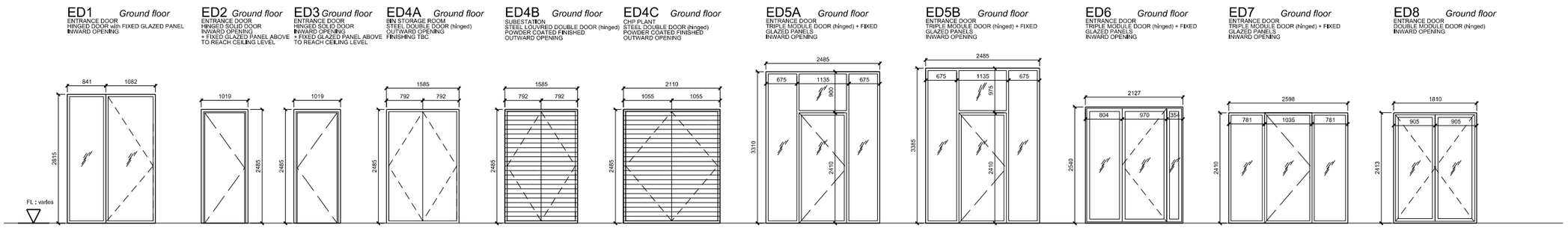
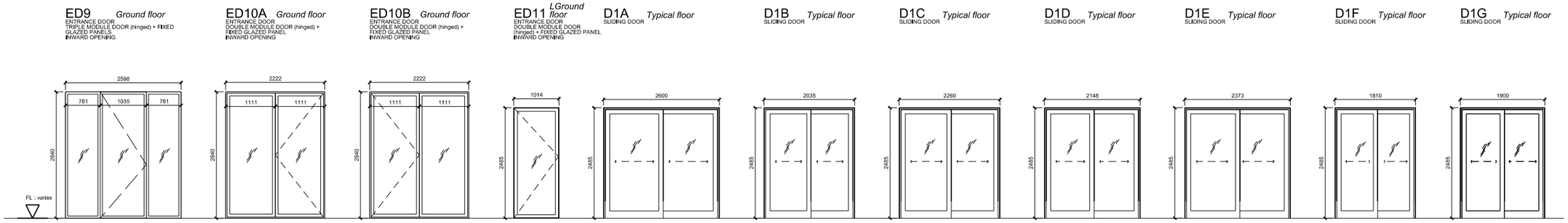
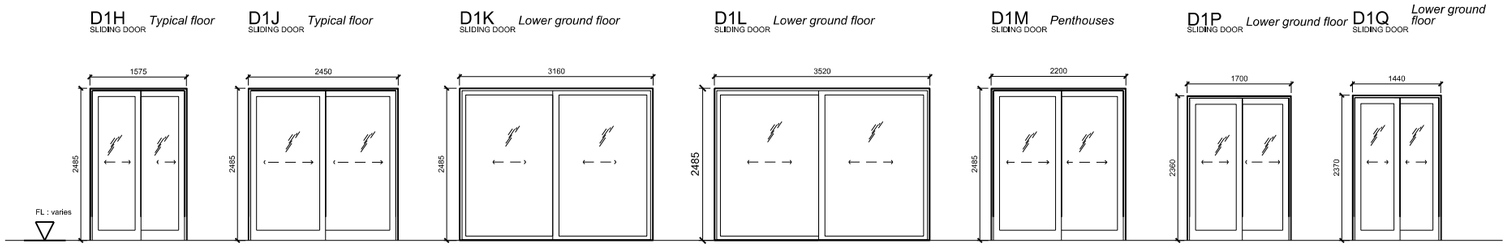
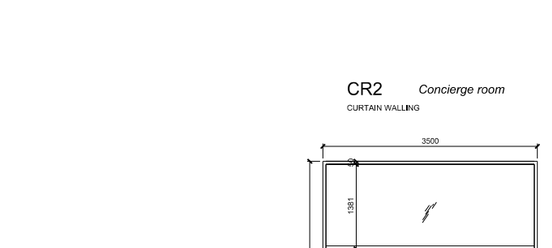
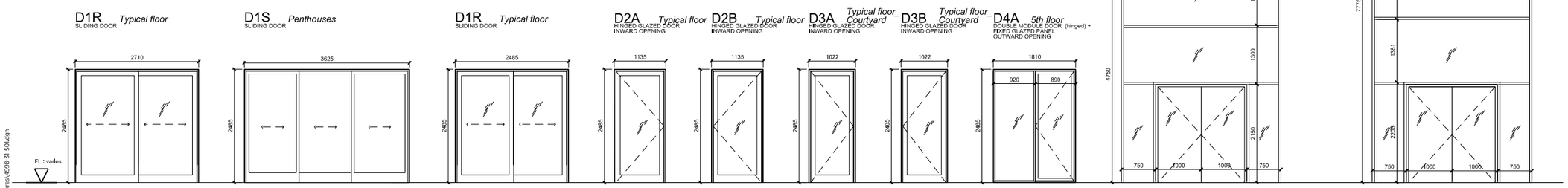
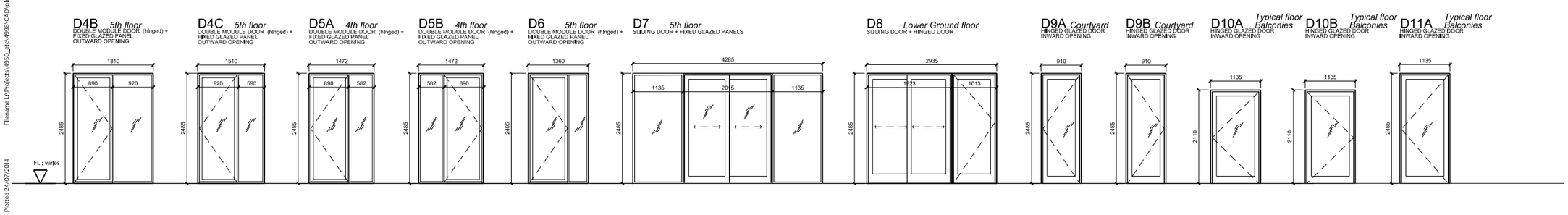












NOTES

REV.	DATE	AMENDMENT
A	24/07/2014	Coordinated tender issue

KEYPLAN

CLIENT

SHEPPARD ROBSON
77 Parkway Camden Town London NW1 7PU
T: +44 (0)20 7504 1700 E: london@sheppardrobson.com

PROJECT
79 CAMDEN ROAD

SCALE@A1	DATE	ORIGINATOR	CHECKED	AUTHORISED
1:50	09.07.2014	JM	TK	AS

TITLE
WINDOWS/DOORS MATRIX

STATUS
TENDER

DRAWING NO.
4998-31-501

REV.
A

Filename:L:\Projects\4950_etc\4998\CAD\plot\31_Windows_louvres\4998-31-501.dgn
Plotted:24/07/2014

A1

D12A *Courtyard*
HINGED GLAZED DOOR
INWARD OPENING

D13 *Penthouses*
BIFOLDING GLAZED DOOR
OUTWARD OPENING

W1A *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W1B *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W1C *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W1D *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

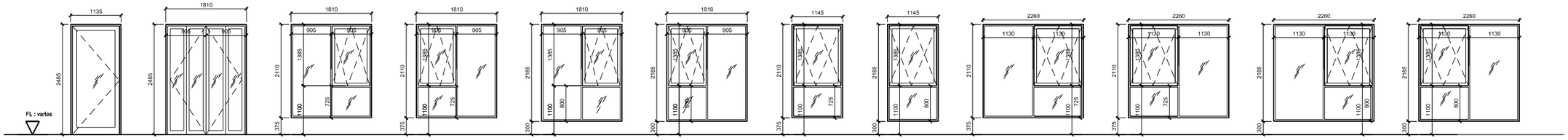
W2A *Typical bay* W2B
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W3A *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W3B *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W3C *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W3D *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL



W4A *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W4B *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W4C *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W4D *Typical bay*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W5A *Rochester Pl*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light + sidehung) with FIXED GLAZED PANEL

W5C *Rochester Pl*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light + sidehung) with FIXED GLAZED PANEL

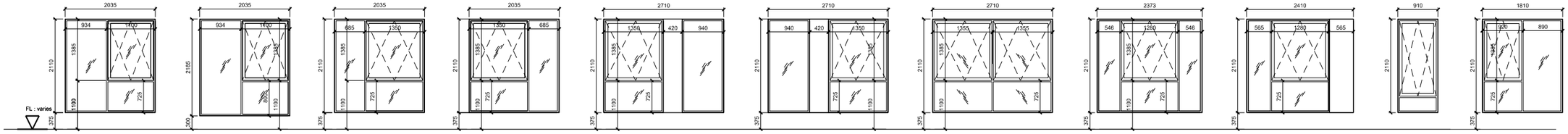
W6 *Rochester Pl*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light + sidehung) with FIXED GLAZED PANEL

W7A *Typical floor_NW*
TRIPLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W8 *Typical floor_NW*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W9 *Ground floor_NW*
WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W10A *6th floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL



W10B *6th floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W11A *5th floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W11B *5th floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W12A *6th* W12B *5th* W13 *Typical floor*
FIXED GLAZED PANEL

FIXED GLAZED PANEL GLASS TO GLASS CORNER + DOOR (Hinged) OUTWARD OPENING

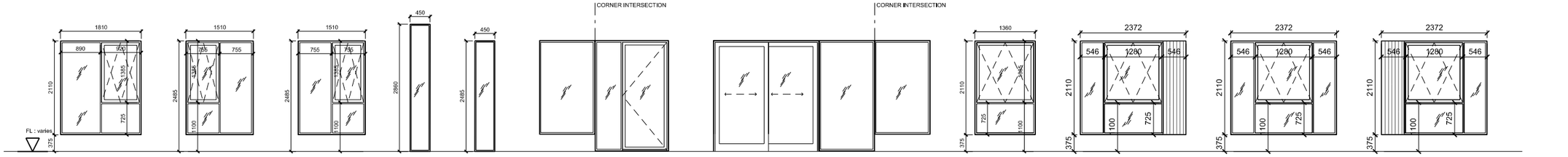
W14 *Typical floor*
GLASS TO GLASS CORNER + DOOR (Sliding)

W15A *NW*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W16A *NW*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)

W16C *NW*
TRIPLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL

W16E *NW*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)



WC1A *Typical floor_Courtyard*
DOUBLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)

WC1B *Typical floor_Courtyard*
DOUBLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)

WC1C *4th floor_Courtyard*
DOUBLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)

WC2A *Typical floor_Courtyard*
FULL HEIGHT WINDOW - OPENABLE (Hinged) + WINDOW OPENABLE (Reversible) + METAL PANEL (not to be considered as part of the window)

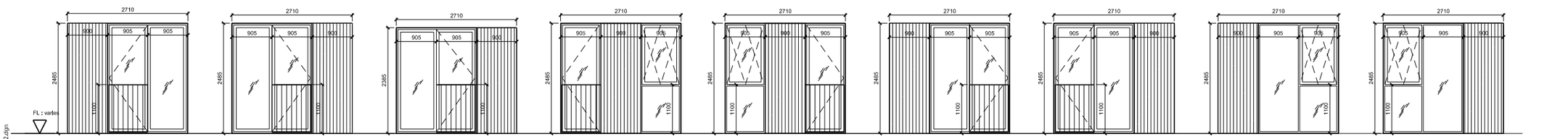
WC2B *Typical floor_Courtyard*
FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING + WINDOW OPENABLE (Reversible) + METAL PANEL (not to be considered as part of the window)

WC3A *Typical floor_Courtyard*
DOUBLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)

WC3B *Typical floor_Courtyard*
DOUBLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)

WC3C *Typical floor_Courtyard*
DOUBLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) + WINDOW OPENABLE (Reversible) with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)

WC3D *Typical floor_Courtyard*
DOUBLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) + WINDOW OPENABLE (Reversible) with FIXED GLAZED PANEL + METAL PANEL (not to be considered as part of the window)



WC4A *Typical floor_Courtyard*
TRIPLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANELS

WC4B *Typical floor_Courtyard*
TRIPLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) + WINDOW OPENABLE (Reversible) with FIXED GLAZED PANEL

WC5A *Typical floor_Courtyard*
FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with + METAL PANELS (not to be considered as part of the window)

WC5B *Typical floor_Courtyard*
FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING + METAL PANEL (not to be considered as part of the window)

WC5C *Typical floor_Courtyard*
FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING + METAL PANEL (not to be considered as part of the window)

WC5D *4th floor_Courtyard*
FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING + METAL PANEL (not to be considered as part of the window)

WC5C *Typical floor_Courtyard*
FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING + METAL PANEL (not to be considered as part of the window)

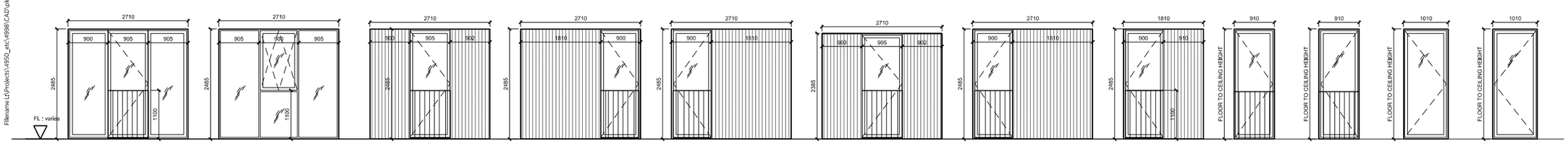
WC6 *Typical floor_Courtyard*
FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING + METAL PANEL (not to be considered as part of the window)

WC7A *Core_Courtyard*
AOV WINDOW LINKED TO THE ALARM SYSTEM

WC7B *Core_Courtyard*
AOV WINDOW LINKED TO THE ALARM SYSTEM

WC7C *Core_Courtyard*
AOV WINDOW LINKED TO THE ALARM SYSTEM

WC7D *Core_Courtyard*
AOV WINDOW LINKED TO THE ALARM SYSTEM



NOTES

REV.	DATE	AMENDMENT
A	24/07/2014	Coordinated tender issue

KEYPLAN

CLIENT

SHEPPARD ROBSON
77 Parkway Camden Town London NW1 7PU
T: +44 (0)20 7504 1700 E: london@sheppardrobson.com

PROJECT
79 CAMDEN ROAD

SCALE@A1	DATE	ORIGINATOR	CHECKED	AUTHORISED
1 : 50	**09.07.2014**	**JM**	**TK**	**AS**

TITLE
WINDOWS/DOORS MATRIX

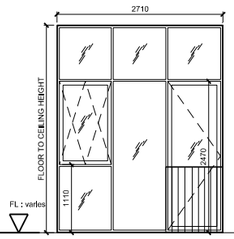
STATUS
TENDER

DRAWING NO.
4998- 31 - 502

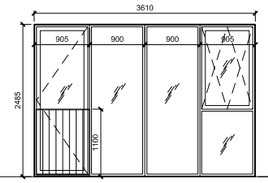
REV.
A

Filename I:\Projects\4950_etc\4998\CAD\plot\31_Windows_Journey\4998-31-502.dgn
Plotted 24/07/2014

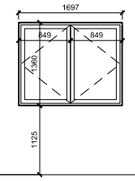
WCG1 *Ground floor_Courtyard*
TRIPLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANELS + REVERSIBLE WINDOW



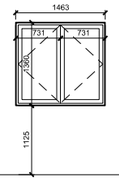
WCG2 *Ground floor_Courtyard*
QUADRUPLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANELS + REVERSIBLE WINDOW



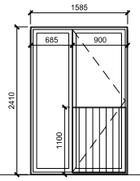
WCG3 *Lower Ground floor_Courtyard*
DOUBLE MODULE WINDOW (Hinged)



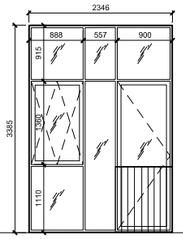
WCG4 *Lower Ground floor_Courtyard*
DOUBLE MODULE WINDOW (Hinged)



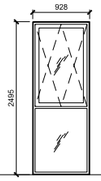
WCG5 *Lower Ground floor_Courtyard*
DOUBLE MODULE WINDOW + FIXED GLAZED PANEL



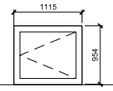
WCG6 *Lower Ground floor_Courtyard*
DOUBLE MODULE FULL HEIGHT WINDOW - OPENABLE (Hinged) INWARD OPENING with FIXED GLAZED PANEL



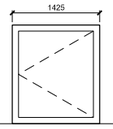
WCG3 *Lower Ground floor_Courtyard*
DOUBLE MODULE WINDOW (Hinged)
GLASS THICKNESS: G4



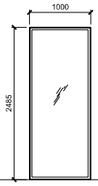
RL1 *Roof*
AOV ROOFLIGHT LINKED TO THE ALARM SYSTEM



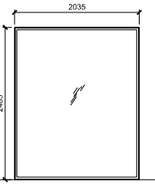
RL2 *1st floor*
ROOFLIGHT



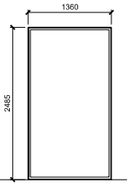
WF1 *5th floor*
FIXED GLAZED PANEL



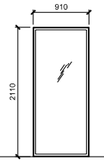
WF2 *4th floor*
FIXED GLAZED PANEL



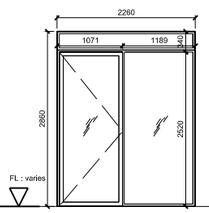
WF3 *4th floor*
FIXED GLAZED PANEL



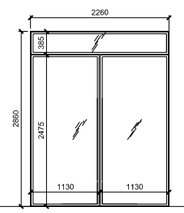
WF4 *Balcony*
FIXED GLAZED PANEL



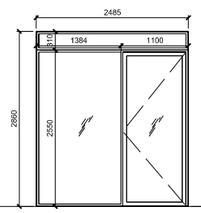
WG1A *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING



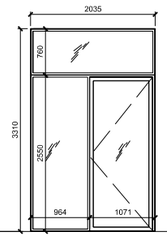
WG1A *Ground floor*
DOUBLE MODULE FIXED GLAZED PANEL



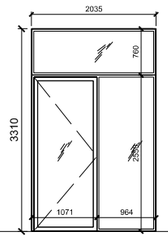
WG2 *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING



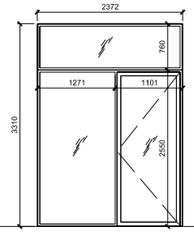
WG3A *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING



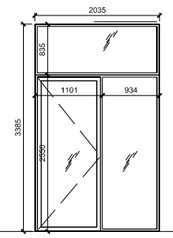
WG3B *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING



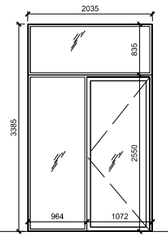
WG4 *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING N UNITS: 1



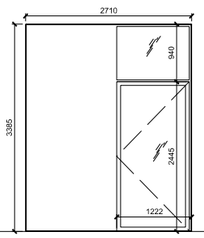
WG5A *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING



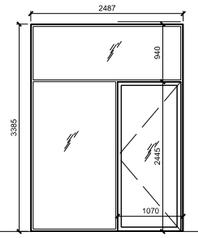
WG5B *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING



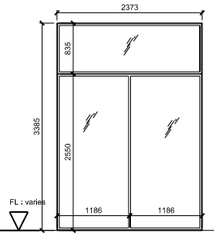
WG6 *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING



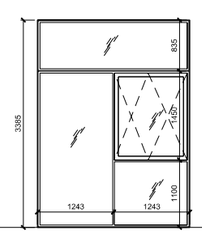
WG7 *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING



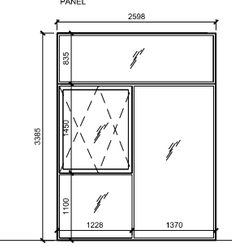
WG8 *Ground floor*
DOUBLE MODULE FIXED GLAZED PANEL



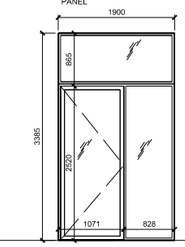
WG9A *Ground floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL



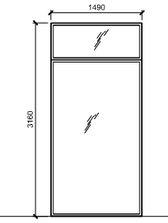
WG9B *Ground floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL



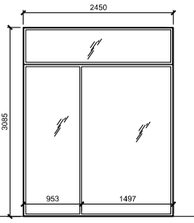
WG10 *Ground floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL



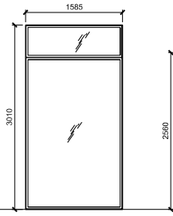
WG11 *Ground floor*
DOUBLE MODULE FIXED GLAZED PANEL



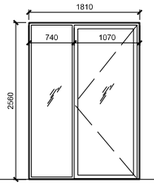
WG12 *Ground floor*
DOUBLE MODULE FIXED GLAZED PANEL



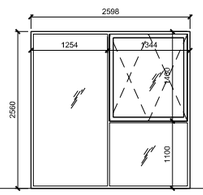
WG13 *Ground floor*
SINGLE MODULE FIXED GLAZED PANEL



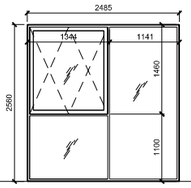
WG14 *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL OUTWARD OPENING N UNITS: 1



WG15 *Ground floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL



WG16 *Ground floor*
DOUBLE MODULE WINDOW - OPENABLE (Tophung projecting light/Reversible) with FIXED GLAZED PANEL



WG17 *Ground floor*
DOUBLE MODULE FIXED GLAZED PANEL

WG18 *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL INWARD OPENING

WG19 *Ground floor*
DOUBLE MODULE FIXED GLAZED PANEL

WG20 *Ground floor*
DOUBLE MODULE FIXED GLAZED PANEL

WG21A *Ground floor*
SINGLE MODULE FIXED GLAZED PANEL

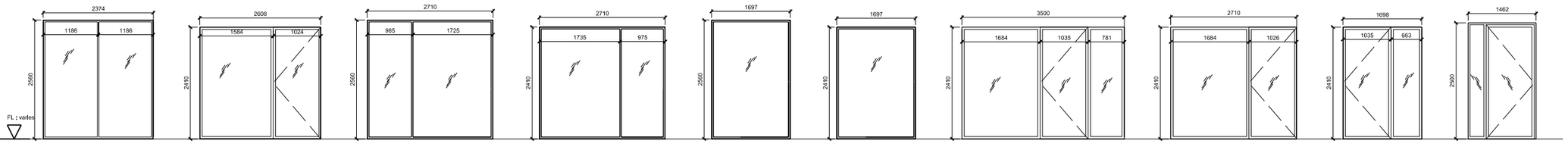
WG21B *Ground floor*
SINGLE MODULE FIXED GLAZED PANEL

WG22 *Ground floor*
TRIPLE MODULE WINDOW (hinged) + FIXED GLAZED PANELS INWARD OPENING

WG23 *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL INWARD OPENING

WG24 *Ground floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL INWARD OPENING

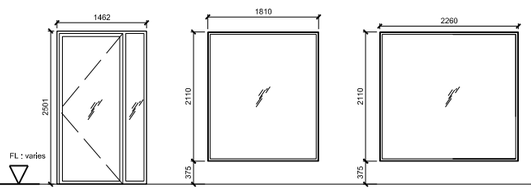
WG25A *LGround floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL INWARD OPENING



WG25B *LGround floor*
DOUBLE MODULE WINDOW (hinged) + FIXED GLAZED PANEL INWARD OPENING

W1A *Typical bay*
(ALTERNATIVE OPTION) FIXED GLAZED PANEL

W3A *Typical bay*
(ACTERNATIVE OPTION)FIXED GLAZED PANEL



DO NOT SCALE FROM THIS DRAWING
The contractor shall check and verify all dimensions on site and report discrepancies in writing to Sheppard Robson before proceeding work.

FOR ELECTRONIC DATA ISSUE
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NOTES

REV.	DATE	AMENDMENT
A	24/07/2014	Coordinated tender issue

KEYPLAN

CLIENT

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PROJECT
79 CAMDEN ROAD

SCALE@A1	DATE	ORIGINATOR	CHECKED	AUTHORISED
1:50	**09.07.2014**	**JM**	**TK**	**AS**

TITLE
WINDOWS/DOORS MATRIX

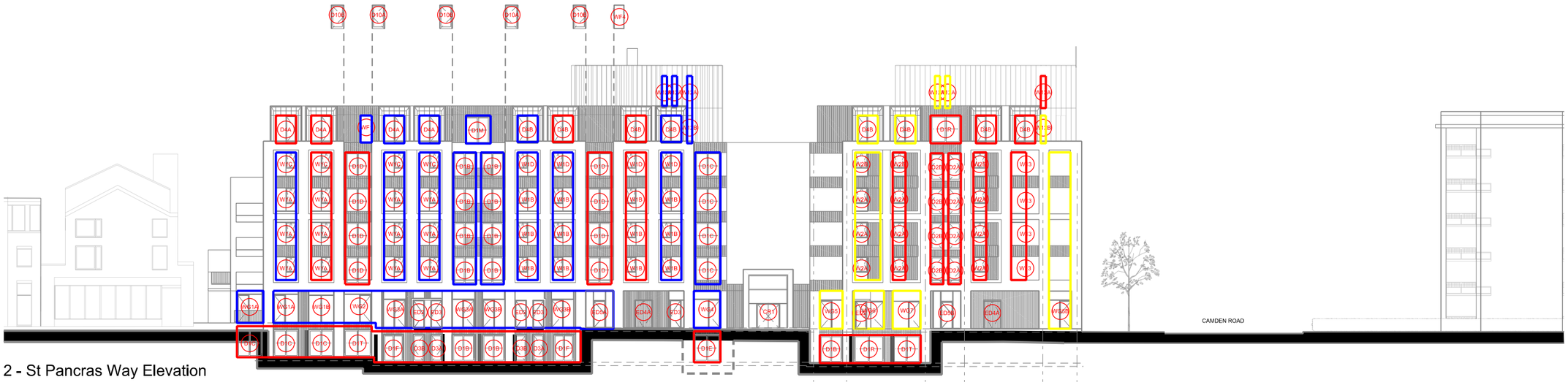
STATUS
TENDER

DRAWING NO.
4998-31-503

REV.
A

Filename:L:\Projects\4950_etc\4998\CAD\plot\31_Windows_Joinery\4998-31-503.dgn
Plotted 24/07/2014

1 - Camden Road Elevation



2 - St Pancras Way Elevation

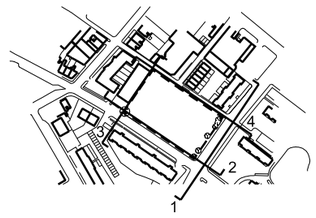
NOTES

GLASS ACOUSTIC PERFORMANCE

- G1
- G2
- G3
- G4

REV.	DATE	AMENDMENT
A	24/07/2014	Coordinated tender issue

KEYPLAN



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PROJECT
79 CAMDEN ROAD

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1:200	09.07.2014	JM	TK	AS

TITLE
WINDOWS

IDENTIFICATION NUMBER

STATUS
TENDER

DRAWING NO.
4998-31-504

REV.
A

Filename L:\Projects\4950_etc\4998\CAD\plot\31_Windows_Journal\4998-31-504.dgn
Plotted 24/07/2014

3 - North West Elevation

4 - Rochester Place Elevation

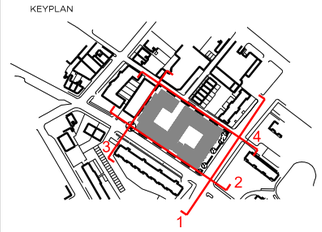
NOTES

GLASS ACOUSTIC PERFORMANCE

- G1
- G2
- G3
- G4

REV.	DATE	AMENDMENT
A	24/07/2014	Coordinated tender issue

KEYPLAN



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PROJECT
79 CAMDEN ROAD

SCALE@A1	DATE	ORIGINATOR	CHECKED	AUTHORISED
1:200	**09.07.2014**	**JM**	**TK**	**AS**

TITLE
WINDOWS

IDENTIFICATION NUMBER

STATUS
TENDER

DRAWING NO.
4998-31-505

REV.
A

Filename L:\Projects\4950_etc\4998\CAD\plot\31_Windows_Journal\4998-31-505.dgn
Plotted 24/07/2014

SECTION C-C

SECTION D-D

DO NOT SCALE FROM THIS DRAWING
The contractor shall check and verify all dimensions on site and report discrepancies in writing to Sheppard Robson before proceeding work.

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NOTES

GLASS ACOUSTIC PERFORMANCE

- G1
- G2
- G3
- G4

REV.	DATE	AMENDMENT
A	24/07/2014	Coordinated tender issue

KEYPLAN

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PROJECT
79 CAMDEN ROAD

SCALE@A1	DATE	ORIGINATOR	CHECKED	AUTHORISED
1:200	**09.07.2014**	**JM**	**TK**	**AS**

TITLE
WINDOWS

IDENTIFICATION NUMBER

STATUS
TENDER

DRAWING NO.
4998-31-506

REV.
A

Filename L:\Projects\4950_etc\4998\CAD\plot\31_Windows_Journal\4998-31-506.dgn
Plotted 24/07/2014

DO NOT SCALE FROM THIS DRAWING
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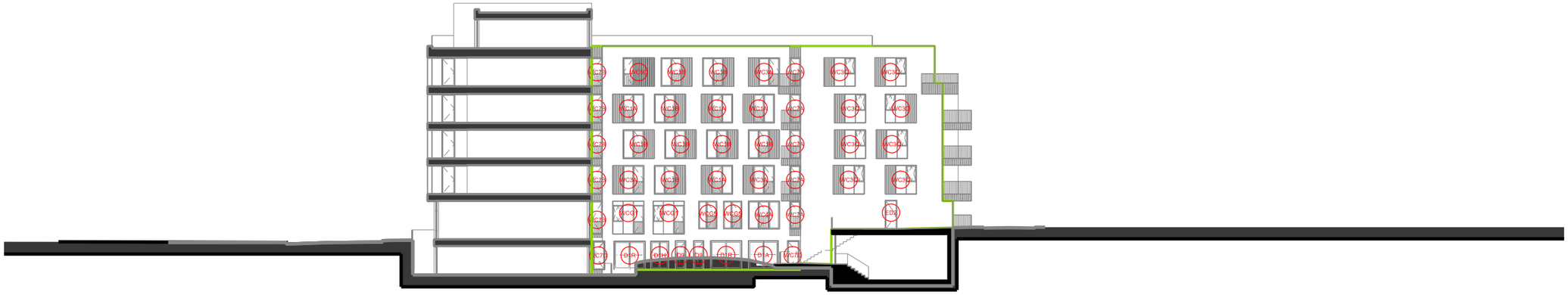
NOTES



SECTION H-H

GLASS ACOUSTIC PERFORMANCE

G1

G2

G3

G4

REV.	DATE	AMENDMENT
A	24/07/2014	Coordinated tender issue

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PROJECT
79 CAMDEN ROAD

SCALE@A1	DATE	ORIGINATOR	CHECKED	AUTHORISED
1 : 250	**09.07.2014**	**JM**	**TK**	**AS**

TITLE
WINDOWS

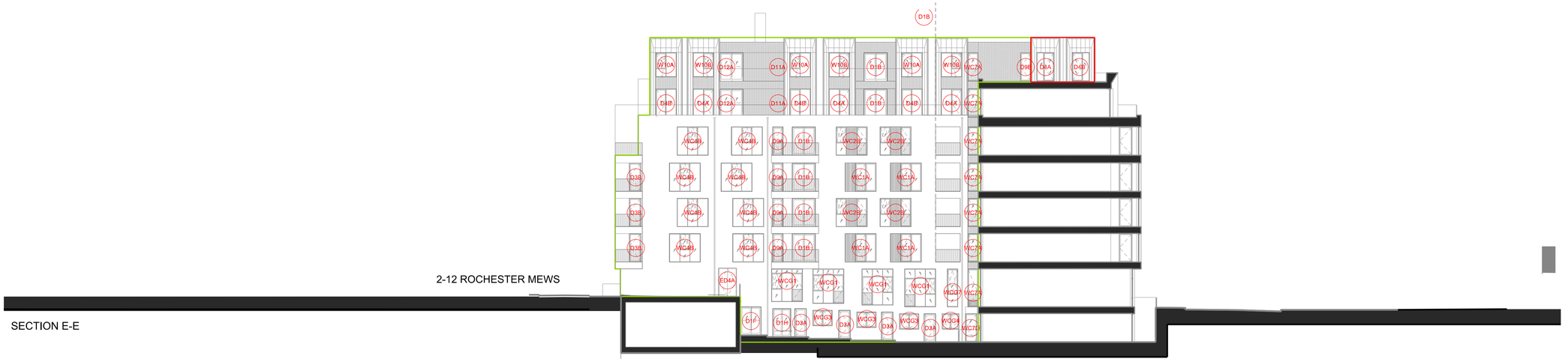
IDENTIFICATION NUMBER

STATUS
TENDER

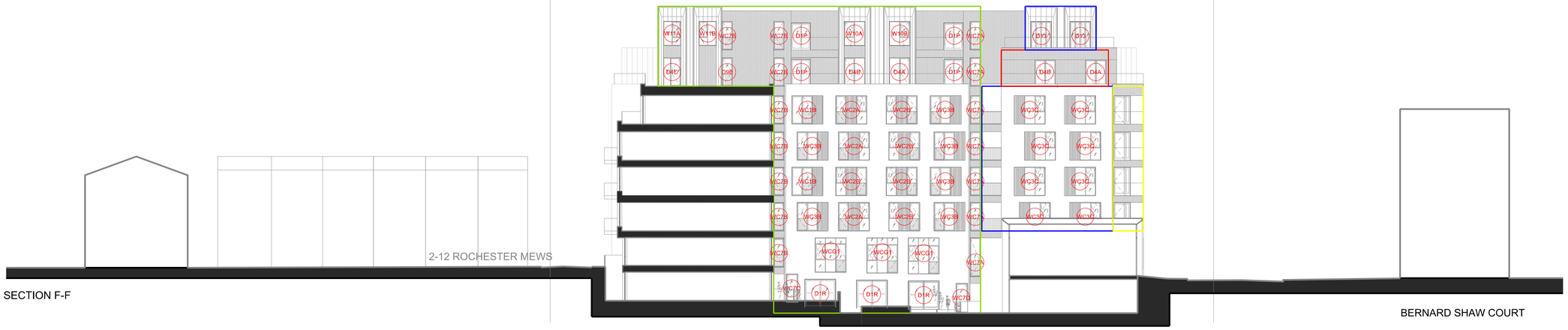
DRAWING NO.
4998 - 31 - 507

REV.
A

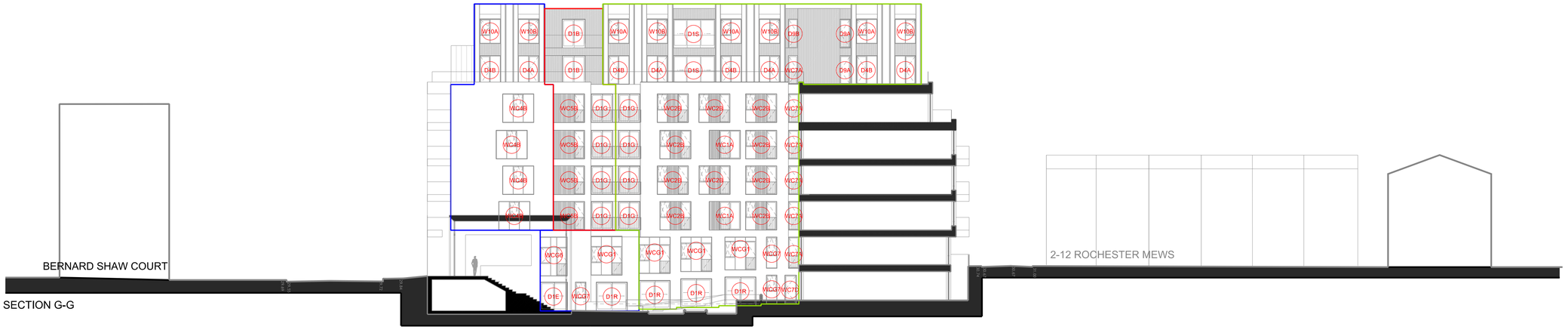
Filename:L:\Projects\4950_etc\4998\CAD\plot\31_Windows_Journal\4998-31-507.dgn
Plotted:24/07/2014



SECTION E-E



SECTION F-F



SECTION G-G

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NOTES

GLASS ACOUSTIC PERFORMANCE

- G1
- G2
- G3
- G4

REV.	DATE	AMENDMENT
A	24/07/2014	Coordinated tender issue

KEYPLAN

CLIENT

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PROJECT
79 CAMDEN ROAD

SCALE@A1	DATE	ORIGINATOR	CHECKED	AUTHORISED
1: 250	09.07.2014	JM	TK	AS

TITLE
WINDOW

IDENTIFICATION NUMBER

STATUS
TENDER

DRAWING NO.
4998 - 31 - 508

REV.
A

Filename:L:\Projects\4950_pt4\4998\CAD\plot\31_Windows_Louvres\4998-31-508.dgn
Plotted:24/07/2014

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A3

CLIENT

NOTES

TITLE
WINDOW SURROUND DETAIL

REV.	DATE	AMENDMENT
-	30.05.2014	STAGE D ISSUE
A	01.06.2014	updated to ideal combi comments
B	09.07.2014	updated for window tender
C	24.07.2014	Fin feature on window jamb reversed

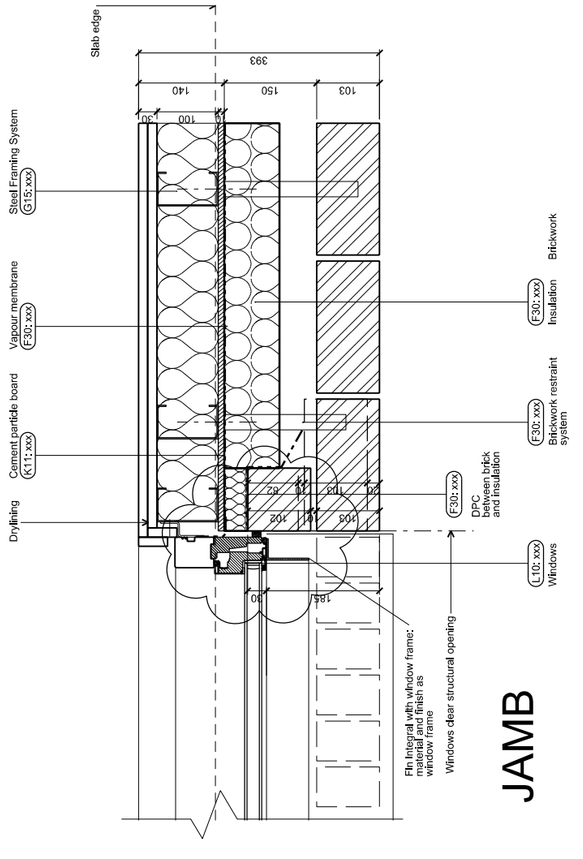
PROJECT
79 CAMDEN ROAD

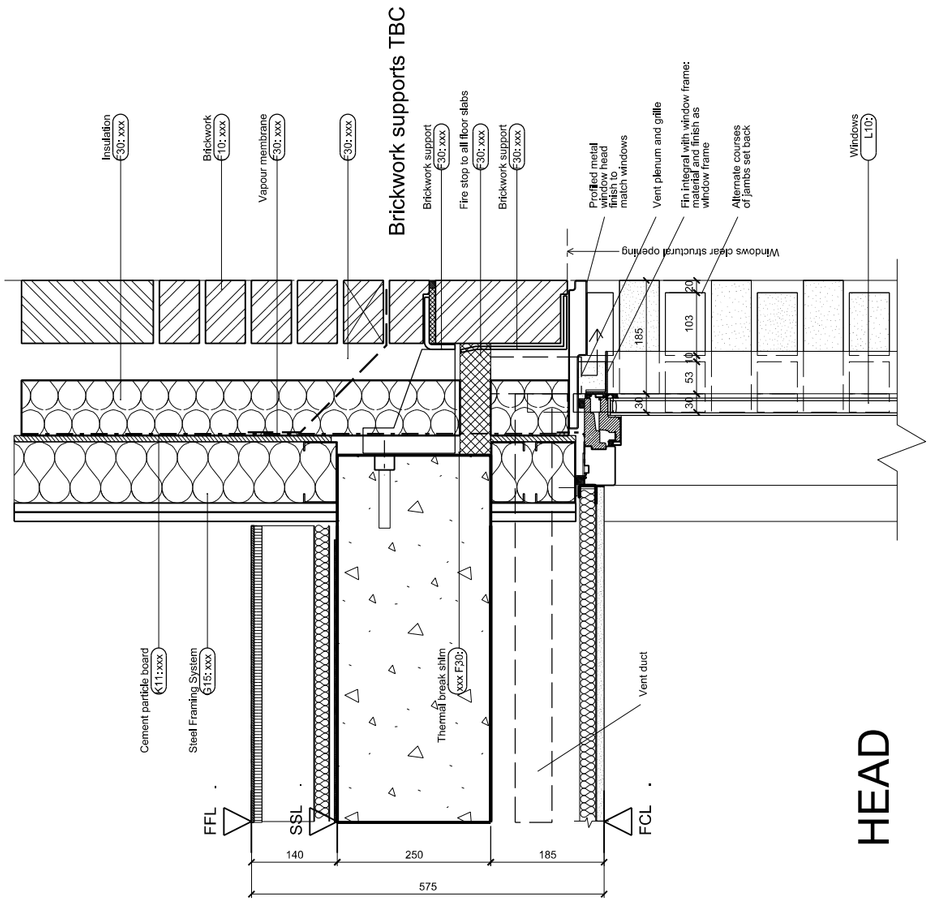
SCALE@A3	DATE	ORIGINATOR	CHECKED	AUTHORISED
1:10	**27.06.2014**	**KS**	**TC**	**AS**

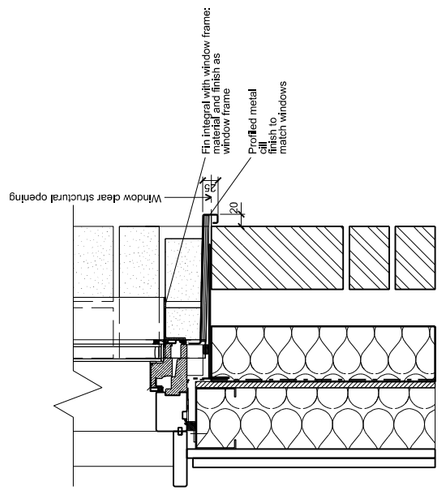
STATUS
TENDER

DRAWING NO.
4998-SK-231

REV.
C







Filename:L:\Projects\4950_etc\4998\CAD\plot\sk_Sketches\sk-231-window surround.dgn

Plotted:24/07/2014

H11 Curtain walling

To be read with Preliminaries/ General conditions.

SUB-CONTRACT PRELIMINARIES

TENDERING

10 INFORMATION TO BE PROVIDED WITH TENDER

- Submit the following curtain walling particulars:
  - Typical plan, section and elevation drawings at suitable scales.
  - Typical detailed drawings at large scales, including all head, base and corner junctions, including junctions with adjacent doffering works .
  - Technical information and certification demonstrating compliance with specification of proposed incorporated products and finishes, including acoustic perfromance as per Acoustic Consultant's requirements .
  - Certification, reports and calculations demonstrating compliance with specification of proposed curtain walling.
  - Proposals for connections to and support from the building structure and building components.
  - Proposals for amendments to primary supporting structure and for secondary supporting structure additional to that shown on preliminary design drawings.
  - Schedule of builder's work, special provisions and special attendance by others.
  - Examples of standard documentation from which project quality plan will be prepared.
  - Preliminary fabrication and installation method statements and programme.
  - 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.
  - Proposals for replacing damaged or failed products.
  - Areas of non-compliance with the specification.

11 CONTRACTOR'S DESIGNED PORTION

- The work specified in this Section is Contractor's Designed Portion work to be carried out by a Domestic Sub-Contractor listed in clause A30:650

20 THE SCOPE OF THE WORKS

- The Contractor is entirely responsible for the detailed design, manufacturing, fixing, jointing, and installation of the curtain walling system, flashings, cills and coordination with all adjacent works as shown on the drawings and specified in this work section, including all necessary or required accessories and ancillary work.
- Definition of Curtain Wall:
  - The NHBC require that multiple elements of an external facade shall be construed as one homogeneous curtain wall.
  - Individual elements specificed in different sections of the specification must be co-ordinated together and designed, built and tested as one element.
  - The Contractor must therefore laise with the manufacturers of other elements of the external wall which, together, make up the total weathertight facade.

  The Contractor is entirely responsible for the detailed design, manufacturing, fixing, jointing, and installation of the [windows] shown on the drawings and specified in this work section, including all necessary or required accessories and ancillary work.

  The design and installation responsibility for junctions between the wall elements must be agreed between the relevant sub-contractors and the said responsibilities confirmed to the Principal Contractor before work begins.
  - Elements include:
    - External Doors described in section L20: Doors/shutters/hatches
    - Windows as described in section L10:Windows/ Rooflights/ Screens/ Louvres.

25 GENERALLY

- 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.
- 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 inculding but not limited to, Technical Notes 61-69, dependant on applicabel scenario and locations.

30 TENDER/ CONTRACT DRAWINGS

- Drawings have been prepared as indicated on the relevant drawing issue sheets. 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

- Architect's drawings
  Structural Engineer's drawings and specifications
  Mechanical and Electrical Consultant's drawings amd specifications
  Acoustic Consultant's report
  Fire Consultant's report
  Fire Strategy drawings.

45 APPROVALS

- The Contractor shall provide, to the CA, all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Control Officer/Approved Inspector/District Surveyor/Fire Officer

46 APPROVALS

- The Contractor shall provide, to the CA, all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the CDM Co-ordinator and/or Health and Safety Officer.

50 ADDITIONAL INFORMATION TO BE SUBMITTED WITH TENDER

- In addition to the general technical information required under clause A30:521/A90:126, the Contractor is required to provide the submit the following curtain walling particulars:
  - Typical plan, section and elevation drawings at suitable scales.
  - Typical detailed drawings at large scales, including all head, base and corner junctions, including junctions with adjacent doffering works.
  - Technical information and certification demonstrating compliance with specification of proposed incorporated products and finishes, including acoustic perfromance as per Acoustic Consultant's requirements.
  - Certification, reports and calculations demonstrating compliance with specification of proposed curtain walling.
  - Proposals for connections to and support from the building structure and building components.
  - Proposals for amendments to primary supporting structure and for secondary supporting structure additional to that shown on preliminary design drawings.
  - Schedule of builder's work, special provisions and special attendance by others.
  - Examples of standard documentation from which project quality plan will be prepared.
  - Preliminary fabrication and installation method statements and programme.
  - Schedule of products and finishes with a design life expectancy less than that specified in clause 80, with proposals for frequencies and methods of replacement.
  - Proposals for replacing damaged or failed products.
  - Areas of non-compliance with the specification.
    - Compliance with the relevant parts of the current editions of:
    - Secured by Design: Section 2: Physical Security (Building Control & Code for Sustainable Homes)
    - Code for Sustainable Homes - Level 4
    - The National House Building Council Standards
    - Lifetime Homes Design Criteria

60 ACCURACY OF CONTRACT WORKS

- In addition to any more stringent requirements specified elsewhere, the Works shall be constructed to the degrees of accuracy specified in clause A33:312.
- 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 to the CA.
- 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 notify the CA and seek instructions before proceeding.

70 WARRANTY

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

71 WARRANTY

- 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

- The design life of the building, as defined in BS ISO 15686-1, is 60 years.
- The design life of the components, assemblies, and installations, as defined in BS ISO 15686-1 and specified in this Section, is 60 years.
- Provide, in the Building Manual specified in Section A37, 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

- Are required and shall comply with Section A37.

TYPES OF CURTAIN WALLING

111 CURTAIN WALLING to ENTRANCE AREA

- Supporting structure: Refer to Architect's draiwngs .
- Curtain walling system:
  - Manufacturer: Kawneer, or equivalent .
    Product reference: To be confirmed .
  - Type: Stick system, pressure equalized .
- Internal framing member:
  - Material: Aluminium .
  - Finish: Powder coating .
    Colour/ texture: To be confirmed .
    Minimum film thickness: Refer to Zection 31 .
- External cover cap:
  - Material: Aluminium .
  - Finish: Powder coating .
    Colour/ texture: To be confirmed .
    Minimum film thickness: Refer to Zection 31 .
- Glazing: Insulating glass units .
  - Inner pane: Thickness and composition of glazing to be confirmed with specialist glazing contractor to take account of requirements of Acousitc Consultant .
  - Outer pane: Thickness and composition of glazing to be confirmed with specialist glazing contractor to take account of requirements of Acousitc Consultant .
- Glazing system: Gaskets, cover plate fixed .
- Panel/ facing type: Not applicable .
  - External material: Not applicable .
  - External finish: Not applicable .
  - Internal material: Not applicable .
  - Internal finish: Not applicable .
  - Core insulation: Not applicable .
- Accessories: Perimeter flashings .
- Incorporated components: Doors, refer the H11/136 .
- Other requirements:
  - Maximum size of glazing panes shall be limited so as to fit in lift car .

136 DOORS

- Manufacturer: Kawneer, or equivalent .
  - Product reference: Specialist curtain walling contractor to propose system which is fully compatible with proposed curtain walling system. Refer to Architect's drawings for composition .
- Material: Aluminium .
- Finish: Powder coating .
  - Colour/ texture: To be confirmed .
  - Minimum film thickness: Refer to Section Z31 .
- Fixing: To be fully integrated into curtain walling system .
- Other requirements:
  Compliance with the relevant parts of the current editions of:
  - Secured by Design: Section 2: Physical Security (Building Control & Code for Sustainable Homes);
  - Code for Sustainable Homes - Level 4;
  - The National House Building Council Standards;
  - Lifetime Homes Design Criteria .

150 MATERIALS SPECIFICATION

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

GENERAL REQUIREMENTS/ PREPARATORY WORK

210 DESIGN

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

211 GENERAL INFORMATION RELEVANT TO THE DESIGN

- Structural information: As clause A31:481
- Fixings to structure: As clause A31:482
- Design environmental conditions: A31:483

215 DESIGN PROPOSALS

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

220 SPECIFICATION

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

226 INFORMATION TO BE PROVIDED WITH TENDER

Submit to the CA the following curtain walling particulars:

- Typical plan, section and elevation drawings at suitable scales.
- Typical detailed drawings at large scales.
- Technical information and certification demonstrating compliance with the specification of proposed incorporated products and finishes.
- Certification, reports and calculations demonstrating compliance with the specification of the proposed curtain walling.
- Proposals for connections to and support from the building structure and building components.
- Proposals for any amendments to primary supporting structure and for any secondary supporting structure additional to that shown on preliminary design drawings.
- Schedule of builder's work, special provisions and special attendance by others.
- Examples of standard documentation from which the project quality plan will be prepared.
- Preliminary fabrication and installation method statements and programme.
- Schedule of products and finishes with a design life expectancy less than that specified in clause H11:080, with proposals for frequencies and methods of replacement.
- Proposals for replacing damaged or failed products.
- Areas of non-compliance with the specification.

230 INFORMATION TO BE PROVIDED DURING DETAILED DESIGN STAGE

- Submit the following curtain walling particulars:
  - A schedule of detailed drawings and dates for submission for comment.
  - A schedule of loads that will be transmitted from the curtain walling to the structure.
  - Proposed fixing anchor details relevant to structural design and construction.
  - A detailed testing programme in compliance with the Main Contract master programme.
  - A detailed fabrication and installation programme in compliance with the Main Contract master programme.
  - Proposals to support outstanding applications for Building Regulation consents or relaxations.

232 QUALITY PLAN

- Requirement: Submit during detailed design.
- Content: In accordance with BS 5750, BS EN ISO 9001 and including the following:
  - Name of the quality manager.
  - Quality assessment procedures.
  - Inspection procedures to be adopted in checking the work.
  - Stages at which check lists will be used and samples of the lists.
  - List of work procedures on the correct use of materials or components, both off site and on site.
  - List of product information with latest revisions.
  - Subcontractors involved in the work.
  - Subcontractors' quality plans.
  - Storage, handling, transport and protection procedures.
  - Procedure for registering and reporting non compliances.
  - Maintenance procedures and calibration records.
  - Certification that completed work complies with specification.
  - 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

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

236 DETAILED DRAWINGS

Referred to in clause H11:235 to include, as a minimum:

- Setting-out and control points.
- Toleranced dimensions indicating both the location of components and the width of all joints.
- Identification of components.
- Details of isolation, packing, and shimming.
- The locations of all sealants, with details of position, type, and size of backing rods, bond-release tapes, and the like.
- Embedment, spacing and edge distances for fixings.
- The type, size, and spacing of all welds.

237 DETAILED CALCULATIONS

Referred to in clause H11:235 to include, as a minimum:

- Structural Calculations: For all sections, connections, anchorages, support assemblies and the like.
- Thermal Calculations: To support the claimed insulation values of all vision panels, spandrel panels, frame sections, and other insulated components.
- Condensation Prediction Calculations: To identify the probability of internal, external, or interstitial condensation forming and, where the calculations indicate that condensation is likely to occur, the quantative rate of formation together with an explanation as to how the proposed design eliminates any damage or inconvenience caused by the condensation so formed.
- Acoustic Calculations: To support the claimed acoustic values of vision panels, spandrel panels, frame sections, and other components.

238 PROJECT SPECIFIC METHOD STATEMENTS

Referred to in clause H11:235 to include, as a minimum:

- Manufacturer's recommendations for the use of proprietary fixings.
- Information on all bolts and fixings requiring specific torques together with details of the required torque levels.
- Information on the location and use of locking nuts and washers, engagement of serrations, and the like.
- Information for glazing procedures, including the position of setting blocks, orientation of glass, and any specific requirements of the glazing supplier.
- Information on the cleaning and, if required, priming procedures for all sealants.
- Details of points which are susceptible to damage, or which should not be loaded during installation.

240 INFORMATION TO BE PROVIDED BEFORE COMMENCEMENT OF STRUCTURAL SEALANT GLAZING

- Submit structural bonding sealant manufacturer's project specific approval for:
  - Compatibility and adhesion of products and finishes.
  - Full details of structural sealant glazing design.
  - Structural sealant dimensions.
  - Project specific sealant application method statement.

250 PRODUCT SAMPLES

- General: Before commencing detailed design, submit labelled samples of:
  - each proposed material;
  - each proposed finish;
  - each proposed component .

260 SAMPLES OF FIXINGS

- 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.

270 FABRICATION SAMPLES

- General: During detailed design, submit samples of:
  - A minimum 1 sq.m. cruciform sample of each curtain wall/window system incorporating a standard mullion and transom.
  - Glass samples min. 600x 600mm samples of each glass type proposed incorporating correctly all proposed components including edge seals, spacer bars, coatings, laminations, thicknesses and manufacturers label etc.
  - Panel samples min. 600x 600mm samples of each panel type proposed incorporating correctly all proposed components including fixings, coatings, supports and backings etc. They shall be representative all of interfaces with other cladding items. Relevant sub-contractors to liaise.
  - Samples of all proposed gaskets including corner joints . .
  - Obtain approval of appearance before proceeding.

280 MOCK-UP

- General: Construct during detailed design work in an approved location. Obtain approval of appearance before proceeding. Retain undisturbed until completion of curtain walling installation.
- Extent: To be confirmed .
- Purpose: To serve as an installation reference panel .

291 MAINTENANCE

- Prepare a maintenance manual in accordance with the CWCT 'Guide to good practice for facades', clause 10.2.
- Comply with Section A37 .

DESIGN/ PERFORMANCE REQUIREMENTS

305 CWCT 'STANDARD FOR SYSTEMISED BUILDING ENVELOPES'

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

313 INTEGRITY

- Requirement: The curtain walling must resist wind loads, dead loads and design live loads, and accommodate deflections and movements without damage.
- Design wind pressure: Calculate in accordance with BS 6399-2.
- Hard body impact loads: To BS 8200:
  - Location and category: To be confirmed by curtain walling sub-contractor..
- Soft body impact loads - curtain walling to BS EN 14019:
  - Location and classification: To be confirmed by curtain walling sub-contractor..
- Soft body impact loads - glass to BS EN 12600:
  - Location and classification: To be confirmed by curtain walling sub-contractor..
- Permanent imposed loads: To be confirmed by curtain walling sub-contractor..
- Temporary imposed loads: To be confirmed by curtain walling sub-contractor..

320 DEFLECTION UNDER DEAD LOADS

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

325 DEFLECTION UNDER WIND LOAD

- Requirement: To CWCT 'Standard for systemised building envelopes' clause 3.5 2 and the following additional requirements: None.
- Additional stiffness to CWCT 'Standard for systemised building envelopes' clause 3.5 4.2: Not allowed .

326 IMPACT LOADS

In addition to the general requirements of the CWCT Standard, clauses 2.3.3 and 2.3.4, the curtain walling must accommodate anticipated impact loads as follows:

- Occasional loads resulting from facade access equipment and the like. The loads shall be taken as equivalent to the load applied by the test method described in BS EN 12600, with a drop height of 1219mm.
- Other impact loads: None

331 GENERAL MOVEMENT

Requirements: Curtain walling must accommodate anticipated building movements as described in clause A31:481

333 APPEARANCE AND FIT

- Requirement: Design curtain walling system:
  - To ensure position and alignment of all parts and features as shown on preliminary design drawings.
  - To accommodate deviations in the primary support structure.
- Primary support structure: Before commencing installation of curtain walling system, carry out survey sufficient to verify that required accuracy of erection can be achieved.
  - Give notice: If the structure will not allow the required accuracy or security of erection.
  - Design tolerances: As Preliminaries Section A33.
- Maximum permitted component and installation tolerances:
  - Panel length ±2 mm;
  - Panel width ±1 mm;
  - Panel tolerance ±2 mm, installation tolerance ±2 mm, overall = ±4 mm.

335 THERMAL MOVEMENT - SERVICE TEMPERATURE RANGES

- Requirement: To CWCT 'Standard for systemised building envelopes' clause 2.7.2 amended and/ or with the addition of the following: to be confirmed by Mechanical and Electrical Consultant.

340 AIR PERMEABILITY

- Requirement: Permissible air leakage rates of 1.5m³/hr/m² for fixed lights and 2.0 m³/hr/lin.m for opening lights must not be exceeded when the curtain walling is subjected to the peak test pressure.
- Permeability class to BS EN 12152: A4.
  - Peak test pressure: 600 Pa.

345 AIR PERMEABILITY EXFILTRATION

- Requirement: The maximum permissible air exfiltration rate through the curtain walling system must not exceed: To be confirmed.

350 WATER PENETRATION
- Watertightness class to BS EN 12154: R7.
  - Peak test pressure: 600 Pa.
- Additional requirements: Underside of any transom not to be wetted at peak test pressure.

370 THERMAL PROPERTIES
- Method of calculating the thermal transmittance (U-value) of curtain walling/ each zone of curtain walling: Weighted U-value.
- Average U-value of curtain walling: 1.4 W/m²K.
- Curtain wall zone interfaces: Co-ordinate to achieve required average U-value.
- Method for assessing thermal transmittance (U-value) of assemblies: Hot box in accordance with BS EN ISO 8990.

376 CALCULATING THERMAL PROPERTIES
- Requirement: Determine the U-value of the curtain walling using appropriate calculation or measurement methods.
  Clearly identify the following:
  - The coldest surface temperature on the warm-side of each component together with sufficient other surface temperatures to characterise the temperature distribution over the surface.
  - The method for assessing the heat transfer for each component.
  - The method for assessing the interactions between components.
  - The basis for defining the projected area of each component.
  - The method for assessing the overall performance of the curtain walling.

385 THERMAL STRESS IN GLAZING
- Glass panes/ units: Must have adequate resistance to thermal stress generated by orientation, shading, solar control and construction.

391 AVOIDANCE OF CONDENSATION
- 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
- 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.

410 SOUND TRANSMITTANCE
- Minimum weighted sound reduction index (Rw) to BS EN ISO 717-1:
  - Between internal and external surfaces of curtain walling: Refer to recommendations of Acousitc Consultant as per report.
- Minimum weighted standardized level difference (DnTw) to BS EN ISO 717-1:
  - Between adjacent floors abutting curtain walling: Refer to recommendations of Acousitc Consultant as per report.
  - Between adjacent rooms on same floor abutting curtain walling: Refer to recommendations of Acousitc Consultant as per report.

420 FIRE RESISTANCE OF CURTAIN WALLING
- Standard: To BS 476-22.
  - Minimum periods and criteria: Refer to Fire Consultant's report .

425 INTERNAL SURFACE SPREAD OF FLAME OF CURTAIN WALLING
- Standard: To BS 476-7.
  - Class 0.

430 FIRE STOPPING
- Locations: At junctions of curtain walling with compartment walls and floors.
- Materials and methods of fixing: To ensure fire resistance not less than that specified for compartment walls and floors.

438 OPENING LIGHTS
- Requirement: Comply with CWCT Standard, Part 4, clause 4.2:
  - Fasteners: Concealed multipoint operated by an internal handle.
  - Integral locks: Within the internal handles and all operated by the same key.
  - Handles generally: Finished and colour-matched to the frame on which they are installed.
  - Handles operating smoke vents, and opening lights intended as smoke vents: Colour-highlighted, not colour-matched, to the approval of the CA.

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

BREEAM PERFORMANCE REQUIREMENTS

480 VIEW OUT
- Glazed areas/ opening sizes and position: Designed to meet BREEAM 'View out' criteria for relevant building type.
- Submit design plan and elevation drawings showing the following:
  - All BREEAM defined 'relevant areas' dependant on building type and room depths.
  - Actual or notional workstation/ desk layouts.
  - Glazed areas/ open areas.
- Submit site plan showing: Building location and proximity to external obstructions.

TESTING

501 TESTING GENERALLY
- 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 H11:515. Confirm with submission which method is used.

511 COMPARISON (TYPE) TESTING
- Requirement: To CWCT 'Standard for systemised building envelopes', Part 8.
- Test results and reports: Before commencement of curtain walling fabrication and installation, submit proof of compliance with this specification.
- Compliance:
  - The test sequence shall be not less than the requirements of clause H11:550.
  - CWCT Standard, Part 1, clause 1.5.5 shall apply and the CA's decision on the acceptability of previous test results shall be final.

520 PROJECT TESTING (SITE)
- Test results and reports: Before installation of general areas of curtain walling, submit proof of compliance with this specification.

531 TESTING AUTHORITY

- Requirement: Project testing must be carried out by either:
  - a United Kingdom Accreditation Service (UKAS) approved independent laboratory, or
  - the curtain walling manufacturer/contractor and witnessed/certified by the CA or a nominated representative.

541 AIR PERMEABILITY LEAKAGE TEST

- Test chamber requirements.
  - Calibrate not more than two weeks before commencing the installation of the test specimen.
  - Calculate the maximum allowable air leakage through the whole specimen, with opening lights unsealed, and agreed with the CA prior to calibrating the test chamber.
  - 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

- Requirement: To CWCT 'Standard for systemised building envelopes', Standard sequence A, clause 8.12.1 and as follows:
- Air permeability (infiltration): To CWCT clause 8.6
  - Peak test pressure: As clause H11:341.
  - Test conditions: Calm wind. Standard temperature, pressure and humidity.
  - Regions of concentrated air leakage: Identify by smoke.
- Air permeability (exfiltration): To CWCT clause 8.6
  - Peak test pressure: To CWCT clause 8.6
  - Allowable exfiltration rates: As clause H11:345
  - Regions of concentrated air leakage: Identify by smoke.
- Water penetration resistance - static: To CWCT clause 8.7.1
  - Peak pressure: As specified in clause H11:351.
- Wind resistance - serviceability: To CWCT clause 8.8
  - Peak pressure: Equal to design wind pressure specified in clause 350
  - Position of displacement measuring devices: To be confirmed with curtain walling specilaist
  - Allowable elastic and residual deformation: To be confirmed with curtain walling specilaist
  - Glazed units: All edges to be supported.
- Air permeability (Infiltration): Repeat as above
- Air permeability (Exfiltration): Repeat as above
- Water penetration resistance - static: Repeat as above.
- Hose test: To CWCT clause 8.16.2
  - Joints to be tested: All joints in the test specimen.
- Wind resistance - safety: To CWCT clause 8.8
  - Peak pressure: Equal to 1.5 times design wind pressure specified in clause 313
  - Position of displacement measuring devices: To be confirmed with curtain walling specilaist
  - Allowable residual deformation: None
- Impact – safety: To CWCT clause 8.10
  - Location, sequence and number of impacts to be applied: To be confirmed with curtain walling specilaist
  - Type of soft body impactor: Loaded canvas spherical/conical bag as described in CWCT 'Standard test methods for building envelopes' clause 15.4.1
  - Energy of soft body impactor (E): To be confirmed with curtain walling specilaist
  - Required hard body impact load category: As clause 313
  - Required soft body impact classification: As clause 313
  - Dismantle, inspect and record.

636 WATERTIGHTNESS - SITE HOSE TEST

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

655 WIND LOAD FATIGUE TEST, SMALL SPECIMEN

- Requirement: To CWCT 'Standard for systemised building envelopes', 'Standard test methods for building envelopes' Section 14.
  - Test sequence: As CWCT 'Standard for systemised building envelopes' Table 8.1.

PRODUCTS

710 ALUMINIUM ALLOY FRAMING SECTIONS

- Standard: To relevant parts of BS EN 515, BS EN 573, BS EN 755 and BS EN 12020.
- Alloy, temper and thickness: Suitable for the application and specified finish.
- Structural members: To BS 8118.

713 ALUMINIUM ALLOY SHEET

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

714 ALUMINIUM ALLOY CASTINGS

- Standards: To BS EN 1559-4.

730 MECHANICAL FIXINGS

- Stainless steel: To BS EN ISO 3506, grade A2 generally, grade A4 when used in severely corrosive environments.
- Carbon steel: To BS 4190 and suitable for galvanizing or other protective coating.
- Aluminium brackets, rivets and shear pins: To relevant parts of BS EN 755.

732 ADHESIVES

- General: Not degradable by moisture or water vapour.

735 FIXING ANCHORS

- Type and use: Reviewed and approved by fixing manufacturers. Submit confirmatory information on request.
- Dimensions: Not less than recommended by their manufacturers.
- Adjustment capability: Sufficient in three dimensions to accommodate building structure and curtain walling fabrication/ installation tolerances.

736 FIXINGS GENERALLY

- Requirements: Comply with
  - Section 2 of Approved Document A of the Building Regulations, 2004 Edition, and any subsequent amendments thereto.
  - Preliminaries clause A31:482
  - Section Z20, unless specified otherwise in this section.
- Materials: As clause H11:730.
- Dimensions: Not less than recommended by their manufacturers.
- Adjustment capability: Sufficient in three dimensions to accommodate building structure and curtain walling fabrication/installation tolerances.
- Differential movement between structure and cladding: Transfer loads without causing undue stress to either element.

737 GLASS GENERALLY

- Standards: To BS 952 and relevant parts of:
  - BS EN 572 for basic soda lime silicate glass.
  - BS EN 1096 for coated glass.
  - BS EN 1748 for borosilicate glass.
  - BS EN 1863 for heat strengthened soda lime silicate glass.
  - BS EN 12150 for thermally toughened soda lime silicate glass.
  - BS EN 13024 for thermally toughened borosilicate glass.
  - BS EN ISO 12543 for laminated glass.
- Glass quality: Clean and free from obvious scratches, bubbles, cracks, ripplings, dimples and other defects.
- Glass edges: Generally undamaged. Shells and chips not more than 2 mm deep and extending not more than 5 mm across the surface are acceptable if ground out.

738 GLASS GENERALLY

- Standards: Toughened and laminated glasses to BS EN 12600, unless specified otherwise.
  - Processes: Toughening, laminating, and coating processes to be carried out by the glass manufacturer unless agreed otherwise by the CA.
  - Manifestation markings: Provide in all locations in accordance with the Building Regulations. Agree the form of the markings with the CA prior to installation.

739 DIMENSIONAL TOLERANCES ON GLASS

- Measurement of tolerances: Before any thermal toughening/ heat strengthening.
- Pane dimensions less than 1500 mm:
  - For 3 to 6 mm thick glass: ± 1.0 mm.
  - For 8 to 12 mm thick glass: ± 1.5 mm.
  - For 15 mm thick glass: ± 2.0 mm.
  - For 19 mm and 25 mm thick glass: ± 2.5 mm.
- Pane dimensions more than 1500 mm:
  - For 3 to 6 mm thick glass: ± 1.5 mm.
  - For 8 to 12 mm thick glass: ± 2.0 mm.
  - For 15 mm thick glass: ± 2.5 mm.
  - For 19 mm and 25 mm thick glass: ± 3.0 mm.
- Pane squareness: Not more than 4 mm difference in diagonal measurements.

741 DISTORTIONAL TOLERANCES ON GLASS

- Measurement of tolerances: After any thermal toughening/ heat strengthening.
- Maximum bow: 0.2% of pane dimension.
- Maximum roller wave:
  - For 3 to 5 mm thick glass: 0.5 mm.
  - For 6 to 10 mm thick glass: 0.3 mm.
  - For 12 mm and thicker glass: 0.15 mm.
- Maximum edge dip:
  - For 3 to 5 mm thick glass: 0.8 mm.
  - For 6 to 10 mm thick glass: 0.5 mm.
  - For 12 mm and thicker glass: 0.25 mm.

743 HEAT SOAKING OF THERMALLY TOUGHENED GLASS

- Standard: BS EN 14179-1.

744 HEAT STRENGTHENED GLASS

- Requirement: A surface compressive stress in the range 25N/mm² to 50N/mm².

746 INSULATING GLASS UNITS

- Standard for double glazed units: To BS EN 1279, hermetically sealed (dual-seal) and Kitemark certified, or to an equivalent National Standard if applicable.
- Requirement: No visible distortion due to temperature or pressure differentials between manufacturing conditions and operational conditions.
  - Colour of aluminium perimeter spacers: As clause H11/121.
  - Perimeter seals: Resistant to UV light degradation on any exposed edges. Compatible with any structural/ assembly/ weather sealants with which they come into contact.
  - Perimeter taping: Not permitted.
- Identification:
  - 'Kitemark' each pane with details of lamination, heat strengthening, toughening and heat soak testing regimes applied. The Kitemarks are to be legible on the lower right hand corner of each pane when viewed from inside the building.
  - Mark the date of manufacture of the units, unobtrusively but in a contrasting colour, on the aluminium perimeter spacers such that the information is legible in the lower right hand corner of the installed unit when viewed from inside the building.

750 INFILL PANELS/ FACINGS

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

761 GASKETS

- Material:
  - Noncellular rubber to BS 4255-1
  - Cellular rubber to ASTM-C509.
  - 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.
  - Durability: Resistant to oxidation, ozone and UV degradation.
  - Dimensions: Manufacture to a small, predetermined, oversize tolerance to ensure that, when installed, the lengths and corners are in slight compression.

770 GENERAL SEALANTS

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

781 THERMAL INSULATION

- Material:
  - Mineral fibre or mineral wool as defined in BS 3533:1981, in the form of bonded slabs complying with BS 3958:Part 5:1986, with thicknesses and densities to provide the thermal and acoustic performance specified.
  - Properties: Durable, rot and vermin proof and not degradable by moisture or water vapour.
  - Insulation materials exposed to the external environment: With a suitable textile-reinforced weathering membrane on the external face.
  - 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.

782 INSULATION SUSTAINABILITY CRITERIA

- All insulation, particularly wall, roof, floor, pipework and ductwork insulation, must be CFC, HFC and HCFC free, both in content and manufacture. All insulants should have an ODP of zero and GWP of less than 5. Where possible insulants are to have an A or A+ rating in BRE's The Green Guide to Specification.Insulation manufacturers to provide Chain of Custody, BES6001:2008 or EMS independent certification as required to comply with environmental rating system requirements.

786 VAPOUR CONTROL LAYERS

- Acceptable materials:
  - Aluminium alloy: Sheet as clause H11:713.
  - Mild steel: Hot-dip metal coated steel sheet as clause H11:718
  - Stainless steel: Sheet as clause H11:721.
  - Reinforced membranes: Foil, plastics or rubbers, protected both sides by rigid facings/linings, where protected internally by adjacent construction.
- Unacceptable materials:
  - Liquid-applied membranes.
- Location: Warm side of thermal insulation.
- Integrity: Continuous, free from gaps and sealed at joints.

791 THERMAL BREAKS

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

FINISHES

830 POWDER COATING

- Requirement: As section Z31.

FABRICATION AND INSTALLATION

901 ACCREDITATION OF INSTALLERS

- Operatives: Competent, trained, and holding current registration cards for the CWCT Registration and Certification Scheme for Window and Curtain Walling Installers, Part II.
- Registration cards: At least 100% 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.
- Custom curtain walling: Full Registration cards to be project-specific.

910 GENERALLY

- Electrolytic corrosion: Prevent. Submit proposed methods.
- Fixings: Concealed unless indicated on detailed drawings. Where exposed they must match material and finish of the products fixed.
- Fabrication: Machine cut and drill products in the workshop wherever possible.
- 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

- Requirements: In addition to Preliminaries clause A33:312:
  - Dimensions: Fabricate and install to the dimensions indicated on the drawings, subject to the permitted deviations specified in the CWCT Standard, clause 2.20.2.
  - Static joints between components: Fabricate and install to the permitted deviations specified in the CWCT Standard, clause 2.20.3.
  - Compliance: Measure dimensions using instruments with an accuracy complying with Preliminaries clause A33:311 . During erection, use instruments with an appropriate degree of accuracy for the operations being undertaken

912 METALWORK

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

916 GLAZING

- Requirement: Comply with the relevant parts of BS 6262, and the glass manufacturer's requirements, for:
  - the dimensions of edge cover and clearance.
  - positions and materials of distance pieces, setting blocks, and location blocks.
- Directional patterned/wired glass: Fix parallel to surround and align adjacent panes where seen together at close quarters.
- Heat-strengthened and thermally toughened glasses, and any such glasses in insulating glass units: Install such that roller waves are aligned horizontally in the completed installation.

917 FIXINGS/ ADHESIVES APPLICATION

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

920 SEALANT APPLICATION

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

930 ASSEMBLY

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

955 FIXING ANCHOR INSTALLATION

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

965 PRELIMINARY CURTAIN WALLING INSTALLATION

- Requirement: Complete an area for inspection and approval of appearance as follows: To be agreed .

970 CURTAIN WALLING INSTALLATION

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

975 WELDING

- In situ welding: Not permitted. .

980 INTERFACES

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

982 IRONMONGERY

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

L10 Windows/ Rooflights/ Screens/ Louvres

To be read with Preliminaries/ General conditions.

SUB-CONTRACT PRELIMINARIES

11 CONTRACTOR'S DESIGNED PORTION

- The work specified in this Section is Contractor's Designed Portion work to be carried out by a Domestic Sub-Contractor listed in clause A30:650.

20 THE SCOPE OF THE WORKS

- Definition of the works:
  - The NHBC require that multiple elements of an external facade shall be construed as one homogeneous element.
  - Individual elements specificed in different sections of the specification must be co-ordinated together and designed, built and tested as one element.
  - The Contractor must therefore laise with the manufacturers of other elements of the external wall which, together, make up the total weathertight facade.
- The Contractor is entirely responsible for the detailed design, manufacturing, fixing, jointing, and installation of the windows shown on the drawings and specified in this work section, including all necessary or required accessories and ancillary work.
- The design and installation responsibility for junctions between the wall elements must be agreed between the relevant sub-contractors and the said responsibilities confirmed to the Principal Contractor before work begins.
  - Elements include:
    - External Doors described in section L20: Doors/shutters/hatches
    - Curtain Walling as described in section H11: Curtain Walling.

25 GENERALLY

- 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.
- 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 inculding but not limited to, Technical Notes 61-69, dependant on applicabel scenario and locations.

30 TENDER/ CONTRACT DRAWINGS

- Drawings have been prepared as indicated on the relevant drawing issue sheets. 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

- The following:
  Architects drawings
  Structural Engineers' drawings and specifications
  Cladding sub-contractors' drawings and specifications
  Acousitc Consultant's report.

45 APPROVALS

- The Contractor shall provide, to the CA, all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Control Officer/Approved Inspector/District Surveyor/Fire Officer.

46 APPROVALS

- The Contractor shall provide, to the CA, all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the CDM Co-ordinator and/or Health and Safety Officer.

50 ADDITIONAL INFORMATION TO BE SUBMITTED WITH TENDER

- In addition to the general technical information required under clause A30:521, the Contractor is required to provide the following detailed information
  - Compliance with the relevant parts of the current editions of:
  - Secured by Design: Section 2: Physical Security (Building Control & Code for Sustainable Homes)
  - Code for Sustainable Homes - Level 4
  - The National House Building Council Standards
  - Lifetime Homes Design Criteria .

60 ACCURACY OF CONTRACT WORKS

- In addition to any more stringent requirements specified elsewhere, the Works shall be constructed to the degrees of accuracy specified in clause A33:312.
- 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 to the CA.
- 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 notify the CA and seek instructions before proceeding.

70 WARRANTY

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

71 WARRANTY

- 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

- The design life of the building, as defined in BS ISO 15686-1, is 60 years.
- The design life of the components, assemblies, and installations, as defined in BS ISO 15686-1 and specified in this Section, is 30 years.
- Provide, in the Building Manual specified in Section A37, 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

- Are required and shall comply with Section A37.

GENERAL

106 THERMAL MOVEMENT

- 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

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

115 TIMBER PROCUREMENT

- Timber (including timber for wood based products): Obtained from well managed forests and/ or plantations in accordance with:
  - The laws governing forest management in the producer country or countries.
  - International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
- Documentation: Provide either:
  - Documentary evidence (which has been or can be independently verified) regarding the provenance of all timber supplied.
  - Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood based products.

120 SITE DIMENSIONS

- Procedure: Before starting work on designated items take site dimensions, record on shop drawings and use to ensure accurate fabrication.
- Designated items:
  Composite windows.

140 CONTROL SAMPLES

- Procedure:
  - Finalise component details.
  - Fabricate one of each of the following designated items as part of the quantity required for the project.
  - Obtain approval of appearance and quality before proceeding with manufacturer of the remaining quantity.
- Designated items:
  Composite windows.

149 DAYLIGHT PERFORMANCE

- Daylight calculations: In accordance with BS 8206-2, CIBSE 'Lighting guide LG10' and BRE 'Site layout guide'.
- Requirements of HEA 1:
  - Code for Sustainable Homes: Living Room, Dining Room, Study, and any room used for home office to achieve a minimum of 1.5% Avg DF
  - Submit: Daylight performance schedule.
  - Calculations showing: Average daylight factor expressed as a percentage for each room/ area.

151 FABRICATION ACCURACY

- Permissible deviations:
  - Height and width: +/-2 mm.
  - Straightness of members measured in the plane of the component or at right angles:
    - Up to 1200 mm long: 3 mm.
    - Up to 2400 mm long: 5 mm.
  - Difference in length of diagonals when frame length plus height is:
    - Up to 1800 mm: 3 mm.
    - Over 1800 mm up to 3000 mm: 5 mm.
    - Over 3000 mm: 10 mm.

156 VIEW OUT

- Windows/ opening sizes and position: Design to meet Lifetime homes 'View out' criteria for relevant building type.
- Submit design plan and elevation drawings showing the following:
  - Window/ open areas.
- Submit site plan showing: Building location and proximity to external obstructions.

160 POTENTIAL FOR NATURAL VENTILATION

- Submit design plan and elevation drawings, and calculations confirming the following:
  - Evidence of compliance with Building Regulations Approved Docuemnt F;
  - A copy of the results from a software modelling tool recommended in CIBSE AM10 ;
  - Locations of openings;
  - Types of windows/ ventilators and total openable areas; and
  - Types and degree of user-controls.

PRODUCTS

401 COMPOSITE WINDOWS GENERALLY

- Manufacturer: IdealCombi A/S or equivalent.
  - Product reference: To be confirmed.
- Materials:
  - Exterior frame/ sash cladding: Aluminium/Polyurethane/Aluminium outward opening sashes and fixed lights.
    - Finish: PPC as section Z31 colour: RAL to be confirmed .
  - Interior frame/ sash section:
    - Redwood timber (Pinus species) from sustainable sources
    - Quality optimised finger jointed timber with 149mm o/a frame depth and 108mm x 149mm transomes and mullions .
    - Finish: 2 coat micro porous paint, from standard colour range; White, factory applied .
- Exposure category classification requirements:
  - To be indicated and to conform with: BS EN 12207 for air permeability. BS EN 12208 for water tightness
- Glazing details: Double glazed units to BS EN 1279. Thickness and composition of glazed units to be confirmed with specialist glazing contractor .
  - Black warm edge spacer bars
  - Safety glass to BS 6206 below 800mm from FFL & below 1500mm within 300mm of doors.
  - U Value: 1.4 W/m²K
  - Solar heat gain Gw: 0.6 (North-East and North-West facades); 0.4 (South-East and Sout-West facades)
  - Design Air permiability: 4m³/hm².
- Ironmongery/ Accessories: To include :
  - Folded aluminium sill pressings (by others or installers)
  - 18mm x 119mm factory fitted sill packers by IdealCombi
  - Opening handles to operate fully concealed multi-point locking safety bolt mechanism with night vent position.
  - Safety catch on all opening windows to limit the opening to approx. 100mm
  - Safety catch releasable to achieve full opening ventilation, open to any random angle, and held by the friction in the hinges.
  - Cills as clause L10:403
- Cleaning: Windows are fully reversible to permit cleaning from inside in accordance with cleaning & maintenance strategy
- Fixing: Screw fixing as clause L10:785 .
- Other requirements:
  - Profile to window units to be bespoke. Refer to drawings for details.
  - Units shall be fabricated with the folowing acoustic performance criteria in accordance with Acosutic Consultant's report:
    Panel Type G1: 43 Rw (dB)
    Panel Type G2: 38 Rw (dB)
    Panel Type G3: 36 Rw (dB)
    Panel Type G4: 33 Rw (dB)
    Refer to Architect's drawings for applicable locations.
  - Maximum size of glazing panes shall be limited so as to fit in lift car.
  - No trickle vents are to be provided. All means of ventilation to be provided by others. - Window system shall incorporate AOV's linked to Fire Alarm system in locations as per Architect's drawings and in accordance with Fire Counsultant's report.

403 PRESSED ALUMINIUM CILLS FOR WINDOWS

- Manufacturer: IdealCombi A/S or equivalent.
- Material:
  - Formed aluminium sheet.
  - Finish: Polyester powder coated. Also refer to Section Z31. RAL color to be confirmed.
- Requirements:
  - Cills for windows to be part of window construction. See clauses L10:401 & 402
  - Additional are cills to be manufactured for use in other locations and installed by others. (See drawings).
  - Anodising to be carried out by single coating company to ensure exact colour match with anodised panels.

461 ROOFLIGHTS

- Manufacturer: Vitral, or equivalent.
  - Product reference: To be confirmed.
- Type: Rectangular.
- Frame: Aluminium.
  - Finish: Powder coated.
  - Colour: To be confirmed.
- Kerb: Aluminium, fully insulated.
- Glazing details: To be confirmed with specialist glazing contractor to take account of required acoustic criteria.
- Other requirements:
  - Automatic opening upon fire alarm activation.
- Fixing:
  - System shall be fully integrated with adjacent roof build-up and shall in no way compromise building envelope.

462 ROOFLIGHT SYSTEM

- Manufacturer: Vitral UK Limited, or equivalent.
  - Product reference: Skyvision Flat, or equivalent.
- Supporting structure: Refer to Architect's drawings.
- Performance criteria:
  - Air permeability: 4m³/hm² (@50Pa).
  - Thermal performance: 1.4 W/m²K.
- Metalwork generally:
  - Material: Aluminium.
  - Finish: Powder coated.
  - Colour: To be confirmed.
  - Minimum film thickness: Refer to Section Z31.
- Pane material: To be confirmed with specialist glazing contractor to take account of required acoustic criteria.
- Accessories: None.
- Other requirements:
  - System shall be fully integrated with adjacent roof build-up and shall in no way compromise building envelope.

652 METAL LOUVRES
- Manufacturer: Colt International plc or equivalent.
  - Product reference: To be confirmed.
- Performance criteria:
  - Free area percentage: . To be confirmed with Mechanical and Electrical Consultant
  - Aerodynamic coefficient: Tested to BS EN 13030:2001: To be confirmed with Mechanical and Electrical Consultant.
  - Weathertightness (to BS EN 13030:2001): Class A2. up to 1m/s suction velocity.
- Physical characteristics:
  - Material: Folded aluminium.
  - Finish: PPC as section Z31. Colour: To be confirmed.
  - Colour/texture: To match window frames and panels.
  - Minimum film thickness: As section Z31.
  - Blade pitch and angle: To be confirmed.
  - Number of banks: To be confirmed.
- Fixing: Clip fixed to mullions @ 1250mm max centres.
- Services: Co-ordinate with Services Engineers specifications for ventilation ducts etc.
- Other requirements: Complete with:
  - Non flanged frame and cill
  - Mullions and half mullions
  - Saddles
  - Blanking panels where required, in accordance with Mechanical and Electrical Consultant's recommendations - Insect mesh, 3mm black HDPE mesh .

EXECUTION

701 FIXING GENERALLY
- General: Install components plumb, level, and aligned as indicated on drawings.
- 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.
- Fixings: Secure to prevent pulling away, deflection, distortion, or other movement during use.
- Loose trims, cills, thresholds, and the like: Fix in unjointed lengths between angles and ends of runs. Mitre angle joints.
- Clear-finished joinery: Screwed and pelleted unless specified otherwise.

710 PROTECTION OF COMPONENTS
- General: Do not deliver to site components that cannot be installed immediately or placed in clean, dry floored and covered storage.
- 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
- Maintain in protective wrappings until completion of contract.

730 PRIMING/ SEALING
- Wood surfaces inaccessible after installation: Prime or seal as specified before fixing components.

750 BUILDING IN
- General: Not permitted unless indicated on drawings.
  - Brace and protect components to prevent distortion and damage during construction of adjacent structure.

765 WINDOW INSTALLATION GENERALLY

- Installation: Into prepared openings.
- Gap between frame edge and surrounding construction:
  - Minimum: 9mm.
  - Maximum: 15mm.
- Distortion: Install windows without twist or diagonal racking.

766 LOCATION OF OPENABLE WINDOWS IN NATURALLY VENTILATED BUILDINGS

- Location: Over 10 m from sources of external pollution.

770 DAMP PROOF COURSES IN PREPARED OPENINGS

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

785 FIXING OF COMPOSITE FRAMES

- Standard: As section Z20.
- Fixings: Galvanised mild steel cramps or as otherwise recommended by the manufacturer.
- Position of fixings: When not pre-drilled or specified otherwise:
  - Not more than 150mm from each end of the jamb, adjacent to each hanging point of opening lights and,
  - At maximum 600mm centres.
- Fasteners:
  - Appropriate to surrounding structure
  - Type and material as recommended by window manufacturer.

811 SEALANT JOINTS

- Sealant:
  - Manufacturer: Adshead Ratcliffe Ltd or equivalent.
    Product reference: Arbo LM silicon, or equivalent.
  - Colour: To be confirmed.
  - Application: As section Z22 to prepared joints. Finish triangular fillets to a flat or slightly convex profile.
    - Brush joints clean and free from all dust etc.
    - Wipe the joint interface with an approved solvent wipe and allow to dry.
    - Insert foam backing strip or bond breaker tape to back of joint.
    - Joint size: 10mm to 15mm
    - Tool the joint with a smooth stick to leave a neat finish.
- External seal:
  - Manufacturer: Compriband or equivalent.
  - Product: Ilmod 600 tape
  - Colour: Anthracite/RAL 7030 Grey or Black
  - Installation:
    - Install windows into prepared opening, maintaining a 12mm +/- 4mm gap
    - Tape is to placed between the wooden frame and the window reveal.
    - For brick reveals, the joint needs to be flush to ensure a weather tight seal.

820 IRONMONGERY

- Fixing: Assemble and fix carefully and accurately using fasteners with matching finish supplied by ironmongery manufacturer. Do not damage ironmongery and adjacent surfaces.
- Checking/ Adjusting/ Lubricating: Carry out at Completion and ensure correct functioning.

L20 Doors/ shutters/ hatches

To be read with Preliminaries/ General conditions.

SUB-CONTRACT PRELIMINARIES

11 CONTRACTOR'S DESIGNED PORTION

- The work specified in this Section is Contractor's Designed Portion work to be carried out by a Domestic Sub-Contractor listed in clause A30:650.

20 THE SCOPE OF THE WORKS

- The Contractor is entirely responsible for the detailed design, manufacturing, fixing, jointing, and installation of the external doors shown on the drawings and specified in this work section, including all necessary or required accessories and ancillary work.
- The design and installation responsibility for junctions between the wall elements must be agreed between the relevant sub-contractors and the said responsibilities confirmed to the Principal Contractor before work begins.
  - Elements include:
    - Windows units described in section L10: Windows/rooflights/screens/louvres
    - Cladding panels described in section H11:Curtain Walling

25 GENERALLY

- 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.
- 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 inculding but not limited to, Technical Notes 61-69, dependant on applicabel scenario and locations.

30 TENDER/ CONTRACT DRAWINGS

- Drawings have been prepared as indicated on the relevant drawing issue sheets. 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

- Drawings and specifications prepared by:
  - Architect's drawings
  - Sub-contractors whose work abuts the elements described in this section
  - The Structural Engineers, where support is required from elements of structure - Acousitc Consultant's report .

45 APPROVALS

- The Contractor shall provide, to the CA, all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the Building Control Officer/Approved Inspector/District Surveyor/Fire Officer.

46 APPROVALS

- The Contractor shall provide, to the CA, all drawings, calculations, and other technical information as may be required to submit the Contractor's proposals to the CDM Co-ordinator and/or Health and Safety Officer.

50 ADDITIONAL INFORMATION TO BE SUBMITTED WITH TENDER

- In addition to the general technical information required under clause A30:521, the Contractor is required to provide the following detailed information:
  - Compliance with the relevant parts of the current editions of:
  - Secured by Design: Section 2: Physical Security (Building Control & Code for Sustainable Homes)
  - Code for Sustainable Homes - Level 4
  - The National House Building Council Standards
  - Lifetime Homes Design Criteria .

60 ACCURACY OF CONTRACT WORKS

- In addition to any more stringent requirements specified elsewhere, the Works shall be constructed to the degrees of accuracy specified in clause A33:312.
- 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 to the CA.
- 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 notify the CA and seek instructions before proceeding.

70 WARRANTY

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

71 WARRANTY

- 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

- The design life of the building, as defined in BS ISO 15686-1, is 60 years.
- The design life of the components, assemblies, and installations, as defined in BS ISO 15686-1 and specified in this Section, is 60 years.
- Provide, in the Building Manual specified in Section A37, 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

- Are required and shall comply with Section A37.

GENERAL

106 THERMAL MOVEMENT

- 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

- Certification: Provide independently certified evidence that all incorporated components comply with specified performance requirements.
  - Fire resistance and smoke control
  - Acoustic performance
  - Strength & Security

112 TIMBER PROCUREMENT

- Timber (including timber for wood-based products): Obtained from well-managed forests and/ or plantations in accordance with:
  - The laws governing forest management in the producer country or countries.
  - International agreements such as the Convention on International Trade in Endangered Species of wild fauna and flora (CITES).
- Documentation: Provide either:
  - Documentary evidence (which has been or can be independently verified) regarding the provenance of all timber supplied.
  - Evidence that suppliers have adopted and are implementing a formal environmental purchasing policy for timber and wood-based products.
- Certification scheme: Canadian Standards Association (CSA) and Forest Stewardship Council (FSA).
  - Other evidence: None.

115 FIRE RESISTING DOORS/ DOORSETS/ ASSEMBLIES

- Evidence of fire performance: Provide certified evidence, in the form of a product conformity certificate, directly relevant fire test report or engineering assessment, that each door/ doorset/ assembly supplied will comply with the specified requirements for fire resistance if tested to BS 476-22, BS EN 1634-1 or BS EN 1634-3. Such certification must cover door and frame materials, glass and glazing materials and their installation, essential and ancillary ironmongery, hinges and seals.

120 NON FIRE RESISTING DOORS/ DOORSETS/ ASSEMBLIES

- Provide certified evidence, in the form of a product conformity certificate or engineering assessment, that each door/ doorset/ assembly supplied will comply with the specified requirements to BS EN 14351 -1. Such certification must cover door and frame materials, glass and glazing materials and their installation, essential and ancillary ironmongery, hinges and seals.

126 IDENTIFICATION OF FIRE RESISTING DOORS

- Requirement: Fit all fire-resisting doors, on the hanging edge of the door, with a coloured dowel or other visible means of identification denoting the period of fire resistance and intumescent requirements.

131 SMOKE CONTROL

- Requirement: All doors identified as requiring smoke control to have an air leakage rate (for head and jambs only) not exceeding 3m3/m/hour when tested at 25Pa to BS 476:Section 31.1.

141 DOORSETS

- Requirement: Unless otherwise specified, door frame and door leaf (or leaves) to be factory-assembled, factory-finished, and delivered to site as a composite unit including hinges, latches, locks, and other non -projecting ironmongery.
- Alternative requirement: With the written permission of the CA, frames and leaves specified as doorsets may be delivered to site as door kits. Door frame and door leaf (or leaves) to be factory-assembled and factory-finished as a composite unit including hinges, latches, locks, and other non-projecting ironmongery prior to dismantling and delivery to site.

150 SITE DIMENSIONS

- Procedure: Before starting work on designated items take site dimensions, record on shop drawings and use to ensure accurate fabrication.
- Designated items:
  All doors and hatches .

180 SUSTAINABILITY CRITERIA

- Where possible the door system shall have an A rating in BRE's The Green Guide to Specification;
- Wood Panels including particleboard, fibreboard, MDF, OSB, Cement-bonded particleboard, plywood, solid wood panel and acoustic board to comply with BS EN 13986:2002. Formaldehyde E1 testing as required under BS EN 717-1:2004. Verify that regulated wood preservatives are absent and of minimum content.
- Decorative Paints and Varnishes to be compliant with BS EN 13300:2001 referred to the criteria of Decorative Paint Directive 2004/42/CE. VOC (organic solvent) content (testing to BS EN ISO 11890-2:2006) requirement for Phase 2. Fungal and algal resistant.
- All internal and external timber will be sustainably sourced, with FSC or other similar approved certification.
- All timber will come from a 'legal source' and is not on the CITES list of endangered species.
- Timber to be preservative treated, will be treated using environmentally friendly processes and will be selected in accordance with relevant current British Standards. All timber will be preservative treated off site by a suitably qualified company. Preservative treatment on site will be confined to cut ends only.
- All material suppliers must have EMS (ISO14001) certification for process (bricks, metals, glass, plastics, pre-cast concrete etc.), extraction (stone, aggregates, sand etc) and supply chain, and are supplied with an environmental product declaration, written in accordance with ISO 14025 standards.
- All material suppliers to provide Chain of Custody, BES6001:2008 or EMS independent certification as appropriate to the product and in line with environmental rating system requirements.

PRODUCTS

281 ALUMINIUM EXTERNAL DOORS GENERALLY

- Manufacturer: Schuco, or equivalent.
  - Product reference: Alu-Doors, or equivalent.
  - Supplier: IdealCombi A/S
- Door types:
  - Patio Doors: Sliding, or Hinged. Refer to Architect's drawings for applicable locations.
  - Entrance Doors to Other locations: Hinged
- Materials:
  - Exterior frame: Aluminium, thermally broken.
  - Finish as delivered: Polyester powder coated as section Z31. RAL: To be confirmed..
  - Interior frame: Aluminium with 122mm (or 149mm) overall depth of frame
  - Finish: Powder coated. Colour: To be confirmed.
- Glazing/ Infill details: Clear double glazing. Thickness and composition of glazing to be confirmed with specialist glazing contractor.
  - Manifestation: Required. Format and layout to be confirmed.
  - Beading: Manufacturers' standard.
- Ironmongery: To be confirmed from manufacurer's standard range, however provision shall be made for inclusion of the following:
  - 15mm low profile aluminium threshold
  - Anti finger trap hinges, painted.
- Exposure category classification: To comply with:
  - BS EN 12207 for air permeability
  - BS EN 12208 for water tightness
- Other requirements:
  - Secure by Design: Doors and ironmongery must comnply with clause L20:720
  - All Entrance doos shall be installed in full accordance with Access and Security Report.
  - Provision of doors shall maintain the required acousitc performance of the adjacent walls.

282 ALUMINIUM EXTERNAL DOORS DUPLEX FRONT DOORS

- Manufacturer: Schuco, or equivalent.
  - Product reference: Alu-Doors, or equivalent.
  - Supplier: IdealCombi A/S
- Door types: Hinged.
- Materials:
  - Exterior frame: Aluminium, thermally broken.
  - Finish as delivered: Polyester powder coated as section Z31. RAL: To be confirmed..
  - Interior frame: Aluminium with 122mm (or 149mm) overall depth of frame
  - Finish: Powder coated. Colour: To be confirmed.
- Glazing/ Infill details: Clear double glazing. Thickness and composition of glazing to be confirmed with specialist glazing contractor.
  - Beading: Manufacturers' standard.
- Ironmongery: To be confirmed from manufacturer's standard range, however provision shall be made for inculsion of the following:
  - Spy hole
  - Secure letterbox
  - Anti finger trap hinges, painted.
- Other requirements:
  - Secure by Design: Doors and ironmongery must comnply with clause L20:720
  - All Entrance doors shall be installed in full accordance with Access and Security Report..

486 STEEL DOORSETS TO BIN STORES and SUB-STATION

- Fire resistance rating:
  Bin Stores: 30 minutes
  Sub-station: Refer to Fire Strategy report.
- Sound insulation rating: None.
- Manufacturer: Prima Doors Ltd or equivalent.
  - Product reference: Steelguard Doors, or equivalent.
- Door leaf:
  - Materials: Mild steel sheet to BS 1449:Part 1 to the following minimum thicknesses:
  - Face sheet: 1.2mm. NOTE: Doors to Bin Stores shall incorporate decorative finish panel. Format to be confirmed.
  - Face sheet stiffeners: 1.0mm at 150mm centres.
  - Top and base channels: 1.6mm.
  - Hardware reinforcement: 2.5mm.
  - Finish as delivered: Factory-primed as BS 1245, Section 12, or DD24.
- Frames: To BS 1245.
  - Materials: Mild steel sheet to BS 1449:Part 1.
  - Junctions of jambs and head are to be: Welded/Rigidly jointed.
  - Adjustable fixing lugs: Are/Are not required.
  - Base ties: Are required.
  - Finish as delivered: Factory-primed as BS 1245, Section 12, or DD24.
- Metalwork workmanship: As Section Z11.
- Louvre details: Where required, louvres are to be:
  - Secureguard 1 by Prima Doors Ltd
  - Material: Galvanised steel
  - Air Flow: To be confirmed with Mechanical and Electrical Consultant.
  - Finish as delivered: Factory primed to match door
  - Complete with bird and insect mesh.
- Ironmongery: Refer to Door Schedule, Ironmongery Schedule, and Specification Section P21.
- Perimeter seals: Not required.
- Other requirements:
  - Rubber buffers: As BS 1245.
  - Earth-bonding tag: Provide in one top corner of frame.
  - Fixing: Frame lugs for securing to adjacent wall construction.

631 HATCHES AUTOMATIC OPENING VENTILATOR & ACCESS HATCH WITH RETRACTABLE LADDER

- Manufacturer: Bilco UK Ltd or equivalent .
  - Product reference: USS-50REM, or equivalent .
- Description:
  - Aluminium, single leaf, automatic smoke ventilator, hinged on long side.
- Size:
  - To achieve minimum 1.5m² clear area.
- Accessories:
  - 2 No 24V DC linear actuators to open the cover to the 'Fire Open Position' of 90°
  - Retractable ladder: Bilco type BL-Z-3
- Other requirements:
  - Installation as recommended by manufacturer
  - Co-ordinate with Services Engineers' drawings and specifications for electrical and fire alarm connections.
  - Secondary power supply shall be battery powered to Mechanical and Electrical Consultant's specification.

EXECUTION

701 FIXING GENERALLY

- General: Install components plumb, level, and aligned as indicated on drawings.
- 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.
- Fixings: Secure to prevent pulling away, deflection, distortion, or other movement during use.
- Loose trims, cills, thresholds, and the like: Fix in unjointed lengths between angles and ends of runs. Mitre angle joints.
- Clear-finished joinery: Screwed and pelleted unless specified otherwise.

710 PROTECTION OF COMPONENTS

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

716 PRE-FINISHED COMPONENTS

- Maintain in protective wrappings until completion of contract.

720 SECURE BY DESIGN GENERAL REQUIREMENTS

- All relevant doors must comply with SBD SECTION 2: PHYSICAL SECURITY (Building Control & Code for Sustainable Homes Issues).
- All doorsets must be successfully tested and certificated tBS PAS 24-1:1999. 'Doors of enhanced security' and PAS 23-1:1999 'General performance requirements for door assemblies'
- Locking systems must comply with SBD requirements
- Doorsets must be secured to the fabric of the building in accordance with the manufacturer's installation specifications and will not be recessed by more than 600mm
- Glazed panels, in or adjacent to doors have been glazed with laminated glass and are either part of the manufacturer's range of certificated doorsets or are certificated to BS 7950: 1997
- Door chains or limiters are to be fitted
- Door viewers or a secure viewing panel are to be fitted
- Letter plates or boxes must comply with sub clause 23.16 of the SBD New Homes document.
- Sliding patio doors will comply with the requirements of sub clauses 25.2 – 25.6 of the SBD New Homes document.

730 PRIMING/ SEALING

- Wood surfaces inaccessible after installation: Primed or sealed as specified before fixing components.

750 FIXING DOORSETS
- Timing: After associated rooms have been made weathertight and the work of wet trades is finished and dried out.

760 BUILDING IN
- General: Not permitted unless indicated on drawings.

770 DAMP PROOF COURSES ASSOCIATED WITH BUILT IN WOOD FRAMES
- Method of fixing: To backs of frames using galvanized clout nails.

780 DAMP PROOF COURSES IN PREPARED OPENINGS
- Location: Correctly positioned in relation to door frames. Do not displace during fixing operations.

790 FIXING OF WOOD FRAMES
- Spacing of fixings (frames not predrilled): Maximum 150 mm from ends of each jamb and at 600 mm maximum centres.

800 FIXING OF LOOSE THRESHOLDS
- Spacing of fixings: Maximum 150 mm from each end and at 600 mm maximum centres.

809 FIRE RESISTING/ SMOKE CONTROL DOORS/ DOORSETS/ ROLLER SHUTTERS/ CURTAINS
- Installation: By a firm currently registered under a third party accredited fire door installer scheme in accordance with instructions supplied with the product conformity certificate, test report or engineering assessment.

810 FIRE RESISTING/ SMOKE CONTROL DOORS/ DOORSETS/ ROLLER SHUTTERS/ CURTAINS
- Gaps between frames and supporting construction: Filled as necessary in accordance with requirements for certification and/ or door/ doorset manufacturer's instructions.

830 FIXING IRONMONGERY GENERALLY
- Fasteners: Supplied by ironmongery manufacturer.
  - Finish/ Corrosion resistance: To match ironmongery.
- Holes for components: No larger than required for satisfactory fit/ operation.
- Adjacent surfaces: Undamaged.
- Moving parts: Adjusted, lubricated and functioning correctly at completion.

840 FIXING IRONMONGERY TO FIRE RESISTING DOOR ASSEMBLIES
- General: All items fixed in accordance with door leaf manufacturer's recommendations ensuring that integrity of the assembly, as established by testing, is not compromised.
- Holes for through fixings and components: Accurately cut.
  - Clearances: Not more than 8 mm unless protected by intumescent paste or similar.
- Lock/ Latch cases for fire doors requiring $\geq$ 60 minutes integrity performance: Coated with intumescent paint or paste before installation.

850 LOCATION OF HINGES
- Primary hinges: Where not specified otherwise, positioned with centre lines 250 mm from top and bottom of door leaf.
- Third hinge: Where specified, positioned with centre line 250 mm below centre line of top hinge .
- Hinges for fire resisting doors: Positioned in accordance with door leaf manufacturer's recommendations.

860 INSTALLATION OF EMERGENCY EXIT DEVICES

- Standard: Unless specified otherwise, install panic bolts/ latches in accordance with BS EN 1125.

Sleek, modern and energy efficient

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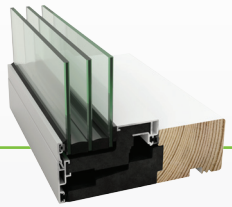
The window of the future

- offering ground-breaking U-values



A ground-breaking energy window

At Idealcombi we are very proud to have developed a new and innovative product series that meets the requirements of our customers with regard to quality, lifetime, environment, cost efficiency and modern design. Futura+ demonstrates that it is possible to think long term when developing windows and thereby ensure high energy standards for many years to come. The sash and frame are both designed with minimal maintenance powder-coated aluminium on the exterior, with the traditional heartwood for the interior.

Highly insulated construction

The Futura+ combines wood and aluminium with a core of polyurethane (PUR). PUR is an environmentally friendly, high insulating material which meets the strictest possible requirements with regards to longevity and strength. It is also a material with truly unique insulation properties, which are necessary to ensure the minimum transfer of energy between the interior and exterior sides of the frame/sash construction.

The slim profile of the Futura+ window maximises the glass area and therefore the amount of light available. The large glass area also allows extra warmth to enter the building and also ensures an elegant and modern appearance.

The security package

Idealcombi's solid and quality fittings make our windows and doors highly resistant to burglary. All windows and doors in the Futura+ series have our burglary resistant hardware as standard which includes heavy duty brackets, receivers and three point espagnolette locks to all our doors.

Learn more about the Futura+ series and its benefits by contacting us.

A QUICK SUMMARY

- Highly insulating
- Allows plenty of light
- Minimal maintenance
- Modern, smooth and sleek aluminium profile
- Choose between double and triple glazed
- 10 year guarantee

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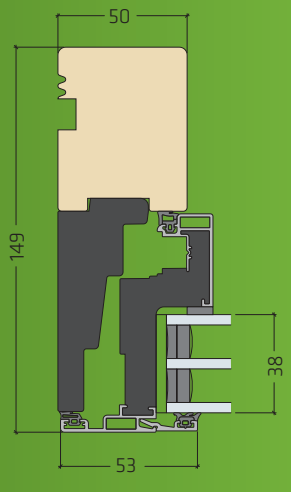

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Enhancing windows

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