cut edges to maintain the level of protection.
- i. All dimensions are nominal sizes unless stated otherwise.
- j. Timber to be in compliance with SANS 1783.
- k. Timber to be free from decay and active insect attack with no knots wider than half

the section width.

l. Timber to be free from knots, pitch pockets, splits and shakes on faces to be exposed in finished work.

m. Timber to be naturally seasoned for a minimum of 1 year per 25mm thickness of board or kiln dried in accordance with the 'BRE Timber Drying Manual'.

n. Flooring timber to comply with SANS 629.

o. Wrot timber to comply with SANS 1783.

p. Warping limits in timber to comply with SANS 1783.

Z10.102 Fabrication

a. Form sections out of the solid when not specified otherwise. Carefully machine timber

to accurate lengths and profiles, free from twist and bowing. After machining, surfaces to be smooth and free from tearing, woolliness, chip bruising and other machining defects.

b. Assemble with tight, close fitting joints to produce rigid components free from distortion.

c. Countersink screw heads not less than 2mm below timber surfaces that will be visible in completed work. All screws to have clearance holes. Screws of 8 gauge or more and all screws into hardwood to have pilot holes.

d. Fixings and fastenings not to protrude above the surface of boards or other finished work.

e. Before fixing, seal off end grain of external components with primer and allow to dry.

Timber Based Boards

Z10.103 Oriented Strand Board

a. Oriented Strand Board to comply with SANS 50312.

Z10.104 Chipboard

a. Chipboard to SANS 50312.

b. Moisture resistant chipboard to SANS 50312.

c. Chipboard for flooring purposes to have tongued and grooved profiles to all edges.

Z10.105 Hardboard

a. Hardboard to SANS 50312.

Z10.106 Medium Density Fibreboard

a. MDF to comply with SANS 540.

Z10.107 Plywood

a. Plywood to comply with SANS 929 and SANS 5973.

b. Plywood to be classified in accordance with the categories contained within the standards and the intended use within the works.

c. Plywood generally to be minimum class 3, as defined in SANS 929.

Z10.108 Blockboard

a. Blockboard to comply with SANS 50312.

Z10.109 Laminboard

a. Laminboard to comply with SANS 50312.

Z10.110 Plastic Laminate Faced Panels

a. Plastic laminate faced panels to be:

1). Core material:

a). MDF.

- b). Plywood.
- c). Chipboard.
- 2). High pressure laminate (HPL) grade to be as appropriate to conditions of use in SANS 4586.
- 3). Maintain moisture content at appropriate levels in relation to the core material and to suit the internal environmental conditions.
- 4). Colour of laminate face and edges to be as agreed with the Architect, based on accepted samples.
- 5). Edges to be laminated with solid grade plastic laminate to match face laminate in colour and texture. Edges, including rebated edges, to be fully lipped and bevelled on all sides to avoid black lines.

Z10.111 Wood Veneer Panels

- a. Wood veneer faces and balanced panels with lipped edges all round to include:
 - 1). Core material:
 - a). MDF.
 - b). Plywood.
 - c). Chipboard.
 - 2). Maintain moisture content at appropriate levels in relation to the core material and to suit the internal environmental conditions.
 - 3). Veneer to be as agreed with the Architect based on accepted samples.
 - 4). Edges to be solid hardwood to match face veneer in colour and texture. Edges, including rebated edges, to be fully lipped and bevelled on all sides.
 - 5). Apply veneers with edges tight butted, with no gaps or other open defects. Set

out veneers so that veneers are aligned in regular uniform symmetry, unless otherwise specified.

6). Finished components to be free from bow, twist, scratches, chipping, pimpling, depressions, glue spill, staining and other defects. Sand to a fine, smooth finish, free from sanding marks.

Z10.200 QUALITY AND WORKMANSHIP

General

Z10.201 Cross-sectional Dimensions

a. Cross-sectional dimensions of timber shown on the Contract Drawings are nominal sizes unless stated otherwise. Reduction to finished sizes to be to BS EN 1313: Part 1 for softwoods and BS EN 1313: Part 2 for hardwoods. Deviation from the stated sizes not permitted unless prior acceptance is given.

Z10.202 Preservative Treated Timber

- a. Treated timber to comply with the British Wood Preserving and Damp Proofing Association Manual.
- b. Carry out as much cutting and machining as possible before treatment.
- c. Retreat all timber that is sawn, ploughed, planed or otherwise extensively processed in any way.
- d. Treat surfaces exposed by minor cutting and drilling with two flood coats of a solution recommended for the purpose by the main treatment solution manufacturer.

Z10.203 Moisture Content

a. Maintain the moisture content of timber and wood based sheets during manufacture and storage, within the range specified for the component.

Z10.204 Bonded Decorative Laminates

- a. Apply sheets in accordance with 'Recommendations for the Fabrication of Decorative Laminated Sheets' published jointly by the British Plastics Federation and the British Laminated Plastics Fabricators' Association.
- b. Condition sheets before bonding. Unless specified otherwise, apply to the reverse side of flat boards a balancing veneer of similar construction to the decorative veneer and from the same manufacturer.
- c. Bond in presses whenever possible.
- d. Finished components to be free from bow, twist, scratches, chipping, cracks, pimpling, depressions, glue spill, staining, defects in colour and pattern and the like.
- e. All joints exposed to view in the finished work to be tight butted and true with no lipping. Chamfer edges at all external angles.

Z10.205 Wood Veneers

- a. Condition core material and veneers before bonding. Unless specified otherwise, apply to the reverse side of flat boards a balancing veneer with the same moisture and temperature movement characteristics as the facing veneer.
- b. Set out veneers so that features and pattern are aligned and in regular, uniform symmetry unless specified otherwise. Apply veneers with edges tight butted, no gaps or other open defects and no lipping.
- c. Bond in presses whenever possible.
- d. Finished components to be free from bow, twist, scratches, chipping, pimpling, depressions, glue spill, staining and the like.

e. Sand to a fine, smooth finish, free from sanding marks.

Z10.206 Finishing and Protecting

a. Sand all joinery to give smooth, flat surfaces suitable to receive specified finishes.

Arrises to be eased unless specified otherwise.

b. Before assembly, seal all end grains for external components with primer or sealer as specified and allow to dry.

c. Protect completed joinery against damage, dirt, moisture and other deleterious substances.

END OF SECTION

Z11 METALWORK

a. To be read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z11.100 MATERIALS AND FABRICATION

Metals

Z11.101 Components

a. The Detailed Design of sections, material thicknesses and the dimensions shown on the Contract Drawings to be maintained within specified tolerances.

b. All materials and components to be durable and to the minimum standards set out in the Specification, together with the relevant British Standards.

c. For each material or component, obtain the total quantity from the same supplier or manufacturer unless otherwise agreed with the Architect.

d. Protect all inaccessible steel against corrosion for the design life of the works.

e. All support systems to be of adequate thickness and strength, to meet the structural requirements and eliminate risk of distortion in finished surfaces.

f. Provide protection until handover to avoid any blemishes on the finished elements.

g. Finish exposed metalwork in accordance with the relevant British Standards. Unless otherwise specified, concealed items to be mill finished aluminium in internal conditions only, or hot dip galvanised steel in accordance with SANS 121. Treat cut edges so that the level of protection is maintained.

h. Take adequate measures to prevent bi-metallic corrosion between dissimilar metals and to isolate aluminium components from cementitious surfaces.

Z11.102 Mild Steel

- a. All mild steelwork to comply with SANS 1200H and SANS 10120, unless stated otherwise.
- b. Fabrication of steelwork to be in accordance with the Specification.
- c. Check the fit for accuracy before and after making permanent connections in frames and other structural elements, which are assembled before delivery to Site.
- d. Welding procedures to be such that distortion is reduced to a minimum and local distortion rendered negligible in the final fabrication.
- e. No welds other than those shown on the Shop Drawings/ Working Drawings, even for temporary attachments or repairs, are acceptable unless agreed in advance by the Architect.
- f. Vent holes in hollow sections to be sealed in a manner to prevent the ingress of moisture.
- g. External visible lines and depressions caused by the internal welding of hollow section steelwork to be positioned in the works so as to be non-visible.

Z11.103 Aluminium

- a. All aluminium work to comply with SANS 10120, unless stated otherwise.
- b. Fabricate all extruded aluminium alloy members from the appropriate grade of aluminium alloy.
- c. Unless specified otherwise, aluminium sheeting to be a minimum of 3mm thick.
- d. Use only appropriate grades, strengths and thicknesses of aluminium to ensure that all structural and finishing requirements of the Specification are met. The wall thicknesses of aluminium extrusions to be sufficient to ensure their rigidity in the lengths required in the final installation.

e. All aluminium fixing brackets and cleats to be manufactured from the appropriate grade of alloy. If visible, finish to match the metal panels and framing members.

f. Protect exposed aluminium with low tack adhesive film during construction and prior to handover.

g. Aluminium sheets not to suffer bowing, dimpling, oil canning, sagging, pillowing, rippling, warp, abrupt transitions or other visible deformation or irregularity.

Z11.104

Stainless Steel

a. Unless otherwise specified, stainless steel to be austenitic and non-magnetic.

Specific grade designations to be either as specified in the relevant sections of the Specification or, where not identified specifically, selected to meet the performance criteria specified for the particular element or components.

b. Stainless steel fasteners, bolts, screws, nuts and other fixings to be to SANS 1700. Select the property class of fastenings to meet the performance requirements specified.

c. Unless otherwise specified, welds to visible areas of stainless steel to be ground smooth to achieve a seamless surface. Remove heat tints using light abrasives, pickling paste, wire brushing or similar to achieve continuity with the specified finish. Areas difficult to access to be manually finished if necessary.

d. Minimise distortion due to thermal movement using jigs or other methods as appropriate during welding. Welding methods and consumables to be chosen as most appropriate to the type, thickness, shape and location of joints to meet the performance levels required and have mechanical properties at least equal to the original base metal. In addition, consumables to have an equal or superior corrosion

resistance to the base metal being welded. All welding recommendations required to meet other relevant standards as specified also apply. Electrodes for manual metal arc welding to comply with SANS 1071.

e. Stress corrosion or cracking not to occur. Undertake necessary precautions in the fabrication and installation of stainless steel elements/materials, avoiding the simultaneous presence of any of the following:

- 1). Tensile stresses.
- 2). Residual stresses after cold working or welding.
- 3). Aggressive local environmental conditions.
- 4). Metal temperatures that in conjunction with the above may induce stress corrosion cracking.

f. Stainless steel castings:

- 1). To comply with SANS 1465.
- 2). To be of austenitic stainless steel and the casting alloy to be determined to meet the requirements of the Specification but to be equal or superior to Grade 1.4408 with respect to corrosion resistance.
- 3). To be manufactured using the lost wax process or such other process as may be proposed and accepted by the Architect.
- 4). Exposed feeder ports and die lines not acceptable in the finished castings.
- 5). The surface finish of the castings to be determined by the submission of samples for review and acceptance. Samples, once accepted, should be the standard required for all subsequent castings to be used in the works.
- 6). The surface roughness of the casting surface prior to any subsequent finishing

process to be SCRATA A2 (Steel Castings Research and Trade Association)

or better.

7). Make allowance for two post production finishing processes to be utilised. The processes to be agreed with the Architect and include blast finishes (including bead blasting) and electropolishing or acid pickling.

g. Stainless steel fixings and support brackets for natural stone cladding to comply with SANS 1700.

h. Stainless steel for wall ties and other components associated with masonry construction to comply with SANS 28.

i. Stainless steel to be protected where possible using appropriate adhesive film, to the film manufacturer's written recommendations.

j. If stainless steel has not been protected by adhesive film, thoroughly clean prior to presentation to the Architect for acceptance.

Z11.200 QUALITY AND WORKMANSHIP

Generally

Z11.201 Fabrication Generally

a. Fabricate components carefully and accurately to ensure compliance with the Design and the Specification.

b. Do not permit contact between dissimilar metals in components that are to be fixed where moisture may be present or occur.

c. Finished components to be rigid and free from distortion, cracks, burrs and sharp arrises. Moving parts to move freely and without binding.

d. Unless specified otherwise, mitre corner junctions of identical sections.

- Z11.202 Cold Formed Work**
- a. Use brake presses or cold rolling to produce accurate profiles with straight arrises.
- Z11.203 Adhesive Bonding**
- a. Prepare surfaces of metals to receive adhesives by degreasing and abrading mechanically or chemically.
 - b. Use adhesives to manufacturer's written recommendations.
 - c. Form bond under pressure.
- Z11.204 Thermal Cutting of Steel**
- a. After cutting, grind off material that is liable to corrode.
- Z11.205 Welding/Brazing Generally**
- a. Thoroughly clean surfaces to be joined.
 - b. Ensure accurate fit using clamps and jigs where practicable. Use tack welds only for temporary attachment.
 - c. Make joints with parent and filler metal fully bonded throughout with no inclusions, holes, porosity or cracks.
 - d. Prevent weld spatter falling on surfaces of materials that will be self-finished and visible in completed work.
 - e. Remove all traces of flux residue, slag and weld spatter.
- Z11.206 Arc Welding**
- a. Arc welding in accordance with BS EN 1011.
- Z11.207 Brazing**
- a. Brazing in accordance with BS EN 14324.
- Z11.208 Finishing Welded/Brazed Joints**

- a. Visible butt joints in completed work to be smooth and flush with adjacent surfaces.
- b. Visible fillet joints in completed work to be executed neatly. Grind smooth to be flush with adjacent surfaces.

Z11.209 Applying Coatings

- a. Apply after fabrication is complete and all fixing holes have been drilled, unless otherwise specified.
- b. Before applying coating, remove all paint, grease, flux, rust, burrs and sharp arrises.
- c. Make good all defects that would show after application of coating and finish surfaces smooth.

END OF SECTION

Z12 PRESERVATIVE/ FIRE RETARDANT TREATMENT

a. To be read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z12.100 MATERIALS, PRODUCTS AND APPLICATION

Type(s) of Preservative/ Fire Retardant Treatment

Z12.101 Organic Solvent Preservative Treatment

a. The moisture content of timber at the time of treatment to be as specified for the component at the time of delivery. After treatment, the timber to be surface dry before use.

b. Application: Double vacuum/ low pressure.

Z12.102 Water Based Micro-emulsion Preservative Treatment

a. Water based on copper and organic biocides.

b. The moisture content of the timber at the time of treatment to be not more than 28%.

Allow timber to dry for at least 14 days before use and ensure it is fully dry.

c. Application: Double vacuum/ pressure treated.

Z12.103 Boron Compound Preservative Treatment

a. Based on boron compounds.

b. The moisture content of the timber at the time of treatment to be not more than 28%.

Allow timber to dry for at least 14 days before use and ensure it is fully dry.

c. Application: High pressure impregnation.

Z12.104 Fire Retardant Treatment

a. The moisture content at the time of treatment to be as specified for the timber at the time of fixing. After treatment, dry timber slowly at temperatures not exceeding 65°

C to minimise degradation and distortion.

b. Application: Vacuum/ hydraulic and low pressure.

Z12.105 Leach Resistant Fire Retardant Treatment

a. The moisture content at the time of treatment to be as specified for the timber at the time of fixing or:

1). 22% for timbers up to 50mm thick.

2). 25% for thicker timbers.

b. Application: Vacuum/hydraulic and low pressure.

Z12.106 Wood Preservative Treatments Generally

a. No timber to be used if not recommended in SANS 10005.

b. Wood preservative products to conform to the efficacy requirements of SANS 10005 and SANS 1288.

c. Treat in accordance with the penetration and retention guidance given in SANS 10005 and SANS 1288 to give a desired service life in the selected hazard class.

d. Testing for retention shall be in accordance with the methods laid down in SANS 5988 or SANS 5989.

e. Hazard classes are defined in SANS 1288.

Z12.200 QUALITY AND WORKMANSHIP

Z12.201 Generally

a. A processor, licensed by the treatment solution manufacturer for the specified treatment, to carry out application after cutting and machining, but before assembly.

b. For each batch of timber provide a certificate of assurance to show that the treatment has been carried out as specified.

Z12.202**SAWPA Hazard Classifications**

a. Where specified, SAWPA Hazard Classifications are those defined in the latest edition of the South African Wood Preservers Association Manual. Solution strengths and treatment cycles to be selected to achieve the service life (if specified) and to suit timber treatability.

END OF SECTION

Z15 HOLES/ CHASES/ RECESSES FOR SERVICES

a. To be read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z15.100 GENERAL

Specification and Scope

Z15.101 Descriptive Works

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

comply with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only. The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

Z15.102 Scope

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Sleeves.

- 2). Chases.
- 3). Holes.
- 4). Service ducts.
- 5). Access boxes.

Samples and Quality Benchmarks

Z15.103 Pre-Contract Control Samples

- a. Provide the following control samples:
 - 1). Samples of each component to be used.

Z15.104 Post-Contract Control Samples

- a. Provide the following control samples.
 - 1). Samples of each component to be used.

Z15.105 Benchmark Requirements

- a. Provide the following quality benchmarks:
 - 1). First completed section of each type in a location to be agreed with the Architect.

Z15.200 MATERIALS/ PRODUCTS

Z15.201 Service Sleeves

- a. Type: To be agreed.
- b. Material: To be agreed.
- c. Diameter To be agreed.

Z15.202 Fire Stopping

- a. Material to provide fire, smoke and air tight seals.
- b. The material shall not shrink, crack or distort during curing

Z15.300 SITE INSTALLATION

Holes, Recesses and Chases

Z15.301 Holes, Recesses and Chases in Masonry and Concrete

- a. Locate all holes, recesses and chases to least affect the strength and stability of the wall, and to be of the smallest practicable size.
- b. Holes must not exceed 300 mm square.
- c. Chasing generally:
 - 1). Fill cores of hollow units to be chased with 15MPa concrete.
 - 2). Vertical chases must not be deeper than one third of the single leaf thickness.
 - 3). Horizontal or raking chases must not be longer than 1m and not deeper than one sixth of the single leaf thickness.
 - 4). Chases in 100mm thick walls shall be by means of power tools only.
- d. Do not set chases or recesses back to back. Offset by a clear distance not less than 200mm.
- e. Where sockets, etc., are shown on Working Drawings as nominally back to back, obtain instructions.
- f. Do not cut until mortar is fully set, cut carefully and neatly, avoid spalling, cracking or other damage.
- g. Do not cut chases with mechanical or hand impact tools.

Z15.302 Holes Recesses in Reinforced Concrete

- a. Holes through bases, slabs and reinforced concrete to be carried out according to the instruction of the Architect.
- b. Holes and recesses to be cast in using void formers.
- c. Drill no hole larger than 10mm diameter without permission of the Architect.

Notches and Holes

Z15.303 Notches and Holes in Structural Timber

- a. To be avoided whenever possible.
- b. To be the minimum size to accommodate the service.
- c. Holes to be on the neutral axis and drilled.
 - 1). Diameter of hole not to be more than 0.25 depth of member. Vertical chases must not be deeper than one third of the single leaf thickness.
 - 2). Spaced apart at not less than three times the diameter of the largest hole.
 - 3). Located at between 0.25 and 0.4 of the span from the support.

Penetrations

Z15.304 Pipe Sleeves

- a. Pipes passing through masonry or concrete are to be lagged with Kraft paper or polythene sheeting where not sleeved.
- b. Sleeving Material: PVC pipe.
- c. Sleeves to extend through full thickness of wall/floor and be positioned to give minimum clearance around service of 20mm or diameter of service, whichever is the least.
- d. Sleeves, whether built in or installed in preformed holes, to be bedded solid.
- e. Fill annular space between service prep and sleeve with fire resistant material.

Z15.305 Cable Penetrations

- a. Seal cable trays all round with fire resistant material.
- b. Seal inside trunking as it passes through the walls with fire resistant material.

END OF SECTION

Z20 FIXINGS/ ADHESIVES

a. Read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z20.100 PRODUCTS AND MATERIALS

Materials

Z20.101 Fixing Generally

a. Fixings to be of sufficient strength, appropriate to their location, and at adequate positions so as to ensure the performance of the elements being attached.

b. The fixings to be suitable and used solely for the purposes intended by the manufacturer.

c. Unless otherwise specified, observe the following requirements:

1). Fixings to be selected such that adequate protection against any corrosion likely to occur in their position of use is provided for the service life specified.

2). Use fixings that are suited to the likely stresses, movements and vibrations in use.

3). Unless otherwise specified, fixings to be non-visible; where fixings are visible these shall match or suit the items being fixed or comply with the Contract Drawings.

4). Removable items that require accessibility or removal to be fixed with hidden screws and/or bolts, unless otherwise specified.

d. Generally, fixings within aluminium framing components to be non-visible, with the exception of capping pieces fixed to vertical mullions.

e. Galvanise and effectively weatherproof any steel sub-frame assemblies to avoid

exposure to the external environment.

f. All fixings shall be tested in accordance with BS 5080: Parts 1 and 2 by an independent Testing Authority acceptable to the Architect.

Adhesives

Z20.102 Phenolic and Polyurethane Resins

a. To SANS 1349.

Z20.103 PVA Adhesives

a. To SANS 1348.

Z20.104 Solvent Based Contact Adhesive

Screws

Z20.105 Screw Fixings

a. Screws: To SANS 1171.

b. Washers and screw cups, where specified, to be of the same material as the screw.

Z20.106 Plugs Generally

a. Use proprietary types selected to suit the background, loads to be supported and conditions expected in use.

Z20.107 Packings Generally

a. Provide suitable, tight packings at fixing points to take up tolerances and prevent distortion.

b. Use non-compressible, rot-proof, non-corrodible materials positioned adjacent to fixing points.

Nails

Z20.108 Types of Nail

a. Nails to SANS 820.

Z20.109 Masonry Nails

a. Do not use without acceptance.

Bolts

Z20.110 Bolts

a. To SANS 1700 and SANS 646.

Z20.200 QUALITY AND WORKMANSHIP

Application

Z20.201 Adhesives

a. Surfaces to receive adhesive to be sound, unfrozen and free from dust, grease and any other contamination likely to affect bond. Where necessary, clean surfaces using methods and materials recommended by the adhesive manufacturer.

b. Surfaces to be sufficiently smooth and even to suit the gap-filling and bonding characteristics of the adhesive. Prepare as necessary.

c. Operatives to observe both the manufacturers' and statutory requirements for storage and safe usage of adhesives.

d. No adhesives to be used in unsuitable environmental conditions or beyond the manufacturer's recommended maximum shelf life or open-pot time periods.

e. Adhesives to be applied using recommended spreaders/applicators to ensure correct coverage. Bring surfaces together within the recommended time period and apply pressure evenly over the full area of contact surfaces to ensure full bonding.

f. Remove surplus adhesive using methods and materials recommended by the adhesive manufacturer and without damage to affected surfaces.

Z20.202 **Fixings**

- a. Carry out all necessary preparation work such as drilling, plugging, screwing, bolting, cutting for anchor bolts or sockets to be cast-in and for making good, including grouting-in of anchor bolts and fixings where necessary.
- b. The method of fixing not to damage anything being fixed or anything receiving fixings.
- c. Welding not permitted, unless accepted by the Architect.
- d. Where fixing is through the finished article make sure that fastenings and plugs (if used) have ample penetration into the backing.

Z20.203 **Screw Fixings**

- a. All screws to have clearance holes.
- b. Screws of 8 gauge or more and all screws into hardwood to have pilot holes about half the diameter of the shank.
- c. Before using brass, aluminium or other soft metal wood screws, pre-cut the thread with a matching steel wood screw.
- d. Do not hammer screws unless specifically designed to be hammered.
- e. Countersink screw heads not less than 2mm below timber surfaces that will be visible in the completed work, unless specified otherwise.

Z20.204 **Pelleting**

- a. Countersink screw heads 6mm below timber surface and glue in grain-matched pellets not less than 6mm thick, cut from matching timber.
- b. Finish off flush with face.

Z20.205 **Packings Generally**

- a. Ensure that packings do not intrude into zones that are to be filled with sealants.

Z20.206**Nail Fixing**

- a. In joints, use not less than two nails and opposed skew nailing unless specified otherwise.
- b. Drive nails fully in without splitting or crushing the material being fixed.
- c. Punch nail heads below surfaces that will be visible in the completed work.

Z20.207**Plugs Generally**

- a. Locate plugs accurately in correctly sized holes in accordance with the manufacturer's recommendations.

Z20.208**Cartridge Operated Fixings**

- a. Do not use without approval.
- b. Fasteners, accessories and consumables to be types recommended by the tool manufacturer.
- c. Operatives to be trained and certified as competent by tool manufacturer.
- d. Ensure that operatives take full precautions against injury to themselves and others.
- e. Apply zinc rich primer to heads of fasteners used externally, in external walls or in other locations subject to dampness.
- f. Use top hat section plastic washers to isolate cartridge fired nails from stainless steel components fixed externally, in external walls or in other locations subject to dampness.

END OF SECTION

Z21**MORTARS**

a. Read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z21.100**PRODUCTS AND MATERIALS****Z21.101****Descriptive Work**

a. Complete the Detailed Design, manufacture, supply, install and warrant that the works

complying with the visual intent shown on the Contract Drawings and criteria stated in the Specification.

b. Where no material, product or supplier is indicated in the Specification, propose suitable materials and systems prior to Contract award which comply with the visual intent and performance criteria stated and remain fully responsible for the Detailed Design of the works.

c. Where a particular material, product or supplier is indicated in the Specification, such material, product or supplier shall be deemed indicative representing the Architect's design intent only, The Contractor may complete the installation using that material or product, or such other confirmed as acceptable by the Architect in writing, but shall remain fully responsible for the Detailed Design and performance of the works.

Z21.102**Section Coverage**

a. This section of the Specification, when read in conjunction with the Contract Drawings, provides particular requirements with respect to the following:

1). Mortar mixes.

Materials

Z21.103**Water**

a. To be clean fresh water free from vegetable or organic matter, earth, clay, mineral salts, acid or alkaline substances.

b. The Contractor may be required to obtain a chemical analysis by an approved laboratory.

Z21.104**Cement**

a. Cement: CEM I Portland cement 42.5N to SANS 50197 or CEM II Portland Fly Ash Cement 32.5N – no site blending of extenders is permitted.

b. Where the use of masonry cement is permitted, it shall comply with SANS 50413: type MC 12.5 or 22.5X.

Z21.105**Sand**

a. To SANS 1090.

b. Sand for facework to be from one source, mix to ensure consistency of colour and texture.

Z21.106**Lime**

a. To SANS 523 hydrated lime.

Z21.107**Admixtures**

a. Use only admixtures that are specified and approved.

b. Do not use calcium chloride or admixtures containing calcium chloride.

Z21.200**QUALITY AND WORKMANSHIP****Testing****Z21.201****Mortar Testing**

a. Testing of mortars to be carried out in accordance with SANS 5863 or to equal

standards acceptable to the Architect.

Storage of Materials

Z21.202 Cement

- a. Store in a weatherproof structure clear of the ground.
- b. Do not store for more than six weeks before using.
- c. Portable silos can be used for bulk storage of cement.

Z21.203 Lime

- a. Store in a weatherproof and damproof structure clear of the ground.

Z21.204 Sand

- a. Store to avoid contamination.

Z21.205 General

- a. Keep mixing plant, tools and banker boards clean at all times.
- b. Measure materials accurately by volume using clean gauge boxes. Proportions of mixes to be for dry sand making allowance for bulking if it is damp.
- c. Mix ingredients thoroughly to a consistency suitable for the work and free from lumps.

Mortars containing air-entraining admixtures to be mixed by machine, but not over mixed.
- d. Use within two hours of mixing. Do not use after initial set has taken place. Do not retemper.

Z21.206 Cement/Sand Mortar Mix Proportions

- a. To SANS 10164.
- b. Class 1: 1:4 Cement: Sand: Highly stressed masonry, work below ground, severe

exposure.

c. Class 2: 1:6 Cement: Sand: Normal load bearing masonry, severe/ moderate

exposure.

d. Class 3: 1:9 Cement: Sand: Single storey load bearing masonry, moderate/ sheltered

exposure.

Z21.207 Masonry Cement/Sand Mortar Mix Proportions

a. Class 1: 1:3 Masonry Cement: Sand: Highly stressed masonry, work below ground,

severe exposure.

b. Class 2: 1:5 Masonry Cement: Sand: Normal load bearing masonry, severe/ moderate

exposure.

c. Class 3: 1:6 Masonry Cement: Sand: Single storey load bearing masonry, moderate/

sheltered exposure.

Z21.208 Cement/ Lime/ Sand Mortar Mix Proportions

a. Class 1: 1:½:3 Cement: Lime: Sand: Highly stressed masonry, work below ground,

Severe exposure.

b. Class 2: 1:1:6 Cement: Lime: Sand: Normal load bearing masonry, severe/ moderate

exposure.

c. Class 3: 1:2:9 Cement: Lime: Sand: Single storey load bearing masonry, moderate/

sheltered exposure.

END OF SECTION

Z22 SEALANT JOINTS

a. Read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z22.100 PRODUCTS AND MATERIALS

Types and Method

Z22.101 Generally

a. Sealant to be suitable for the purpose intended, and used strictly in accordance with the manufacturer's instructions.

b. Sealant colour to be agreed with the Architect.

c. The chemical composition of the sealant and primers, where any, to be compatible with the joint substrate, and with adjacent surface treatments or building components with which they may come into contact.

d. Determine the appropriate hardness, compressibility or consistency of sealant in consultation with the manufacturer, considering the joint movement and exposure for the size of joint.

e. Sealant to have the lowest modulus of elasticity which is consistent with the degree of exposure to wear, abrasion and vandalism. Any sealant exposed to traffic to have strength and modulus sufficiently high to resist damage by traffic, including indentation.

f. Demonstrate to the satisfaction of the Architect that the sealant joints can accommodate and are compatible with any movements to which they may be subjected.

g. Do not use sealant likely to stain, discolour or bleed into adjacent building materials.

Sealant Types

Z22.102 Polysuphide

- a. Polysuphide sealants to comply with SANS 110.

Z22.103 Polyurethane

- a. Polyurethane sealants to comply with SANS 1077.

Z22.104 Silicone Rubber

- a. Silicone rubber sealants to comply with SANS 1305.

Z22.105 Acrylic

- a. Acrylic sealants to comply with SANS 11600.

Z22.200 SITE INSTALLATION

Workmanship

Z22.201 Suitability of Joint

- a. Before commencing check that:
 - 1). Joint dimensions are within the limits specified for the sealant.
 - 2). Surfaces are undamaged.
 - 3). Preparatory work required has been completed prior to assembly of the joint.

Z22.202 Joint Preparation

- a. Ensure that surfaces are firm, clean, dry and free from oil or grease.
- b. Clean surfaces to which sealant must adhere using methods and materials recommended by the sealant manufacturer.
- c. Remove all temporary coatings, tapes, loose material and other contaminants.
- d. Keep joints clean until sealant is applied.
- e. Backing strip, bond breaker and primer: to be as recommended by the sealant

manufacturer.

f. Insert backing strip and/or bond breaker tape, leaving no gaps.

g. Mask adjacent surfaces.

Z22.203

Joint Fillers

a. Joint fillers, when placed in the joint, to provide a gap consistent with the required depth of sealant.

b. The cross section of sealant in the joint to be of 2:1 width to depth unless otherwise accepted.

c. Joint fillers to be as follows:

1). Compatible with the sealant used and surrounding construction elements.

2). Formed from closed cell foam.

3). Non-adhering to cured sealant.

Z22.204

Sealant Application

a. Apply strictly in accordance with the manufacturer's instructions.

b. Do not apply to damp surfaces.

c. Do not apply heat to joints.

d. Fill joints completely, leaving no gaps.

e. Sealant to be evenly applied without bubbles in joints.

f. Remove excess sealant and ensure that joints are neat and clean.

g. Tool sealant to form a neat, slightly concave profile using only liquids approved by the sealant manufacturer.

h. Protect until cured.

END OF SECTION

Z25 GLASS AND COATINGS

a. To be read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z25.100 MATERIALS AND FABRICATION

Types of Glass

Z25.101 Glazing Generally

a. All glass types to be cut to accurate sizes with clean cut, arrised edges. Damage such as shark teeth, serration hackle, sharp flare, flake chips, rough chips, feathered edges, shells or other imperfections is not acceptable if detrimental to the visual and performance criteria of the glass. Glass delivered to Site to be of the required size.

No cutting or nipping of glass allowed on Site. Variations in manufacture and performance of the glass not to affect its colour or appearance, while all glass of the same type to be visually consistent in appearance and colour at all times, having due regard to the direction and angle of view within manufacturing tolerances and the agreed range of samples or observations of previous installations of the same type of glass.

b. All glass to be of the type specified in the relevant SANS EN series range. The glazing to be carried out in accordance with the manufacturer's recommendations.

c. All glass panes within frames to be installed to give the necessary edge cover and clearance to ensure a permanent and safe installation. Do not fix glass panes with damaged edges, including shelling and impact markings, into the building under any circumstances.

d. Provide a warranty from the glass manufacturer, which states that the glazing systems

comply with the manufacturer's requirements and which indicates the life expectancy of the glass, interlayers, spacers and other components.

e. Distortion to be kept to an absolute minimum with no local defects (such as tong marks) producing irregular reflections being allowed. All glass to be manufactured and processed in accordance with quality control procedures to SANS 9000 and be independently maintained.

f. Visual quality testing of float glass (jumbo sizes and stock size sheets) for dimensional requirements and visual defects to be in accordance with SANS 50572: Part 2.

g. Stresses in glazing: Ensure that no glass or glazing combination develops stresses that may lead to damage of glass, glazing materials, components and/or framing systems:

1). Conduct a thermal stress analysis and make due allowance for any thermally treated or edge working of annealed glass which may be required.

2). Take into account shading stresses that might occur from adjacent components, including solar shading devices.

h. The method of glazing adopted to take account of the manufacturing tolerances in the glass, thus minimising the effects of distortion resulting.

i. The glass to be replaceable without undue difficulty. Provide a method statement showing the method of removing damaged glass and any associated metal framework and of installing new components.

j. A highly uniform, low reflection and durable quality is required of any surface modified glass. Such coatings to be neutral in colour, durable and sufficiently hard on exposed surfaces to avoid damage. For the purposes of the Specification, neutral is defined

as a colour having no unacceptable hue and being capable of reflecting or refracting light without chromatic aberration. Provide glass with a colour rendering index (Ra) as specified, both for the transmittance and the reflected spectrum and provide detailed reflected and transmitted spectrum data for the purpose of identifying/anticipating the possible problems with colour reflection. Demonstrate this by provision of full size samples of each glass type, which are to be viewed under reproduction lighting conditions and accepted prior to material manufacture.

k. Provide all glass from a single supplier unless agreed otherwise by the Architect, and provide certification proving the origin of the glass.

l. Ensure that glass does not contain impurities, which would detract in any way from the performance of the glazing system.

m. All exposed glass edges to be ground and arrised.

n. All glass to be free from bubbles, smoke vanes, air holes, scratches or any other visible defects, unless described as acceptable elsewhere in the Specification.

o. Mirror glass is not acceptable, unless described as acceptable elsewhere in the Specification.

p. Where combinations of glass types are used in a unit, the least stringent criteria for viewing to be used in accordance with the relevant standards.

q. Prior to placing an order for any glazing materials, obtain all necessary confirmation and/or calculations in writing from the glass manufacturer on all aspects of the glazing systems for review, as, but not limited to the following:

1). Ventilating and draining provisions of the glazing rebates.

2). Thickness of individual glass panes and of insulating glass units due to

consideration of the wind loadings specified.

3). Snow and access loads for horizontal/inclined glazing conditions with

consideration of the wind loadings specified.

4). Determination as to whether or not heat strengthening or toughening of glass

will be required.

5). Thickness and number of PVB interlayers (laminated glass).

6). Thermal and shading performance of insulating glass units.

7). Thermal safety of insulating glass units.

8). Hardness, location, shape and dimensions of setting blocks and glazing

gaskets.

9). Depth and width of glazing rebates.

10). Expansion, tolerances, glass bite and clearance to meet all specified

performance requirements.

Z25.102

Safety Glass

- a. Select safety glass categories for use in critical locations as defined and recommended in the relevant parts of SANS 1263, as required to comply with the Building Regulations, Local Authority requirements and other relevant Health and Safety requirements. The selection of the glass type and thickness to be undertaken to meet the performance requirements of the Specification and to minimize the risk to persons both during construction and during the service life of the works. The risk of failure and the consequences of failure to be documented and prepared for review.
- b. All safety glass to be marked with an internationally recognized symbol, marked and labelled in a consistent position on the glass, as agreed with the Architect. Safety

glass to be in accordance with the relevant parts of SANS 10137 and SANS 1263

as applicable and meet the relevant requirements of SANS 10400 the Building Regulations for safety glass.

- c. Test safety glass to meet the requirements of SANS 1263 as applicable.
- d. Where it is necessary to meet the requirements of the Building Regulations and any other health and safety requirements, manifestation to be provided. Agree the type of manifestation with the Architect and provide samples for acceptance.

Z25.103 Annealed Glass

- a. Unless otherwise specified and accepted in advance by the Architect, all sheet glass to be manufactured by the float process. Other sheet glass not acceptable without the prior written agreement of the Architect.
- b. Untinted glass sheets to provide a clear, undistorted vision and reflection.
- c. The tolerances on thickness to be as reproduced in SANS 50572.
- d. The tolerances on cut sizes for different thicknesses of material to be as SANS 50572.
- e. Visual quality testing of annealed glass for dimensional requirements and visual defects to be in accordance with SANS 50572.

Z25.104 Laminated Glass

- a. Utilize expertise and experience for the selection of glass in order to comply with the performance requirements of the Specification.
- b. Laminated glass to be in accordance with SANS 50572.
- c. Laminated glass to consist of a number of sheets of flat glass with polyvinyl butyral (PVB) of not less than 0.375mm thick, or methyl metacrylate resin interleaving

between each layer. The layers can be clear, translucent or coloured depending on the design intentions of the glazing. The glass may be annealed, heat strengthened, or heat soak toughened, as required to meet the performance requirements of the Specification.

d. The Contract Drawings to show the visual requirements of the Architect. Final selection of glass type and thickness of each layer, together with type, opacity, density and location of interlayer and coatings to be accepted by the Architect prior to ordering materials.

e. All glass to meet the colour and quality standards set by the Control Samples.

f. Seal laminated glass edges with materials compatible with the interlayer.

Delamination of the laminated glass for any reason is not acceptable.

g. The bottom supported edges of laminated glass panes to be cut flush over the width of the pane to provide even distribution of vertical load to the setting blocks.

Z25.105 Toughened Glass

a. Justify the use of toughened glass by risk assessment and/or calculations, with the general aim of minimising its use.

b. All toughened glass to be heat soaked to DIN 18516: Part 4, paying particular attention to temperature and duration of treatment. Demonstrate that, despite temperature tolerances, the air temperature in all parts of the oven was maintained at or above 280°C for 8 hours. Provide detailed records of heat soaking for each batch prior to delivery to Site.

c. The glass to conform to the following requirements in the horizontal toughening

process:

- 1). Maximum overall bow: 0.003mm per millimetre measured along the glass edge.
- 2). Maximum local bow: The maximum deviation for flatness from peak to trough not to exceed 0.3mm per 300mm or 0.15mm at the edge or 0.08mm in the middle.
- 3). Rollerwave: Size glass to provide for the consistent and horizontally aligned orientation of ripples throughout the Works. The maximum deviation for flatness from peak to trough not to exceed 0.08mm. In any event, state in the Tender submission proposals to control the extent of rollerwave, if any. Provide full size samples of all specified heat treated glass to signify the range of rollerwave throughout the Works, prior to commencing production of the glass.
- 4). Edge dip - 0.25mm maximum.
- d. Exposed edge working to be flat ground with small ground arris and have a frosted appearance. Small shells and/or chips, exceeding a maximum diameter of 2mm, to be ground out prior to toughening.
- e. The surface compressive stress to be demonstrated by non-destructive testing, to be controlled at the Works at $\geq 120\text{N/mm}^2$.
- f. Cut all glass to accurate sizes and deliver to the Site in the required sizes. No on-Site cutting or nipping allowed. The glass to be clearly marked to show its intended final position and orientation.
- g. Ensure that glass heat treatment requirements are satisfactory to meet wind, impact, thermal or other loads anticipated in the works. The manufacturer of the toughened glass to be made aware of its intended use in the construction. Carry out any drilling

and notching with the agreement of the manufacturer of the toughened glass and prior to the toughening being carried out. All toughened glass to be tempered on a roller heat furnace eliminating tong marks and to conform to SANS 1263 and SANS 10137.

h. Ensure that the toughening process does not produce iridescence, distortion, roll marks or ripples in the glass which are unacceptable to the Architect. Demonstrate such anticipated imperfections by the provision of samples prior to commencement of glass production. The Architect to examine the samples provided and advise what is acceptable and what is unacceptable. All glass produced for the works to comply with the acceptable samples as a minimum standard.

i. Prior to commencement of manufacture, advise the Architect of the glass supplier and the premises where fabrication and processing to be carried out. The Architect to be given the opportunity of visiting the glass manufacturer's premises during fabrication and/or processing.

j. Prior to installation of the toughened glass, demonstrate with documentary evidence that the glass has been heat soaked for the prescribed periods. Such evidence to include, as a minimum, the following:

- 1). Source of supply and evidence of batching.
- 2). Dates and records of toughening/heat soaking of all glass.
- 3). Certification that the glass meets the performance requirements of the Specification.
- 4). Records to include details of all units that failed during the heat soak test.

k. The toughening process not to create any stresses in the glass that are visible within

the limits specified.

l. The toughening process not to affect the appearance of the coating.

m. No cooling jet marks to be visible on the finished surface of the toughened glass.

n. Any discolouration or distortion caused by the toughening process is unacceptable outside of roller wave distortion and glass bow specified.

o. Should it be considered that the glass panel configuration within the completed installation is susceptible to anisotropy, when viewed in polarised light, notify the Architect and submit proposals in the Tender to minimise this characteristic. Take all reasonable measures to control the toughening process so as to avoid the occurrence of anisotropy at the time of manufacture. Reject glass if it does not fall within the range of agreed samples; refer to SANS 50572.

p. Demonstrate that all necessary control has been taken to ensure that the effect of anisotropy in the manufactured glass has been controlled and minimized taking into account the thickness of glass and its orientation on the façade of the building. Glass will be rejected if it does not fall within the range of agreed samples. Any coatings applied to the glass must not increase the tendency to show the effects of anisotropy.

Z25.106 Heat Strengthened Glass

a. Unless otherwise specified, all heat strengthened glass to comply with the requirements of BS EN 1863.

b. Visual quality testing of heat strengthened glass for dimensional requirements and visual defects to be in accordance with BS EN 1863: Part 1.

c. When subjected to a fracture test in accordance with BS 6206 and BS EN 12600 as applicable, the fracture characteristics to be similar to annealed glass and therefore,

heat strengthened glass not to be considered as a 'safety' glass. If heat strengthened glass is proposed for use in a situation, which requires a safety glazing material, it is to be laminated.

Z25.107 Wired Glass

- a. Wired glass to comprise "polished wired glass" as defined in SANS 50572.
- b. Glass to be annealed,
- c. Glass to be of the thickness specified and, unless otherwise specified, with 1.3mm 'Georgian' wire embedded within the glass thickness.
- d. Tolerances on wired glass thickness to be to the minimum specified in SANS 50572, length, breadth and squareness as specified in SANS 50572.

Z25.108 Fire Resistant Glass

- a. Fire resisting glass to provide the fire ratings specified; test to BS 476: Parts 20 and 22 and classify as safety glass to SANS 1263.
- b. Fire resisting glazing to incorporate fire rated beading and fixing methods to match the fire rating specified. Test, certify or assess as being equal to the relevant parts of BS 476.
- c. Unless otherwise specified, wired glass not to be used. Glass to be clear, with fire resisting properties as specified above.
- d. Submit technical/product information on all fire resisting glass proposed for review by the Architect. It is recognized that the glass will not necessarily meet the visual quality requirements set out in the Specification. Submit details of the visual quality and dimensional limits of any proposed fire resistant glass for review by the Architect.
- e. Where insulation is specified in addition to stability/integrity, this to be in accordance

with Building Regulations and tested to the relevant parts of BS 476.

Z25.109 Curved Glass (Tolerances)

- a. The maximum variation in curved form to be $\pm 4\text{mm}$ from the theoretical form.
- b. The maximum variation in adjacent glass edges when installed to be 1mm per 1000mm.
- c. The maximum difference between curved adjacent glass edges when installed to be 3mm.
- d. All curved glass panels to be continuously curved from edge to edge for the full radius with no straight returns.
- e. The maximum allowed deviation of the length and width of sheets to be $\pm 4\text{mm}$ for dimensions up to and including 2000mm and $\pm 4.5\text{mm}$ for dimensions over 2000mm.
- f. The maximum allowed deviation of the diagonal dimension of any sheet to be $\pm 7\text{mm}$ for dimensions over 2000mm.
- g. The maximum allowed deviation of the top and bottom edges (i.e. the curved edges) measured on the face of the glass and perpendicularly to the curvature to be $\pm 3\text{mm}$.

Coatings

Z25.110 Glass Coatings Generally

- a. Submit to the Architect detailed proposals in respect of coatings.
- b. Surface coatings: A highly uniform, low reflection and durable quality is required of any surface modified glass. Such coatings to be consistent in colour, durable and sufficiently hard on exposed surfaces to avoid damage.
- c. Body tinting:
 - 1). Provide evidence from the glass manufacturer that the correct body tinting has

been incorporated into the materials at the appropriate stage, when this has been specified on the Contract Drawings.

2). Provide evidence that the correct surface modified tinting has been applied by the glass manufacturer, where this has been specified on the Contract Drawings.

d. Ceramic frit coatings:

1). Tolerances for positioning and sizes of prints to comply with optical quality determined by viewing from a distance of 3000mm using daylight without direct sunlight or direct spotlight, perpendicularly to the glass, for no more than 10 seconds.

2). Apply smoothly and consistently over the whole, or part, of each glazed area as indicated on the Contract Drawings.

3). Fuse into the surface of the glass, thus providing a permanent layer (with the exception of the exposed internal surface).

4). The coatings to have similar sheen, chromaticity and luminosity, to give nondiscernible

colour difference when viewed by eye and illuminated by a standard

light source, and to colour match. All ceramic fritting to be opaque and to a

colour to be agreed with the Architect. Provide samples of at least 1200mm x

1200mm of each glass type.

e. Coatings/treatments/interlayers not to crack, disintegrate or corrode in any way under the extremes of conditions outlined in the Specification.

f. Advise the Architect, prior to commencement of the glass coating, the name of the

supplier and applicator, together with the location of the premises where work to be carried out.

Z25.111

High Performance Glass Coatings

- a. Panes of glass with high performance coatings to be examined for defects in accordance with BS EN 1096: Part 1, viewed from a distance of 3000mm from the outside face of the glazing, for both the main area and the edge area of the glass panes.
- b. Acceptance criteria of coated glass defects for uniformity, stain, spots/pinholes, clusters and scratches to be in accordance with BS EN 1096: Part 1.
- c. Where soft coatings are used in double glazed units, the glass to be edge stripped on the coating side to a width corresponding to the width of the spacer bar (complete with butyl strip) such that when the panes are sealed together no discolouration to the coating by the butyl strip occurs around the perimeter of the double glazed unit. The occurrence of a red or blue line around the perimeter of the glass panes to be deemed unacceptable.
- d. Suitably protect glass panes where soft coatings are applied. Up until time of installation the double glazed unit and all handling of glass to be carried out using protective cotton or surgical gloves so as not to damage the surface of the coating with finger prints. After protection is removed from the coated glass panes, the panes to be installed into the double glazed units and sealed within the recommended time by the coating manufacturer, to avoid any atmospheric deformation of the surface.
- e. Provide samples minimum 1200mm x 1200mm in size of any high performance coated glass types for review by the Architect.

Unitised Systems

Z25.112

Double Glazed Units

- a. Unless otherwise specified, double glazed units to be hermetically sealed units complying with BS 5713 or BS EN 1279. Double glazed units to utilise panes of unequal thickness, unless specified otherwise. The outer pane to be thicker to minimize the effect of pillowing.
- b. Spacers to be of adequate rigidity for their purpose, be continuous, with bent corners and have welded joints sealed to ensure the integrity of the seal and to provide a consistent moisture seal around the entire perimeter of the unit. Spacers to accommodate the seal and contain desiccant, allowing both to operate at maximum efficiency.
- c. Spacers to separate glass panes and the units to have a mechanically applied primary polyisobutylene seal between glass and spacer. This to provide a continuous vapourproof barrier to a minimum width of 1mm and a secondary two part silicone seal to the perimeter of the units to carry wind loads.
- d. Visual inspection of the glass edges, edge seals and spacers to be unhindered, prior to glazing.
- e. Drainage of water along edge seals not permitted.
- f. All double glazed units to be assembled in controlled temperature and humidity conditions. Breather tubes to be used, if necessary, during manufacture and transportation. Remove and seal units prior to manufacture.
- g. With regard to mechanically restrained glazing systems, the manufacturer to confirm

the maximum compression allowable on the edge of the units.

h. State the maximum concavity and convexity that will occur under the ambient climatic

conditions and barometer pressure differentials anticipated by the requirements of the Specification. Ensure that the double glazed units are flat (with a maximum deviation of 1/1000 at the centre of the glass pane when measured diagonally) when finally installed.

i. The bottom supported edges of laminated glass panes within vertical double glazed units to be ground flush over the width of the pane to provide even distribution of load to the setting blocks.

j. Double glazed units are to carry a test certificate/report carried out by an independent authority, showing compliance with BS EN 1279: Part 2.

Structural Silicone Glazing

Z25.113

Type and Method

a. General:

1). Be responsible for the structural silicone glazing based upon the Contract

Drawings and the requirements of the Specification.

2). Be responsible for the final selection of materials, testing, fabrication,

transportation and installation of the structural silicone glazing, all in

accordance with SANS 10137 and/or other standards specified herein and

submit samples for review by the Architect prior to manufacture.

3). The structural silicone glazing to be carried out in such a manner that will not

compromise the integrity of the double glazed units' edge seals and the

specified warranties.

4). Structural silicone glazing application only to be carried out in an appropriate working environment. The environment to be strictly controlled in accordance with the manufacturer's written instructions to maintain temperature, humidity, dust and dirt free conditions etc., in the working environment.

b. Materials:

1). Provide structural silicone adhesive, obtained from a single source, and apply strictly in accordance with the manufacturer's written recommendations.

2). For marine, or similar, environments the structural silicone to be resistant to damage from algae or attack by birds.

b. Installation/Fabrication:

1). Structural silicone glazing application not to be carried out on-Site unless agreed otherwise with the Architect.

2). Provide documentation of the sealant manufacturer's requirements for the particular substrate of the construction, including joint sizes, limitations and requirements for mixing, cleaning, surface preparation, priming and application.

3). Provide evidence that the sealant has been selected taking into account the sealant manufacturer's recommendation as to use and compatibility with the contact surfaces.

4). Joint design to be in accordance with the sealant manufacturer's written recommendations for glue-line and bite to glue-line ratio, taking into consideration the design wind pressures and panel sizes.

- 5). Provide details of tensometer and any other testing equipment as required.
- 6). Glazing procedures to include frame assembly, cleaning, priming (if necessary), gunning, tooling and frame handling after glazing and curing. Sealant not to be applied when the temperature is below 4°C and units not to be moved until the silicone has achieved a level of cure recommended by the silicone supplier.
- 7). Adopt silicone batching logging procedures to record all batches used, including batch manufacture date and arrival date of each batch at the fabrication works. The location of each structural silicone glazed panel to be individually located on As-built Drawings of the building, recording date and batch of structural silicone, with details of tests carried out to ensure that the highest quality of silicone is being used.
- 8). The structural silicone glazing to be recorded at the time of assembly and include identification marks of every panel by a unique number, readable from the inside of the building for the life of the building. Provide glazing records with information on each panel including silicone type, batch, date of application, glazier's name and temperature and humidity measured inside the factory on the day of assembly.
- 9). Recommend a periodical maintenance regime for agreement with the Architect. This to be incorporated in the O&M manuals. Acceptance criteria to be consistent with the requirements of the testing criteria and as a minimum must be:
- a). A standard 'peel test' on any broken panels that require replacement.

b). A close visual inspection, to be carried out externally from the cleaning apparatus, including application of hand pressure to verify continued adhesion. Carry out this exercise for 1% of the cladding, at a yearly frequency for the first 3 years, then at a frequency of 5 years following. The panels to be randomly selected around the elevations at varying heights.

c). The sealant supplier or other qualified body to carry out tests.

Rooflights/Horizontal and Inclined Glazing

Z25.114 Type and Method

a. Horizontal glazing to be designed to satisfy the requirements of ACR(M) 001 and CWCT Technical Note No. 42 in addition to the 'Health and Safety in Roof Work' guidance book (G)33, Appendix 4, the HSE and CDM regulations and be manufactured only by a company registered to SANS 9001.

b. Glazing for rooflights or horizontal and inclined situations to be capable of accommodating the following live loads without any reduction in its performance:

1). All defined loads resulting from specified movements of the main structural frame during building use.

2). Point loads imposed on the glass framing members of 695N inwardly acting.

Maintenance loads not to be carried by the glass infill panels.

3). Wind loads as defined by SANS 10160.

4). Loads imposed by snow as determined by SANS 10160.

5). Minimum working pressures on infill panels for hand cleaning operations as defined in SANS 10160.

- 6). The impact load of two persons falling on it during maintenance, cleaning and inspection operations. The glazing system to maintain its structural integrity and the glass and edge covering to have adequate thickness so that units do not 'pop out' of the frame under such impact. Should the outer layer of glass break, then the inner sheet glass to stay in place and support the operatives.
- 7). Large body impact tests by an accredited test organisation with certification produced to demonstrate compliance to an energy level of 1200J, when tested to prEN 1873.
- 8). When calculating loads on the glazing and structure, the worst combination of the above to be considered, taking account of the fact that the pressure coefficients at various locations may determine more than one design criterion

END OF SECTION

Z30 METALWORK FINISHES

a. To be read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z30.100 MATERIALS AND APPLICATION

Finishes

Z30.101 Appearance

a. All finishes to be stable, fade resistant and not affected by ultraviolet light. Provide data and samples for review by the Architect.

b. All finishes to be durable, of uniform texture and colour and be resilient to all known and/ or specified environmental and pollution effects. This to include scratching, cigarette smoke and burns, etc. Submit data and samples for review by the Architect.

c. Minor scratches and blemishes to be repaired using the coating manufacturer's recommended products and system, matching original finish for colour, texture and gloss. Repair coatings to be visually acceptable to the Architect. Provide confirmation that repair to the damaged finish complies in all respects to the requirements of the Specification. Guarantee in writing that the damaged or defective coating is satisfactory for the proposed remedial paint system. Employ an independent finishing consultant to carry out an inspection and any necessary tests and supply a full report to the Architect.

d. All finishes to be within the limits of the agreed samples and without irregularities or distortions. Fixings, stiffeners, etc. which are not intended to be visible to be treated so that there is no discontinuity in the finished surface appearance.

Z30.102 Surface Preparation of Steelwork

a. Surface preparation to remove all rust, scale and surface contamination to leave a surface equivalent in cleanliness to Sa 2.5 quality of Swedish standard SIS 05-59-00 (SANS 5767, SANS 5768, SANS 5769, SANS 5770 and SANS 5771). Achieve this by acid pickling, except where the presence of paint, oil, grease, welding slag, etc. renders this ineffective, and in all weld areas the steel to be locally blast-cleaned to Sa 2.5 quality of Swedish standard SIS 05-59-00 (SANS 5767, SANS 5768, SANS 5769, SANS 5770 and SANS 5771).

Finishes

Z30.103 Liquid Organic Coating

a. Aluminium alloy components to SANS 2063.

Z30.104 Plating of Surfaces

a. Cadmium/ zinc plating of iron and steel surfaces to comply with SANS 2081 and SANS 2082.

b. Chromium plating to comply with SANS 27.

Z30.105 Galvanising Generally

a. To SANS 121.

b. Coating thicknesses to comply with SANS 121 to suit the requirements of the Specification.

c. Where galvanising is visible, the final finish is to be smooth, continuous, consistent and free from flux staining and other forms of staining. Coating weight to be consistent maintaining a uniform appearance throughout the service life of the Works.

Z30.106 Galvanised Self Finish Surfaces

a. Galvanised steelwork not to be painted.

- b. Blast clean: Blast clean to SANS 5767, SANS 5768, SANS 5769, SANS 5770 and SANS 5771, Sa 2.5 where applied thickness of coating is greater than 86 microns.
- c. Preparation: Edge grind, remove all grease, oil and varnish and any other surface contaminants, ensure that any oil or silicon based anti-weld spatter is removed, remove weld spatter, grind welds as required and fill pits and other surface imperfections that may cause the premature failure of the coating system.
- d. Galvanising: The steelwork to be supplied to the galvaniser in a suitable condition to be acid pickled in dilute hydrochloric acid, passivated and then hot dip galvanised in accordance with the provisions of SANS 121.
- e. Uniformity: Carry out galvanising in such a way as to maximise the smoothness and uniformity of the deposited coating. Only use double dipping where no alternative exists.
- f. Touching-up is not allowed unless agreement is given by the Architect.
- 1). Where acceptance is given, use the Zilt-Stick system in accordance with the manufacturer's current recommendations. Zilt-Stick is a self-fluxing and galvanising system, which is applied by hand. The stick is made up of a galvanising compound, which has a "foil" wrapping, and is rubbed over the affected area until completely covered. The black flux residue can be removed using a damp cloth.
- 2). The maximum size of an area of touch-up is to be determined by locating the point on the damaged surface that is furthest from an intact galvanised coating. If the distance from this point to the galvanising is in excess of 10mm, then the member to be re-galvanised or rejected.

- 3). Galvafruid or paint applied finishes are not permitted under any circumstances.
- g. Refer to the recommendations of the Zinc Development Association for galvanising and zinc metal-spraying.
- h. Immersion process to be discussed and agreed with the Architect and submitted for formal comment. This is to ensure that during the galvanising process drips are not allowed to run off fair-faced surfaces and thus disfigure them. Fair-faced surfaces are all those surfaces that will be visible in the completed Works. Agree location of all fair-faced surfaces with the Architect before application.
- i. Breathing holes: Locate in unobtrusive places. Agree the location of these holes with the Architect and mark clearly on the Shop Drawings/ Working Drawings.
- j. Distortion: Ensure that no distortion of fabricated elements occurs during galvanising. Advise the Architect on the possibility for distortion of the steelwork elements during the galvanising process to enable design modifications of components to be made before fabrication of these components

Z30.107 Galvanised Steelwork to be painted

- a. Preparation: As recommended by the manufacturer of the applied coating system and to SANS 121.

Z30.108 Sprayed Metal Coatings

- a. To SANS 1391.
- b. Minimum coating thickness to comply with SANS 1391.

END OF SECTION

Z31 POWDER COATINGS

a. To be read in conjunction with other related sections of the Specification, the Preliminaries and Contract Conditions.

Z31.100 STANDARD DURABILITY POWDER COATINGS

Z31.101 General

a. Unless stated otherwise in the Specification section, the polyester powder coating for the works shall be in accordance with the following standards:

1). Qualicoat Class 1.

2). BS EN 12206: Part 1 (aluminium substrates).

3). BS EN 13438 (galvanised steel substrates).

4). GSB International Quality Regulations - aluminium and steel.

5). British Board of Agrément (BBA).

b. Only materials, sourced from a reputable supplier and which are fit for purpose shall be used.

c. The final visual appearance of all powder coated elements and components shall be consistent and identical.

d. Extrusion alloys shall be grade EN AW-6063, EN AW-6060 or acceptable equivalent, and comply with BS EN 754: Parts 3-5 and BS EN 755: Parts 1-9.

e. Powder coating to sheet material shall be grade 1200/3103, and shall comply with BS EN 485 + A1, BS EN 515 and BS EN 573: Parts 1-3.

f. Base aluminium shall be suitable to receive the powder coating application.

g. Aluminium sheet shall be of a suitable temper and thickness to facilitate the stoving process without damage or reduction in performance and visual intent.

h. Comply with the relevant sections of the COSHH Regulations 2002, the Environmental Protection Act 1990 Part 1, the Management of Health and Safety at Work Regulations 1999 and the Construction (Design and Management) Regulations 2015.

Z31.102 Materials

- a. Colour shall be as specified or selected by the Architect from the BS/ RAL range.
- b. Colour shall remain consistent regardless of batch, as stated in BS 950: Part 1.
- c. In order to achieve consistency of colour only use one batch per colour, spray apply, use regulated and automated equipment and use the minimum number of batches.
- d. Provide a range of colour, including metallic, and finish quality samples prior to production for selection by the Architect. Samples shall demonstrate the range of anticipated finish and colour consistency acceptable to the Architect.
- e. Local dry film thickness, applied to adjacent panels, shall not vary (maximum and minimum) by more than 20% unless otherwise agreed by the Architect following receipt of samples for review.
- f. All coatings shall be consistent in terms of colour, quality and finish within the limits agreed in advance through samples provided and accepted.
- g. Use only low tack protective tape applied in accordance with good practice and manufacturer's recommendations for a maximum period of six months. If longer periods are required, remove and re-apply new tape.

Z31.103 Workmanship

- a. All coatings shall have a current BBA Approval Certificate or acceptable equivalent.
- b. Application of coatings shall be carried out as recommended by the Qualicoat

scheme, BS EN 12206 and/ or BS EN 13438.

c. All coating work shall be carried out at a single plant/ location using a single batch where possible. If multiple batching is required, notify the Architect and take measures necessary to comply with the Specification in terms of quality and consistency of colour and finish.

d. Keep the surfaces clean and as new until Practical Completion so as to maintain the warranty. This includes sufficient regimes in environments stipulated as Hostile (C4 and C5 as determined by BS EN ISO 12944), which can reduce cleaning periods from every twelve months to every three months for standard polyesters, depending on specific locality from the pollutant.

e. Damage rectification shall be carried out if it is repaired immediately and to the Architect's satisfaction. Repairs shall be carried out at the point of manufacture under strictly controlled conditions and not on Site unless specifically agreed in advance with the Architect and colour retention, gloss retention and adhesion are guaranteed without detriment to the warranty.

f. In environments classified as Hostile (C4 and C5) environments, cut edges, drilled holes and mitres shall be sealed to avoid coating failure.

g. Agree in advance with the Architect any proposed pre-anodising.

Z31.104 Testing

a. Carry out tests or provide certified evidence of previous tests to satisfy the Architect that the following requirements have been achieved in relation to the works in accordance with the specified standards, quality and performance requirements:

1). Artificial weathering.

- 2). Natural Weathering, including chalking and colour/ gloss fastness shall be based on a one year Florida Testing regime.
- 3). Visual inspection, from a distance of not more than 1000mm to determine any failure as a result of exterior exposure.
- 4). Impact resistance.
- 5). Cupping, scratching, adhesion, flexibility, salt spray, humidity and film thickness in accordance with the Qualicoat scheme and BS EN 12206.
- 6). Permeability.
- 7). Mortar resistance.
- 8). Film thickness:
 - a). The minimum average film thickness at any point shall be 50 microns for aluminium and 60 microns for galvanised steel.
 - b). In hazardous environments, the minimum thickness shall be increased to 60-70 microns.
 - c). Certain colours may require an increase in the minimum film thickness to 80 microns to achieve the required colour intensity.
 - d). Seeding and double coating is not acceptable.
 - e). Ensure that the minimum film thicknesses are applied to non-significant, non-visible surfaces and secondary faces.
- 9). Gloss levels shall be maintained at 30% \pm 5% for matt finishes, 70% \pm 5% for satin finishes and 85% \pm 5% for gloss finishes when measured using a 60° gloss meter.
- 10). Coatings shall achieve Class 1 rating when tested in accordance with BS 476:

Part 7.

11). Coatings shall achieve a Class 0 rating as defined under the Building Regulations.

12). Carry out tests on finished elements (extrusions and panels) which are a minimum size of 150mm x 75mm consisting of a flat coated/ significant surface, as defined in BS EN ISO 2064, using instrumental measurements.

13). Comply with the testing requirements of BS EN ISO 2064 and BS EN 13438.

14). Provide detailed reports confirming where and when tests were carried out, which coating system was tested (i.e, name of product, supplier, the precise colour reference, product code and precise batch reference) and confirmation that all tests were passed, or details of failures and extent of failure.

15). Should the Architect deem it necessary the Contractor shall appoint an independent testing authority to prove compliance with the Specification. Such a test shall comprise a minimum of three independent inspections, sampling procedures and plans as set out in BS 6001: Part 1 for general inspection level 2. An Acceptable Quality Level of 1% for each colour and finish to be installed shall be the minimum acceptable.

16). Independent Site inspections shall be carried out if the Architect is not satisfied with the test reports provided by the Contractor to confirm Specification compliance or otherwise. Such inspections shall comply with the requirements of BS 6001: Part 2, LQ (Limited Quality) (Pa = 10%) + 5% with each individual fabrication element being considered as an individual component for assessment purposes. For units that are finished in fewer than three production

runs, inspections shall comply with the requirements of BS 6001: Part 2 to the same LQ.

17). Where elements delivered to Site are damaged or test reports have not been provided, the Contractor shall carry out an independent investigation of all finishes to all relevant elements. This investigation shall be carried out within the guidelines of BS 6001: Part 2, LQ (Limited Quality) (Pa = 10%) + 5%. For the purpose of this inspection, each section in the window curtain wall or other fabrication shall be taken as an individual component in assessing the overall batch number to allow the acceptance inspection laboratory to certify that the works comply with the Specification. For units that are finished in fewer than three production runs, acceptance inspections shall also be made using BS 6001: Part 2 to the same LQ.

18). Practical Completion will not be confirmed if any test report has not been received by the Architect.

Z31.200 SUPER DURABLE POWDER COATINGS

Z31.201 General

a. Unless stated otherwise in the Specification section, the polyester powder coating for the works shall be advanced super durable polyester coated in accordance with the following standards:

- 1). Qualicoat Class 2.
- 2). BS EN 12206: Part 1 (aluminium substrates).
- 3). BS EN 13438 (galvanised steel substrates).
- 4). GSB International Quality Regulations - aluminium and steel.

- 5). British Board of Agrément (BBA).
- b. Only materials sourced from a reputable supplier and which are fit for purpose shall be used.
 - c. The final visual appearance of all powder coated elements and components shall be consistent and identical.
 - d. Extrusion alloys shall be grade EN AW-6063, EN AW-6060 or acceptable equivalent, and comply with BS EN 754: Parts 3-5 and BS EN 755: Parts 1-9.
 - e. Powder coating to sheet material shall be grade 1200/3103, and comply with BS EN 485 + A1, BS EN 515 and BS EN 573: Parts 1-3.
 - f. Base aluminium shall be suitable to receive the powder coating application.
 - g. Aluminium sheet shall be of a suitable temper and thickness to facilitate the stoving process without damage or reduction in performance and visual intent.
 - h. Comply with the relevant sections of the COSHH Regulations 2002, the Environmental Protection Act 1990 Part 1, the Management of Health and Safety at Work Regulations 1999 and the Construction (Design and Management) Regulations 2015.

Z31.202

Materials

- a. Colour shall be as specified or selected by the Architect from the BS/ RAL range.
- b. Colour shall remain consistent regardless of batch, as stated in BS 950: Part 1.
- c. In order to achieve consistency of colour only use one batch per colour, spray apply, use regulated and automated equipment and use the minimum number of batches.
- d. Provide a range of colour, including metallic, and finish quality samples prior to production for selection by the Architect. Samples shall demonstrate the range of

anticipated finish and colour consistency acceptable to the Architect.

e. Local dry film thickness, applied to adjacent panels, shall not vary (maximum and minimum) by more than 20% unless otherwise agreed by the Architect following receipt of samples for review.

f. All coatings shall be consistent in terms of colour, quality and finish within the limits agreed in advance through samples provided and accepted.

g. Use only low tack protective tape applied in accordance with good practice and manufacturer's recommendations for a maximum period of six months. If longer periods are required, remove and re-apply new tape.

Z31.203 Workmanship

a. All coatings shall have a current BBA Approval Certificate or acceptable equivalent.

b. Application of coatings shall be carried out as recommended by the Qualicoat scheme, BS EN 12206 and/ or BS EN 13438.

c. All coating work shall be carried out at a single plant/ location using a single batch where possible. If multiple batching is required, notify the Architect and take measures necessary to comply with the Specification in terms of quality and consistency of colour and finish.

d. Keep the surfaces clean and as new until Practical Completion so as to maintain the warranty. This includes sufficient regimes in environments stipulated as Hostile (C4 and C5 as determined by BS EN ISO 12944), which can reduce cleaning periods from every eighteen months in non-aggressive environments, (i.e. C1-C3 as determined by BS EN ISO 12944, only) to every three months for standard polyesters, depending on specific locality from the pollutant.

e. Damage rectification shall be carried out if it is repaired immediately and to the Architect's satisfaction. Repairs shall be carried out at the point of manufacture under strictly controlled conditions and not on Site unless specifically agreed in advance with the Architect and colour retention, gloss retention and adhesion are guaranteed without detriment to the warranty.

f. Agree in advance with the Architect any proposed pre-anodising.

g. Where pre-anodising is proposed as a method to promote strong adhesion, this shall be specifically notified to the Architect as part of the proposals/ submittals process.

Z31.204

Testing

a. Carry out tests or provide certified evidence of previous tests to satisfy the Architect that the following requirements have been achieved in relation to the works in accordance with the specified standards, quality and performance requirements:

1). Artificial weathering.

2). Natural Weathering, including chalking and colour/ gloss fastness shall be based on a one year Florida Testing regime.

3). Visual inspection, from a distance of not more than 1000mm to determine any failure as a result of exterior exposure.

4). Impact resistance.

5). Cupping, scratching, adhesion, flexibility, salt spray, humidity and film thickness in accordance with the Qualicoat scheme and BS EN 12206.

6). Permeability.

7). Mortar resistance.

8). Film thickness:

- a). The minimum average film thickness at any point shall be 50 microns for aluminium and 60 microns for galvanised steel.
- b). Where hazardous environments are involved, the minimum shall be increased to 60-70 microns.
- c). Certain colours may require an increase in the minimum film thickness to 80 microns to achieve the required colour intensity.
- d). Seeding and double coating is not acceptable.
- e). Ensure that the minimum film thicknesses are applied to non-significant, non-visible surfaces and secondary faces.
- 9). Gloss levels shall be maintained at 30% \pm 5% for matt finishes, 70% \pm 5% for satin finishes and 85% \pm 5% for gloss finishes when measured using a 60° gloss meter.
- 10). Coatings shall achieve a Class 1 rating when tested in accordance with BS 476: Part 7.
- 11). Coatings shall achieve a Class 0 rating as defined under the Building Regulations.
- 12). Carry out tests on finished elements (extrusions and panels), which are a minimum size of 150mm x 75mm consisting of a flat coated/ significant surface, as defined in BS EN ISO 2064, on which to conduct instrumental measurements.
- 13). Comply with the testing requirements of BS EN ISO 2064 and BS EN 13438.
- 14). Provide detailed reports confirming where and when tests were carried out, which coating system was tested (i.e, name of product, supplier, the precise

colour reference, product code and precise batch reference) and confirmation that all tests were passed, or details of failures and extent of failure.

15). Independent Site inspections shall be carried out if the Architect is not satisfied with the test reports provided by the Contractor to confirm Specification compliance or otherwise. Such inspections shall comply with the requirements of BS 6001: Part 2, LQ (Limited Quality) (Pa = 10%) + 5% with each individual fabrication element being considered as an individual component for assessment purposes. For units that are finished in fewer than three production runs, inspections shall comply with the requirements of BS 6001: Part 2 to the same LQ.

16). Where elements delivered to site are damaged or test reports have not been provided, the Contractor shall carry out an independent investigation of all finishes to all relevant elements. This investigation shall be carried out within the guidelines of BS 6001: Part 2, LQ (Limited Quality) (Pa = 10%) + 5%. For the purpose of this inspection, each section in the window curtain wall or other fabrication shall be taken as an individual component in assessing the overall batch number to allow the acceptance inspection laboratory to certify that the works comply with the Specification. For units that are finished in fewer than three production runs, acceptance inspections shall also be made using BS 6001: Part 2 to the same LQ.

17). Practical Completion will not be confirmed if any test report has not been received by the Architect.

END OF SECTION

Z33

ANODISING

a. To be read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z33.100

MATERIALS AND APPLICATION

Aluminium Anodising

Z33.101

Materials

a. Aluminium anodising to comply with SANS 999, unless specified otherwise. Provide a certificate of assurance that each batch of anodising has been properly carried out.

b. The colour anodising process to be agreed with the Architect. Colouring of the anodic film to be achieved by use of a two-stage electrolytic process utilising cobalt or nickel as the colouring metal or by use of a single stage integral process. On no account allow anodic films coloured by the use of tin electrolytes to be used. Any proposal for the use of an alternative colouring technique can only be considered if the anodiser confirms in writing that the alternative process will meet all of the visual, physical and documentary requirements detailed within the Specification. Satisfactory independent evidence and samples will be required to prove that an alternative colouring process will provide an equal or superior standard of performance and life expectancy.

c. Colour control limits to be submitted as samples with the Tender for review and comment by the Architect. The anodic finish to be within these limits agreed and held by the Architect.

d. All aluminium alloys to be selected to ensure that the finished visual appearance of all components is identical. The alloy for extrusions to be grade 6063, or acceptable

equivalent, and for sheet material grade J57S, or acceptable equivalent. Obtain a certificate from the material supplier stating the grade of material supplied.

e. Base metal batching to be controlled in order that areas match. Critical visible areas to be from a single batch. Agree base metal batching with the Architect in advance of production.

Z33.102

Workmanship

a. Anodic oxidation coating to be carried out at a single place of manufacture. All critical visible areas to be anodised in a single batch.

b. Anodising to commence after fabrication/machining is complete wherever possible.

c. Any fabrication of pre-finished lengths to be previously agreed with the Architect.

Uncoated edges to be non-visible in assemblies, nor exposed to the atmosphere.

Fabricated pieces to meet the thickness requirements of SANS 999.

d. The processes adopted to be compatible, offering weather resistance, abrasion resistance, impact resistance and protection against chemical attacks as follows:

1). Corrosion resistance to be equal to or greater than that of an anodised aluminium finish thickness of minimum average 25 microns and sealing in accordance with SANS 999 and the Specification.

2). For production control the sealing value of the anodising to be determined in accordance with SANS 2931. In the event of a dispute, the referee test described in SANS 3210 to be carried out. The maximum weight loss from the referee test to be no greater than 30mg/dm^2 , for acceptance. Impregnated cold sealing processes not to be used.

3). For production control the film thickness of the anodising to be determined in

accordance with ISO 2360. In the event of a dispute the referee test described in SANS 144 to be carried out. The minimum local film thickness to be 20 microns with a maximum of 35 microns.

4). Anodic oxidation coating to be carried out by the sulphuric acid bath process.

The temperatures of the anodising bath and chemical content to be set and maintained to achieve good quality control of the finished product in accordance with SANS 999.

5). Notwithstanding SANS 999, visible surfaces to be free from coating or metallurgical defects when viewed from 1 metre.

e. The temperatures of the anodising bath and chemical content to be set and maintained to achieve good quality control of the finished product in accordance with SANS 999.

f. A quality control system for cleaning extrusion dies to be adopted such that no lines appear on the face of the extrusions. As a minimum check every 5th extrusion.

g. Rejected anodised extrusions only to be reprocessed once.

h. Anodised finishes to be within the control limits (established from range samples) or standards accepted by the Architect.

i. The finish to be agreed with the Architect from the range samples provided.

j. The finish to be sealed in accordance with SANS 999.

k. Finishes to be tested to SANS 6581.

l. Variation of final surface finish to be limited to tolerances agreed with the Architect prior to commencement. If such variations do occur then such components that, in the opinion of the Architect, fail to achieve a uniform final surface finish to be replaced.

m. Lines produced at the location of die connection points only to occur on non-visible surfaces in the installed works. The contact marks on sections resulting from electrical connection not to be on visible surfaces of the installed works.

n. Cleaning Frequency: The normal cleaning frequency associated with the guarantees to be not less than 18 months, unless advised otherwise at the time of Tender.

o. Repair of damage: Surface areas likely to be damaged during handling, fixing or by other building trades to be fully protected until completion of all other work in the area of the installation. If during fixing or glazing any damage does occur, rectify immediately. Site rectification of damage only to be carried out with the Architect's acceptance and to carry a 25 year guarantee for colour retention, avoidance of discolouration and corrosion resistance

Z33.103

Testing

a. The Architect to commission an independent testing authority with the Contractor responsible for all costs incurred. To gain acceptance of the finished products for use, carry out a minimum of three independent acceptance inspections, sampling procedures and plans, as set out in SANS 2859, on each colour and finish used in the works. These inspections to be carried out at the finishing plant prior to fabrication by a competent independent inspector from an approved laboratory.

b. Where there is damage or the production test reports have not been provided, the Architect to commission an independent investigation of all finishes on Site-fixed units with the Contractor being responsible for all costs in connection with such Site inspections. This investigation is to be carried out within the guidelines of SANS 3951. For the purpose of this inspection each section in the window curtain wall or

other fabrication to be taken as an individual component in assessing the overall batch number to allow the consultant to certify that the completed Contract complies with the Specification.

c. Certificates of Practical Completion or any other document of authority accepting responsibility may not be signed by the Architect until he has received these reports

END OF SECTION

Z36 GASKETS

a. To be read in conjunction with Section A, other related sections of the Specification, the Preliminaries and Contract Conditions.

Z36.100 MATERIALS AND FABRICATION

Materials Type and Use

Z36.101 Materials

- a. Gaskets to accommodate the maximum movements applicable.
- b. All gasket to gasket joints to be butt jointed and heat sealed. The bonding of gaskets using other materials is not acceptable. The gaskets to perform and appear as a single continuous material.
- c. The gasket system to comprise both extruded and moulded elements. These to perform and appear as a single element.
- d. All gaskets to be fabricated to the most appropriate grade and hardness. Design and select all gaskets in order to:
- 1). Comply with the stipulations of SANS 635.
 - 2). Be most appropriate to the extrusion design.
 - 3). Ensure that glass retention and weatherproofing requirements are maintained by dry solid materials and/or structural silicone.
 - 4). Ensure that they do not permanently distort over the working life of the works.
- e. Gaskets to be free from contact with materials that have stain characteristics and be compatible with all substrate, sealants and all other materials used in the works.
- f. Provide written confirmation from the gasket manufacturer that the gasket material and designs are wholly suitable for their specific use in any part of the works and are

compatible with all other materials and sealants used within the installation and at interfaces with other materials/components.

g. The colour of all gaskets to be black unless specified otherwise.

h. Gaskets not to shrink, warp or deteriorate between the periods stated in the Contractor's stated times for replacement.

i. Gasket corners in frames to be preformed and factory vulcanised in ladders.

j. The choice of seals and gaskets not to result in any reduction in sound insulation performance.

k. Gaskets and seals used to achieve the required airtightness to be selected to accommodate fully the range of dimensional tolerances and movements associated with the design, fabrication and installation of the works. To be formed from materials capable of maintaining their elastic qualities and dimensions and be resistant to physical and chemical attack, sufficient to maintain the full acoustic performance of the works.

l. Be responsible for ensuring that the glazing framework is effectively sealed to the building structure to such an extent that the acoustic performance of the installation is equivalent to that measured under the test conditions detailed in the Specification.

END OF SECTION