

THE CASTINGS

Façade Quality Plan

Rev.A - 9th December 2022



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Façade Quality Plan

1. INTRODUCTION

This document sets out the quality control management strategy for The Castings project for the selection, design, manufacture, and construction of the external façade.

2. DESIGN CONCEPT

The proposed facade treatment is to be a combination of the following components:

- Brick facade
- Aluminium cladding, composite windows, curtain walling, doors and louvres

As noted in the Condition 3a submission: *“The design objective is to use brick in a number of subtle variations with differing mortar joints to give the building an identity as a modern development rooted in an area with a strong identity and sense of place. The Heyrod Street block will use a distressed weather-struck brick type while the Longacre Street block will use a brick from the same local supplier with a greyer tone. Both blocks will use two different mortar types to differentiate the grid and the banding. At ground floor a special brick profile using the same brick facing will be used to give the street level façade a higher level of interest. Anthracite window frames, curtain walling, cladding panels, cill’s, fascia’s, flashings and Juliette balconies will be used to contrast against both brick types”.*

These products and components will be procured and installed by ourselves through the use of our preferred supply chain. The quality control of the components and construction / installation is paramount to achieve the requisite finish. To ensure the delivery of a high quality finish a number of policies will be implemented, including the preparation of an Architect’s Specification and the implementation of the Sub-contractor’s Quality Plan.

The architect’s role is to check all works for compliance against the specification. It will also be a fundamental requirement for the architect, in collaboration with MCC planning department, to sign-off full scale mock-up samples before works commence. These samples are to demonstrate the abutment and interface details between the components, and to this end the VMU design was agreed prior site commencement (Condition 3a).

As main contractor, Midgard work closely with the supply chain, design team and construction team members to ensure robust details are developed that accurately represent the quality aspirations of the scheme and that these can be effectively implemented on site.

3. ROLES AND RESPONSIBILITIES

The design and construction team members all have important roles and responsibilities in managing the quality of the façade materials for The Castings Project. The key team members include:

- Architects – Axis Architects (Shepherd Robson)
- Main Contractor – Midgard Ltd (working with the following subcontractors):
 - Brickwork – Kinlan Brickwork Specialists
 - Aluminium Cladding – McMullen Facades Ltd
 - Composite Windows – Janex Ltd
 - Curtain Walling/Louvres – GH Facades

Axis Architects

Axis Architects are responsible for the development of the design. As Lead Designer they are also responsible for checking and coordinating sub-contractor design information and coordination of information from other design team members. This includes building product specification / selection and the policing of the quality of all installations, including all façade components.

Midgard Ltd

Midgard Ltd is the Principal Contractor with total responsibility for the delivery of the Castings project. This includes the careful selection and management of all subcontract package contractors.

Midgard work very closely with our sub-contractors and supply chain to ensure that quality of the project is effectively implemented on site. Underpinning our on-site quality management procedures Midgard utilise the digitised “Field View” system, this is used to check and record the implementation of all works on site against checklists appropriate to each trade, including piling and foundations, brickwork, windows, cladding, curtain walling, to internal fit out fire-stopping etc.

Field View is a tablet/mobile based system that allows the site management team to capture and record data and create snagging lists with “hold” points which are managed for quality, safety. These are managed carefully to ensure all items as closed out to achieve the approved “benchmark”. All information is uploaded into a central database that allows monitoring to ensure all snags are addressed and closed out prior handover. An overview of the system was submitted to Angela Leckie via email on 12th July (see Appendix C).

In addition to our project quality control processes and procedures, our company quality team, will carry out independent checks and audits on The Castings as they do for all Midgard Projects.

Subcontractor selection: The use of high quality materials and products, together with the careful selection of the right sub-contractors with a proven track record of delivering high quality is vital to the successful outcome of The Castings project. Following a rigorous selection and tender process by Midgard which includes evaluation of key factors, including financial status, quality management, standard of workmanship, track record of relevant project experience, adequacy of skilled and experienced staff, resources, adherence to programme, past relationships etc, Kinlan, McMullen Facades, Janex, and GH Facades have been appointed to deliver the façade elements as listed above.

Façade Consultant

Midgard Ltd have employed a façade consultant dedicated to the Castings project – GFS who work closely with Midgard Ltd and the wider JRL Group across various projects.

GFS’s responsibilities are

- Review and input on the Architect’s and Consultants design information, provide comments and advice on the Façade Performance and quality specification.
- Review the facade design details, calculations (Acoustic/ Structural/ Thermal) including the buildability of the proposed designs, and interface details.

- Development of wind analysis, and review the structural calculations, including engineer's movement and tolerance report and ensure full compliance within the sub-contractor designs
- Review of the access & maintenance strategy for the façade and the suitability of operational & maintenance issues and the replacement of materials during service.
- Review subcontractor's QA procedures in their manufacturing facilities and on-site, verify compliance with specification and good standards. Carry out reasonable audits in the subcontractors manufacturing facilities and on site, to check their QA procedures
- Together with the Project Team ensure compliance with specification, including but not limited to façade detailing, junctions, tolerance to ensure compliance with the project specification and relevant UK standards, Building Regulations, and the approved fire strategy
- Review of the façade system(s) to ensure specification, and quality compliance, warranty insurance as well as the contractor's warranties and their design life / life expectancy of materials used in the facade system.
- Attendance at Design Meetings during the design development stages.
- Review and comment on the Façade details and subcontractor design details, technical submissions, samples, VMU for compliance with the technical and quality requirements.
- Review façade structural calculations for the various systems & thermal calculations (U-value, 2D, condensation risk and 3D point thermal bridging).
- Attend design/ installation co-ordination meetings during the Stage 5 phase to provide input, resolve interface issues or material changes and ensure compliance with the design intent. Review testing proposals where applicable. Attendance at site inspections, witnessing site testing and providing reports.

4. INTERFACE MANAGEMENT

The main interfaces on the façade are the brickwork vertical piers and horizontal brick banding with recessed brick panels, these have various interfaces with other materials, which is reflected in the VMU panel.



The sample VMU panel with these interfaces, with a composite window, Juliette balcony, and powder coated aluminium cill and soffit (as approved under Condition 3a) has been built within the site compound, this also included horizontal and vertical movement joints.

Following an initial visit by Angela Leckie and David Roscoe, the final VMU together with 6no sample panels of the three previously approved brick types (Farmstead Antique Brick / Woodside Mixture / Granite Ash), each in a light and dark mortar was presented by Midgard and Axis Architects to Angela Leckie and David Roscoe and approved on 5th August 2022.

As part of the visit Axis Architects also presented images to illustrate the design process that has taken place in determining the most discreet locations for brickwork movement joints and also the positions of weep holes.

5. TOLERANCES

The dimensional accuracy of the façade will be controlled and checked by Axis Architects as architects, Midgard as the Principal Contractor. Midgard provide all primary gridline setting out and datums, which is checked and verified as the works proceed to ensure within acceptable tolerances.

To ensure the interface of these elements remains consistent and of a high level of quality all facing brickwork is set out to full brickwork dimensions as defined within the Architects construction drawings, to maintain the correct dimensional accuracy within the permitted tolerances for the brickwork and also at abutments with areas of aluminium cladding, and curtain walling.

To achieve the successful design and construction of the brickwork façade Axis Architects have considered the material when setting out, in both plan and elevation. By setting out to multiples of brick dimensions, cut bricks and awkward bond patterns have been avoided. This will improve the aesthetic of the finished building. The tolerance and range values declared by the brick manufacturer for the approved facing bricks noted above are Tolerance category: T2 and a Range category: R1

6. ENSURING ON-SITE QUALITY AND RECTIFYING DAMAGE

The quality control of both the façade components and construction / installation is paramount to achieve the requisite finish. To ensure the delivery of a high-quality finish requires several policies to be implemented, including the preparation of an Architect's Specification (see Appendix B) and the

implementation of the Sub-contractor's Quality Plan (see Appendix C), and also a stringent policing of quality by the contractor, Midgard as well as their Façade Engineer (which is managed via the "Field View" QA system.

To ensure the interface of these elements remains consistent and a high level of quality it is of paramount importance that the façade is set out to full brick dimensions as defined within the Architects construction drawings and remains within the permitted tolerances for both brickwork, and abutments with areas of aluminium cladding, and curtain walling.

The architect has prepared detailed construction specifications for all façade components and external wall build ups, which are provided in Appendix B. This sets the benchmark for quality as well as technical requirements which is critical to the long term performance of the building. The architect's specification describes the exacting detail and quality measures required.

Delivery and storage on site – Components and materials are to be carefully stored to prevent damage, and protect from inclement weather. And also protected to prevent soiling, chipping and contamination by salts and other deleterious substances.

Damaged Units – Components will be inspected prior use and installation. No repairs are to be undertaken without Architects approval.

Such acceptance shall not be given where the components are badly damaged or where the proposed repair would impair appearance or performance. Any repairs are to be recorded in a schedule or as built drawings for inclusion in the maintenance manual.

Cleaning – Clean any dirt or blemishes from exposed surfaces, including all mortar or staining on brickwork or façade components. Wash and rinse in accordance with the manufacturer's recommendations. Protect adjacent surfaces from damage due to cleaning operations. The architect's role is to check all works for compliance against the above specification.

7. APPENDICES

APPENDIX A

Architect's Elevation Drawings – Original CRTKL consented elevations

APPENDIX B

Architects NBS specifications:

NBS F10 – Brickwork

NBS H11 – Curtain Walling

NBS H92 – Rain screen Cladding

NBS L10 – Composite Windows

APPENDIX C

Midgard Quality Management – Field View

Quality Brickwork – External Façade

Kinlan Handover Certificate

Curtain Walling

Aluminium Cladding

Composite Windows

WORKMANSHIP GENERALLY

430 CONDITIONING OF CLAY AND CALCIUM SILICATE BRICKS AND CLAY BLOCKS

- Bricks and blocks delivered warm from manufacturing process: Do not use until cold.
- Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.

460 MORTAR GROUPS

- Mix proportions: For a specified group select a mix design from the following:

- Group 1:

1:0–0.25:3 (Portland cement:lime:sand with or without air entraining additive).

1:3 (Portland cement:sand and air entraining additive).

- Group 2:

1:0.5:4–5 (Portland cement:lime:sand with or without air entraining additive).

1:3 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).

1:2.5–3.5 (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).

1:3–4 (Portland cement:sand and air entraining additive.)

- Group 3:

1:1:5–6 (Portland cement:lime:sand with or without air entraining additive).

1:3.5–4 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).

1:4–5 (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).

1:5–6 (Portland cement:sand and air entraining additive).

- Group 4:

1:2:8–9 (Portland cement:lime:sand with or without air entraining additive).

1:4.5 (masonry cement:sand containing Portland cement and lime in approximate ratio 1:1, and an air entraining additive).

1:5.5–6.5 (masonry cement:sand containing Portland cement and inorganic materials other than lime and air entraining additive).

1:7–8 (Portland cement:sand and air entraining additive).

- Batching: Mix proportions by volume.

- Mortar type: Continuous throughout any one type of masonry work.

500 LAYING GENERALLY

- Mortar joints: Fill vertical joints. Lay bricks, solid and cellular blocks on a full bed.
- AAC block thin mortar adhesive and gypsum block adhesive joints: Fill vertical joints. Lay blocks on a full bed.
- Clay block joints:
 - Thin layer mortar: Lay blocks on a full bed.
 - Interlocking perpend: Butted.
- Bond where not specified: Half lap stretcher.
- Vertical joints in brick and concrete block facework: Even widths. Plumb at every fifth cross joint.

520 ACCURACY

- Courses: Level and true to line.
- Faces, angles and features: Plumb.
- Permissible deviations:
 - Position in plan of any point in relation to the specified building reference line and/ or point at the same level ± 10 mm.
 - Straightness in any 5 m length ± 5 mm.
 - Verticality up to 3 m height ± 10 mm.
 - Verticality up to 7 m height ± 14 mm.
 - Overall thickness of walls ± 10 mm.
 - Level of bed joints up to 5 m (brick masonry) ± 11 mm.
 - Level of bed joints up to 5 m (block masonry) ± 13 mm.

535 HEIGHT OF LIFTS IN WALLING USING CEMENT GAUGED OR HYDRAULIC LIME MORTAR

- Quoins and advance work: Rack back.
- Lift height (maximum): 1.2 m above any other part of work at any time.
- Daily lift height (maximum): 1.5 m for any one leaf.

635 JOINTING

- Profile: Consistent in appearance.

665 POINTING TO ALL BRICKWORK AND BLOCKWORK

- Joint preparation: Remove debris. Dampen surface.
- Mortar: As section Z21.
 - Standard: to BS EN 998-2.
 - Mix: as clause 111.

- Additional requirements: trial panel required for approval.
- Profile: Bucket handle.

671 FIRE STOPPING

- Avoidance of fire and smoke penetration: Fit tightly between cavity barriers and masonry. Leave no gaps.

690 ADVERSE WEATHER

- General: Do not use frozen materials or lay on frozen surfaces.
- Air temperature requirements: Do not lay bricks/ blocks:
 - In cement gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising.
 - In hydraulic lime:sand mortars when at or below 5°C and falling or below 3°C and rising.
 - In thin joint mortar glue when outside the limits set by the mortar manufacturer.
- Temperature of walling during curing: Above freezing until hardened.
- Newly erected walling: Protect at all times from:
 - Rain and snow.
 - Drying out too rapidly in hot conditions and in drying winds.

ADDITIONAL REQUIREMENTS FOR FACEWORK

730 BRICK/ CONCRETE BLOCK SAMPLES

- General: Before placing orders with suppliers submit for approval of appearance labelled samples of the following: Bricks as in clause F10/111; 112; 113, and blocks as F10/256 .
- Selection of samples: Representative of the range in variation of appearance.

740 FINISHED MASONRY WORK REFERENCE PANELS

- General: Before proceeding to construct the following walling types, construct panels as specified. Give notice when panels are dry.
- Selection of masonry units: Reasonably representative of the average quality of the whole order to be delivered .
- Panel types:
 - Walling type: F10/111; 112; 113; 256 .
- Location: To be agreed .
- Size: As per agreed Visual Mock agreed with MCC.
- Other requirements: None .

742 FACING BRICKWORK ACCURACY

- Notwithstanding any other specified requirements:

- After approval of the appearance of the reference panel(s), survey the panel and measure a representative selection of the following dimensions:
 - Perpendicular joint widths.
 - Bed joint heights.
 - Vertical alignment of perpendicular joints.
 - Unless agreed otherwise, measure not less than 20% of the built joints for each of the three conditions specified.
- Submit survey results to Architect on a scaled drawing of the reference panel indicating the exact location of the dimensions measured.
- In addition, express results in the following format:
 - Perpendicular joints vary from 'x'mm to 'y'mm.
 - Bed joints vary from 'x'mm to 'y'mm.
 - Perpendicular joints are in alignment by +/- 'x'mm.
- After obtaining Architect's approval to the survey results, ensure that all completed facing brickwork is built to the same degree of accuracy as the reference panel(s).

750 COLOUR CONSISTENCY OF MASONRY UNITS

- Colour range: Submit proposals of methods taken to ensure that units are of consistent and even appearance within deliveries.
- Conformity: Check each delivery for consistency of appearance with previous deliveries and with approved reference panels; do not use if variation is excessive.
- Finished work: Free from patches, horizontal stripes and racking back marks.

760 APPEARANCE

- Brick/ block selection: Do not use units with damaged faces or arrises.
- Cut masonry units: Where cut faces or edges are exposed cut with table masonry saw.
- Quality control: Lay masonry units to match relevant reference panels.
- Setting out: To produce satisfactory junctions and joints with built-in elements and components.
- Coursing: Evenly spaced using gauge rods.
- Lifts: Complete in one operation.
- Methods of protecting facework: Submit proposals.

830 CLEANLINESS

- Facework: Keep clean.
- Mortar on facework: Allow to dry before removing with stiff bristled brush.
- Removal of marks and stains: Rubbing not permitted.

APPENDIX A

Architect's Elevation Drawings – Original CRTKL consented elevations

	Brick Type 1 – Light Mortar	Composite Windows – Anthracite Grey
	Brick Type 1 – Dark Mortar	Curtain Walling; Frames and Louvres – Anthracite Grey
	Brick Type 2 – Light Mortar	Flat Metal Juliette Balcony – Anthracite Grey
	Brick Type 2 – Dark Mortar	Structural Glass Balustrade
	Brick Type 3 – Dark Mortar with Projecting Course	
	Aluminium Cladding – Anthracite Grey	



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ARCHITECT AND MAY NOT BE DUPLICATED, USED OR
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NOTES AND MATERIAL DESIGNATIONS ARE TYPICAL FOR
SIMILAR CONDITIONS UNLESS OTHERWISE INDICATED.

DO NOT SCALE FROM THIS DRAWING.

1	24/09/2020	Elevations update		
REV No.	DATE	DESCRIPTION	DWN	CHK

KEY PLAN

PROJECT _____

Heyrod Street

Heyrod St, Manchester M1 2NQ

CLIENT



Suite 12A, Manchester One, Portland Street
Manchester, M1 3FL, United Kingdom.

SHEET IDENTIFICATION

TITLE

HEYROD ST ELEVATION

STATUS

For Planning

PROJECT NUMBER	SCALE @ A1:	1 : 400
058-190002	DATE DRAWN:	04/30/20
SUITAB. CODE:	DRAWN BY:	JO
REVISION: 1	CHECKED BY:	MP

PROJECT	ORIGIN	ZONE	LEVEL	TYPE	ROLE	NUMBER
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190002 - CRL- ZZ- ZZ- DR- A- 020 - 0

©

25/09/2020 12:04:25

MATERIAL KEY

Brick Type 1 – Light Mortar	Composite Windows – Anthracite Grey
Brick Type 1 – Dark Mortar	Curtain Walling; Frames and Louvres – Anthracite Grey
Brick Type 2 – Light Mortar	Flat Metal Juliette Balcony – Anthracite Grey
Brick Type 2 – Dark Mortar	Structural Glass Balustrade
Brick Type 3 – Dark Mortar with Projecting Course	
Aluminium Cladding – Anthracite Grey	

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1	24/09/2020	Elevations update		
REV No.	DATE	DESCRIPTION	DWN	CHK

KEY PLAN

PROJECT

Heyrod Street
Heyrod St, Manchester M1 2NQ

CLIENT



CALLISONRTKL™

Suite 12A, Manchester One, Portland Street
Manchester, M1 3FL, United Kingdom.

SHEET IDENTIFICATION

TITLE
LONGACRE ST
ELEVATION

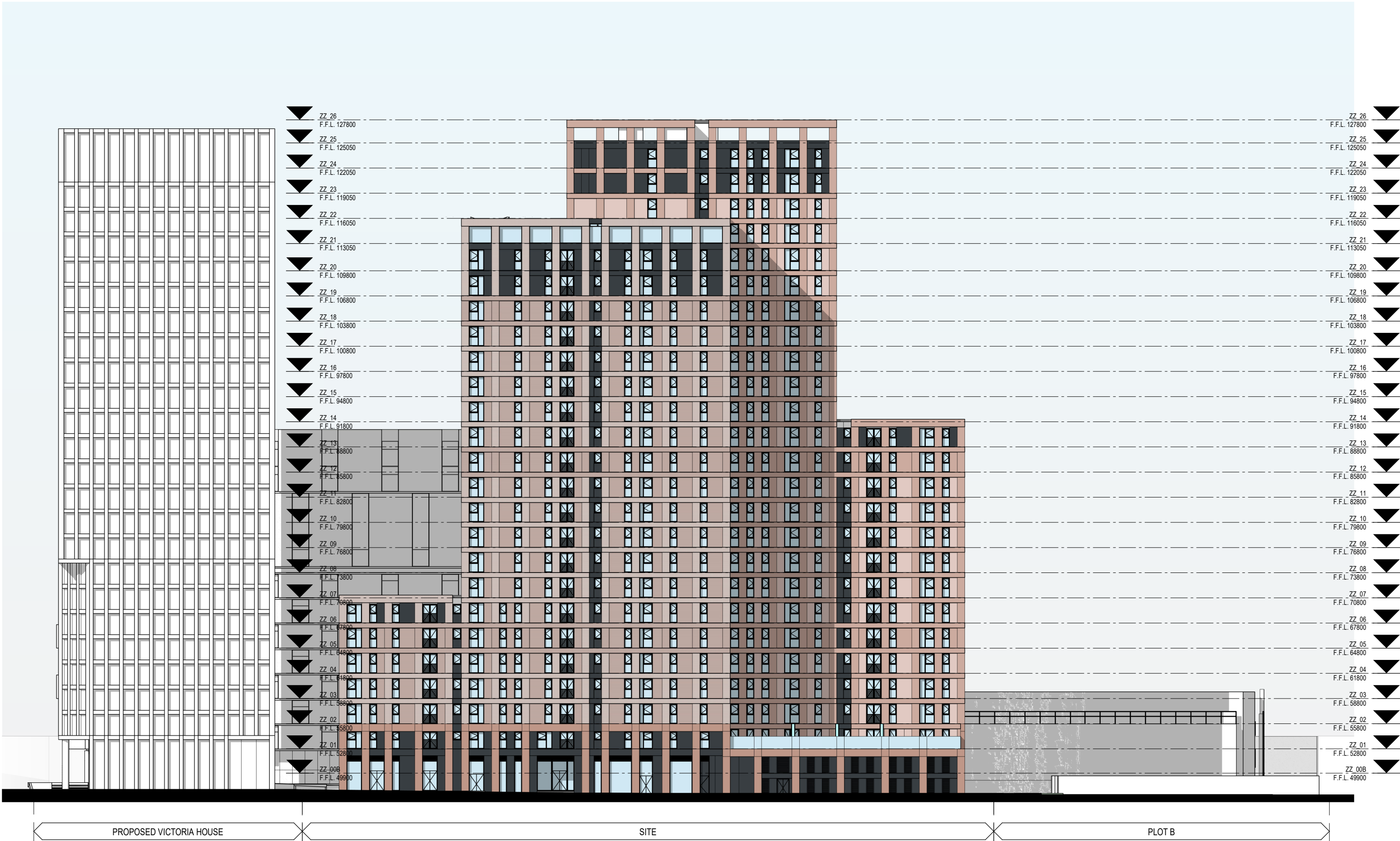
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For Planning

PROJECT NUMBER 058-190002	SCALE @ A1: 1 : 400
SUITAB. CODE:	DATE DRAWN: 04/30/20
REVISION: 1	DRAWN BY: JO
	CHECKED BY: MP

PROJECT	ORIGIN	ZONE	LEVEL	TYPE	ROLE	NUMBER
190002	- CRL-	ZZ-	ZZ-	DR-	A-	020 - 003

©



25/09/2020 12:05:11

MATERIAL KEY

Brick Type 1 – Light Mortar	Composite Windows – Anthracite Grey
Brick Type 1 – Dark Mortar	Curtain Walling; Frames and Louvres – Anthracite Grey
Brick Type 2 – Light Mortar	Flat Metal Juliette Balcony – Anthracite Grey
Brick Type 2 – Dark Mortar	Structural Glass Balustrade
Brick Type 3 – Dark Mortar with Projecting Course	
Aluminium Cladding – Anthracite Grey	

GENERAL NOTES

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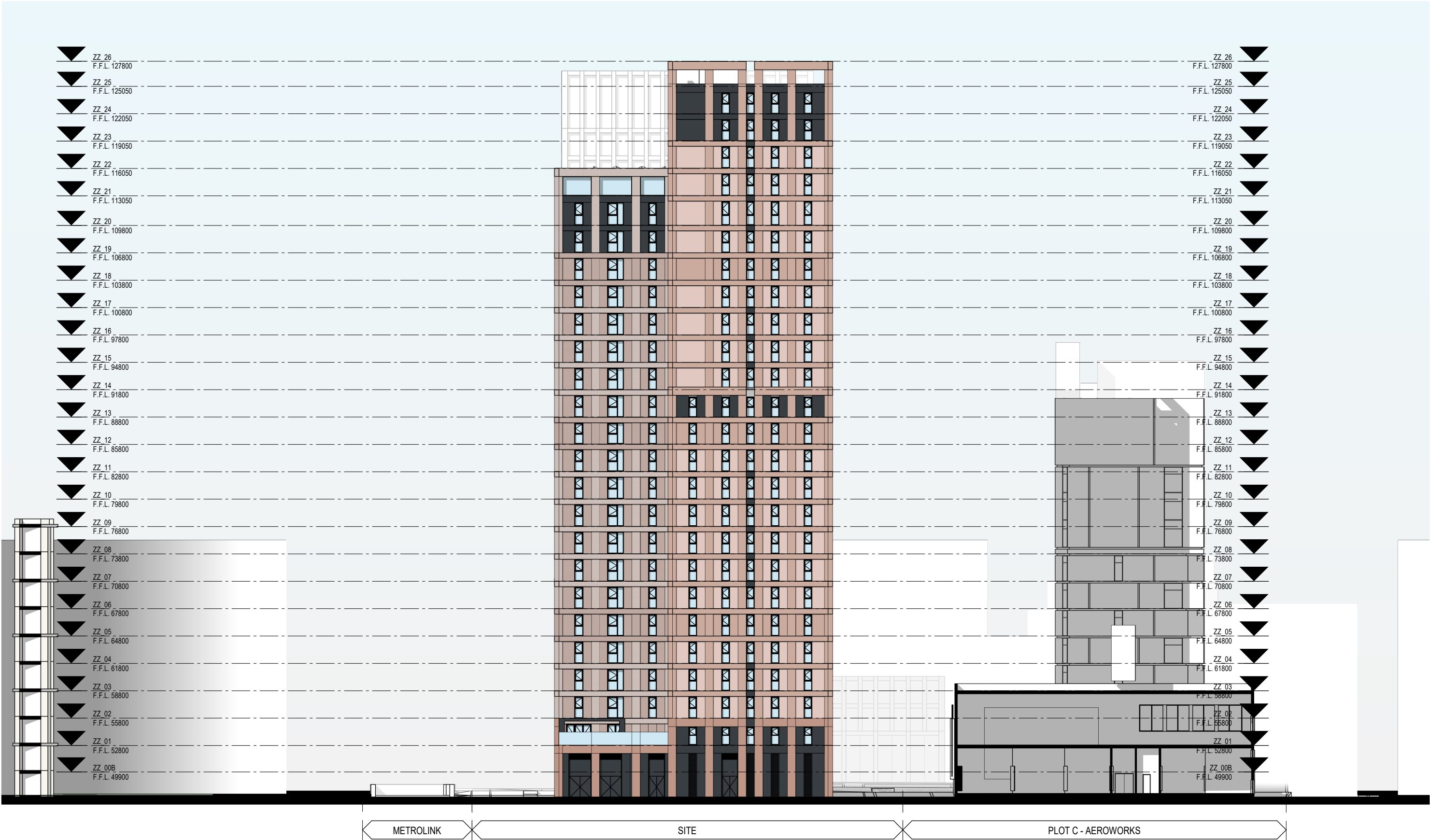
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1	24/09/2020	Elevations update		
REV No.	DATE	DESCRIPTION	DWN	CHK

KEY PLAN



PROJECT

Heyrod Street
Heyrod St, Manchester M1 2NQ

CLIENT



CALLISON RTKL

Suite 12A, Manchester One, Portland Street
Manchester, M1 3FL, United Kingdom.

SHEET IDENTIFICATION

TITLE
SOUTH ELEVATION

STATUS

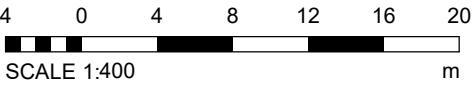
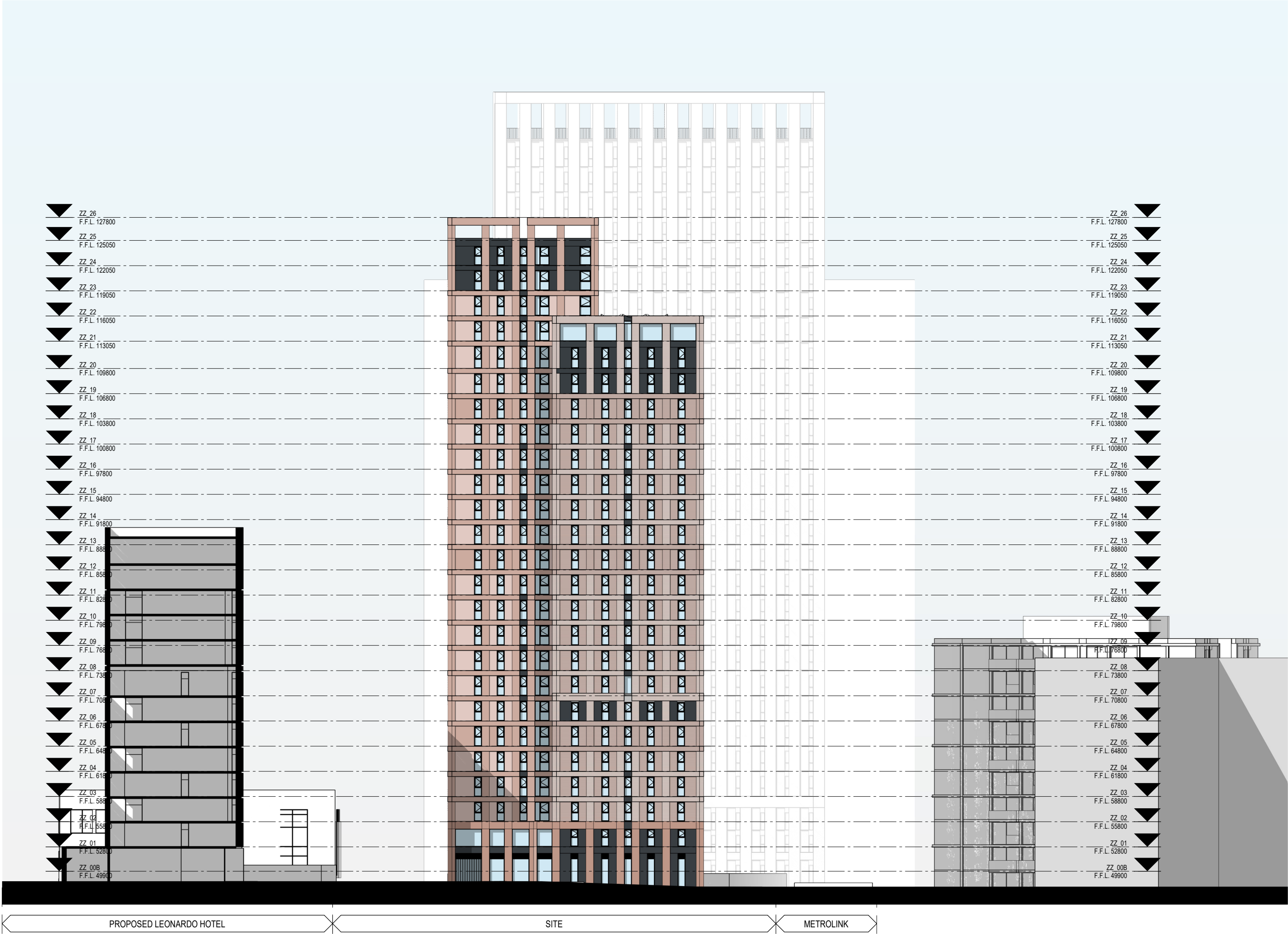
For Planning

PROJECT NUMBER 058-190002	SCALE @ A1: 1 : 400
SUITAB. CODE:	DATE DRAWN: 06/26/20
REVISION: 1	DRAWN BY: JO
	CHECKED BY: MP

PROJECT	ORIGIN	ZONE	LEVEL	TYPE	ROLE	NUMBER
190002	- CRL-	ZZ-	ZZ-	DR-	A-	020 - 005

MATERIAL KEY

Brick Type 1 – Light Mortar	Composite Windows – Anthracite Grey
Brick Type 1 – Dark Mortar	Curtain Walling; Frames and Louvres – Anthracite Grey
Brick Type 2 – Light Mortar	Flat Metal Juliette Balcony – Anthracite Grey
Brick Type 2 – Dark Mortar	Structural Glass Balustrade
Brick Type 3 – Dark Mortar with Projecting Course	
Aluminium Cladding – Anthracite Grey	



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REV No.	DATE	DESCRIPTION	DWN	CHK
1	24/09/2020	Elevations update		

KEY PLAN

PROJECT

Heyrod Street
Heyrod St, Manchester M1 2NQ

CLIENT



CALLISON RTKL™

Suite 12A, Manchester One, Portland Street
Manchester, M1 3FL, United Kingdom.

SHEET IDENTIFICATION

TITLE
NORTH ELEVATION

STATUS

For Planning

PROJECT NUMBER 058-190002	SCALE @ A1: 1 : 400
SUITAB. CODE:	DATE DRAWN: 06/26/20
REVISION: 1	DRAWN BY: JO
	CHECKED BY: MP

PROJECT	ORIGIN	ZONE	LEVEL	TYPE	ROLE	NUMBER
190002	- CRL-	ZZ-	ZZ-	DR-	A-	020 - 006

APPENDIX B

Architects NBS specifications:

NBS F10 – Brickwork

NBS H11 – Curtain Walling

NBS H92 – Rain screen Cladding

NBS L10 – Composite Windows

Sheppard Robson

The Castings

CAS-AXIS-BU1-XX-SP-A-10-0002

F10 Brick/ block walling

A4 - For Construction

C01

27-04-2022

Contents

F10 Brick/ block walling **REVISED** 1

F10 Brick/ block walling **REVISED**

To be read with preliminaries/ general conditions.

4 Sub-contractor's design responsibility

1. Based on the JCT guide to the use of Performance Specifications, the following are the requisite performance levels for Sub-Contractor design:
2. Performance Level 1: Prescriptive Specification (no design by Sub-Contractor):
 - 2.1. The Sub-Contractor is to construct the work in accordance with production information and a prescriptive specification provided by others and has no design responsibility.
 - 2.2. The Sub-Contractor is responsible for materials and workmanship and the provision of product manufacturer's guarantees and warranties where required.
3. Performance Level 2: Performance Specification (no 'in context' design by the Sub-Contractor)
 - 3.1. The Sub-Contractor's design input is limited to the selection of 'off the shelf' products that satisfy the performance specification and construction of the works using the selected components.
 - 3.2. The Sub- Contractor is responsible for materials and workmanship, design input in selecting products and the provision of product manufacturer's guarantees and warranties where required.
4. Performance Level 3: Performance Specification (simple 'in context' design):
 - 4.1. The Sub-Contractor's design input is limited to the selection of 'off the shelf' products that satisfy the performance specification, adapting them as necessary to suit the Specifier's design and constructing the works using the selected components as adapted.
 - 4.2. The Sub-Contractor is responsible for materials and workmanship, design input in selecting and adapting products and the provision of product manufacturer's guarantees and warranties where required.
5. Performance Level 4: Performance Specification (complex 'in context' design):
 - 5.1. The Sub-Contractor is to provide detail design and production information, including a prescriptive specification of products and construct the works in accordance with that design using selected components adapted as necessary.
 - 5.2. The Sub-Contractor is responsible for materials and workmanship and for design input. May obtain product manufacturers' guarantees and warranties for Client.

6 Sub contractor's design scope performance level 2

1. The Performance Level 2: Work associated with this Work Package is specified in the following clause(s) of this Work Package Section: all clauses

26 Generally

1. The fabrication, installation and performance requirements specified are intended to establish a minimum performance level and general principles. The Contractor shall be responsible for achieving or surpassing the performance criteria for all components.

35 Read in conjunction with

1. The following documents: the architect's 21 series drawings, and the structural engineer's information

43 Compliance with current regulations

1. The Contractor: Shall ensure that the works described in this Section are compliant with the current editions of:

2. - The Building Regulations (England) or - The Building Regulations (Wales) or - The Building Regulations (Northern Ireland) or - The Building Standards (Scotland).

45 Approvals

1. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Control Officer/Approved Inspector/Fire Officer.
2. The Contractor shall provide all drawings, calculations, specifications, other technical information together with any risk assessments or risk analysis as may be required to contribute to the fire safety information required under Regulation 38 of the Building Regulations.

46 Approvals

1. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Principal Designer and/or Health and Safety Officer.

47 Compliance and approvals

1. The Contractor shall ensure that works described in this Section are compliant with the requirements of the Building Insurer/ Warranty Provider.
 - 1.1. Building Insurer: Build Zone
2. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Insurer/ Warranty Provider.

60 Accuracy of contract works

1. In addition to any more stringent requirements specified elsewhere, the Works shall be constructed to the degrees of accuracy specified in clause [A33:312/A90:352].
2. Not less than 15 days before commencing the work specified in this section confirm, by survey relative to the Contractor's setting-out points, that the locations of all relevant previously-built works are correct taking account of all specified tolerances. The results of this survey shall be provided.
3. If the surveyed locations of the relevant previously-built works will not allow the works specified in this section to be completed within the specified degrees of accuracy, the Contractor is to immediately seek instructions before proceeding.

71 Warranty

1. The Contractor must review the Contract Documentation and provide a written warranty confirming that all specified products are suitable for the expected conditions of use, in all specified locations.

80 Design life of the installation

1. The design life of the building: 60 years, as defined in BS ISO 15686-1.
2. The design life: Of the components, assemblies, and installations, as defined in BS ISO 15686-1 and specified in this Section, is 40 years.
3. Provide: In the Building Manual specified in [A90:715], information on the methods for replacing all components and assemblies with a design life less than that of the building or less than that of the installation of which they form part.

85 Building manuals

1. Are required and shall comply with: [A90:715].

Types of walling

100 General

1. For configuration, dimensions and location refer to the Architect's drawings.

110 Clay facing brickwork Type 1

1. **Description:** TO EXTERNAL WALLS ABOVE DPC LEVEL REFER TO 21 SERIES DRAWINGS FOR LOCATION
2. **Bricks:** To BS EN 771-1.
 - 2.1. **Manufacturer:** Forterra
 - 2.1.1. **Product reference:** Accrington Woodside Mixture
 - 2.2. **Recycled content:** as manufactured
 - 2.3. **Special shapes:** as indicated on architect's 21 series drawings
3. **Mortar:** As section Z21.
 - 3.1. **Standard:** Not applicable
 - 3.2. **Mix:** 1:1:6 cement:lime:sand
 - 3.3. **Additional requirements:** Coloured mortar Marshalls PM103 and PM96 refer to architects 21 series drawings for location
4. **Bond:** Half-lap stretcher
5. **Joints:** Bucket handle
6. **Features:** Projecting courses, refer to architect's 21 series drawings

110 Clay facing brickwork Type 2

1. **Description:** TO EXTERNAL WALLS ABOVE DPC LEVEL REFER TO 21 SERIES DRAWINGS FOR LOCATION
2. **Bricks:** To BS EN 771-1.
 - 2.1. **Manufacturer:** Forterra
 - 2.1.1. **Product reference:** Accrington Granite Ash
 - 2.2. **Recycled content:** as manufactured
 - 2.3. **Special shapes:** as indicated on architect's 21 series drawings
3. **Mortar:** As section Z21.
 - 3.1. **Standard:** Not applicable
 - 3.2. **Mix:** 1:1:6 cement:lime:sand
 - 3.3. **Additional requirements:** Coloured mortar Marshalls PM103 and PM96 refer to architects 21 series drawings for location
4. **Bond:** Half-lap stretcher
5. **Joints:** Bucket handle
6. **Features:** Projecting courses, refer to architect's 21 series drawings

110 Clay facing brickwork Type 3

1. **Description:** TO EXTERNAL WALLS ABOVE AND BELOW DPC LEVEL REFER TO 21 SERIES DRAWINGS FOR LOCATION
2. **Bricks:** To BS EN 771-1.
 - 2.1. **Manufacturer:** Forterra or Equivalent
 - 2.1.1. **Product reference:** Accrington Farmstead Antique
 - 2.2. **Recycled content:** as manufactured

- 2.3. Special shapes: as indicated on architect's 21 series drawings
- 3. Mortar: As section Z21.
 - 3.1. Standard: Not applicable
 - 3.2. Mix: 1:1:6 cement:lime:sand
 - 3.3. Additional requirements: Coloured mortar Marshalls PM 96
- 4. Bond: Half-lap stretcher
- 5. Joints: Bucket handle
- 6. Features: Projecting courses, refer to architect's 21 series drawings

355 Concrete common blockwork (A) REVISED

- 1. Description: REFER TO ARCHITECTS 21 SERIES DRAWINGS FOR LOCATION
- 2. Blocks: To BS EN 771-3.
 - 2.1. Manufacturer: [Lignacite Ltd](#) or equivalent
 - 2.1.1. Contact details
 - 2.1.1.1. Address: Norfolk House
High Street
Brandon
Suffolk
IP27 0AX
 - 2.1.1.2. Telephone: [+44 \(0\)1842 810678](tel:+44201842810678)
 - 2.1.1.3. Web: www.lignacite.co.uk
 - 2.1.1.4. Email: info@lignacite.co.uk
 - 2.1.2. Product reference: [Lignacite Concrete Blocks](#)
 - 2.2. Standard: To BS EN 771-3.
 - 2.3. Block description: Fine textured, loadbearing units for facing and general purpose applications
 - 2.4. Appearance: Medium grey in colour with a fine textured surface.
 - 2.5. Configuration: Solid (Group 1).
 - 2.6. Compressive strength Group 1
 - 2.6.1. Mean value: 7.3 N/mm².
 - 2.6.2. Category: M4.
 - 2.7. Thermal conductivity: 0.111–0.258 m²K/W depending on width.
 - 2.8. Recycled content: Up to 48%.
 - 2.9. Work sizes (length x width x height): 440 x 140 x 215 mm.
 - 2.10. Tolerance category: D1.
 - 2.11. Density
 - 2.11.1. Net dry density: 1450 kg/m³.
 - 2.12. Reaction to fire: Class A1.
 - 2.13. Water absorption by capillarity: 5/15 μ.
 - 2.14. Face grade: fine textured Paint-grade.
 - 2.15. Moisture movement: <0.7 mm/m.
 - 2.16. Specific Heat Capacity: 1000 J/kg/K.
 - 2.17. Sound reduction index: refer to acoustic report
 - 2.18. Fire resistance: Minimum 120 mins
 - 2.19. Third-party certification: BSI Kitemark approved.
 - 2.20. Compressive strength

3. Mortar: As section Z21.
 - 3.1. Standard: To BS EN 998-2
 - 3.2. Mix: 1:1:6 cement:lime:sand 1:1:6 cement:lime:sand 4 N/mm² (class M4)
 - 3.3. Additional requirements: None
4. Bond: Half-lap stretcher

360 Autoclaved aerated concrete (AAC) blocks ADDED

1. Blocks: To BS EN 771-4.
 - 1.1. Manufacturer:
 - 1.1.1. Product reference: [Airtec Standard Wall Block \(Airtec Standard Wall Block 100 mm\)](#)
 - 1.2. Manufacturer: [Thomas Armstrong \(Concrete Blocks\) Ltd](#)
 - 1.2.1. Contact details
 - 1.2.1.1. Address: Whinfield Road
Rowlands Gill
Newcastle-upon-Tyne
Tyneside
United Kingdom
NE39 1EH
 - 1.2.1.2. Telephone: [+44 \(0\)1207 544214](tel:+44(0)1207544214)
 - 1.2.1.3. Web: www.thomasarmstrongconcreteblocks.co.uk
 - 1.2.1.4. Email: blocks@thomasarmstrong.co.uk
 - 1.3. Standard: To BS EN 771-4.
 - 1.4. Configuration: Group 1.
 - 1.5. Mean compressive strength (minimum): 3.6 N/mm².
 - 1.5.1. Category: I.
 - 1.6. Freeze/ thaw resistance: Frost resistant.
 - 1.7. Thermal conductivity (maximum): 0.11 W/mK.
 - 1.8. Recycled content: 85%.
 - 1.9. Work sizes (length x width x height): 620 x 215 x 100 mm.
 - 1.10. Tolerance category: TLMB.
 - 1.11. Density: 530 kg/m³.
 - 1.12. Reaction to fire: Class A1 to BS EN 13501-1.
 - 1.13. Moisture movement: 3%.
 - 1.14. Shear bond strength: 0.15 N/mm².
 - 1.15. Water absorption by capillarity: 150 g/(m² x s-0.5).
 - 1.16. Water vapour permeability: 5/15.
 - 1.17. Thickness: 100 mm.
 - 1.18. Accessories: None.
 - 1.19. Coefficient of linear expansion (to ASTM D-696): 0.6 x 10⁻⁶/K.
 - 1.20. Shrinkage: 0.40 mm/m.
 - 1.21. Thermal conductivity: 0.11W/mK
 - 1.22. Water vapour resistance: 50 MNs/gm.
 - 1.23. Environmental Product Declaration (EPD): ISO 14001.

Testing

410 Compressive strength of mortar for each walling type

1. Testing authority: A UKAS Accredited laboratory
2. Test method: To BS EN 1015-11.
3. Preliminary tests procedure: As follows:
 - 3.1. Specimens
 - 3.1.1. Number of specimens: 6.
 - 3.1.2. Type: 40 x 40 x 160 mm prism.
 - 3.1.3. Preparation: At least six weeks before walling commences.
 - 3.2. Specimen testing: Half of specimens at 7 days. Remainder at 28 days.
 - 3.2.1. Retarded mixes: Extend curing periods to include retardation period.
 - 3.3. Response to result: If mean compressive strength at 28 days is not within the range given below repeat tests with more suitable sand or next higher
4. Site tests procedure: As follows.
 - 4.1. Number of specimens: Six per 150m² of walling or per storey whichever the more frequent.
 - 4.2. Specimen types: As preliminary test, but prepared during construction.
 - 4.3. Specimen testing: Half of specimens at 7 days. Remainder at 28 days.
 - 4.3.1. Retarded mixes: Extend curing periods to include retardation period.
5. Required test mean compressive strength at 28 days (N/mm²): To be within the following range:
 - 5.1. Walling type: All wall types
 - 5.1.1. Preliminary tests minimum (N/mm²): 4.0
 - 5.1.2. Preliminary tests maximum (N/mm²): 6.0
 - 5.1.3. Site tests minimum (N/mm²): 4.0
 - 5.1.4. Site tests maximum (N/mm²): 6.6
6. Results: Submit.

415 Fresh mortar cement content

1. Test method: BREMORTEST in accordance with Building Research Establishment Information Paper 8/89
2. Test specimens: Test mortar for the following wall types: F10/ all wall types .
3. Results: Submit.

428 Workmanship

1. Where applicable, the works shall be carried out in accordance with the manufacturer's recommendations.
2. Operatives shall be trained, experienced and appropriately skilled in the installation of the works and, where applicable, be recommended by the system/ product manufacturer.

Workmanship generally

430 Conditioning of clay bricks and blocks

1. Bricks and blocks delivered warm from manufacturing process: Do not use until cold.
2. Absorbent bricks in warm weather: Wet to reduce suction. Do not soak.

440 Conditioning of concrete bricks/ blocks

1. Autoclaved concrete bricks/ blocks delivered warm from manufacturing process: Do not use.

2. Age of nonautoclaved concrete bricks/ blocks: Do not use until at least four weeks old.
3. Avoidance of suction in concrete bricks/ blocks: Do not wet.
 - 3.1. Use of water retaining mortar admixture: Submit details.

461 Mortar groups

1. Where mortars are specified by constituents and proportions, the Contractor may, subject to the approval of the Architect, use alternative mortar mixes from the same Group as defined in BS EN 1996-1+2, BS EN 1996-2, BS 1996-3 or the same Class to BS EN 998-2.

465 Mortar for brick cills

1. Brick cills: Shall be laid in 1:3 cement:sand mortar with the addition of an approved waterproof bonding additive, irrespective of the mortar mix specified for walling generally.
2. Manufacturer and reference: Ronafix for Bedding by Ronacrete Ltd.

500 Laying generally

1. Mortar joints: Fill vertical joints. Lay bricks, solid and cellular blocks on a full bed.
2. AAC block thin mortar adhesive and gypsum block adhesive joints: Fill vertical joints. Lay blocks on a full bed.
3. Clay block joints
 - 3.1. Thin layer mortar: Lay blocks on a full bed.
 - 3.2. Interlocking perpend: Butted.
4. Bond where not specified: Half lap stretcher.
5. Vertical joints in brick and concrete block facework: Even widths. Plumb at every fifth cross joint.

520 Accuracy

1. Courses: Level and true to line.
2. Faces, angles and features: Plumb.
3. Permissible deviations
 - 3.1. Position in plan of any point in relation to the specified building reference line and/ or point at the same level : ± 10 mm.
 - 3.2. Straightness in any 5 m length: ± 5 mm.
 - 3.3. Verticality up to 3 m height: ± 10 mm
 - 3.4. Verticality up to 7 m heightNew Item: ± 14 mm.
 - 3.5. Overall thickness of walls: ± 10 mm.
 - 3.6. Overall thickness of walls: ± 10 mm.
 - 3.7. Level of bed joints up to 5 m (brick masonry): ± 11 mm.
 - 3.8. Level of bed joints up to 5 m (block masonry): ± 13 mm

545 Levelling of separate leaves

1. Locations for equal levelling of cavity wall leaves: As follows:
 - 1.1. Every course containing vertical twist type ties or other rigid ties.
 - 1.2. Every third tie course for double triangle/ butterfly ties.
 - 1.3. Courses in which lintels are to be bedded.

560 Coursing brickwork

1. Gauge: Four brick courses including bed joints to 300 mm.

595 Lintels

1. **Bearing:** Ensure full length masonry units occur immediately under lintel ends.

635 Jointing

1. **Profile:** Consistent in appearance.

645 Accessible joints not exposed to view

1. **Jointing:** Struck flush as work proceeds.

665 Pointing

1. **Description:** TO ALL WALLING
2. **Joint preparation:** Remove debris. Dampen surface.
3. **Mortar:** As section Z21.
 - 3.1. **Standard:** To BS EN 998-2
 - 3.2. **Mix:** 1:1:6 cement:lime:sand
 - 3.3. **Additional requirements:** Coloured mortar (colour tbc) samples and mock ups required
4. **Profile:** Bucket handle

671 Fire stopping

1. **Avoidance of fire and smoke penetration:** Fit tightly between cavity barriers and masonry. Leave no gaps.

690 Adverse weather

1. **General:** Do not use frozen materials or lay on frozen surfaces.
2. **Air temperature requirements:** Do not lay bricks/ blocks:
 - 2.1. In cement gauged mortars when at or below 3°C and falling or unless it is at least 1°C and rising.
 - 2.2. In hydraulic lime:sand mortars when at or below 5°C and falling or below 3°C and rising, or as manufacturer's/ supplier's recommendations.
 - 2.3. In thin layer mortars when outside the limits set by the mortar manufacturer.
3. **Temperature of walling during curing:** Above freezing until hardened.
4. **Newly erected walling:** Protect at all times from:
 - 4.1. Rain and snow.
 - 4.2. Drying out too rapidly in hot conditions and in drying winds.

Additional requirements for facework

710 The term facework

1. **Definition:** Applicable in this specification to brick/ block walling finished fair.
 - 1.1. **Painted facework:** The only requirement to be waived is that relating to colour.

730 Brick/ Concrete block samples

1. **General:** Before placing orders with suppliers submit for approval of appearance labelled samples of the following: Bricks as in clause F10/110 TYPE A, 110 TYPE B AND 110 TYPE C, Blocks as in clause F10/335 .
2. **Selection of samples:** Representative of the range in variation of appearance.

740 Finished masonry work reference panels

1. **General:** Before proceeding to construct the following walling types, construct panels as specified. Give notice when panels are dry.
2. **Selection of masonry units:** Reasonably representative of the average quality of the whole order to be delivered
3. **Panel types**
 - 3.1. **Walling type:** All
 - 3.1.1. **Location:** Site/ contractor's compound
 - 3.1.2. **Size:** 1.5 m x 1.5 m
 - 3.1.3. **Other requirements:** Movement joint with sealant

742 Facing brickwork accuracy

1. **Apart from any other specified requirements:**
 - 1.1. After approval of the appearance of the reference panel(s), survey the panel and measure a representative selection of the following dimensions.
 - 1.2. Perpendicular joint widths.
 - 1.3. Bed joint heights.
 - 1.4. Vertical alignment of perpendicular joints:
 - 1.4.1. **Unless agreed otherwise:** Measure not less than 20% of the built joints for each of the three conditions specified.
Submit survey results to Architect on a scaled drawing of the reference panel indicating the exact location of the dimensions measured.
2. Submit survey results to Architect on a scaled drawing of the reference panel indicating the exact location of the dimensions measured.
3. In addition, express results in the following format:
4. After obtaining Architect's approval to the survey results, ensure that all completed facing brickwork is built to the same degree of accuracy as the reference panel(s).

745 Masonry sample panels

1. **Sampling frequency:** A panel for each type and delivery of masonry unit.
2. **Selection of masonry units:** Reasonably representative of the average quality of the whole order to be delivered
3. **Panel types:** As clause 740.

750 Colour consistency of masonry units

1. **Colour range:** Submit proposals of methods taken to ensure that units are of consistent and even appearance within deliveries.
2. **Conformity:** Check each delivery for consistency of appearance with previous deliveries and with approved reference panels; do not use if variation is excessive.
3. **Finished work:** Free from patches, horizontal stripes and racking back marks.

760 Appearance

1. **Brick/ block selection:** Do not use units with damaged faces or arrises.
2. **Cut masonry units:** Where cut faces or edges are exposed cut with table masonry saw.
3. **Quality control:** Lay masonry units to match relevant reference panels.
 - 3.1. **Setting out:** To produce satisfactory junctions and joints with built-in features and components.
 - 3.2. **Coursing:** Evenly spaced using gauge rods.

4. Lifts: Complete in one operation.
5. Methods of protecting facework: Submit proposals.

780 Ground level

1. Commencement of facework: Not less than 150 mm below finished level of adjoining ground or external works level.

785 Brickwork below DPC

1. To be built using sulphate resisting cement.

790 Putlog scaffolding

1. Use: Not permitted in facework.

830 Cleanliness

1. Facework: Keep clean.
2. Mortar on facework: Allow to dry before removing with stiff bristled brush.
3. Removal of marks and stains: Rubbing not permitted.

Deleted clauses

360 Autoclaved aerated concrete (AAC) common blockwork **DELETED**

Ω End of Section



Specification created using NBS Chorus

Sheppard Robson

The Castings

CAS-AXIS-BU1-XX-SP-A-10-0015

H11 Curtain Walling

A4 - For Construction

C01

28-11-2022

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H11

Curtain walling **REVISED**

Clauses - Not Used

To be read with preliminaries/ general conditions.

4 Sub-contractor's design responsibility

1. Based on the JCT guide to the use of Performance Specifications, the following are the requisite performance levels for Sub-Contractor design.
2. **Performance Level 1: Prescriptive Specification (no design by Sub-Contractor)**
 - 2.1. The Sub-Contractor is to construct the work in accordance with production information and a prescriptive specification provided by others and has no design responsibility.
 - 2.2. The Sub-Contractor is responsible for materials and workmanship and the provision of product manufacturer's guarantees and warranties where required.
3. **Performance Level 2: Performance Specification (no 'in context' design by the Sub-Contractor)**
 - 3.1. The Sub-Contractor's design input is limited to the selection of 'off the shelf' products that satisfy the performance specification and construction of the works using the selected components.
 - 3.2. The Sub-Contractor is responsible for materials and workmanship, design input in selecting products and the provision of product manufacturer's guarantees and warranties where required.
4. **Performance Level 3: Performance Specification (simple 'in context' design)**
 - 4.1. The Sub-Contractor's design input is limited to the selection of 'off the shelf' products that satisfy the performance specification, adapting them as necessary to suit the Specifier's design and constructing the works using the selected components as adapted.
 - 4.2. The Sub-Contractor is responsible for materials and workmanship, design input in selecting and adapting products and the provision of product manufacturer's guarantees and warranties where required.
5. **Performance Level 4: (complex 'in context' design)**
 - 5.1. The Sub-Contractor is to provide detail design and production information, including a prescriptive specification of products and construct the works in accordance with that design using selected components adapted as necessary.
 - 5.2. The Sub-Contractor is responsible for materials and workmanship and for design input. May obtain product manufacturers' guarantees and warranties for Client.

8 Sub-contractor's design scope performance level 4

1. The Performance Level 4 work associated with this Work Package is specified in the following clauses of this Work Package section: All clauses.
2. These clauses should be read in conjunction with the general clauses of the associated specifications.

Sub-contract preliminaries

13 Contractor's design

1. The work specified in this Section shall be designed by the Contractor based on the Employer's Requirements.
2. **Production information:** Shall be prepared by the Contractor, [in conjunction with the novated Design Team], as necessary to procure and construct the work.

20 The scope of the works

1. **The Contractor:** Is entirely responsible for the detailed design, manufacturing, fixing, jointing, and installation of the works shown on the drawings and specified in this work section, including all necessary or required accessories and ancillary work.
2. The Contractor is responsible for coordinating the detail design of related and adjacent work to maintain the specified performance at all interfaces.
3. The Contractor is responsible for ensuring that all materials used are compatible with those of adjacent works so as not to compromise the specified performance or life expectancy of the works.

25 Generally

1. The design, fabrication, installation and performance requirements specified are intended to establish a minimum performance level and general principles. The Contractor shall be responsible for achieving or surpassing the design and performance criteria for all components.

30 Tender/ contract drawings

1. **Drawings:** Have been prepared as scheduled. Information shown is schematic and indicative of the design proposals for the basic functional and architectural requirements. The drawings do not indicate a detailed solution, nor do they prejudice the submission of alternative proposals complying with the specified requirement.

35 Read in conjunction with

1. The following documents
 - 1.1. The Architect's drawings
 - 1.1.1.17 Series window and curtain walling scoping drawing and schedules
 - 1.1.2.12 Series - Façade elements interface details
 - 1.1.3.02 Series - in context Bay Studies
 - 1.2. The Structural Engineer's documents
 - 1.3. Loads and Load Combinations Report by Midgard Design Services
 - 1.4. The Services Consultant's documents
 - 1.5. The fire strategy report
 - 1.6. The acoustic report
 - 1.7. Sections specifying systems that sit adjacent to, or interface with systems specified in this section

43 Compliance REVISED

1. **The Contractor:** Shall ensure that the works described in this Section are compliant with the current editions of:
2. - The Building Regulations (England).

45 Approvals

1. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Control Officer/Approved Inspector/Fire Officer.
2. The Contractor shall provide all drawings, calculations, specifications, other technical information together with any risk assessments or risk analysis as may be required to contribute to the fire safety information required under Regulation 38 of the Building Regulations.

46 Approvals

1. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Principal Designer and/or Health and Safety Officer.

47 Compliance and approvals

1. The Contractor shall ensure that works described in this Section are compliant with the requirements of the Building Insurer/ Warranty Provider.
 - 1.1. Building Insurer: Build Zone .
2. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Insurer/ Warranty Provider.

55 Production information

1. Shall be provided by the Contractor as follows:
 - 1.1. Product specifications
 - 1.2. Setting out drawings
 - 1.3. All relevant certification
2. Design and production information procedures shall comply with: A90.
3. Design and production information shall include all interfaces of related and adjacent work.

60 Accuracy of contract works REVISED

1. In addition to any more stringent requirements specified elsewhere, the Works shall be constructed to the degrees of accuracy specified in clause [A90:352].
2. Not less than 15 days before commencing the work specified in this section confirm, by survey relative to the Contractor's setting-out points, that the locations of all relevant previously-built works are correct taking account of all specified tolerances. The results of this survey shall be provided.
3. If the surveyed locations of the relevant previously-built works will not allow the works specified in this section to be completed within the specified degrees of accuracy, the Contractor is to seek instructions before proceeding.

70 Warranty

1. **The Contractor:** Must warrant that he has exercised, and will exercise, all reasonable skill and care in:
 - 1.1. The design of the Works insofar as the Works have been or will be designed by the Contractor.
 - 1.2. The selection of materials and goods for the Works insofar as such materials and goods have been or will be selected by the Contractor.
 - 1.3. The satisfaction of any performance specification or requirement insofar as such performance specification or requirement is included or referred to elsewhere in this specification.

80 Design life of the installation REVISED

1. The design life of the building, as defined in BS ISO 15686-1, is 60 years.
2. The design life of the envelope system works specified in this Section, as defined in BS ISO 15686-1, is 60 years.
3. **Primary components:** 60 years:

- 3.1. All primary components, as defined in Section 7.2.4 of the CWCT Standard for Systemised Buildings, will have a predicted service life of not less than the design life of the envelope system, without the need for any cleaning or maintenance.
- 3.2. All framing components, their fixings, and means of attachment to the structure.
- 3.3. Thermal insulation and vapour barriers which cannot be removed without dismantling the envelope system.
- 3.4. Flashings, gutters, copings, and similar metal weathering elements.
- 3.5. Sealants and gaskets which are concealed within the system and cannot be removed without dismantling the envelope system.
- 3.6. Brackets for attachment of additional components.
- 3.7. Structural sealants and bonded joints.
- 3.8. Fire stopping and cavity barriers.
4. **Secondary components: 30 years:**
 - 4.1. All secondary components, as defined in Section 7.2.5 of the CWCT Standard for Systemised Buildings which, under the specified conditions, have a predicted service life that is less than the design life of the Cladding will be capable of replacement without compromising the long-term structural or weatherproof integrity of the Cladding. They will be capable of replacement without progressive dismantling of the Cladding
 - 4.2. Internal linings.
 - 4.3. Exposed finishes to metal components.
 - 4.4. Window and door equipment.
 - 4.5. Glass.
 - 4.6. External panels and their fixings.
 - 4.7. Accessible gaskets and compression seals.
 - 4.8. Accessible sealants.
5. The predicted service life of components will be the service life predicted from recorded performance over time, as defined in clause 3.20 of BS ISO 15686-1.
6. **Provide:** In the Building Manual specified in Section [A90:715], information on the methods for replacing all components and assemblies with a design life less than that of the building or less than that of the installation of which they form part.

85 Building manuals

1. Are required and shall comply with: [Section A90: 710 and 715].

Tendering

10 Information to be provided with tender

1. Submit the following curtain walling particulars
 - 1.1. **Evidence of compliance:** All curtain walling to be CE marked to BS EN 10830. Submit Declaration of Performance (DoP). CE marking and Declaration of Performance (DoP) requirements for structural sealant glazing to be submitted on the basis of a manufacturer's European Technical assessment (ETA) prepared in accordance with EOTA technical guide ETAG 002 (Parts 1, 2 and 3).
 - 1.2. Typical plan, section and elevation drawings at suitable scales.
 - 1.3. Typical detailed drawings at large scales, including including all junctions and interfaces.
 - 1.4. Technical information and certification demonstrating compliance with specification of proposed incorporated products and finishes, including including risk assessments for all glass types.
 - 1.5. Certification, reports and calculations demonstrating compliance with specification of proposed curtain walling.

- 1.6. Proposals for connections to and support from the building structure and building components.
- 1.7. Proposals for amendments to primary supporting structure and for secondary supporting structure additional to that shown on preliminary design drawings.
- 1.8. Schedule of builder's work, special provisions and special attendance by others.
- 1.9. Examples of standard documentation from which project quality plan will be prepared.
- 1.10. Preliminary fabrication and installation method statements and programme.
- 1.11. Schedule of products and finishes with a design life expectancy less than that specified in clause 440, with proposals for frequencies and methods of replacement.
- 1.12. Proposals for replacing damaged or failed products.
- 1.13. Areas of non-compliance with the specification.

Types of curtain walling

101 General

1. For configuration, dimensions and location refer to the Architect's 21 series drawings.

111 Curtain walling REVISED

1. **Description:** Applies to the following areas:
 - Ground floor glazing generally
 - Level 01 Amenity Spaces
 - Level 21 Amenity Space
2. **Supporting structure:** supported from concrete floor slab
3. **Manufacturer:** TECHNAL, or equivalent
 - 3.1. **Product reference:** MX Aluminium stick curtain walling system
 - 3.2. **Type:** drained and ventilated, with vertical and horizontal caps.
4. **Performance criteria:**
 - 4.1. **Air permeability:** As clause H11:341.
 - 4.2. **Water penetration:** As clause H11:351 .
 - 4.3. **Thermal properties:** As clause H11:371.
 - 4.4. **Acoustic properties:**
 - 4.4.1. **Between:** Internal and external surfaces. As clause H11:411.
 - 4.4.2. **Between:** Adjoining floors. As clause H11:416.
 - 4.4.3. **Between:** Adjoining rooms on the same floor. As clause H11:416.
5. **Fire Performance:**
 - 5.1. **Fire resistance:** As clause H11:420.
 - 5.2. **Fire classification:** Of curtain wall and cladding materials: As clause [H11:421/ H11:422/ H11:43].
 - 5.3. **Reaction to Fire:** As clause H11:426.
 - 5.4. **Fire/ smoke stopping:** As clause H11:430.
 - 5.5. **Cavity barriers:** As clause H11:431.
6. **Testing:** As clauses: 501 - 661 inclusive
 - 6.1. **Test specimen:** As clause: 540
 - 6.2. **Test sequence:** As clause: 551
7. **Metalwork generally:**
 - 7.1. **Material:** Aluminium as clause H11:710

- 7.2. Finish: PPC
- 7.3. Colour/texture: matt RAL 7016
- 7.4. Minimum film thickness: 60 microns
- 8. Internal framing member:
 - 8.1. Material: Aluminium as clause H11:710
 - 8.2. Finish: PPC
 - 8.2.1.Colour/ texture: matt RAL 7016
 - 8.2.2.Minimum film thickness: 60 microns
- 9. External cover cap:
 - 9.1. Material: Aluminium as clause H11:710
 - 9.2. Finish: PPC
 - 9.2.1.Colour/ texture: matt RAL 7016
 - 9.2.2.Minimum film thickness: 60 microns
- 10. Glazing: insulating glass units as clause H11:748
 - 10.1. Inner pane: as clause H11:121
 - 10.2. Outer pane: as clause H11:121
- 11. Glazing system: A secure mechanical fixing system tested to PAS 24:2012, OR LPS 1175SR1 or STS 202 Issue 3BR1.
- 12. Glass generally: Refer to Section Z25.
- 13. Accessories: All necessary fixings to complete the installation, fire rated EPDMs.
- 14. Incorporated components: louvres and doors compatible with system and range, and matching flashings.
- 15. Other requirements:
 - 15.1. Manifestation: Statutory manifestation, pattern tbc
 - 15.2. Electrical services: allow for electrical conduiting within curtain walling framing system as required for items such as access control, lighting etc

112 Curtain walling

- 1. Description: Applies to the following areas:
 - Level 01 External Amenity Terrace
 - Level 21 External Amenity Terrace
- 2. Supporting structure: supported from concrete floor slab
- 3. Manufacturer: TECHNAL, or equivalent
 - 3.1. Product reference: MX Aluminium stick curtain walling system
 - 3.2. Type: drained and ventilated, with vertical and horizontal caps.
- 4. Performance criteria:
 - 4.1. Air permeability: As clause H11:341.
 - 4.2. Water penetration: As clause H11:351 .
 - 4.3. Thermal properties: N/A
 - 4.4. Acoustic properties:
 - 4.4.1.Between: Internal and external surfaces. As clause H11:411.
 - 4.4.2.Between: Adjoining floors. As clause H11:416.
 - 4.4.3.Between: Adjoining rooms on the same floor. As clause H11:416.
- 5. Fire Performance:
 - 5.1. Fire resistance: As clause H11:420.

- 5.2. Fire classification: Of curtain wall and cladding materials: As clause [H11:421/ H11:422/ H11:43].
- 5.3. Reaction to Fire: As clause H11:426.
- 5.4. Fire/ smoke stopping: As clause H11:430.
- 5.5. Cavity barriers: As clause H11:431.
6. Testing: As clauses: 501 - 661 inclusive
 - 6.1. Test specimen: As clause: 540
 - 6.2. Test sequence: As clause: 551
7. Metalwork generally:
 - 7.1. Material: Aluminium as clause H11:710
 - 7.2. Finish: PPC
 - 7.3. Colour/texture: matt RAL 7016
 - 7.4. Minimum film thickness: 60 microns
8. Internal framing member:
 - 8.1. Material: Aluminium as clause H11:710
 - 8.2. Finish: PPC
 - 8.2.1.Colour/ texture: matt RAL 7016
 - 8.2.2.Minimum film thickness: 60 microns
9. External cover cap:
 - 9.1. Material: Aluminium as clause H11:710
 - 9.2. Finish: PPC
 - 9.2.1.Colour/ texture: matt RAL 7016
 - 9.2.2.Minimum film thickness: 60 microns
10. Glazing: can be single glazed
11. Glazing system: A secure mechanical fixing system tested to PAS 24:2012, OR LPS 1175SR1 or STS 202 Issue 3BR1.
12. Glass generally: Refer to Section Z25.
13. Accessories: All necessary fixings to complete the installation, fire rated EPDMs.
14. Incorporated components: louvres and doors compatible with system and range, and matching flashings.
15. Other requirements:
 - 15.1. Manifestation: Statutory manifestation, pattern tbc
 - 15.2. Barrier Loads: 1.5kn as per recommendations in BS:6180

121 Pane material type

1. Performance requirements: Refer to Services Consultant's thermal model study
 - 1.1. Thermal transmittance: U-Value: Not more than 1.4 W/m²K
2. Glazing type: sealed double glazed unit
 - 2.1. Overall unit thickness: submit proposals
 - 2.2. Outer pane material: submit proposals
 - 2.3. Air gap/Cavity: submit proposals
 - 2.4. Colour of spacer bar: black
 - 2.5. Inner pane material: submit proposals
3. Manufacturer and reference: Saint Gobain or equivalent
4. Glass generally: Refer to Section Z25.

5. **Other requirements:** Double Glazed units to be clear glazing; thickness and composition to be confirmed by the Sub- Contractor. Saint Gobain Glass, Cool-Lite Xtreme should be used as a visual reference.
 - 5.1. **Carry out risk assessments :** For all glass types in accordance with clause H11:231.
 - 5.2. **Security:** Glazing to incorporate at least one pane of glass rated P4A under EN356

136 Doors

1. **Incorporated with:** Curtain walling as clause H11: 111.
 - 1.1. **Manufacturer:** Kawneer or equivalent
 - 1.2. **Product reference:** AA 190 Aluminium Thermally Broken Door
2. **Metalwork generally:**
 - 2.1. **Material:** Aluminium
 - 2.2. **Finish:** PPC
 - 2.3. **Colour/texture:** RAL 7016 mat finish
 - 2.4. **Minimum film thickness:** 60 microns
3. **Glazing:**
 - 3.1. **Glazing system:** gaskets
 - 3.2. **Pane material:** as H11: 121
4. **Ironmongery:** Refer to the Door Schedule/ Ironmongery Schedule.- Stainless Steel Ironmongery. Alos for access control requirments
5. **Fixing:** manufacturer's standards
6. **Category of use:** [Light/ Medium/ Heavy/ Severe] in accordance with BS 6375-2.
7. **Other requirements:**
 - 7.1. **Manifestation markings:** As clause H11:738.
 - 7.2. **Powered:** Sliding and folding doors: To BS 7036-0 and BS EN 16005.
 - 7.3. **Emergency exit devices:** Operated by lever handle or push pad: To BS EN 179.
 - 7.4. **Panic exit devices:** Operated by a horizontal bar: To BS EN 1125.
 - 7.5. **Controlled door closing devices:** To BS EN 1154.
 - 7.6. **Hold-open devices for swing doors:** Electrically powered To BS EN 1155.

141 Louvres

1. **Incorporated with:** Curtain walling as clause H11:111.
2. **Manufacturer:** By Kawneer Manufacturer's compatible range systems. Naco (Ruskin Air Management), or equivalent.
 - 2.1. **Product reference:** NACO SLH-S.
3. **Performance criteria:**
 - 3.1. **Free area percentage:** 53%
 - 3.2. **Aerodynamic coefficient:** 0.345
 - 3.3. **Weathertightness:** Tested to BS EN 13030 2001: Class A up to 0.25m/s and Class B up to 1.5m/s
 - 3.4. **Sound Reduction:** Refer to acoustic report
4. **Physical characteristics:**
 - 4.1. **Material:** Aluminium
 - 4.2. **Finish:** PPC
 - 4.3. **Colour/texture:** RAL 7016 mat finish

- 4.4. Minimum film thickness: 60 microns
- 4.5. Number of banks: refer to architect's 21 series drawings
- 5. Fixing: Glazed in to curtain wall frames
- 6. Other requirements: Woven aluminium insect mesh and blanking plates where required.

150 Materials specification

- 1. Minimum BRE 'Green Guide to Specification' online rating: A+
- 2. Specification of glazing materials to be in accordance with guidance in CIRIA document 'Guidance on glazing at height'.

General requirements/ preparatory work

210 Design

- 1. Curtain walling and associated features: Complete the detailed design. Submit before commencement of fabrication.
- 2. Related works: Coordinate in the detailed design.

211 General information relevant to the design

- 1. Structural information: As clause: [refer to structural engineer's information].
- 2. Fixings to structure: As clause: [A90:267].
- 3. Design environmental conditions: [A90:268].

215 Design proposals

- 1. Submission of alternative proposals: Preliminary design drawings indicate intent. Other reasonable proposals will be considered.

220 Specification

- 1. Compliance standards: BS EN 13830 and The Centre for Window and Cladding Technology (CWCT) 'Standard for systemised building envelopes'.
- 2. Reference information: For the duration of the contract, keep available at the design office, workshop and on site copies of:
 - 2.1. The CWCT 'Standard for systemised building envelopes'.
 - 2.2. Publications invoked by the CWCT 'Standard for systemised building envelopes'.

227 Information to be provided with tender

- 1. The typical detailed drawings at large scales, referred to in clause H11:226, shall include, as a minimum, the Contractor's proposals for the system's junctions.
- 2. The proposals must identify all flashings, closers, and weathertight and air permeability seals between the system and adjacent building components.
- 3. The technical information and certification, referred to in clause H11:226, shall include, as a minimum:
 - 3.1. Details of the time/temperature regime for the heat soaking of toughened glass, with information on the method for the control and monitoring of the regime.
- 4. Include, as a minimum: The certification, reports and calculations, referred to in clause H11:226:
 - 4.1. Calculations to justify the design wind pressure used as the basis of the design.

230 Information to be provided during detailed design stage

- 1. Submit the following curtain walling particulars
 - 1.1. A schedule of detailed drawings and dates for submission for comment.

- 1.2. A schedule of loads that will be transmitted from the curtain walling to the structure.
- 1.3. Proposed fixing anchor details relevant to structural design and construction.
- 1.4. A detailed testing programme in compliance with the main contract master programme.
- 1.5. A detailed fabrication and installation programme in compliance with the main contract master programme.
- 1.6. Proposals to support outstanding applications for Building Regulation consents or relaxations.

231 Information on glass types to be provided during detailed design stage

1. **Risk assessment:**
 - 1.1. The specialist glazing contractor shall carry out risk assessments confirming that the composition and buildup of glazed panels is suitable for use in applicable locations and all relevant forms of loadings.
 - 1.2. The selection of glass types and thickness will be undertaken to meet the performance requirements of this specification and to minimise the risk to persons both during construction and during the service life of the Cladding in normal service conditions.
 - 1.3. The risk of failure in normal service conditions and the consequences of failure will be documented in a glass risk assessment prepared in accordance with CIRIA C632 publication 'Guidance on Glazing at Height' and the Technical Notes prepared by the CWCT.
2. **Risk Assessment schedule:** Submit a schedule of risk assessments carried out in accordance with the above, to confirm the choice of glass type in each and every location and for all glass types proposed as components of the Curtain Walling System.
3. **CWCT compliance:** All requirements shall comply with the guidance of relevant CWCT documentation including but not limited to, Technical Notes 61-69, dependent on applicable scenario and locations.

232 Quality plan

1. **Requirement:** Submit during detailed design.
2. **Content:** In accordance with BS EN ISO 9001 and including the following:
 - 2.1. Name of the quality manager.
 - 2.2. Quality assessment procedures.
 - 2.3. Inspection procedures to be adopted in checking the work.
 - 2.4. Stages at which check lists will be used and samples of the lists.
 - 2.5. List of work procedures on the correct use of materials or components, both off site and on site.
 - 2.6. List of product information with latest revisions.
 - 2.7. Subcontractors involved in the work.
 - 2.8. Subcontractors' quality plans.
 - 2.9. Storage, handling, transport and protection procedures.
 - 2.10. Procedure for registering and reporting non compliances.
 - 2.11. Maintenance procedures and calibration records.
 - 2.12. Certification that completed work complies with specification.
 - 2.13. Check list register to ensure all items have been inspected and non compliances discharged.

235 Information to be provided before commencement testing or fabrication of curtain walling

1. **Submit the following curtain walling particulars**
 - 1.1. Detailed drawings to fully describe fabrication and installation.

- 1.2. Detailed calculations to prove compliance with design/ performance requirements.
- 1.3. Project specific fabrication, handling and installation method statements.
- 1.4. Certification for incorporated components manufactured by others confirming their suitability for proposed locations in the curtain walling.
- 1.5. Recommendations for spare parts for future repairs or replacements.
2. Certification for incorporated components manufactured by others confirming their suitability for proposed locations in the curtain walling.
 - 2.1. Recommendations for spare parts for future repairs or replacements.
3. Recommendations for safe dismantling and recycling or disposal of products.

236 Detailed drawings

1. Referred to in clause H11:235: To include, as a minimum:
 - 1.1. Setting-out and control points.
 - 1.2. Toleranced dimensions indicating both the location of components and the width of all joints.
 - 1.3. Identification of components.
 - 1.4. Details of isolation, packing, and shimming.
 - 1.5. The locations of all sealants, with details of position, type, and size of backing rods, bond release tapes, and the like.
 - 1.6. Embedment, spacing and edge distances for fixings.
 - 1.7. The type, size, and spacing of all welds.

237 Detailed calculations

1. Referred to in clause H11:235: To include, as a minimum:
2. **Structural Calculations:** For all sections, connections, anchorages, support assemblies and the like.
3. **Acoustic Calculations:** To support the claimed acoustic values of vision panels, spandrel panels, frame sections, and other components.
4. **Thermal Calculations:** To support the claimed insulation values of all vision panels, spandrel panels, frame sections, and other insulated components.
5. **Calculations:** Condensation Prediction: Assess the risk of surface or interstitial condensation forming on/in the works specified in this Section, based on the worst case environmental conditions specified in accordance with the following:
 - 5.1. BS EN ISO 13788.
 - 5.2. The Centre for Window and Cladding Technology's Guide to Good Practice for Assessing Heat Transfer and Condensation Risk for a Curtain Wall.
 - 5.3. Thermal Assessment of Window Assemblies, Curtain Walling and Non-traditional Building Envelopes.
 - 5.4. Contractor to identify the probability of internal, external, or interstitial condensation forming and where the calculations indicate that condensation is likely to occur, the quantitative rate of formation together with an explanation as to how the proposed design eliminates any damage or inconvenience caused by the condensation so formed.

238 Project specific method statements

1. Referred to in clause H11:235: Shall include, as a minimum: Assess the risk of surface or interstitial condensation forming on/in the works specified in this Section, based on the worst case environmental conditions specified in accordance with the following:
 - 1.1. Manufacturer's recommendations for the use of proprietary fixings.
 - 1.2. Information on all bolts and fixings requiring specific torques together with details of the required torque levels.

- 1.3. Information on the location and use of locking nuts and washers, engagement of serrations and the like.
- 1.4. Information for glazing procedures, including the position of setting blocks, orientation of glass and any specific requirements of the glazing supplier.
- 1.5. Information on the cleaning and if required, priming procedures for all sealants.
- 1.6. Details of points which are susceptible to damage, or which should not be loaded during installation.

250 Product samples

1. **General:** Before commencing detailed design, submit labelled samples of: curtain walling sections and caps, all glass types, ppc metal panels, spandrel panels, flashings and copings .

260 Samples of fixings

1. **General:** During detailed design, submit labelled samples of each type of fixing anchor, including casting-in restraints and shims, together with manufacturers' recommended torque figures.

280 Mock-Up

1. **General:** Construct during detailed design work in an approved location. Obtain approval of appearance before proceeding. Retain undisturbed until completion of curtain walling installation.
2. **Extent:** Storey height bay, refer to architect's drawing
3. **Purpose:** To serve as an installation reference panel and to obtain Planning

291 Maintenance REVISED

1. Prepare a maintenance manual in accordance with the CWCT 'Guide to good practice for facades', clause 10.2.
2. **Comply with Section:** [Clauses A90:710,720,761].

Design/ performance requirements

305 CWCT 'Standard for systemised building envelopes'

1. **General:** Unless specified or agreed otherwise comply with:
2. Part 2 - Loads, fixings and movement.
3. Part 3 - Air, water and wind resistance.
4. Part 4 - Operable components, additional elements and means of access.
5. Part 5 - Thermal, moisture and acoustic performance.
6. Part 6 - Fire performance
7. Part 7 - Robustness, durability, tolerances and workmanship.
8. **Project performance requirements specified in this subsection:** Read in conjunction with CWCT performance criteria.

306 Loads general

1. **Static and dynamic loads:** The Sub-contract Works shall transmit the specified static and dynamic design loads to the building's structure via the points of support provided for the purpose with an adequate margin of safety appropriate to each material and product.

307 Loads self-weight

1. **General:**
 - 1.1. The work specified in this Section shall support its self-weight, including additional components or services attached to either the internal or external surfaces of the work and

transmit this self-weight safely back to the primary structure without overloading or permanently displacing any of the components of the work.

- 1.2. The effect of self-weight of all components of the work specified in this Section, shall be designed in accordance with BS EN 1991-1-1 and the UK NA to BS EN 1991-1-1.
- 1.3. The self-weight of the work specified in this Section shall allow for water absorption where appropriate.
2. **Serviceability:**
 - 2.1. The works specified in this Section shall be capable of carrying self-weight without any reduction in the performance criteria given in this Specification.
 - 2.2. The maximum in-plane deflection of any main framing member due to self-weight and imposed loads shall not exceed 1/500 of the span or 3 mm whichever is the lesser.
3. **Safety:**
 - 3.1. The works specified in this Section shall transmit safely all self-weight likely to be placed on it to the building's structure via the points of support provided for the purpose.
 - 3.2. The works specified in this Section shall accommodate self-weight locally, and without causing deflections or movements that will load components not designed to carry those loads.

308 Loads imposed loads **REVISED**

1. **Wind:**
 - 1.1. The works specified in this Section shall support wind loads and transmit them safely back to the supporting structure without overloading or permanently deforming any part of the works.
 - 1.2. The wind load shall be calculated in accordance with BS EN 1991-1-4+A1 and the UK NA to BS EN 1991-1-4+A1.
 - 1.3. The design wind load shall not be less than 800 Pa.
2. **Wind resistance: Serviceability:**
 - 2.1. The Sub-contract Works shall be capable of accommodating the design loads without any reduction in the specified performance.
 - 2.2. Deflections of curtain wall framing members shall not exceed the values given in Section 3.5.2 of the CWCT's Standard for Systemised Building Envelopes under the action of the most onerous combination of loads.
 - 2.3. The maximum deflection of rainscreen panels, at both positive and negative applications of the peak test pressure, shall not exceed
 - 2.4. 1/90 of the span measured between the points of attachment of the panel for aluminium, glass and steel, or
 - 2.5. 1/360 of the span measured between the points of attachment, or 3 mm whichever is the lesser, for brittle materials;
 - 2.6. After loading to the peak test pressure and unloading, residual deformation of frame members shall nowhere be more than five per cent of the maximum measured deformation or 1.0 mm, whichever is the greater, with one hour being allowed for recovery. This requirement shall apply separately to both positive and negative pressures.
 - 2.7. Displacement of framing members at points of support shall be minimised and shall be less than 2 mm taken as the difference between the position under peak positive load and peak negative load.
3. **Design calculations:** When calculating deflections and stresses, no account shall be taken of the additional stiffness imparted by glazing units, spandrel panels, glazing beads, pressure-plates, decorative capping pieces.
4. **Wind resistance: Safety:**
 - 4.1. The peak test pressure shall be 1.5 times the design wind pressure.

- 4.2. At both positive and negative applications of the peak test pressure, there shall be no permanent damage to framing members, panels, or anchors. Framing members shall not be buckled. Panels, glazing beads, and decorative capping pieces shall remain securely held, and gaskets shall not be displaced.
- 4.3. After loading to the positive and negative peak test pressure, residual deformation of framing members shall not exceed 1/500 of the span, measured between points of attachment to the building, one hour after the loading has been removed.
- 4.4. Displacement of framing members at supports shall not exceed 3 mm taken as the difference between the position under peak positive load and peak negative load.
5. **Wind resistance:** Cyclic loading:
 - 5.1. The works specified in this Section shall not become detached from the building as a result of repeated reversals of wind loading.
 - 5.2. All panels, framing members, fasteners and fixings of the Works described in this Section shall take into account the effect of wind load fatigue.
6. **Vertical loads:** Due to building occupants: Internal ledges, horizontal framing members and horizontal surfaces in the work specified in this Section shall sustain safely and without damage, a vertical point load of 1kN applied anywhere or a uniformly distributed load of 0.6kN/m², whichever is the most onerous.
7. **Parapets, barriers and balustrades:**
 - 7.1. Parapets, barriers and balustrades incorporated into the work specified in this Section shall be designed in accordance with the requirements of BS 6180, BS EN 1991-1-4+A1 and the UK NA to BS EN 1991-1-4+A1.
 - 7.2. Where the work specified in this Section incorporates barriers and balustrades it shall sustain safely and without damage, the following minimum horizontal imposed un-factored or characteristic loads:
 - 7.2.1. **Spaces without obstacles for moving people and not susceptible to overcrowding:**
 - 7.2.2. Line load of 0.74kN/m acting at a height of 1.1m above finished floor level.
 - 7.2.3. Uniformly distributed load of 1.0kN/m².
 - 7.2.4. Point load of 0.5kN acting on any part up to and including 1.1m above finished floor level.
 - 7.3. Spaces where people may congregate, with tables or fixed seating or less than 3.0m wide and susceptible to overcrowding:
 - 7.3.1. Line load of 1.5kN/m acting at a height of 1.1m above finished floor level.
 - 7.3.2. Uniformly distributed load of 1.5kN/m².
 - 7.3.3. Point load of 1.5kN acting on any part up to and including 1.1m above finished floor level.
 - 7.4. Spaces greater than 3m wide susceptible to overcrowding:
 - 7.4.1. Line load of 3.0kN/m acting at a height of 1.1m above finished floor level.
 - 7.4.2. Uniformly distributed load of 1.5kN/m².
 - 7.4.3. Point load of 1.5kN acting on any part up to and including 1.1m above finished floor level.
 - 7.5. The uniformly distributed line load and the uniformly distributed and concentrated loads applicable to the infill are not additive and shall be considered as three separate load cases.
 - 7.6. Parapets, barriers and balustrades shall be designed for a vertical load. This vertical load shall be either a concentrated load of 1 kN or a uniformly distributed load of 0.6 kN/m, whichever gives the worst design condition in combination with the minimum horizontal imposed horizontal given above.
8. **Snow ice:**
 - 8.1. Loads created by snow or ice shall be accommodated safely, without detriment to the overall structural integrity and performance of the Sub-contract Works.

- 8.2. Snow loads shall be calculated in accordance with BS EN 1-3 and the UK NA to BS EN 1-3.
9. **Cleaning:** The Sub-contract Works shall sustain safely, without reduction in performance and without permanent deformation to any component, a static 500 N load applied horizontally through a square of 100 mm sides on any part of the works specified in this Section.
10. **General maintenance:** Any gutters, copings or flat or near-flat roof surfaces in the works specified in this Section shall sustain the loads given in UK National Annex to BS EN 1991-1-1+A1, Table NA7.
11. **Building Maintenance:** Unit restraints: The works specified in this Section shall sustain a uniform load of: 0.6kN/m² and 0.9kN point load applied in any direction restraint point and shall transmit this load safely back through the cladding to the supporting structure.
12. **Loads combinations:** Loads shall be combined in accordance with BS EN 1990+A1 and the UK NA to BS EN 1990.

309 LOADS IMPACT LOADS

1. General
 - 1.1. The Sub-contract Works shall withstand all specified impact loads, or transferred impact loads that may be expected to occur during its service life. Impact may occur in the following circumstances:
 - 1.1.1. On internal faces of the Sub-contract Works due to normal occupancy.
 - 1.1.2. On external faces of the Sub-contract Works due to normal occupancy.
 - 1.1.3. On external faces of the Sub-contract Works due to maintenance.
2. Internal components: The Sub-contract Works, excluding glass shall achieve Internal Impact Classification I5 (BS EN 14019) when tested in accordance with BS EN 13049.
3. Soft body impact for components:
 - 3.1. The Sub-contract Works, shall satisfy the following requirements when tested in accordance with CWCT Technical Note 76:
 - 3.1.1. Classes for safety performance: CWCT Technical Note 75, Table 1.
 - 3.1.2. Classes for serviceability performance: CWCT Technical Note 75, Table 2.
 - 3.1.3. Exposure categories: CWCT Technical Note 75, Table 3.
 - 3.1.4. Soft body impact test energy: CWCT Technical Note 75, Table 4.
4. Hard body impact for components:
 - 4.1. The Sub-contract Works described in this Section, excluding glass, shall satisfy the following requirements when tested in accordance with CWCT Technical Note 76.
 - 4.1.1. Classes for safety performance: CWCT Technical Note 75, Table 1.
 - 4.1.2. Classes for serviceability performance: CWCT Technical Note 75, Table 2.
 - 4.1.3. Exposure categories: CWCT Technical Note 75, Table 3.
 - 4.1.4. Hard body impact test energy: CWCT Technical Note 75, Table 5.
5. The Sub-contractor shall submit with the tender, elevation drawings indicating the exposure categories of the areas of the elevations.
6. Robustness for rooflight: Rooflight shall be Class 2 in accordance with CWCT Technical Note 66.

310 Loads other loads

1. **Thermally-induced loads:**
 - 1.1. Materials and components used in the building envelope shall be capable of accommodating stresses generated by differential temperatures.
 - 1.2. Calculations shall be performed to establish maximum stresses developed in all brittle materials (including glass), all composite materials and components as a result of temperature gradients within the material or component. These calculations shall prove that

the strength of the materials and components is adequate to prevent damage or failure due to thermally-induced loads.

- 1.3. The Sub-contractor shall ensure that no glass or glazing develops stresses that may lead to loss of integrity and damage or distortion of the glass, glazing materials, components and/or framing systems.
- 1.4. Calculations undertaken to establish maximum stresses developed in glass shall take into account shading stresses that may occur from neighbouring buildings and adjacent components including shading devices. The Sub-contractor shall make due allowance for any special edge treatment or heat treated glass, which may be required.
2. **Internal loads:** On insulating glass units:
 - 2.1. Insulating glass units incorporated into the Sub-contract Works shall be designed to resist without damage or failure the combined effects of pressure differences, arising from changes in temperature and atmospheric pressure, and from the difference in altitude between the place of manufacture and the place of installation together with the other specified loads.
 - 2.2. The place of manufacture shall be taken as the place where the insulating glass units were finally sealed.
 - 2.3. The loads given in Section 4 of the publication 'Technical Regulations for the Use of Glazing with Linear Supports' (TRLV) shall be used.
3. **Limits of pillowing:** Of insulating glass units:
 - 3.1. The outer panes of vertical insulating glass units incorporated into the Sub-contract Works shall be at least as stiff as the inner panes in order to reduce distortions in the external reflections from the glass as a result of atmospheric loads.

314 Temporary conditions

1. **The Sub-contract Works:** Shall carry safely:
 - 1.1. Wind loading experienced as a temporary load during the construction phase.
 - 1.2. Additional temporary loads associated with construction including, storage, transportation, lifting, hoisting and installation which will induce stresses greater than those which will be induced when the Cladding is completed.
 - 1.3. Other loads arising from the temporary or partial support of the Sub-contract Works.

320 Deflection under dead loads

1. **Requirement:** Framing members parallel to the curtain walling plane must not:
 - 1.1. Reduce glass bite to less than 75% of design dimension.
 - 1.2. Reduce edge clearance to less than 3 mm between members and immediately adjacent glazing units, panel/ facing units or other fixed units.
 - 1.3. Reduce clearance to less than 2 mm between members and movable components such as doors and windows.

331 General movement

1. **Curtain walling:** Shall accommodate anticipated building movements as described in clause [A90:266 or A31:481].
2. **The Cladding:** Shall accommodate the following without any reduction in performance:
 - 2.1. Deflections under repeated cycles of the design wind loads.
 - 2.2. Deflections due to design dead loads and specified live loads.
 - 2.3. Changes in dimension and shape arising specified in structural Movement and Tolerances Report.
 - 2.4. **Maximum mid-span deflection:** Due to superimposed dead and live loads: 12 mm (this is a differential long term deflection due to frequent service load after cladding is installed. It includes deflection due to applied load plus additional deflection due to shrinkage and creep over the time after the installation of cladding).

- 2.5. Changes in dimension and shape of the Cladding arising from thermal and moisture movement and shrinkage.

332 Appearance and fit

1. Requirement: Design curtain walling system:
 - 1.1. To ensure position and alignment of all parts and features as shown on preliminary design drawings.
 - 1.2. To accommodate deviations in the primary support structure.
2. Primary support structure: Before commencing installation of curtain walling system, carry out survey sufficient to verify that required accuracy of erection can be achieved.
 - 2.1. Give notice: If the structure will not allow the required accuracy or security of erection.
 - 2.2. Design tolerances: refer to structural engineer's information
3. Curtain wall envelope zone tolerances
 - 3.1. Width: refer to structural engineer's information
 - 3.1.1. Critical reference location: refer to structural engineer's information
4. Maximum permitted component and installation tolerances: refer to structural engineer's information

335 Thermal movement – service temperature ranges REVISED

1. Requirement: To CWCT 'Standard for systemised building envelopes' clause 2.7.2 amended and/or with the addition of the following: TBC.

341 Air permeability

1. Requirement: Permissible air leakage rates of 1.5 cu m/hr/sq m for fixed lights and 2.0 cu m/hr/lin.m for opening lights must not be exceeded when the curtain walling is subjected to a peak positive and negative test pressure of:
 - 1.1. H11:111: 50 Pascals.

345 Air permeability exfiltration

1. Requirement: The maximum permissible air exfiltration rate through the curtain walling system must not exceed: the values given in the services engineer's documents.

351 Water penetration

1. General:
 - 1.1. The Works described in this Section shall be designed to prevent the penetration of water.
 - 1.2. All joints within the works specified in this Section, and all interfaces with other elements of work, shall:
 - 1.2.1. Prevent leakage of water into the interior of the building under the action of wind pressure kinetic energy, gravity, surface tension, or capillary action.
 - 1.2.2. Maintain their watertightness under the loads and movements specified.
 - 1.2.3. Prevent water entering into those parts of the Sub-contract Works that would be adversely affected by the presence of water.
2. Curtain wall:
 - 2.1. At all pressures up to and including the peak test pressure, there shall be no water leakage onto the internal face of the curtain wall. The peak test pressure shall be Class R7 in accordance with BS EN 12154.
 - 2.2. There shall no water leakage onto the internal face of the works specified in this Section when permanently sealed joints are hose tested in accordance with Section 9 of the CWCT's Test Methods for Building Envelopes.

3. **Insulating glass units:** The drainage of water along the edge seals of insulating glass units shall not be permitted.

371 Thermal properties

1. **Requirement:** Average thermal transmittance (U-value) of the curtain walling must not exceed:
 - 1.1. H11:111 ∴ 1.4W/m²K.

376 Calculating thermal properties

1. **Assessment and calculations:**
 - 1.1. Undertake the calculations for the curtain walling types in accordance with BS EN ISO 12631.
 - 1.2. Calculate, where applicable, linear and/or point thermal transmittances through the works specified in this Section in accordance with BS EN ISO 10211.
 - 1.3. Assess the heat transferred through the works specified in this Section by 2 and 3 dimensional numerical analysis.
 - 1.4. Provide 3 dimensional numerical analysis wherever primary structure penetrates the Sub-contract Works.
 - 1.5. Take into account internal and external air temperatures, surface heat transfer coefficients, air spaces and the thermal interaction between all elements of the work specified in this Section.
2. **Thermal Bridges:** There shall be no thermal bridges within the Sub-contract Works that are not accounted for in the assessment of U-values.
3. **Presentation of results:**
 - 3.1. The results of the assessments shall be presented as overall U-values for each type of the works specified in this Section, calculated as weighted averages of the constituent areas.
 - 3.2. Use software shown to be validated against the examples given in Annex D of BS EN ISO 10077-2.
4. **Guidance:**
 - 4.1. Guidance can be found in the following CWCT publications:
 - 4.2. Guide to Good Practice for Assessing Glazing Frame U-values.
 - 4.3. Guide to Good Practice for Assessing Heat Transfer and Condensation Risk for a Curtain Wall.
 - 4.4. Thermal Assessment of Window Assemblies, Curtain Walling and Non-traditional Building Envelopes.

381 Solar and light control

1. **Assessment and calculations:**
 - 1.1. Assess the proposed glass configurations for compliance with the specified performance requirements using BS EN 410.
 - 1.2. All calculations shall be based upon on the spectral properties of single glass panes.

385 Thermal stress in glazing

1. **Glass panes/ units:** Must have adequate resistance to thermal stress generated by orientation, shading, solar control and construction.

391 Avoidance of condensation REVISED

1. **Requirement:** Notional psychrometric conditions under which condensation must not form on the building interior surfaces of framing members or any part of infill panels/facings are described in clause [A90:268].

396 Vapour control layers

1. **Requirement:** Notwithstanding CWCT Standard, clause 2.15.2, provide vapour control layers with a vapour resistance of not less than 300 MN s/g on the internal side of all insulation materials.

411 Sound transmittance - external to internal

1. **Requirement:** The construction must provide the following sound reduction index /indices (Rw) between the external and internal surfaces of the curtain walling when measured in accordance with the relevant parts of BS EN ISO 10140.

412 Acoustic seals

1. **Standard**
 - 1.1. The standard of sealing of the Cladding will ensure no reduction in sound insulation performance for the service life.
 - 1.2. Gaskets and seals used to achieve the required weather and airflow resistance will be selected to accommodate fully the range of dimensional tolerances associated with fabrication, installation and movement in situ of the Cladding sufficient to maintain the acoustic performance required.
 - 1.3. Materials for gaskets and seals will be capable of maintaining their elastic qualities, dimensions and resistance to physical or chemical attack.

416 Sound transmittance - flanking

1. **Requirement:** The construction must maintain the specified sound pressure level difference DnTw between adjoining floors and/or rooms, normalised to a reverberation time of 0.5s, when measured in accordance with BS EN ISO 16283-1:+A1 and weighted in accordance with BS EN ISO 717-1.
 - 1.1. **Sound insulation:** Of the abutting floors: refer to acoustic report
 - 1.2. **Sound insulation:** Of the abutting partitions: refer to acoustic report

418 Noise generation vibration

1. **Standard:**
 - 1.1. The façade types will not creak, rattle or whistle due to the wind and/ or specified thermal and structural movements.
 - 1.2. Anti-drumming materials will be fixed to surfaces of the Cladding likely to be affected.
 - 1.3. Primary brackets and fixings will not loosen due the effects of vibration or the cyclic effects of loads, deflections and thermal movements.

420 Fire resistance of curtain walling

1. **Standard:** To BS EN 13501-1.
 - 1.1. **Minimum periods and criteria:** to comply with Building Regulations and fire engineer's report
 - 1.2. **Direction:** refer to fire engineer's report
 - 1.3. **Basis of verification:** refer to fire engineer's report

421 Fire performance of materials used in external walls and attachments

1. **Standards:** The Building Regulations – refer to clause 43:
 - 1.1. All materials used in the curtain walling and cladding, including all accessories and incorporated components specified in this section will be of European Classification A2-s1, d0 or A1, classified in accordance with BS EN 13501-2 unless specifically excluded from this requirement under the relevant applicable national Building Regulations.
 - 1.2. In all cases, products or elements of construction of the curtain walling and cladding requiring a fire performance will have the appropriate evidence of performance based on test information. The final installation will follow the applicable test evidence in all respects.

- 1.3. The Cladding, including junctions with other works, will not be composed of materials which readily support combustion, add significantly to the fire load, and/ or give off toxic fumes.

427 Reaction to fire of curtain walling

1. **Standard:** To BS EN 13501-2:
 - 1.1. **Class:** A2-s1,d0 or A1

430 Fire stopping

1. **Locations:** At junctions of curtain walling with compartment or separating walls and floors.
2. **Materials and methods of fixing:** To ensure fire resistance not less than that specified for compartment or separating walls and floors when tested from both sides.

431 Fire performance of cavity barriers

1. **Standard:** To BS EN 13501-2.
2. **Requirement:** To resist the passage of flame and smoke for not less than the values given in the Fire Engineer's documentation.
3. **Location:**
 - 3.1. As required to comply with the Building Regulations – refer to clause 43.
 - 3.2. In all transoms and mullions where they span compartment floors and walls.
 - 3.3. **Materials:** Commensurate with their location within the cavity and the design life of the cladding.

437 Louvres

1. Performance classification to BS EN 13030.
 - 1.1. **Discharge operation:** Outlet
 - 1.2. **Water penetration class:** A
 - 1.3. **Discharge/ entry loss coefficient class:** 1

439 Doors and other access facilities

1. **Addition requirements:** To those found elsewhere in this specification, the following shall apply to doors.
2. **General Requirements:**
 - 2.1. Door thresholds:
 - 2.1.1. For accessible doors shall satisfy the requirements of BS 8300.
 - 2.1.2. They shall be slip-resistant grade 1.44 stainless steel.
 - 2.1.3. The design and construction of accessible balcony thresholds shall incorporate a door threshold with an upstand of not more than 5mm.
 - 2.1.4. The 15mm threshold upstand is measured at the door position.
 - 2.1.5. Additional sloping transition elements, such as a small internal ramp and external sill, may be provided either side of the upstand.
 - 2.1.6. The maximum slope on ramps and sills shall be 15 degrees.
 - 2.1.7. Door thresholds shall have a minimum 45mm projecting sill and drip.
 - 2.1.8. The sill shall have a minimum 45mm overhang and drip to shed rainwater away from the interface between the waterproofing layer and the sill and to avoid reliance on exposed joint sealants and their limited design life.
 - 2.2. Door opening force:
 - 2.2.1. The door opening force for manually operated, non-powered accessible swing doors shall comply with BS 8300-2.

2.2.2. Where the opening force is not sufficient to keep the door closed against external conditions, a door closing system shall be used in accordance with Clause 2.8 of Approved Document M.

2.2.3. **Locking system:** Door locking systems shall be in accordance to the Architect's ironmongery schedule.

2.2.4. **Wireways:** Doors shall include wireways concealed in the framing for the access control systems.

3. Operation/ hardware:

3.1. **Powered:** Sliding and folding doors: Shall comply with BS 7036 and BS EN 16005.

3.2. **Emergency exit devices:** Emergency exit devices operated by lever handle or push pad shall comply with BS EN 179.

3.3. **Panic exit devices:** Panic exit devices operated by a horizontal bar shall comply with BS EN 1125.

3.4. **Closing devices:** Controlled door closing devices shall comply with BS EN 1154.

3.5. **Hold-open devices:** Electrically powered hold-open devices for swing doors shall comply with BS EN 1155.

3.6. Sliding doors:

3.6.1. Hardware for sliding doors and folding doors shall comply with BS EN 1527.

3.6.2. External sliding doors shall be secured by way of multi-point locking system with a minimum of three locking points incorporating mushroom headed bolts, hook-bolts or shoot bolts.

3.6.3. Where shoot bolts are fitted they shall engage into the head and sill of the door frame. An anti-lift device shall also be fitted so that doors cannot be lifted from their frame from the outside.

3.6.4. All sliding doors shall be secured by a key operated locking mechanism.

3.6.5. **Escape doors:** Shall comply with BS EN 1634.

4. Performance Requirements:

4.1. **CE Marking:**

4.1.1. Provide certified evidence, in the form of a product conformity certificate or engineering assessment, that each door/ door-set/ assembly supplied shall comply with the specified requirements to BS EN 14351-1.

4.1.2. Such certification shall cover door and frame materials, glass and glazing materials and their installation, essential and ancillary ironmongery, hinges and seals.

4.2. **Wind Resistance:** Classified in accordance with BS EN 12210 and commensurate with the calculated design wind pressure for the building.

4.3. **Air Infiltration:**

4.3.1. Fully rebated and sliding doors: The permissible air infiltration rate through fully-rebated and sliding doors shall not exceed 2.5m³/hr/m² at the peak test pressure.

4.3.2. The peak test pressure shall be as required to achieve Class 4 in accordance with BS EN 12207.

4.4. Non-fully rebated accessible doors at Ground Level: Shall have an airtightness performance commensurate with the architectural design of the door.

4.5. **Watertightness:**

4.5.1. Fully rebated and sliding doors:

4.5.2. There shall be no water leakage onto the internal face of the door, frame or threshold at all pressures up to and including the peak test pressure.

4.5.3. The peak test pressure shall be as required to achieve Class 9A in accordance with BS EN 12208.

- 4.6. **Accessible doors:** Non-fully rebated doors at Ground Level, with level or near level thresholds for compliance with Approved Document M/ BS 8300, shall have a watertightness performance commensurate with the architectural design of the door.
- 4.7. **Impact:**
 - 4.7.1. **Hard and soft body impact:** Classification in accordance with BS EN 1192
 - 4.7.2. **Doors not accessible:** To the public: Class 2.
 - 4.7.3. **Doors:** Accessible to the public: Class 3.
 - 4.7.4. **Service access doors:** Class 4.
- 4.8. **Robustness**
 - 4.8.1. **Strength and durability:** To CWCT 'Standard for systemised building envelopes' clause 4.3.3.
 - 4.8.2. **Doors shall comply with:** BS 6375-2: Section 6 and meet the following requirements found in Table A2 of Annex A of BS 6375-2.
 - 4.8.3. **Doors:** Not accessible to the public: Medium Duty Class.
 - 4.8.4. **Doors:** Accessible to the public: Heavy Duty Class in Table A.2.
 - 4.8.5. **Service access doors:** Severe Duty Class in Table A.2
- 4.9. **Assembly:** Fabrication tolerance: Doors shall be Tolerance Class 3 and 4 in accordance with BS EN 1529 and BS EN 1530 respectively.
- 5. **Security:**
 - 5.1. Doors at Ground Floor shall comply with LPS 1175 (Loss Prevention Standard) Security Rating 2.
 - 5.2. Doors at Ground Floor shall comply with BS PAS 24.
 - 5.3. **Applicable doors:** H11:136
 - 5.4. **Security rating:** PAS 24

441 Louvres

- 1. In addition to the requirements found elsewhere in this specification, the following shall apply also to louvres
- 2. **General Requirements:** Louvres, forming part of the Works described in this Section shall limit the ingress of water such that water passing the louvre drains from the building or is dispersed by evaporation.
- 3. **Performance Requirements:** Vent requirement based on providing min 50% Free Area. subject to tenants requirements
 - 3.1. **Discharge operation:** [Outlet].
 - 3.2. **Water penetration class:** Louvres shall be Class A when tested in accordance with BS EN 13030.
- 4. **Manufacture tolerances:**
 - 4.1. After manufacture, all finished louvre blades within panels shall be within the following tolerances
 - 4.2. **Length of blade:** $\pm 0.5\text{mm}$
 - 4.3. **Position of louvre blade:** In plan and elevation: $\pm 1.0\text{mm}$.
 - 4.4. **Bow of louvre blade:** $\pm 1.0\text{mm}$.
 - 4.5. **Maximum deviation:** Between each individual louvre blade in elevation and in plane: $\pm 1.0\text{mm}$.

442 Corrosion resistance REVISED

- 1. **Materials:**

- 1.1. Materials will be selected and installed, so that they will remain compatible with the other materials around it within its range of influence for the service life of the Cladding.
- 1.2. Measures will be taken to prevent bimetallic corrosion between dissimilar metals.
- 1.3. Reference will be made to PD 6484 'Commentary on corrosion at bimetallic contacts and its alleviation'.
- 1.4. Where different metallic materials are used, separators will be fitted to eliminate the risk of corrosion.
- 1.5. All aluminium or galvanised steel components in direct contact with, but not totally encased in, cementitious surfaces will be isolated with thin dense PVC or EPDM isolation packs. The use of bituminous paint will not be accepted.
- 1.6. Zinc-coated components outside the vapour barrier that cannot be inspected and/or replaced once installed in the Cladding, will be Primary Components as defined in Section 7.2.4 of the CWCT Standard for Systemised Building Envelopes.
- 1.7. The use of continuously zinc-coated coil outside the vapour control line will not be permitted.
2. **Environmental conditions:**
 - 2.1. The external environment of the Cladding, including all cavities outside the vapour control line enclosed will be Atmospheric-Corrosivity Category TBC in accordance with BS EN ISO 12944-2.
 - 2.2. The internal environment of the Cladding will be as follows in accordance with BS EN ISO 12944-2:
 - 2.2.1. Atmospheric-Corrosivity Category C1 for heated internal spaces.
 - 2.2.2. Atmospheric-Corrosivity Category C2 for unheated internal spaces where condensation may occur.

443 Water run-off management and staining mitigation

1. **Design:**
 - 1.1. System solutions are to be developed that manage water evacuation and run-off from the façade, avoiding staining risks to vision areas.
 - 1.2. Channelling of rainwater to curtain wall joints to be developed for water and staining management.

444 Pest infestation

1. **Requirement:**
 - 1.1. The design, manufacture and installation of the Works shall protect against and not contain or provide harbour for infestation by pests.
 - 1.2. The Contractor shall take account of the recommendations of BRE Digest 415, and shall protect against damage caused by termites and other local pests not included in BRE Digest 415.
 - 1.3. Unless where specified within this document, timber components shall not be used in areas where they cannot be readily inspected and replaced without disturbing the system. Any timber components shall be naturally durable for the design life of the façade.

446 Lightning protection system

1. **Standard:**
 - 1.1. The Cladding will be suitable for use as part of the lightning protection system air termination and down conductor system in accordance with BS EN 62305.
 - 1.2. The Cladding will be clamped and /or bonded to the structural components that form part of the lightning protection system and to the earth electrodes (i.e. piles) via the structure in accordance with BS EN 62305. No external tapes or visible connections will be accepted.

- 1.3. All metal components of the Cladding will be electrically continuous, used as part of the inherent lightning protection system and will be of suitable material with sufficient thickness and cross sectional area all in accordance with BS EN 62305.
- 1.4. Where bonding is required the metal component parts of the Cladding will be mechanically connected together with the building structure to provide an equipotential bond to the earth circuit of the building. Unless otherwise specified the electrical resistance of the bond will not exceed 10 Ω when tested in accordance with BS 13830+A.

450 Safety

1. Finished surfaces of curtain walling: Accessible internal and external areas must not:
 - 1.1. Have irregularities capable of inflicting personal injury.
 - 1.2. Release irritant or staining substances.

460 Structural sealant/ bonded glazing requirements

1. Structural sealant/ bonded glazing units: Installable, removable and replaceable without site application of structural bonding sealant.
2. Structural sealant/ bonded glazing design: Must limit design tensile stress of sealants to 138 kPa.

461 Fixings

1. Fixings will comply with the requirements of the Building Regulations Approved Document A, Section 2.
2. They will be designed so that there will be no risk of loosening due to specified loads, deflections and thermal movements.
3. All fixings outside or through the vapour control line will be stainless steel.
4. All fixings that will be concealed once cladding installation is complete will be stainless steel.
5. Galvanised mild steel fixings and brackets are not permitted.

Breeam performance requirements - Not Used

Testing

501 Testing generally

1. Test results and reports: Before commencement of curtain walling fabrication and installation, submit proof of compliance with this specification. Compliance may be achieved by either Comparison (Type) testing as clause H11:511 or Project Testing (Laboratory) as clause H11:111 . Confirm with submission which method is used.

511 Comparison (type) testing

1. Requirement: To CWCT 'Standard for systemised building envelopes', Part 8.
 - 1.1. Test results and reports: Before commencement of curtain walling fabrication and installation, submit proof of compliance with this specification.
2. Compliance:
 - 2.1. 550.
 - 2.2. The test sequence shall be not less than the requirements of clause H11:550.
 - 2.3. CWCT Standard, Part 1, clause 1.5.5 shall apply and the design team's decision on the acceptability of previous test results shall be final.

515 Project testing (laboratory)

1. Test results and reports: Before commencement of curtain walling fabrication and installation, submit proof of compliance with this specification.

521 Project testing (site)

1. Timing: During installation on site, arrange for testing of sections of curtain walling as follows:
 - 1.1. H11:111: As clause H11: 636
 - 1.2. Test results and reports: Submit as soon as possible following each test.

531 Testing authority

1. Requirement: Project testing must be carried out by either:
 - 1.1. A United Kingdom Accreditation Service (UKAS) approved independent laboratory. Or
 - 1.2. The curtain walling manufacturer/contractor and witnessed/certified by a nominated representative.

540 Test specimen

1. Arrangement and overall dimensions: TBA
2. Features: Include doors and louvres

541 Air permeability leakage test

1. Test chamber requirements.
 - 1.1. Calibrate not more than two weeks before commencing the installation of the test specimen.
 - 1.2. Calculate the maximum allowable air leakage through the whole specimen, with opening lights unsealed, prior to calibrating the test chamber.
 - 1.3. If, at any time during the calibration of the test chamber or during the test, the extraneous chamber leakage exceeds 4 times the agreed maximum allowable air leakage as calculated above, the calibration or test shall be terminated and the chamber re-sealed.

551 Test sequence - standard laboratory tests

1. Requirement: To CWCT 'Standard for systemised building envelopes', Standard sequence A, clause.
2. 8.12.1 and as follows:
3. Air permeability (infiltration): To CWCT clause 8.6
 - 3.1. Peak test pressure: As clause H11:341.
 - 3.2. Test conditions: Calm wind. Standard temperature, pressure and humidity.
 - 3.3. Air leakage: Regions of concentrated air leakage: Identify by smoke.
4. Air permeability (exfiltration): To CWCT clause 8.6.
 - 4.1. Peak test pressure: To CWCT clause 8.6.
 - 4.2. Allowable exfiltration rates: As clause H11:345.
 - 4.3. Air leakage: Regions of concentrated air leakage: Identify by smoke.
5. Water penetration resistance: Static: To CWCT clause 8.7.1.
 - 5.1. Peak pressure: As specified in clause H11:351.
6. Wind resistance - serviceability: To CWCT clause 8.8.
 - 6.1. Peak pressure: Equal to design wind pressure specified in clause 308 .
 - 6.2. Position: Of displacement measuring devices: submit proposals
 - 6.3. Allowable : Elastic and residual deformation: clause 345.
 - 6.4. Glazed units: All edges to be supported.
7. Air permeability (Infiltration): Repeat as above.
8. Air permeability (Exfiltration): Repeat as above.
9. Water penetration resistance: Static: Repeat as above.

10. **Hose test:** To CWCT clause 8.16.2
 - 10.1. **Joints to be tested:** All joints in the test specimen.
11. **Wind resistance - safety:** To CWCT clause 8.8
 - 11.1. **Peak pressure::** Equal to 1.5 times design wind pressure specified in clause 308.
 - 11.2. **Position:** Of displacement measuring devices: submit proposals
 - 11.3. **Allowable:** Residual deformation: As CWCT Standard, clause 3.6.2.2
12. **Impact – safety:**
 - 12.1. **Location, :** Sequence and number of impacts to be applied: submit proposals
 - 12.2. **Type:** Of soft body impactor: Loaded canvas spherical / conical bag as described in CWCT 'Standard test methods for building envelopes' clause 15.4.1
 - 12.3. **Energy:** Of soft body impactor (E): As clause H11:309
 - 12.4. **Required hard body impact load category:** as clause H11:309
 - 12.5. **Required soft body impact classification:** as clause H11:309
 - 12.6. **Dismantle, inspect and record.**

636 Watertightness - site hose test

1. **Requirement:** To CWCT 'Standard for systemised building envelopes', and 'Standard test methods for building envelopes' section 9.
 - 1.1. **Joints to be tested:** 5% of the external surface area of the completed curtain walling in locations to be agreed.
 - 1.2. The testing may take place at any time during the installation of the curtain walling.

637 Watertightness - site spray bar test

1. **Requirement:** To BS EN 13051 and 'Standard test methods for building envelopes' section 10.
 - 1.1. **Areas to be tested:** 5% of the external surface area of the completed curtain walling in locations to be agreed.
 - 1.2. The testing may take place at any time during the installation of the curtain walling.
 - 1.3. Water leakage at any point on the curtain walling will constitute a failure of the test. This includes areas outside the areas used for calculating 5% of the external surface area.

655 Wind load fatigue test, small specimen

1. **Requirement:** To CWCT 'Standard for systemised building envelopes', 'Standard test methods for building envelopes' Section 14.
 - 1.1. **Test sequence:** 10,000 cycles of 100% effective wind pressure

661 Structural sealant glazing test

1. **Product samples:** Provide the structural bonding sealant manufacturer with framing profiles, glass, gaskets, assembly/ weathering sealants and other curtain walling products that are proposed for contact with structural bonding sealant.
 - 1.1. **Testing:** By sealant manufacturer to determine compatibility and adhesion of structural bonding sealant under specified design loadings.
 - 1.2. **Modification of product:** To enable compliance with test criteria: Details must be recorded in the sealant manufacturer's project specific approval.
 - 1.3. **Batch testing:** Of the structural bonding sealant: Carry out at regular intervals during manufacture. Agree the frequency of such tests prior to manufacture.
 - 1.4. **Random adhesion testing:** Of the structural bonding sealant: Carry out at regular intervals during manufacture of the glazing units. Agree the frequency of such tests shall be agreed prior to manufacture.

Products

710 Aluminium alloy framing sections

1. **Standard:** To relevant parts of BS EN 515, BS EN 573, BS EN 755 and BS EN 12020.
2. **Alloy, temper and thickness:** Suitable for the application and specified finish.
3. **Structural members:** To BS EN 1999-1-1.

713 Aluminium alloy sheet

1. **Standards:** To relevant parts of BS EN 485+A1, BS EN 515 and BS EN 573-3.
 - 1.1. **Alloy, temper and thickness:** Suitable for the application and specified finish.
 - 1.2. **Aluminium sheet:** For flat panels and copings: Not less than 3mm thick.
 - 1.3. **Aluminium sheet for flashings:** Not less than 1.6mm thick.

714 Aluminium alloy castings

1. **Standards:** BS EN 515.

715 Carbon steel framing sections/ Reinforcement

1. **Standards:** To relevant parts of BS 7668, BS EN 10029, and BS EN 10210.
2. **Thickness:** Suitable for the application, and for galvanizing or other protective coating.

717 Carbon steel sheet

1. **Standards:** To relevant parts of BS 1449-1, BS EN 10048, BS EN 10051, BS EN 10111, BS EN 10131, BS EN 10132, BS EN 10139, BS EN 10140, BS EN 10149, BS EN 10209 and BS EN 10268.
2. **Grade and thickness:** Suitable for the application, and for galvanizing or other protective coating.

718 Hot-dip metal coated steel sheet

1. **Standard:** To BS EN 10143 in a thickness suitable for the application.

721 Stainless steel sheet

1. **Standards:**
 - 1.1. To relevant parts of BS EN 10029, BS EN 10048, BS EN 10051, BS EN 10095 and BS EN ISO 9445.
 - 1.2. **Grade:** To BS EN 10088-2, austenitic 1.4301 (304) generally, 1.4401 (316) where visible in the finished work.
 - 1.3. **Thickness:** Suitable for the application.
2. **Finish:**
 - 2.1. Unless specified otherwise, all stainless steel to be bright polished, Surface Finish Code 1P/2P.
 - 2.2. Rolling grain on self-finished components: Run horizontally in the completed installation unless specified otherwise on the drawings.

731 Mechanical fixings

1. Stainless steel fixings and fasteners for internal use or for use in external environment where the fixing or fastener is not visible shall be A2 grade in accordance with BS EN ISO 3506.
2. Stainless steel fixings and fasteners for external use where the fixing or fastener is visible shall be A4 grade in accordance with BS EN ISO 3506.
3. Aluminium brackets, rivets and shear pins: To relevant parts of BS EN 755.

732 Adhesives

1. **General:** Not degradable by moisture or water vapour, or exposure to UV light.

736 Fixings generally

1. **Requirements:** Comply with:
 - 1.1. **Current Building Regulations:** Refer to clause H11:43.
 - 1.2. **Preliminaries clause:** [A31:482/A90:267].
 - 1.3. **Section Z20**, unless specified otherwise in this section.
2. **Materials:** As clause H11:731.
3. **Dimensions:** Not less than recommended by their manufacturers.
4. **Adjustment capability:** Sufficient in three dimensions to accommodate building structure and curtain walling.
5. **Differential movement between structure and cladding:** Transfer loads without causing undue stress to either element.
6. **Fire performance:**
 - 6.1. All primary fixings, panel fasteners and insulation retainers will be selected to ensure that a fire does not result in premature system detachment.
 - 6.2. Where insulation within the cavity of a shadow panel is attached to the inner wall, a minimum of one extra non-combustible fixing per square metre or per batten of insulation, whichever is the lesser, will be provided to prevent detachment of the insulation in the event of fire.

738 Glass generally

1. Refer to Section Z25.

739 Dimensional tolerances on glass

1. **Description:**
2. **Measurement of tolerances:** Before any thermal toughening/ heat strengthening.
3. **Pane dimensions less than 1500 mm**
 - 3.1. For 3 to 6 mm thick glass: ± 1.0 mm.
 - 3.2. For 8 to 12 mm thick glass: ± 1.5 mm.
 - 3.3. For 15 mm thick glass: ± 2.0 mm.
 - 3.4. For 19 mm and 25 mm thick glass: ± 2.5 mm.
4. **Pane dimensions more than 1500 mm**
 - 4.1. For 3 to 6 mm thick glass: ± 1.5 mm.
 - 4.2. For 8 to 12 mm thick glass: ± 2.0 mm.
 - 4.3. For 15 mm thick glass: ± 2.5 mm.
 - 4.4. For 19 mm and 25 mm thick glass: ± 3.0 mm.
5. **Pane squareness:** Not more than 4 mm difference in diagonal measurements.

741 Distortional tolerances on glass

1. **Description:**
2. **Measurement of tolerances:** After any thermal toughening/ heat strengthening.
3. **Maximum bow:** 0.2% of pane dimension.
4. **Maximum roller wave**
 - 4.1. For 3 to 5 mm thick glass: 0.5 mm.
 - 4.2. For 6 to 10 mm thick glass: 0.3 mm.

- 4.3. For 12 mm and thicker glass: 0.15 mm.
- 5. Maximum edge dip
 - 5.1. For 3 to 5 mm thick glass: 0.8 mm.
 - 5.2. For 6 to 10 mm thick glass: 0.5 mm.
 - 5.3. For 12 mm and thicker glass: 0.25 mm.

747 Glass edge condition for structural sealant/ bonded glazing

- 1. Bonded, unframed outer edges: Flat ground with a small arris suitable for open jointing or for weatherseal jointing.

748 Insulating glass units

- 1. Standard : For double glazed units: To BS EN 1279, hermetically sealed (dual-seal) and Kitemark certified, or to an equivalent National Standard if applicable.
- 2. Glass:
 - 2.1. The proposed glass build-up for the outer and inner panes of insulating glass units in vision areas is laminated annealed glass. If heat treated glass is required it shall be laminated heat strengthened glass.
 - 2.2. Glass to comply with requirements of the Building Regulations Approved Document K, and tested to BS EN 12600, unless specified otherwise.
 - 2.3. Toughened glass shall be used only when it can be demonstrated by the Sub-contractor that no other glass type can be used.
 - 2.4. Glass colour and visual appearance to be approved via sample inspection.
- 3. Insulated glass unit cavity: Cavity to be filled with argon gas to meet performance requirements.
- 4. Perimeter treatment:
 - 4.1. Colour: Of aluminium perimeter spacers: Black
 - 4.2. Perimeter seals: Resistant to UV light degradation on any exposed edges. Compatible with any structural/ assembly/ weather sealants with which they come into contact.
 - 4.3. Perimeter taping: Not permitted.
- 5. Identification: Marking of safety glazing to be in accordance with BS 6262-4 Section 7.
- 6. Risk assessment: Refer to clause H11:231.
- 7. Limits of pillowing: Of insulated glass units: The outer panes of insulating glass units incorporated into the works described in the section shall be stiffer than the inner panes in order to reduce distortions in the external reflections from the glass as a result of atmospheric loads.
- 8. Thermal Shock:
 - 8.1. The likelihood of thermal shock is to be investigated and eliminated in connection with internal blinds.
 - 8.2. Confirm that fit-out glare blind specification will not prevent an annealed laminated inner pane.
 - 8.3. Façade contractor is responsible for thermal shock analysis for any other influencing factors.
 - 8.4. If annealed laminated glass is suitable, base bid to reflect this, with cost option for heat strengthened laminated inner pane for 'just in case' purposes so that tenderers can carry out thermal shock analysis.
- 9. Loads on insulating glass units:
 - 9.1. Insulated glass units incorporated into the works described in this section shall be designed to resist without damage or failure the combined effects of; pressure differences arising from changes in temperature and atmospheric pressure, the difference in altitude between the place of manufacture and the place of installation together with other specified loads.
 - 9.2. The place of manufacture shall be taken as the place where the insulating glass units were finally sealed.

10. **Tolerances:**
 - 10.1. **After processing:** Individual pieces of heat treated glass will be within the following tolerances.
 - 10.2. **Length and width:** As required by BS EN 12150.
 - 10.3. **Square-ness :** Measured along the diagonals: As required by BS EN 12150.
 - 10.4. **Roller wave:** 0.15mm between peak and trough for panes of 8mm or thicker, 0.20mm for panes less than 8mm thick.
 - 10.5. **Edge dip:** 0.25mm.
 - 10.6. **Bow/Local bow:** As required by BS EN 12150.
11. **Material manufacturer:** The total quantity of each glass material for each façade type will be obtained from the same material manufacturer. In the case of coated glasses, or other processed glass products, all products will be processed from float glass obtained from one manufacturer.
12. **Assembly:** Insulating glass units will be assembled in accordance in controlled temperature and humidity conditions in accordance with BS EN 1279.
13. **Glass Assessment:**
 - 13.1. The 'Guideline to Assess the Visible Quality of Glass in Buildings, (BF Bulletin 006/2009) prepared by the Bundesverband Flachglas e.V will be used to assess the visual quality of glass installed in the façade.
 - 13.2. The 'Guideline for Assessing the Visual Quality of Enamelled Glass, (BF Bulletin 015/2013) prepared by the Bundesverband Flachglas e.V will be used to assess the visual quality of fully or partially enamelled glass installed in the façade.

750 Infill panels/ Facings

1. **Tolerances**
 - 1.1. **Deviation in size (maximum):** ± 1 mm.
 - 1.2. **Deviation in flatness from plane per 2 m length (maximum):** ± 1 mm.
2. **Rigidity:** Adequate to comply with design/ performance requirements.
3. **Fire performance:**

761 Gaskets

1. **Material:**
 - 1.1. Noncellular rubber to BS 4255-1
 - 1.2. Cellular rubber to ASTM-C509-06.
2. **Continuity:** Outer gaskets of single front sealed curtain walling systems and inner gaskets of drained and ventilated or pressure equalised curtain walling systems must be formed in a complete frame with sealed joints. Vulcanised rubber gaskets must have factory moulded corner joints.
3. **Durability:** Resistant to oxidation, ozone and UV degradation.
4. **Dimensions:** Manufacture to a small, predetermined, oversize tolerance to ensure that, when installed, the lengths and corners are in slight compression.

765 Weatherstripping of opening units

1. **Material**
 - 1.1. Noncellular rubber to BS 4255-1.
 - 1.2. Cellular rubber to ASTM-C509-06.
 - 1.3. Polypropylene woven pile, silicone treated.
2. **Attachment:** Fixed in undercut grooves in framing sections using preformed corners, with any joints in the length.

770 General sealants

1. **Selection:** In accordance with BS 6213 from:
 - 1.1. Silicone.
 - 1.2. One part polysulfide.
 - 1.3. Two part polysulfide.
 - 1.4. One or two part polyurethane.
2. **Classification and requirements:** To BS EN ISO 11600.
3. **Reaction to contact products and finishes:** Stable and compatible.

772 Curtain walling joint assembly sealants

1. **Material:** One part, low modulus silicone to BS EN ISO 11600, type F or G. Neutral curing where in contact with or close proximity to other products that may be adversely affected by acetoxycuring.
2. **Manufacturer:** Contractor's choice
 - 2.1. **Product reference:** submit proposals

775 Bonding sealants for structural sealant/ bonded glazing

1. **Material:** Silicone, neutral curing, designed and manufactured for bonding of structural sealant/ bonded glazing. Compatible with contact and close proximity products and finishes.
2. **Manufacturer:** Contractor's choice
 - 2.1. **Product reference:** submit proposals

781 Thermal insulation

1. **Material:** Mineral fibre or mineral wool as defined in BS EN 13162+A1, in the form of bonded slabs complying with BS EN 13162+A1, with thicknesses and densities to provide the thermal and acoustic performance specified.
2. **Properties:**
 - 2.1. Durable, rot and vermin proof and not degradable by moisture or water vapour.
 - 2.2. Insulation materials exposed to the external environment: With a suitable textile-reinforced weathering membrane on the external face.
3. **Fixing:** Attached to or supported within the curtain walling so as not to bulge, sag, delaminate or detach during installation or in situ during the life of the curtain walling.

786 Vapour control layers

1. **Requirement:** Notwithstanding CWCT Standard, clause 2.15.2, provide vapour control layers with a vapour resistance of not less than 300 MN s/g on the internal side of all insulation materials.
2. **Acceptable materials:**
 - 2.1. Aluminium alloy.
 - 2.2. Stainless steel.
 - 2.3. **Reinforced membranes:** Complying with the requirements of Approved Documents B: Fire safety Vol 2, where required: Foil, plastics or rubbers, protected both sides by rigid facings/ linings.
3. **Location:** Warm side of thermal insulation.
4. **Integrity:** Continuous, free from gaps and sealed at joints.

791 Thermal breaks

1. **Requirement:** Rigidly fixed to the metal sections but with allowance for accommodating differential movement without deformation or distortion.

Finishes

810 Protective coating of carbon steel framing sections/ Reinforcement

1. Treatment: One of the following to all surfaces:
 - 1.1. Hot dip galvanized to BS EN ISO 1461.
 - 1.2. An appropriate equivalent coating to BS EN ISO 12944-5 or BS EN ISO 14713-1, -2 and -3.

830 Powder-coating

1. Requirement: As section Z31.

840 Anodizing

1. Requirement: As section Z33.

Fabrication and installation

901 Accreditation of installers

1. Operatives: Competent, trained, and holding current registration cards for the CWCT Registration and Certification Scheme for Window and Curtain Walling Installers, Part II.
2. Registration cards: : At least 80 % of the operatives to hold current Full Registration cards for the system being installed. The balance to hold Trainee or Provisional Registration Cards, or Full Registration Cards for systems other than that being installed.
3. Custom curtain walling: Full Registration cards to be project-specific.

910 Generally

1. Electrolytic corrosion: Prevent. Submit proposed methods.
2. Fixings: Concealed unless indicated on detailed drawings. Where exposed they must match material and finish of the products fixed.
3. Fabrication: Machine cut and drill products in the workshop wherever possible.
4. Identification of products: Mark or tag to facilitate identification during assembly, handling, storage and installation. Do not mark surfaces visible in the completed installation.

911 Fabrication and installation accuracy REVISED

1. Requirements: In addition to Preliminaries clause [A90:352]:
 - 1.1. Dimensions: Fabricate and install to the dimensions indicated on the drawings, subject to the permitted installation tolerances specified in the CWCT Standard, clauses 7.4.5 and 7.4.6
 - 1.2. Static joints: Between components. Fabricate and install to the permitted installation tolerances specified in the CWCT Standard, clauses 7.4.5 and 7.4.6
 - 1.3. Compliance: Measure dimensions using instruments with an accuracy complying with Preliminaries clause A90:351. During erection, use instruments with an appropriate degree of accuracy for the operations being undertaken.

912 Metalwork

1. Requirement: As section Z11, unless specified otherwise in this section.

917 Fixings/ Adhesives application

1. Requirement: As section Z20, unless specified otherwise in this section.

920 Sealant application

1. Requirement: As section Z22, unless specified otherwise in this section.

925 Structural sealant/ bonded glazing

1. **Curing:** Do not transport units until structural bonding sealant has adequately cured for the period stated in the project specific approval.

930 Assembly

1. **General:** Carry out as much assembly as possible in the workshop.
2. **Joints (other than movement joints):** Rigidly secured, reinforced where necessary and fixed with hairline abutments.
3. **Displacement of components in assembled units:** Submit proposals for reassembly on site.

955 Fixing anchor installation

1. **Site drilling or cutting into structure:** Submit proposals for positions other than shown on detailed drawings.
2. **Concrete supporting structure**
 - 2.1. **Cast-in inserts:** Provide detailed locational information. Protect cavities in inserts from entry of concrete.
 - 2.2. **Edge fixing distances:** Not less than recommended by fixing anchor manufacturers.
3. **Corrective fabrication:** Minimize. Where necessary, submit proposals.

965 Preliminary curtain walling installation

1. **Requirement:** Complete an area for inspection and approval of appearance as follows: as clause 520.

970 Curtain walling installation

1. **Securing to fixing anchors:** Through holes formed during fabrication only.
2. **Tightening mechanical fasteners:** To manufacturer's recommended torque figures. Do not overtighten fasteners intended to permit differential movement.
3. **Protective coverings:** Remove only where necessary to facilitate installation and from surfaces that will be inaccessible on completion.

975 Welding

1. **In situ welding:** Not permitted.

979 Installing fire and smoke stops

1. **Fire and smoke stops:**
 - 1.1. To be located at all junctions between the curtain wall and compartment or separating walls and floors.
 - 1.2. To be installed strictly in accordance with manufacturers' guidelines and as recommended in CWCT Technical Note TN 98.
 - 1.3. To be positively fixed in position in such a manner that they will not become dislodged in the event of a fire.
 - 1.4. The fixing method will secure the stop in position for a period at least equal to that required of the compartment wall or floor against which the building envelope abuts.
 - 1.5. The fixing will take account of the movement of the Cladding and the supporting structure during the design life of the Cladding and during a fire.
2. **Installer qualification:** To be a member of a UKAS accredited installer scheme.

980 Interfaces

1. **Flashings, closers, etc:** Locate and form correctly to provide weathertight junctions with the curtain walling.

982 Ironmongery

1. **Assembly and fixing:** Accurately, using fasteners with matching finish supplied by ironmongery manufacturer.
2. **Completion:** Check, adjust and lubricate as necessary to ensure correct functioning.

985 Maintenance **REVISED**

1. **Maintenance manual:** Incorporate details within the Building Manual in accordance with CWCT 'Standard for systemised building envelopes' clause 7.6.1.
 - 1.1. **Materials certification and test reports to be included:** TBC

Deleted clauses

782 Insulation sustainability criteria **DELETED**

Ω End of Section



Specification created using NBS Chorus

Sheppard Robson

The Castings

CAS-AXIS-BU1-XX-SP-A-10-0005

H92 Rainscreen cladding

A4 - For Construction

C01

17-11-2022

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To be read with preliminaries/general conditions.

4 Sub-contractor's design responsibility

1. Based on the JCT guide to the use of Performance Specifications, the following are the requisite performance levels for Sub-Contractor design:
2. Performance Level 1: Prescriptive Specification (no design by Sub-Contractor)
 - 2.1. The Sub-Contractor is to construct the work in accordance with production information and a prescriptive specification provided by others and has no design responsibility.
 - 2.2. The Sub-Contractor is responsible for materials and workmanship and the provision of product manufacturer's guarantees and warranties where required.
3. Performance Level 2: Performance Specification (no 'in context' design by the Sub-Contractor)
 - 3.1. The Sub-Contractor's design input is limited to the selection of 'off the shelf' products that satisfy the performance specification and construction of the works using the selected components.
 - 3.2. The Sub- Contractor is responsible for materials and workmanship, design input in selecting products and the provision of product manufacturer's guarantees and warranties where required.
4. Performance Level 3: Performance Specification (simple 'in context' design)
 - 4.1. The Sub-Contractor's design input is limited to the selection of 'off the shelf' products that satisfy the performance specification, adapting them as necessary to suit the Specifier's design and constructing the works using the selected components as adapted.
 - 4.2. The Sub-Contractor is responsible for materials and workmanship, design input in selecting and adapting products and the provision of product manufacturer's guarantees and warranties where required.
5. Performance Level 4: Performance Specification (complex 'in context' design)
 - 5.1. The Sub-Contractor is to provide detail design and production information, including a prescriptive specification of products and construct the works in accordance with that design using selected components adapted as necessary.
 - 5.2. The sub-contractor is responsible for materials and workmanship and for design input. May obtain product manufacturers' guarantees and warranties for Client.

Tendering

8 Sub-contractor's design scope performance level 3

1. The Performance Level 3: Work associated with this Work Package is specified in the following clause(s) of this Work Package Section: all.
2. These clauses should be read in conjunction with the general clauses of the associated specifications.

13 Contractor's design

1. The work specified in this Section shall be designed by the Contractor based on the Employer's Requirements.
2. **Production information:** Shall be prepared by the Contractor, [in conjunction with the novated Design Team], as necessary to procure and construct the work.

20 The scope of the works

1. **The Contractor:** Is entirely responsible for the detailed design, manufacturing, fixing, jointing, and installation of the works shown on the drawings and specified in this work section, including all necessary or required accessories and ancillary work.
2. The Contractor is responsible for coordinating the detail design of related and adjacent work to maintain the specified performance at all interfaces.
3. The Contractor is responsible for ensuring that all materials used are compatible with those of adjacent works so as not to compromise the specified performance or life expectancy of the works.

25 Generally

1. The design, fabrication, installation and performance requirements specified are intended to establish a minimum performance level and general principles. The Contractor shall be responsible for achieving or surpassing the design and performance criteria for all components.

30 Tender/ contract drawings

1. **Drawings:** Have been prepared as scheduled. Information shown is schematic and indicative of the design proposals for the basic functional and architectural requirements. The drawings do not indicate a detailed solution, nor do they prejudice the submission of alternative proposals complying with the specified requirements.

35 Read in conjunction with

1. **The following documents:** The structural engineer's information
The fire strategy report
The acoustic report
The drawings and specifications from manufacturers whose products are adjacent to those specified in this section.

43 Compliance with current regulations **REVISED**

1. **The Contractor:** Shall ensure that the works described in this Section are compliant with the current editions of:
2. - The Building Regulations (England).

45 Approvals

1. **The Contractor:** Shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Control Officer/Approved Inspector/Fire Officer.
2. The Contractor shall provide all drawings, calculations, specifications, other technical information together with any risk assessments or risk analysis as may be required to contribute to the fire safety information required under Regulation 38 of the Building Regulations.

46 Approvals

1. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Principal Designer and/or Health and Safety Officer.

47 Compliance and approvals

1. The Contractor shall ensure that works described in this Section are compliant with the requirements of the Building Insurer/ Warranty Provider.
 - 1.1. Building Insurer: ...Build Zone.
2. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Insurer/ Warranty Provider.

50 Information to be submitted with tender **REVISED**

1. **The Contractor:** Shall provide, in addition to the general technical information required under clause [A90:126], the following cladding particulars:
 - 1.1. Typical plan, section and elevation drawings at suitable scales.
 - 1.2. **Typical detailed drawings at large scales, including:** All flashings, closers, and weathertight & air permeability seals which may be required between the system and adjacent building components
 - 1.3. Elevation drawings indicating the exposure categories of the areas of the elevations.
 - 1.4. Technical information and certification demonstrating compliance with specification of proposed incorporated products and finishes, including: Carrying out risk assessments for all glass types in accordance with clauses Z25:167 and H92:233
 - 1.5. Certification, reports and calculations demonstrating compliance with specification of proposed cladding.
 - 1.6. Proposals for connections to and support from the primary support structure.
 - 1.7. Proposals for primary support structure additional to that shown on preliminary design drawings.
 - 1.8. Schedule of builder's work, special provisions and special attendance by others.
 - 1.9. Examples of standard documentation from which project quality plan will be prepared.
 - 1.10. Preliminary fabrication and installation method statements and programme.
 - 1.11. Proposals for replacing damaged or failed products.
 - 1.12. Areas of non-compliance with specification.
 - 1.13. **Additional information:** None

55 Production information

1. Shall be provided by the Contractor as follows: Drawings and calculations.
2. Design and production information shall include all interfaces of related and adjacent work.

60 Accuracy of contract works **REVISED**

1. In addition to any more stringent requirements specified elsewhere, the Works shall be constructed to the degrees of accuracy specified in clause [A90:352].
2. Not less than 15 days before commencing the work specified in this section confirm, by survey relative to the Contractor's setting-out points, that the locations of all relevant previously-built works are correct taking account of all specified tolerances. The results of this survey shall be provided.
3. If the surveyed locations of the relevant previously-built works will not allow the works specified in this section to be completed within the specified degrees of accuracy, the Contractor is to immediately seek instructions before proceeding.

70 Warranty

1. **The Contractor:** Shall warrant that he has exercised, and will exercise, all reasonable skill and care in:
 - 1.1. The design of the Works insofar as the Works have been or will be designed by the Contractor.
 - 1.2. The selection of materials and goods for the Works insofar as such materials and goods have been or will be selected by the Contractor.
 - 1.3. The satisfaction of any performance specification or requirement insofar as such performance specification or requirement is included or referred to elsewhere in this specification.

80 Design life of the installation **REVISED**

1. The design life of the building, as defined in BS ISO 15686-1, is 60 years.
2. The design life of the envelope system works specified in this Section, as defined in BS ISO 15686-1, is 60 years.
3. **Primary components:** 60 years:
 - 3.1. All primary components, as defined in Section 7.2.4 of the CWCT Standard for Systemised Buildings, will have a predicted service life of not less than the design life of the envelope system, without the need for any cleaning or maintenance.
 - 3.2. All framing components, their fixings, and means of attachment to the structure.
 - 3.3. Thermal insulation and vapour barriers which cannot be removed without dismantling the envelope system.
 - 3.4. Flashings, gutters, copings, and similar metal weathering elements.
 - 3.5. Sealants and gaskets which are concealed within the system and cannot be removed without dismantling the envelope system.
 - 3.6. Brackets for attachment of additional components.
 - 3.7. Structural sealants and bonded joints.
 - 3.8. Fire stopping and cavity barriers.
4. **Secondary components:** 30 years:
 - 4.1. All secondary components, as defined in Section 7.2.5 of the CWCT Standard for Systemised Buildings which, under the specified conditions, have a predicted service life that is less than the design life of the Cladding will be capable of replacement without compromising the long-term structural or weatherproof integrity of the Cladding. They will be capable of replacement without progressive dismantling of the Cladding:
 - 4.2. Internal linings.
 - 4.3. Exposed finishes to metal components.
 - 4.4. Window and door equipment.
 - 4.5. Glass.
 - 4.6. External panels and their fixings.
 - 4.7. Accessible gaskets and compression seals.
 - 4.8. Accessible sealants.
5. The predicted service life of components will be the service life predicted from recorded performance over time, as defined in clause 3.20 of BS ISO 15686-1.
6. **Provide:** In the Building Manual specified in [A90:715], information on the methods for replacing all components and assemblies with a design life less than that of the building or less than that of the installation of which they form part.

85 Building manuals **REVISED**

1. Are required and shall comply with: [A90:715].

Type(s) of rainscreen cladding

101 General

1. For configuration, dimensions and location refer to the Architect's drawings.

110 Rainscreen cladding **REVISED**

1. **Description:** AS INDICATED ON THE DRAWINGS
2. **Primary support structure:** SFS with cementitious sheathing board - refer to section G15. Blockwork - refer to section F10. For locations refer to architect's drawings.

3. Rainscreen cladding system
 - 3.1. Type: Drained and back-ventilated
 - 3.2. Requirement: Include products, fixings and interfaces necessary to complete the fabrication and installation. Performance criteria to comply with Design/ Performance Requirements and Testing subsections.
 - 3.3. Design/ performance requirements: Generally - as clause 310
4. Rainscreen panel
 - 4.1. Type: Cassette
 - 4.2. Material: Aluminium
 - 4.3. Thickness: As determined by performance requirements
 - 4.4. Finish/ Colour: PPC RAL 7016 - Anthracite Grey
 - 4.5. Other panel requirements: None
 - 4.6. Panel fixing system: Secret
 - 4.7. Panel fixings: As determined by clause 340.
 - 4.8. Joint type: Baffled
5. Air gap: Not less than 38 mm.
6. Backing wall: SFS as section G15, Blockwork as section F10.
 - 6.1. Thermal insulation: To meet requirements of clause 430
 - 6.2. Air and vapour control layer: To meet requirements of clauses 440 and 450
 - 6.3. Breather membrane: To meet requirements of clauses 440 and 450
7. Accessories: Parapet pressings, flashings
8. Incorporated components: None
9. Other requirements: None

General requirements/preparatory work

210 Design

1. Rainscreen cladding system and associated features: Complete detailed design in accordance with this specification and the preliminary design drawings and submit before commencement of fabrication.
2. Related works: Coordinate in detailed design.

215 Design proposals

1. Submission of alternative proposals: Preliminary design drawings indicate intent. Other reasonable proposals will be considered.

220 Specification

1. Compliance standards: The Centre for Window and Cladding Technology (CWCT) 'Standard for systemised building envelopes'.
2. Reference information: For the duration of the contract, keep available at the design office, workshop and on site copies of:
 - 2.1. The Centre for Window and Cladding Technology (CWCT) 'Standard for systemised building envelopes'.
 - 2.2. Publications invoked by the CWCT 'Standard for systemised building envelopes'.

230 Information to be provided during detailed design

1. Submit the following cladding particulars
 - 1.1. A schedule of detailed drawings and dates for submission for comment.

- 1.2. A schedule of loads that will be transmitted from the rainscreen cladding to the structure.
- 1.3. Proposed fixing details and systems relevant to the structural design and construction with methods of adjustment and tolerances.
- 1.4. A schedule of fabrication tolerances/ size tolerances.
- 1.5. A detailed testing programme in compliance with the Main Contract master programme.
- 1.6. A detailed fabrication and installation programme in compliance with the Main Contract master programme.
- 1.7. Proposals to support outstanding applications for Building Regulation consents or relaxations.

232 Quality plan

1. **Requirement:** Submit during detailed design.
2. **Content:** In accordance with BS EN ISO 9001 and including the following:
 - 2.1. Name of the quality manager.
 - 2.2. Quality assessment procedures.
 - 2.3. Inspection procedures to be adopted in checking the work.
 - 2.4. Stages at which check lists will be used and samples of the lists.
 - 2.5. List of work procedures on the correct use of materials or components, both off site and on site.
 - 2.6. List of product information with latest revisions.
 - 2.7. Subcontractors involved in the work.
 - 2.8. Subcontractors quality plans.
 - 2.9. Storage, handling, transport and protection procedures.
 - 2.10. Procedure for registering and reporting non compliances.
 - 2.11. Maintenance procedures and calibration records.
 - 2.12. Certification that completed work complies with specification.
 - 2.13. Check list register to ensure all items have been inspected and non compliances discharged.

235 Information to be provided before commencement of testing or manufacture of rainscreen cladding system

1. **Submit the following cladding particulars**
 - 1.1. Detailed drawings to fully describe fabrication and installation.
 - 1.2. Detailed calculations to prove compliance with design/ performance requirements.
 - 1.3. Project specific fabrication, handling and installation method statements.
 - 1.4. Certification for incorporated components manufactured by others confirming their suitability for proposed locations in the rainscreen cladding.
 - 1.5. Recommendations for spare parts for future repairs or replacements.
 - 1.6. Recommendations for safe dismantling and recycling or disposal of products.

240 Product samples

1. **General:** Before commencing detailed design, submit labelled samples of: powder coating finishes .

250 Samples of fixings

1. **General:** During detailed design, submit labelled samples of each type of fixing, together with manufacturers' recommended torque figures.

260 Fabrication samples

1. General: During detailed design, submit samples of: rainscreen panel showing edge conditions .
2. Obtain approval of appearance before proceeding.

Design/performance requirements

310 CWCT 'Standard for systemised building envelopes'

1. General: Unless specified or agreed otherwise comply with:
 - 1.1. Part 2 - Loads, fixings and movement.
 - 1.2. Part 3 - Air, water and wind resistance.
 - 1.3. Part 4 - Operable components, additional elements and means of access.
 - 1.4. Part 5 - Thermal, moisture and acoustic performance.
 - 1.5. Part 6 - Fire performance.
 - 1.6. Part 7 - Robustness, durability, tolerances and workmanship.
2. Project performance requirements specified in this subsection: Read in conjunction with CWCT performance requirements.

311 Loads general

1. Static and dynamic loads: The Sub-contract Works shall transmit the specified static and dynamic design loads to the building's structure via the points of support provided for the purpose with an adequate margin of safety appropriate to each material and product.

312 Loads self-weight

1. General:
 - 1.1. The work specified in this Section shall support its self-weight, including additional components or services attached to either the internal or external surfaces of the work and transmit this self-weight safely back to the primary structure without overloading or permanently displacing any of the components of the work.
 - 1.2. The effect of self-weight of all components of the work specified in this Section, shall be designed in accordance with BS EN 1991-1-1 and the UK NA to BS EN 1991-1-1.
 - 1.3. The self-weight of the work specified in this Section shall allow for water absorption where appropriate.
2. Serviceability:
 - 2.1. The works specified in this Section shall be capable of carrying self-weight without any reduction in the performance criteria given in this Specification.
 - 2.2. The maximum in-plane deflection of any main framing member due to self-weight and imposed loads shall not exceed 1/500 of the span or 3 mm whichever is the lesser.
3. Safety:
 - 3.1. The works specified in this Section shall transmit safely all self-weight likely to be placed on it to the building's structure via the points of support provided for the purpose.
 - 3.2. The works specified in this Section shall accommodate self-weight locally, and without causing deflections or movements that will load components not designed to carry those loads.

313 Loads imposed loads REVISED

1. Wind:
 - 1.1. The works specified in this Section shall support wind loads and transmit them safely back to the supporting structure without overloading or permanently deforming any part of the works.

- 1.2. **The wind load:** Shall be calculated in accordance with BS EN 1991-1-4+A1 and the UK NA to BS EN 1991-1-4+A1/ The Design wind pressure shall be $+0.94\text{kN/m}^2$. Refer to Glass Facade Solutions Loadings Report .
- 1.3. The design wind load shall not be less than 800 Pa.
2. **Wind resistance: Serviceability:**
 - 2.1. The Sub-contract Works shall be capable of accommodating the design loads without any reduction in the specified performance.
 - 2.2. Deflections of curtain wall framing members shall not exceed the values given in Section 3.5.2 of the CWCT's Standard for Systemised Building Envelopes under the action of the most onerous combination of loads.
 - 2.3. The maximum deflection of rainscreen panels, at both positive and negative applications of the peak test pressure, shall not exceed:
 - 2.4. $1/90$ of the span measured between the points of attachment of the panel for aluminium, glass and steel, or:
 - 2.5. $1/360$ of the span measured between the points of attachment, or 3 mm whichever is the lesser, for brittle materials;
 - 2.6. After loading to the peak test pressure and unloading, residual deformation of frame members shall nowhere be more than five per cent of the maximum measured deformation or 1.0 mm, whichever is the greater, with one hour being allowed for recovery. This requirement shall apply separately to both positive and negative pressures.
 - 2.7. Displacement of framing members at points of support shall be minimised and shall be less than 2 mm taken as the difference between the position under peak positive load and peak negative load.
3. **Design calculations:** When calculating deflections and stresses, no account shall be taken of the additional stiffness imparted by glazing units, spandrel panels, glazing beads, pressure-plates, decorative capping pieces.
4. **Wind resistance: Safety:**
 - 4.1. The peak test pressure shall be 1.5 times the design wind pressure.
 - 4.2. At both positive and negative applications of the peak test pressure, there shall be no permanent damage to framing members, panels, or anchors. Framing members shall not be buckled. Panels, glazing beads, and decorative capping pieces shall remain securely held, and gaskets shall not be displaced.
 - 4.3. After loading to the positive and negative peak test pressure, residual deformation of framing members shall not exceed $1/500$ of the span, measured between points of attachment to the building, one hour after the loading has been removed.
 - 4.4. Displacement of framing members at supports shall not exceed 3 mm taken as the difference between the position under peak positive load and peak negative load.
5. **Wind resistance: Cyclic loading:**
 - 5.1. The works specified in this Section shall not become detached from the building as a result of repeated reversals of wind loading.
 - 5.2. All panels, framing members, fasteners and fixings of the Works described in this Section shall take into account the effect of wind load fatigue.
6. **Vertical loads:** Due to building occupants: Internal ledges, horizontal framing members and horizontal surfaces in the work specified in this Section shall sustain safely and without damage, a vertical point load of 1kN applied anywhere or a uniformly distributed load of 0.6kN/m^2 , whichever is the most onerous.
7. **Parapets, barriers and balustrades:**
 - 7.1. Parapets, barriers and balustrades incorporated into the work specified in this Section shall be designed in accordance with the requirements of BS 6180, BS EN 1991-1-4+A1 and the UK NA to BS EN 1991-1-4+A1.

- 7.2. Where the work specified in this Section incorporates barriers and balustrades it shall sustain safely and without damage, the following minimum horizontal imposed un-factored or characteristic loads
- 7.2.1. Spaces without obstacles for moving people and not susceptible to overcrowding
 - 7.2.2. Line load of 0.74kN/m acting at a height of 1.1m above finished floor level.
 - 7.2.3. Uniformly distributed load of 1.0kN/m².
 - 7.2.4. Point load of 0.5kN acting on any part up to and including 1.1m above finished floor level.
- 7.3. Spaces where people may congregate, with tables or fixed seating or less than 3.0m wide and susceptible to overcrowding
- 7.3.1. Line load of 1.5kN/m acting at a height of 1.1m above finished floor level.
 - 7.3.2. Uniformly distributed load of 1.5kN/m².
 - 7.3.3. Point load of 1.5kN acting on any part up to and including 1.1m above finished floor level.
- 7.4. Spaces greater than 3m wide susceptible to overcrowding
- 7.4.1. Line load of 3.0kN/m acting at a height of 1.1m above finished floor level.
 - 7.4.2. Uniformly distributed load of 1.5kN/m².
 - 7.4.3. Point load of 1.5kN acting on any part up to and including 1.1m above finished floor level.
- 7.5. The uniformly distributed line load and the uniformly distributed and concentrated loads applicable to the infill are not additive and shall be considered as three separate load cases.
- 7.6. Parapets, barriers and balustrades shall be designed for a vertical load. This vertical load shall be either a concentrated load of 1 kN or a uniformly distributed load of 0.6 kN/m, whichever gives the worst design condition in combination with the minimum horizontal imposed horizontal given above.
8. **Snow ice:**
- 8.1. Loads created by snow or ice shall be accommodated safely, without detriment to the overall structural integrity and performance of the Sub-contract Works.
 - 8.2. Snow loads shall be calculated in accordance with BS EN 1-3 and the UK NA to BS EN 1-3.
9. **Cleaning:** The Sub-contract Works shall sustain safely, without reduction in performance and without permanent deformation to any component, a static 500 N load applied horizontally through a square of 100 mm sides on any part of the works specified in this Section.
10. **General maintenance:** Any gutters, copings or flat or near-flat roof surfaces in the works specified in this Section shall sustain the loads given in UK National Annex to BS EN 1991-1-1+A1, Table NA7.
11. **Building Maintenance Unit: Restraints:** The works specified in this Section shall sustain a load of kN applied in any direction at the extreme end of each building maintenance unit restraint point and shall transmit this load safely back through the cladding to the supporting structure.
12. **Loads combinations:** Loads shall be combined in accordance with BS EN 1990 and the UK NA to BS EN 1990.

314 Loads - impact loads

1. **General:**
- 1.1. The Sub-contract Works shall withstand all specified impact loads, or transferred impact loads that may be expected to occur during its service life. Impact may occur in the following circumstances
 - 1.1.1. On internal faces of the Sub-contract Works due to normal occupancy.
 - 1.1.2. On external faces of the Sub-contract Works due to normal occupancy.
 - 1.1.3. On external faces of the Sub-contract Works due to maintenance.
 - 1.2. Impacts shall be considered in respect of both serviceability and safety.

2. **Internal components:** The Sub-contract Works, excluding glass shall achieve Internal Impact Classification I5 (BS EN 14019) when tested in accordance with BS EN 13049.
3. **Soft body impact:** For components:
 - 3.1. The Sub-contract Works, shall satisfy the following requirements when tested in accordance with CWCT Technical Note 76
 - 3.1.1. **Classes:** For components: CWCT Technical Note 75, Table 1.
 - 3.1.2. **Classes:** For serviceability performance: CWCT Technical Note 75, Table 2.
 - 3.1.3. **Exposure categories:** CWCT Technical Note 75, Table 3.
 - 3.1.4. **Soft body:** Impact test energy: CWCT Technical Note 75, Table 4.
4. **Hard body impact:** For components:
 - 4.1. The Sub-contract Works described in this Section, excluding glass, shall satisfy the following requirements when tested in accordance with CWCT Technical Note 76
 - 4.1.1. **Classes:** For safety performance: CWCT Technical Note 75, Table 1.
 - 4.1.2. **Classes:** For serviceability performance: CWCT Technical Note 75, Table 2.
 - 4.1.3. **Exposure categories:** CWCT Technical Note 75, Table 3.
 - 4.1.4. **Hard body impact:** Test energy: CWCT Technical Note 75, Table 5.
5. The Sub-contractor shall submit with the tender, elevation drawings indicating the exposure categories of the areas of the elevations.

315 Loads other loads

1. **Thermally-induced loads:**
 - 1.1. Materials and components used in the building envelope shall be capable of accommodating stresses generated by differential temperatures.
 - 1.2. Calculations shall be performed to establish maximum stresses developed in all brittle materials (including glass), all composite materials and components as a result of temperature gradients within the material or component. These calculations shall prove that the strength of the materials and components is adequate to prevent damage or failure due to thermally-induced loads.
 - 1.3. The Sub-contractor shall ensure that no glass or glazing develops stresses that may lead to loss of integrity and damage or distortion of the glass, glazing materials, components and/or framing systems.
 - 1.4. Calculations undertaken to establish maximum stresses developed in glass shall take into account shading stresses that may occur from neighbouring buildings and adjacent components including shading devices. The Sub-contractor shall make due allowance for any special edge treatment or heat treated glass, which may be required.
2. **Internal loads:** On insulating glass units:
 - 2.1. Insulating glass units incorporated into the Sub-contract Works shall be designed to resist without damage or failure the combined effects of pressure differences, arising from changes in temperature and atmospheric pressure, and from the difference in altitude between the place of manufacture and the place of installation together with the other specified loads.
 - 2.2. The place of manufacture shall be taken as the place where the insulating glass units were finally sealed.
 - 2.3. The loads given in Section 4 of the publication 'Technical Regulations for the Use of Glazing with Linear Supports' (TRLV) shall be used.
3. **Limits of pillowing:** Of insulating glass units
 - 3.1. The outer panes of vertical insulating glass units incorporated into the Sub-contract Works shall be at least as stiff as the inner panes in order to reduce distortions in the external reflections from the glass as a result of atmospheric loads.

316 Temporary conditions

1. **The Sub-contract Works:** Shall carry safely:
 - 1.1. Wind loading experienced as a temporary load during the construction phase.
 - 1.2. Additional temporary loads associated with construction including, storage, transportation, lifting, hoisting and installation which will induce stresses greater than those which will be induced when the Cladding is completed.
 - 1.3. Other loads arising from the temporary or partial support of the Sub-contract Works.

317 Deflection under dead loads

1. **Requirement:** Framing members parallel to the curtain walling plane must not:
 - 1.1. Reduce glass bite to less than 75% of design dimension.
 - 1.2. Reduce edge clearance to less than 3mm between members and immediately adjacent glazing units, panel/ facing units or other fixed units.
 - 1.3. Reduce clearance to less than 2mm between members and movable components such as doors and windows.

318 General movement

1. **The rainscreen cladding:** Shall accommodate anticipated building movements as described in clause A90:266/ A31:481.
2. **The Cladding:** Will accommodate the following without any reduction in performance:
 - 2.1. Deflections under repeated cycles of the design wind loads.
 - 2.2. Deflections due to design dead loads and specified live loads.
 - 2.3. Changes in dimension and shape arising specified in structural Movement and Tolerances Report.
 - 2.4. Maximum mid-span deflection (due to superimposed dead and live loads): 12mm (this is a differential long term deflection due to frequent service load after cladding is installed. It includes deflection due to applied load plus additional deflection due to shrinkage and creep over the time after the installation of claddings).
 - 2.5. Changes in dimension and shape of the cladding arising from thermal and moisture movement and shrinkage.

370 Appearance and fit

1. **Requirement:** Design rainscreen wall:
 - 1.1. To ensure position and alignment of all parts and features as shown on preliminary design drawings.
 - 1.2. To accommodate deviations in the primary support structure.
2. **Primary support structure:** Before commencing installation of rainscreen cladding system, carry out survey sufficient to verify that required accuracy of erection can be achieved.
 - 2.1. **Give notice:** If the structure will not allow the required accuracy or security of erection.
 - 2.2. **Design tolerances:** CWCT standard
3. **Rainscreen envelope zone tolerances**
 - 3.1. **Width:** CWCT Standard
4. **Maximum permitted component and installation tolerances:** Panel length ± 2 mm Panel width ± 1 mm Secondary support bracket length ± 1 mm Panel tolerance ± 2 mm, installation tolerance ± 2 mm, overall = ± 4 mm

385 Thermal movement – service temperature ranges

1. **Requirement:** To CWCT 'Standard for systemised building envelopes' clause 2.7.2 amended and/ or with the addition of the following: N/A.

390 Air permeability exfiltration

1. Requirement: The maximum permissible air exfiltration rate through the building envelope system must not exceed: 3m³/hr/m²@50Pa.

410 Air permeability

1. Permeability class to BS EN 12152:
 - 1.1. Peak test pressure:

421 Water penetration

1. General
 - 1.1. The Works described in this Section in combination with the backing wall described in Section G15/ F10 shall be designed to prevent the penetration of water.
 - 1.2. All joints within the works specified in this Section, and all interfaces with other elements of work, shall
 - 1.2.1. Prevent leakage of water into the interior of the building under the action of wind pressure kinetic energy, gravity, surface tension, or capillary action.
 - 1.2.2. Maintain their watertightness under the loads and movements specified.
 - 1.2.3. Prevent water entering into those parts of the Sub-contract Works that would be adversely affected by the presence of water.
2. Backing wall:
 - 2.1. At all pressures up to and including the peak test pressure, there shall be no water leakage onto the internal face of the backing wall. The peak test pressure shall be Class R7 in accordance with BS EN 12154.
 - 2.2. There shall no water leakage onto the internal face of the backing wall when permanently sealed joints are hose tested in accordance with Section 9 of the CWCT's Test Methods for Building Envelopes.

430 Thermal properties

1. Method for calculating the thermal transmittance (U-value) of the rainscreen wall: Weighted U-value.
2. Average U-value of rainscreen wall: 0.2 W/m²K
3. Method for assessing thermal transmittance (U-value) of assemblies: Method 3 - simplified method in accordance with CAB/CWCT publication 'The thermal assessment of window assemblies, curtain walling and non-traditional building envelopes'

433 Pest infestations

1. The design, manufacture and installation of the Works shall protect against and not contain or provide harbour for infestation by pests including micro-organisms, fungi, insects or other vermin.
2. The Contractor shall take account of the recommendations of BRE Digest 415 'Reducing the Risk of Pest Infestations in Buildings.', and shall protect against damage caused by termites and other local pests not included in BRE Digest 415.
3. Consideration shall be given to preventing the entry of insects, birds and animals into cavities where:
 - 3.1. They may be detrimental to the performance of the Sub-contract Works, and;
 - 3.2. They cannot be removed as part of the routine maintenance of the Sub-contract Works

450 Air and Vapour control layer

1. Condensation risk within rainscreen wall: Determine using the method described in BS 5250, Annex D. Where required, provide a suitable air and vapour control layer to ensure that damage and nuisance from condensation is reduced.

460 Sound transmittance

1. Minimum weighted sound reduction index (R_w) to BS EN ISO 717-1
 - 1.1. Between internal and external surfaces of rainscreen clad wall: 58dB R_w + C_{tr}
2. Minimum weighted standardized level difference (D_{nTw}) to BS EN ISO 717-1.
 - 2.1. Between adjacent floors abutting rainscreen clad wall: Refer to acoustic report
 - 2.2. Between adjacent rooms on same floor abutting rainscreen clad wall: Refer to acoustic report

470 Fire performance of rainscreen cladding

1. **Standard:** In accordance with the CWCT 'Standard for systemised building envelopes', section 6 and TN 98.
2. **Reaction to fire**
 - 2.1. **External surfaces:** BS EN 13501-1, Class A2-s1,d0
 - 2.2. **Internal (cavity) surfaces:** BS EN 13501-1, Class A2-s1,d0
3. **Verification of fire performance:** In accordance with the CWCT 'Standard for systemised building envelopes', section 6 and TN98.

471 Fire performance of materials used in rainscreen cladding and attachments

1. **Standards:** The Building Regulations – refer to clause 43:
 - 1.1. All materials used in the rainscreen cladding, including all accessories and incorporated components specified in this section will be of European Classification A2-s1, d0 or A1, classified in accordance with BS EN 13501-1 unless specifically excluded from this requirement under the relevant applicable national Building Regulations.

472 Fire performance of materials used in rainscreen cladding and attachments

1. **Standards:** The Building Regulations – refer to clause 43:
 - 1.1. All materials used in the rainscreen cladding, including all accessories and incorporated components specified in this section will be of European Classification A2-s3, d2 or better, classified in accordance with BS EN 13501-1 unless specifically excluded from this requirement under the relevant applicable national Building Regulations.
 - 1.2. In all cases, products or elements of construction of the rainscreen cladding requiring a fire performance will have the appropriate evidence of performance based on test information. The final installation will follow the applicable test evidence in all respects.
 - 1.3. The rainscreen cladding, including junctions with other works, will not be composed of materials which readily support combustion, add significantly to the fire load, and/ or give off toxic fumes.

Testing

510 Comparison (type) testing

1. **Verification of performance**
 - 1.1. **Submit:** Certification and reports satisfying CWCT 'Standard for systemised building envelopes', clause 1.5.5 items a and b.
2. **Commencement of fabrication and installation of rainscreen cladding:** Not until test results and reports showing compliance with this specification have been submitted.

520 Project testing (site)

1. **Timing of testing:** At an agreed stage during preliminary installation on site arrange for testing of a section of rainscreen cladding in accordance with relevant clauses of this specification.

2. Continuation of installation of general areas of rainscreen cladding: Not until site test results and reports showing compliance with this specification have been submitted.

530 Testing authority– UKAS approved-approved laboratory

1. Requirement: Project testing must be carried out by a United Kingdom Accreditation Service (UKAS) approved independent laboratory.

535 Testing authority– cladding manufacturer/ contractor

1. Requirement: Project testing must be carried out by the rainscreen cladding manufacturer/ contractor and is to be witnessed and certified by: building insurance provider.

685 Site hose test

1. Requirement: To CWCT 'Standard for systemised building envelopes', 'Standard test methods for building envelopes' Section 9.
 - 1.1. Joints to be tested: All

Products

710 Aluminium alloy framing sections

1. Standards: To BS EN 755 alloy EN AW-6063 and suitable for the specified finish.
2. Structural members: To comply with BS EN 1999-1-1, -3 and -4.

712 Aluminium alloy sheet

1. Standards: To BS EN 485, BS EN 515 and BS EN 573.
2. Alloy, temper and thickness: Suitable for the application and specified finish.

715 Carbon steel framing sections/ reinforcement

1. Standards: To the relevant parts of BS 7668, BS EN 10029, BS EN 10025 or BS EN 10210.
2. Thickness: Suitable for the application, and for galvanizing or other protective coating.

717 Carbon steel sheet

1. Standards: To the relevant parts of BS 1449-1, BS EN 10048, BS EN 10051, BS EN 10111, BS EN 10131, BS EN 10132, BS EN 10139, BS EN 10140, BS EN 10149-1, -2, -3, BS EN 10209, or BS EN 10268.
2. Grade and thickness: Suitable for the application, and for galvanizing or other protective coating.

720 Stainless steel sheet

1. Standards: To the relevant parts of BS EN 10029, BS EN 10048, BS EN 10051, BS EN 10095 or BS EN ISO 9445-1 and -2.
2. Grade: To BS EN 10088-2, -4, -5, austenitic 1.4301 (304) generally, 1.4301 (316) when used externally or in severely corrosive environments.
3. Thickness: Suitable for the application.

725 Timber battens REVISED

1. General: Not permitted

730 Mechanical fixings – material requirements

1. Stainless steel: To BS EN ISO 3506 grade A2 generally, grade A4 when used in severely corrosive environments.

2. **Carbon steel:** To BS 4190 and suitable for galvanizing or other protective coating.
3. **Aluminium:** To BS EN 755.

732 Adhesives

1. **General:** Not degradable by moisture or water vapour.

735 Fixings and fasteners

1. **Type and use:** Reviewed and approved by manufacturers. Submit confirmatory information on request.
2. **Dimensions:** Not less than recommended by their manufacturers.
3. **Adjustment capability:** Sufficient in three dimensions to accommodate primary support structure and rainscreen cladding fabrication/ installation tolerances.

770 General sealants

1. **Selection:** In accordance with BS 6213 from:
 - 1.1. Silicone.
 - 1.2. One part polysulfide.
 - 1.3. Two part polysulfide.
 - 1.4. One or two part polyurethane.
2. **Classification and requirements:** To BS EN ISO 11600.
3. **Reaction to contact products and finishes:** Stable and compatible.

Finishes

810 Protective coating of carbon steel framing sections/ reinforcement

1. **Treatment:** All surfaces to one of the following:
 - 1.1. Hot dip galvanized to BS EN ISO 1461.
 - 1.2. An appropriate equivalent coating to BS EN ISO 12944 and BS EN ISO 14713-1 and -2.

820 Protective coating of carbon steel mechanical fixings

1. **Treatment:** All surfaces to one of the following:
 - 1.1. Hot dip galvanized to BS EN ISO 1461.
 - 1.2. Sherardized to BS EN ISO 17668, Class 30 coating thickness and passivated.
 - 1.3. Zinc plated to BS EN ISO 2081, coating designation of FE//Zn//C for an iridescent (yellow passivate) chromate conversion coating or FE//Zn//D for an opaque (olive green) chromate conversion coating.

830 Powder coating

1. **Requirement:** As section Z31.

Fabrication and installation

910 Generally

1. **Electrolytic corrosion:** Take necessary measures to prevent.
2. **Identification of products:** Mark or tag to facilitate identification during assembly, handling, storage and installation. Do not mark surfaces visible in the complete installation.

912 Metalwork

1. **Requirement:** As section Z11, unless specified otherwise in this section.

915 Timber treatment

1. **Requirement:** As section Z12, unless specified otherwise in this section.
2. **Exposed cut and drilled surfaces:** Treat with two flood coats of a solution recommended for the purpose by main treatment solution manufacturer.

922 Fixings/ adhesives application

1. **Requirement:** As section Z20, unless specified otherwise in this section.

925 Sealant application

1. **Requirement:** As section Z22, unless specified otherwise in this section.

930 Assembly

1. **Location:** Carry out as much assembly as possible in the workshop.
2. **Joints:** Other than movement joints and designed open joints, must be rigidly secured, reinforced where necessary and fixed with hairline abutments.
3. **Displacement of components in assembled units:** Submit proposals for reassembly on site.

960 Preliminary rainscreen cladding installation

1. **Requirement:** Complete an area of cladding as set out below for inspection and approval of appearance.

970 Rainscreen cladding installation

1. **Tightening mechanical fasteners:** To manufacturer's recommended torque figures. Do not overtighten fasteners intended to permit differential movement.
2. **Protective coverings:** Remove only where necessary to facilitate installation and from surfaces which will be inaccessible on completion.

975 Welding

1. **In situ welding:** Not permitted

980 Interfaces

1. **Installation:** Locate flashings, closers etc. correctly and neatly overlap cladding to form a weathertight junction.

985 Damage

1. **Repairs:** Do not repair cladding without approval.
 - 1.1. **Approval:** Will not be given where the proposed repair will impair performance or appearance.
2. **Record of repairs:** Prepare schedule or record on drawings for inclusion in the maintenance manual.

995 Maintenance

1. **Maintenance manual:** Incorporate details within the Building Manual in accordance with CWCT 'Standard for systemised building envelopes', clause 7.6.1.
 - 1.1. **Materials certification and test reports to be included:** All relevant certificates and approvals

Deleted clauses

11 Contractor's designed portion **DELETED**

Ω End of Section



Specification created using NBS Chorus

Sheppard Robson

The Castings

CAS-AXIS-BU1-XX-SP-A-10-0006

L10 Windows/ rooflights/ screens/ louvres

A4 - Construction

C01

07-07-2022

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L10

Windows/ rooflights/ screens/ louvres **REVISED**

To be read with preliminaries/ general conditions.

4 Sub-contractor's design responsibility

1. Based on the JCT guide to the use of Performance Specifications, the following are the requisite performance levels for Sub-Contractor design
2. **Performance Level 1: Prescriptive Specification (no design by Sub-Contractor)**
 - 2.1. The Sub-Contractor is to construct the work in accordance with production information and a prescriptive specification provided by others and has no design responsibility.
 - 2.2. The Sub-Contractor is responsible for materials and workmanship and the provision of product manufacturer's guarantees and warranties where required.
3. **Performance Level 2: Performance Specification (no 'in context' design by the Sub-Contractor)**
 - 3.1. The Sub-Contractor's design input is limited to the selection of 'off the shelf' products that satisfy the performance specification and construction of the works using the selected components.
 - 3.2. The Sub-Contractor is responsible for materials and workmanship, design input in selecting products and the provision of product manufacturer's guarantees and warranties where required.
4. **Performance Level 3: Performance Specification (simple 'in context' design)**
 - 4.1. The Sub-Contractor's design input is limited to the selection of 'off the shelf' products that satisfy the performance specification, adapting them as necessary to suit the Specifier's design and constructing the works using the selected components as adapted.
 - 4.2. The Sub-Contractor is responsible for materials and workmanship, design input in selecting and adapting products and the provision of product manufacturer's guarantees and warranties where required.
5. **Performance Level 4: Performance Specification (complex 'in context' design)**
 - 5.1. The Sub-Contractor is to provide detail design and production information, including a prescriptive specification of products and construct the works in accordance with that design using selected components adapted as necessary.
 - 5.2. The Sub-Contractor is responsible for materials and workmanship and for design input. May obtain product manufacturers' guarantees and warranties for Client.

7 Sub-contractor's design scope performance level 3

1. **The Performance Level 3:** Work associated with this Work Package is specified in the following clause(s) of this Work Package section: All.
2. These clauses should be read in conjunction with the general clauses of the associated specifications.

Sub-contract preliminaries

13 Contractor's design

1. The work specified in this Section shall be designed by the Contractor based on the Employer's Requirements.
2. **Production information:** Shall be prepared by the Contractor, [in conjunction with the novated Design Team], as necessary to procure and construct the work.

20 The scope of the works

1. **The Contractor:** Is entirely responsible for the detailed design, manufacturing, fixing, jointing, and installation of the works shown on the drawings and specified in this work section, including all necessary or required accessories and ancillary work.
2. The Contractor is responsible for coordinating the detail design of related and adjacent work to maintain the specified performance at all interfaces.
3. The Contractor is responsible for ensuring that all materials used are compatible with those of adjacent works so as not to compromise the specified performance or life expectancy of the works.

25 Generally

1. The design, fabrication, installation and performance requirements specified are intended to establish a minimum performance level and general principles. The Contractor shall be responsible for achieving or surpassing the design and performance criteria for all components.
2. Specialist glazing contractor shall carry out risk assessments confirming composition and build-up of glazed panels as suitable for use in applicable locations and all relevant forms of loadings. All requirements shall be in line with the guidance of relevant CWCT documentation including but not limited to, Technical Notes 61-69.

30 Tender/ contract drawings

1. **Drawings:** Have been prepared as scheduled. Information shown is schematic and indicative of the design proposals for the basic functional and architectural requirements. The drawings do not indicate a detailed solution, nor do they prejudice the submission of alternative proposals complying with the specified requirements.

35 Read in conjunction with

1. **The following documents:** AXIS architect's 12, 17 and 02 series drawings,
The structural engineer's information
The Wind Load Report
The Overheating Report and,
Purge Calculations

43 Compliance with current regulations **REVISED**

1. **The Contractor:** Shall ensure that the works described in this section are compliant with the current editions of:
2. - The Building Regulations (England).

45 Approvals

1. **The Contractor:** Shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Control Officer/Approved Inspector/Fire Officer.
2. The Contractor shall provide all drawings, calculations, specifications, other technical information together with any risk assessments or risk analysis as may be required to contribute to the fire safety information required under Regulation 38 of the Building Regulations.

46 Approvals

1. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Principal Designer and/or Health and Safety Officer.

47 Compliance and approvals **REVISED**

1. The Contractor shall ensure that works described in this Section are compliant with the requirements of the Building Insurer/ Warranty Provider.
 - 1.1. Building Insurer: Build Zone.
2. The Contractor shall provide all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Insurer/ Warranty Provider.

55 Production information **REVISED**

1. Shall be provided by the Contractor as follows: A90:270.
2. Design and production information procedures shall comply with: A90:281.
3. Design and production information shall include all interfaces of related and adjacent work.

60 Accuracy of contract works **REVISED**

1. In addition to any more stringent requirements specified elsewhere, the Works shall be constructed to the degrees of accuracy specified in clause [A90:352].
2. Not less than 15 days before commencing the work specified in this section confirm, by survey relative to the Contractor's setting-out points, that the locations of all relevant previously-built works are correct taking account of all specified tolerances. The results of this survey shall be provided.
3. If the surveyed locations of the relevant previously-built works will not allow the works specified in this section to be completed within the specified degrees of accuracy, the Contractor is to immediately seek instructions before proceeding.

70 Warranty

1. **The Contractor:** Shall warrant that he has exercised, and will exercise, all reasonable skill and care in:
 - 1.1. The design of the Works insofar as the Works have been or will be designed by the Contractor.
 - 1.2. The selection of materials and goods for the Works insofar as such materials and goods have been or will be selected by the Contractor.
 - 1.3. The satisfaction of any performance specification or requirement insofar as such performance specification or requirement is included or referred to elsewhere in this specification.

80 Design life of the installation **REVISED**

1. **The design life of the building:** 60 years, as defined in BS ISO 15686-1.
2. **The design life:** Of the components, assemblies, and installations, as defined in BS ISO 15686-1 and specified in this Section, is 30 years.
3. **Provide:** In the Building Manual specified in [A90:715], information on the methods for replacing all components and assemblies with a design life less than that of the building or less than that of the installation of which they form part.

85 Building manuals

1. Are required and shall comply with: [Clause A90:715].

General

103 Glass generally

1. Refer to Section Z25.

106 Thermal movement

1. **Requirement:** Design the components to take account of all temperature changes, local climatic conditions, temperature differentials, etc. to ensure that no buckling, distortion, or damage, to components, joints, or fixings occurs.

110 Evidence of performance

1. **Certification:** Provide independently certified evidence that all incorporated components comply with specified performance requirements.

115 Timber procurement

1. **Timber (including timber for wood based products):** Obtained from well managed forests and/ or plantations in accordance with:
 - 1.1. The laws governing forest management in the producer country or countries.
 - 1.2. International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
2. **Documentation:** Provide either:
 - 2.1. Documentary evidence (which has been or can be independently verified) regarding the provenance of all timber supplied.
 - 2.2. Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood based products.
3. **Certification scheme:** Forest Stewardship Council (FSC), Grown in Britain (GiB) or Programme for the Endorsement of Forest Certification (PEFC)
 - 3.1. **Other evidence:** UK Government Timber Procurement Policy (UKTPP) Category B evidence

116 Insulating glass units

1. **Standards:** To BS EN 1279-1 hermetically sealed (dual-seal) and Kitemark certified.
2. **Marking:** Show date of manufacture on the units, unobtrusively marked in a position to be agreed.

140 Control samples

1. **Procedure**
 - 1.1. Finalise component details.
 - 1.2. Fabricate one of each of the following designated items as part of the quantity required for the project.
 - 1.3. Obtain approval of appearance and quality before proceeding with manufacturer of the remaining quantity.
2. **Designated items:** Window, as clause 400

145 Avoidance of condensation

1. **Requirement::** Notional psychrometric conditions under which condensation must not form on building interior surfaces of framing members or any part of infill panels/ facings are:
 - 1.1. Notional outdoor psychrometric conditions as BS 6229, table A1.
 - 1.2. Notional indoor psychrometric conditions:
2. **Winter interstitial condensate:**
 - 2.1. **Amount:** Calculated amount (maximum) 0.35 kg/m².
 - 2.2. **Retention:** Calculated annual net retention Nil.

151 Fabrication accuracy

1. **Permissible deviations:**

- 1.1. Height and width: +/-2 mm.
- 1.2. Straightness: Of members measured in the plane of the component or at right angles:
 - 1.2.1.Up to 1200 mm long:
 - 1.2.2.Up to 2400 mm long: 5 mm.:
- 1.3. Difference: In length of diagonals when frame length plus height is:
 - 1.3.1.Up to 1800 mm:: 3 mm.
 - 1.3.2.Over 1800 mm: Up to 3000 mm: 5 mm.
 - 1.3.3.Over 3000 mm:: 10 mm.

160 Potential for natural ventilation

1. Submit design plan and elevation drawings, and calculations confirming the following: Types of windows/ ventilators and total openable areas

Products

201 General

1. For configuration, dimensions and location refer to the Architect's drawings.

205 Window materials specification

1. Minimum BRE 'Green Guide to Specification Online' rating: A+

400 Composite windows and doors to apartments

1. Manufacturer: [VELFAC Windows](#) or equivalent
 - 1.1. Contact details
 - 1.1.1.Address: The Forum, Ground Floor
Lancaster Way
Ermine Business Park
Huntingdon
Cambridgeshire
United Kingdom
PE29 6XU
 - 1.1.2.Telephone: [+44 \(0\)1223 897100](tel:+441223897100)
 - 1.1.3.Web: www.VELFAC.co.uk
 - 1.1.4.Email: sales-support@dovista.com
 - 1.2. Product reference: [VELFAC 200 Double Glazed Window Units](#)
2. Standard: Non-fire- and/ or smoke-rated windows to BS EN 14351-1.
3. Third-party certification: Q-Mark product certification, BM TRADA certified, CWCT, Danish window verification and indoor climate label.
4. Dimensions and configurations: Refer to drawings and window schedules
5. Product performance
 - 5.1. Weather performance
 - 5.1.1.UK exposure category: To BS 6375-1, 1600 Pa.
 - 5.1.2.Air permeability: To BS EN 1026, 600 Pa (positive and negative pressure).
 - 5.1.3.Watertightness: To BS EN 1027, 450 Pa.
 - 5.1.4.Resistance to wind load: To BS EN 12211, 1600 Pa.
 - 5.2. Durability
 - 5.2.1.Loadbearing capacity of safety devices: To EN 14351-1:2006 +A2:2016.
 - 5.3. Safety

- 5.3.1. User design standards:
- 5.3.2. Security level: To PAS 24 and Secured by Design where required. Refer to SBD report.
- 5.4. Environmental
 - 5.4.1. Background ventilation: Up to 4000 mm².
 - 5.4.2. Acoustic performance rating: To BS EN ISO 717-3, sound reduction index Rw 32–43.
- 5.5. Thermal
 - 5.5.1. Whole window U-value: 1.4 W/m²K.
- 6. Frame
 - 6.1. Profile: 54 mm aluminium external profile coupled with timber internal main-frame.
 - 6.2. Wood species: Manufacturer's standard.
 - 6.3. Chain of custody: FSC.
 - 6.4. Wood finishes: Water-based diffusion open timber surface treatment.
 - 6.5. Metal finishes
 - 6.5.1. Coating: Polyester powder coated to BS EN 6496.
 - 6.5.2. Colour: RAL 7016.
 - 6.5.3. Film thickness (minimum): 60–120 µm.
 - 6.6. Ventilator: Not required.
- 7. Glazing or infill
 - 7.1. Standard: Relevant parts of BS EN 1279.
 - 7.2. Requirements: Insulated Glass Units and panels.
- 8. Hardware: As Operation, Type below.
- 9. Operation
 - 9.1. Type: Espagnolette handle (manual).
- 10. Configuration/ Design: Refer to drawings / schedules
- 11. Bead colour: RAL 9005, Black.
- 12. Opening restrictors: 30 degrees
- 13. Mullions:
- 14. Transoms:
- 15. Perimeter edge/ thermal break: Not required.
- 16. Type:
- 17. Materials
 - 17.1. Interior frame/ sash section: Manufacturer's standard
 - 17.1.1. Finish: Clear lacquer
- 18. Thermal performance (U-value maximum): 1.4 W/m²K
- 19. Acoustic performance rating: Refer to acoustic report
- 20. Fire performance
 - 20.1. Fire resistance: To BS EN 13501-2, EI 30 or better

650 Metal louvres not within curtain wall system

- 1. Manufacturer: Naco (Ruskin Air Management), or equivalent
 - 1.1. Product reference: NACO SLH-S
- 2. Material: Aluminium
 - 2.1. Finish as delivered: Powder-coated to RAL 7016
- 3. Fire performance: Reaction to fire to BS EN 13501, Class A2.

4. Number of louvre banks: Refer to architect's drawings
5. Louvre blade pitch and angle: Manufacturer's standard (53% free area)
6. Blanking panels: Manufacturer's standard. For locations refer to architect's M&E contractor's drawings.
7. Accessories/ Other requirements: Stainless steel bird mesh
8. Fixing: Manufacturer's standard

Doors

692 General

1. Refer to the Door Schedule for:
 - 1.1. Door reference.
 - 1.2. Performance: Fire, acoustic.
 - 1.3. Number of leaves.
 - 1.4. Vision panels.
 - 1.5. Double or single swing.
2. For configuration, dimensions, and location refer to the Architect's drawings and Door Schedule.
3. For colour pattern and texture refer to the Finishes Schedule.
4. Vision panels and glazed side panels shall be formed from clear safety glass and maintain the fire/ acoustic performance of the doorset.
5. Ironmongery: Refer to the Ironmongery Schedule and Section P21.
6. Standards:
 - 6.1. Safety glazing: BS EN 12600.
7. Refer to Sections:
 - 7.1. Z10: Purpose made joinery,
 - 7.2. Z11: Purpose made metalwork,
 - 7.3. Z20: Fixings and adhesives,
 - 7.4. Z22: Sealants,
 - 7.5. Z25: Glass
 - 7.6. Z31: Powder coatings.
 - 7.7. Z33: Anodizing

Execution

701 Fixing generally

1. General: Install components plumb, level, and aligned.
2. Distortion: Do not distort during fixing. Check all opening parts, after installation, for correct operation and adjust as necessary. Do not plane, cut, or sand, joinery to remedy distortion.
3. Fixings: Secure to prevent pulling away, deflection, distortion, or other movement during use.
4. Fix: Loose trims, cills, thresholds, and the like in unjointed lengths between angles and ends of runs. Mitre angle joints.
5. Clear-finished joinery: Screwed and pelleted unless specified otherwise.

706 Workmanship

1. Where applicable, the works shall be carried out in accordance with the manufacturer's recommendations.

2. Operatives shall be trained, experienced and appropriately skilled in the installation of the works and, where applicable, be recommended by the system/ product manufacturer.

710 Protection of components

1. **General:** Do not deliver to site components that cannot be installed immediately or placed in clean, dry floored and covered storage.
2. **Stored components:** Stack vertical or near vertical on level bearers, separated with spacers to prevent damage by and to projecting ironmongery, beads, etc.

716 Pre-finished components

1. Maintain in protective wrappings until completion of contract.

730 Priming/ sealing

1. **Wood surfaces inaccessible after installation:** Prime or seal as specified before fixing components.

740 Corrosion protection

1. **Surfaces to be protected:**
2. **Protective coating:** Two coats of bitumen solution to BS 6949 or an approved mastic impregnated tape.
 - 2.1. **Timing of application:** Before fixing components.

750 Building in

1. **General:** Not permitted unless indicated on drawings.
 - 1.1. Brace and protect components to prevent distortion and damage during construction of adjacent structure.

765 Window installation generally

1. **Installation:** Into prepared openings.
2. **Gap between frame edge and surrounding construction**
 - 2.1. **Minimum:** To manufacturer's requirements
 - 2.2. **Maximum:** To manufacturer's requirements
3. **Distortion:** Install windows without twist or diagonal racking.

770 Damp-proof courses in prepared openings

1. **Location:** Ensure correct positioning in relation to window frames. Do not displace during fixing operations.

784 Fixing of composite frames

1. **Standard:** As section Z20.
2. **Fasteners:** To manufacturer's recommendations
 - 2.1. **Spacing:** When not predrilled or specified otherwise, position fasteners not more than 150 mm from ends of each jamb, adjacent to each hanging point of opening lights, and at maximum 600 mm centres.

810 Sealant joints around windows and Juliette balcony brackets

REVISED

1. **Sealant**
 - 1.1. **Manufacturer:** Tremco CPG UK Ltd or equivalent
 - 1.1.1. **Product reference:** Illbruck Compriband TP600 Impregnated Expanding Foam Tape

- 1.2. Colour: Black
- 1.3. Manufacturer: Tremco CPG UK Ltd or equivalent
 - 1.3.1. Product reference: Illbruck ME010 Facade UV and Fire Breather Membrane
- 1.4. Colour: Black
- 1.5. Adhesive:: Illbruck SP025 Fire Membrane Adhesive
- 1.6. Application: As section Z22 to prepared joints. Finish triangular fillets to a flat or slightly convex profile.

820 Ironmongery

- 1. **Fixing:** In accordance with any third party certification conditions applicable. Assemble and fix carefully and accurately using fasteners with matching finish supplied by ironmongery manufacturer. Do not damage ironmongery and adjacent surfaces.
- 2. **Checking/ Adjusting/ Lubricating:** Carry out at Completion and ensure correct functioning.

Deleted clauses

107 Thermal stress in glazing **DELETED**

11 Contractor's designed portion **DELETED**

71 Warranty **DELETED**

Ω End of Section



Specification created using NBS Chorus

APPENDIX C

Midgard Quality Management – Field View

Quality Brickwork - External Façade

Kinlan Handover Certificate

Curtain Walling



Field View

Management Tool

Field View

1. What is Field View
2. Uses
3. Structure
4. Tasks
5. QR Codes
6. Website Portal

Field View – What is Field View?

- Essentially Field View (FV) platform consists of two parts:
- Tablet/ Mobile device based App (Windows/ Android/ iOS)
- ...Used to capture/ record data – replacing pen & paper in the field. for quality, safety, closeout and commissioning.
- Website portal
- ...Used to view, monitor & analyse and report – all data in one place.
- Users are invited to a project/s on the platform and are assigned with a role that defines their access and permissions
- ...Tablet/ website use, creating records, visibility of records, raising tasks etc.



Field View – Uses.

- Often used primarily as a reactive snagging tool to raise issues post construction. Useful for closing out issues for handover.
- JRL Group primarily uses FV as a proactive monitoring and measurement tool to verify and validate installation...
- ...from enabling and piling works through drainage and frame construction to internal fit out and façade install.
- Witnessing, handover & commissioning.

Field View – Uses.

- The system is highly configurable
- We tailor the system to suit each project and our specific installation methodologies.
- This is based on the project specifications, drawings and construction programme
- Benchmark records and Hold points are integrated into processes to ensure that quality is checked at the crucial points within a process. E.g. works cannot continue until the hold point is checked for quality by various parties (JRL, Client, Subcontractor, NHBC/ Building Control).

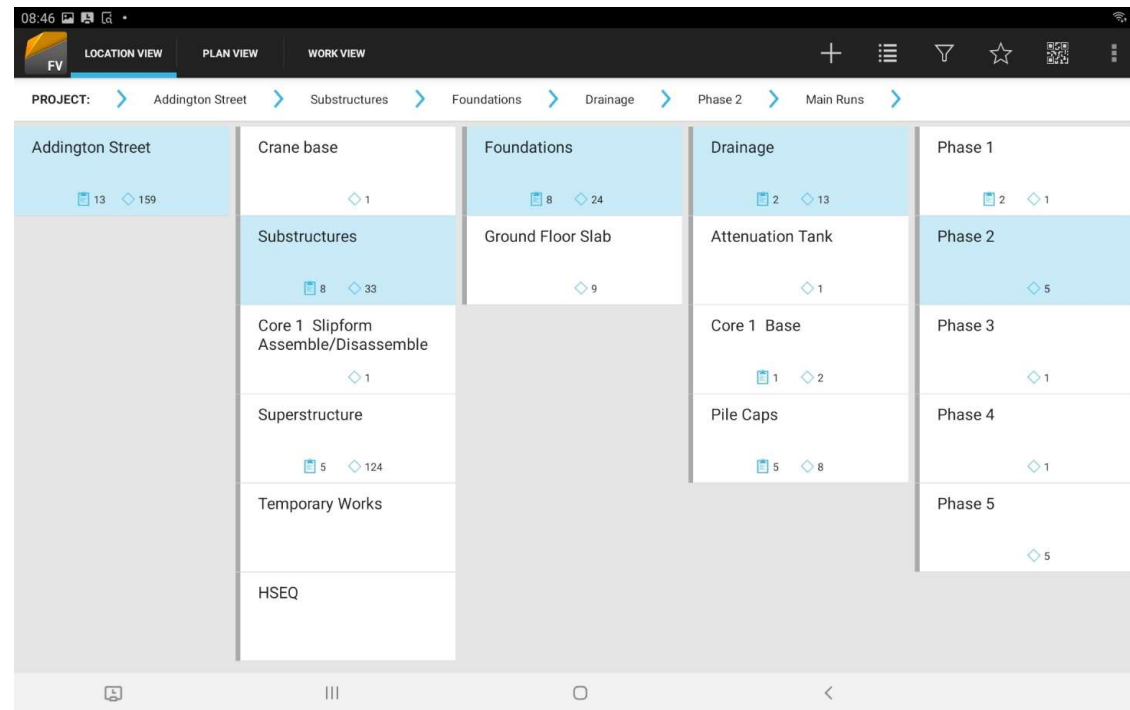
Field View – Structure.

- Geometry
- Processes
- Forms
- Tasks

Field View – Structure - Geometry

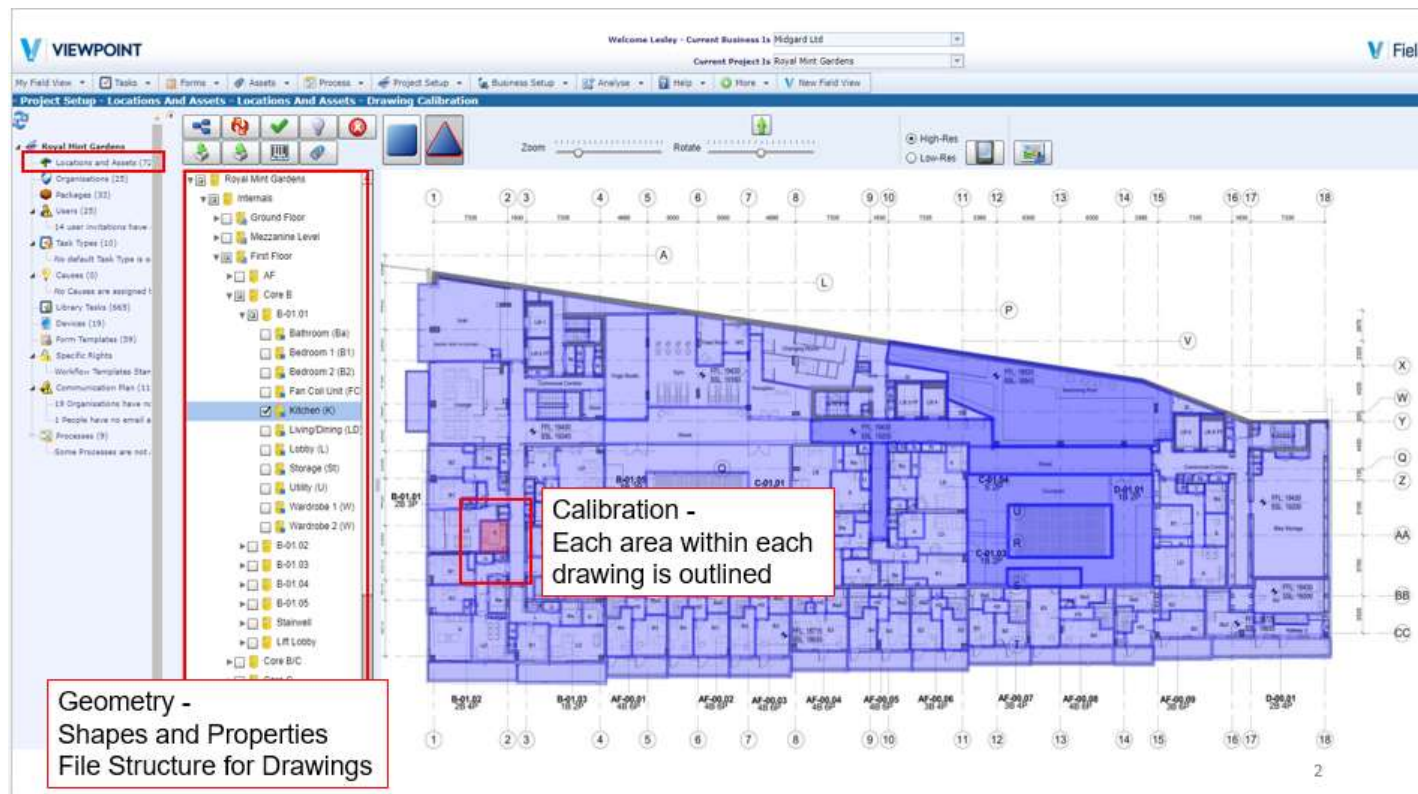
- Project framework – Geometry – Consisting of Blocks, levels & locations:

- Zones/Areas
- Concrete pours
- Apartments
- Rooms.



Field View – Structure - Geometry

- Drawing Calibration:



Field View – Structure - Processes

- Processes – individual stages of construction within an element

The screenshot displays the Field View app interface. At the top, there's a status bar with the time 08:52 and various icons. Below it, a navigation bar shows 'LOCATION VIEW', 'PLAN VIEW', and 'WORK VIEW'. A breadcrumb trail indicates the project path: PROJECT: > Addington Street > Substructures > Foundations > Drainage > Phase 2 > Main Runs >. The main content area is divided into two columns. The left column lists construction phases: Phase 1 (13 items), Phase 2 (1 item), Phase 3 (2 items), Phase 4 (8 items), and Phase 5 (5 items). The right column lists specific tasks: Main Runs (1 item), 2a (1 item), 2b (1 item), 2c (1 item), and 2d (1 item). On the far right, a 'MANHOLE & DRAINAGE PIPE RUN' checklist is visible, with a dropdown menu open showing status options: Not Started, In Progress (highlighted), Completed, Not Applicable, and Overdue. The checklist items include 'Quality record', 'Setting out confirmed', 'Excavate to correct depth', 'Pipes & Manholes Installed', 'Final Inspection', and 'As built completed', each with a corresponding status indicator.

Phase	Item	Status
Phase 1	13	Not Started
	1	Not Started
	2	Not Started
	2	Not Started
	2	Not Started
Phase 2	1	Not Started
	5	Not Started
	1	Not Started
	1	Not Started
	1	Not Started
Phase 3	1	Not Started
	1	Not Started
	1	Not Started
	1	Not Started
	1	Not Started
Phase 4	1	Not Started
	1	Not Started
	1	Not Started
	1	Not Started
	1	Not Started
Phase 5	1	Not Started
	1	Not Started
	1	Not Started
	1	Not Started
	1	Not Started

Field View – Structure - Forms

- Example drainage form section...

- Example question types:

- Text
- Numerical
- Logical (Yes/ No)
- Drop down/ multi-select
- Date Time
- Signatures
- Photographs
- Mandatory/ Non mandatory
- Attachments
- QR code

08:54 FV F177336.3 - Manhole & Drainage Run Installation ACTIONS

Pipework Checks

Pipe runs

Run reference	Description	Photo
		PHOTO GALLERY

+

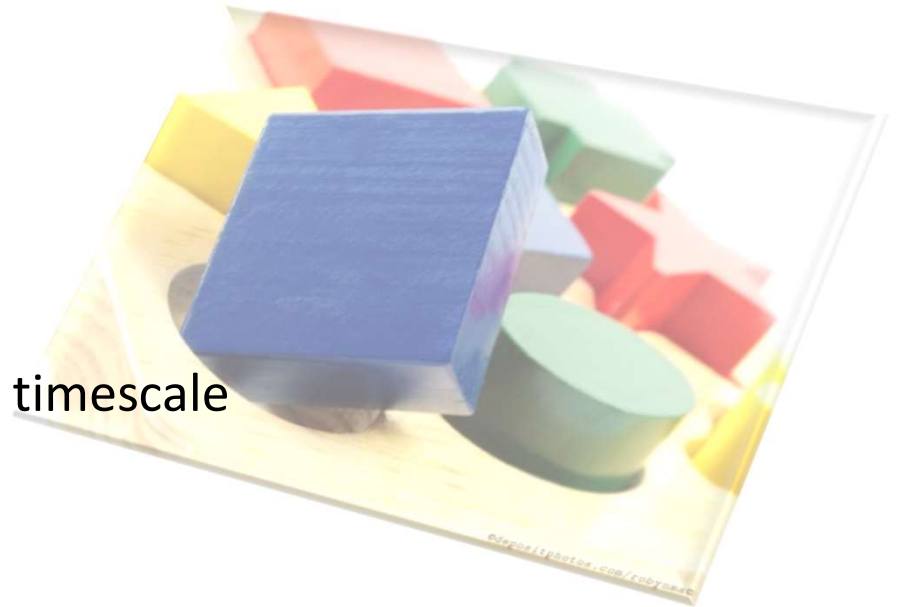
Pipe Type (Material) correct as per drawing and revision referenced above ☐ Yes ☐ No

Pipe Diameter correct as per drawing and revision referenced above ☐ Yes ☐ No

Trench widths correct as per drawing and revision referenced above ☐ Yes ☐ No

Field View - Tasks

- Raising Snags, Observations & NCR's
 - Completed on tablet
 - During team site walks
 - Issues agreed
 - Recorded with location photograph and timescale



Field View - Tasks

- Snags – Raised internally upon completion of work.
- Observations – Raised by Client during site walks, where checking, clarification/ questions can be recorded.
- NCR's – to record instances of non conforming work or products.
- Can be viewed tracked and reported through to closure on the website portal.

The graphic features the word 'Think' in white and 'sync' in orange on a teal background. A large, light-blue circular arrow surrounds the word 'sync'. To the left of 'sync' are two white circles of different sizes, resembling a zero and a period.

Think
sync

Field View – Forms – QR codes

JRL

MIDGARD

A0.11 Apartment

Location QR code

Training Area
A Block
A2 Core
00 Floor
A0.11 Apartment



Apartment Type 3.2

Scan with Field View App



Field View – Integration & Analysis

- Viewpoint for Projects
- Analysis Tool – Power BI

Field View – Website Portal

Questions



Quality - Brickwork External Facade

Form Reference	F1.1386144
Owned By	Graham Priest (Kinlan Test Environment)
Date	27/06/2022 13:47:45
Status	Open
Project Name	Test Project
Project Address	Test Space Test Street
Location	Test Project

Location	Test Project
Grid Line	
Mast Climber	
Other Form of Access	

Bricklayers Gang

#	Name
---	------

Facework

Brick Type	
Brick Finish	
Capture photo(s) of the brickwork finish	
Is the work set out and bonded correctly?	
Is the work plumb line & level to brick gauge (If no state the reason)	
Are there any tipping bricks visible?	
Capture photo(s) of level on wall	
Capture photo(s) of gauge	
Is the movement joints in the correct position as per the drawings?	
Has a lintel been installed?	

Ties & Reinforcement

Are channel ties installed to the required specification?	
Are ties installed to the correct spacing?	
Capture photo(s) of internal cavity with tape measure	
Has Tram track/Bricktor mesh been installed	
Tram track/Bricktor mesh specification	
Capture photo(s) of Tram track/Bricktor mesh	

Lintels

Are the correct lintel sizes installed as per the lintel bearing specification for all openings?	
Has the lintel been set at the correct level as per the drawing specification?	
If the lintel has bowed is this within the specified tolerance level?	
Has the lintel been propped if required?	
By how many mm has the lintel bowed?	
Capture photo(s) of the lintel with tape measure	

Cavity

Have the correct ties been used?	
Are the ties free of mortar droppings and cavities are clean?	
Capture photo(s) of clean cavities free from mortar droppings	
Are the cavity widths correct size to the work drawings?	
Capture photo(s) with tape showing the measurement	
Have core holes been left out on clean cavity in tray levels?	
Is the cavity tray visible through the mortar bed?	
Capture photos(s) of cavity tray	

Weep Holes	
Have weep holes been installed to the specification requirements?	
Capture photos(s) of weep holes installed to the specification required	
Pointing	
Have all Profill clamp holes and pin holes been pointed?	
Has the work been brushed off and pointed to the required specification?	
Work Area	
Have the work areas been cleared and left in a safe standard?	
Capture photo(s) of work area	
Workmanship Standard	
Comments on the appearance and standard of workmanship	
Standard of workmanship rating	
Actions taken	
Inspected and works signed off by Kinlan representative	

Area Handover Certificate

Project:	The Castings	Sheet:	1
Contract No:	7072	Date:	

Description of Area to be Handed Over –

- Class 3 mortar / DSM – EcoReady 101 or 96
- Facing Brick – Woodside / Ash / Farmstead Brickwork built to horizontal and vertical gauge working to Wincro.
- Mortar bed and cross joints formed full and solid.
- Brickwork built vertically plumb and to correct line and level working to Masonry Support.
- Openings formed correct size, plumb and square.
- Vista VS9 slot ties installed to 25/14 channel at 600mm centres horizontally and 450mm vertically with 50mm minimum embedment into the brickwork outer leaf.
- All cavity ties level or sloping slightly towards the brickwork outer leaf.
- All cavity ties clear of mortar droppings.
- Minimum 50mm clear cavity provided. (Full Fill when against concrete)
- Movement joints formed plumb, constant width and free from mortar.
- Pointing –Half rounded bucket handled.
- All pointing uniform and constant in appearance.
- Cross joints vertically plumb at every fourth brick along the length of the wall.
- All pistol brick cuts to the brickwork outer leaf cut with masonry saw (off site).
- Area left clean, tidy and free from trip hazards.

The area detailed above has been handed over on behalf of:		Kinlan	
Name:	Be	Signature:	Date: 14/10/2020
The area detailed above has been accepted on behalf of:		Midgard	
Name:		Signature:	Date: 14/10/2020

Additional Documentation:

See drawing highlighted

Comments:

[illegible]

	ITP for STICK CURTAIN WALL SYSTEM	ITP No:	C1004-NCH-ITP/SCW-001
		Rev Date:	21/05/2021

Activity No.	Item / Activity to be Inspected/ Tested	INSPECTION DESCRIPTION	REQUIREMENTS REFERENCE	FREQUENCY	ACCEPTANCE CRITERIA	INSPECTION TYPE *				REFERENCE DOC. TO BE VERIFIED
						GHF	Vinci		Arup	
1.0	Material Verification, Delivery, Handling and Storage.	1.1 Aluminium	- Façade specification Section 02/1.2 'EW-02: Stick Curtain wall' - Façade specification Section 01/5.6 'Transportation & Site Operations/ 5.6.2 'Handling and Storage' - Façade specification Section 02 Part 3 'Materials' /3.1 'Aluminium' - Approved material submittal	Random deliveries to site	Material conforming to the approved material submittal and approved shop drawing.	H/R	W/R		H/R	Delivery Note Material submittal approval comment sheet
		1.2 Glass	- Façade specification Section 02/1.2 'EW-02: Stick Curtain wall' - Façade specification Section 01/5.6 'Transportation & Site Operations/ 5.6.2 'Handling and Storage' - Façade specification Section 02 Part 2 'Components, products & assemblies'/ 2.1 'Insulated Glass Units (IGU's)'& 2.2.3 'Double Glazed Unit' - Part 3 'Materials' /3.3 'Glass' - Approved material submittal	Random deliveries to site	Material conforming to the approved material submittal	H/R	W/R		H/R	Delivery Note/Packing list Factory Quality Control Inspection Checklist from glass supplier Material submittal approval comment sheet

	ITP for STICK CURTAIN WALL SYSTEM	ITP No:	C1004-NCH-ITP/SCW-001
		Rev Date:	21/05/2021

Activity No.	Item / Activity to be Inspected/ Tested	INSPECTION DESCRIPTION	REQUIREMENTS REFERENCE	FREQUENCY	ACCEPTANCE CRITERIA	INSPECTION TYPE *				REFERENCE DOC. TO BE VERIFIED
						GHF	Vinci		Arup	
		1.3 Gasket / Sealant	- Façade specification Section 01/5.6 'Transportation & Site Operations/ 5.6.2 'Handling and Storage' - Façade specification Section 02 Part 2 'Components, products & assemblies'/2.4 'Gaskets' - Façade specification Section 02 Part 2 'Components, products & assemblies'/2.4 'Gaskets' - Approved material submittal	Random deliveries to site	Material conforming to the approved material submittal.	H/R	W/R		H/R	Delivery Note/order Material submittal approval comment sheet
2.0	Site preparation	2.1 Verify General requirements and Preparations	- Facade specification Section 1/ 5.6.4 'Site Operatives' - Facade specification Section 1/ 5.6.6 'Tolerances' - Facade specification Section 1/ 5.6.7 'Survey' - Hand over documents - As built	Prior to commencement of work	- Work is to be performed by experienced workers under the direction of qualified supervisor who is fully aware of the project requirements. - Area to be handed over when ready for installation - Concrete structure/slab will be checked for defects and a survey will be conducted if within tolerance.	R	W		S	Not Applicable
3.0	Installation	3.1 Bracket	- Approve shop drawing - Bolts Calculation - Facade specification Section 1/ 4.2.1 'Construction Drawings generally'	After Installation 10%	- Fixing including primary fixing to the building structure shall be installed in accordance with the fixing manufacturer's recommendations and required procedure - For all bolts assemblies the strength grade combination of bolts/nuts/washers shall be as	H/R	H/R		H/R	Bolt Tightening & Torque Inspection Report

* Inspection Point Type Codes: S-Surveillance Inspection W-Witness Inspection Point H-Mandatory Hold Point For Inspection R-Record Review

	ITP for STICK CURTAIN WALL SYSTEM	ITP No:	C1004-NCH-ITP/SCW-001
		Rev Date:	21/05/2021

Activity No.	Item / Activity to be Inspected/ Tested	INSPECTION DESCRIPTION	REQUIREMENTS REFERENCE	FREQUENCY	ACCEPTANCE CRITERIA	INSPECTION TYPE *				REFERENCE DOC. TO BE VERIFIED
						GHF	Vinci		Arup	
					prescribed or recommended in the relevant British Standards - All should be secure in connections to prevent loosening during life of the building - Length of bolts shall be such that at least one clear thread shows above the nut after tightening, and at least one thread plus the thread run out shall be clear between the nut and the unthreaded shank of the bolt.					
		3.2 Aluminium curtain wall (stick) installation	- Approved shop drawing - Facade specification Section 1/ 5 'Accuracy of erection'/ 5.3 'Aluminium curtain wall'	After Installation 10%	- Frames should be checked against site datum/grids - Materials installed should have no sign of damages. - Frames should be plumb and level. - Screws and gasket should be installed before glazing work begins. - Surfaces to receive glazing materials shall be free of dirt's, dust, grease, oil and other foreign materials before glazing work is begun.	W	S		S	Not applicable
		3.3 Gasket Installation	- Approved shop drawing - Facade specification Section 1/ 5 'Accuracy of erection'/ 5.8 'Gasket'	After Installation Visual check	- Materials use should have no sign of damages. - The appearance should be satisfactory. - Surfaces to receive glazing materials shall be free of dirt's, dust, grease, oil and other foreign materials before glazing work is begun.	W	S		S	Not applicable
		3.4 Glazing	- Approved shop drawing - Facade specification Section 1/ 5 'Accuracy of erection'/ 5.7 'Glass'	After Installation Visual check	- Material used should not have sign of damage - The unit shall be adjusted, plumbed and squared. All rivets, screws, bolts nails heads, welds and other projection shall be finished flush in glazing rebates. - Surfaces interfacing with the unit shall be free of dirt, dust, grease, oil and other foreign materials and shall be painted or sealed, before glazing work is begun. - All toggles to be fully engaged and torqued to the manufacture requirements	H	W		H/R	Toggle fixation & Torque in accordance to system supplier

* Inspection Point Type Codes: S-Surveillance Inspection W-Witness Inspection Point H-Mandatory Hold Point For Inspection R-Record Review

	ITP for STICK CURTAIN WALL SYSTEM	ITP No:	C1004-NCH-ITP/SCW-001
		Rev Date:	21/05/2021

Activity No.	Item / Activity to be Inspected/ Tested	INSPECTION DESCRIPTION	REQUIREMENTS REFERENCE	FREQUENCY	ACCEPTANCE CRITERIA	INSPECTION TYPE *				REFERENCE DOC. TO BE VERIFIED
						GHF	Vinci		Arup	
		3.5 Slab closure against SCW	- Approved shop drawing - Facade specification Section 2/ 5.9 'Insulation'	After Installation Visual check	- Material should not have sign of damage - Material should be compacted and neatly installed as per drawings and manufacturer guidance and recommendations.	S	S		S	
4.0	Post Completion	4.1 Cleaning	- Manufacturer product data - Facade specification Section 1/ 5.6.8 'Protection and Cleaning'	Prior to Final Inspection	- Materials used for temporary protection shall be compatible with the surface and finishes. They shall be removed without detriment to the finish. - All exposed cladding surfaces shall be cleaned on completion - Clean and check for damages due to installation.	S	S		S	Not Applicable
5.0	On site testing	5.1 On site hose testing	- Facade specification Section 1/ 4.6.6.2 'On Site hose testing' - Agreed areas and mark-up Drawing - Facade specification Section 1/ 4.6.2 'Testing Authority' - Facade specification Section 1/ 4.6.3 'Test Report'	After completion of works	- Testing areas to be suggested or chosen to/by the Client/Main Contractor. - Testing areas to be mark-up on drawing - Back of curtain wall to be free of obstruction for clear view of the system	H/R	H/R		H/R	Not Applicable

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Area:

Date:

Item	Description	Tick	Comments and (Date Commented)
PRE - CONSTRUCTION			
1	RAM's Approved		
2	RAM's Communicated		
3	Site Quality Plan/QA Inspection/ System Installation Manual on site and copied to INSERT MAIN CONTRACTOR NAME		
4	Latest Construction Issue Drawings in Use		
5	Preceding Works/Structural Opening completed, (including substrate DPM's, VCL's Membranes and Cavity Closers)		
6	Interfaces - internals/cladding/roof-checked		
7	Confirmation materials are delivered complete, enact and undamaged at pre-install framing stored correctly and protection tapes and foams present to prevent damage, glazing units free from edge damage and secured to suitable stillage's or A frame trolleys		
FIRST FIX (BRACKETS AND GRIDWORK/WINDOW FRAME) Items 8 to 13, HOLD POINT 1			
8	Brackets and fixings installed as per details		
9	No excessive, shimming and fixing embedment depths correct.		
10	Torque settings checked on all critical Bolts/ fasteners Sprayed by JRL GH Facades Ltd managers		
11	Framing installed to detail and (Plumb/Line/Level checked) – Punch windows		
12	Grid -work connections checked and free from gaps. Connection gaskets and sealants as per system installation manual.		
13	Shear-blocks, mitre splices, re-enforcements and corner posts installed to detail.		
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Main Contractor:		Sign/Date	
SECOND FIX - GLAZING, GASKETS, EPDM, Weather seals (Items 14 to 21) HOLD POINT 2			
14	Pre-glaze, retainer gasket (back gasket) glass packers and shoes installed as system detail. (after glazing check no transom sag is evident)		
15	Glass installed centralised in aperture even gap (nominal 6mm) around perimeter, correct edge coverage on bead/pressure plate/toggles		
16	Check that glazing is installed correctly with low emissive coating and solar control leaf in the correct plain and the requirements for Kite Marks is observed to contract requirements		
17	If glazing is stitched sufficient number of stitch plates used (nominally every 450 mm)		
18	EDPM fitted these should be fully mechanical retained at the perimeter of the glazing system and continuously sealed to the substrate (porous surfaces should be primed)		
19	Areas of weakness checked (corners and laps) use of preformed corners is advisable where suitable.		
20	Windows Fully beaded and wedge gaskets fitted under compression working in from corners, check that gaskets are even and not tucked over.		
21	Protection tapes checked visible damage noted. Before windows protected internally. Remove protection tape at jambs internally to prevent knife damage from trapping.		
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Main Contractor:		Sign/Date	

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Completion, de-tape and handover

22	Perimeter flashings and cills installed with continuous straight lines and set to level ensuring that cills can drain (no back fall to the glazing system and painted butt straps and end caps are fitted.		
23	Curtain Wall Systems fully pressure plated (torque checked nominal - 6.5N/m) and cover caps/ Bull noses fitted maximum 1mm Gap and either end.		
24	Perimeter sealant applied with Width to depth ratio of 2:1, check colour and specification as per drawing is used. Good even consistent finish. Once cured check adhesion to substrate, (porous surface primers used)		
25	Glass to glass sealant applied check bond breaker gasket/ foam used check colour and specification and good even consistent finish.		
26	Ironmongery fitted, correct specification and free from damage.		
27	Mechanisms adjusted and operations of opening vents checked and working correctly.		
28	De-tape and remove label, wipe down ready for inspection of Metal finishes		
29	Inspection of all framing, flashings and panels check free from visible scratches and dents		
30	Inspection of glass free from scratches, coating defects and cavity defects,		
JRL GH Facades Ltd		Sign/Date	
Main Contractor:		Sign/Date	