

K00290 Greenheys Redevelopment

Willmott Dixon Construction Ltd

Quality Control Management Strategy and As Built Records

Façade

(SFS, Curtain Walling, Cladding and Cavity Barriers)

Rev 01 06/05/2026

WILLMOTT DIXON
SINCE 1852

1. Overview

This document has been produced to provide the necessary information to discharge the following planning condition:

136934/FO/2023 Erection of 7-storey building including a full plant level; comprising office and laboratory floorspace (Use Class E); associated cycle parking, hard and soft landscaping, access and servicing and other associated works (varied by permissions 138222/JO/2023 and 141721/JO/2024.)

Condition 3c Sample Panel

This Quality Control Management Strategy Document summarises the control measures which have been in place to manage the quality of the installation of the façade at Greenheys.

This document also includes examples of design specification, quality plans and as built quality records related to the design and installation of these elements of the building.

2. Façade Elements

The façade elements covered in this document include:

- SFS
- Curtain Walling
- Cladding
- Cavity Barriers

3. Supply Chain Partner Details

- The SFS has been installed by **RED Systems**
- The Curtain Walling has been installed by **Red Systems**
- The Cladding has been installed by **Longworth**
- The Cavity Barriers in the Curtain Walling System have been installed by **RED Systems**
- The living wall has been installed by **IWantPlants** who have been appointed directly by the Employer to complete the installation of the plant cassettes, plants and irrigation systems. The quality control information relating to the living wall installation is not included in this report

4. Pre-Commencement Requirements

Prior to the commencement of any works on site, the installing supply chain partner must provide the following information:

- **Supply chain Package Quality Plan**
    - This is a key document which must be developed prior to the package starting on site. It sets out the plan for the completion of the works, including specification and design information, scope of works and quality hold points which must be followed during the course of the

installation. Any safety critical fixings in line with the Willmott Dixon Fixings and Anchors policy will also be recorded withing the Supply Chain Package Quality Plan.

- **Quality Method Statement**
    - This document must be completed and issued for approval prior to the package starting on site. It sets out the agreed hold points which must be followed and recorded on the Quality Delivery checklists. The Quality Method Statement also covers competencies of operatives and supervisors, any applicable 3rd party certifications, quality risks, approvals required prior to the commencement of works, install methodology, inspection and test plan and any other package specific details relating to quality.

These documents must be submitted to and approved by the package manager from the Willmott Dixon project management team prior to the commencement of any related works.

Prior to the commencement of installation works on the building a full-sized sample panel/mock-up was erected adjacent to the site accommodation to BDP Architects design. This provided the opportunity to trial the details prior to commencing the installation of the façade components on the building.

Prior to the installation, arrangements were made with suppliers and third parties to inspect the installation and also to provide training to the operatives installing the systems via Toolbox talks and on-site training. Evidence of these inspections are included in the appended information.

5. Requirements During Installation

Prior to the commencement of the installation of any products on site, the installing Supply Chain Partner must prepare the relevant Quality Delivery Checklists which are recorded on Field View.

The QD Checklists must be updated by the installing supply chain partner throughout all stages of the construction of that element of the works. The QD Checklists must be signed off by the supervisor from the Supply Chain Partner and the package manager from the Willmott Dixon Project Management Team.

6. Audit and Inspection

Willmott Dixon Construction Ltd have dedicated local and national Quality Teams. These teams coach and support Willmott Dixon employees and Supply Chain Partners in achieving a perfect product for our customers. They work to develop policies and initiatives to support installation and workmanship on products and installation.

During the construction of Greenheys, the project has been routinely inspected by the National Quality Team. These inspections are completed at key stages of work in order to ensure compliance with mandated policies and Willmott Dixon processes, providing a quality health check function to assist our project teams deliver a perfect product.

In addition, OFR Fire Consultants have been appointed on this project to inspect the façade throughout its installation. Details of these inspections are included in the Stage 5 Fire Strategy Report issued as part of the Regulation 38 submission.

7. Requirements Post Construction

Prior to acceptance of the completed installation the Quality Delivery Checklist must be completed and signed off by the relevant person from the installing Supply Chain Partner and also the package manager from the Willmott Dixon Project Management team.

The completed QD Checklists for each element of works are saved on Fieldview.

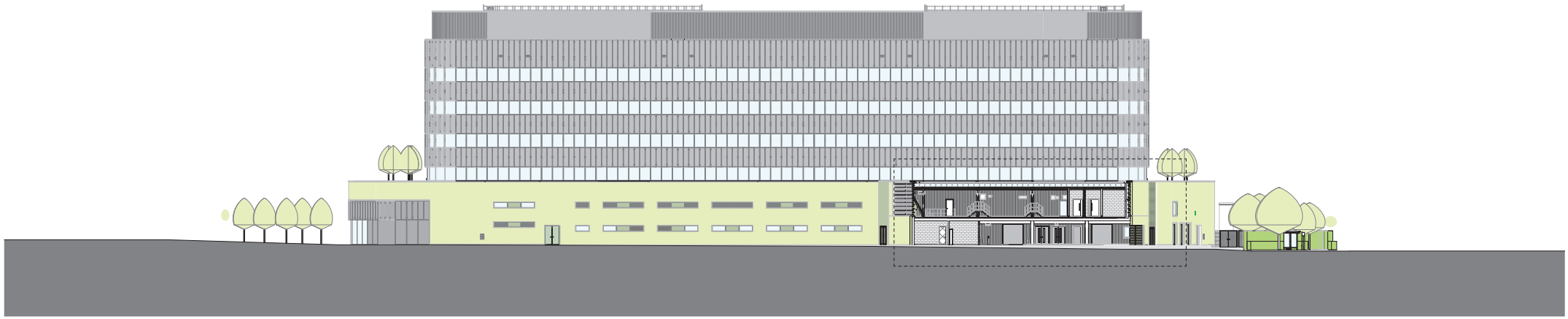
8. Evidence

Installation records and Quality Plans related to the Façade have been appended below.

9. Appended Information

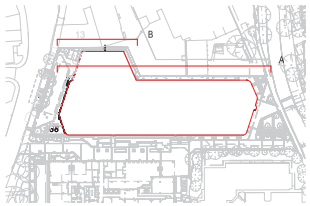
- BDP Architects Elevation Drawings
- BDP Architects Sample Panel Drawing
- RED Systems Curtain Wall Technical Submission
- Longworth Quality Plan
- Sample Panel QD Checklist
- Sample Panel Wintech Site Visit Report
- RED Systems Fixings Test Report
- RED Systems Obex Site Visit Report
- RED Systems Reynaers Site Visit Report
- RED Systems Curtain Walling Water Test Report
- Remagin SFS Toolbox Talk Records
- RED Systems Cavity Barrier QD Checklists
- Longworth Cladding QD Checklists
- RED Systems Curtain Walling QD Checklists
- RED Systems SFS QD Checklists

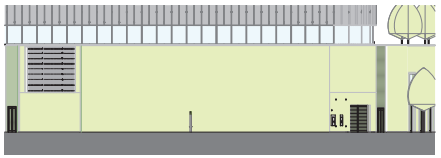
Final Construction Issue - This drawing records the final design information issued to the Contractor. Construction may have varied from the arrangements shown and tolerance zones may have been utilised during construction. Any dimensions must be checked on site.



North Elevation A

NOTE:
Elevation cutting through the service yard area





North Elevation B

0m 5m 10m 15m 20m 25m

VISUAL SCALE 1:250 @ A1

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ALL DIMENSIONS SHOULD BE CHECKED ON SITE. DO NOT SCALE FROM THIS DRAWING.

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DRAWING S SHALL BE READ IN CONJUNCTION WITH THE FOLLOWING BEFORE WORK COMMENCES:

- THE CDM DESIGN ISSUES REGISTER
- THE BDP RISK SERIES OF DRAWINGS
- THE PROJECT CDM RISK REGISTER

SUBJECT TO DESIGN DEVELOPMENT, SURVEY, CONSULTANT INPUT & STATUTORY APPROVAL.

NOTES

REVISION	DESCRIPTION	DRAWN	CHECKED	DATE
C01	Final construction issue	OM	PE	30.01.26
P15	General design updates	OM	PE	16.10.24
P14	NMA Issue - Curtain walling to Science Hub realligned. Doors omitted. Louvre replaced with ribbon window. Green wall type revised.	AA	PE	14.08.23
P13	Curtain walling to Science Hub realligned. Window added. Green wall type revised.	AA	PE	28.07.23
P12	General design updates	KK	GW	06.04.23
P11	General design updates	KK	GW	29.03.23
P10	General design updates	KK	PE	10.03.23

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PROJECT TITLE: MSP Greenheys (Private & Confidential)

BDP JOB NUMBER: P3001624

DRAWING TITLE: General arrangement - North Elevation

SCALE: As indicated @ A1

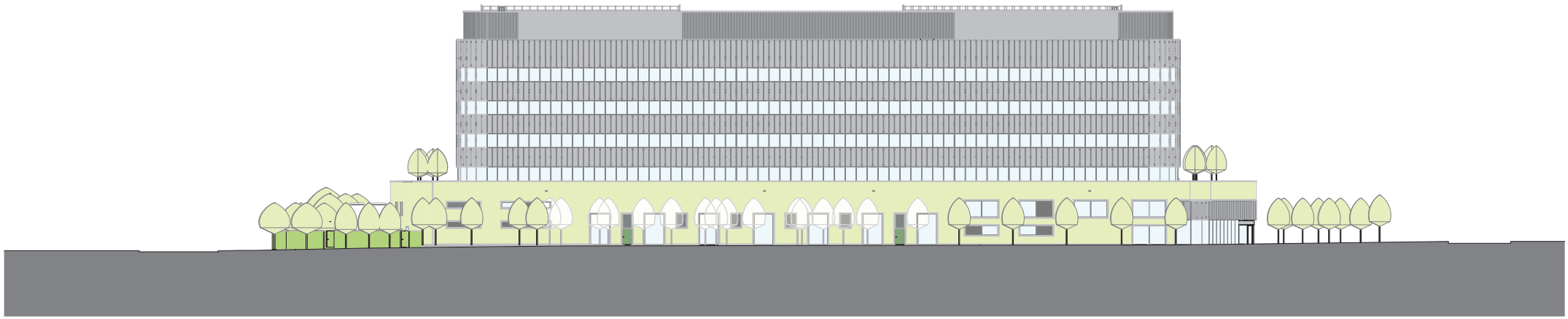
DATE FIRST ISSUED: Feb 22

DRAWING NO: GRE-BDP-ZZ-XX-DR-A-20100

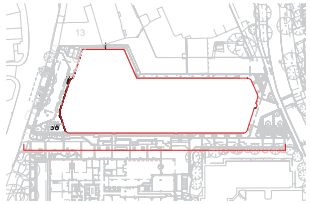
REVISION: C01

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South Elevation



0m 5m 10m 15m 20m 25m

VISUAL SCALE 1:250 @ A1

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C01	Final construction issue	OM	PE	30.01.26
P15	General design updates	OM	PE	16.10.24
P14	Elevation changes to align with Design Fire Report Rev 02 as indicated	OM	MH	23.10.23

REVISION	DESCRIPTION	DRAWN	CHECKED	DATE
P13	NMA Issue - Curtain walling to Science Hub realligned. Doors omitted. Louvre replaced with ribbon window. Green wall type revised.	AA	PE	14.08.23
P12	Curtain walling to Science Hub realligned. Window added. Green wall type revised.	AA	PE	28.07.23
P11	General design updates	KK	GW	06.04.23
P10	General design updates	KK	GW	29.03.23
P09	General design updates	KK	PE	10.03.23
P08	General design updates	KK	PE	24.02.23
P07	General design updates	KK	GW	30.01.23

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PROJECT TITLE: MSP Greenheys (Private & Confidential)

BDP JOB NUMBER: P3001624

DRAWING TITLE: General arrangement - South Elevation

SCALE: As indicated @ A1

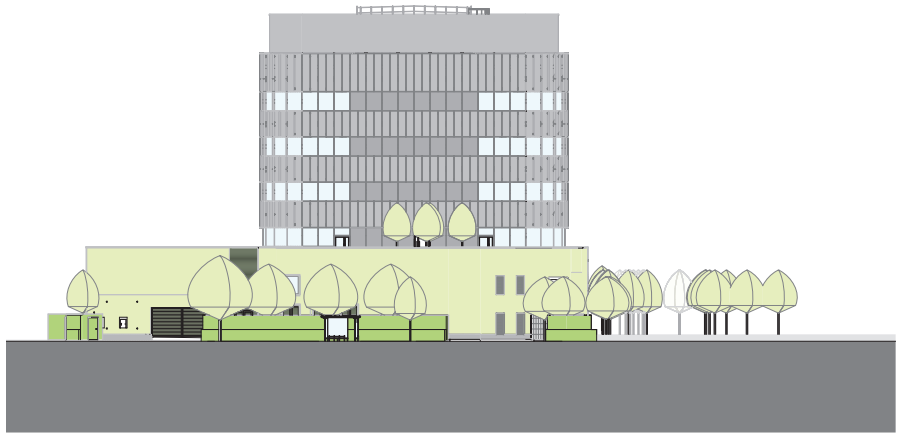
DATE FIRST ISSUED: Feb 22

DRAWING NO: GRE-BDP-ZZ-XX-DR-A-20101

REVISION: C01

Final Construction Issue - This drawing records the final design information issued to the Contractor. Construction may have varied from the arrangements shown and tolerance zones may have been utilised during construction. Any dimensions must be checked on site.

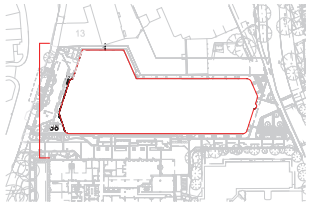
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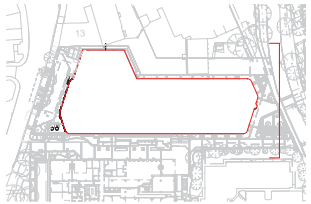


West Elevation



East Elevation





0m 5m 10m 15m 20m 25m

VISUAL SCALE 1:250 @ A1

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C01	Final construction issue	OM	PE	30.01.26
P13	NMA Issue - Curtain walling to Science Hub realigned. Doors omitted. Louvre replaced with ribbon window. Green wall type revised.	AA	PE	14.08.23
P12	Curtain walling to Science Hub realigned. Green wall type revised.	AA	PE	28.07.23
P11	General design updates	KK	GW	06.04.23
P10	General design updates	KK	GW	29.03.23
P09	General design updates	KK	PE	10.03.23
P08	General design updates	KK	PE	24.02.23
P07	General design updates	KK	GW	30.01.23
P06	General design updates	KK	GW	09.12.22
P05	General design updates	KK	GW	25.11.22
P04	General design updates	KK	GW	17.10.22
P03	General design updates	KK	GW	26.08.22
P02	General design updates	AM	GW	29.07.22
P01	First issue	KK	GW	18.07.22

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PROJECT TITLE: MSP Greenheys (Private & Confidential)

BDP JOB NUMBER: P3001624

DRAWING TITLE: General arrangement - West Elevation & East Elevation

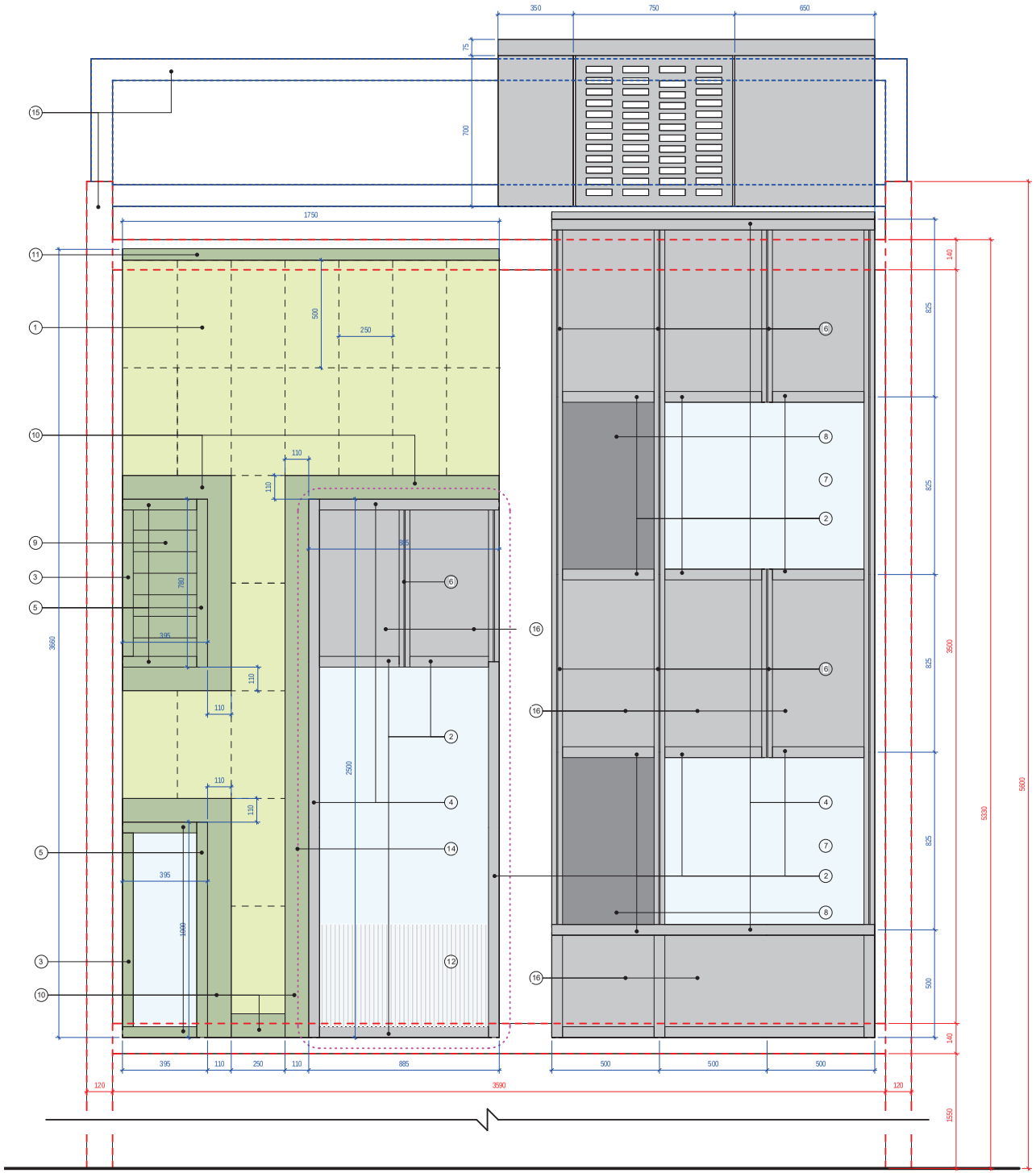
SCALE: As indicated @ A1

DATE FIRST ISSUED: Feb 22

DRAWING NO.: GRE-BDP-ZZ-XX-DR-A-20102

REVISION: C01

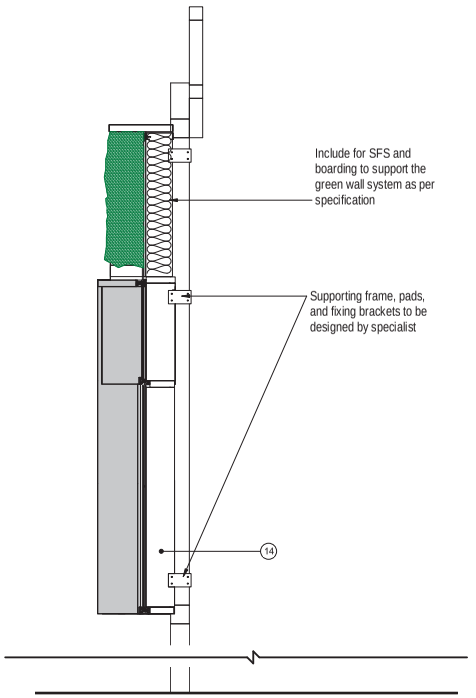
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1 Mock Up Elevation
1 : 10



2 Mock Up Elevation including planting
1 : 25



3 Mock Up Section
1 : 20

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SUBJECT TO DESIGN DEVELOPMENT, SURVEY, CONSULTANT INPUT & STATUTORY APPROVAL.

NOTES

Subject to design development, survey, consultant input & statutory approval.

MATERIAL KEY

1. Green Wall System, including fully planted trays; rain water good, irrigation pipework and Flashings / Trims
2. Anodised Aluminium Curtain Walling Standard Capped Mullion (Colour Dark grey – UnAtex 2147)
3. Anodised Aluminium Curtain Walling Standard Capped Mullion (Colour Dark green – UnA Green)
4. Anodised Aluminium Curtain Walling Extended Capped Mullion (Colour Dark grey – UnAtex 2147)
5. Anodised Aluminium Curtain Walling Extended Capped Mullion (Colour Dark green – UnA Green)
6. Anodised Aluminium Curtain Walling Triangular Fin Mullion (Colour Dark grey – UnAtex 2147)
7. Standard Glazed Panels
8. Back Painted Glass Spandrel (Colour Dark grey RAL 7037
9. Anodized Aluminium Louvers (Colour Dark green – UnA Green)
10. Anodised Aluminium Flashing in front of rainwater goods (Colour Dark green – UnA Green)
11. Anodised Aluminium Parapet Capping (Colour Green – UnA Green)
12. Vertical ceramic frit applied to double glazed units
13. Powder Coated Aluminium Curtain Walling Standard Backbox (Colour White - PPC RAL 9003) to all areas with the exception of area noted by no.14
14. Powder Coated Aluminium Curtain Walling Standard Backbox (Colour RAL 7024 Graphite Grey)
15. Supporting framwork (to SE design)
16. Anodized Aluminium Spandrel (Colour Dark grey – UnAtex 2147)

REVISION	DESCRIPTION	BY	CHECKED	DATE
P07	Updated Key	PE	PE	11.07.24
P06	Updated to utilise perforated cladding panels in maufacture.	PE	PE	13.06.24
P05	Updated to utilise perforated cladding panels in maufacture.	PE	PE	06.06.24
P04	Updated to utilise existing sample support structure. Design Change as requested by WD & BW	PE	PE	30.05.24
P03	Drawing number updated to reflect WD naming protocol. Mock up panel size amended, section updated as indicated, White RAL colour added, Graphite Grey RAL colour added, internal mullion updated to PC from anodised, all captured in updated key. Details omitted.	AR	MH	08.02.23
P02	RAL Colours Updated	AR	PE	11.10.23
P01	First Issue	AR	MH	25.09.23

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PROJECT TITLE
MSP Greenheys (Private & Constitutional)

BDP JOB NUMBER
P3001624

DRAWING TITLE
Mock Up Facade Sample

SCALE
As indicated @ A1

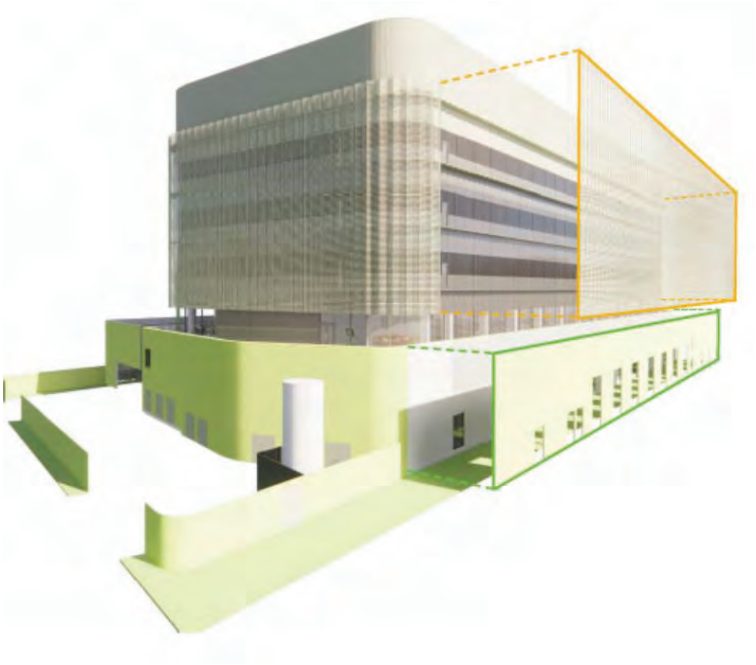
DATE OF ISSUE
09/13/23

DRAWING NO.
GRE-BDP-ZZ-XX-DR-A-20910

REVISION
P07

Technical Submission
Curtain Walls

Title



Project / Building: Greenheys MSP
Document Ref: GRE-RED-ZZ-ZZ-TX-X-00003 **Revision:** P01
Status: S3 (For approval and comment)

Red Systems Ref: RED-TS-467-03
Title: Main Entrance and Ground Floor CW Screens
Description: Curtain Walling System Framing

Prepared By: Technical Manager, Ken Basnett
Issue Date: 14/06/2024

For the attention of: Carlos Munez
Response required by: 28/06/2024

Technical Submission
Curtain Walls

Contents

1. **Project Specific Information**

   System Specification

   Infills

   System Performance

2. **Product Data**

   CW 50 Brochure

3. **Test Data / Performance**

   CW 50 Product Pass

   CWCT (Wintech)

4. **Certificates**

   ISO14001 Environmental Management System (EMS)

   ISO 14025 Environmental Product Declaration (EPD)

5. **Other**

   Guide to BREEAM

14/06/2024

Technical Submission
Curtain Walls

Project Specification

System Specification

Manufacturer: Reynaers

System / Range: CW50

Material Data: 205mm Box with 300mm square cap to head, 300mm triangular to verticals

External Finish: Anodised

External Colour: UnAtex 2147 Blue / Gey

Internal Finish: Polyester Powder Coating

Internal Colour: Standard RAL 7024 matt (30% gloss)

Colour Charts: N/A

Infills

Glazing: GT1 - Refer to RED technical submission document GRE-RED-ZZ-ZZ-TX-X-00005

Glazing: GT2 - Refer to RED technical submission document GRE-RED-ZZ-ZZ-TX-X-00006

Panels: PT1 - Refer to RED technical submission document GRE-RED-ZZ-ZZ-TX-X-00008

Louvre: LT1 - Refer to RED technical submission document GRE-RED-ZZ-ZZ-TX-X-00009

System Performance

System Thermal Transmittance (U-Values): 1.44 average

System Acoustic Insulation - Sound Reduction - TBC

Air Permeability – Refer to CW 50 Product Pass

Watertightness – Refer to CW 50 Product Pass

Resistance to Wind Loads - Refer to CW 50 Product Pass

Mechanical Resistance - Refer to CW 50 Product Pass

Impact Resistance – Refer to CW 50 Product Pass

Fire Classification – Refer to CW 50 Product Pass

Technical Submission
Curtain Walls

Product Data

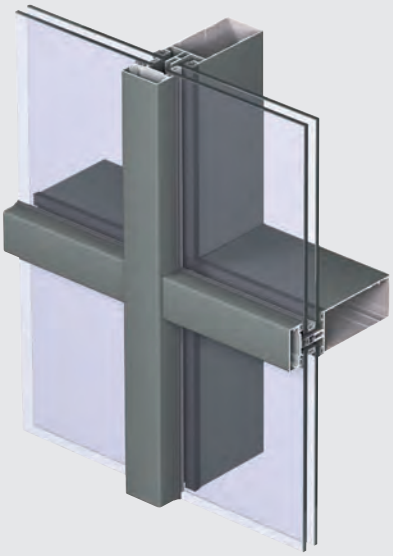


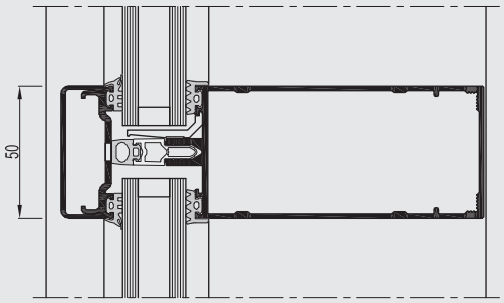
Knowledge Centre ARHUS, Belgium / Architect : BURO II & ARCHI+I

CW 50

Unlimited creative freedom and maximum entrance of light

REYNAERS
aluminium





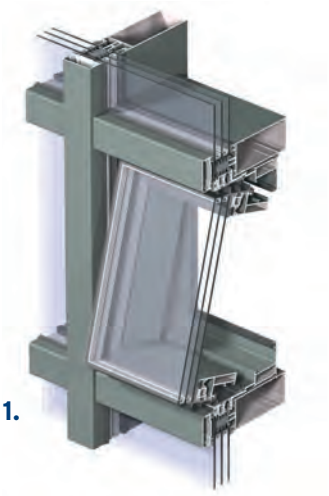
Concept Wall® 50 is a façade and roof system that offers unlimited design freedom and allows maximum transparency. As such, CW 50 meets all requirements of contemporary architecture. Innovative solutions contribute towards the tendency of big, heavy and thick glass panes. CW 50 supports up to 150, 310 and 700 kg in various glass support configurations. Even more glass weight can be offered in bespoke solutions.

The system is available in several design and glazing variants, like steel beam look, standard pressure plates, structurally glazed and structurally clamped solutions. Specified levels of fire-resistance, burglar proof classes and thermal insulation, down to Uf = 0.56W/ m²K, are provided by different technical variants.

In addition to that, dedicated opening types can also be seamlessly integrated; a parallel opening window, a top hung window, a hidden vent turn and tilt window, but also a flush roof vent for integration in roof applications of CW 50.

The CW 50 stands for an extensive range of profiles, gaskets, accessories and tools. It is specially developed for easy fabrication and installation.

The extensive range of CW 50 profiles meets all requirements of contemporary architecture. With regard to the thermal performance, the system offers solutions in different levels, allowing the use of triple glazing and making the system even applicable for passive house or low energy buildings.
In addition to that, dedicated opening types can also be seamlessly integrated:

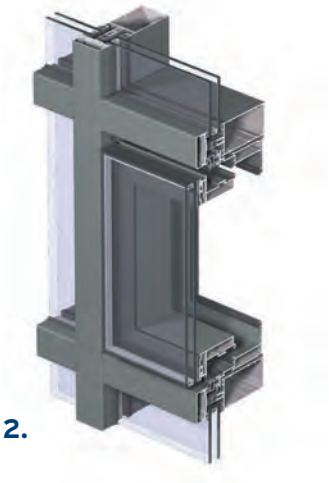


1.

Description opening types*:

1. Top Hung Window – THW:

The Top Hung Window allows integrating opening elements with large opening spans, which can be operated manually or automatically. The design choice between the solution with glazing bead or structural silicone glazing (SSG) characterises the total appearance of the façade.
This THW can be integrated in the overall strategy of the building's Smoke & Heat Exhaust Ventilation Systems (SHEVS).



2.

2. Parallel Opening Window – POW:

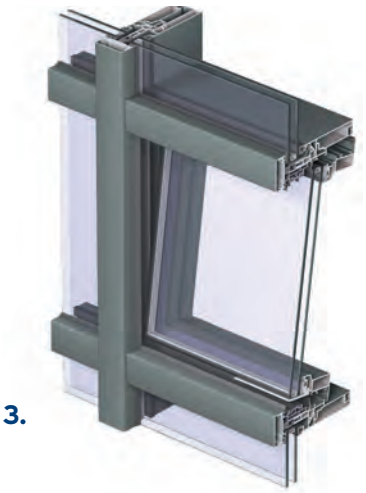
The opening concept, Parallel Opening Window, allows an ultimate airflow for small or tall windows. This results in a better natural ventilation, improving the indoor air quality, thermal comfort and healthy indoor climate for building users. Aesthetically, this parallel way of opening gives a uniform impression: the reflection of the building remains the same for opened or closed vents. An additional advantage of this opening type is that it realises ventilation without creating unwanted access to the building (e.g. night ventilation). Furthermore, the POW can be used for big opening elements, operated both manually or automatically, and is suited to be integrated in Smoke & Heat Exhaust Ventilation Systems. The glazing of the window can be done with glazing beads or with structural silicone glazing (SSG).



Top Hung Window - THW



Parallel Opening Window: POW



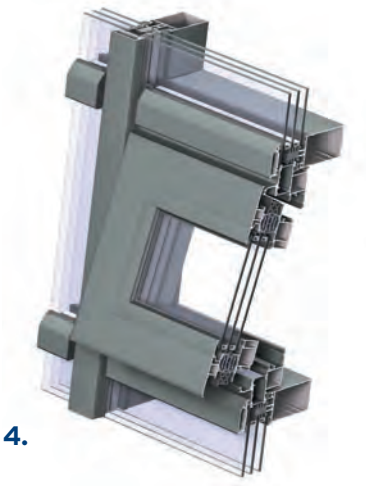
3.

3. Hidden vent turn and tilt window - HV-TUTI:

A special type of Inward Opening Window, also known as the hidden vent, is a structural silicone glazing solution which can be applied in a standard curtain wall façade or in a structurally clamped façade. It's main advantage is that the exterior doesn't differ from a fixed glazing panel in the façade. Therefore it doesn't affect the façade geometry. From the inside, this system uses a half mullion, resulting in a minimal visible width. Water tightness is assured by the use of a central gasket.

4. Flush Roof Vent - FRV:

The Flush Roof Vent has been developed to perfectly blend into the buildings' outer shell without causing any disruption to the surface, with inclination angles of 5° up to 80°. With this opening type, the architectural creativity is limitless.



4.

The superior High Insulation variant assures an increased insulation by using additional gaskets and longer insulation strips. The possibility to integrate 52 mm glass in this HI version further enhances thermal efficiency. A motor-operated version is especially convenient within building management systems or in roof windows in hard-to-reach places.

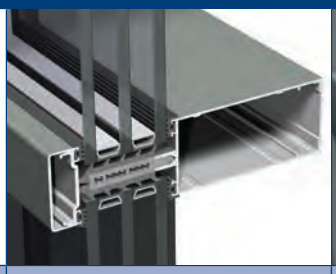
5. Integration of Reynaers window and door systems

Several aesthetical connection profiles allow a concealed integration of other Reynaers window and door systems.



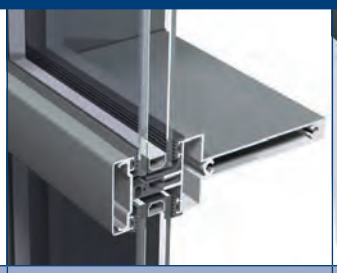
Coca-Cola headquarters - Madrid (Architect: DL+A arquitectos asociados)

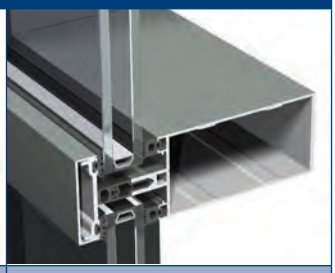
TECHNICAL CHARACTERISTICS


Style variants	CW 50	CW 50-HI	CW 50-FP
	functional	ultimate thermal comfort	Fire Proof EI 30 & EI 60
Interior visible width	50 mm	50 mm	50 mm
Exterior visible width	50 mm	50 mm	50 mm
Depth mullions	from 42 mm to 300 mm	from 42 mm to 300 mm	from 63 mm to 105 mm
Depth transoms	from 5 mm to 193 mm	from 5 mm to 193 mm	from 67 mm to 109 mm
Inertia mullions (Ix: wind load)	min 14 cm^4 to max 2690 cm^4	min 14 cm^4 to max 2690 cm^4	min 38 cm^4 to max 123 cm^4
Inertia transoms (Ix: wind load)	min 4 cm^4 to max 612 cm^4	min 4 cm^4 to max 612 cm^4	min 34 cm^4 to max 124 cm^4
Inertia transoms (Iy: glass load)	min 8 cm^4 to max 59 cm^4	min 8 cm^4 to max 59 cm^4	min 20 cm^4 to max 29 cm^4
Exterior face caps	different shapes available	different shapes available	different shapes available
Glazing	fixing by pressure plates	fixing by pressure plates	fixing by pressure plates
Rebate height	20 mm	20 mm	20 mm
Glass thickness	from 6 mm to 61 mm	from 22 mm to 61 mm	33 mm/48 mm
Opening types (see: description)*	1 - 2 - 3 - 4 - 5	1 - 2 - 3 - 4 - 5	CS 77-FP door
Roof application	yes	yes	no

TECHNICAL CHARACTERISTICS





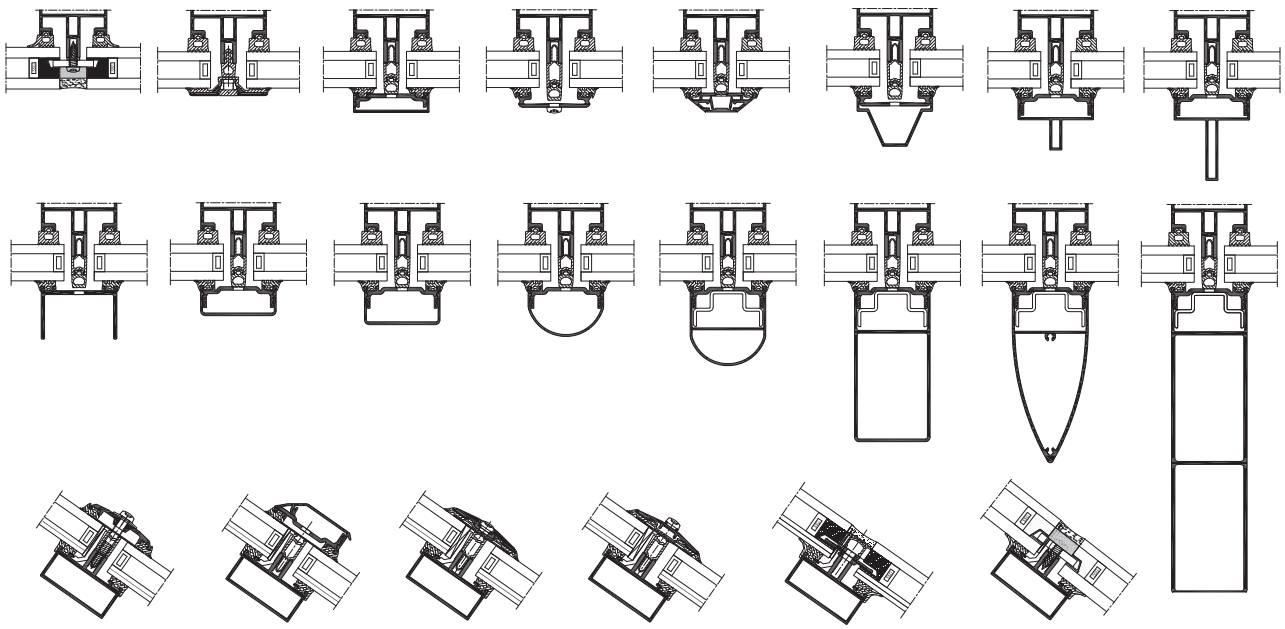
Style variants	CW 50-SL	CW 50 ALU ON STEEL	CW 50-TT
	slender appearance	designed for steel structure	rationalized system
Interior visible width	15/50 mm	50 mm	50 mm
Exterior visible width	50 mm	50 mm	50 mm
Depth mullions	from 126 mm to 168 mm	51 mm	-
Depth transoms	from 88 mm to 173 mm	from 5 mm to 58 mm	from 84 mm to 231 mm
Inertia mullions (Ix: wind load)	min 160 cm^4 to max 381 cm^4	not applicable	-
Inertia transoms (Ix: wind load)	min 73 cm^4 to max 436 cm^4	min 4 cm^4 to max 16 cm^4	min 74 cm^4 to max 937 cm^4
Inertia transoms (Iy: glass load)	min 9 cm^4 to max 24 cm^4	min 8 cm^4 to max 13 cm^4	min 23 cm^4 to max 68 cm^4
Exterior face caps	different shapes available	different shapes available	different shapes available
Glazing	fixing by pressure plates / clamped	fixing by pressure plates / clamped	fixing by pressure plates / clamped
Rebate height	20 mm	20 mm	20 mm
Glass thickness	from 6 to 61 mm	from 6 to 61 mm	from 6 mm to 61 mm
Opening types (see description)*	1 - 2 - 3 - 4 - 5	1 - 2 - 3 - 4 - 5	1 - 2 - 5
Roof application	yes	yes	no

CW 50-HI is certified by the German notified body ift Rosenheim for passive house applications. This certification requires an overall insulation value of max. 0.7 W/m²K using glass with Ug 0.7 W/m²K and a panel with Up of 0.25 W/m²K. With the CW 50-HI profiles, the curtain wall system achieved the overall insulation value of 0.66 W/m²K.

			
CW 50-SC	**CW 50-HL**	**CW 50-VL**	**CW 50-SG**
structural clamped glazing	aesthetical horizontal lining	aesthetical vertical lining	structural sealed glazing
50 mm	50 mm	50 mm	50/88 mm
joint: 20 mm	vertical: 20 mm joint horizontal: 50 mm	vertical: 50 mm horizontal: 20 mm joint	EPDM gasket (width 27 mm)
from 42 mm to 300 mm	from 42 mm to 300 mm	from 42 to 300 mm	from 42 mm to 300 mm
from 5 mm to 193 mm	from 5 mm to193 mm	from 5 to 193 mm	from 5 mm to 193 mm
min 14 cm^4 to max 2690 cm^4	min 14 cm^4 to max 2690 cm^4	min 14 cm^4 to max 2690 cm^4	min 14 cm^4 to max 2690 cm^4
min 4 cm^4 to max 612 cm^4	min 4 cm^4 to max 612 cm^4	min 4 cm^4 to max 612 cm^4	min 4 cm^4 to max 612 cm^4
min 8 cm^4 to max 59 cm^4	min 8 cm^4 to max 59 cm^4	min 8 cm^4 to max 59 cm^4	min 8 cm^4 to max 59 cm^4
not applicable	different shapes available	different shapes available	not applicable
continuously clamped and locally clamped solution	vertical: continuously clamped and locally clamped solution horizontal: fixation by pressure plate	vertical: fixation by pressure plate horizontal: continuously clamped and locally clamped solution	structural glazing glued on cassettes
structural sealed glazing	20 mm /structural sealed glazing	20 mm/structural sealed glazing	structural sealed glazing
from 26 mm to 63 mm	from 22 mm to 48 mm	from 27 mm to 42 mm	from 24 mm to 36 mm
1 - 2 - 3 - 5	1 - 2 - 3 - 5	1 - 2 - 3 - 5	1 - 2 - 5
yes	no	yes	no



Overview exterior looks





Prosecutor's Office - Tbilisi (Architect: Architects of Invention)

REYNAERS
aluminium

TOGETHER FOR BETTER

PERFORMANCES

	ENERGY						
	Thermal insulation (1) EN 12631:2012	Uf value down to 0,56 W/m²K, depending on the profile combination					
	COMFORT						
	Acoustic performance (2) EN ISO 10140-2; EN ISO 717-1	RW (C;Ctr) = 33 (-1; -4) dB / 60 (-2; -6) dB, depending on glazing or panel type					
	Air tightness (3) EN 12153, EN 12152	A1 (150 Pa)	A2 (300 Pa)	A3 (450 Pa)	A4 (600 Pa)	AE 1200 (1200 Pa)	AE 1950 (1950 Pa)
	Water tightness (4) EN 12155, EN 12154	R4 (150 Pa)	R5 (300 Pa)	R6 (450 Pa)	R7 (600 Pa)	RE 1200 (1200 Pa)	RE 1950 (1950 Pa)
	Wind load resistance, max. test pressure (5) EN 12179, EN 13116	2000 Pa			2400Pa		
	Resistance against impact EN 12600, EN 14019	I3 / E5			I5 / E5		
	SAFETY						
	Fire Resistance (6) EN 1364-3, EN 13501-2	EI 15	EW 30	EI 30	E 60	EW 60	EI 60
	Burglar Resistance (7) EN 1627 – EN 1630	WK1 / RC1		WK2 / RC2		WK3 / RC3	

This table shows classes and values of performances, which can be achieved for specific configurations and opening types.

(1) The Uf-value measures the heat flow. The lower the Uf-value, the better the thermal insulation of the curtain wall.
(2) The sound reduction index (Rw) measures the capacity of the sound reduction performance of the curtain wall.
(3) The air tightness test measures the volume of air that would pass through a curtain wall at a certain air pressure.
(4) The water tightness testing involves applying a uniform water spray at increasing air pressure until water penetrates the curtain wall.
(5) The wind load resistance is a measure of the profile's structural strength and is tested by applying increasing levels of air pressure to simulate the wind force.
(6) The fire resistance is defined by exposing the curtain wall to direct fire in order to determine the stability, thermal insulation and radiation insulation over a certain amount of time.
(7) The burglar resistance is tested by static and dynamic loads, as well as by stimulated attempts to break in using specific tools. This variant requires specific burglar resistance accessories and processing techniques.

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Technical Submission
Curtain Walls

Test Data / Performance

PRODUCT PASS

1 GENERAL EXPLANATION

The following paragraphs indicate the performances which can be declared on the Declaration of Performance (DoP) in accordance with Regulation (EU) no. 305/2011 of the European Parliament and of the Council of 9 March 2011.

The listed characteristics are the essential characteristics for curtain walling according to hEN 13830:2003 Curtain walling - Product standard.

All essential characteristics should be mentioned on the DoP. Where no performance is required, NPD (No Performance Declared) can be used.

The mentioned performances are performances which can be achieved for the given dimensions when the product is fabricated following the Reynaers instruction manual (catalogue). The performances as mentioned will meet the requirements of the majority of projects.

Higher performances for smaller dimensions or lower performances for larger dimensions might be possible. In this case contact your Reynaers office. For AWW performances, the maximum dimensions indicated in the system catalogue must be respected.

It is obviously allowed to declare lower performances than those mentioned in the product pass. E.g. when resistance to wind load of 1600 Pa was tested, also 1200 Pa can be declared.

In the second part of the table the non-essential characteristics are indicated. These are the characteristics which give information about the performance of a product, but which are not legally required in any European country and thus not mandatory to declare.

2 NOTIFIED BODIES

ID	Name	Address	Country
0074	CENTRE D'EXPERTISE DU BÂTIMENT ET DES TRAVAUX PUBLICS	Domaine De Saint-Paul – 102, Route de Limours 78471 Saint-Remy-Les-Chevreuse Cedex	France
0432	MATERIALPRÜFUNGSAMT NORDRHEIN-WESTFALEN	Auf den Thränen 2 59597 Erwitte	Germany
0679	CENTRE SCIENTIFIQUE ET TECHNIQUE DU BÂTIMENT	84, Avenue Jean Jaurès Champs-sur-Marne F-77447 Marne-la-Vallée Cedex 2	France
0744	SOCOTEC	Les Quadrants – 3,Avenue du Centre – Guyancourt 78182 St-Quentin en Yvelines	France
0749	BELGIAN CONSTRUCTION CERTIFICATION ASSOCIATION	Aarlenstraat 53 1040 Brussel	Belgium
0757	IFT ROSENHEIM	Theodor-Gietl-Strasse 7-9 83026 Rosenheim	Germany
0845	DANISH INSTITUTE OF FIRE AND SECURITY TECHNOLOGY	Jernholmen, 12 2650 Hvidovre	Denmark
0960	SKG-IKOB	Poppenbouwing 56 4191 NZ Geldermalsen	Netherlands
1136	BELGIAN BUILDING RESEARCH INSITUTE	Lombardstraat 42 1000 Brussel	Belgium
1234	EFECTIS NEDERLAND	Brandpuntlaan Zuid 16, Postbus 554 2665 ZN Bleiswijk	Netherlands
1288	WINTECH ENGINEERING LIMITED	Halesfield 2 Telford,Shropshire TF7 4QH	United Kingdom
1309	PRÜFINSTITUT SCHLÖSSER UND BESCHLÄGE, VELBERT	Wallstrasse 41 42551 Velbert	Germany
1488	INSTYTUT TECHNIKI BUDOWLANEJ	ul. Filtrowa 1 00-611 Warszawa	Poland
1671	PEUTZ	Lindenlaan 41, Molenhoek PO Box 66 6585 ZH MOOK	Netherlands
1749	TNO DEFENCE, SECURITY AND SAFETY	Lange Kleiweg 137, Postbus 45 2280 AA Rijswijk	Netherlands
1769	UNIVERSITY OF GENT	Sint-Pietersnieuwstraat 41 9000 Gent	Belgium
1812	EFECTIS FRANCE	Voie Romaine 57280 Maizieres-les-Metz	France
2211	INSTITUTO DE INVESTIGAÇÃO E DESENVOLVIMENTO TECNOLÓGICO PARA A CONSTRUÇÃO, ENERGIA, AMBIENTE E SUSTENTABILIDADE	Rua Pedro Hispano Pólo II da Universidade de Coimbra 3030-289 Coimbra	Portugal

3 EXPLANATIONS AND SYMBOLS

H: Element Height
B: Element Width
Fh: Vent Height
Fb: Vent Width
npd: No Performance Declared
CWFT: Classification Without Further Testing

(1) Indicated wind load = design load

(2) For multi level solution

(3) Other dimensions and deformations to be calculated in function of the wind load (fmax< L/200, max 15 mm)

(4) Impact resistance was only tested with screw connection between transom and mullion -> Also connections with additional T-connectors are approved

(5) Composition of the spandrel part: see test report

4 PERFORMANCE

4.1 Classifications for CW50

Characteristic			Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**2000 Pa** (1) **2000 Pa** (1)	[0960] – 06.174 [0960] – 15.00669 (2)	Max. panel size (3): 1500x3000 (4.5 m²) 2000x2400 (4.8 m²)
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	**I5 / E5**	[1136] – CAR 5010/1	Minimum glass dimension: 1500x1200 (4)
	4.4	Air permeability	**A4** (600 Pa) **AE750** (750Pa) **AE1200** (1200 Pa)	[0960] – 06.174 [0960] – 15.00669 (2) [0960] – 09.149	
	4.5	Watertightness	**RE950** (950 Pa) **RE1050** (1050 Pa) **RE1200** (1200 Pa)	[0960] – 06.174 [0960] – 09.149 [0960] - 15.00669 (2)	
	4.6	Airborne sound insulation	Glass **34 (-1;-4)** **40 (-2;-7)** **48 (-2;-8)** **48 (-2;-8)** + spandrel (5)	**34 (-1;-4)** **42 (-2;-6)** **47 (-2;-5)** **55 (-2;-7)**	[1488] – LA/1365a/06 [1488] – LA/1365b/06 [1488] – LA/1365c/06 [1488] – LA/1365d/06
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	npd		
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	**EI60**	[1488] – 02142/17/Z00NZP	WxH ≤ 3000x1440
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

4.2 Classifications for CW50 with flat pressure plate 034.0551.XX

Characteristic			Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**1200 Pa** (1)	[0960] – 13.00949	Max. panel size (3): 1500x3300 (4.95 m²)
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	**E5**	[1136] – CAR 5010/1	Minimum glass dimension: 1500x1200 (4)
	4.4	Air permeability	**A4** (600 Pa)	[0960] – 13.00949	
	4.5	Watertightness	**R5** (300 Pa)	[0960] – 13.00949	
	4.6	Airborne sound insulation	Glass **34 (-1;-4)** **40 (-2;-7)** **48 (-2;-8)** **48 (-2;-8)** + spandrel (5)	**34 (-1;-4)** **42 (-2;-6)** **47 (-2;-5)** **55 (-2;-7)**	[1488] – LA/1365a/06 [1488] – LA/1365b/06 [1488] – LA/1365c/06 [1488] – LA/1365d/06
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	npd		
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	npd		
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

4.3 Classifications for CW50-HI

Characteristic			Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**2000 Pa** (1) **2400 Pa** (1)	[0960] – 15.00669 (2) [1488] – LK03-00948/15/R86NK	Max. panel size (3): 1850x3300 (6.1 m^2)
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	**I5 / E5**	[1136] – CAR 5010/1	Minimum glass dimension: 1500x1200 (4)
	4.4	Air permeability	**AE750** (750Pa) **AE1950** (1950Pa)	[0960] – 15.00669 (2) [1488] – LK03-00948/15/R86NK	
	4.5	Watertightness	**RE1200** (1200 Pa) **RE1950** (1950 Pa)	[0960] – 15.00669 (2) [1488] – LK03-00948/15/R86NK	
	4.6	Airborne sound insulation (7)	Glass **34 (-1;-4)** **40 (-2;-7)** **48 (-2;-8)** **Spandrel** (5)	**34 (-1;-4)** **42 (-2;-6)** **47 (-2;-5)** **54 (-2;-7)**	[1488] – LA/1365i/2006 + LA/1365a/2006 [1488] – LA/1365j/2006 + LA/1365b/2006 [1488] – LA/1365k/2006 + LA/1365c/2006 [1488] – LA/1365l/2006 + LA/1365d/2006
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	npd		
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	**EI60**	[1488] – 02142/17/Z00NZP	WxH ≤ 3000x1440
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

(7) Result based on combination of tests on old version of CW50-HI and test of CW50

4.4 Classifications for CW50-TT

Characteristic			Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**2000 Pa** (1)	[0960] – 15.00422	Max. panel size (3): 1500x2500 (3.75 m²)
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	**I5 / E5**	[0960] – 15.00678	Minimum glass dimension: 735x1200
	4.4	Air permeability	**AE1200** (1200 Pa)	[0960] – 15.00422	
	4.5	Watertightness	**RE1200** (1200 Pa)	[0960] – 15.00422	
	4.6	Airborne sound insulation	Glass **34 (-1;-4)** **40 (-2;-7)** **48 (-2;-8)** **48 (-2;-8)** + spandrel (5)	 **34 (-1;-4)** **42 (-2;-6)** **47 (-2;-5)** **55 (-2;-7)**	 [1488] – LA/1365a/06 [1488] – LA/1365b/06 [1488] – LA/1365c/06 [1488] – LA/1365d/06
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	npd		
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	**EI60**	[1488] – 02142/17/Z00NZP	WxH ≤ 3000x1440
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

4.5 Classifications for CW50-HL

Characteristic			Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**1200 Pa** (1)	[0960] – 07.190	Max. panel size (3): 2500x2400 (6 m²)
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	**I5 / E5**	[1136] – CAR 5010/1	Minimum glass dimension: 1500x1200 (4)
	4.4	Air permeability	**A4** (600 Pa)	[0960] – 07.190	
	4.5	Watertightness	**R7** (600 Pa)	[0960] – 07.190	
	4.6	Airborne sound insulation	Glass **34 (-1;-4)** **40 (-2;-7)** **48 (-2;-8)** **Spandrel** (5)	 **33 (-1;-4)** **41 (-2;-5)** **43 (-1;-4)** **54 (-2;-7)**	 [1488] – LA/1365e/06 [1488] – LA/1365f/06 [1488] – LA/1365g/06 [1488] – LA/1365h/06
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	npd		
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	**EI60**	[1488] – 02142/17/Z00NZP	WxH ≤ 3000x1440
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

4.6 Classifications for CW50-SC (clamping profiles)

	Characteristic		Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**1600 Pa** (1) **2000 Pa** (1) **2400 Pa** (1)	[0960] – 06.135 (6) [1136] – CAR 5010/2 (7) [1488] – LZE00-00948/17/R136NZE	
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	**I5 / E5**	[0960] – 06.136	Minimum glass dimension 1525x1225 (4)
	4.4	Air permeability	**A4** (600 Pa) **A4** (600 Pa) **AE1200** (1200 Pa)	[0960] – 06.135 (6) [1136] – CAR 5010/2 (7) [1488] – LZE00-00948/17/R136NZE	
	4.5	Watertightness	**RE1050** (1050 Pa) **RE1200** (1200 Pa) **RE1200** (1200 Pa)	[0960] – 06.135 (6) [1136] – CAR 5010/2 (7) [1488] – LZE00-00948/17/R136NZE	
	4.6	Airborne sound insulation	Glass **32 (-1;-5)** **40 (-2;-7)** **45 (-3;-8)** **Spandrel** (5)	 **34 (-1;-3)** **42 (-1;-5)** **47 (-2;-6)** **56 (-1;-5)**	 [1488] – LA/1220a/05 [1488] – LA/1220b/05 [1488] – LA/1220c/05 [1488] – LA/1220d/05
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	npd		
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	**EI60**	[1488] – 00948/20/R169NZP	WxH ≤ 1960x960
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

(6) With 080.9850.04 and glass edge with silicone

(7) With 034.0100.17

4.7 Classifications for CW50-SC (butterfly)

Characteristic			Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**2000 Pa** (1)	[1488] – LK01-00948/15/R94NK	Max. panel size (3): 1850x3300 (6.10 m²)
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	npd		
	4.4	Air permeability	**AE1200** (1200 Pa)	[1488] – LK01-00948/15/R94NK	
	4.5	Watertightness	**RE1200** (1200 Pa)	[1488] – LK01-00948/15/R94NK	
	4.6	Airborne sound insulation	Glass **32 (-1;-5)** **40 (-2;-7)** **45 (-3;-8)** **Spandrel** (5)	**34 (-1;-3)** **42 (-1;-5)** **47 (-2;-6)** **56 (-1;-5)**	[1488] – LA/1220a/05 [1488] – LA/1220b/05 [1488] – LA/1220c/05 [1488] – LA/1220d/05
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	npd		
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	**EI60**	[1488] – 00948/20/R169NZP	WxH ≤ 1960x960
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

4.8 Classifications for CW50-SG

Characteristic			Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**2000 Pa** (1)	[1136] – CAR 5010/3	
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	npd		
	4.4	Air permeability	**A4** (600 Pa)	[1136] – CAR 5010/3	
	4.5	Watertightness	**RE1200** (1200Pa)	[1136] – CAR 5010/3	
	4.6	Airborne sound insulation	Glass **33 (-1;-4)** **40 (-2;-7)** **43 (-2;-6)** **Spandrel** (5)	**33 (-1;-3)** **41 (-2;-6)** **45 (-2;-6)** **60 (-2;-6)**	[1488] – LA/1220e/05 [1488] – LA/1220f/05 [1488] – LA/1220g/05 [1488] – LA/1220h/05
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	npd		
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	**EI60**	[1488] – 00948/20/R169NZP	WxH ≤ 1960x960
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

4.9 Classifications for CW50-FP EI30/EI60

	Characteristic		Performance	Notified body - Report	Limits (mm)
EN 13830:2003	**Essential characteristics**				
	4.1	Resistance to wind load	**1200 Pa** (1)	[0960] – 08.171	
	4.2	Dead load	See system catalogue for more detailed info about maximum weights for each type of glass support.		
	4.3	Impact resistance	**I5 / E5**	[1136] – CAR 5010/1	Minimum glass dimension: 1500x1200 (4)
	4.4	Air permeability	**A4** (600 Pa)	[0960] – 08.171	
	4.5	Watertightness	**R7** (600 Pa)	[0960] – 08.171	
	4.6	Airborne sound insulation	Glass **34 (-1;-4)** **40 (-2;-7)** **48 (-2;-8)** **48 (-2;-8)** + spandrel (5)	 **34 (-1;-4)** **42 (-2;-6)** **47 (-2;-5)** **55 (-2;-7)**	 [1488] – LA/1365a/06 [1488] – LA/1365b/06 [1488] – LA/1365c/06 [1488] – LA/1365d/06
	4.7	Thermal transmittance	Ucw to be calculated according to EN ISO 12631 (see also 6). The U-values of the different profiles are available in separate U-value tables. The U-values of the profiles are calculated under certification of BCCA: certificate BPCB-420-72-10077/2.		
	4.8	Resistance to fire	**EI30** **EI60**	[1812] – EFR-20-004109 [1812] – EFR-20-003155	See report
	4.9	Reaction to fire	Anodized: **A1** Painted: **A2** Gaskets: **E**	EC decision 96/603/EC certificate P155748 [0432] – 230006500-6	
	4.10	Fire propagation	**EI30** **EI60**	[1812] – EFR-20-004109 [1812] – EFR-20-003155	See report
	4.15	Thermal shock resistance	When requested, glass with thermal shock resistance conforming to the appropriate standards has to be chosen.		
	4.17	Resistance to live horizontal loads	When requested, declare the value in kN at sill height. The loads have to be calculated according to national specifications. The allowable loads per T-connection are given in 5.		
	Non-essential characteristics				
	4.13	Equipotentiality	All metal parts have to be conductively connected (see also examples in the catalogue and guidelines in Annex A of EN 13830). The electrical resistance has to be measured in accordance with Annex A of EN 13830.		

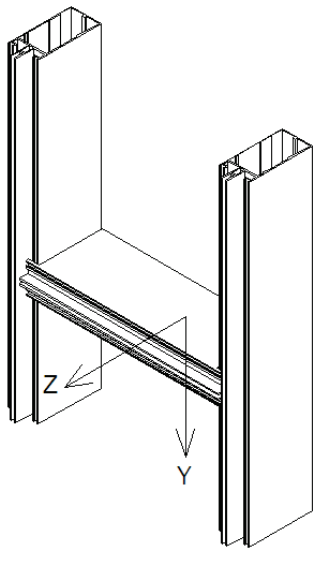
5 RESISTANCE TO HORIZONTAL LOADS

The maximum loads on each T-connection can be derived from following table which summarises the results from test report R-44-05-2 of PSP.

The result is each time for 1 connection.

Type of connection	Force direction	Xk/γM (kN)
1. Standard transom/mullion connection	Dead load	0.88
	Wind suction	3.02
	Wind pressure	3.45
	Combined (1)	2.53
2. Connection with 021.0283 or 073.7000	Dead load	2.07
	Wind suction	2.93
	Wind pressure	4.46
	Combined (1)	2.59
3. Connection with 073.7318 ~ 073.7324	Dead load	1.60
	Wind suction	2.28
	Wind pressure	5.00
	Combined (1)	1.59

(1) The force indicated in the table is the maximum force wind suction in combination with the maximum dead load as indicated in the table



Dead load +Y
Wind suction +Z
Wind pressure -Z
Wind suction + dead load +Y +Z

6 Thermal transmittance

The U-value of the complete curtain wall should be calculated according to EN ISO 12631.

The thermal transmittance Ucw of a typical curtain wall module should be declared, using the U value for the correct profile section (provided by Reynaers) and the Ug or Up value for the used glazing or panel.

For standard curtain walls, Ucw can be calculated with following formula following the component assessment method from EN ISO 12631 with following formula:

$$U_{cw} = \frac{\Sigma A_g U_g + \Sigma A_p U_p + \Sigma A_f U_f + \Sigma A_m U_m + \Sigma A_t U_t + \Sigma l_{f,g} \psi_{f,g} + \Sigma l_{m,g} \psi_{m,g} + \Sigma l_{t,g} \psi_{t,g} + \Sigma l_p \psi_p + \Sigma l_{m,f} \psi_{m,f} + \Sigma l_{t,f} \psi_{t,f}}{A_{cw}}$$

Where

U_g , U_p = thermal transmittances of glazing and panels;

U_f , U_m , U_t = thermal transmittances of frames, mullions and transoms;

$\Psi_{f,g}$, $\Psi_{m,g}$, $\Psi_{t,g}$, Ψ_p = linear thermal transmittances due to the combined thermal effects of glazing unit or panel and frame or mullion or transom;

$\Psi_{m,f}$, $\Psi_{t,f}$ = linear thermal transmittances due to the combined thermal effects of frame, mullion and frame-transom

Uf , Um , Ut can be derived from the U-value tables which were made up under certification of BCCA.

The Ψ-value can be calculated using the exact geometries of the connections or glass spacer or can be chosen from tables in Annex B from EN ISO 12631.

The area of the curtain walling can be calculated with formula:

$A_{CW} = A_g + A_p + A_f + A_m + A_t$

Where

A_{CW} = area of curtain walling

A_g = total area of glazing;

A_p = total area of panels;

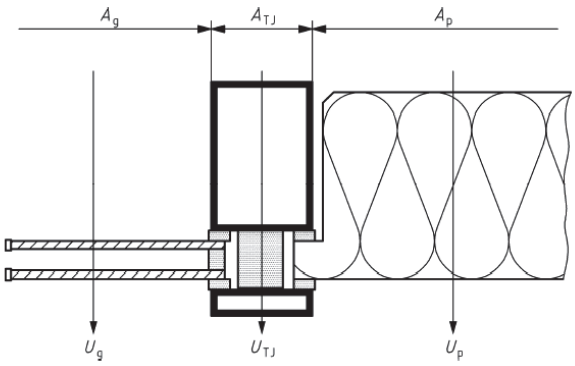
A_f = total area of frame;

A_m = total area of mullions;

A_t = total area of transoms.

For structural clamped and structural glazing systems, the single assessment method is used. The U-value of the curtain wall can then be calculated with following formula:

$$U_{cw} = \frac{\Sigma A_g U_g + \Sigma A_p U_p + \Sigma A_{TJ} U_{TJ}}{\Sigma A_g + \Sigma A_p + \Sigma A_{TJ}} \quad [W/m^2K]$$



Where

A = Area [m²]

U = U-value (thermal transmittance) [W/m²K]

g = Glazing

p = Panel

TJ = Thermal Joint

In the U-value of the profile section (UTJ = U-value of thermal joint), the edge effect of the glass is already included and thus this must not be taken into account again.

WINTECH
WINDOW AND CLADDING
TESTING & LABORATORY
SERVICES

Technical Report

Report No: DPP/R11995

UKAS TESTING
2223

Reynaers Ltd
Kettles Wood Drive
Birmingham
B32 3DB

Project

CW50 & CW60 System Test

CWCT Test Sequence

Project Ref: 11995

17th July 2015

Rev 1 – this report has been amended by updating Appendix A and it replaces previous report No. DPP/R11995 dated 16th January 2015.

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Test Conducted at:	Above Address
Test Conducted for:	Reynaers Ltd
Standards Specified:	CWCT Test Methods for Building Envelopes – Dec 2005; Sections 5, 6, 7, 9, 11, 12 & 15

The Test Sequence was Witnessed Wholly or in Part by:

J McComb	Reynaers Ltd
L Morley	Reynaers Ltd
P Kent	Reynaers Ltd

Project No:	11995
Dates of Final Test Sequence:	6th & 17th November 2014 8th & 9th December 2014
Product/System Tested:	CW50 & CW60 Curtain Wall System Test
Tests Performed:	As Listed in Section 5 – Test Procedures

Final Test Sequence Conducted by:

D Price	Wintech Engineering Ltd
D Reynolds	Wintech Engineering Ltd
D Potts	Wintech Engineering Ltd

Report Compiled by: D Price
Senior Test Engineer

Testing Supervised by: M Cox
Works Director

Technical Approval:
(Authorising Signatory) M Wass
Technical Director

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1. INTRODUCTION

This report describes tests conducted at the test site of Wintech Engineering Ltd on a sample of curtain walling, on behalf of Reynaers Ltd.

The following test sequence was conducted on the 6th & 17th November and 8th & 9th December 2014 in order to determine the weather tightness of the sample with respect to air leakage, water penetration, wind and impact resistance. The test methods were in accordance with the following standards, and testing was conducted at the request of Reynaers Ltd and in accordance with method statement DPP/M11995 Rev 1 dated 15th November 2014.

CWCT Standard Test Methods for Building Envelopes - December 2005

Air Leakage (Infiltration & Exfiltration)	CWCT Section 5
Water Penetration – Static	CWCT Section 6
Water Penetration – Dynamic Aero Engine	CWCT Section 7
Water Penetration – Hose	CWCT Section 9
Wind Resistance – Serviceability	CWCT Section 11
Wind Resistance – Safety	CWCT Section 12
Impact – Safety (Soft body)	CWCT Section 15

Wintech Engineering Ltd is accredited by the United Kingdom Accreditation Service as UKAS Testing Laboratory No. 2223.

The test sample was supplied and erected on to the test chamber by Reynaers Ltd.

2. SUMMARY OF TEST RESULTS

The following summarises the results of tests carried out. The sample was tested in the following sequence and the associated results are as follows;

	Peak Test Pressure	Result	Date of test	Classification
Test 1 – Air Leakage (Infiltration)	600 Pa	Pass	06.11.14	A4
Test 2 – Air Leakage (Exfiltration)	100 Pa	(See note[1])	06.11.14	N/A
Test 3 – Water Penetration (Static Pressure)	600 Pa	Pass	06.11.14	R7
Test 4 – Wind Resistance (Serviceability)	2400 Pa	Pass	17.11.14	N/A
Test 5 – Repeat Air Leakage (Infiltration)	600 Pa	Pass	17.11.14	A4
Test 6 – Repeat Air Leakage (Exfiltration)	100 Pa	(See note[1])	17.11.14	N/A
Test 7 – Water Penetration (Static Pressure)	600 Pa	Pass	08.12.14	R7
Test 8 – Water Penetration (Dynamic Aero Engine)	600 Pa	Pass	08.12.14	N/A
Test 9 – Water Penetration (Hose)	-	Pass	08.12.14	N/A
Test 10 – Wind Resistance (Safety)	3600 Pa	Pass	09.12.14	N/A
Test 11a – Impact Resistance (Safety) - External		Pass	09.12.14	E5
Test 11b – Impact Resistance (Safety) - Internal		Pass	09.12.14	I5

Note[1]: There is no classification or performance requirement for exfiltration testing in CWCT Standard for Systemised Building Envelopes – Section 5.

The test sample successfully passed all of the above CWCT test requirements and all tests are either equal to or in excess of the requirements for current BS EN Standards for Curtain Walling.

These results are valid only for the conditions under which the test was conducted.

Note: The Eco Glazed vent contained within the system was fully tapped up and excluded from the test sequence with only the interface being monitored during testing as per the client's instruction.

3. DESCRIPTION OF TEST SAMPLE

Curtain Wall System: CW50 standard capped
CW50-SC (Structurally clamped)
CW50-HL (Horizontally lined with aerofoil cap)
CW50 Integrated bonded opening vent
CW60 standard capped
CW60-SC (Structurally clamped)
Eco glazed in interface detail

Manufactured by: Reynaers Ltd

Sample Size: 7200 mm wide 8000 mm high

Framing Material: Extruded aluminium EN-AW6060 T66

Finish: All main profiles power coated 60 microns RAL 7016 matt.

Mullions: 034.2510 (230.5mm back-box) – CW50 Zone
034.1609 (209.5mm back-box) – CW60 Zone

Transom: 034.3529 (193.4mm back-box) – CW50 Zone
034.1628 (193.2mm back-box) – CW60 Zone

Fixings:

Between mullion and transom overlap

- 052.5317 4.2x12.7mm A2-70 stainless steel.

Pressure plate and clamping strip screws

- CW60-SC Mullion/transom: 053.5462 6.3x25mm A2-70 stainless steel
- CW50-SC Mullion/transom: 053.5462 6.3x25mm A2-70 stainless steel

- CW60 capped mullion/transom: 053.5469 6.3x46mm A2-70 stainless steel
- CW50 capped mullion/transom: 053.5469 6.3x46mm A2-70 stainless steel

- CW50-HL (Horizontally lined with aero foil shaped cap) transom: 053.5470 6.3x49mm A2-70 stainless steel

Glass supports: Please refer to drawing CW50/CWCT/E3 Rev A for type and positioning of glass supports.

Mullion to transom T-connection: CW50 – 073.7000 spring pin
CW60 – 073.7516 shear blocks fixed with 2No 052.5330 4.8x13mm A2-70 stainless steel.

Gaskets:

Inner glazing gaskets to pressure plate/cap areas both CW50 & CW60 zones

Sealed together at the corners using Reynaers vulcanising glue 084.9103

- 080.9817 – 7.5mm thick black EPDM 60 SH-A (Transom)
- 080.9812 – 13mm thick black EPDM 60 SH-A (Mullion)

Inner glazing gaskets to structurally clamped areas both CW50-SC & CW60-SC zones

With moulded corners sealed together using Reynaers vulcanising glue 084.9103.

- 080.9825 – 3.5mm thick black EPDM 60 SH-A (Transom)
- 080.9820 – 9mm thick black EPDM 60 SH-A (Mullion)
- 080.9860 – 3.5mm/9mm moulded corner piece black EPDM 60 SH-A

Outer glazing gasket to pressure plate/cap areas both CW50 & CW60 zones

Sealed together at the corners using Reynaers vulcanising glue 084.9103

- 080.9740 – 3.5mm thick black EPDM 60 SH-A

End pads between mullion and transom connection

- 080.9886 – CW50 Zone 50mm wide x 187.9mm deep x 6.8mm thick black santoprene 90 SH-A.
- 080.9986 – CW60 Zone 60mm wide x 188.1mm deep x 6.8mm thick black santoprene 90 SH-A.

Compartimentation gasket to the front of the thermal isolator behind the pressure plate

- 080.9523 – 6.5mm to 8.5mm thick black EPDM 70 SH-A

End gasket under the mullion/transom overlap

- 080.9490 – 10mm x 53mm x 3.3mm thick EPDM 70 SH-A (CW50 Zone)
- 080.9900 – 10mm x 63mm x 3.3mm thick EPDM 70 SH-A (CW60 Zone)

Perimeter Seals: Reynaers 080.9800 perimeter EPDM 250mm girth, 1.5mm thick black EPDM 70 SH-A. The 080.9800 was fitted onto Reynaers aluminium carrier 034.0160 which in turn was sealed using 080.9381 cord gasket inside and out (EPDM foam density 0.5) bedded on Reynaers vulcanising glue 084.9103, fixed using 052.5360 screws max every 500mm approx.

Glass Units:

Glass specs

Locations as marked on the elevation drawing.

Glass type A: 35.5mm SSG unit (55kg/m²)
Inner pane: 13.5mm clear toughened laminate
Cavity: 14mm air filled cavity
Outer pane: 8mm clear toughened

Glass type B: 32mm SSG unit to be bonded to the vent frame (40kg/m²)
Inner pane: 8mm clear toughened
Cavity: 16mm air filled cavity
Outer pane: 8mm clear toughened

Glass type C: 32mm Std unit (55kg/m²)
Inner pane: 12mm clear toughened
Cavity: 10mm air filled cavity
Outer pane: 10mm clear toughened

Glass type D: 32mm Std unit (40kg/m²)
Inner pane: 8mm clear toughened
Cavity: 16mm air filled cavity
Outer pane: 8mm clear toughened

Panel spec

Type PA: 32mm Std panel unit (40kg/m²)
Inner pane: 8mm clear toughened with colour enamelled glass (Std graphite grey)
Cavity: 16mm air filled cavity
Outer pane: 8mm clear toughened

Type PA1: 35.5mm SSG panel unit (50kg/m²)
Inner pane: 13.5mm clear toughened laminate with colour enamelled glass (Std graphite grey)
Cavity: 14mm air filled cavity
Outer pane: 8mm clear toughened

Drainage and Ventilation:

Drainage generally spouts positioned at the C/L of the first transom above the expansion joint split in the mullion and at the C/L of the first transom at the bottom. If a heavy duty glass support was in the location then the drainage spout was positioned under the support. An additional drainage spout was positioned upside down at the head of each mullion for pressure equalisation.

At the mullion expansion joint split a dilatation piece was placed over the joint to project:

- CW50 – 073.8234 dilatation piece fixed in position using screw 053.5460 6.3x19mm.
- CW60 – 073.6234 dilatation piece fixed in position using screw 053.5460 6.3x19mm.

Generally drainage slot positions were:

- Up to 1200mm transom width no additional drainage slots.
- Between 1200mm – 1500mm transom width 1No drainage slot centrally positioned.
- Over 1500mm transom width drainage slots positioned max 500mm centres.

Description of the drainage spouts are as follows:

- 073.8262 To the CW50 capped locations made from black silicone 70 SH-A, fully sealed with Reynaers 084.9063 and fixed into place with fixing 050.5029 M6x16mm A2-70 stainless steel.
- 073.8263 To the CW50-SC (structurally clamped) locations made from black silicone 70 SH-A, fully sealed with Reynaers 084.9063 and fixed into place with fixing 050.5029 M6x16mm A2-70 stainless steel.
- 073.6237 To the CW60 capped locations made from ABS (black) UV-resistant, fully sealed with Reynaers 084.9063.
- 073.8263 To the CW60-SC (structurally clamped) locations made from black silicone 70 SH-A, fully sealed with Reynaers 084.9063 and fixed into place with fixing 050.5029.

Fixing Bracket Details:

- CW50 Zone - Top and bottom base plate brackets constructed of 500mm Reynaers spigot 034.5598 (aluminium) welded onto 225mmx200mmx10mm thick mill finish aluminium flat plate. Fixed to the structure using M12x70mm A2 S/S fixing bolts, at the base bracket only; 2No M12x110mm A2 S/S bolts were used under bottom transom.

- CW60 Zone - Top and bottom base plate brackets constructed of 500mm Reynaers spigot 034.1699 (aluminium) welded onto 225mmx200mmx10mm thick mill finish aluminium flat plate. Fixed to the structure using M12x70mm A2 S/S fixing bolts, at the base bracket only; 2No M12x110mm A2 S/S bolts were used under bottom transom.

- Intermediate fixing brackets same for both the CW50 & CW60 zones 75x260x10mm thick, 200mm long galvanised steel angle. Fixed to the structure using M12x70mm A2 S/S fixing bolts, through the mullion; 2No M12x110mm A2 S/S bolts were used.

Further details of the test sample and façade system can be found in Appendix A – Sample Drawings.

Test Sample During Testing

Photograph No. 1



4. TEST ARRANGEMENT

4.1 TEST CHAMBER

A curtain walling specimen, supplied for testing in accordance with CWCT requirements, was mounted on to a rigid test chamber constructed from steel, timber and plywood sheeting.

The pressure within the chamber was controlled by means of a centrifugal fan and a system of ducting and valves. The static pressure difference between the outside and inside of the chamber was measured by means of a differential pressure transmitter.

4.2 INSTRUMENTATION

4.2.1 Static Pressure

A differential pressure transmitter capable of measuring rapid changes in pressure to an accuracy within 2%, was used to measure the pressure differential across the sample.

4.2.2 Air Flow

A Laminar flow element, mounted in the air system ducting, was used along with differential pressure transducers to measure the airflow required to obtain pressures within the test chamber and has the capability of measuring airflow through the sample to an accuracy within 2%.

4.2.3 Water Flow

An in-line flowmeter, mounted in the spray frame water supply system, was used to measure water flow to the test sample to an accuracy of ± 5%.

4.2.4 Deflection

Digital linear measurement devices with an accuracy of +/- 0.1 mm were used to measure deflection of principle framing members.

4.2.5 Temperature & Humidity

A digital data logger capable of measuring temperature with an accuracy of ± 1°C and humidity with an accuracy of ± 5 %Rh was used.

4.2.6 Atmospheric Pressure

A digital barometer was used to take atmospheric pressure readings with an accuracy of ± 1Kpa.

4.2.7 General

Electronic instrument measurements were scanned by a computer controlled data logger, which processed and recorded the results.

4.3 PRESSURE GENERATION

Note: References are made to both positive and negative pressures in this document, it should be noted that in these instances, positive pressure is when pressure on the weather face of the sample is greater than that on the inside face and vice versa.

4.3.1 Static Air Pressure

The air supply system comprised of a centrifugal fan assembly and associated ducting and control valves which were used to create both positive and negative static pressure differentials. The fan provided a constant airflow at the required pressure and period required for the tests.

4.3.2 Dynamic Aero Engine

A wind generator was mounted adjacent to the external face of the test sample and used to create positive pressure differential during dynamic testing.

4.4 WATER SPRAY

4.4.1 Spray frame arrangement

A water spray system was used which comprised of nozzles spaced on a uniform grid, not more that 700 mm apart and mounted approximately 400 mm from the face of the sample. The nozzles provided a full cone pattern, as per the requirements outlined by CWCT. The system delivered water uniformly to the entire surface of the test sample at a rate of not less than 3.4 lt/m^2/min.

4.4.2 Hose arrangement

The water was applied using a brass nozzle which produced a solid cone of water droplets with a nominal spread of 30°. The nozzle was provided with a control valve and a pressure gauge between the valve and the nozzle. The water flow to the nozzle was adjusted to produce 22 $\pm$ 2 litre/min when the water pressure at the nozzle inlet was 220 $\pm$ 20kPa.

4.5 IMPACTOR

4.5.1 Soft Body Impactor (as specified in BS EN 12600:2002)

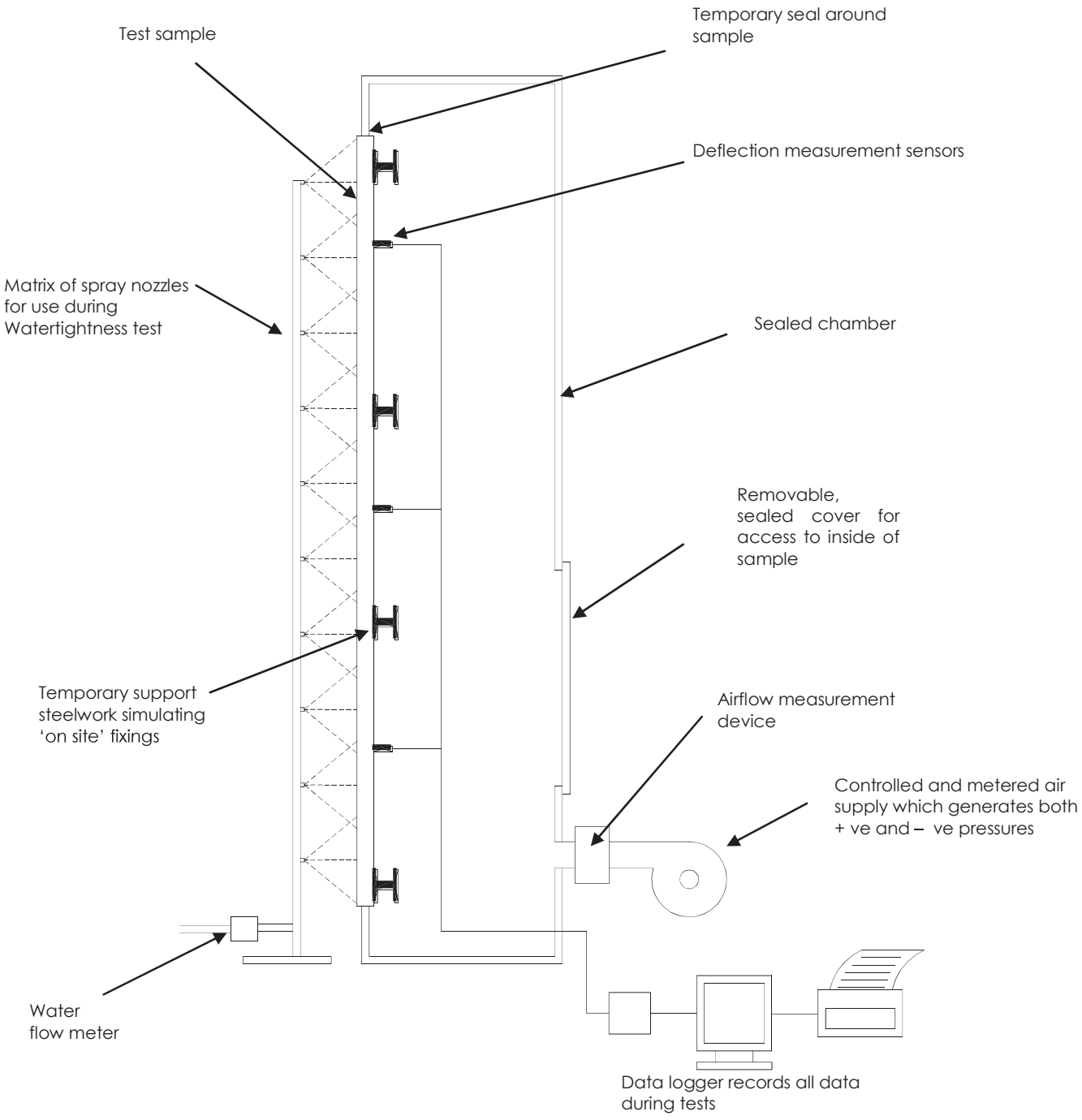
The BS EN 12600 impactor, as per the requirement of CWCT Section 15 & BSEN 13049:2003 was used, and calibrated at appropriate intervals and traceable to National Standards.

It comprised of two specified pneumatic tyres; two equal steel weights and a means of their connection, to give a total mass of 50 Kg ± 0.1 Kg. It was suspended by means of a steel cable of 5 mm diameter. The tyres were inflated to a pressure of 0.35, ± 0.02 MPa – 3.5 bar and were checked before each impact.

All measurement devices, instruments and other relevant equipment were calibrated and are traceable to National Standards.

Figure 1

General Arrangement of a Typical Test Assembly



5. TEST PROCEDURES

5.1 SEQUENCE OF TESTING

1. Air Leakage – Infiltration
2. Air Leakage – Exfiltration
3. Water Penetration – Static Pressure
4. Wind Resistance – Serviceability
5. Repeat Air Leakage – Infiltration
6. Repeat Air Leakage – Exfiltration
7. Repeat Water Penetration – Static Pressure
8. Water Penetration – Dynamic Aero Engine
9. Water Penetration – Hose
10. Wind Resistance – Safety

11a. Impact Resistance – Safety (Soft Body - External)
11b. Impact Resistance – Safety (Soft Body - Internal)

5.2 AIR LEAKAGE

5.2.1 Infiltration

Three (3) preparatory pulses of **660 Pa (110% of peak test pressure)** positive pressure were applied to the test sample. An airtight seal comprising of plastic sheeting and adhesive tape was then attached to the face of the test sample.

Leakage through the test chamber and joints between the chamber and test sample was determined by measuring the air flow at the following positive pressures; **50, 100, 150, 200, 250, 300, 450 and 600 Pa** each step being held for at least 10 seconds.

Test results for the sample were determined by repeating the above sequence with the sample unsealed. The difference between the readings being the air leakage through the sample.

A check for concentrated air leakage was conducted following the above sequence.

5.2.2 Exfiltration

Three (3) preparatory pulses of **500 Pa** negative pressure were applied to the test sample. An airtight seal comprising of plastic sheeting and adhesive tape was then attached to the face of the test sample.

Leakage through the test chamber and joints between the chamber and test sample was determined by measuring the air flow at the following positive pressure; **50 & 100 Pa**, which was held for at least 10 seconds.

Test results for the sample were determined by repeating the above sequence with the sample unsealed. The difference between the readings being the air leakage through the sample.

5.3 WATER PENETRATION

5.3.1 Water Penetration – Static Pressure

Three (3) preparatory pulses of **660 Pa (110% of peak test pressure)** positive pressure were applied to the test sample.

Water was sprayed on to the sample as described in section 4.4.1 for 15 minutes at zero (0) Pa. The water spray continued and the pressure was increased in the following positive increments; **50, 100, 150, 200, 300, 450 and 600 Pa**, each stage being held for 5 minutes.
The interior face of the sample was continuously monitored for water ingress throughout the test.

5.3.2 Water Penetration – Dynamic Aero Engine

Water was sprayed on to the sample as described in section 4.4.1.

The sample was subjected to airflow from the wind generator, as described in 4.3.2, which achieved average deflections equal to those produced at a static pressure differential of **600 Pa** and these conditions were met for the specified 15 minutes.

The interior face of the sample was continuously monitored for water ingress throughout the test.

5.3.3 Water Penetration – Hose

Working from the exterior, selected areas of curtain wall were wetted from the bottom up, progressing from the lowest horizontal joint then the intersecting vertical joints.

Water was applied to the sample for 5 mins per 1.5 m length of joint, as described in section 4.4.2.

Throughout the water penetration testing, and for 30 minutes following the cessation of spraying, the internal face of the sample was examined for water penetration. The emergence of any water on the inside face would be recorded, and the location and extent of any leakage noted on a drawing of the test specimen.

5.4 WIND RESISTANCE

5.4.1 Wind Resistance – Serviceability

Three (3) preparatory pulses of **1200 Pa (50% of design wind load)** positive pressure were applied to the test sample. Upon returning to 0 Pa, any opening parts of the test specimen were opened and closed five (5) times, secured in the closed position and finally sealed with tape. All deflection sensors were then zeroed.

The sample was then subjected to positive pressure stages of **600, 1200, 1800 and 2400 Pa (25%, 50%, 75% and 100% of design wind load)** and held at each step for 15 seconds (± 5 secs).

The deformation status of the sample was recorded at each step at characteristic points as stated in the standard, following which the pressure was reduced to 0 Pa and any residual deformations recorded within 1 hour of the test.

The above test sequence was then repeated, including the preparation pulses, at a negative pressure differential. All sensors other than those used for recording the movement of framing members adjacent to their fixings to building structure were zeroed following preparation pulses.

Following each of the above tests, the sample was inspected for permanent deformation or damage.

5.4.2 Wind Resistance – Safety

Three preparatory positive air pressure pulses of **1200 Pa (50% of design wind load)** positive pressure were applied to the test sample, and the deflection sensors were zeroed.

The sample was subjected to a positive pressure pulse of **3600 Pa (2400 Pa x 150%)**. The pressure was applied as rapidly as possible but in not less than 1 second and was maintained for 15 seconds (± 5 secs).

Following this pressure pulse and upon returning to zero (0) pressure, residual deformations were recorded and any change in the condition of the specimen was noted.

After the above sequence, a visual inspection was conducted, any moving parts were operated and any damage or functional defects noted.

The above test sequence was then repeated, including the preparation pulses, with negative pressure. The deflection sensors were zeroed following the preparation pulses.

Following each of the above tests, the sample was inspected for any permanent deformation or damage.

5.5 IMPACT - SAFETY

5.5.1 Impact Test Procedure

The test sample was tested using a drop height which corresponded with the required performance level.

The Impactor, as described in section 4.5.1, was suspended on a wire cord and allowed to swing freely, without initial velocity, in a pendulum motion until it hit the sample normal to its face. Only one impact was performed at any single position.

Tests were conducted at the specified drop height of **950 mm** to the selected impact points and the impactor was not allowed to strike the sample more than once.

Drop heights were set to an accuracy of ± 10 mm.

6. TEST RESULTS

6.1 AIR LEAKAGE

6.1.1 Calculated Permissible Air Infiltration of Test Sample

Permissible air infiltration rate as CWCT standard test methods for building envelopes – section 5:
Fixed glazing = 1.5 $m^3/hr/m^2$
Opening joints = 2.0 $m^3/hr/m$

The permissible air infiltration rate at intermediate test pressures was determined as specified by CWCT standard test methods for building envelopes – section 5.

Air permeability measured at maximum test pressure in the 2nd test should not increase by more than 0.3 $m^3/hr/m^2$ for fixed glazing above those recorded in the 1st test, as required in CWCT standard for systemised building envelopes: section 3 & BS EN 13116: 2001.

Measured area of test sample = 57.6 m^2
Measured length of joint of opening vents = 5.91 m

6.1.2 Air Leakage – Classification

Classification according to CWCT & BS EN 12152: 2002

Tests 1 & 5 – Infiltration – Fixed glazing	A4
Tests 1 & 5 – Infiltration – Opening joints	A4

Note: There is no classification requirement for exfiltration testing in CWCT standard for systemised building envelopes – section 5. However, Approved Document L2 requires a maximum air leakage rate of 10 $m^3/hr/m^2$ @ 50 Pa for a completed building envelope.

6.1.3 Fixed Glazing

Pressure Differential Pa	Maximum Air Permeability Rate –Infiltration $m^3/hr/m^2$				Maximum Air Permeability Rate – Exfiltration $m^3/hr/m^2$			
	Test No. 1		Test No. 5		Test No. 2		Test No. 6	
	Ambient ° C	3.0	Ambient ° C	9.0	Ambient ° C	3.0	Ambient ° C	9.0
50	0.04		0.04		0.02		0.05	
100	0.04		0.04		0.03		0.04	
150	0.04		0.04					
200	0.05		0.05					
250	0.05		0.06					
300	0.06		0.07					
450	0.09		0.09					
600	0.10		0.01					

Observations
No areas of concentrated leakage were found during testing.

6.1.4 Opening Joints

Pressure Differential Pa	Maximum Air Permeability Rate –Infiltration $m^3/hr/m$				Maximum Air Permeability Rate – Exfiltration $m^3/hr/m$			
	Test No. 1		Test No. 5		Test No. 2		Test No. 6	
	Ambient ° C	3.0	Ambient ° C	9.0	Ambient ° C	3.0	Ambient ° C	9.0
50	0.06		0.05		0.11		0.17	
100	0.05		0.06		0.16		0.20	
150	0.10		0.05					
200	0.11		0.05					
250	0.13		0.06					
300	0.10		0.08					
450	0.10		0.12					
600	0.11		0.14					

Observations
No areas of concentrated leakage were found during testing.

Note: The standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%, for the above measurements is ± 5.33 % of the reading

Figure 2

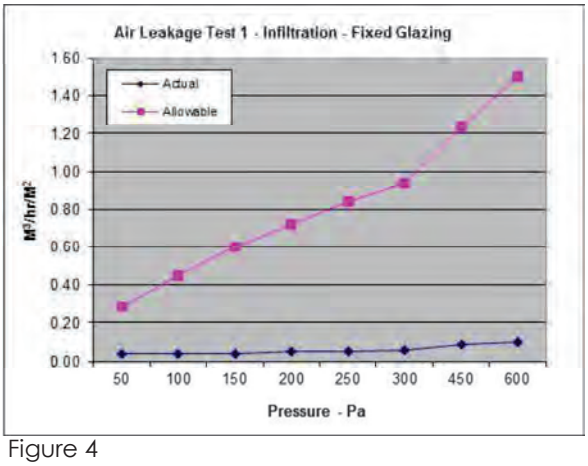


Figure 3

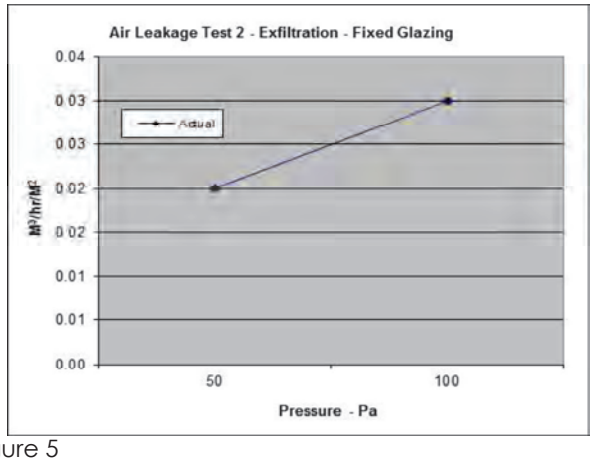


Figure 4

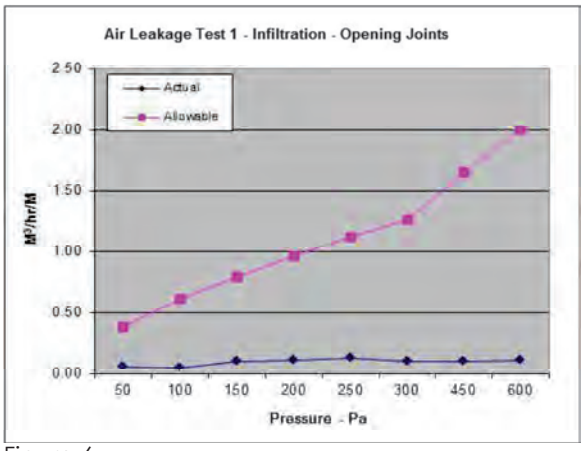


Figure 5

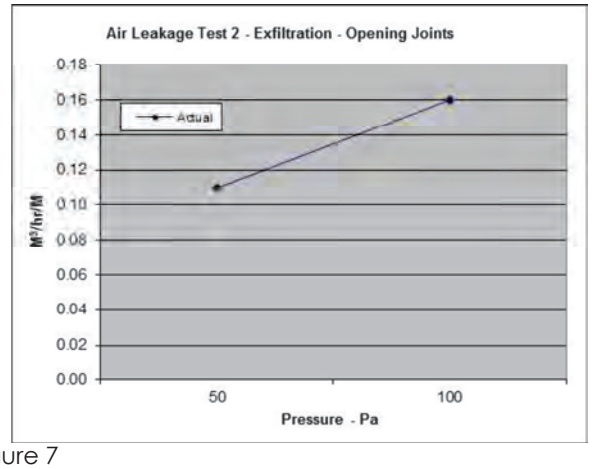


Figure 6

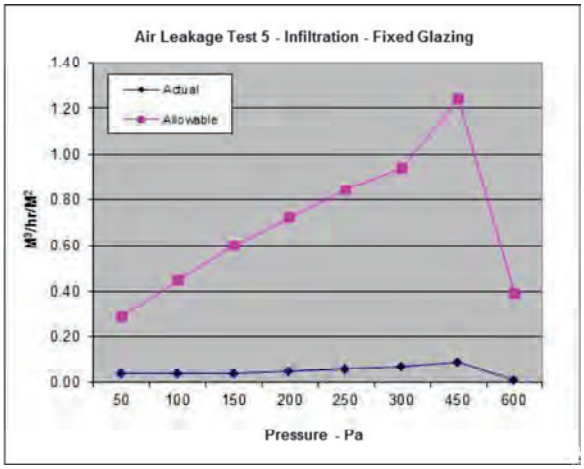


Figure 7

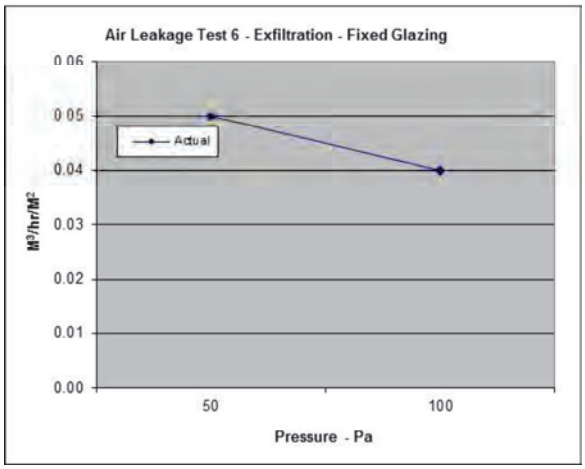


Figure 8

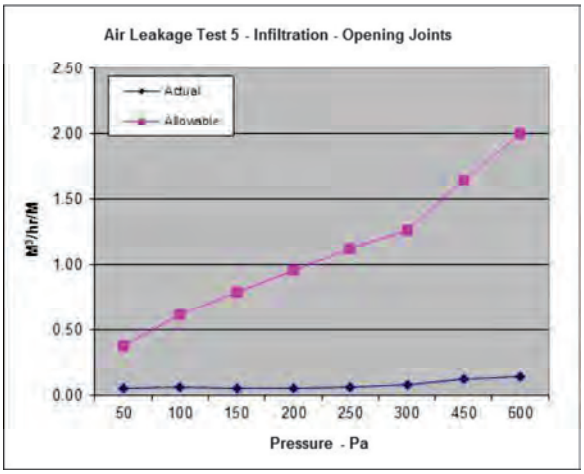
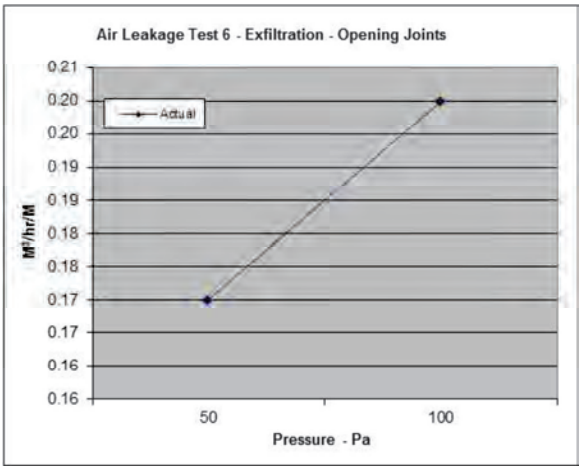


Figure 9



6.2 WATER PENETRATION

6.2.1 Water Penetration – Classification

Classification according to CWCT & BS EN 12154: 2000

Test 3 – Water Penetration – Static	R7

6.2.2 Test 3 – Water Penetration – Static

Temperatures (°C)	Water	10.4
	Ambient	5.0

AIR PRESSURE Pa	COMMENTS
0 x 15 minutes	No Leakage
50 x 5 minutes	No Leakage
100 x 5 minutes	No Leakage
150 x 5 minutes	No Leakage
200 x 5 minutes	No Leakage
300 x 5 minutes	No Leakage
450 x 5 minutes	No Leakage
600 x 5 minutes	No Leakage

Observations
There was no water leakage observed during the water spray.

6.2.3 Test 7 – Repeat Water Penetration – Static

Temperatures (°C)	Water	9.8
	Ambient	7.0

AIR PRESSURE Pa	COMMENTS
0 X 15 minutes	No Leakage
50 x 5 minutes	No Leakage
100 x 5 minutes	No Leakage
150 x 5 minutes	No Leakage
200 x 5 minutes	No Leakage
300 x 5 minutes	No Leakage
450 x 5 minutes	No Leakage
600 x 5 minutes	No Leakage

Observations
There was no water leakage observed during the water spray.

6.2.4 Test 8 – Water Penetration – Dynamic Aero Engine

Temperatures (°C)	Water	8.5
	Ambient	6.0

Observations
The sample was subjected to testing as described in section 5.3.2, for a period of not less than 15 minutes, during which no water leakage was observed through the sample.

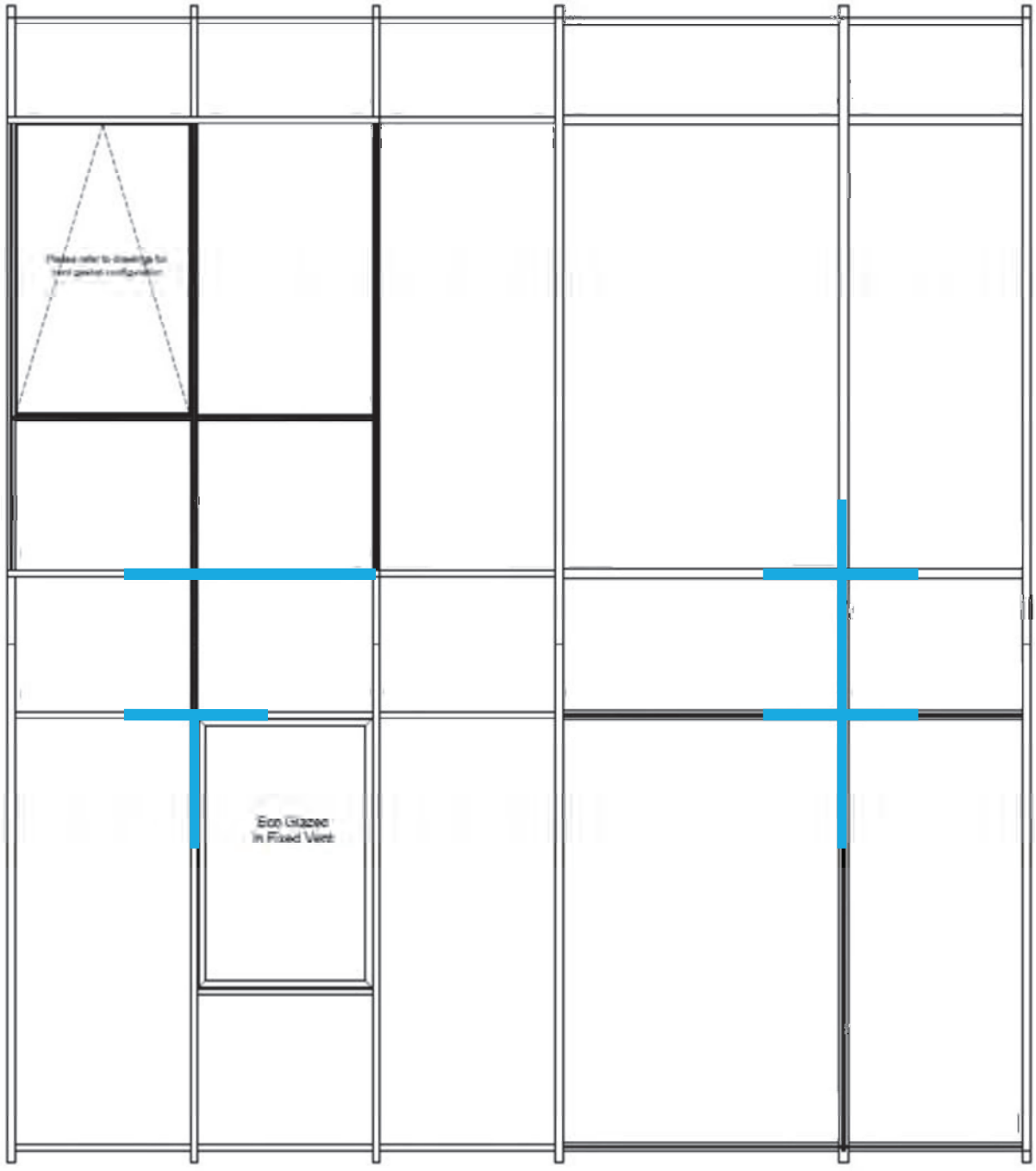
6.2.5 Test 9 – Water Penetration – Hose

Observations

The sample was subjected to hose testing, as described in section 5.3.4. During the test, and for 30 minutes following the cessation of spraying, the sample was monitored for water ingress and none was found.

Figure 10

Hose Test Areas



View from Outside

- Hose test areas

Not to Scale

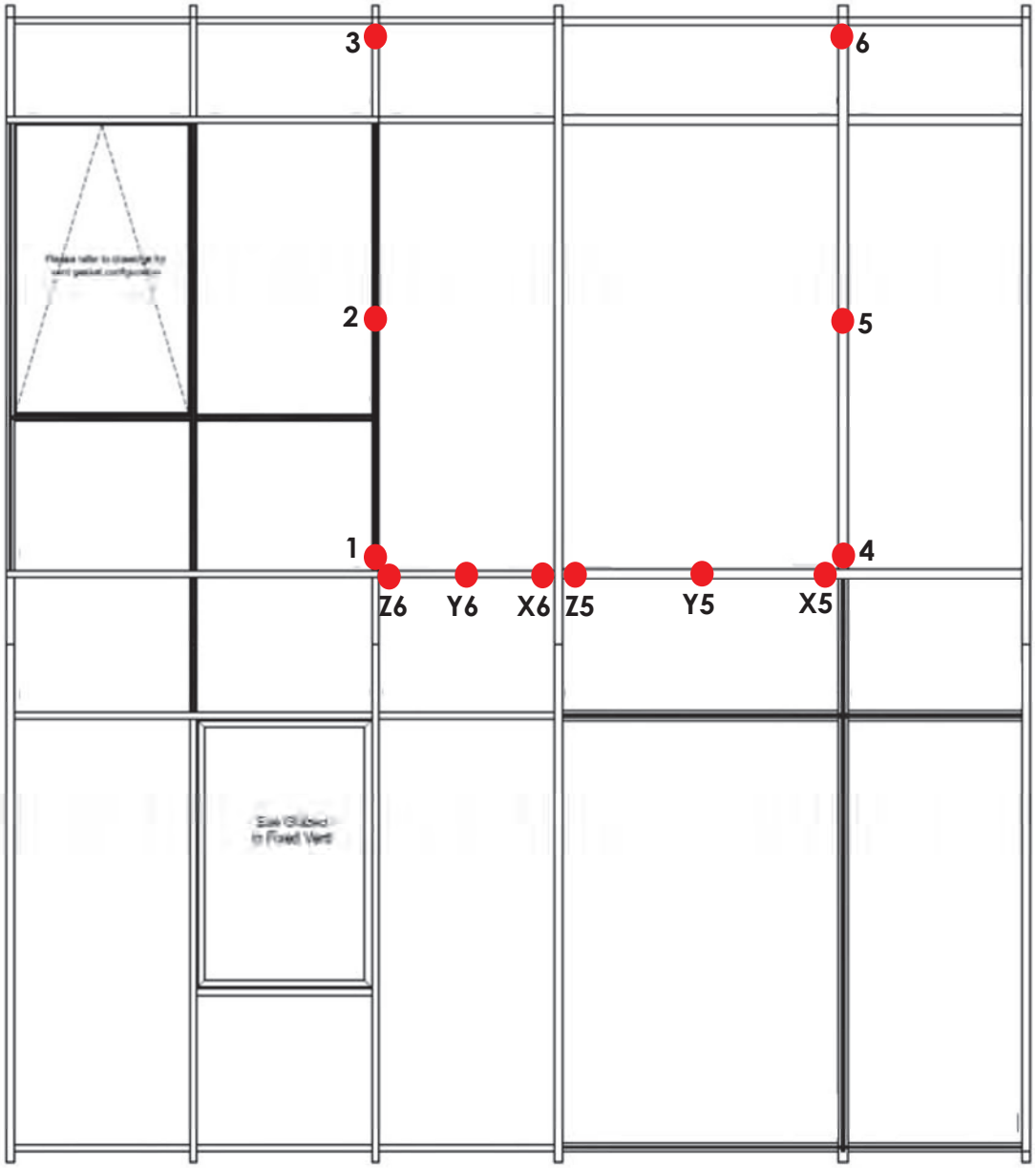
6.3 WIND RESISTANCE TESTING

	Calculation of deflection
Group A comprised of probes 1, 2 & 3	= Probe 2 – ((Probe 1 + Probe 3)/2)
Group B comprised of probes 4, 5, & 6	= Probe 5 – ((Probe 4 + Probe 6)/2)
Group B comprised of probes X5, Y5, & Z5	= Probe Y5 – ((Probe X5 + Probe Z5)/2)
Group B comprised of probes X6, Y6, & Z6	= Probe Y6 – ((Probe X6 + Probe Z6)/2)

An inspection carried out following tests 4 and 10, after both positive and negative pressure testing, showed no evidence of any permanent deformation or damage to the test sample.

Figure 11

Positions of Deflection Measurement Probes



● - Deflection probe position

View from Outside

Not to Scale

6.3.1 Test 4 - Wind Resistance, Serviceability

Temperatures (°C)	Ambient	6.0

Measured Length of Framing Member (mm)		Allowable Deflection	
		Ratio	Calculated (mm)
Group A	4080	L/300	18.6
Group B	4050	L/300	18.5
Group C	1894	L/200	9.5
Group D	1190	L/200	6.0

Frontal deflection shall recover by either 95%, or 1mm, whichever the greater.

The total movement of framing members adjacent to points of support shall be less than 2 mm taken as the difference between the positions under peak positive and peak negative loads.

6.3.1.1 Wind Resistance, Serviceability - Positive Pressure

Positive Pressure Pa	Results			
	Group A	Group B	Group C	Group D
0	0.0	0.0	0.0	0.0
600	1.4	2.0	0.3	0.1
1200	2.6	3.7	0.5	0.1
1800	4.1	5.4	0.8	0.1
2400	5.6	7.4	1.2	0.2
Residuals Immediately following test	0.8	0.8	0.1	0.0

6.3.1.2 Wind Resistance, Serviceability - Negative Pressure

Negative Pressure Pa	Results			
	Group A	Group B	Group C	Group D
0	0.0	0.0	0.0	0.0
600	1.5	2.0	0.3	0.0
1200	3.0	3.9	0.5	0.1
1800	4.5	5.9	0.9	0.0
2400	6.1	8.3	1.1	0.2
Residuals Immediately following test	0.3	0.6	0.1	0.1

6.3.2 Test 10 - Wind Resistance, Safety

Temperatures (°C)	Ambient	7.1

Measured Length of Framing Member (mm)		Allowable Deflection	
		Ratio	Calculated (mm)
Group A	4080	L/500	8.2
Group B	4050	L/500	8.1
Group C	1894	L/500	3.8
Group D	1190	L/500	2.4

The total movement of framing members adjacent to points of support shall be less than 3 mm taken as the difference between the positions under peak positive and negative loads.

6.3.2.1 Wind Resistance, Safety - Positive Pressure

Positive Pressure Pa	Results			
	Group A	Group B	Group C	Group D
0	0.0	0.0	0.0	0.0
3600	8.7	11.5	1.5	0.3
Residuals Immediately following test	1.2	1.3	0.0	0.0

6.3.2.2 Wind Resistance, Safety - Negative Pressure

Negative Pressure Pa	Results			
	Group A	Group B	Group C	Group D
0	0.0	0.0	0.0	0.0
3600	9.3	13.3	1.5	0.2
Residuals Immediately following test	0.7	1.5	0.1	0.0

Note: The standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95%, for the above measurements is ± 2.4 % of the reading

6.4 IMPACT TESTING

6.4.1 Test 11a – Impact – Safety (Soft Body)

Temperatures (°C)	Ambient	3.0
Humidity (%RH)	89.0	

Impact Reference	Test Classification	Drop Height (mm)	Observations	Result
E1	E5	950	Bounce – No Damage	Pass
E2	E5	950	Bounce – No Damage	Pass
E3	E5	950	Bounce – No Damage	Pass
E4	E5	950	Bounce – No Damage	Pass
E5	E5	950	Bounce – No Damage	Pass
E6	E5	950	Bounce – No Damage	Pass
E7	E5	950	Bounce – No Damage	Pass
E8	E5	950	Bounce – No Damage	Pass
E9	E5	950	Bounce – No Damage	Pass
E10	E5	950	Bounce – No Damage	Pass

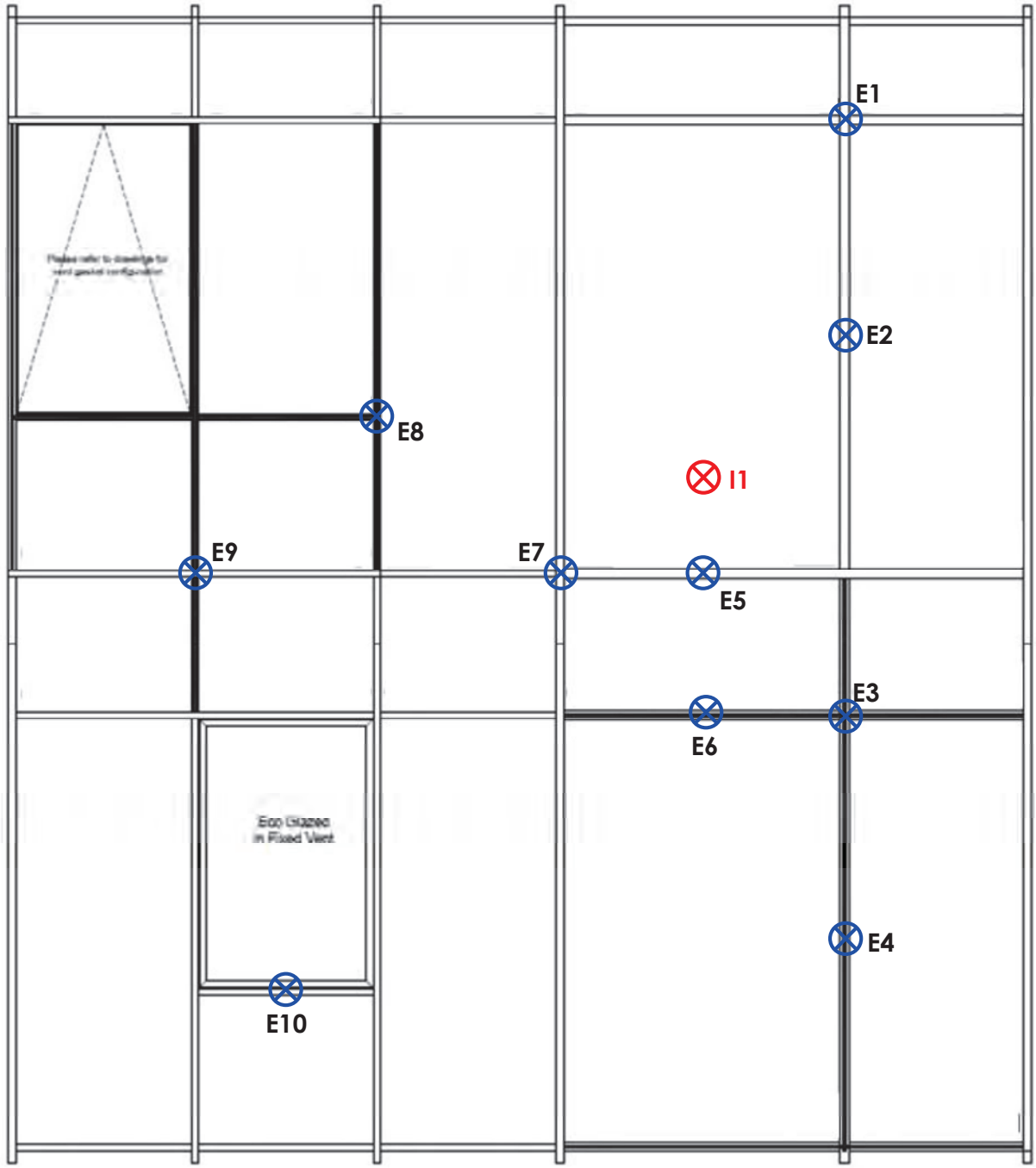
6.4.2 Test 11b – Impact – Safety (Soft Body)

Temperatures (°C)	Ambient	3.0
Humidity (%RH)	89.0	

Impact Reference	Test Classification	Drop Height (mm)	Observations	Result
I1	I5	950	Bounce – No Damage	Pass

6.4.3 Impact Positions

Figure 12



⊗ - Internal impact position

⊗ - External impact position

View from Outside

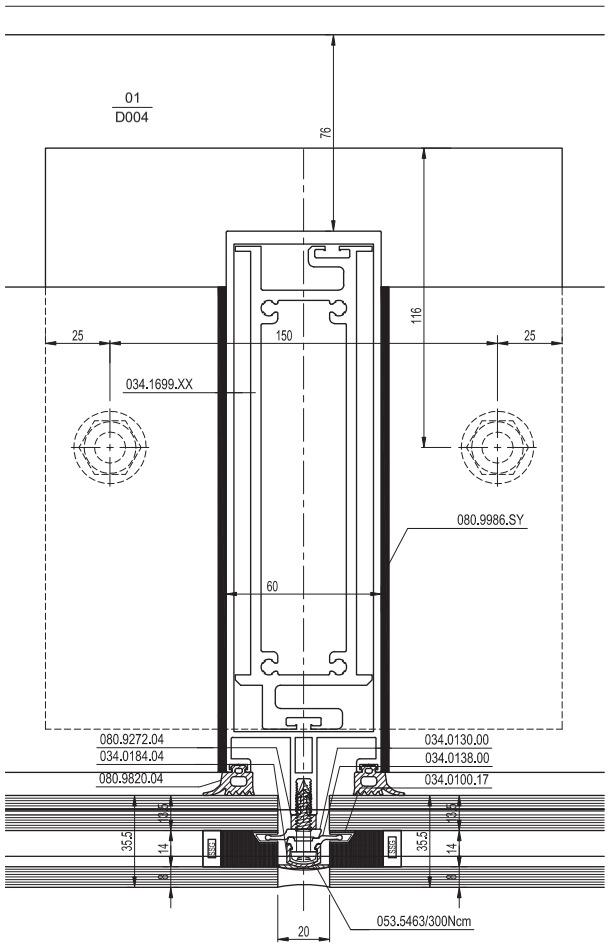
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APPENDIX A

System Drawings

(23 drawings on 23 un-numbered pages)

CW50/CWCT/D001 C Rev D
CW50/CWCT/D002 C Rev D
CW50/CWCT/D003 C Rev D
CW50/CWCT/D004 C Rev C
CW50/CWCT/D005 C Rev E
CW50/CWCT/D006 B Rev B
CW50/CWCT/D007 D Rev E
CW50/CWCT/D008 A Rev A
CW50/CWCT/D009 D Rev E
CW50/CWCT/D010 B Rev B
CW50/CWCT/D011 D Rev E
CW50/CWCT/D012
CW50/CWCT/D013 B Rev B
CW50/CWCT/D014
CW50/CWCT/D015 B Rev C
CW50/CWCT/D016 B Rev C
CW50/CWCT/E2 A Rev A
CW50/CWCT/E3 A Rev A
CW50/CWCT/E4 A Rev A
CW50/CWCT/E1 E Rev F
CW50/CWCT/B1
CW50/CWCT/B2
CW50/CWCT/B3 Rev A



CW60 Zone

WINTECH
Drawing as supplied to WEL
BUILDING ENVELOPE TESTING

Reynaers Ltd,
Kettles Wood Drive,
Birmingham.
B32 3DB
Tel: 0121 421 1999 Fax: 0121 421 9797

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PROJECT: CWCT Test Sample

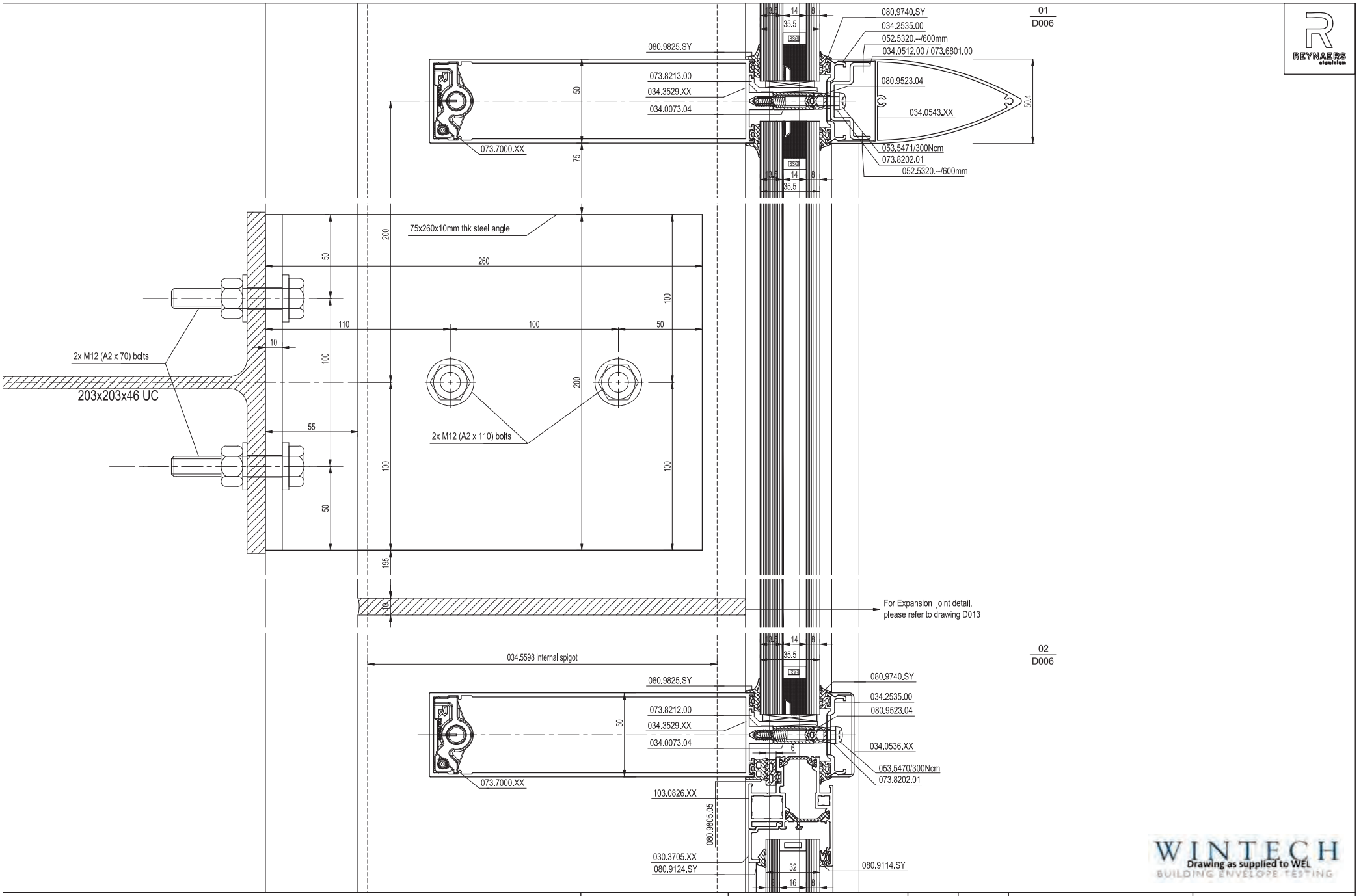
DRAWING TITLE: Detail Drawing 4

ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments
B	20/08/2014	Updated as per latest S/E comments
C	15/12/2014	Updated as per site comments

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D004 C



WINTECH
Drawing as supplied to WEL
BUILDING ENVELOPE TESTING

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Kettles Wood Drive,
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PROJECT: CWCT Test Sample

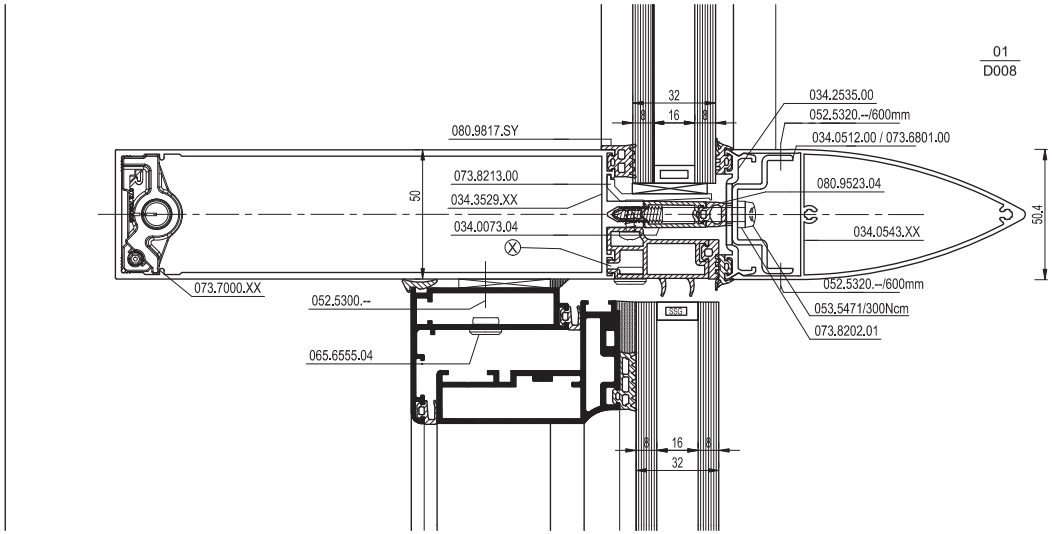
DRAWING TITLE: Detail Drawing 6

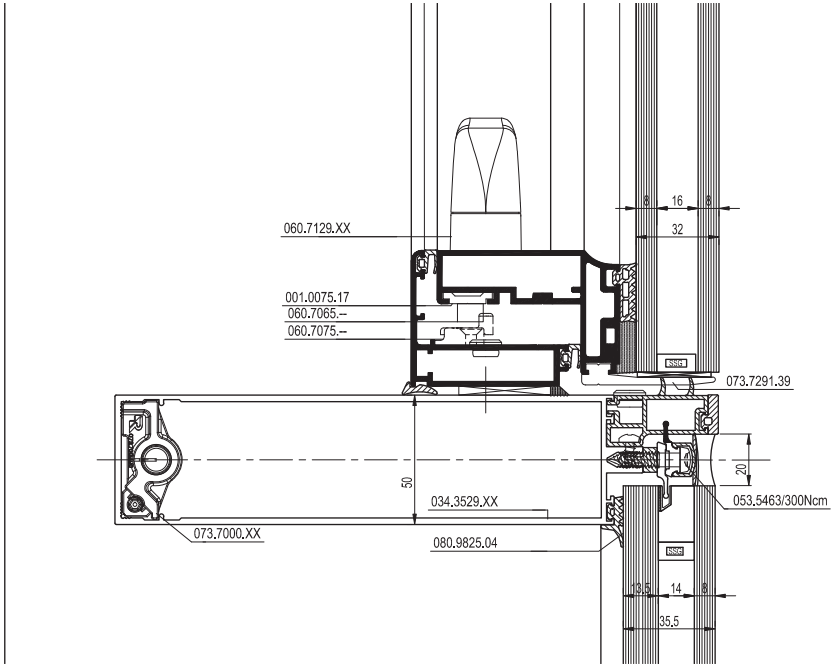
ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments
B	20/08/2014	Updated as per latest S/E comments

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D006 B





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PROJECT: CWCT Test Sample

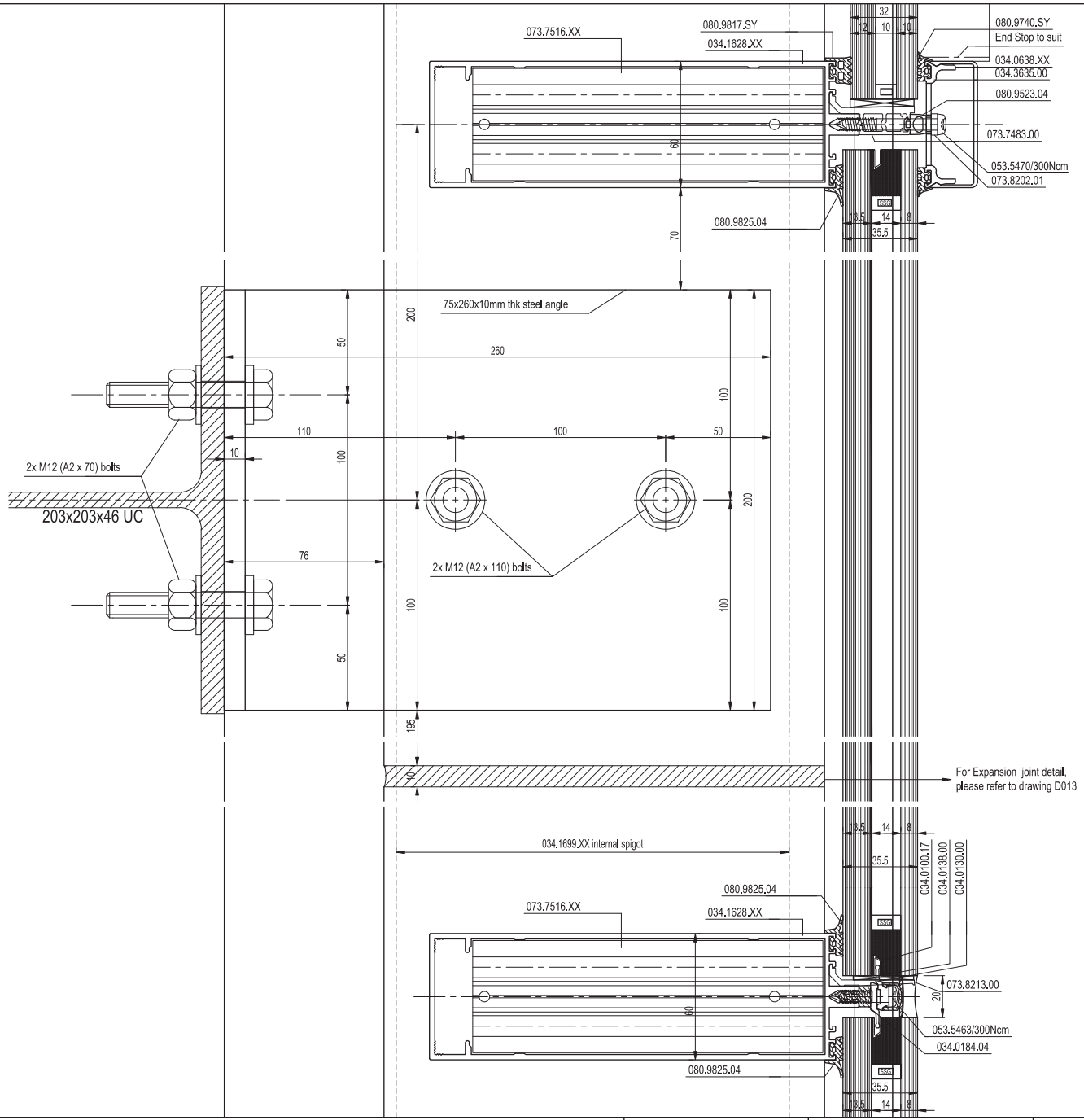
DRAWING TITLE: Detail Drawing 8

ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D008 A



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PROJECT: CWCT Test Sample

DRAWING TITLE: Detail Drawing 10

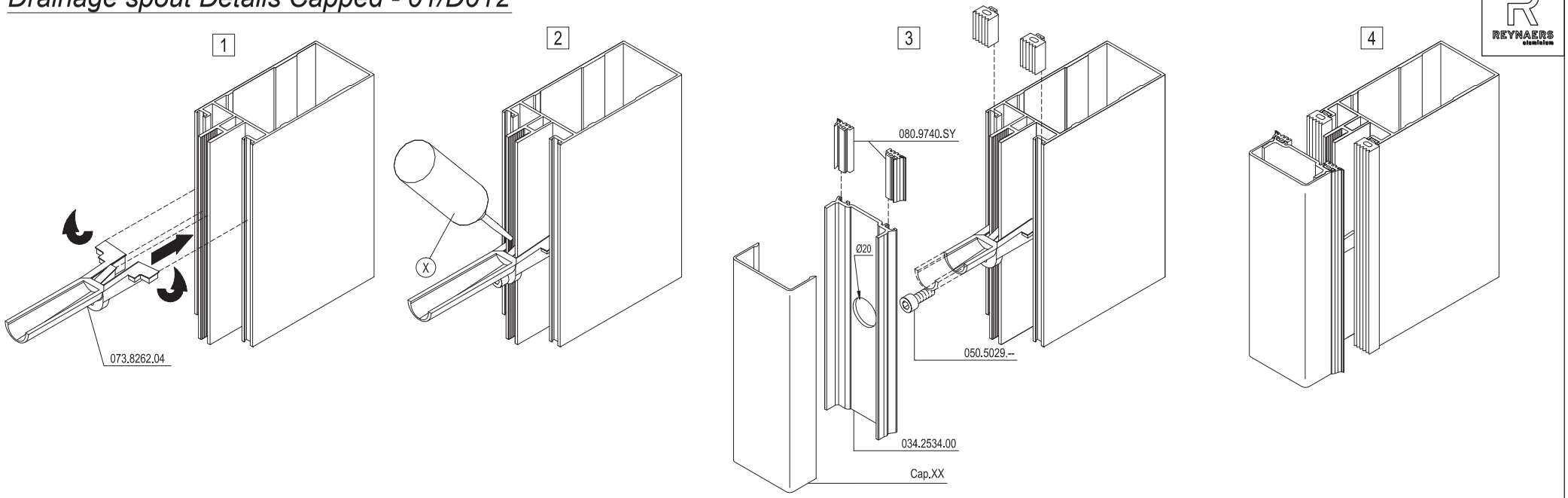
ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments
B	20/08/2014	Updated as per latest S/E comments

DRAWN: LJM DATE: Jul 2014

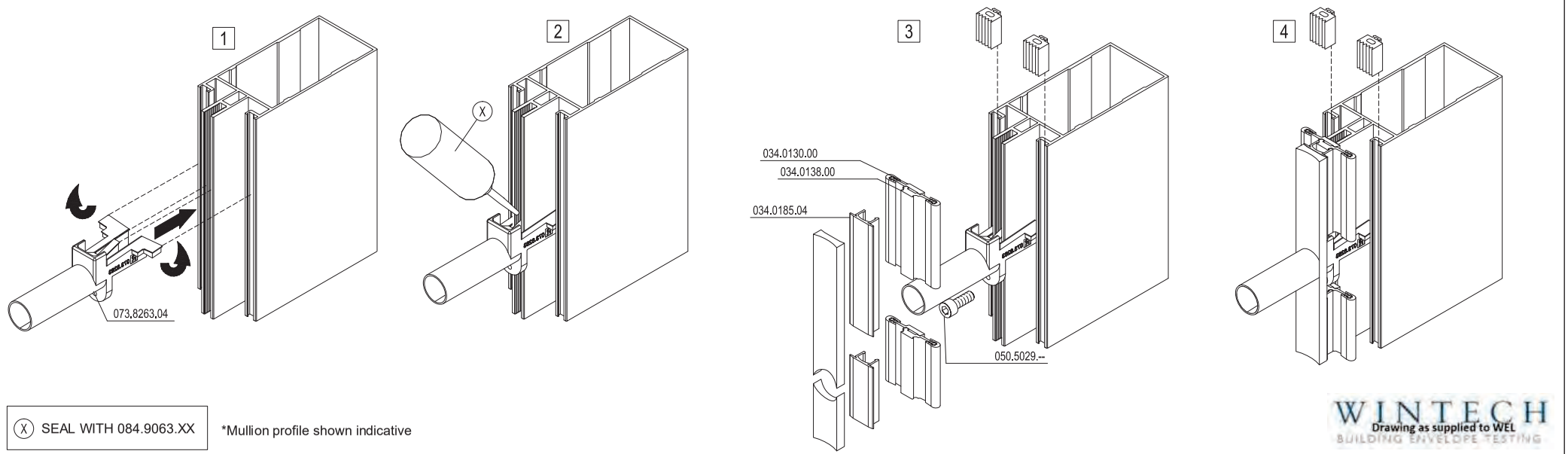
SCALE: NTS

DRAWING NO: CW50/CWCT/D010 B

Drainage spout Details Capped - 01/D012



Drainage spout Details SC (Structurally Camped) - 02/D012



X SEAL WITH 084.9063.XX

*Mullion profile shown indicative

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PROJECT: CWCT Test Sample

DRAWING TITLE: Drainage spout details

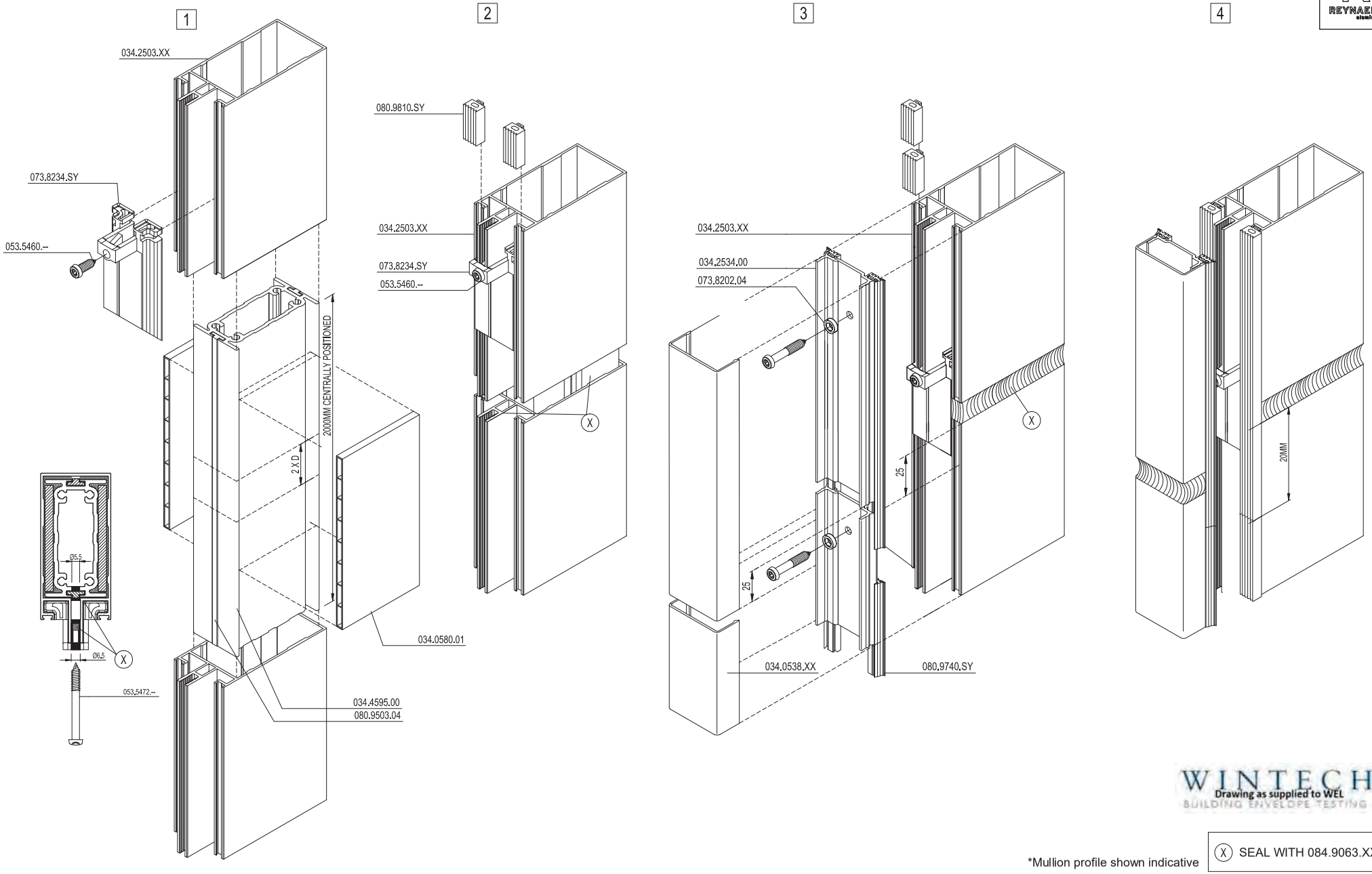
ISSUE	DATE	DESCRIPTION OF REVISION
.	.	.

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D012

Expansion Detail - 01/D013- To be read in conjunction with D014



*Mullion profile shown indicative

X SEAL WITH 084.9063.XX

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PROJECT: CWCT Test Sample

DRAWING TITLE: Expansion joint details

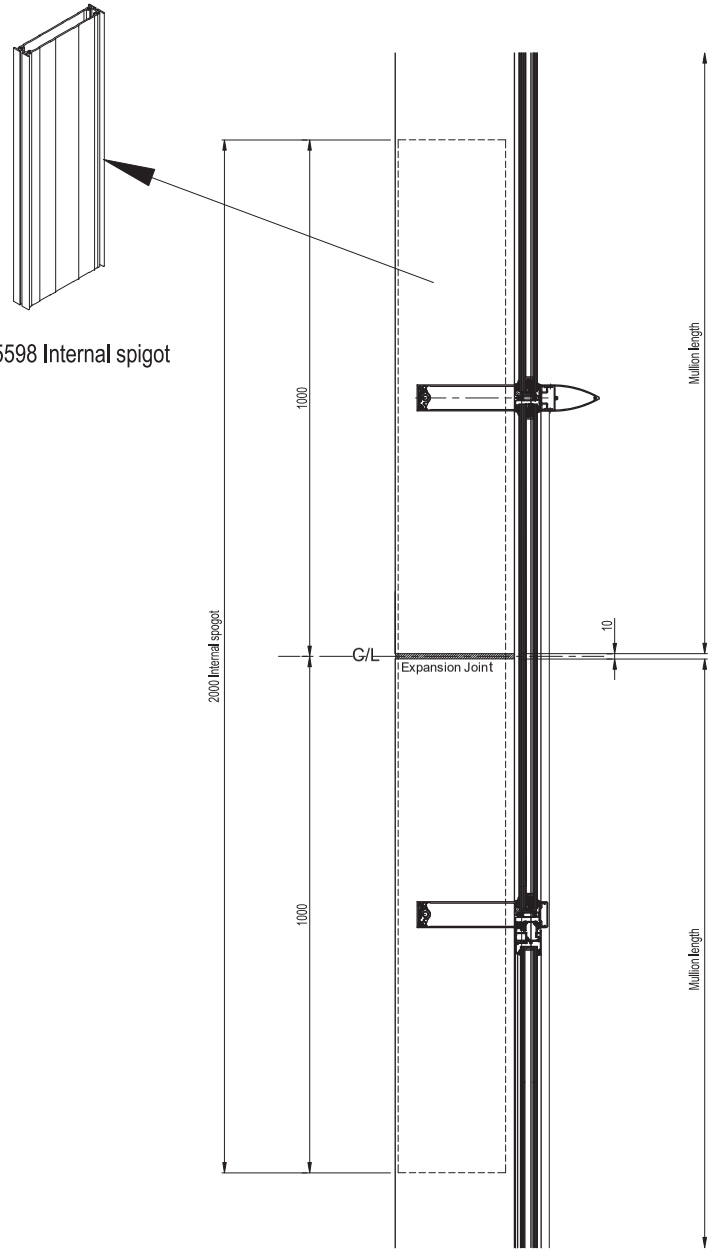
ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments
B	20/08/2014	Updated as per latest S/E comments

DRAWN: LJM DATE: Jul 2014

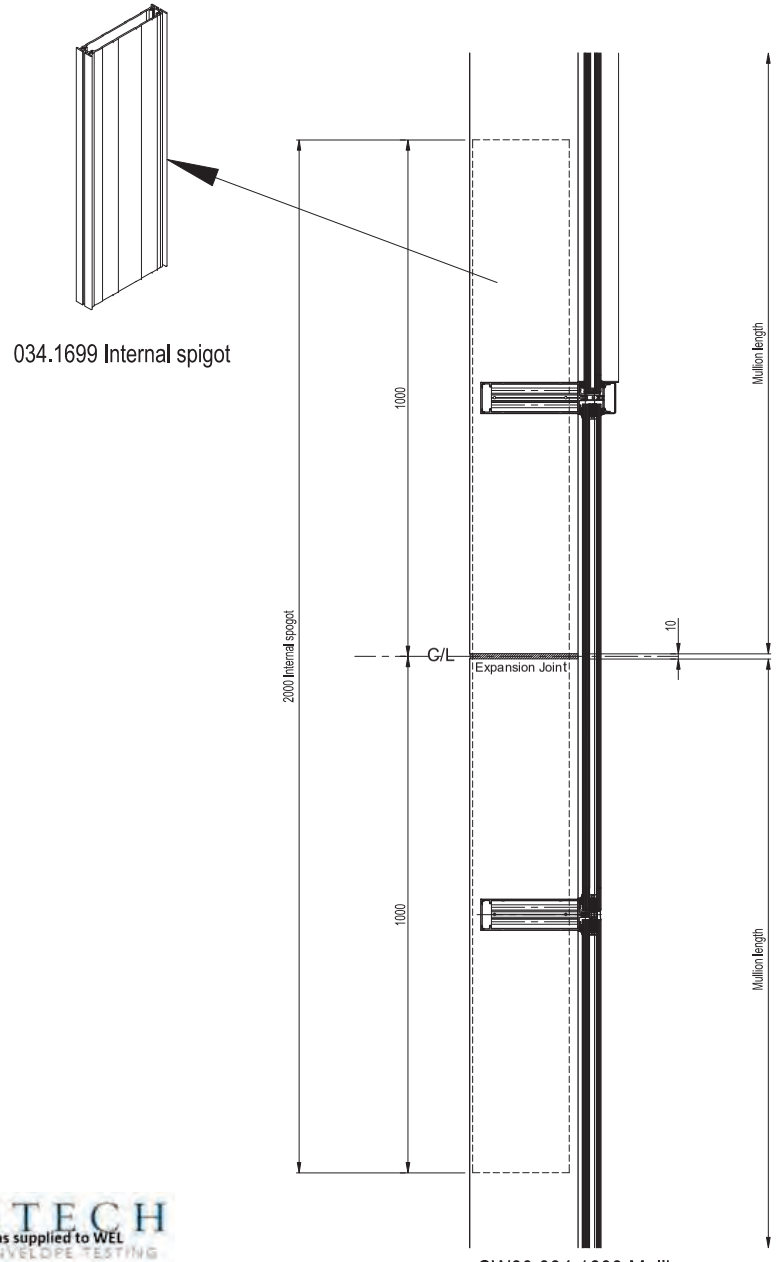
SCALE: NTS

DRAWING NO: CW50/CWCT/D013 B

Expansion Detail - 01/D014- To be read in conjunction with D013



CW50 034.2510 Mullion



CW60 034.1609 Mullion

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PROJECT: CWCT Test Sample

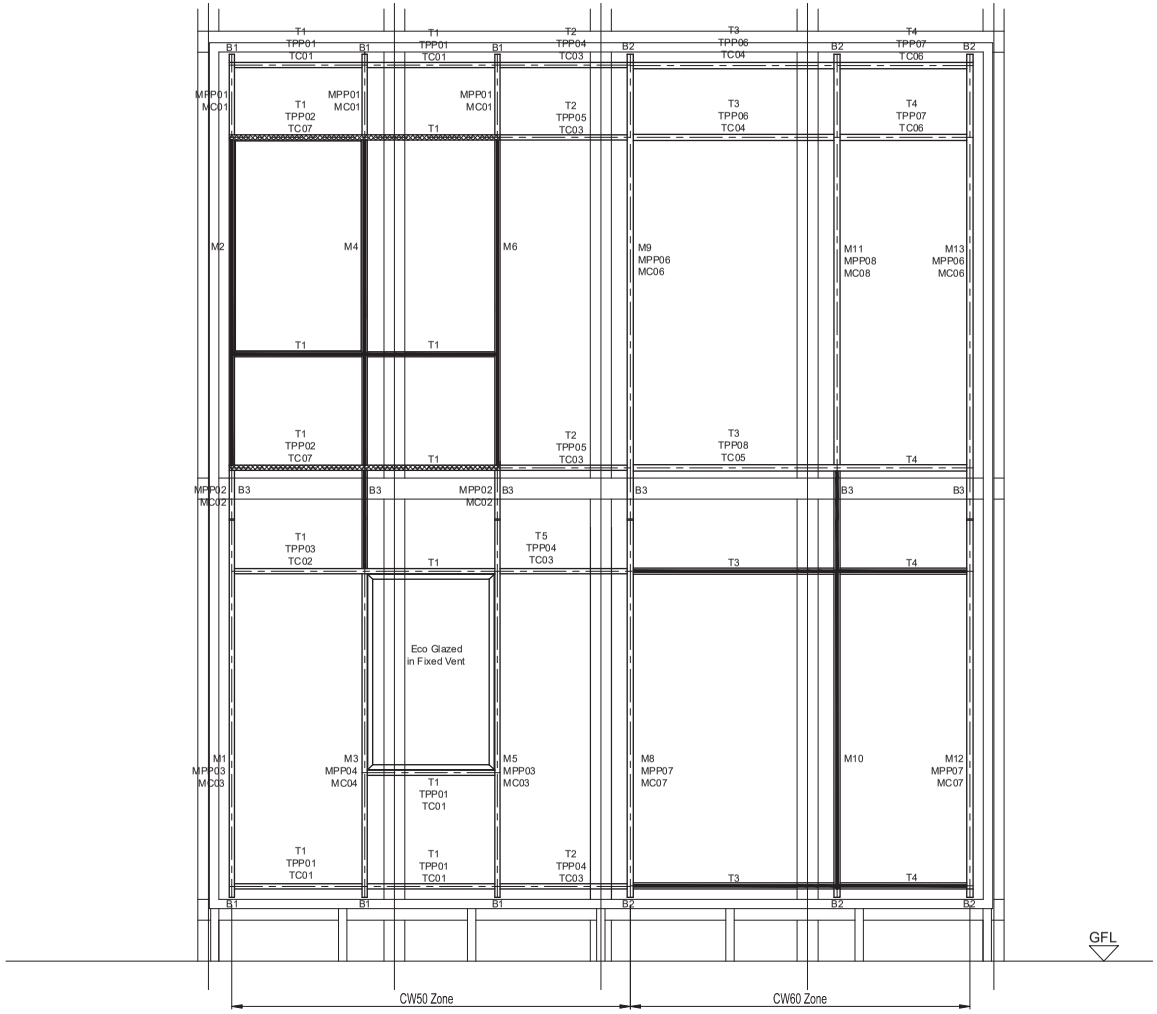
DRAWING TITLE: Internal details at expansion joint

ISSUE	DATE	DESCRIPTION OF REVISION
.	.	.

DRAWN: LJM DATE: Aug 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D014



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PROJECT: CWCT Test Sample

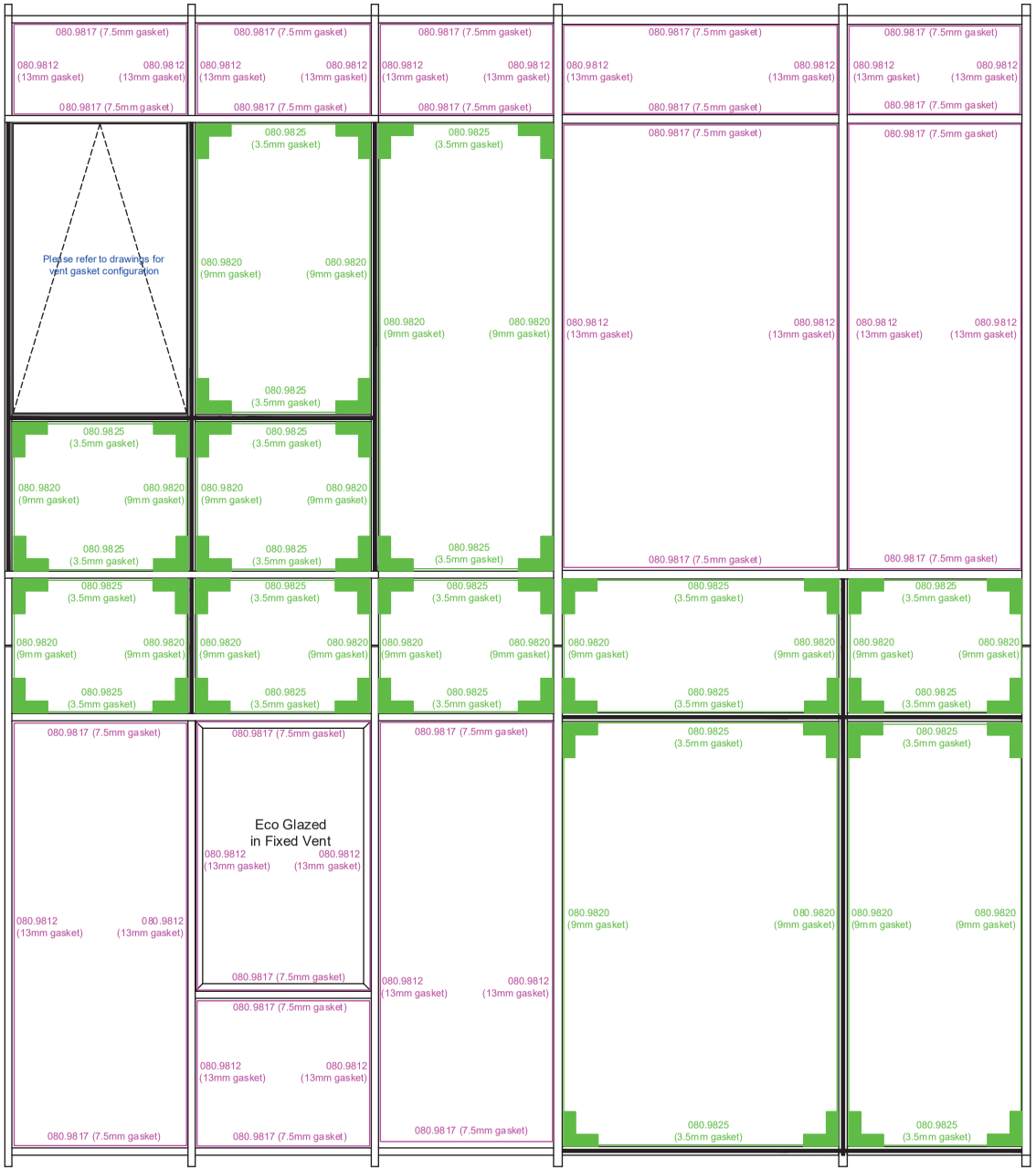
DRAWING TITLE: Bar/bracket location drawing

ISSUE	DATE	DESCRIPTION OF REVISION
A	15/12/2014	General updates

DRAWN: LJM DATE: Sept 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/E2 A



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PROJECT: CWCT Test Sample

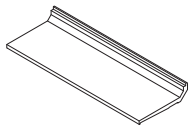
DRAWING TITLE: Gasket location drawing

ISSUE	DATE	DESCRIPTION OF REVISION
A	15/12/2014	General updates

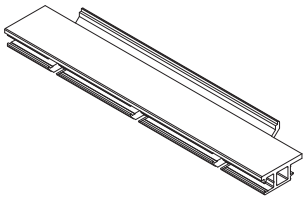
DRAWN: LJM DATE: Oct 2014

SCALE: NTS

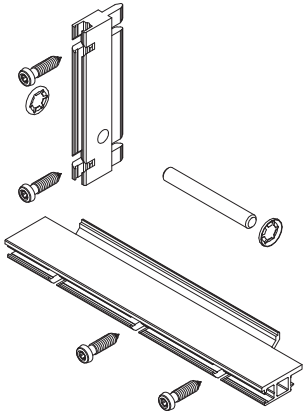
DRAWING NO: CW50/CWCT/E3 A



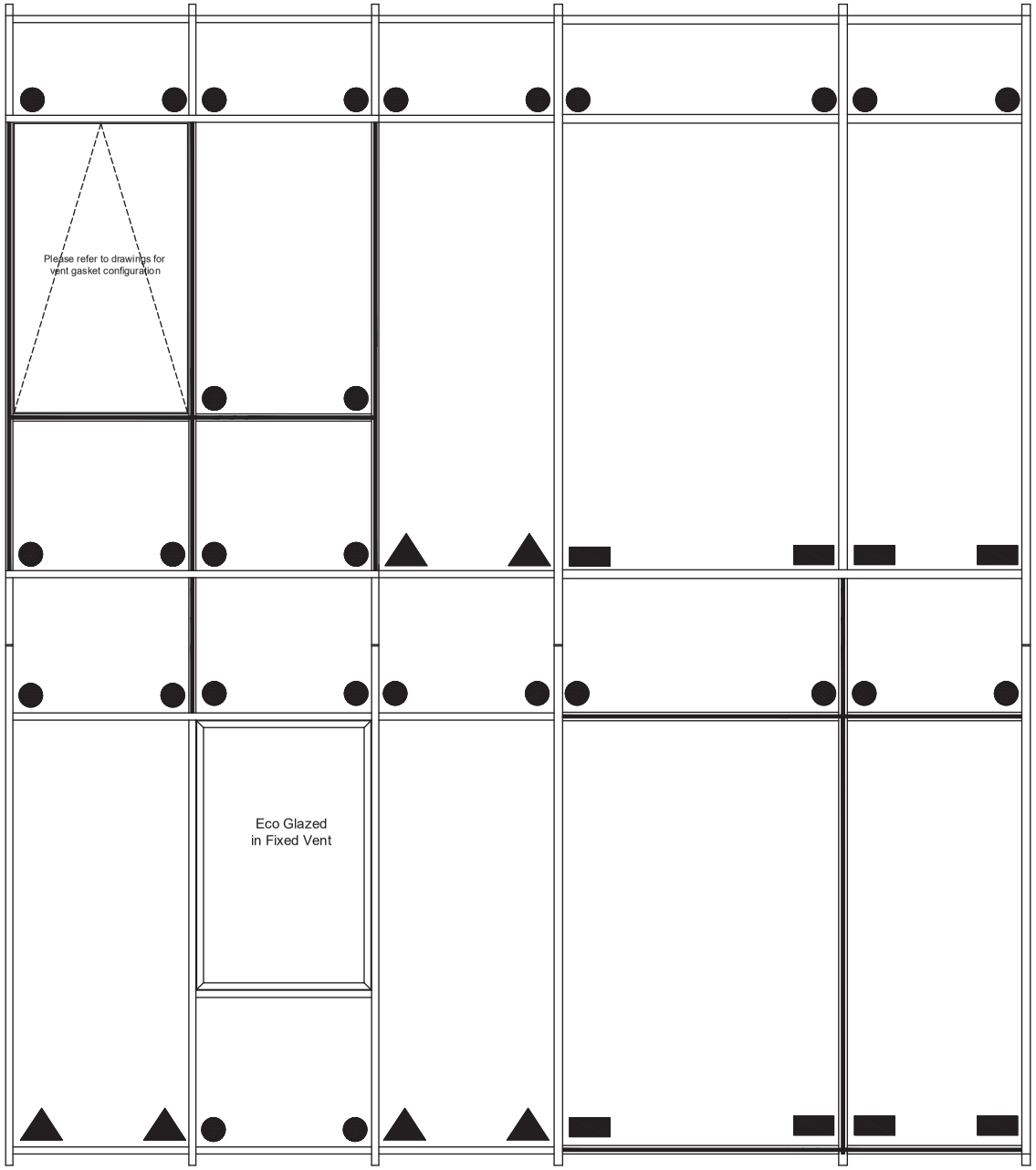
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REYNAERS aluminium

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PROJECT: CWCT Test Sample

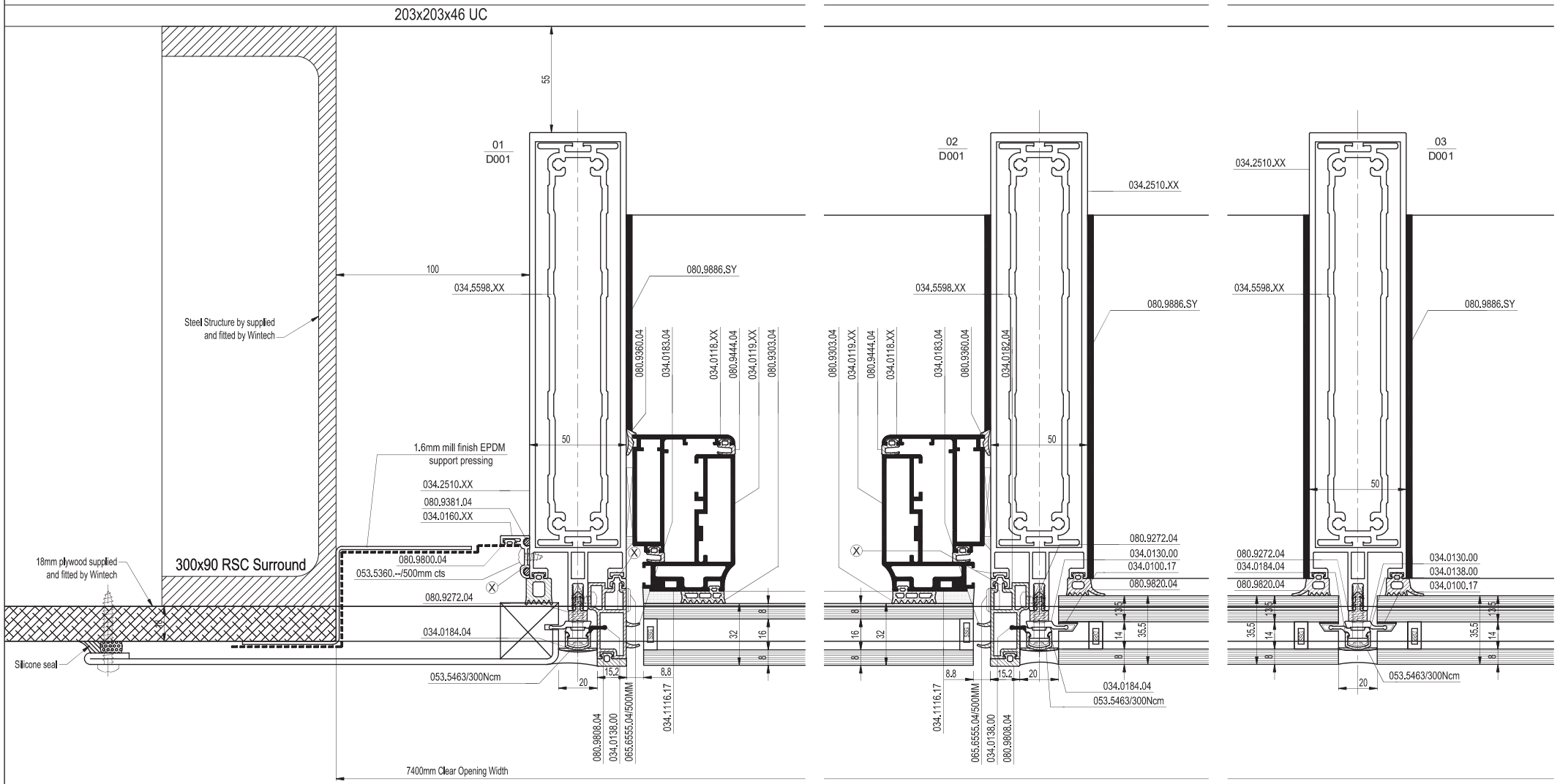
DRAWING TITLE: Glass support location

ISSUE	DATE	DESCRIPTION OF REVISION
A	15/12/2014	General updates

DRAWN: LJM DATE: Oct 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/E4 A



CW50 Zone

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PROJECT: CWCT Test Sample

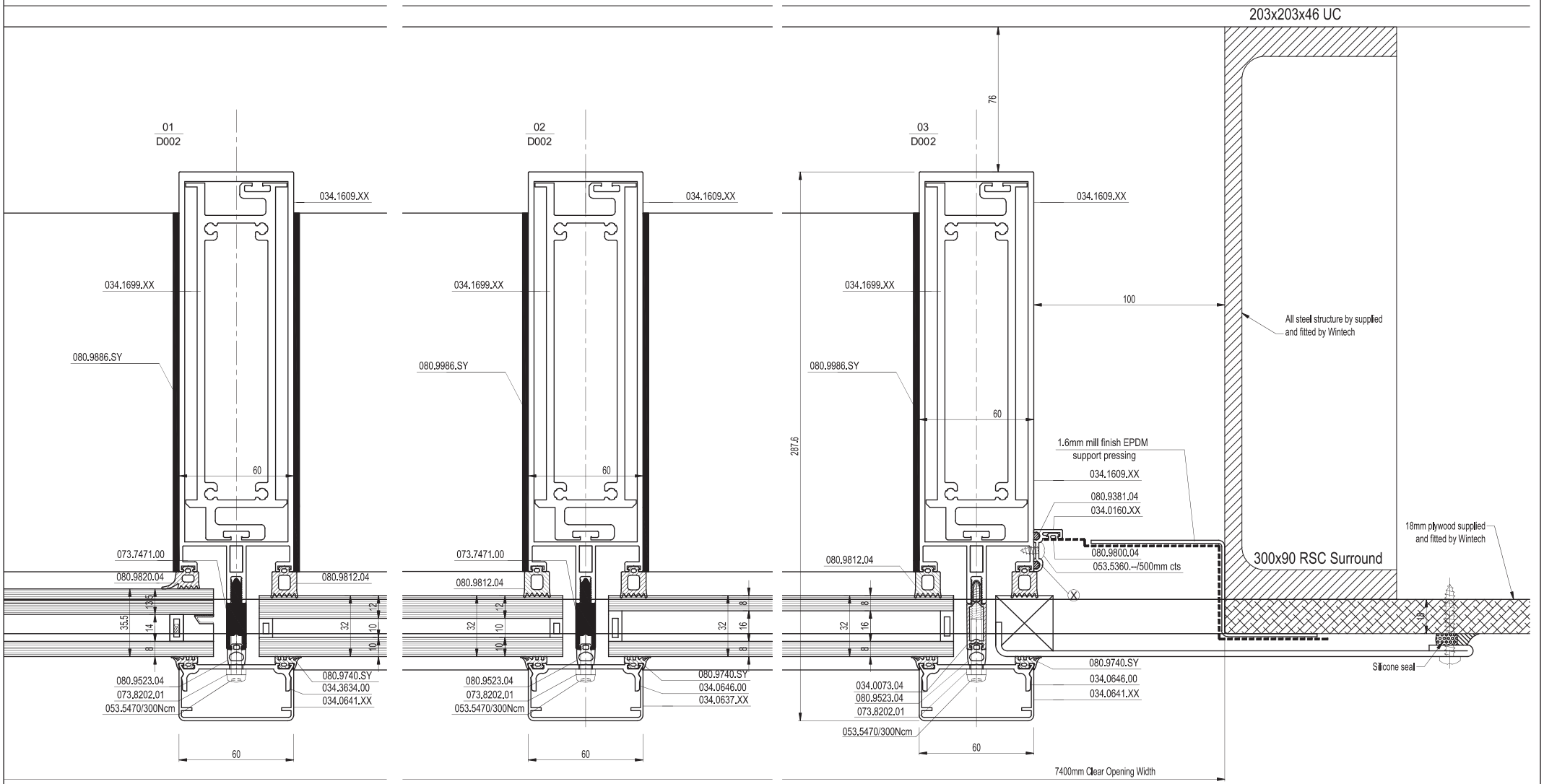
DRAWING TITLE: Detail Drawing 1

ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments
B	20/08/2014	Updated as per latest S/E comments
C	29/09/2014	Interface flashing detail updated
D	07/01/2015	EPDM carrier pressing updated

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D001 D



CW60 Zone

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PROJECT: CWCT Test Sample

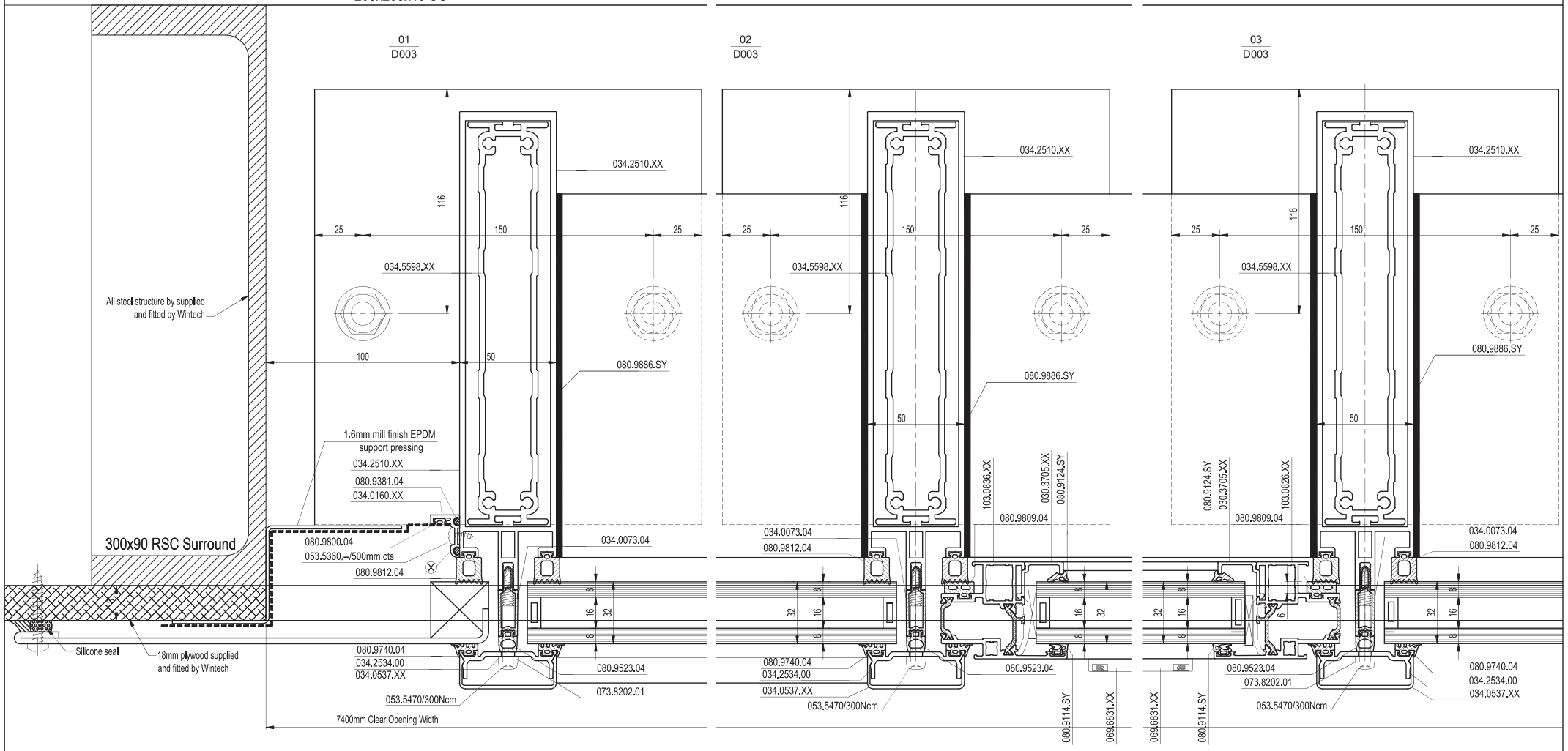
DRAWING TITLE: Detail Drawing 2

ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments
B	20/08/2014	Updated as per latest S/E comments
C	29/09/2014	Interface flashing detail updated
D	07/01/2015	EPDM carrier pressing updated

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D002 D



CW50 Zone

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PROJECT: CWCT Test Sample

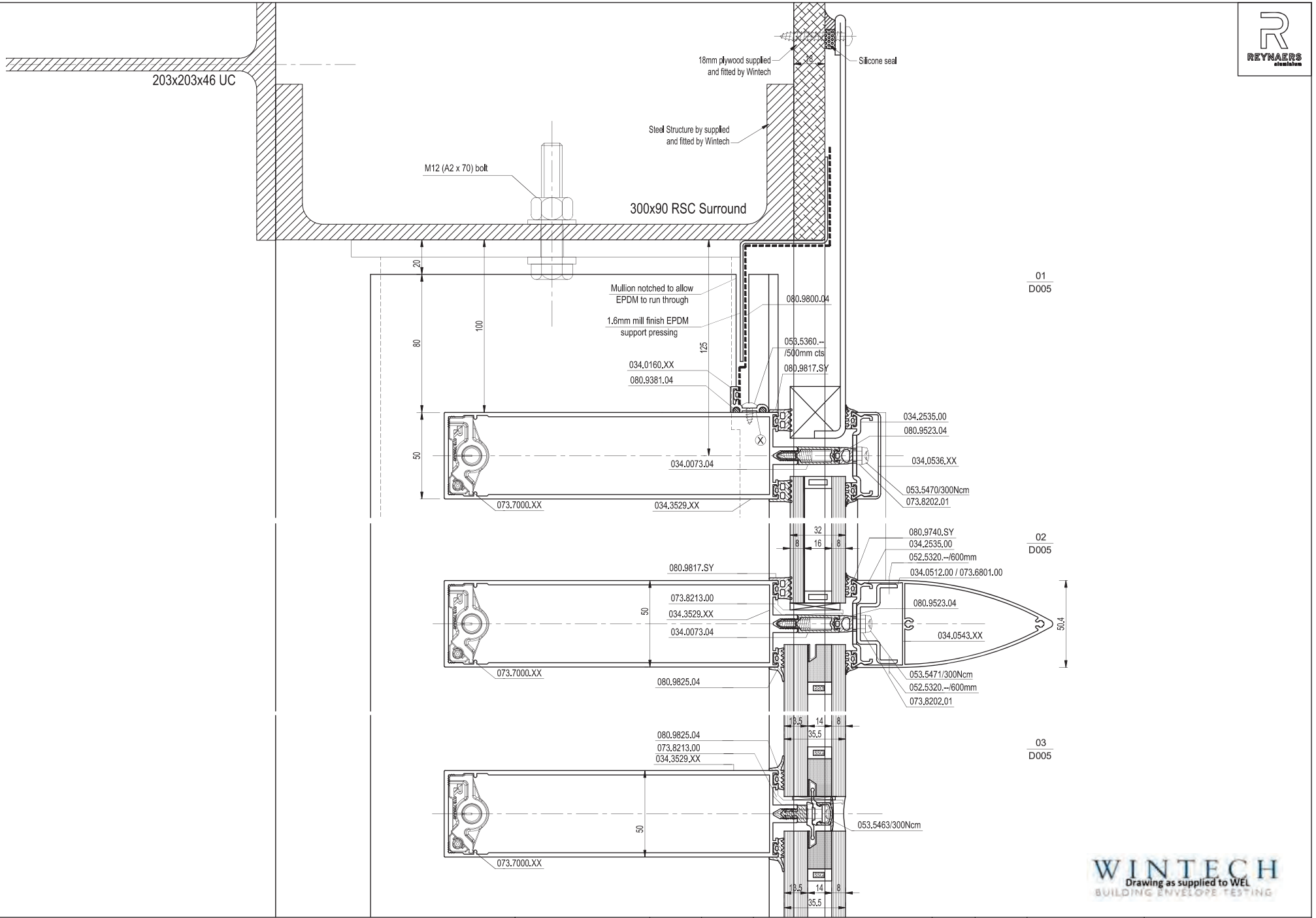
DRAWING TITLE: Detail Drawing 3

ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments
B	20/08/2014	Updated as per latest S/E comments
C	29/09/2014	Interface flashing detail updated
D	07/01/2015	EPDM carrier pressing updated

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D003 D



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PROJECT: CWCT Test Sample

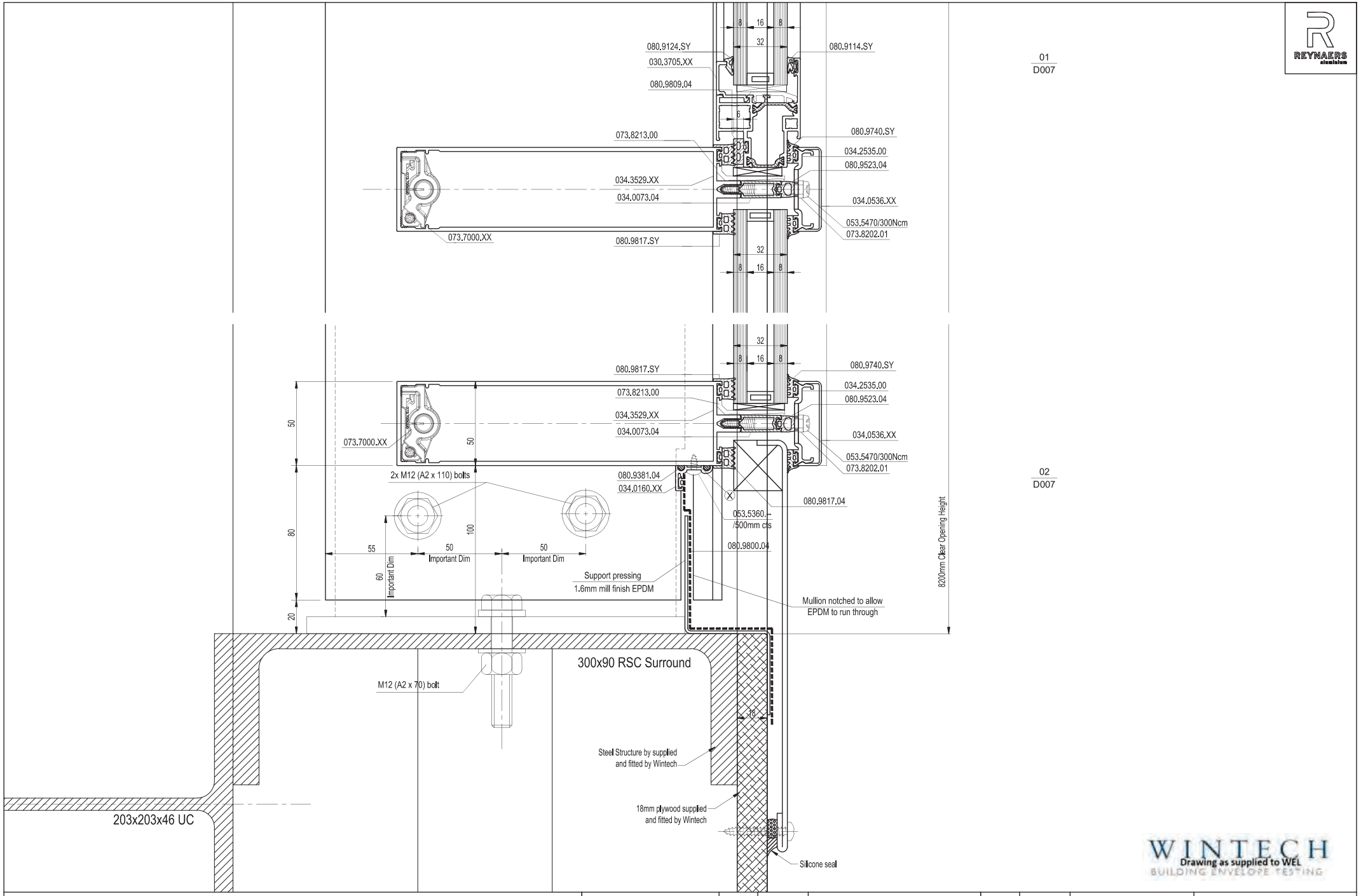
DRAWING TITLE: Detail Drawing 5

ISSUE	DATE	DESCRIPTION OF REVISION	ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments	E	07/01/2015	EPDM carrier added
B	20/08/2014	Updated as per latest S/E comments			
C	08/09/2014	Mullion end prep altered			
D	29/09/2014	Interface flashing detail updated			

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D005 E



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PROJECT: CWCT Test Sample

DRAWING TITLE: Detail Drawing 7

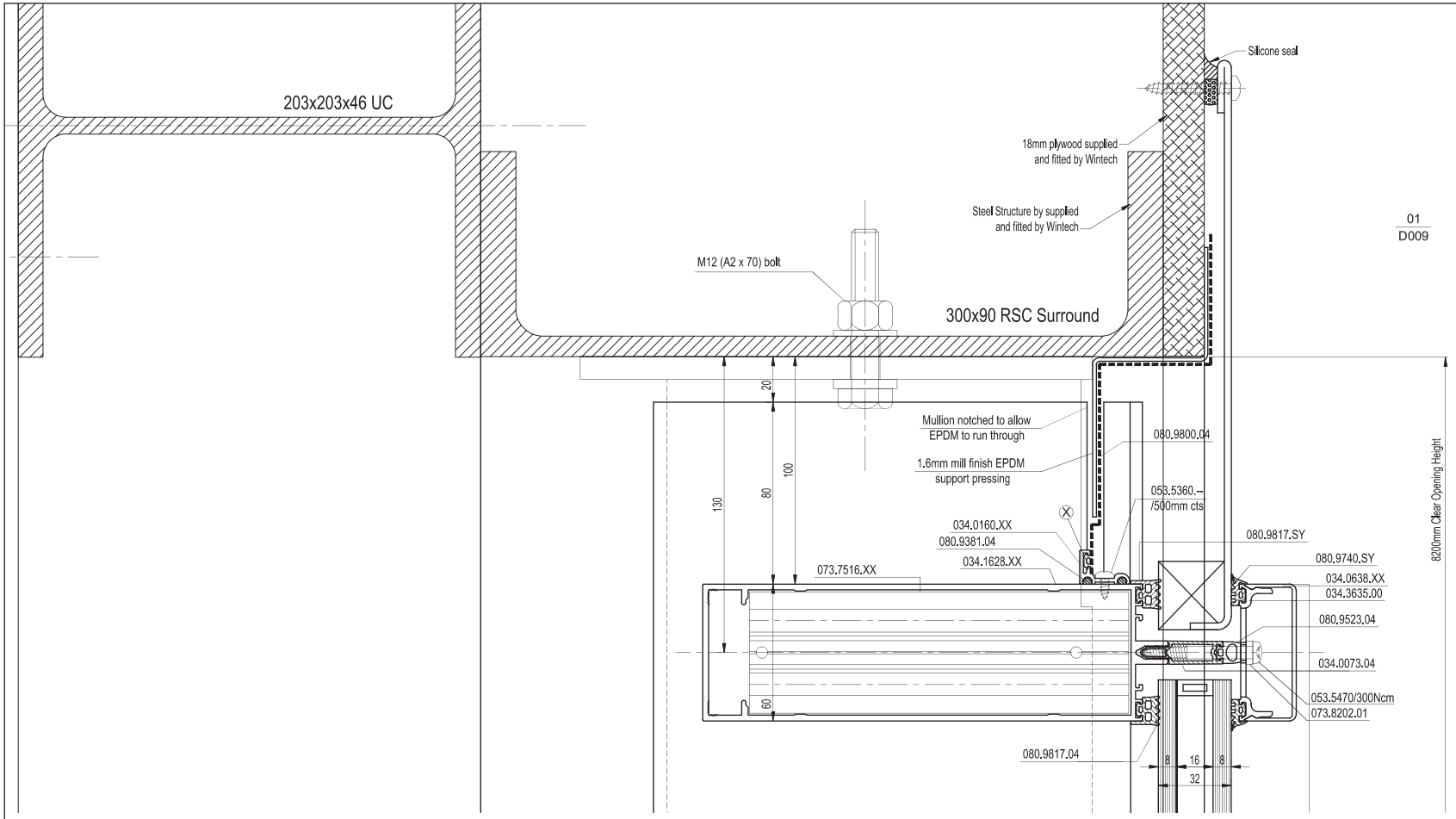
ISSUE	DATE	DESCRIPTION OF REVISION	ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments	E	07/01/2015	EPDM carrier added
B	20/08/2014	Updated as per latest S/E comments			
C	08/09/2014	Mullion end prep altered			
D	29/09/2014	Interface flashing detail updated			

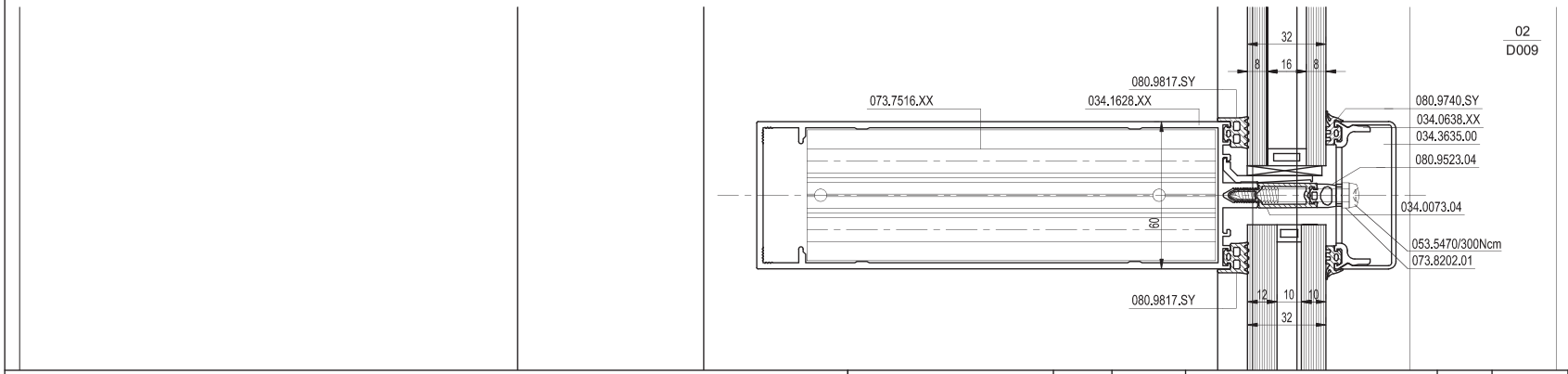
DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D007 E

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PROJECT: CWCT Test Sample

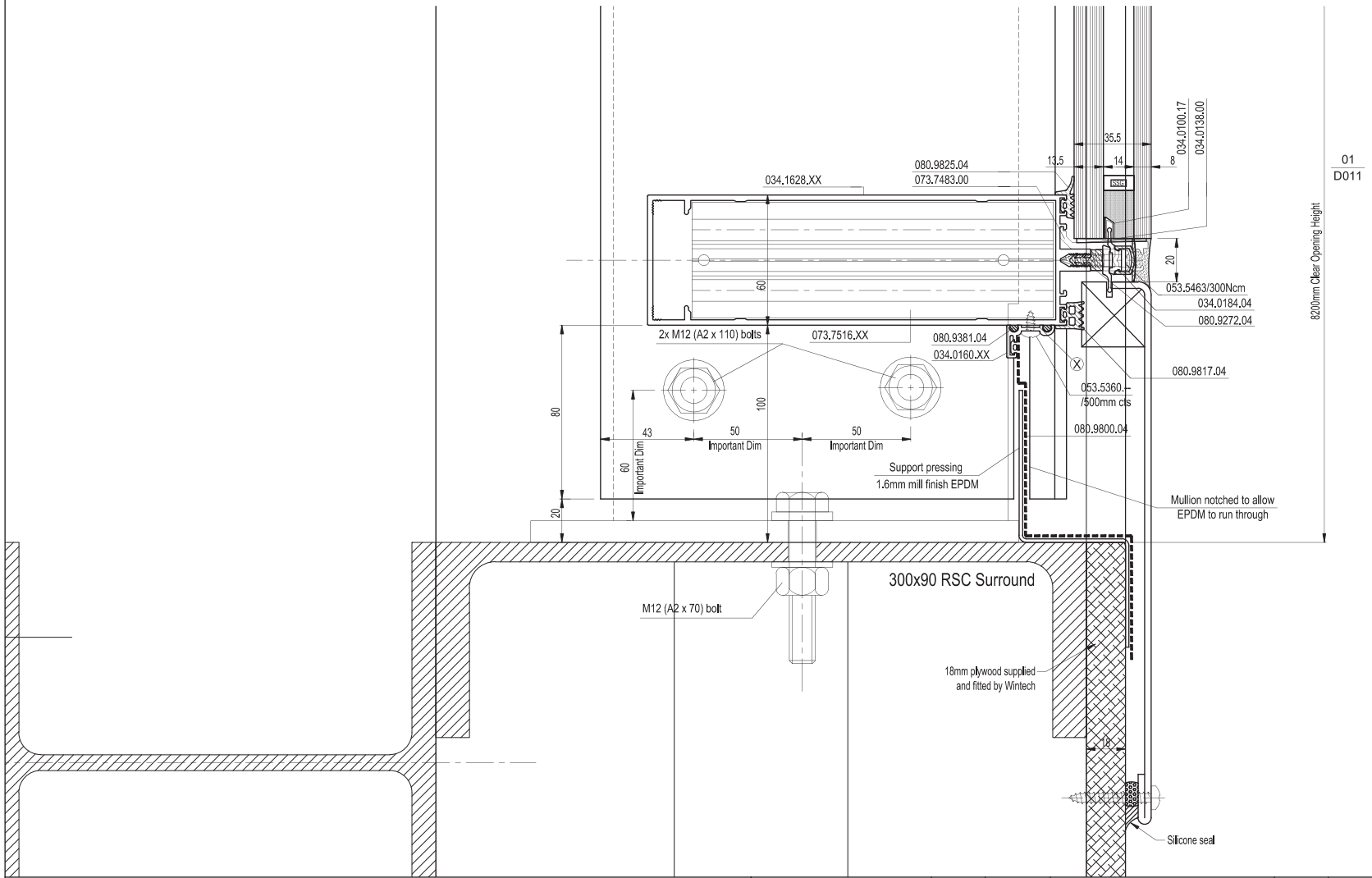
DRAWING TITLE: Detail Drawing 9

ISSUE	DATE	DESCRIPTION OF REVISION	ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments	E	07/01/2015	EPDM carrier added
B	20/08/2014	Updated as per latest S/E comments			
C	08/09/2014	Mullion end prep altered			
D	29/09/2014	Interface flashing detail updated			

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D009 E



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PROJECT: CWCT Test Sample

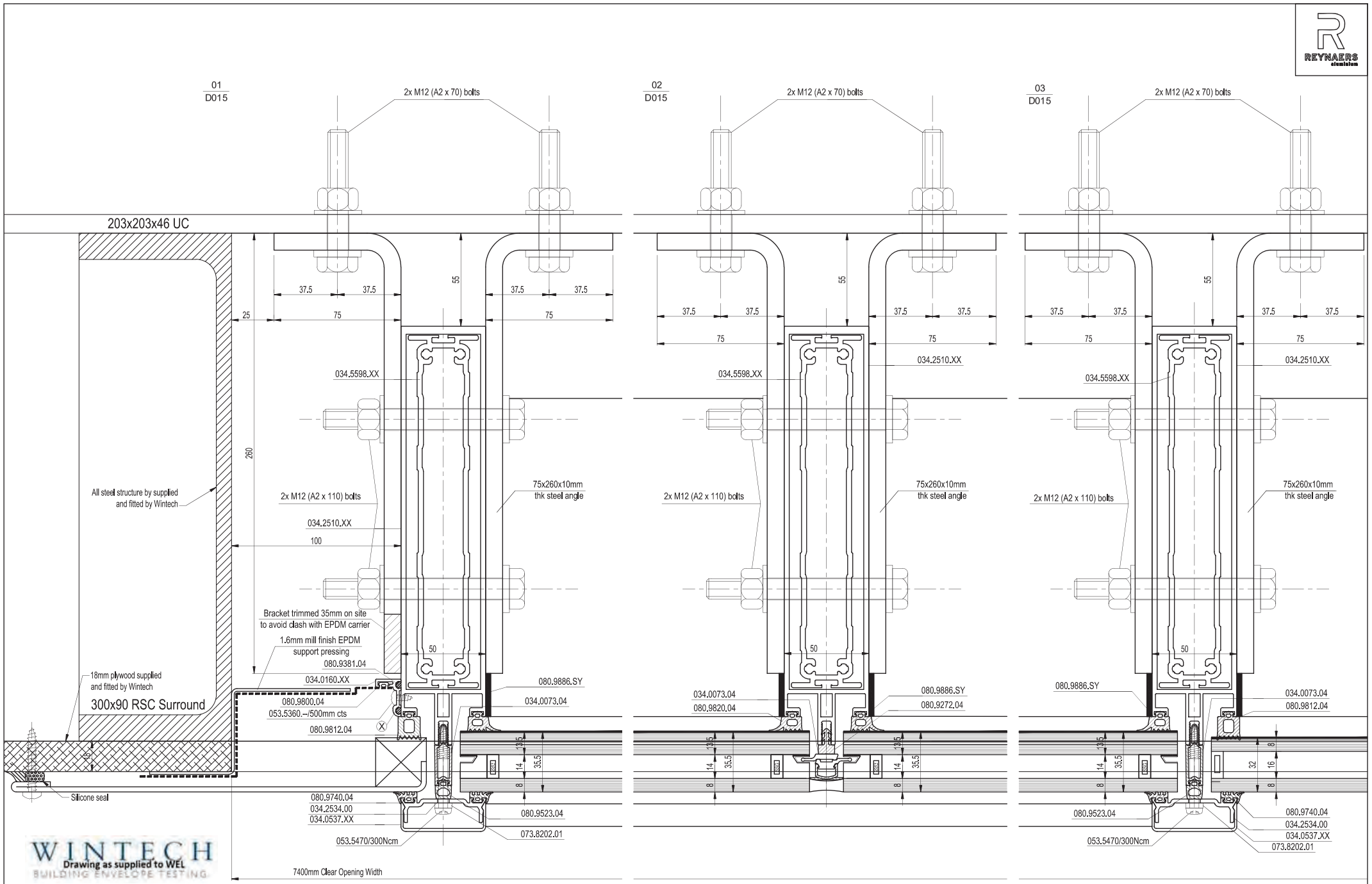
DRAWING TITLE: Detail Drawing 11

ISSUE	DATE	DESCRIPTION OF REVISION	ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments	E	07/01/2015	EPDM carrier added
B	20/08/2014	Updated as per latest S/E comments			
C	08/09/2014	Mullion end prep altered			
D	29/09/2014	Interface flashing detail updated			

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D011 E



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PROJECT: CWCT Test Sample

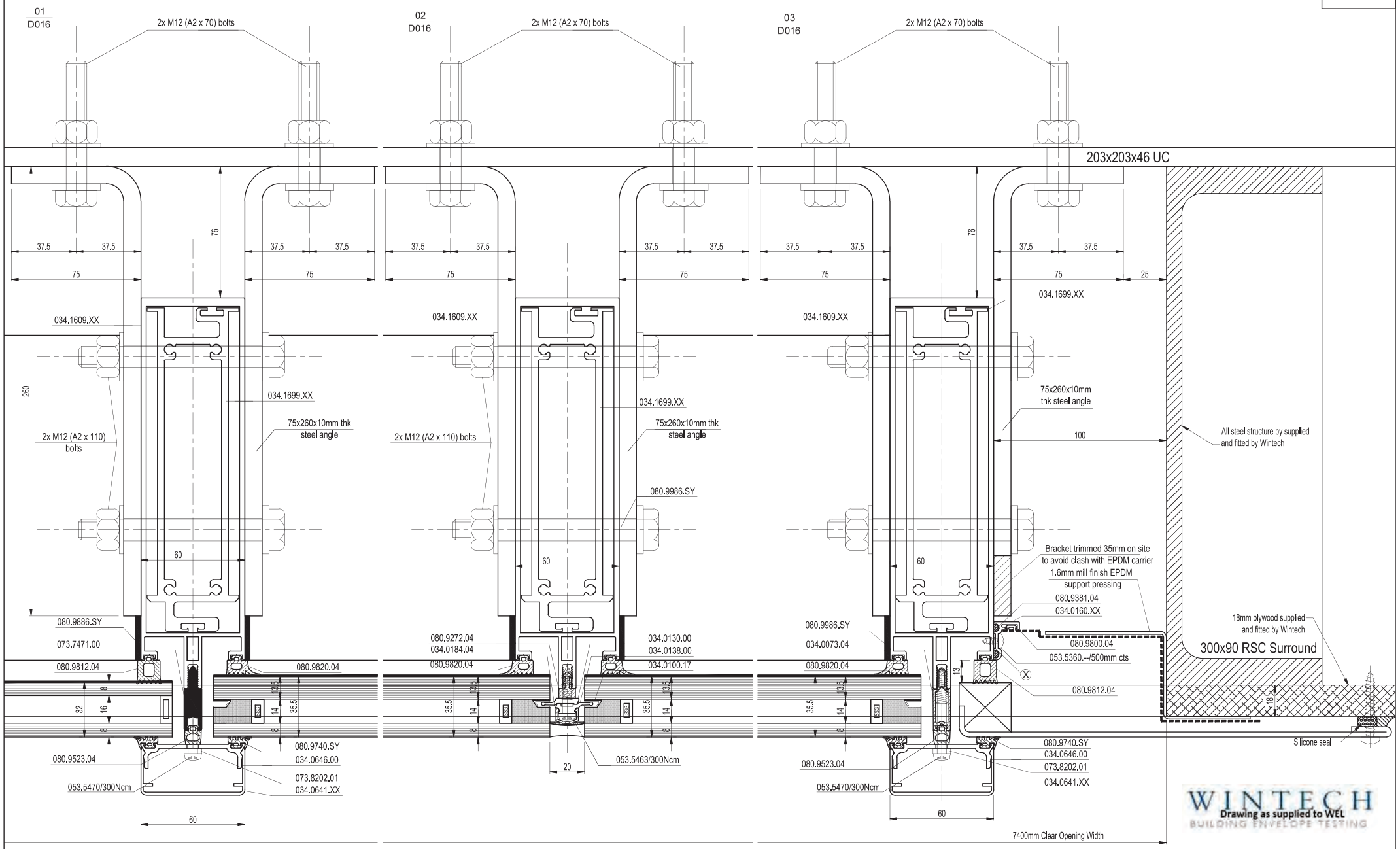
DRAWING TITLE: Detail Drawing 15

ISSUE	DATE	DESCRIPTION OF REVISION
A	20/08/2014	Updated as per Structural engineers comments
B	29/09/2014	Interface flashing detail updated
C	07/01/2015	EPDM carrier pressing updated & bracket updated

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D015 C



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PROJECT: CWCT Test Sample

DRAWING TITLE: Detail Drawing 16

ISSUE	DATE	DESCRIPTION OF REVISION
A	20/08/2014	Updated as per Structural engineers comments
B	29/09/2014	Interface flashing detail updated
C	07/01/2015	EPDM carrier pressing updated & bracket updated

DRAWN: LJM DATE: Jul 2014

SCALE: NTS

DRAWING NO: CW50/CWCT/D016 C

Specification:

Mullions: 034.2510 (230.5mm backbox) - CW50 Zone
034.1609 (209.5mm backbox) - CW60 Zone

Transoms: 034.3529 (193.4mm backbox) - CW50 Zone
034.1628 (193.2mm backbox) - CW60 Zone

Glazing Spec:

Type A - 35.5mm **SSG** unit (50kg/m2)
Inner Pane: 13.5mm clear toughened laminate
Cavity: 14mm air filled cavity
Outer Pane: 8mm clear toughened

Type B - 32mm **SSG** unit to be bonded to vent frame (40kg/m2)
Inner Pane: 8mm clear toughened
Cavity: 16mm air filled cavity
Outer Pane: 8mm clear toughened

Type C - 32mm Std unit (55kg/m2)
Inner Pane: 12mm clear toughened
Cavity: 10mm air filled cavity
Outer Pane: 10mm clear toughened

Type D - 32mm Std unit (40kg/m2)
Inner Pane: 8mm clear toughened
Cavity: 16mm air filled cavity
Outer pane: 8mm clear toughened

Panel Spec:

Type PA - 32mm std panel unit (40kg/m2)
Inner Pane: 8mm clear toughened with colour enamelled glass (Std graphite grey)
Cavity: 16mm air filled cavity
Outer Pane: 8mm clear toughened

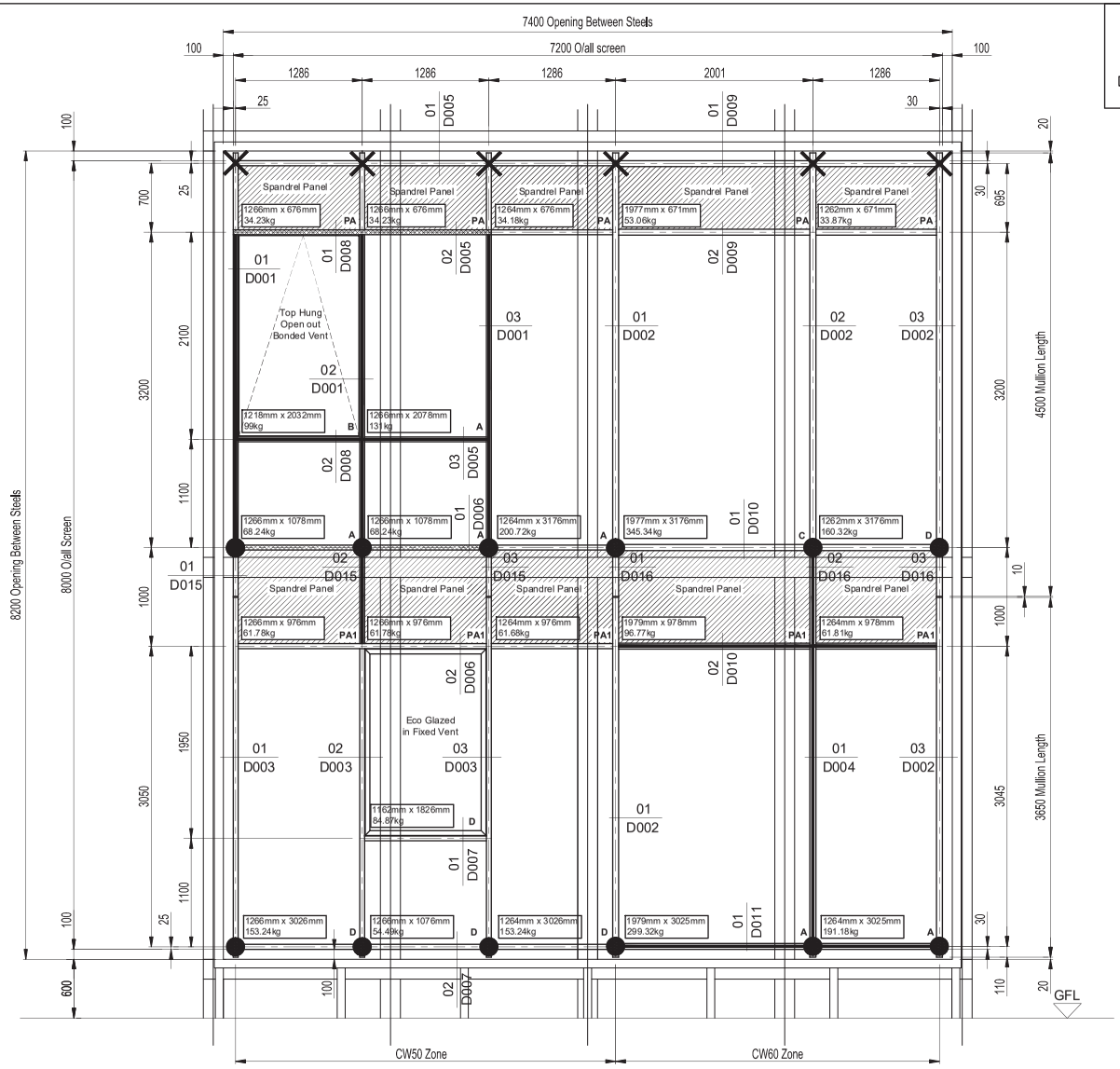
Type PA1 - 35.5mm **SSG** Unit (50kg/m2)
Inner Pane: 13.5 clear toughened laminate with colour enamelled glass (Std graphite grey)
Cavity: 14mm air filled cavity
Outer Pane: 8mm clear toughened

Key:

Denotes aerofoil HL type cap

Denotes lookalike paneled area

Solid hatch- Denotes SC type curtain wall



Pressure plate screw general guide:

CW60-SC Mullion/transom: 053.5462 6.3x25mm long
CW50-SC Mullion/transom: 053.5462 6.3x25mm long

CW60 Capped Mullion/transom: 053.5469 6.3x46mm long
CW50 Capped Mullion/transom: 053.5469 6.3x46mm long

CW50-HL Aero Foil shaped cap transom: 053.5470 6.3x49mm long

● = Position of Drainage spouts, for installation details please refer to drawing D012

✕ = Position of Drainage spouts, at C/L of top transom upside down for pressure equalisation

WINTECH
Drawing as supplied to WEL
BUILDING ENVELOPE TESTING

Reynaers Ltd,
Kettles Wood Drive,
Birmingham.
B32 3DB
Tel: 0121 421 1999 Fax: 0121 421 9797

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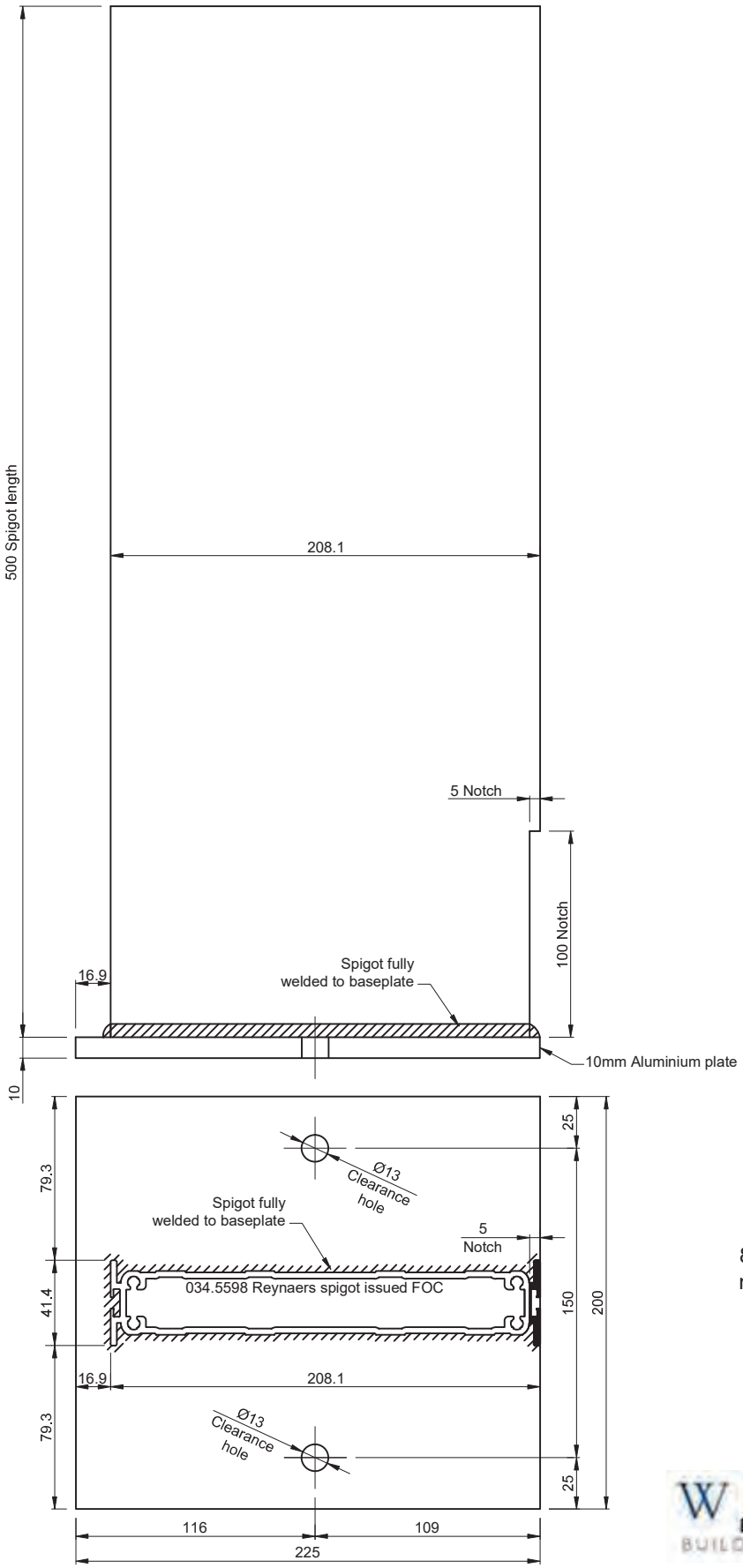
PROJECT: CWCT Test Sample

DRAWING TITLE: Elevation Drawing

ISSUE	DATE	DESCRIPTION OF REVISION	ISSUE	DATE	DESCRIPTION OF REVISION
A	08/08/2014	Updated as per Structural engineers comments	E	07/01/2015	Pressure plate screw length corrected
B	20/08/2014	Updated as per latest S/E comments	F	17/07/2015	Drainage spout locations added at head
C	15/12/2014	PP Screw Types altered/General updates			
D	16/12/2014	Specification updated			

DRAWN: LJM DATE: Jul 2014
SCALE: NTS
DRAWING NO: CW50/CWCT/E1 F

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Tel: 0121 421 1999
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8No Reqd as drawn; to be marked as reference B1

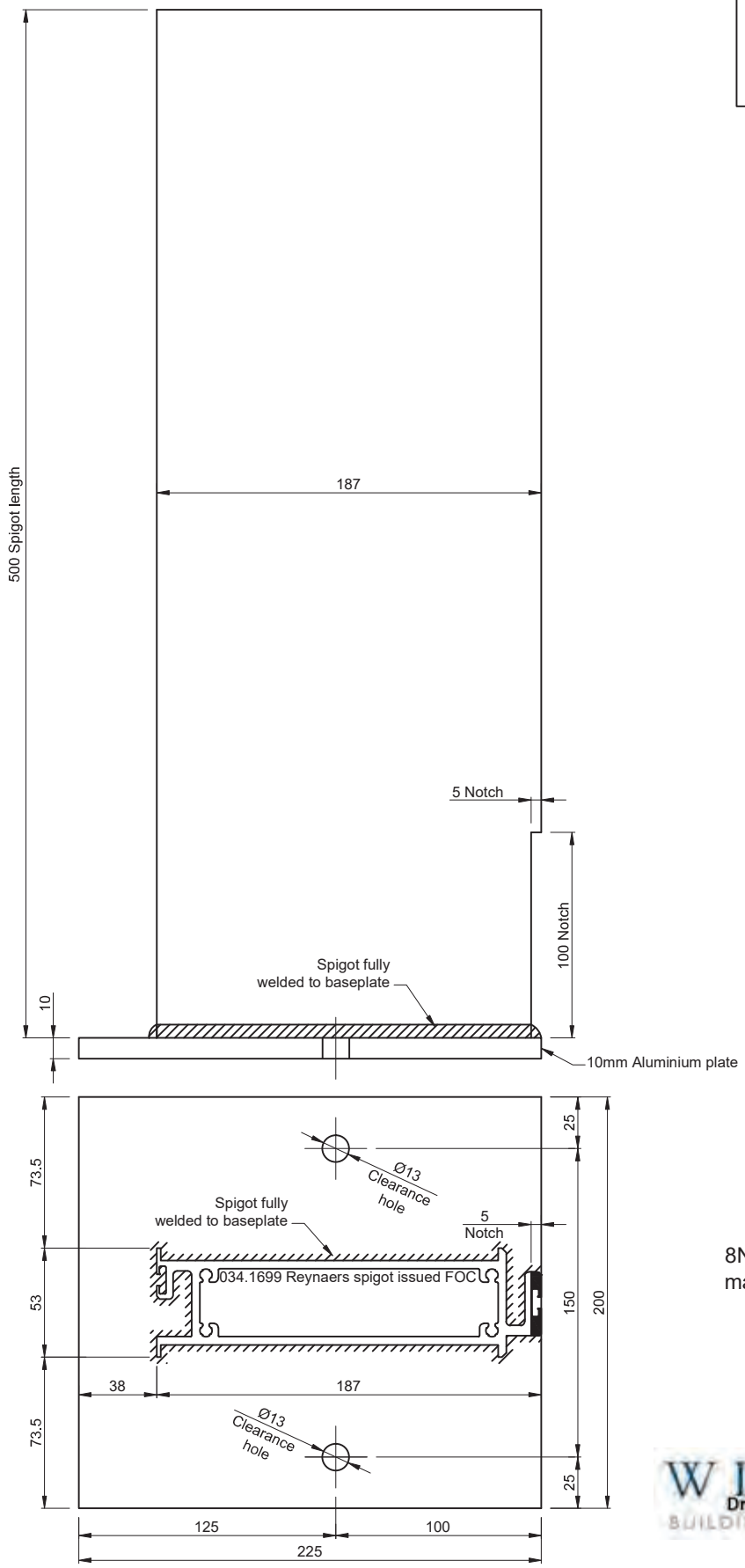
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Rev	Date & Description of Revision
A	-
B	-
C	-

PROJECT: CWCT Test Sample Screen		DRAWN: LJM	DATE: SEPT/2014
TITLE: Bracket type B1		SCALE: NTS	
		DRG No: CW50/CWCT/B1	-

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B32 3DB
Tel: 0121 421 1999
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8No Reqd as drawn; to be marked as reference B2

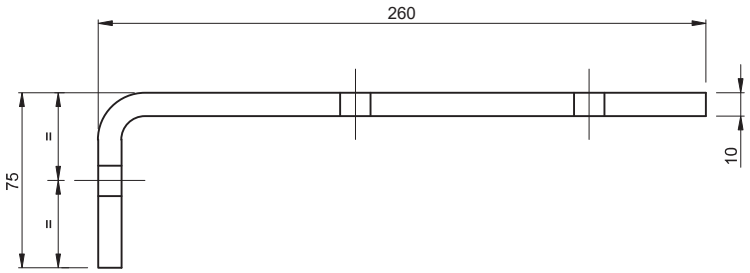
Drawing as supplied to WEL

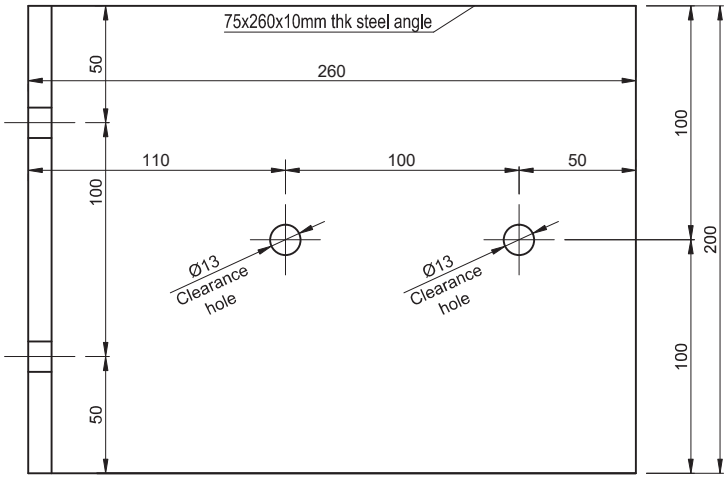
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Rev	Date & Description of Revision
A	-
B	-
C	-

PROJECT: CWCT Test Sample Screen		DRAWN: LJM	DATE: SEPT/2014
TITLE: Bracket type B2		SCALE: NTS	
		DRG No: CW50/CWCT/B2	-

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15No Reqd as drawn; to be marked as reference B3
Made from 10mm thk galv steel

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Rev	Date & Description of Revision
A	Dims updated
B	-
C	-

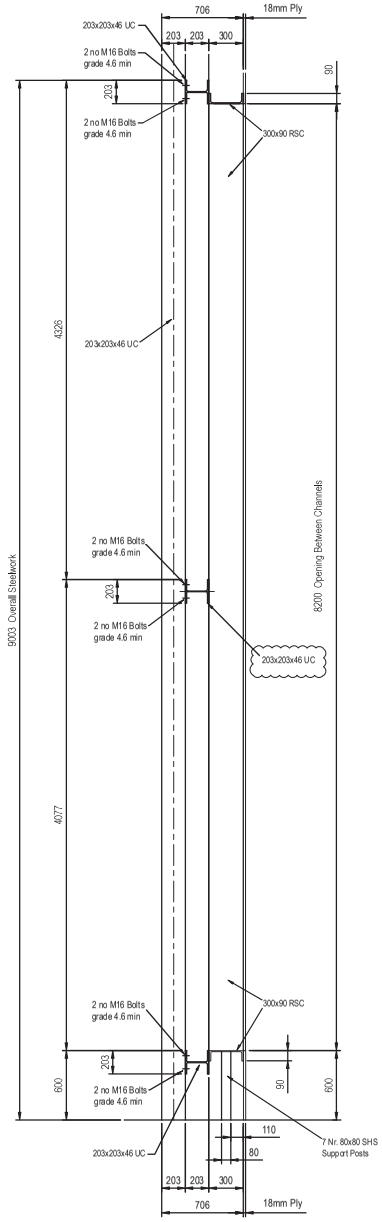
PROJECT: CWCT Test Sample Screen		DRAWN: LJM	DATE: SEPT/2014
TITLE: Bracket type B3		SCALE: NTS	
		DRG No: CW50/CWCT/B3	A

APPENDIX B

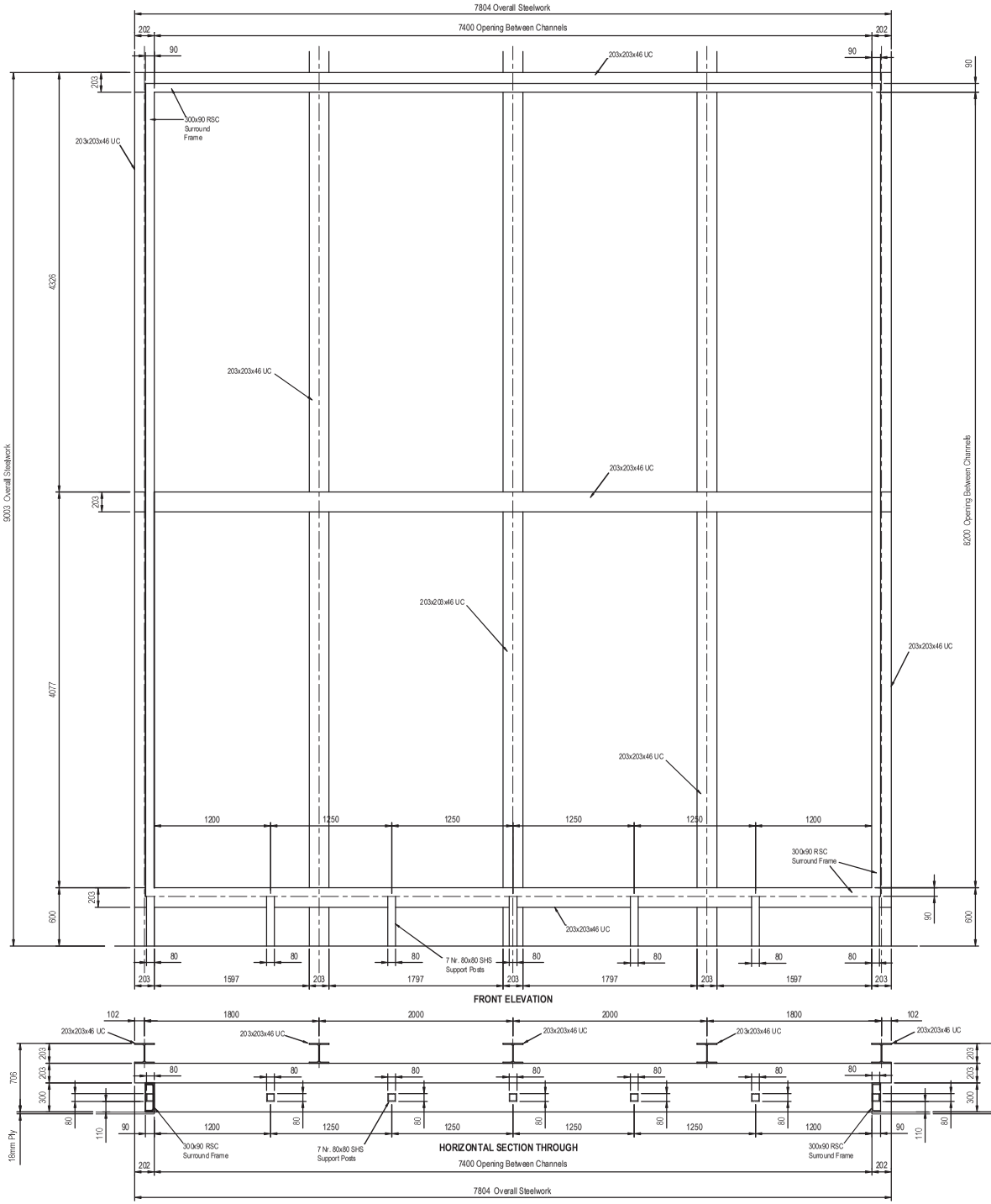
Support Steelwork Drawing

(1 drawing on 1 un-numbered page)

WEL/14/241 Rev B



SIDE ELEVATION



FRONT ELEVATION

NOTES

1. NO DIMENSIONS ARE TO BE SCALED FROM THIS DRAWING – IF IN DOUBT ASK
2. THIS DRAWING MUST NOT BE ALTERED BY HAND
3. DISCREPANCIES IN SITE DIMENSIONS TO BE REPORTED TO WINTECH.
4. ALL DIMENSIONS IN MILLIMETRES
5. ALL LEVELS IN METRES

Rev	Date	Description	By
B	03.09.14	CENTRE UC SPECIFICATION CORRECTED	HGD
A	02.09.14	REVISED TO THE CLIENTS RETURN COMMENTS	HGD

WINTECH

WINDOW AND CLADDING TESTING AND LABORATORY SERVICES

WINTECH ENGINEERING LTD, HALESFIELD 2, TELFORD, SHROPSHIRE, TF7 4QH.
TEL: 01952 586580 FAX: 01952 586585
E-MAIL ADDRESS: testing@wintech-group.co.uk

Project :	REYNAERS - CWCT TEST SAMPLE
Main Contractor :	N/A
Architect :	N/A
Drawing Title :	STEEL SUPPORT FRAME ASSEMBLY
Scale :	1:45
Contract No :	11995
Date :	13.08.14
Drawing No :	WEL/14/241
Drawn By :	HGD
Latest Revision No :	B
Checked By :	-

APPENDIX C

Dismantling

C1. DISMANTLING

The dismantling was conducted on 18th & 19th December 2014 by representatives of Reynaers Ltd and was witnessed by representatives of Wintech Engineering Ltd and Alan Keiller of CWCT.

There was no water evident in the system in parts designed not to be wetted, and it was found that the system fully complied with the system drawings in Appendix A provided by Reynaers Ltd at the time of the dismantle.

~~~~~~~~~~~~~~~~~~~~ END OF REPORT ~~~~~~~~~~~~~~~~~~~~

Technical Submission
Curtain Walls

Certificates

Certificate of Registration

ENVIRONMENTAL MANAGEMENT SYSTEM - ISO 14001:2015

This is to certify that:

Reynaers Aluminium Limited
111 Hollymoor Way
Northfield
Birmingham
B31 5HE
United Kingdom

Holds Certificate Number: EMS 571628

and operates an Environmental Management System which complies with the requirements of ISO 14001:2015 for the following scope:

The procurement and stocking of the Reynaers Architectural Aluminium System components and associated hardware and accessories, to supply fabricators of windows, doors, curtain walling and slope glazing products involved in the residential and commercial markets.

For and on behalf of BSI:

Matt Page, Managing Director Assurance - UK & Ireland

Original Registration Date: 2011-04-28
Effective Date: 2022-11-05
Latest Revision Date: 2022-10-17
Expiry Date: 2025-11-04

...making excellence a habit.™

This certificate was issued electronically and remains the property of BSI and is bound by the conditions of contract.
An electronic certificate can be authenticated online.
Printed copies can be validated at www.bsigroup.com/ClientDirectory

Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: + 44 345 080 9000
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.
A Member of the BSI Group of Companies.



ENVIRONMENTAL PRODUCT DECLARATION

in accordance with ISO 14025 and EN 15804:2012 + A2:2019

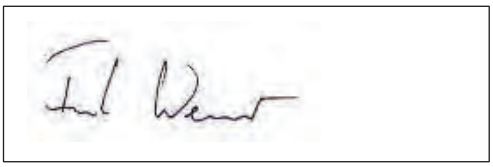
ConceptWall® 50 Curtain Wall – Standard and HI

Owner of the declaration:	
Publisher and Programme holder:	EUROPEAN ALUMINIUM
Declaration number:	EPD-2023-0005
Issue date:	2023-07-17
Valid until	2028-07-16

www.european-aluminium.eu

GENERAL INFORMATION

Owner of the declaration	Reynaers Aluminium Oude Liersebaan 266 B- 2570 Duffel, Belgium www.reynaers.com
Manufacturer	Reynaers Aluminium Oude Liersebaan 266 B- 2570 Duffel, Belgium
Publisher and Programme holder	EUROPEAN ALUMINIUM AISBL Avenue des Nerviens 85 1040 Brussels, Belgium  Paul Voss, Director General
The declaration is based on the Product Category Rules	European Aluminium General Programme Instructions version 3, 23rd of September 2020
Declared Unit	1 m^2 of ConceptWall 50 curtain wall
Scope of the Environmental Product Declaration	This EPD covers 1 m^2 of façade and roof system type ConceptWall 50 curtain wall- Standard and HI. These EPD results have been calculated from an LCA tool for EPD, based on the GaBi database, initially realised by Thinkstep in 2013 and updated by Ecoinnovazione in 2019. Among the product family, two representative products have been selected and corresponding EPD results have been calculated based on specific bill of materials. These two products refer to Standard curtain wall system and HI curtain wall system. The results generated by the collective tool can be considered as a good proxy to model façade and roof system produced by Reynaers Aluminium. The EPD may be used in a B2B context within the European Market.
Liability	The owner of the declaration is liable for the underlying manufacturing information and European Aluminium is not liable in this respect.
Disclaimers	This EPD cannot be used as a guarantee of the recycled content of the actual product sold on the market. A specific declaration may be asked from the supplier. The use of this EPD within BIM tools is in principle limited to the products explicitly included in the EPD. The scaling of results to model similar products can only be done if justified and transparently reported in the project report. Any responsibility regarding the misuse of this EPD by third parties is not accepted by the Programme Operator.

Verification	Verifier
EN15804:2012 +A2:2019 serves as core PCR completed by European Aluminium PCR 03/2020	
Verification of the EPD by an independent third party in accordance with ISO 14025	
☐ Internally / ☒ Externally	

1 PRODUCT

1.1 Product description and applications

This Environmental Product Declaration (EPD) is for business-to-business communication. The product object of the EPD is our ConceptWall® 50, a façade and roof system that offers unlimited design freedom and allows maximum transparency. As such, ConceptWall 50 meets all requirements of contemporary architecture. Innovative solutions contribute towards the tendency of big, heavy and thick glass panes. The system supports up to 700 kg in various glass support configurations. Even higher glass weight can be offered in bespoke solutions.

The system is available in several design and glazing variants, like steel beam look, standard pressure plates, structurally glazed and structurally clamped solutions. Specified levels of fire-resistance, burglar proof classes and thermal insulation, down to Uf = 0.56W/ m²K, are provided by different variants.

Reynaers Aluminium is a leading European specialist in the development and marketing of innovative and sustainable aluminium solutions for windows, doors, curtain walls, façade and roof systems, sun screening and conservatories. Reynaers Aluminium is founded in 1965 and is part of the group Reynaers, currently employing over 2400 workers in more than 40 countries worldwide and exporting to more than 70 countries on 5 continents. Reynaers' mission is to improve the living- and work environment for people today and tomorrow. Reynaers combines design, technique and digitalisation to create innovative solutions that add value and inspire partners to create sustainable buildings.

The representative products are Standard and HI façade and roof systems of 3.6 m high by 6 m wide. EPD results have been calculated for 2 representative products, which are detailed in Table 1.

Table 1 Details representative products

ID	Model	Size (W x H)	Glazing	Glass surface area (m²)	Glass thickness (mm)
1	ConceptWall 50 curtain wall- Standard	3.6 m x 6 m	Double	20.6	24 mm
2	ConceptWall 50 curtain wall- HI	3.6 m x 6 m	Double	20.52	24 mm

1.2 Technical Data

The most relevant technical data are reported in Table 2.

Table 2 Most relevant technical data

Category	Description & value	Standards
Thermal Insulation	Uf value down to 0,56 W/m²K, depending on the profile combination.	EN 12631:2012
Acoustic performance	RW (C;Ctr) = 33 (-1; -4) dB / 60 (-2; -6) dB, depending on glazing or panel type	EN ISO 10140-2; EN ISO 717-1
Air tightness	A4 (600 Pa); AE 1200 (1200 Pa); AE 1950 (1950 Pa)	EN 12153, EN 12152
Water tightness	R7 (600 Pa); RE 1200 (1200 Pa); RE 1950 (1950 Pa)	EN 12155; EN 12154
Wind load resistance	maximum test pressure 2000 Pa; 2400Pa	EN 12179, EN 13116

For the most up-to-date values of the technical data, please refer to the product specifications available on the Reynaers website (www.reynaers.com/consumers/our-products).

The most relevant standard for applications of aluminium façade and roof systems in buildings is EN 13830:2015+A1:2020.

1.3 Process description

The entire installation process is typically performed at the job site.

The following operations are carried out for the production of the main parts:

1. Aluminium profile (powder coated) preparation mainly via sawing and milling.
2. Frame production by assembling the various profiles via connectors and fixing via bolting or gluing. Connectors used are mostly composed of aluminium.
3. Positioning and fixing the various gaskets.
4. Infill application (e.g., glazing, opaque panels).
5. The hardware integration (if relevant).

The main background production processes are reported in Figure 1.

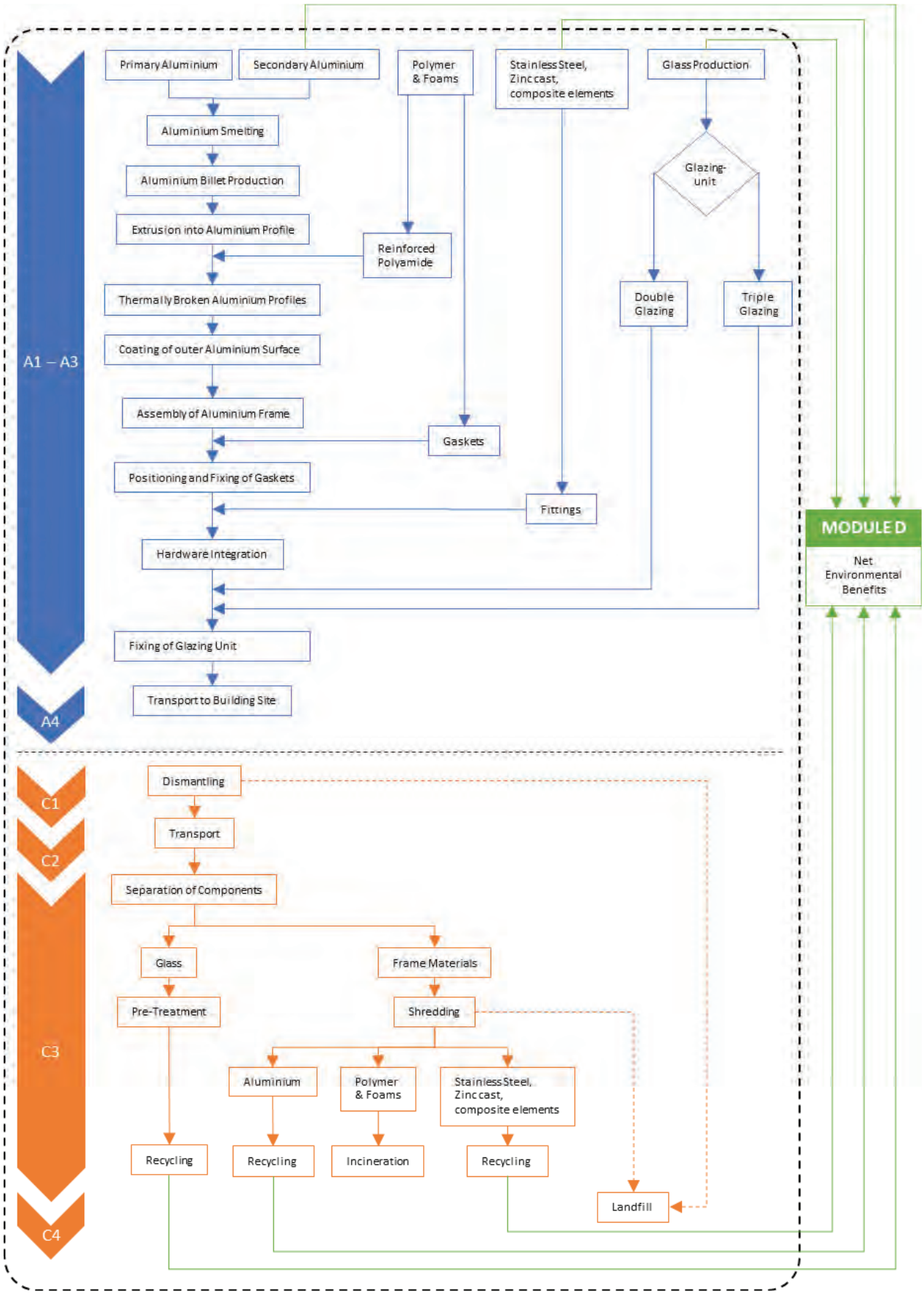


Figure 1 Main production processes and components of the façade and roof system

The upstream aluminium processes have been modelled using European Aluminium LCI datasets for the primary aluminium production, recycling and remelting as described in the European Aluminium Environmental profile report 2018.

For the other processes and materials, e.g., gaskets, glass unit or hardware, datasets from the GaBi database have been used. The powder coating of aluminium profiles has been modelled using GaBi datasets as well.

At end-of-life, thanks to their high price value (i.e., about 50% of the LME price) aluminium frames and profiles are systematically dismantled and collected for sending them to recycling. After being collected, the façade and roof systems are treated through shredding and sorting. However, the glazing unit might not be systematically collected at the building renovation or demolition site. Hence, two extreme end-of-life scenarios have been used for flat glass: 100% recycling or 100% landfilling. This allows to calculate country-specific end-of-life results if the collection rate is known, by interpolation of the results of these 2 extreme scenarios.

1.4 Health and safety aspects during production and installation

There are no critical health and safety aspects during the production of aluminium façade and roof systems. The pre-treatments used for the pre-treatment of aluminium profile do not contain chromium nor other substances of very high concern (SVHC substances), and this process is followed by a coating process realised using a powder without VOC.

There are no relevant aspects of occupational health and safety during the further processing and installation of Reynaers façade and roof systems. Under normal installation, no measurable Environmental impacts can be associated with the use of Reynaers aluminium façade and roof systems. The appropriate safety measures need to be taken at the building site, especially if installation takes place on a high-rise building.

1.5 Reference service life

Since the use phase is not modelled, no specific information is provided about the Reference Service Life. In normal use, aluminium building products are not altered or corroded over time. A regular cleaning (e.g. once a year) of the product suffices to secure a long service life. However, the use of highly alkaline (pH >10) or highly acidic (pH < 4) cleaning solutions should be avoided. In practice, a service life of 50 years can be assumed in normal use for such application, except for the IGU (Insulated Glass Unit) which needs to be replaced usually after 30 years due to slow degradation of its performance.

2 LCA – CALCULATION RULES

2.1 Declared unit & bill of materials

The Bill of Materials of the two analysed products is reported in Table 3. The declared unit corresponds to 1 m^2 of façade and roof system doors.

Table 3 Bill of materials (kg) of the declared unit for 2 products

Reference				
Type	**ConceptWall 50 curtain wall – Standard**		**ConceptWall 50 curtain wall – HI**	
	kg	**%**	**kg**	**%**
Glass	57.20	90.11%	57.00	90.40%
Aluminium	5.23	8.24%	5.15	8.17%
Metal parts	0.10	0.16%	0.09	0.15%
Thermal break	0.01	0.01%	0.32	0.51%
Gasket	0.59	0.93%	0.48	0.76%
Polymers	0.36	0.56%	0.01	0.01%
Foams	0.00	0.00%	0.00	0.00%
Total	**63.48**	**100%**	**63.05**	**100%**

2.2 System boundary

This EPD is from cradle to gate with modules C1-C4 and module D, as reported in Table 4.

The production stage (modules A1-A3) includes processes that provide materials and energy input for the system, manufacturing and transport processes up to the factory gate, as well as waste processing. For the end-of-life, the default scenario defined in the General Product Instructions and detailed in 3.2 is applied.

Table 4 Modules declared

Production			Installation		Use stage							End-of-Life				Next product system
Raw material	Transport	Manufacturing	Transport to	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy	Operational water	Deconstruction	Transport	Waste processing	Disposal	Reuse, recovery, recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

Note: ND: Not Declared; X: Module included in the LCA.

Module A4 is declared for a distance of 1 km to give the possibility to adjust the resulting Environmental impacts depending on the specific distance at hand.

2.3 Energy mix

In the model developed the background electricity mix used is the European electricity mix (EU-28 Electricity grid mix (2017)). Details about the electricity modelling in the datasets: production of

primary aluminium, extrusion, rolling and recycling please refer to the Environmental Profile Report 2018.

2.4 Allocation

The scrap which are produced along the production chain are recycled into the same production chain and are modelled as "closed-loop" within Module A. This recycling loop has been modelled in the GaBi model so that the façade and roof system is the only product exiting the gate. Hence, the production process does not deliver any co-products.

At the end-of-life stage, the façade and roof systems are sent to an end-of-life treatment which is modelled according to the scenario reported in 3.2. The environmental burdens and benefits of recycling and energy recovery are calculated in module D accordingly.

2.5 Assumptions and Cut-off criteria

The aluminium profiles were composed of a mix of 34% primary aluminium, low carbon primary aluminium 26% and 40% recycled aluminium. For the primary aluminium, a primary aluminium ingot consumption mix was considered (European production + net fraction of imports into Europe), whereas for low carbon primary aluminium the data reported in the EPD of the manufacturer has been used, where possible, or primary aluminium production has been considered as a proxy. Alloying elements were not considered, and a pure aluminium profile has been assumed as a proxy.

2.6 Data quality

Representativeness

Technological: All primary and secondary data were modelled to be specific to the technologies or technology mixes under study. Where technology-specific data were unavailable, proxy data were used. For the aluminium production, extrusion profiles and recycling, the datasets described in the Environmental Profile Report 2018 of European Aluminium have been used and integrated with the EPD profile of the low carbon primary aluminium. The modelling reflects the specific BoM of the analysed products. Technological representativeness is considered to be very good.

Geographical: All primary data were collected specifically to the countries under study. Regarding secondary data, where EU region-specific data were unavailable, DE datasets were used. For the aluminium production, extrusion profiles and recycling, the datasets described in the Environmental Profile Report 2018 of European Aluminium have been used. Geographical representativeness is considered to be good.

Temporal: Primary data refer to the year 2020, and all secondary data come from the GaBi version 2021.2, including those on aluminium production, which are the most recent ones as described in the Environmental Profile Report 2018 of European Aluminium.

Completeness

All known operating data was taken into consideration in the analysis. Based on earlier studies conducted by European Aluminium, it can be assumed that the ignored processes or flows contribute to much less than 5% of the impact categories under review.

The process chain is considered sufficiently complete regarding the goal and scope of this study.

Overall, the data quality can be described as good.

2.7 Software and databases

These EPD results have been calculated from an LCA tool for EPD, based on the GaBi database. Currently, the EPD software is using the software GaBi version 2021.2.

2.8 Comparability

As a general rule, a comparison or evaluation of EPD data may be possible when all of the data to be compared has been drawn up in accordance with EN 15804 and the building context or product-specific characteristics are taken into consideration.

3 LCA – SCENARIOS AND ADDITIONAL INFORMATION

3.1 Scenario for additional modules

Module A4 is taken into consideration in this Declaration, and it has been modelled according to the information reported in Table 5.

Table 5 Module A4 – Transport to the building site

Scenario information	Unit (expressed per DU)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long-distance truck, boat, etc.	Truck-trailer, Euro 4, 34 - 40t gross weight / 27t payload capacity, diesel driven
Distance	1 km
Capacity utilisation (including empty returns)	61 %
Bulk density of transported products	-
Volume capacity utilisation factor (factor = 1 or <1 or ≥1 for compressed or nested packaged products)	Not applicable

3.2 Scenario for Mod. C1-C4

The default scenario for the end-of-life of the façade and roof system, as reported in the General Programme Instructions, is the following:

- collection rate: 99%;
- shredding efficiency: 95%;
- scrap recycled through refining process: 96,5%
- overall aluminium recycling rate: 91%

For the glass used in the façade and roof system, two extreme end-of-life scenarios were modelled: one with 100% recycling of the glass and one with 100% landfill of the glass.

Table 6 reports the main parameters of the end-of-life scenarios for the main materials and components.

Table 6 Parameters of the end-of-life scenarios for the main materials and components, related to the DU

Processes	Unit (expressed per FU or DU of components, products or materials and by type of material)		ConceptWall 50 curtain wall-Standard		ConceptWall 50 curtain wall-HI	
			Scenario 100% glass landfill	Scenario 100% glass recycling	Scenario 100% glass landfill	Scenario 100% glass recycling
Collection process specified by type	Kg collected separately		Glass: 57.2 kg		Glass: 57 kg	
			Aluminium frame: 5.18 kg		Aluminium frame: 5.09 kg	
			Gasket: 0.58 kg		Gasket: 0.48 kg	
			Metal fittings and others: 0.46 kg		Metal fittings and others: 0.42 kg	
	Kg collected with mixed construction waste		0		0	
Recovery system specified by type	Kg for re-use		0		0	
	Kg for recycling		0	Glass: 55.4 kg	0	Glass: 55.2 kg
			Aluminium frame: 4.63 kg		Aluminium frame: 4.55 kg	
			Metal fittings: 0.09 kg		Metal fittings: 0.09 kg	
	Kg for energy recovery		Gasket: 0		Gasket: 0	
			Others: 0		Others: 0	
Disposal specified by type	Kg product or material for final deposition	Landfill	Aluminium frame: 0.29 kg		Aluminium frame: 0.29 kg	
		Landfill (inert materials)	Fittings and others: 0.06 kg		Fittings and others: 0.05 kg	
		Waste incineration	Gasket: 0.55 kg		Gasket: 0.45 kg	
		Waste incineration (plastics)	Fittings and others: 0.34 kg		Fittings and others: 0.31 kg	
		Landfill	Glass: 57.2 kg	0	Glass: 57 kg	0

Note to Table 6:

Material collected separately: This amount refers to the waste stream collected separately per material before being subjected to shredding

Material for recycling: This amount refers to the waste stream sent to recycling per material after the shredding and/or sorting process.

Material for final deposition – aluminium: this amount includes the aluminium not collected separately and the shredding losses.

3.3 Scenario Mod. D

Module D includes:

- a transport from the scrap dealers to the recycling plants, considering an average distance of 200 km;
- recycling of Aluminium through refining;
- a net credit for the avoided production of primary aluminium;
- a net credit for the avoided production of flat glass (for 100% glass recycling scenario)

The calculation of module D has been implemented in line with the General Programme Instructions of European Aluminium, thus based on the difference between the scrap used at the input and output side. In some cases, this may result in environmental burdens instead of environmental benefits if the product system is a net consumer of valuable secondary material.

3.4 Additional environmental information

During use, the air quality, i.e. VOC emission, is not affected by façade and roof system. In case of fire, aluminium is a non-combustible construction material (European Fire Class A1) in accordance with Commission Decision 96/603/EC and does therefore not make any contribution to fire.

4 LCA RESULTS – FAÇADE AND ROOF SYSTEM ConceptWall 50 curtain wall – Standard

4.1 Result of the LCA – Environmental impacts

The tables below report the results of the LCA study for the two glass scenarios: 100% recycling and 100% landfill.

4.1.1 Core Environmental impacts indicators

Scenario 100% glass recycling

Table 7 Core Environmental impacts indicators for 1 m² façade and roof system ConceptWall 50 curtain wall– Standard, ***scenario 100% glass recycling***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP - total	kg CO_2 eq.	1.08E+02	3.10E-03	1.19E-01	6.23E-01	2.37E+00	2.34E+00	-4.17E+01
GWP – fossil	kg CO_2 eq.	1.08E+02	3.08E-03	1.20E-01	6.19E-01	1.77E+00	2.33E+00	-4.16E+01
GWP – biogenic	kg CO_2 eq.	2.02E-01	1.55E-06	-1.04E-03	3.11E-04	5.86E-01	6.24E-05	-6.03E-02
GWP - luluc	kg CO_2 eq.	6.15E-02	2.00E-05	3.64E-04	4.02E-03	1.24E-02	2.28E-04	-1.50E-02
ODP	kg CFC 11 eq.	3.01E-10	7.96E-19	1.91E-15	1.60E-16	-1.83E-15	1.57E-15	-8.73E-11
AP	mol H^+ eq.	7.40E-01	1.74E-05	3.55E-04	3.50E-03	2.31E-03	4.31E-04	-2.29E-01
EP - freshwater	kg PO_4^{3-} eq.	2.35E-04	6.40E-09	2.94E-07	1.29E-06	4.22E-06	1.01E-06	-2.83E-05
EP - marine	kg N eq.	1.87E-01	8.56E-06	1.29E-04	1.72E-03	1.95E-03	1.32E-04	-4.26E-02
EP - terrestrial	mol N eq.	2.14E+00	9.47E-05	1.41E-03	1.91E-02	2.25E-02	1.81E-03	-5.93E-01
POCP	kg NMVOC eq.	4.34E-01	1.64E-05	3.59E-04	3.30E-03	3.08E-03	3.81E-04	-1.10E-01
ADP-MM (**)	kg Sb eq.	6.75E-05	2.71E-10	2.68E-08	5.45E-08	1.74E-08	2.29E-08	-5.69E-06
ADPF (**)	MJ	1.49E+03	4.12E-02	1.93E+00	8.30E+00	-2.41E+00	1.97E+00	-4.77E+02
WDP (**)	m^3	1.33E+01	1.21E-05	1.29E-02	2.43E-03	2.34E-01	1.93E-01	-4.58E+00

Note: GWP – Global Warming Potential; ODP – Ozone Depletion; AP – acidification potential for soil and water; EP – Eutrophication potential; POCP – formation potential of tropospheric ozone; ADP - MM – abiotic depletion potential for non fossil resources; ADPF – Abiotic depletion potential for fossil resources; WDP – Water deprivation potential.

(**) **Disclaimer**: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Scenario 100% glass landfill

Table 8 Core Environmental impacts indicators for 1 m² façade and roof system ConceptWall 50 curtain wall– Standard, ***scenario 100% glass landfill***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP - total	kg CO_2 eq.	1.08E+02	3.10E-03	1.19E-01	2.05E-01	1.90E-01	3.18E+00	-1.23E+01
GWP – fossil	kg CO_2 eq.	1.08E+02	3.08E-03	1.20E-01	2.03E-01	1.88E-01	3.20E+00	-1.23E+01
GWP – biogenic	kg CO_2 eq.	2.02E-01	1.55E-06	-1.04E-03	1.02E-04	1.17E-03	-2.51E-02	-2.77E-02
GWP - luluc	kg CO_2 eq.	6.15E-02	2.00E-05	3.64E-04	1.32E-03	4.58E-04	2.77E-03	-1.99E-03
ODP	kg CFC 11 eq.	3.01E-10	7.96E-19	1.91E-15	5.26E-17	5.91E-15	4.93E-15	-8.72E-11
AP	mol H^+ eq.	7.40E-01	1.74E-05	3.55E-04	1.15E-03	3.22E-04	6.60E-03	-6.77E-02
EP - freshwater	kg PO_4^{3-} eq.	2.35E-04	6.40E-09	2.94E-07	4.23E-07	7.96E-07	2.46E-06	-5.91E-06
EP - marine	kg N eq.	1.87E-01	8.56E-06	1.29E-04	5.66E-04	9.04E-05	1.73E-03	-9.39E-03
EP - terrestrial	mol N eq.	2.14E+00	9.47E-05	1.41E-03	6.26E-03	9.44E-04	1.94E-02	-1.03E-01
POCP	kg NMVOC eq.	4.34E-01	1.64E-05	3.59E-04	1.08E-03	2.28E-04	5.23E-03	-2.86E-02
ADP-MM (**)	kg Sb eq.	6.75E-05	2.71E-10	2.68E-08	1.79E-08	7.14E-08	1.05E-07	-4.50E-06
ADPF (**)	MJ	1.49E+03	4.12E-02	1.93E+00	2.72E+00	2.38E+00	1.34E+01	-1.54E+02
WDP (**)	m^3	1.33E+01	1.21E-05	1.29E-02	7.99E-04	4.22E-03	2.86E-01	-1.79E+00

Note: GWP – Global Warming Potential; ODP – Ozone Depletion; AP – acidification potential for soil and water; EP – Eutrophication potential; POCP – formation potential of tropospheric ozone; ADP - MM – abiotic depletion potential for non fossil resources; ADPF – Abiotic depletion potential for fossil resources; WDP – Water deprivation potential.

(**) **Disclaimer**: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

4.1.2 Additional Environmental impacts indicators

Scenario 100% glass recycling

Table 9 Additional Environmental impacts indicators for 1 m² façade and roof system ConceptWall 50 curtain wall– Standard, ***scenario 100% glass recycling***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Particular Matter emissions	Disease incidence	5.51E-06	5.96E-11	3.57E-09	1.20E-08	-8.55E-09	7.88E-09	-2.79E-06
Ionising radiation - human health (*)	[kBq U235 eq.]	8.33E+00	3.77E-06	3.46E-02	7.58E-04	-2.38E-01	7.07E-03	-2.57E+00
Eco-toxicity (freshwater) (**)	[CTUe]	2.76E+03	3.42E-02	1.03E+00	6.89E+00	1.13E+01	1.54E+00	-2.63E+03
Human toxicity - cancer effects (**)	[CTUh]	1.69E-07	6.77E-13	2.54E-11	1.36E-10	-4.84E-10	6.94E-11	-7.91E-09
Human toxicity - non-cancer effects (**)	[CTUh]	1.38E-06	3.55E-11	1.12E-09	7.14E-09	9.17E-09	6.74E-09	-6.37E-07
Land Use related impacts/ Soil quality (**)	dimensionless	1.67E+02	1.29E-02	6.09E-01	2.60E+00	6.13E+00	4.37E-01	-2.47E+01

(*) **Disclaimer**: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

(**) **Disclaimer**: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Scenario 100% glass landfill

Table 10 Additional environmental impacts for 1 m² façade and roof system ConceptWall 50 curtain wall– Standard, ***scenario 100% glass landfill***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Particular Matter emissions	Disease incidence	5.51E-06	5.96E-11	3.57E-09	3.94E-09	2.38E-09	8.44E-08	-9.49E-07
Ionising radiation - human health (*)	[kBq U235 eq.]	8.33E+00	3.77E-06	3.46E-02	2.49E-04	2.21E-02	1.97E-02	-1.78E+00
Eco-toxicity (freshwater) (**)	[CTUe]	2.76E+03	3.42E-02	1.03E+00	2.26E+00	9.49E-01	8.08E+00	-4.95E+01
Human toxicity - cancer effects (**)	[CTUh]	1.69E-07	6.77E-13	2.54E-11	4.48E-11	1.31E-10	1.03E-09	-3.14E-09
Human toxicity - non-cancer effects (**)	[CTUh]	1.38E-06	3.55E-11	1.12E-09	2.34E-09	1.08E-09	1.13E-07	-8.83E-08
Land Use related impacts/ Soil quality (**)	dimensionless	1.67E+02	1.29E-02	6.09E-01	8.53E-01	1.18E+00	2.75E+00	-5.87E+00

(*) **Disclaimer**: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.
(**) **Disclaimer**: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

4.2 Result of the LCA – Resource use

The tables below report the results of the resource use for the two glass scenarios: 100% recycling and 100% landfill.

Scenario 100% glass recycling

Table 11 Resource use for 1 m² façade and roof system ConceptWall 50 curtain wall– Standard, ***scenario 100% glass recycling***

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	2.70E+02	2.39E-03	6.82E-01	4.82E-01	-2.36E+00	4.19E-01	-8.64E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.70E+02	2.39E-03	6.82E-01	4.82E-01	-2.36E+00	4.19E-01	-8.64E+01
PENRE	MJ	1.38E+03	4.12E-02	1.93E+00	8.30E+00	-2.42E+00	1.97E+00	-4.77E+02
PENRM	MJ	3.11E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.41E+03	4.12E-02	1.93E+00	8.30E+00	-2.42E+00	1.97E+00	-4.77E+02
SM	kg	2.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.89E-01	2.13E-06	6.61E-04	4.28E-04	1.14E-03	4.71E-03	-2.43E-01

Note: PERE – use of renewable primary energy resources used as raw materials; PERT – Total use of renewable primary energy resources; PENRE – use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM – use of non-renewable primary energy resources used as raw materials; PENRT – Total use of non-renewable primary energy resources; SM – Use of secondary materials; RSF – Use of renewable secondary fuels; NRSF – use of non-renewable secondary fuels; FW – use of net fresh water.

Scenario 100% glass landfill

Table 12 Resource use for 1 m² façade and roof system ConceptWall 50 curtain wall– Standard, ***scenario 100% glass landfill***

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	2.70E+02	2.39E-03	6.82E-01	1.58E-01	1.28E+00	1.97E+00	-6.77E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.70E+02	2.39E-03	6.82E-01	1.58E-01	1.28E+00	1.97E+00	-6.77E+01
PENRE	MJ	1.38E+03	4.12E-02	1.93E+00	2.72E+00	2.38E+00	1.35E+01	-1.54E+02
PENRM	MJ	3.11E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.41E+03	4.12E-02	1.93E+00	2.72E+00	2.38E+00	1.35E+01	-1.54E+02
SM	kg	2.22E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.89E-01	2.13E-06	6.61E-04	1.41E-04	6.93E-04	7.55E-03	-1.67E-01

Note: PERE – use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM – use of renewable primary energy resources used as raw materials; PERT – Total use of renewable primary energy resources; PENRE – use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM – use of non-renewable primary energy resources used as raw materials; PENRT – Total use of non-renewable primary energy resources; SM – Use of secondary materials; RSF – Use of renewable secondary fuels; NRSF – use of non-renewable secondary fuels; FW – use of net fresh water.

4.3 Result of the LCA – Output flows, waste categories

Scenario 100% glass recycling

Table 13 Output flows, waste categories for 1 m² façade and roof system ConceptWall 50 curtain wall– Standard, ***scenario 100% glass recycling***

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	1.05E-06	1.72E-12	3.96E-10	3.47E-10	-9.27E-10	3.47E-10	-8.40E-08
NHWD	kg	1.07E+01	6.66E-06	1.09E-03	1.34E-03	4.08E-02	9.32E-01	-4.41E+00
RWD	kg	3.55E-02	3.96E-08	2.11E-04	7.96E-06	-1.16E-03	6.14E-05	-1.45E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.01E+01	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.70E+00	0.00E+00

Note: HWD – hazardous waste disposed; NHWD – Non-hazardous waste disposed; RWD – Radioactive waste disposed; CRU – Components for re-use; MFR – Materials for recycling; MER – Materials for energy recovery; EEE – Exported electrical energy; EET – Exported thermal energy

Scenario 100% glass landfill

Table 14 Output flows, waste categories for 1 m² façade and roof system ConceptWall 50 curtain wall– Standard, ***scenario 100% glass landfill***

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	1.05E-06	1.72E-12	3.96E-10	1.14E-10	1.85E-09	1.57E-09	-8.03E-08
NHWD	kg	1.07E+01	6.66E-06	1.09E-03	4.40E-04	2.46E-03	5.82E+01	-3.28E+00
RWD	kg	3.55E-02	3.96E-08	2.11E-04	2.61E-06	2.24E-04	1.82E-04	-9.44E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.72E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.17E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.70E+00	0.00E+00

Note: HWD – hazardous waste disposed; NHWD – Non-hazardous waste disposed; RWD – Radioactive waste disposed; CRU – Components for re-use; MFR – Materials for recycling; MER – Materials for energy recovery; EEE – Exported electrical energy; EET – Exported thermal energy

5 LCA RESULTS – FAÇADE AND ROOF SYSTEM ConceptWall 50 curtain wall – HI

5.1 Result of the LCA – Environmental impacts

The tables below report the results of the LCA study for the two glass scenarios: 100% recycling and 100% landfill.

5.1.1 Core Environmental impacts indicators

Scenario 100% glass recycling

Table 15 Core Environmental impacts indicators for 1 m² façade and roof system ConceptWall 50 curtain wall– HI, ***scenario 100% glass recycling***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP - total	kg CO_2 eq.	1.07E+02	3.08E-03	1.19E-01	6.18E-01	2.35E+00	1.85E+00	-4.15E+01
GWP – fossil	kg CO_2 eq.	1.07E+02	3.05E-03	1.20E-01	6.14E-01	1.76E+00	1.85E+00	-4.14E+01
GWP – biogenic	kg CO_2 eq.	1.94E-01	1.54E-06	-1.03E-03	3.09E-04	5.84E-01	-5.55E-05	-6.04E-02
GWP - luluc	kg CO_2 eq.	6.54E-02	1.98E-05	3.62E-04	3.99E-03	1.23E-02	4.32E-05	-1.50E-02
ODP	kg CFC 11 eq.	1.19E-09	7.90E-19	1.91E-15	1.59E-16	-2.03E-15	2.83E-16	-8.58E-11
AP	mol H^+ eq.	7.36E-01	1.73E-05	3.54E-04	3.47E-03	2.29E-03	6.68E-04	-2.27E-01
EP - freshwater	kg PO_4^{3-} eq.	2.33E-04	6.35E-09	2.93E-07	1.28E-06	4.18E-06	7.01E-07	-2.83E-05
EP - marine	kg N eq.	1.87E-01	8.50E-06	1.29E-04	1.71E-03	1.94E-03	2.92E-04	-4.24E-02
EP - terrestrial	mol N eq.	2.13E+00	9.41E-05	1.40E-03	1.89E-02	2.24E-02	3.51E-03	-5.90E-01
POCP	kg NMVOC eq.	4.31E-01	1.63E-05	3.57E-04	3.27E-03	3.06E-03	7.63E-04	-1.10E-01
ADP-MM (**)	kg Sb eq.	6.48E-05	2.69E-10	2.68E-08	5.40E-08	1.48E-08	4.84E-09	-5.53E-06
ADPF (**)	MJ	1.48E+03	4.09E-02	1.93E+00	8.23E+00	-2.48E+00	5.55E-01	-4.75E+02
WDP (**)	m^3	1.32E+01	1.20E-05	1.29E-02	2.41E-03	2.33E-01	1.86E-01	-4.55E+00

Note: GWP – Global Warming Potential; ODP – Ozone Depletion; AP – acidification potential for soil and water; EP – Eutrophication potential; POCP – formation potential of tropospheric ozone; ADP - MM – abiotic depletion potential for non fossil resources; ADPF – Abiotic depletion potential for fossil resources; WDP – Water deprivation potential.

(**) **Disclaimer**: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Scenario 100% glass landfill

Table 16 Core Environmental impacts indicators for 1 m² façade and roof system ConceptWall 50 curtain wall– HI, ***scenario 100% glass landfill***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP - total	kg CO_2 eq.	1.07E+02	3.08E-03	1.19E-01	2.01E-01	1.82E-01	2.69E+00	-1.22E+01
GWP – fossil	kg CO_2 eq.	1.07E+02	3.05E-03	1.20E-01	2.00E-01	1.81E-01	2.72E+00	-1.22E+01
GWP – biogenic	kg CO_2 eq.	1.94E-01	1.54E-06	-1.03E-03	1.00E-04	1.12E-03	-2.51E-02	-2.79E-02
GWP - luluc	kg CO_2 eq.	6.54E-02	1.98E-05	3.62E-04	1.30E-03	4.41E-04	2.58E-03	-2.05E-03
ODP	kg CFC 11 eq.	1.19E-09	7.90E-19	1.91E-15	5.16E-17	5.69E-15	3.63E-15	-8.58E-11
AP	mol H^+ eq.	7.36E-01	1.73E-05	3.54E-04	1.13E-03	3.10E-04	6.81E-03	-6.67E-02
EP - freshwater	kg PO_4^{3-} eq.	2.33E-04	6.35E-09	2.93E-07	4.15E-07	7.65E-07	2.15E-06	-5.99E-06
EP - marine	kg N eq.	1.87E-01	8.50E-06	1.29E-04	5.55E-04	8.70E-05	1.89E-03	-9.29E-03
EP - terrestrial	mol N eq.	2.13E+00	9.41E-05	1.40E-03	6.15E-03	9.08E-04	2.10E-02	-1.01E-01
POCP	kg NMVOC eq.	4.31E-01	1.63E-05	3.57E-04	1.06E-03	2.19E-04	5.59E-03	-2.82E-02
ADP-MM (**)	kg Sb eq.	6.48E-05	2.69E-10	2.68E-08	1.76E-08	6.87E-08	8.62E-08	-4.35E-06
ADPF (**)	MJ	1.48E+03	4.09E-02	1.93E+00	2.67E+00	2.29E+00	1.20E+01	-1.53E+02
WDP (**)	m^3	1.32E+01	1.20E-05	1.29E-02	7.84E-04	4.06E-03	2.78E-01	-1.77E+00

Note: GWP – Global Warming Potential; ODP – Ozone Depletion; AP – acidification potential for soil and water; EP – Eutrophication potential; POCP – formation potential of tropospheric ozone; ADP - MM – abiotic depletion potential for non fossil resources; ADPF – Abiotic depletion potential for fossil resources; WDP – Water deprivation potential.

(**) **Disclaime**r: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

5.1.2 Additional Environmental impacts indicators

Scenario 100% glass recycling

Table 17 Additional Environmental impacts indicators for 1 m² façade and roof system ConceptWall 50 curtain wall– HI, ***scenario 100% glass recycling***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Particular Matter emissions	Disease incidence	5.46E-06	5.91E-11	3.55E-09	1.19E-08	-8.60E-09	3.55E-09	-2.77E-06
Ionising radiation - human health (*)	[kBq U235 eq.]	8.22E+00	3.74E-06	3.46E-02	7.51E-04	-2.38E-01	3.01E-03	-2.57E+00
Eco-toxicity (freshwater) (**)	[CTUe]	2.74E+03	3.40E-02	1.02E+00	6.83E+00	1.12E+01	3.03E-01	-2.62E+03
Human toxicity - cancer effects (**)	[CTUh]	1.59E-07	6.73E-13	2.53E-11	1.35E-10	-4.86E-10	2.04E-11	-7.85E-09
Human toxicity - non-cancer effects (**)	[CTUh]	1.38E-06	3.52E-11	1.12E-09	7.08E-09	9.10E-09	1.66E-09	-6.34E-07
Land Use related impacts/ Soil quality (**)	dimensionless	1.64E+02	1.28E-02	6.07E-01	2.58E+00	6.07E+00	1.18E-01	-2.49E+01

(*) **Disclaimer**: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

(**) **Disclaimer**: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Scenario 100% glass landfill

Table 18 Additional Environmental impacts indicators for 1 m² façade and roof system ConceptWall 50 curtain wall– HI, ***scenario 100% glass landfill***

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Particular Matter emissions	Disease incidence	5.46E-06	5.91E-11	3.55E-09	3.86E-09	2.29E-09	7.98E-08	-9.34E-07
Ionising radiation - human health (*)	[kBq U235 eq.]	8.22E+00	3.74E-06	3.46E-02	2.44E-04	2.12E-02	1.56E-02	-1.78E+00
Eco-toxicity (freshwater) (**)	[CTUe]	2.74E+03	3.40E-02	1.02E+00	2.22E+00	9.13E-01	6.82E+00	-4.92E+01
Human toxicity - cancer effects (**)	[CTUh]	1.59E-07	6.73E-13	2.53E-11	4.39E-11	1.26E-10	9.81E-10	-3.11E-09
Human toxicity - non-cancer effects (**)	[CTUh]	1.38E-06	3.52E-11	1.12E-09	2.30E-09	1.04E-09	1.08E-07	-8.77E-08
Land Use related impacts/ Soil quality (**)	dimensionless	1.64E+02	1.28E-02	6.07E-01	8.38E-01	1.13E+00	2.43E+00	-6.15E+00

(*) **Disclaimer**: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.
(**) **Disclaimer**: the results of this Environmental impacts indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

5.2 Result of the LCA – Resource use façade and roof system ConceptWall 50 curtain wall– HI, 1 m^2

The tables below report the results of the resource use for the two glass scenarios: 100% recycling and 100% landfill.

Scenario 100% glass recycling

Table 19 Resource use for 1 m^2 façade and roof system ConceptWall 50 curtain wall– HI, ***scenario 100% glass recycling***

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	2.65E+02	2.38E-03	6.82E-01	4.77E-01	-2.39E+00	8.98E-02	-8.57E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.65E+02	2.38E-03	6.82E-01	4.77E-01	-2.39E+00	8.98E-02	-8.57E+01
PENRE	MJ	1.37E+03	4.09E-02	1.93E+00	8.23E+00	-2.49E+00	5.55E-01	-4.76E+02
PENRM	MJ	3.37E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.40E+03	4.09E-02	1.93E+00	8.23E+00	-2.49E+00	5.55E-01	-4.76E+02
SM	kg	2.18E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.84E-01	2.11E-06	6.61E-04	4.24E-04	1.11E-03	4.37E-03	-2.40E-01

Note: PERE – use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM – use of renewable primary energy resources used as raw materials; PERT – Total use of renewable primary energy resources; PENRE – use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM – use of non-renewable primary energy resources used as raw materials; PENRT – Total use of non-renewable primary energy resources; SM – Use of secondary materials; RSF – Use of renewable secondary fuels; NRSF – use of non-renewable secondary fuels; FW – use of net fresh water.

Scenario 100% glass landfill

Table 20 Resource use for 1 m^2 façade and roof system ConceptWall 50 curtain wall– HI, ***scenario 100% glass landfill***

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	2.65E+02	2.38E-03	6.82E-01	1.55E-01	1.24E+00	1.63E+00	-6.71E+01
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.65E+02	2.38E-03	6.82E-01	1.55E-01	1.24E+00	1.63E+00	-6.71E+01
PENRE	MJ	1.37E+03	4.09E-02	1.93E+00	2.67E+00	2.29E+00	1.20E+01	-1.53E+02
PENRM	MJ	3.37E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.40E+03	4.09E-02	1.93E+00	2.67E+00	2.29E+00	1.20E+01	-1.53E+02
SM	kg	2.18E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	3.84E-01	2.11E-06	6.61E-04	1.38E-04	6.66E-04	7.19E-03	-1.65E-01

Note: PERE – use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM – use of renewable primary energy resources used as raw materials; PERT – Total use of renewable primary energy resources; PENRE – use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM – use of non-renewable primary energy resources used as raw materials; PENRT – Total use of non-renewable primary energy resources; SM – Use of secondary materials; RSF – Use of renewable secondary fuels; NRSF – use of non-renewable secondary fuels; FW – use of net fresh water.

5.3 Result of the LCA – Output flows, waste categories

Scenario 100% glass recycling

Table 21 Output flows, waste categories for 1 m² façade and roof system ConceptWall 50 curtain wall– HI, ***scenario 100% glass recycling***

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	8.05E-06	1.71E-12	3.95E-10	3.44E-10	-9.87E-10	1.05E-10	-8.32E-08
NHWD	kg	1.06E+01	6.61E-06	1.09E-03	1.33E-03	4.06E-02	4.07E-01	-4.35E+00
RWD	kg	3.50E-02	3.93E-08	2.11E-04	7.90E-06	-1.17E-03	2.02E-05	-1.45E-02
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.98E+01	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.72E+00	0.00E+00

Note: HWD – hazardous waste disposed; NHWD – Non-hazardous waste disposed; RWD – Radioactive waste disposed; CRU – Components for re-use; MFR – Materials for recycling; MER – Materials for energy recovery; EEE – Exported electrical energy; EET – Exported thermal energy.

Scenario 100% glass landfill

Table 22 Output flows, waste categories for 1 m² façade and roof system ConceptWall 50 curtain wall– HI, ***scenario 100% glass landfill***

Parameter	Unit	A1-A3	A4	C1	C2	C3	C4	D
HWD	kg	8.05E-06	1.71E-12	3.95E-10	1.12E-10	1.78E-09	1.32E-09	-7.95E-08
NHWD	kg	1.06E+01	6.61E-06	1.09E-03	4.32E-04	2.37E-03	5.75E+01	-3.23E+00
RWD	kg	3.50E-02	3.93E-08	2.11E-04	2.57E-06	2.16E-04	1.40E-04	-9.46E-03
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.64E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.72E+00	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.72E+00	0.00E+00

Note: HWD – hazardous waste disposed; NHWD – Non-hazardous waste disposed; RWD – Radioactive waste disposed; CRU – Components for re-use; MFR – Materials for recycling; MER – Materials for energy recovery; EEE – Exported electrical energy; EET – Exported thermal energy.

6 LCA – INTERPRETATION

The results are analysed and interpreted for modules A1-A3 and modules C1-D for the product with the highest LCIA results within this EPD. In case the selected product has double and triple glazing variants, a comparison between these two options is provided. Results for module A4 are not further interpreted, as calculated only for 1 km. Finally, the end-of-life modules are compared to the most impactful modules (A1-A3) for the product with the highest LCIA results. This allows a comparison of the impacts of the two extreme end-of-life scenarios for glass: 100% glass recycling and 100% glass to landfill.

Production stages: modules A1 to A3.

The biggest contributor to the Environmental impacts is aluminium production which is influenced by the mass of aluminium in the declared unit: the higher the aluminium mass, the higher the indicator. Hence, the GWP indicator evolves from 1.07E+02 [kg CO2-eq] for the HI insulating curtain wall to 1.08E+02 [kg CO2-eq] for the Standard insulating curtain wall.

Within the aluminium production processes, the primary aluminium production is dominant, especially the alumina production and the electrolysis. The recycled ingot production, which presents a much lower impact than the primary ingot production, is used in Module A1-A3 for the fraction of aluminium coming from recycling. The extrusion process which converts ingot, i.e. billets, into profile is much less significant. The LCA modelling and the impact of the primary aluminium production are detailed in the Environmental Profile Report 2018.

End-of-life stage: modules C1-C4 and module D

Modules C1-C3: they are negligible for all products compared to modules A1-A3 (<2.9% for scenario 100% glass recycling and <0.5% for scenario 100% glass landfill).

Module C4: the contribution of module C4 (disposal) is very limited (<2.9%) compared to modules A1-A3 and module D.

Module D: environmental benefits come from the recycling of aluminium. About 38.6% of GWP savings, for scenario 100% glass recycling, are obtained in Module D compared to the value calculated for module A1-A3 and 11.4% for scenario 100% glass landfill. These calculations show the relevance to consider Module D in the full assessment of the façade and roof system in the building context.

7 OTHER INFORMATION

Reynaers Aluminium is founded on the concept of corporate responsibility and includes recognition of the need for positive actions and continuous support and development of the local communities that neighbour our facilities.

Through its Management Systems, certified according to ISO 9001:2015 and ISO 14001:2015, Reynaers Aluminium actively implements best practices regarding environmental protection through significant investments and measures, by optimizing the production cycle, implementing new procedures that reduce the energy footprint of our plants, and the vigilant prevention of any possibility of environmental pollution.

Additional information about Reynaers Aluminium's corporate responsibility and sustainability policy (Reynaers Act) and the products can be found on the Reynaers Aluminium website www.reynaers.com.

These EPD results have been calculated from an LCA tool for EPD, based on the GaBi database, initially realised by thinkstep GmbH in 2013 and updated by Ecoinnovazione in 2019 (Ecoinnovazione S.r.l. – spin-off ENEA Via della Liberazione, 6/c, 40128 Bologna BO www.ecoinnovazione.it)

8 REFERENCES

European Aluminium General Programme Instructions version 3, 23rd of September 2020

European Aluminium (2018) ENVIRONMENTAL PROFILE REPORT Life-Cycle inventory data for aluminium production and transformation processes in Europe February 2018

EN 15804:2012+A2:2019, Sustainability of construction works - Environmental Product Declarations – Core rules for the product category of construction products

International Organisation for Standardization (ISO), 2006 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures. ISO 14025:2006, Geneva

Technical Submission
Curtain Walls

Other



Solutions for Sustainable Buildings

The guide to BREEAM

Reynaers Aluminium

Windows.
Doors.
Curtain Walls.

Together for better

www.reynaers.com

About Reynaers Aluminium

"Our goal is to increase the value of buildings and to enhance the living and working environment of people worldwide."

As a part of the Reynaers Group, Reynaers Aluminium is a leading specialist in the development, distribution and commercialisation of innovative and sustainable aluminium architectural solutions. These include a wide variety of window and door systems, curtain walls, sliding systems, and conservatories.
Besides the extensive range of standard solutions, we also develop customised solutions, tailored to the individual customer or project. Reynaers Aluminium has been founded in 1965, is currently employing over 2400 workers in more than 40 countries worldwide and exporting to more than 70 countries on 5 continents. Reynaers Group achieved an annual turnover of over 555 million euros in 2020.

Our company's success is strengthened by our close partnership with 5,000 partner fabricators, architects, and project developers worldwide. This unique cooperation reflects in our motto: Together for Better.

At Reynaers Campus, we focus on sharing knowledge and experience with architects, fabricators, contractors and other building partners while inspiring with new technologies. Next to the Technology, Training and Automation Centre, Reynaers Campus also has its own Experience Centre where future buildings can be explored in our virtual reality room Avalon.



Reynaers Aluminium can help you to achieve BREEAM credits

Using Reynaers Aluminium solutions, in combination with other building components, up to 22 BREEAM credits can be achieved. The feasibility to obtain these credits was analysed and confirmed by an independent and qualified expert engineering company, ENCON, specialised in optimising energy consumption.

To help you achieve these credits, Reynaers Aluminium specialists can assist you in selecting the most appropriate solutions for your project and provide you with the necessary documents, required for the BREEAM assessment. This will include the general documents and certificates, but also project specific information to increase your BREEAM score.

Some Reynaers Aluminium references with BREEAM certificates:

- V&D Distribution centre (NL) – Good
- Duetto (BG) – Good
- Premium Business Center (LT) – Good
- Lidl (LT) – Good
- BC 2000 (LT) – Good
- Bulgaria Mall Sofia (BG) – Good
- Twin city block ABC (CZ) – Good
- Malmo Office Tower (RO) – Good
- Mediacité (BE) – Very Good
- St. Mary Axe (UK) – Very Good
- St. David's Hospice (UK) – Very Good
- The Cooperative Supermarket – Very Good
- Airport Plaza (BE) - Very Good
- Onyx (BE) - Very Good
- Jersey Esplanade (UK) – Very Good
- Great Marlborough Street (UK) – Very Good
- Oregon Park (RO) - Very Good/ Excellent
- Severn Trent HQ (UK) – Excellent
- Selby War Memorial Hospital (UK) – Excellent
- Radisson Blu Hotel, East Midlands Airport (UK) – Excellent
- Kendal College (UK) – Excellent
- Eleven Brindleyplace (UK) – Excellent
- Trowbridge County Council (UK) – Excellent
- Finchley Memorial Hospital (UK) – Excellent
- Derby Council (UK) – Excellent
- 1 Aldermanbury Square (UK) – Excellent
- Greenwich Square (UK) – Excellent

GET IN TOUCH

For more information, visit www.reynaers.com to find your local Reynaers' contact

Reynaers Aluminium

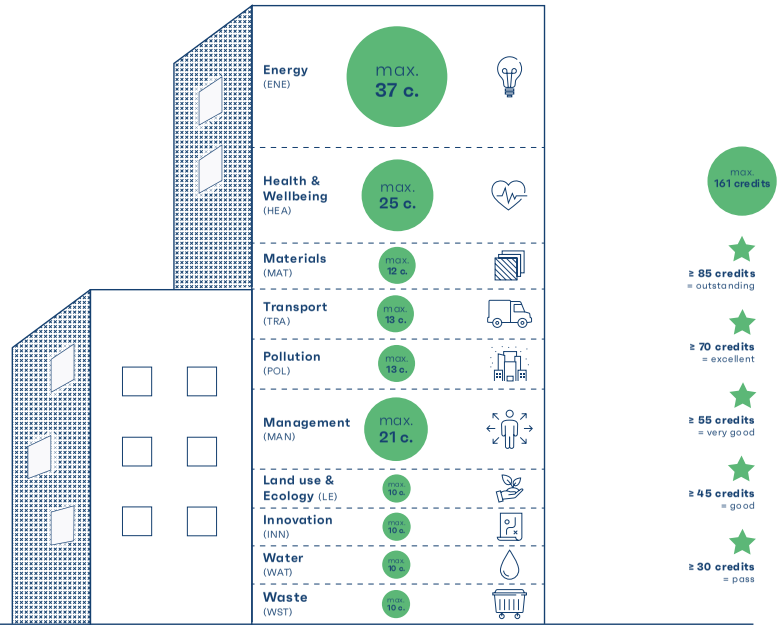
develops innovative and sustainable aluminium solutions

We develop aluminium solutions for windows, doors, curtain walls and sun screening that increase the architectural value of buildings and enhance people's living and working environment. Integration of Reynaers Aluminium products in buildings can contribute to the overall sustainability level of the building, thus achieving credits for building certificates such as BREEAM.

BREEAM (British Research Establishment Environmental Assessment Method) is a certification system that recognises sustainable buildings that exceed national standards. As a quality label, it encourages the market to focus on sustainability in building design as well as the environmental impact of products in buildings.

As this label assesses the overall building concept, BREEAM specifies 10 main categories, with multiple issues, on which the building is evaluated. Credits are awarded and weighted for each category in order to generate the final score for the building, in levels from pass to outstanding.

The maximum amount of credits available can differ slightly depending on building type.





Architect: Taylor Young Architects

Using Reynaers Aluminium solutions in combination with other building components, up to 22 credits can be gained on the following issues (according to BREEAM International New Construction 2016:

Category	Issue	Max. credits	Window Door	Sliding door	Curtain wall	Sun screening
Health & Wellbeing (HEA)	HEA1 - Visual comfort	max 4	2	2	2	1
	HEA2 - Indoor air quality	max 5*	3	3	3	-
	HEA4 - Thermal comfort	max 3	2	2	2	2
	HEA5 - Acoustic performance	max 2	2	2	2	-
Energy (ENE)	ENE1 - Reduction of energy use and carbon	max 15*	5	4	6	6
	ENE4 - Low carbon design	max 3	1	1	1	1
Materials (MAT)	MAT1 - Life cycle impacts	max 6*	3	3	3	2
	MAT3 - Responsible sourcing of construction products	max 4*	1	1	1	1
Pollution (POL)	Reduction of noise pollution	max 1	1	1	1	-
Innovation (INN)	Innovation	max 10	1	0	1	1

* For these issues, it is possible to gain one extra innovation credit based on exemplary performance, as described in the assessment criteria.

The data in this brochure is specifically linked to office and industry buildings.
For other types of buildings, the achievable number of credits may be slightly different.



Health & Wellbeing (HEA)

Lead architect: Ron Arad Architects - Executive architect: Jaspers & Eyers



Lead architect: Ron Arad Architects - Executive architect: Jaspers & Eyers

HEA1
Visual comfort

max. 4 credits | 2 | 2 | 2 | 1

Aim

To ensure daylighting, artificial lighting and occupant controls are considered at the design stage to ensure best practice in visual performance and comfort for building occupants

Assessment Criteria

Daylighting - max 1 credit

- Provision of daylight designed in compliance with national best practice
- Daylight simulation study required
- Minimum 80% of the total floor area must meet the average daylight factor requirement

Glare control - 1 credit / View Out - 1 credit

- Provision of shading systems with possibility to control
- Shading control for all 'relevant building areas'
  - Areas where lighting and resultant glare could be problematic for users
  - Workstations, projector screens,...
- Specifications of shading systems and controls required as evidence
- View out = window surface ≥20% of the surrounding wall area

Product range analysis		Credits
Windows & Doors	CS Series	2
	MasterLine 8	2
	SlimLine Series	2
	ES 45-Pa	2
	TS Series	2
	CD Series	1
Folding systems	CF Series	2

Product range analysis		Credits
Sliding systems	CP Series	2
	Hi-Finity	2
	SlimPatio 68	2
Curtain wall systems	CW Series	2
	CW 60 solar	1
Sun screening	BS 40	1
	BS 30, 100 solar	1

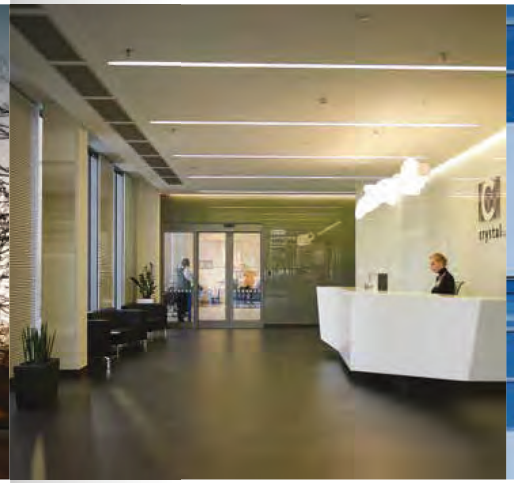
Reynaers Aluminium

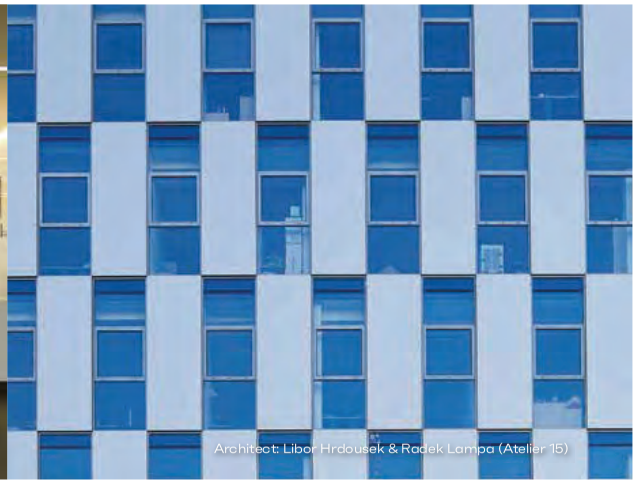
Good access to daylight is one of the major benefits of completely glazed curtain walls or roofs and sliding doors. This credit can therefore be readily achieved by integrating these solutions into the building. The correct integration of windows can also provide building users with uniform daylight illuminance exactly where needed.

In general, people spend more than 90% of their time indoors and more than 30% of the time in offices in front of a computer screen. Looking through a window allows them to refocus their gaze from the intensive work on a screen or other detailed work, preventing tired eyes or headaches. All Reynaers systems provide building occupants with this external view. The use of sun screening systems such as BS 100 or BS 30 will not obstruct the view and gives the perfect combination of light, view and shading.

HEA2
Indoor air quality


Architect: Libor Hrdousek & Radek Lampa (Atelier 15)




Architect: Libor Hrdousek & Radek Lampa (Atelier 15)

Aim

To recognise and encourage a healthy internal environment through the specification and installation of appropriate ventilation, equipment and finishes

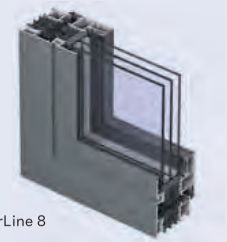
Assessment Criteria

- Emissions from building products (1 credit)
- Natural ventilation strategy (1 credit)
- Indoor air quality measurement (1 credit) Measurement by external party in the building

Reynaers Aluminium

The best way to get fresh air into a building is by opening a window or sliding element. The turn and tilt position of a window gives the user two levels of fresh air supply. These windows can also be integrated in curtain wall systems, achieving natural ventilation in the building. Based on the ventilation study, the total natural ventilation needs to be set-up correctly in order to gain the BREEAM credit. With the Ventalis system, available in Eco system, CS 68, CS 77, CP 130 and CP 155, an adequate cross air flow strategy can be achieved, although a ventilation study on the building will be required.

To ensure a basic level of indoor air quality, Reynaers Aluminium products use low VOC powder coating and low VOC gaskets. This contributes to the health and well-being of building users by minimizing pollutants.


MasterLine 8

max. 5 credits	3	3	3	-

Product range analysis		Credits
Windows & Doors	CS Series	3
	MasterLine 8	3
	SlimLine Series	3
	ES 45-Pa	3
	TS Series	3
	CD Series	2
Sliding systems	CP Series	3
	Hi-Finity	3
	SlimPatio 68	3
Folding systems	CF Series	3
Curtain wall systems	CW Series	3
	CW 60 solar	3

Remarks

- Emissions from building products = Low levels of VOC from powder coatings and gaskets
- Natural ventilation strategy = operable window strategy OR combined ventilation strategy. BREEAM considers a strategy based only on opening doors insufficient to satisfy ventilation requirements. It can however form part of a more extensive natural ventilation strategy.
- Indoor air quality measurement = Low levels of VOC from powder coatings and gaskets

HEA4
Thermal Comfort

max. 3 credits				
	2	2	2	2

Aim

To ensure that appropriate thermal comfort levels are achieved through design, and controls are selected to maintain a thermally comfortable environment for occupants within the building

Assessment Criteria

Option 1 - Thermal modelling (1 credit)

- Analysis of thermal comfort level using Predicted Mean Vote (PMV) and Predicted Percentage of Dissatisfied (PPD)
- Thermal comfort levels in accordance with European Standard EN ISO 7730

Option 2 - Adaptability for a projected climate change scenario (1 credit)

- Option 1 must be achieved
- Thermal modelling demonstrates that the relevant requirements from option 1 are achieved for a projected climate change environment

Reynaers Aluminium

A comfortable temperature will greatly improve people's well-being and productivity. Reynaers Aluminium solutions, in combination with suitable glazing, provide the required insulation to achieve the right level of thermal comfort. Reducing draughts and improving thermal comfort also depends on the correct installation of airtight elements. A high quality production system and the use of Reynaconnect will guarantee the air tightness of the total solution.

Beside the thermal insulation aspect, an effective shading system will also greatly improve thermal comfort during summer.

To achieve these BREEAM credits, dynamic thermal analysis is required to guide design decisions.



Architect: Hodder + Partners

HEA5
Acoustic performance

max. 2 credits				
	2	2	2	-

Aim

To ensure the acoustic performance of the building meets the appropriate standards for its purpose

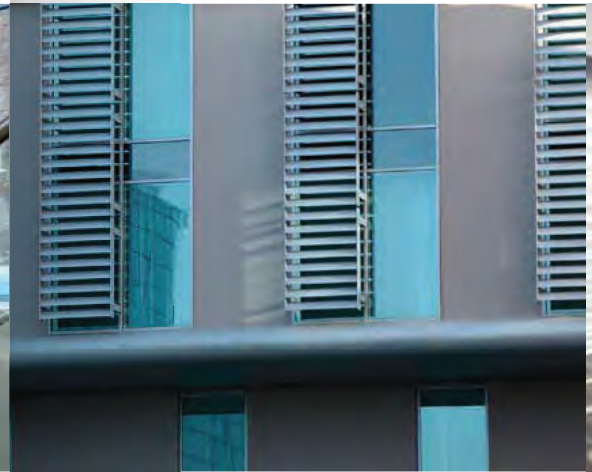
Assessment Criteria

- Sufficiently low internal noise levels
- Adequate sound insulation between rooms
- Demonstrate that the reverberation time or equivalent absorption area for relevant spaces complies with targets
- Noise study by qualified acoustician required

Reynaers Aluminium

All Reynaers Aluminium systems can achieve acoustic results (Rw) ranging from 40dB up to 60dB, depending on the system and the glass specifications. We can offer an appropriate acoustic insulating system to achieve low internal noise levels in most situations, in line with the BREEAM credit.







Architect: Hodder + Partner

Energy (ENE)



Architect: Webb Gray Architects





Architect: Leach Rhodes Walker

More than 40% of the energy used within the European Union goes towards heating, cooling, lighting and managing the buildings in which we live and work. This figure must be reduced by at least 60% before 2050 in order to meet current global climate change targets. Reynaers Aluminium is uniquely positioned to help reduce the environmental impact of new and existing buildings. Our declared intent and philosophy is to continue innovating towards a greener planet and the objective of zero-energy building across Europe.

ENE1
Reduction of energy use and carbon emissions

max. 15 credits | 5 | 4 | 6 | 6

Aim

To recognise and encourage buildings that are designed to minimise their operational energy consumption

Assessment Criteria

Option 1: Use of approved building energy calculation software (15 credits)

- Calculation of the Energy Performance Ratio for International New Construction (EPRINC) by comparing the energy requirements of the assessed building with a notional equivalent and comparison of EPRINC with the BREEAM benchmarks
- The building is modelled to demonstrate compliance withlocal building regulations by a qualified energy modelling engineer using approved building energy calculation software

Option 2: Energy efficient design features (10 credits)

- Defining the building energy performance using checklist A5: Energy Design Features which covers issues such as U-values, lighting efficiency, renewable technologies
- Requirements dependent on building location

Product range analysis		Credits
Windows & Doors	CS Series	4
	MasterLine 8	5
	SlimLine Series	4
	ES 45-Pa	4
	TS Series	5
	CD Series	5
Sliding systems	CP Series	4
	Hi-Finity	4
	SlimPatio 68	4

Product range analysis		Credits
Folding systems	CF Series	4
Curtain wall systems	CW Series	6
	CW 60 solar	6
Sun screening	BS 40	5
	BS 30, 100 solar	6
Balustrade	RB 10 Solar	2

Reynaers Aluminium

Our window and door solutions, sliding doors and curtain walls provide exceptional insulation and create buildings with excellent energy performance.

With our high-insulation range, in combination with triple glazing, an Energy Performance Ratio (EPRINC) of up to 0.36 can be achieved. This results in 6 BREEAM credits.

ENE4
Low carbon design

max. 3 credits | 1 | 1 | 1 | 1


Architect: Stride Treglown Architects

Aim

To encourage the adoption of design measures, which reduce building energy consumption and associated carbon emissions and minimise reliance on active building services systems

Assessment Criteria

Passive design (2 credits)

- Passive design analysis (1 credit)
  - Achieve HEA4 Thermal comfort
  - Perform passive design analysis
  - Implementation of passive design measures
- Free Cooling (1 credit)
  Implementation of natural ventilation through operable windows

Low and zero carbon technologies (1 credit)

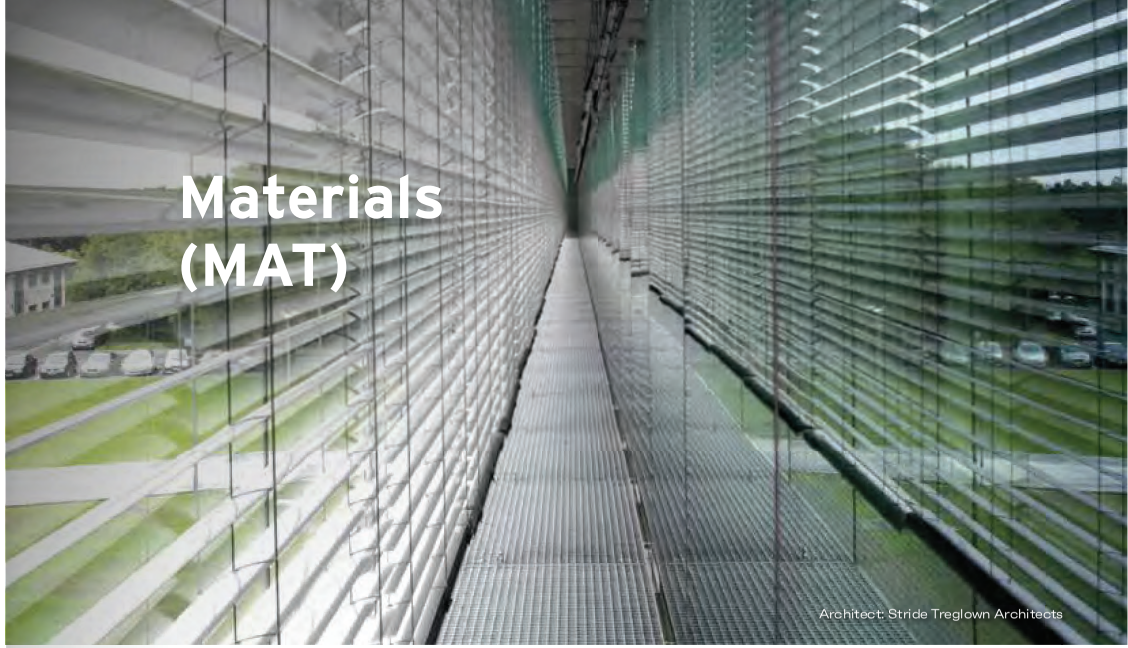
- Feasibility study

Reynaers Aluminium

Our high insulating range of operable windows create natural ventilation and help attain the Free Cooling credit.

Our building integrated photovoltaic solutions for curtain walls and sun shading systems provide excellent performances which meet the aim of this issue. All photovoltaic (PV) technologies can be used. However, the type of PV cells and the available PV area will affect the amount of energy produced. With our RB 10 Solar, the solar panels can be integrated in the balustrade. For BS 100 Solar, we create a combined advantage with HEA1, because it is a controllable shading system.

Due to the integration of PV panels, the CO_2 reduction can be reduced by 10% to 20% because part of the energy consumption of the building is produced on site in the roof, façade, shading system or balustrade, contributing to the ideal of a zero-energy building.


Architect: Stride Treglown Architects

Materials (MAT)

MAT1
Life cycle impacts

max. 6 credits | 3 | 3 | 3 | 2

Aim

To recognise and encourage the use of robust and appropriate life cycle assessment tools and the specification of materials with low environmental impact over full building life cycle

Reynaers Aluminium

The full life cycle assessment of materials used for the construction of a building will provide the environmental impact of the building. Environmental Product Declarations (EPD's) are available for a wide range of our windows, doors, sliding systems and curtain walls.

Assessment Criteria

Measuring the life cycle environmental impact of building elements

- Building fabric, services & landscaping
- Evaluating a range of material options for the building with a Life Cycle Assessment (LCA) tool => BREEAM MAT1 Calculator required (5 credits)

EPD - Environmental product declarations (1 credit)



MAT3
Responsible sourcing of construction products

max. 4 credits | 1 | 1 | 1 | 1

Aim

To recognise and encourage the specification and procurement of responsibly sourced construction products

Assessment Criteria

Using materials with responsible origin (3 credits)

- An Environmental Management System (EMS) is needed for example ISO 14001 certificate
- Output BREEAM MAT3 Calculator required

Reynaers Aluminium

To create a full cycle of responsible sourcing, the whole process must be taken into account, from the production of aluminium billets, to the manufacturing of the finished elements. Therefore, Reynaers Aluminium has incorporated the ISO 14001 certificate in its processes and looks for suppliers with this certification to ensure responsible sourcing. To complete the cycle, it is also important that the manufacturer initiates an Environmental Management Scheme (EMS). A total of 80% of the building elements must be responsibly sourced to gain credits, with Reynaers Aluminium systems achieving one BREEAM credit for this issue.

ISO 14001
Gecertificeerd door SKG-IKOB



Architect: Taylor Young Architects

Architect: Libor Hrdousek & Radek Lampa (Atelier 15)



Pollution (POL)

Architect: Libor Hrdousek & Radek Lampa (Atelier 15)



Innovation (INN)

Architect: Make Architects

POL5 Reduction of noise pollution

max. 1 credits				
	1	1	1	-

Aim

To reduce the likelihood of noise, arising from fixed installations on the new development, affecting nearby noise-sensitive buildings

Assessment Criteria

- Sufficiently low external noise levels
- Noise impact study by qualified acoustician required
- Credit automatically awarded if no noise sensitive buildings are in the area

Reynaers Aluminium

All Reynaers Aluminium systems achieve acoustic results (Rw) ranging from 40dB up to 60dB, depending on the frame system and the glass specifications. In most situations, we can offer an appropriate acoustic insulating system to achieve low external noise levels, in line with the BREEAM credit.

INN1 Innovation

max. 10 credits				
	1	0	1	1

Aim

To support innovation within the construction industry through the recognition of sustainability related benefits which are not rewarded by standard BREEAM issues

Assessment Criteria

- Exemplary performance in existing BREEAM issues AND/OR
- Innovation application(s)
- For each application: assessment of BRE required

Reynaers Aluminium

Reynaers' mission statement is to develop innovative and sustainable solutions that increase the architectural value and enhance the living and working environment of buildings. Thus we are dedicated to providing solutions with exceptional performance, offering features such as burglary and bullet protection, fire and smoke protection, earthquake proofing, PV cells in sun screening and glass, Minergie® or Passive House® product certification, etc. Cradle-to-cradle certification is available for a number of Reynaers Aluminium solutions. These specific features can help gain this BREEAM credit.

06/2022 – Publisher Responsible at Law: Reynaers Aluminium, Oude Liersebaan 266, B-2570 Duffel

Reynaers Aluminium

Oude Liersebaan 266
B-2570 Duffel

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www.reynaers.com

Longworth

Quality Plan
Greenheys, Manchester

Project Reference: R1968

Package Information

Client: Willmott Dixon Construction
Location: Pencroft Way, Manchester M15 6SZ
Start Date and Duration: 11d November 2024, approx. 45 Weeks

Controlled Copy No :	1
Revision No. :	0
Issue Date :	Date: 25/10/24
Drafted By : Darius Urbonas	Date : 25/10/24
Authorised By : Jamie Gannon	Date : 25/10/24

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Register of Recipients

This register is a list of Project persons who are holders of this Plan.

Copy Number	Holder's name	Organisation
1.	Jack Overson	Willmott Dixon (WDC)- Project Manger
2.	Abi Belfield	Willmott Dixon (WDC)- Package Manger
3.	Paul Smith	Longworth (LBS) - Managing Director
4.	Lee Smith	Longworth (LBS) - Contracts Director
5.	Jamie Gannon	Longworth (LBS) - Contracts Manager
6.	Darius Urbonas	Longworth (LBS) - Project Manager
7.	Lusy Edgson	Longworth (LBS) - Q/S
8.	Lee Charlton	Longworth (LBS) - Senior Designer
9.	Mike Smith	Longworth (LBS) – Design Manager
10.	Andrew Fletcher	Longworth (LBS) – Commercial Manager
11.	Paul Hilde	Longworth (LBS) – Technical Manager
12.	Codey Leyland	Longworth (LBS) –SHEQ Manager

RECORD OF AMENDMENTS

Issue	Date	Comments
1st Draft	**25.10.2024**	
1st Issue	**29.10.2024**	
Revisions		
1.		
2.		

1. Content and Use

This Quality Plan covers the work carried out by **Longworth Building Services** and their sub-contractors. This document will be reviewed at regular intervals throughout the project and updated as necessary.

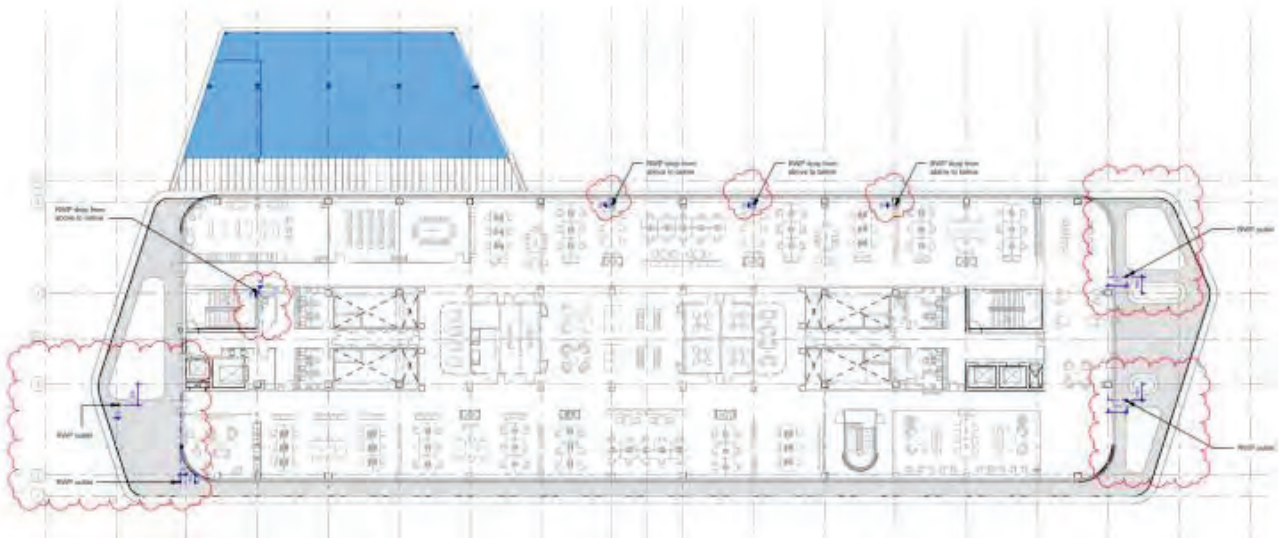
This Plan describes the way we will manage our work at all stages of the contract and provide assurances that our work meets the agreed requirements. This Plan acts as our project specific quality plan.

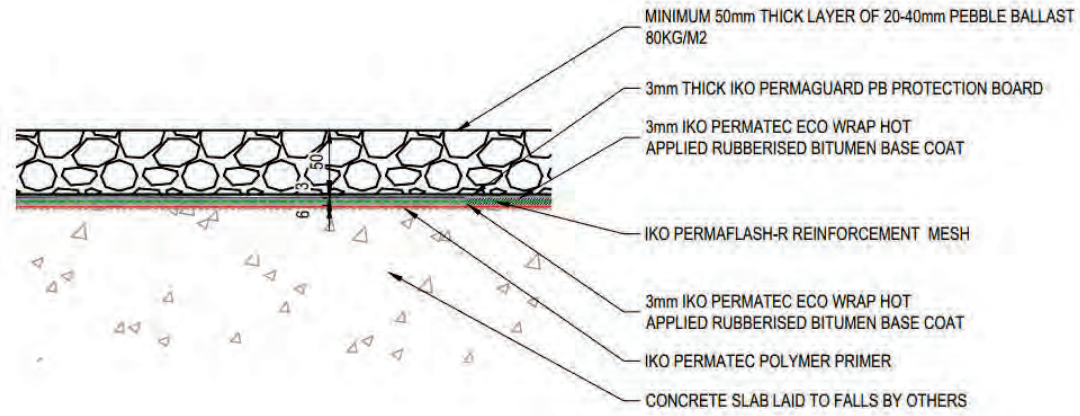
2. Scope of Works

A brief description of the work being undertaken on this project as below:

IKO PermaTec Hot Melt System– Level 1 Annexe Roof

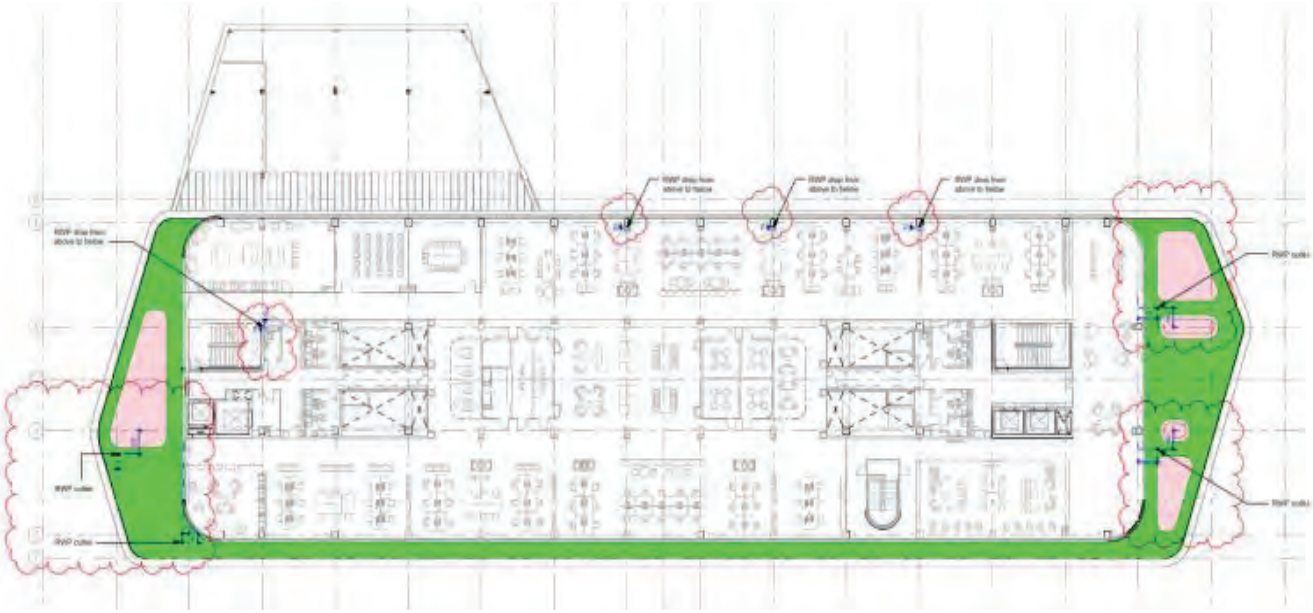
- IKO PermaTec Polymer Primer.
- Iko PermaTec Eco wrap – hot applied bitumen waterproof base coat
- IKO PermaFLASH-R Reinforcement Fleece.
- Iko PermaTec Eco wrap – hot applied bitumen waterproof base coat
- Iko PermaGuard – PB Heavy duty protection Board
- Natural Stone Pebble Ballast 50 mm thick

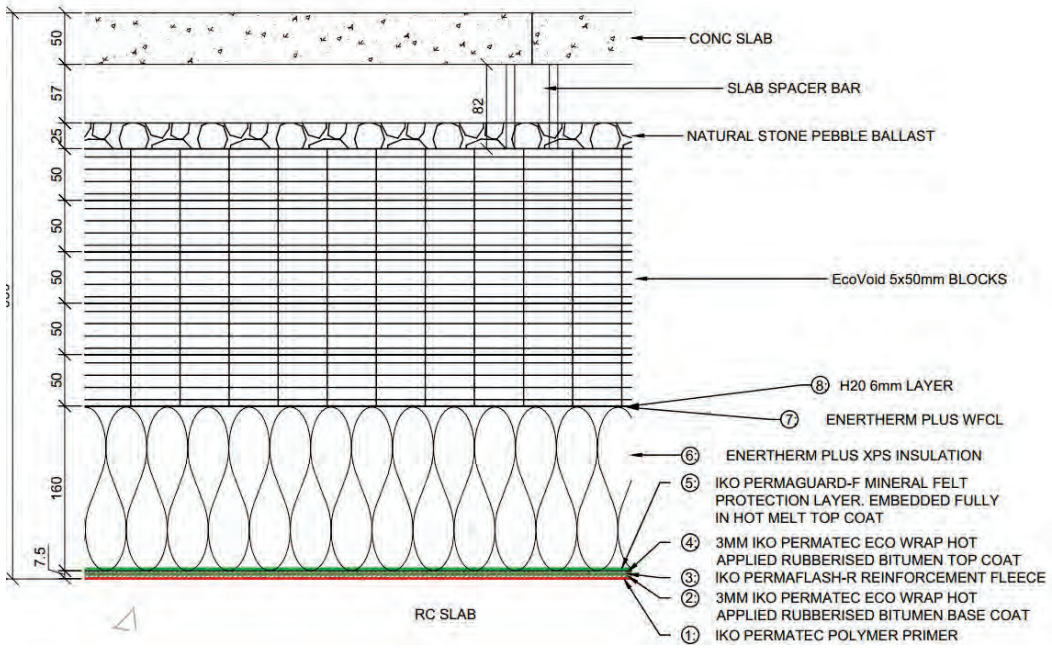




IKO PermaTec Hot Melt Blue Roofing System – Level 2 Roof

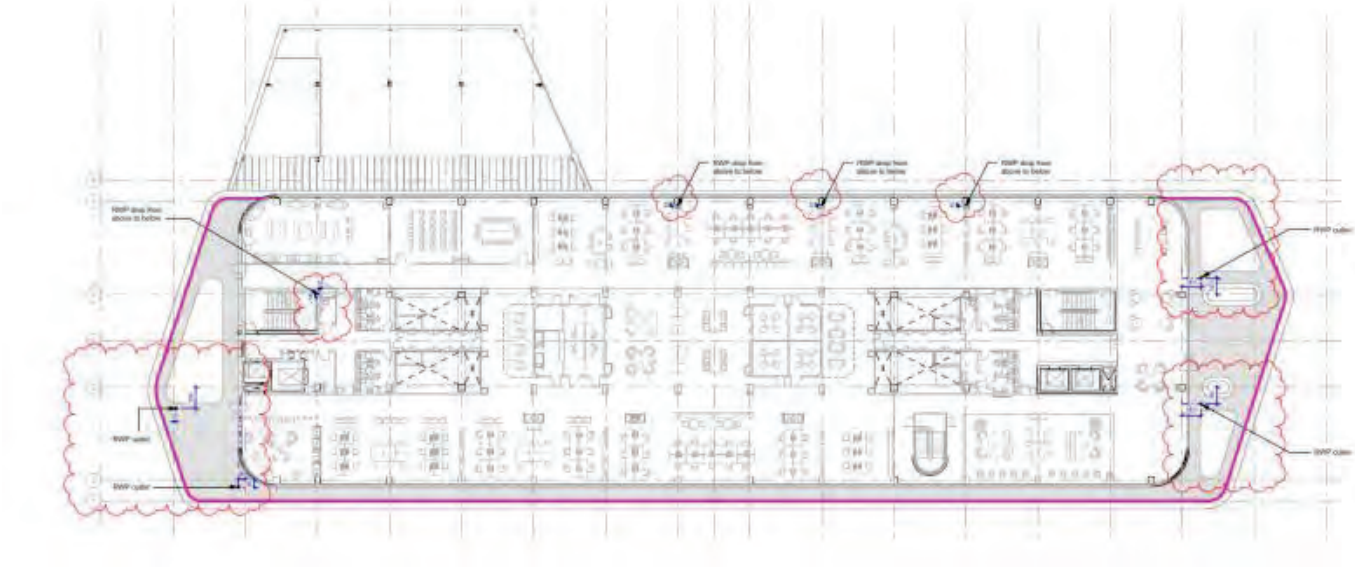
- IKO PermaTec Polymer Primer.
- Iko PermaTec Eco wrap – hot applied bitumen waterproof coating
- IKO PermaFLASH-R Reinforcement Fleece.
- Iko PermaGuard – F sand surfaced 180g/m² polyester based bitumen membrane
- IKO Enertherm XPS300 Plus Insulation boards
- IKO Enertherm Water Control Layer.
- Eco Green Blue Roof Ecovoid 250 drainage system
- Natural Stone Pebble Ballast
- 600x600x50 Concrete Grey Paving Slabs Set on Non-adjustable Packers.

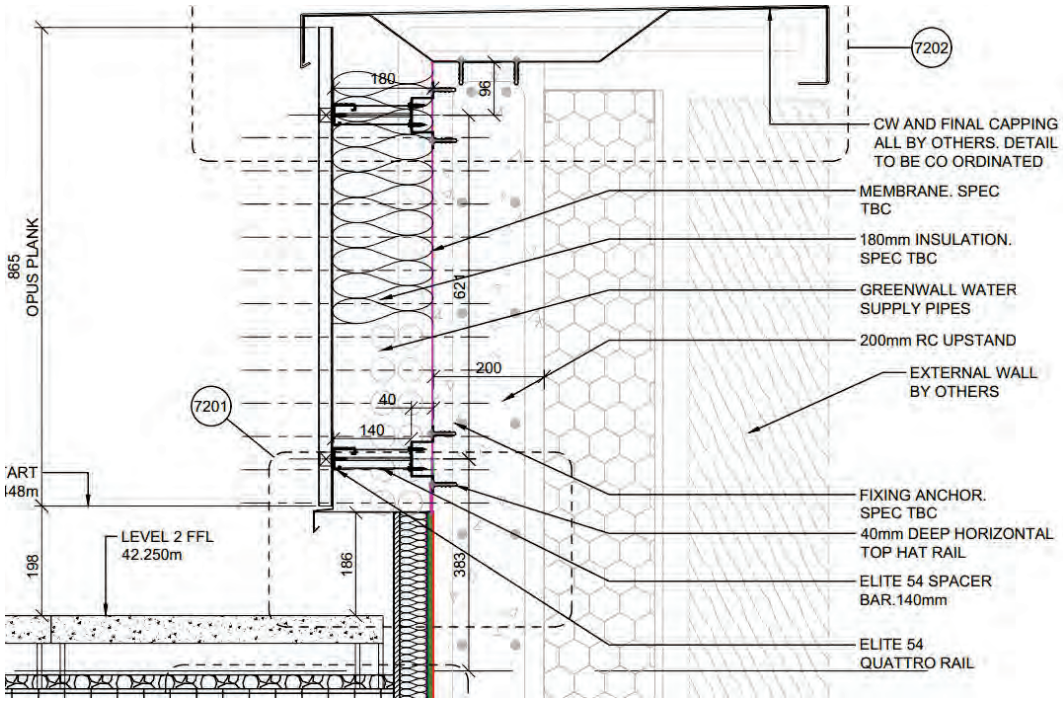




Euroclad Elite 54 Cladding - L2 Internal Parapet cladding including the inspection hatch

- Build up – Horizontal top hat, elite 54 spacer bar, elite 54 quattro horizontal rail
- Insulation
- Opus plank - rainscreen sheet
- Inspection doors/ hatch including support and the jamb flashings



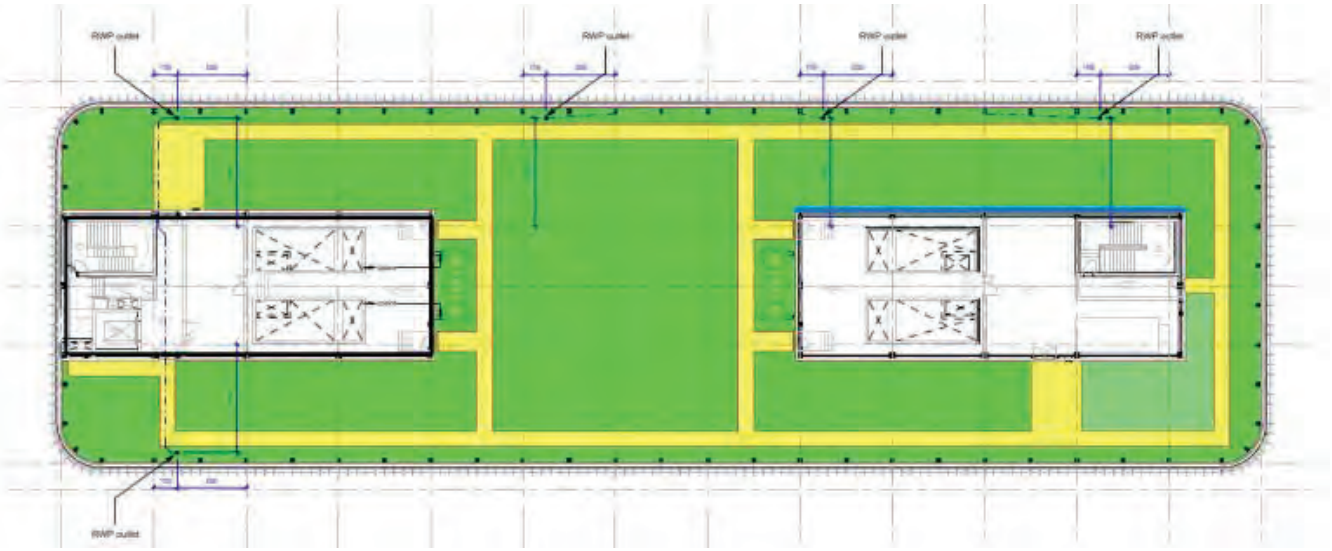


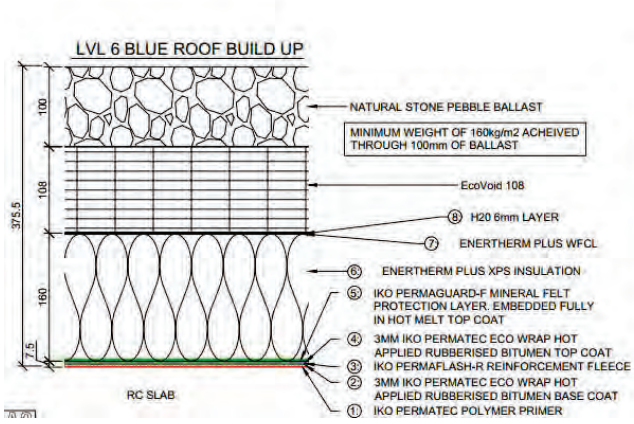
IKO PermaTec Hot Melt Blue Roofing System – Level 6 Roof

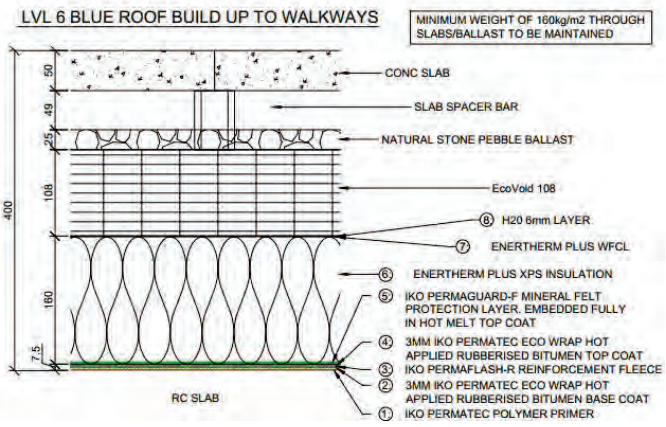
- IKO PermaTec Polymer Primer.
- Iko PermaTec Eco wrap – hot applied bitumen waterproof coating
- IKO PermaFLASH-R Reinforcement Fleece.
- Iko PermaGuard – F sand surfaced 180g/m² polyester based bitumen membrane
- IKO Enertherm XPS160 Plus Insulation boards
- IKO Enertherm Water Control Layer.
- Eco Green Blue Roof Ecovoid 108 drainage system
- Natural Stone Pebble Ballast 100 mm

IKO PermaTec Hot Melt Roofing System – Level 6 Roof Walkways

- IKO PermaTec Polymer Primer.
- Iko PermaTec Eco wrap – hot applied bitumen waterproof coating
- IKO PermaFLASH-R Reinforcement Fleece.
- Iko PermaGuard – F sand surfaced 180g/m² polyester based bitumen membrane
- IKO Enertherm XPS300 Plus Insulation boards
- IKO Enertherm Water Control Layer.
- Eco Green Blue Roof Ecovoid 108 drainage system blocks
- Natural Stone Pebble Ballast 25mm tick
- 600x600x50 Concrete Grey Paving Slabs Set on Non-adjustable spacer bars.







Genius plant screen – L6 External Parapet Wall

- Build up – Vertical channels, helping hand brackets, L rails
- Genius Anodised aluminium screen cladding panels

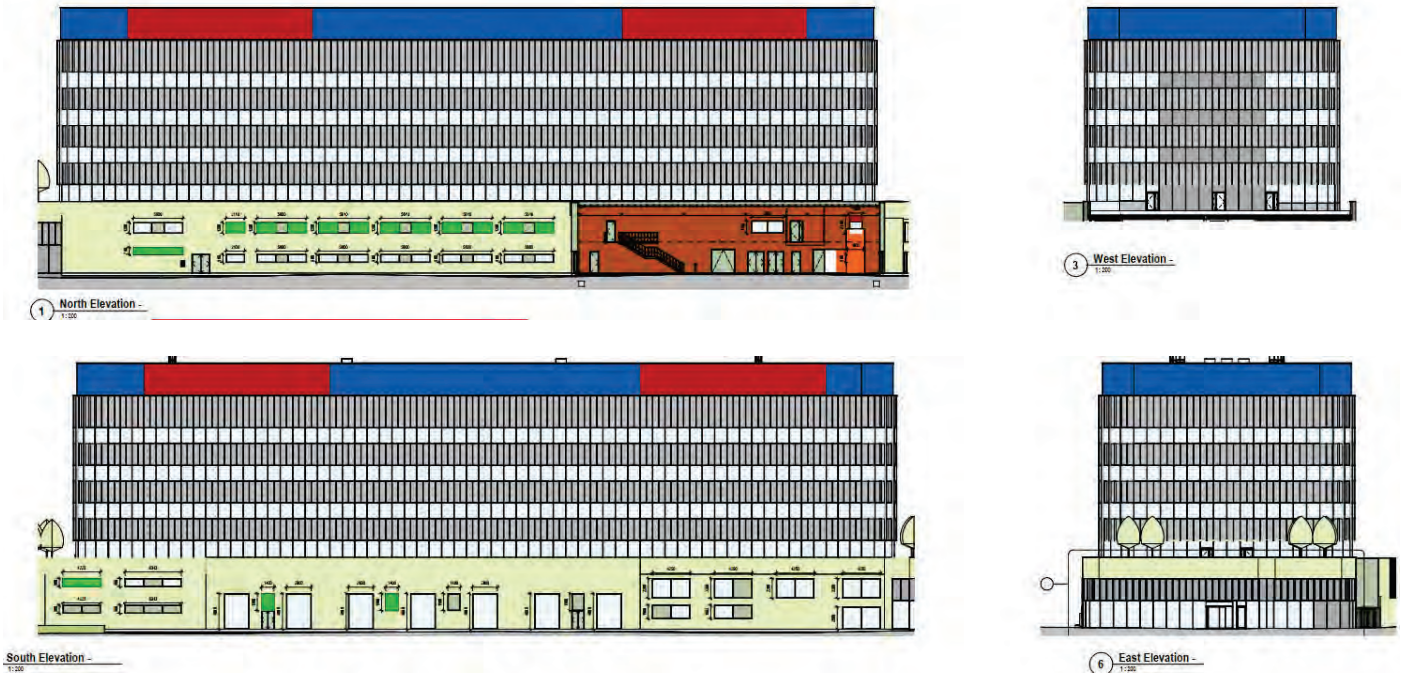
RED – Solid

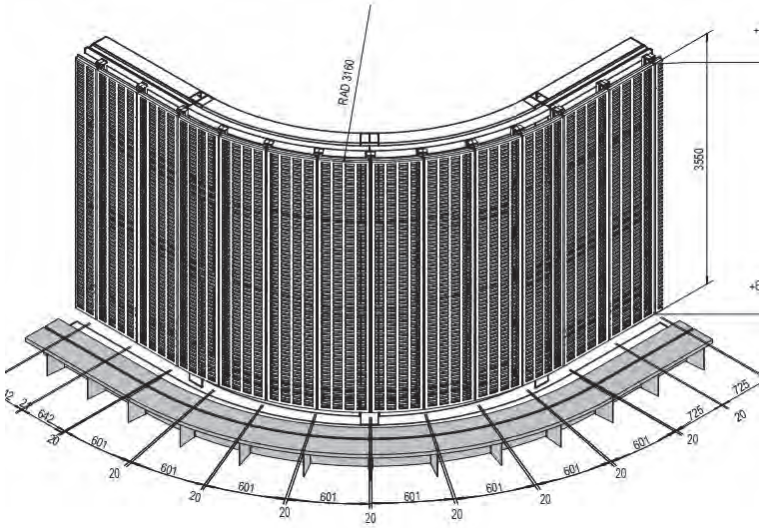
Blue – Perforated

- Aluminium Louvres

Green – double bank anodised

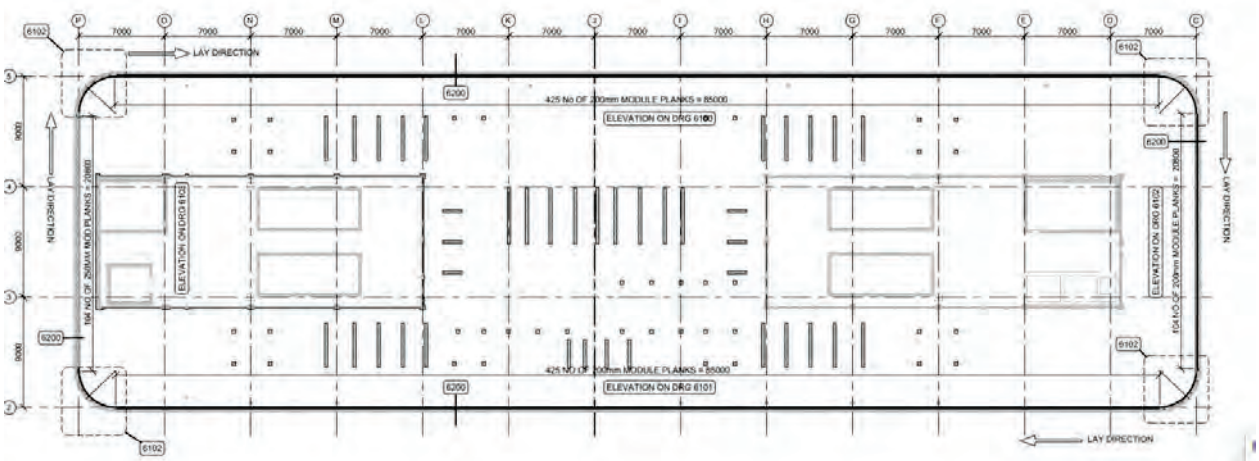
Yellow – Single bank PPC aluminium



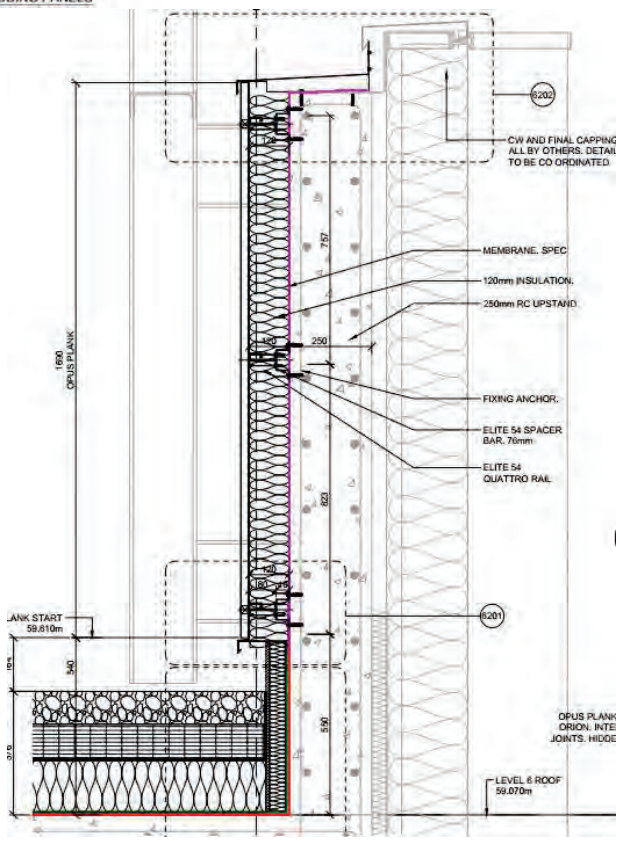


Euroclad Elite 54 Cladding – L6 Internal Parapet Cladding

- Build-up – Top hat carrier rail, Elite 54 Quattro rail
- Insulation
- Opus plank
- Capping detail

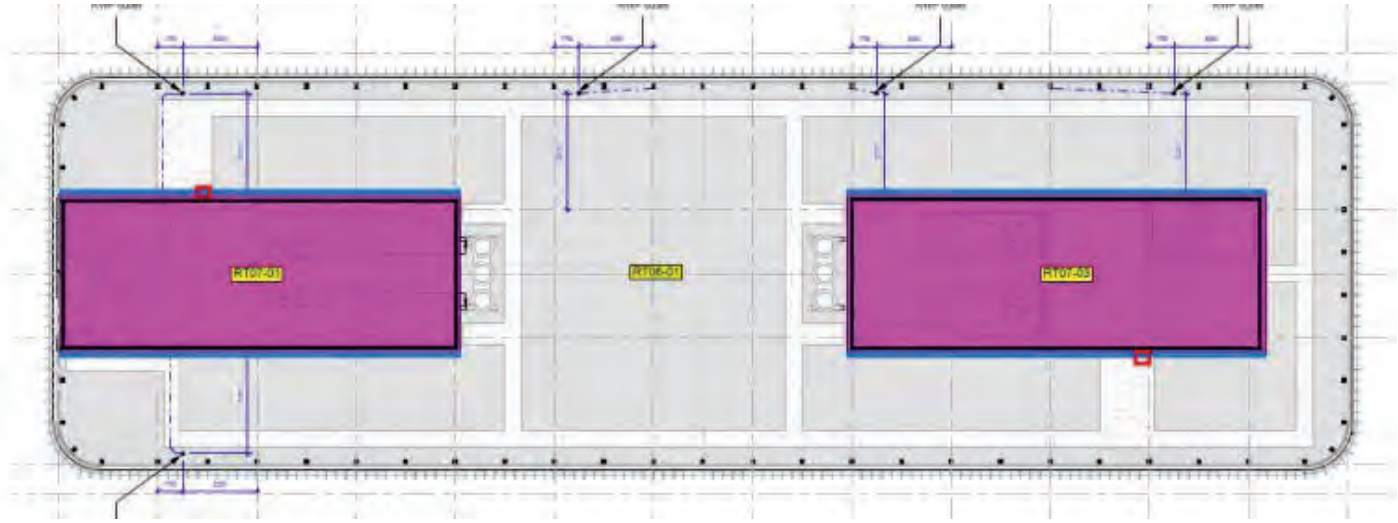


LEVEL 6. GA OF PARAPET CLADDING PANELS



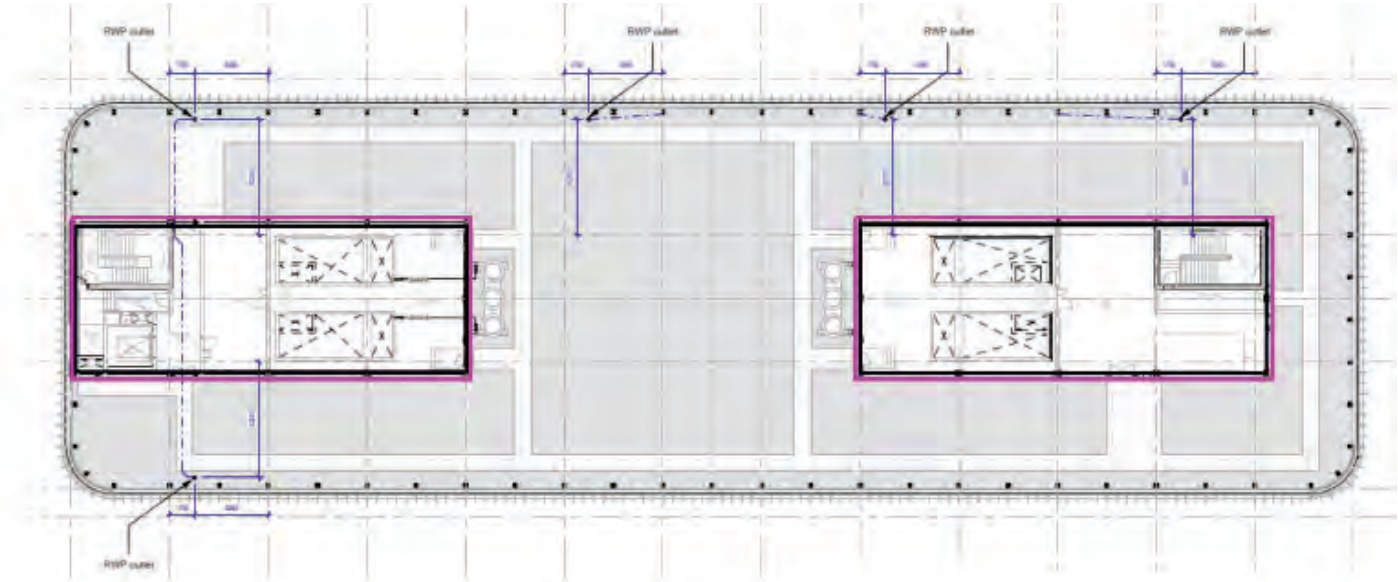
Euroclad Roof – Level 6 Plant rooms

- MW5 liner sheet
- Quattro spacer bar and bracket system
- Insulation
- External Euroclad profile sheet



Euroclad Rockspan composite panel Cladding – Level 6 Roof Plant rooms

- Build up – channel rails
- 240mm insulation
- Colourcoat Prisma steel gey outer face



All works will be installed as per the Project specifications and LBS design drawings.

3. Programme

The contract start date is 04th November 2024

The works are due to commence on site on **11th November 2024** and be completed by the agreed date. - **(circa 45 weeks Duration)**

- **Labour Levels – Running at full capacity LBS envisage between 3 to 15 Men.**
- **Management:**

  1 Nr Full Time PM – Darius Urbonas

  1 Nr Visiting QS – Lusy Edgson

  1 Nr Visiting Contracts Manager– Jamie Gannon

Longworth's Management will attend site progress meetings and action any issues or co-ordination that may arise from these meetings.

4. Certification

We are certified to BS EN ISO 9001: 2008 & BS EN ISO 14001: 2004 & BS EN ISO 18001: 2007

We are certified/licensed by other regulatory/professional/trade/accredited bodies.

Construction Line

CHAS

FTMRC

IIP

ACHILLES

N.F.R.C

C.I.T.B

MIoR

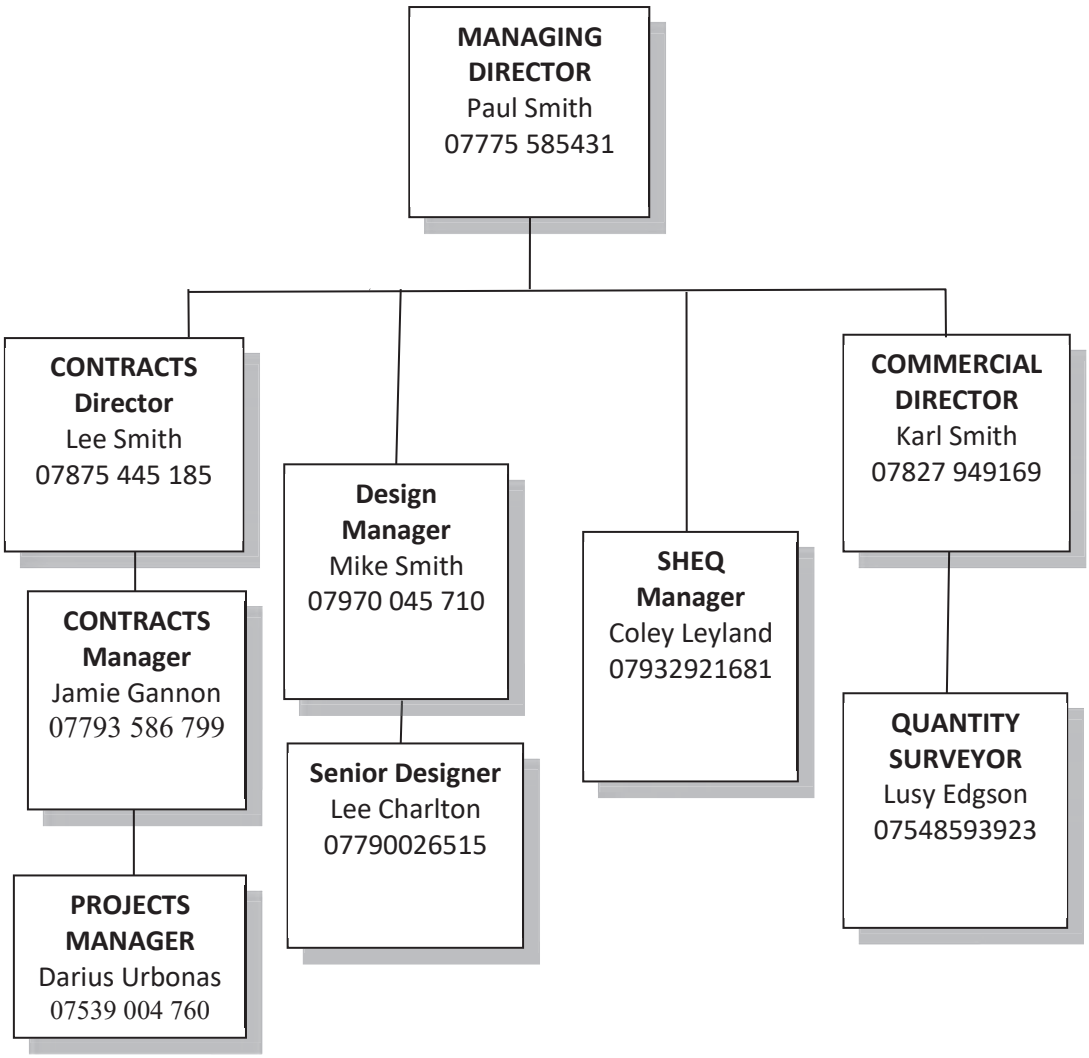
IFC

5. Responsibilities

Darius Urbonas - Project Manager are responsible for ensuring that the following is carried out:

- Ensure that all works are carried out in accordance with the Method Statement/Risk assessment, specifications and drawings.
- That all works are checked fully and offered to Willmott Dixon management services for signing off. Evidence of these checks to be provided if requested.
- All documentation and photos will be available on field view.
- That any labour used on this project, comply with the requirements of this Quality Plan.

6. Organisation Chart



7. Competency of Staff

All Staff / Operatives employed on this project will hold the necessary skills and training to undertake the individual's task.

All operatives will hold CSCS as an absolute minimum with specific training for the task in hand.

Specific training will be required for the following: -

MEWPS – IPAF

Aluminium towers – PASMA

Abrasive wheel

Manual Handling

Fire marshalling training,

Non-Working Project Manager – SMSTS, Supervisors CSCS Card, Fire marshalling training,

Copies of all training certificates are available on Request

Our internal Training Matrix is reviewed every 12months to ensure all our Staff / Operatives training to kept up to date

8. Design Management

Design Responsibilities

Longworth Building Services are responsible for the full design of their works on this Project.

All drawings will be produced and approved from LBS design team only, Project Architects, and any adjoining subcontractors, prior to issuing for construction.

All design drawings will be issued form LBS **Document controller only** when only their approved drawings for construction. In addition, LBS will attend design / co-ordination meetings on site with the project team where requested, architects and any other sub-contractors involved in the project.

All drawings issued to site operatives will be controlled as detailed in section 9.

ONLY Status 'construction issue' drawings will be used during the installation period of our works.

9. Document Control

To ensure that we are only working to the latest revision of any document (specification, drawings, schedules and other relevant documentation) the Project Manager will implement this document control system. When documents are received, they will be recorded as follows:

All documentation will be recorded in the Document Register as shown by the template in Appendix A.

Superseded drawings will be:

- Marked "Superseded" or "S/S" and stored off site access can be made available if required*

10. Method Statement / Risk Assessment for The Works

All works will be undertaken under a site-specific method statement/risk assessment reflecting the works to be completed. All RAMS will be produced in-house and submitted for approval prior to works commencing.

All MS/RA will be working documents reflecting the task, however, should the task change during the works an amendment can be added by LBS and works will continue to minimise any delays and ensuring the work will continue safely.

In addition to the project specific RAMS Longworth site management will conduct any necessary Activity Briefings. An activity briefing sheet will be completed and any issues arising from the briefing will be recorded and added to the site SHE files, to ensure any corrective and preventative action are logged and progressed to close out.

11. Inspection and Test Plans

Our site installation and inspection regime will be as follows

The Inspection Plan **– Longworth will submit a I &T Plan(s) which must be agreed before commencement of works**

The project specific Plan sets out an agreement of:

- What is to be checked
- Who is to be involved
- Against what criteria
- When and how often
- How inspection will be recorded (i.e. what checklist(s) to be used)

The Project inspection and test plan is set out on the following pages:

INSPECTION & TEST PLAN / INSPECTION MATRIX

Inspection Authorities: **H** – Hold Point, **W** – Witness, **R** – Review, **NP** – Notification Point, **A** - Approve, **FI** – First Install, **I** - Intermittent

Item	***Activity***	***Controlling Document***	***Inspection Method***	***By Whom***	***inspections Period***	***Inspection Authority***					***Verifying Document***
						LBS	***MC***	***Iko***			
1	Drawings	Drawing register / 4 Projects	Visual / Signature	Principal Contractor / LBS / Architects.	Prior to start / Ongoing process	NP	R / A				Drawing register
2	RAMS	LBS RAMS sign off sheets	Visual / Approval	LBS / Principal Contractor	Prior to start / Weekly / when required	NP	R / A				LBS Project check list / RAMS sign off sheet
3	Pre-inspection Access and structures	Drawings	Approval by Principal Contractor	LBS / Principal Contractor	Prior to start	R / A	R / A				LBS Project check list / Photographs – Field View
IKO Permatec											
04	IKO PermaTec Concrete Peel Test	Manufactures inspection report and sign off	Peel test	LBS / WDC/IKO	28 days after concrete pour – 1NR inspection	H / W / R /A	W / R/ A	W/A			LBS Project check list / Photographs / FieldView
05	Roof Outlets	LBS approved drawing	Visual/ Photographs	LBS / WDC	Prior to covering up	NP / W / A	W / R	W			LBS Project check list / Photographs / FieldView
06	Surface Conditioning Primer	LBS approved drawing / IKO Perma Tec spec sheet	Visual/ Photographs	LBS / WDC	Daily / Ongoing and prior to covering up	R / A	W / R	W			LBS Project check list / Photographs / FieldView

Item	Activity	Controlling Document	Inspection Method	By Whom	inspections Period	Inspection Authority					Verifying Document
						LBS	MC	Iko			
07	Perma Tec 3mm Base Layer	LBS approved drawing / IKO Perma Tec spec sheet	Visual/ Photographs	LBS / WDC	Daily / Ongoing. On completion of the Works	W / R / A	W / R	W			LBS Project check list / Photographs / FieldView
08	Reinforcement Fleece and Perma Tec 3mm Top Coat	LBS approved drawing / IKO Perma Tec spec sheet	Visual/ Photographs	LBS / WDC	On completion of the Works	W / R / A	W / R	W			LBS Project check list / Photographs / FieldView
09	Roof Inspection and Leak Test	Test Report	Visual/ Photographs/ Electronic/ Physical	Independent Roof Tester	On completion of the Works	H / R / A	W / R / A				LBS Project check list / Photographs / Test Report
10	Enertherm XPS Insulation Board and water control layer	LBS approved drawing / IKO PermaTec spec sheet	Visual/ Photographs	LBS / WDC	On completion of the Works	W / R / A	W / R	W			LBS Project check list / Photographs / FieldView
11	Eco Green Blue roof Drainage System	LBS approved drawing / Blue roof installation guidlines	Visual/ Photographs	LBS / WDC	On completion of the Works	W / R / A	W / R	W			
11	50mm Stone Pebble ballast	LBS approved drawing / IKO PermaTec spec sheet	Visual/ Photographs	LBS / WDC	On completion of the Works	H / R / A	W / R / A	W / A			LBS Project check list / Photographs / FieldView
12	Paving Slabs 600mm x 600mm x 50mm Economy Grey	LBS approved drawing	Visual/ Photographs	LBS / WDC	On completion of the Works	H / R / A	W / R / A	W / A			LBS Project check list / Photographs / FieldView

Item	Activity	Controlling Document	Inspection Method	By Whom	inspections Period	Inspection Authority					Verifying Document
						LBS	MC	Iko			
Euroclad Elite 54 Cladding											
13	Sub structure	LBS approved drawing	Visual/ Photographs	LBS / Principal Contractor	Daily / Ongoing and prior to covering up.	H/A	W				LBS Project check list & Photographs (Field view)
14	Insulation	LBS approved drawing	Visual/ Photographs	LBS / Principal Contractor	Daily / Ongoing and prior to covering up	H	H/A				LBS Project check list & Photographs (Field view)
15	Opus Planks	LBS approved drawing	Visual/ Photographs	LBS / Principal Contractor	Daily/ongoing and completion of work	H/A	A				LBS Project Hand over & Photographs (Field view)

Item	Activity	Controlling Document	Inspection Method	By Whom	inspections Period	Inspection Authority					Verifying Document
						LBS	MC	Iko			
Genius Rainscreen Cladding											
16	Sub structure	LBS approved drawing	Visual/ Photographs	LBS / Principal Contractor	Daily / Ongoing and prior to covering up.	H	H				LBS Project check list & Photographs (Field view)
17	Genius Cladding Panels	LBS approved drawing	Visual/ Photographs	LBS / Principal Contractor	Daily / Ongoing and prior to covering up.	W	W				LBS Project check list & Photographs (Field view)
18	Capping detail	LBS approved drawing	Visual/ Photographs	LBS / Principal Contractor	Daily / Ongoing and prior to covering up.	H/A	A				LBS Project Hand over & Photographs (Field view)

Check Lists– **(A Checklist(s) serves as a prompt at the time of the inspection and as a formal record of what was checked and by whom). The Contractor is required to submit copy of those typically to be used.**

12. Control of Sub-Contractors

The following sub-contractors will/may be employed by us on the project and their work will be quality controlled, by our onsite Project Manager, who will constantly monitor the operatives on site and fill in the inspection forms once each item is completed. Photographs will also be taken as proof of the works being undertaken and the quality of the install. If the Project Manager is not happy with the standard of work, then he will stop the works and ensure the operatives install the works as per the agreed design

Longworth's Project Manager will be responsible for doing the inspections in accordance with the procedures noted above.

Sub-contractor	**Trade**

13. Quality Audits

All works will be continually audited by the site manager; additional audits will be carried on a regular basis by the visiting Contract Manager/Director.

Safety Inspections will be carried out monthly by our Internal Health & Safety consultant/SHEQ Manager. Following the visit, safety audit reports will be formulated and copies issued to Willmott Dixon. Any finding highlighted within the report will be acted upon.

14. Calibration

Any measuring or test equipment used on this project will be calibrated to ensure accuracy. The procedure used to prove that equipment is calibrated will be as follows: -

All equipment used on the project will be tested to current legislation / manufactures recommendations. copies made available to PC management services.

Equipment:

- 110v/Cordless Tec Guns
- 110v/Cordless Drills
- 110v/Cordless Reciprocating saw
- 110v/Cordless Circular saw
- 110v/Cordless angle grinders
- Cordless impact drivers
- 110v extension leads
- Hand tools
- Laser

15. Control of Non-Conformities

All issues of nonconformities will be handled initially by our Project Team and full investigations will be carried out to highlight the fundamental reason behind the issues and procedures implemented to ensure future re-occurrences are prevented. Consultations will be carried out with Willmott Dixon to highlight direct impact on the works with corrective works being carried out prior to commencement of further works.

Any defects will be notified on site and the Longworth project team will close them out, within the time given by Willmott Dixon.

16. Handling, Storage & Protection

These handling, storage and protection procedures have been planned to ensure that all products, materials and work will remain in perfect condition through to handover or practical completion of the project as a whole. They will also ensure that waste generation is minimised.

17. Materials and Waste

All waste will be separated and segregated as far as reasonably practical to enable maximum quantities of site generated material to be re-used / re-cycled.

Rubbish will be transported into a skip via manual handling, telehandler or leave in a designated area agree with the site team.

Materials ready to be installed will be loaded on to the relevant roof area via crane or hoist. Once there, the material will be distributed horizontally and into position. Willmott Dixon are to provide clear access and egress routes to all areas. LBS operatives will not undermine these routes in any way.
There will always be a minimum of two operatives when lifting heavy materials.

18. Storage

All materials will be stored in the agreed areas once completed and inspected will be handed over.
All materials will be secured down when not being used and checked at the end of every working day by the non-working site manager.

19. Customers Property

once access is given to areas LBS will collect photos of before and after and will be taken and any copies will be made available to PC management services at any time.
On completion of areas and once the handover process is complete, then it will become the responsibility of the MC to protect LBS works from damage by other persons, trades or plant.

20. Record Documents

The following records will be handed to the client in accordance with the contract requirements.

Operation and Maintenance Manuals

On completion of works – Completed by Liz James – 0845 634 1370

As built Drawings

On completion of works – Completed by Paul Hilde – 0845 6341370

Retention of Records:

All documents on this project will be retained for a period of 12 **years** from practical completion of the whole project.

If required, delivery notes and guarantees will be provided at the end of the project.

21. Traceability - Certificates of Compliance

Traceability is the procedure that is carried out to provide documentary evidence to prove that materials come from a specific source or what they or their constituent parts contain.

On this project traceability is required on the following items and Certificates of Compliance will be provided.

22. Additional Procedures

List of additional procedures that are required by PC Management services and can be provided daily.

- Daily start sheets required for all operatives on a Daily/weekly basis
- Weekly/fortnightly project meetings to be carried out between PC and Longworth
- All operatives to undertake Longworth site induction before entering site

Longworth's Site Management team will be on site throughout the works to ensure compliance and competencies, quality and safety of operations. managing the daily running of the works including: -

- Daily Activity Briefings
- Weekly Toolbox Talks
- Plant and Equipment Checks and ensuring equipment is operated only by competent trained persons
- Day to Day Co-ordination of activities with other trades.
- Site Corrective Action Logs
- Material Deliveries including any co-ordination required with Main Contractor for storage etc.
- Quality Control and Inspection Checklists including snagging and Area Sign off (as listed above)
- Providing copies of checklists and documents are available at request.

Appendix A – Copies Of Certificates and Policy Statements

Supplied with Order Acknowledgement and SHE Document.

QD Checklist-P1-Quality Benchmarks

Sample Panel for SFS and curtain walling to facade

Form Reference	F383650.93
Owned By	Abi Belfield (Willmott Dixon Construction)
Date	12/08/2024 10:57:16
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Sample Panel - Benchmarking>Facades>QUALITY DELIVERY

Form Location	Sample Panel - Benchmarking
Supply Chain	RED Systems Ltd
Area of Work/Location	Sample Panel for SFS and curtain walling to facade

General

#	Work Section	Element	Date benchmark constructed
1	Site specific works	External cladding/wall finish	14/08/2024

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	Raeyners curtain wall system/ siniat SFS	AB	AB
2	Confirm Drawing	GRE BDP ZZ XX DR A 2019	AB	AB

Images

#1



17/09/2024 08:51:25

Apply & Control

What element/area of work is being benchmarked	Yes

Images



16/08/2024 08:57:39

Comments	Created By	Date
sample panel for planning - curtain wall and SFS	Abi Belfield (Willmott Dixon Construction)	12/08/2024 14:05:34

Is the design available and approved and in acccordance with YB	Yes
Have the specified products in the design been procured or have any change control requests been approved by the relevant consultant	Yes
Is full manufacturers installation guidance available for all the products	Yes

Comments	Created By	Date
wintech on site all day Thursday 28.08 - witnessed siniat, obex and edpm and curtain walling installation	Abi Belfield (Willmott Dixon Construction)	29/08/2024 11:15:42
obex on site 28.08 checked sample panel with wdc and obex 0500 membrane joints use - gave guidance on sequencing(breather membrane goes on over top of window edpm) raised no issues and booked in qa session with team	Abi Belfield (Willmott Dixon Construction)	29/08/2024 11:20:25

SCP HOLD POINT 1 - Have the SCP and the WD package manager reviewed and understood the manufacturers installation guidance	

Chris Ward (RED Systems Ltd)

04/02/2025 11:10:00

WD countersign of HOLD POINT 1 when complete	

Abi Belfield (Willmott Dixon Construction)

17/09/2024 08:51:36

Installation sequence and evidence		
#	**Demonstrate and record installation sequence to evidence quality standard and compliance**	**Detailed photos for each key installation stage i.e. tape measure checks widths, compression, overlaps, fixing patt**
1	siniat / edpm / sfs	
2	curtain walling	
3	capping	
4	flashing - updated prep detail and colour matched in discussions with bruntwood and planner Reds	

Images

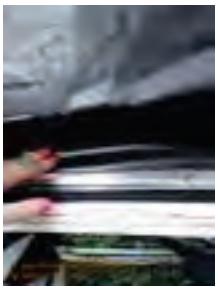
#1



31/08/2024 08:06:47



31/08/2024 08:07:26



31/08/2024 08:08:08



31/08/2024 08:08:30



31/08/2024 08:08:41

#2



31/08/2024 08:09:00



18/09/2024 08:27:05



18/09/2024 08:27:30



18/09/2024 08:27:40



18/09/2024 08:56:02



18/09/2024 08:56:08

#	Comments	Created By	Date
2	not true reflection of fixings as main works is Fischer halphen channel back to slab	Abi Belfield (Willmott Dixon Construction)	31/08/2024 08:04:47

Identify instances where the benchmark may vary in the building	N/A
SCP HOLD POINT 2 - confirmation that the benchmark meets all of the above requirements	

Anthony Bowen (RED Systems Ltd)

11/02/2025 10:20:24

WD PACKAGE MANAGER countersign of HOLD POINT 2 - confirmation that the benchmark meets all of the above requirements	

syrus mcloughlin (Willmott Dixon Construction)

11/02/2025 10:20:13

WD PROJECT LEAD countersign of HOLD POINT 2 - confirmation that the benchmark meets all of the above requirements	

Jack Overson (Willmott Dixon Construction)

11/02/2025 10:20:34

Bespoke Items - Additional Hold Points/Additional Checks		
#	**Additional Hold Point**	**Additional check**

Complete for Quality	
Comments	

Fixing Test Report

VJ Technology, Brunswick Road, Cobbs Wood Ind. Estate, Ashford, Kent, TN23 1EN T 01233 637695

Test Details

Test conducted by	Dave Lambert	**Test date**	13-Dec-2024
Report code (internal use)	DL13122024RS		
SKU (internal use)	00000105 pull out testing half day		

Client details	**Site details**	**Witnessed by**
Red Systems Plot L Buildwas Road, Neston CH64 3RU	Red Systems C/O Willmott Dixon Construction site Pencroft way Manchester M15 6JJ	Anthony Bown 07471 035788
		Test requested by & agreed by
		Gary Blackwell 07894242572

Test type	proof	**Fixing installed by**	Red Systems	**Sacrificial/live anchors**	live

Base material

Substrate material	**Strength (if known)**	**Thickness (mm)**
Concrete	n/a	n/a

If masonry	n/a	**Masonry dimensions WxLxH (mm)**	

Anchor

Product code (if applicable)	Fischer 564619		
Fixing type (inc. brand)	FAZ II Plus 12/10 R		
Fixing finish	Stainless Steel		
Hole diameter (mm)	12	**Hole depth (mm)**	90
Hole condition	dry		
Recommended embedment depth (mm)	70	**Actual embedment depth (mm)**	90
Installation torque (if applicable) (Nm)	60Nm	**Torque wrench type**	

(For resin anchors only)

Anchor rod diameter (mm)	**Anchor rod length (mm)**	**Anchor rod grade**

Temp. when installed (°C)		**Curing time**	

Test equipment

Tester make	**Model No.**	**Serial No.**
Hydrajaws	Hydrajaws 2000	VJ584E
Gauge No.	**Gauge range (kN)**	**Calibration date**
MAN7575	0-25	23-Oct-2024

Test #	Test Info/Location		Test load (kN)	Ultimate (kN)	Comments (including first movement and failure mode if ultimate test)
1	Ground Floor brackets		12.20		Anchor progressively loaded to12.2kN. Held and Observed for 30 seconds. No movement detected.
	Anchor spacing (mm)	300	Edge distance (mm)	300	
2	Ground Floor brackets		12.20		Anchor progressively loaded to 12.2kN. Held and Observed for 30 seconds. No movement detected.
	Anchor spacing (mm)	300	Edge distance (mm)	300	
3	Ground Floor brackets		12.20		Anchor progressively loaded to 12.2kN. Held and Observed for 30 seconds. No movement detected.
	Anchor spacing (mm)	300	Edge distance (mm)	300	
4	Ground Floor brackets		12.20		Anchor progressively loaded to 12.2kN. Held and Observed for 30 seconds. No movement detected.
	Anchor spacing (mm)	300	Edge distance (mm)	300	
5	Ground Floor brackets		12.20		Anchor progressively loaded to 12.2kN. Held and Observed for 30 seconds. No movement detected.
	Anchor spacing (mm)	300	Edge distance (mm)	300	
6	Ground Floor brackets		12.20		Anchor progressively loaded to 12.2kN. Held and Observed for 30 seconds. No movement detected.
	Anchor spacing (mm)	300	Edge distance (mm)	300	
7					
	Anchor spacing (mm)		Edge distance (mm)		

Results

Test #	Test Info/Location		Test load (kN)	Ultimate (kN)	Comments (including first movement and failure mode if ultimate test)
8					
	Anchor spacing (mm)		Edge distance (mm)		
9					
	Anchor spacing (mm)		Edge distance (mm)		
10					
	Anchor spacing (mm)		Edge distance (mm)		
11					
	Anchor spacing (mm)		Edge distance (mm)		
12					
	Anchor spacing (mm)		Edge distance (mm)		
13					
	Anchor spacing (mm)		Edge distance (mm)		
14					
	Anchor spacing (mm)		Edge distance (mm)		

Test #	Test Info/Location		Test load (kN)	Ultimate (kN)	Comments (including first movement and failure mode if ultimate test)
15					
	Anchor spacing (mm)		Edge distance (mm)		
16					
	Anchor spacing (mm)		Edge distance (mm)		
17					
	Anchor spacing (mm)		Edge distance (mm)		
18					
	Anchor spacing (mm)		Edge distance (mm)		
19					
	Anchor spacing (mm)		Edge distance (mm)		
20					
	Anchor spacing (mm)		Edge distance (mm)		

Additional comments (indicate any deviations from the standard test method here)

"These tests have been conducted using VJ Technology's in-house test method based on the latest CFA guidance note (Procedure for Site Testing Construction Fixings – 2022). The tests have been conducted to meet specific customer requirements that may not be fully compliant with the guidance note. Disclaimer: whilst this test may have qualified the suitability of this anchor for the given application it is the client's responsibility to ensure that the products are used strictly in accordance with the manufacturer's installation procedures and to confirm with the specifier and/or the structural engineer their approval of this product."

Tester signature	Client representative
	

OBEX Protection Ltd
Unit 5 St. Modwen Park
Norton Road
Broomhall
Worcester
WR5 2QR

Attn: **Anthony Bowen**
Customer**: Red Systems**
Main Contractor: **Willmott Dixon**

Date	Project	Site Contact	Tel
16/01/2025	Greenheys		

Reason for Report:

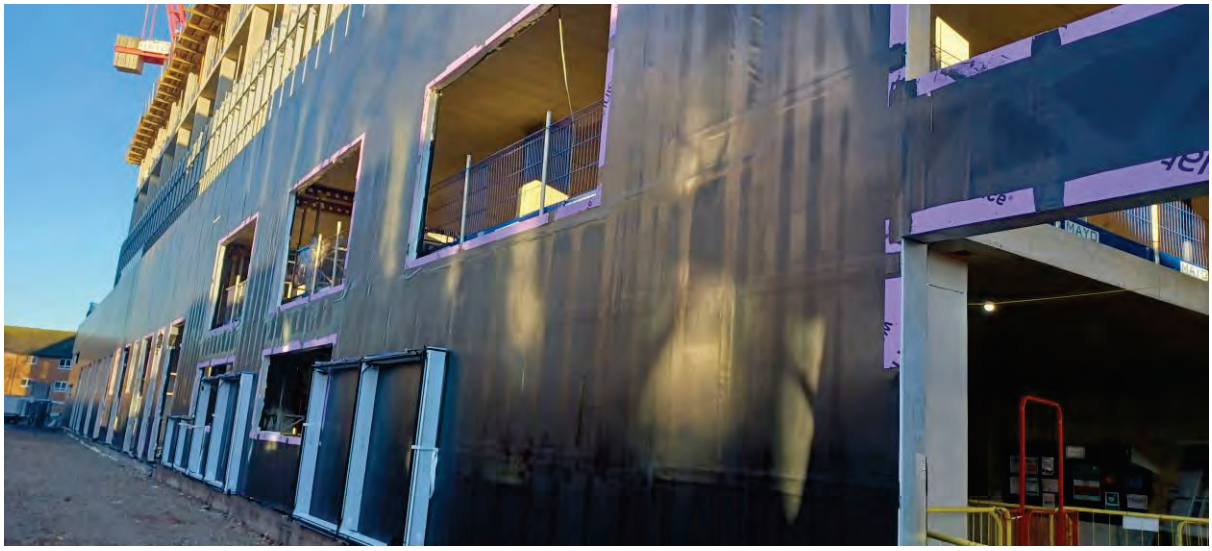
A visit was requested to inspect and report on the install of Cortex 0521FR breather membrane.

Inspection Criteria:

Inspect the overall workmanship evident in the installation of the membrane, that its installed in accordance with the Obex KIWA certified good practise installation method.

The following points were checked off as carried out;

- 0521FR bond strength to the substrate
- 0521FR bond width onto the substrate
- 0521FR application over all workmanship
- 0521FR lap sequence
- 0521FR edge sealed correctly







Visit Report Conclusion & Recommendations:

As is evident in the above images and from the examples of membrane I checked the OBEX CORTEX 0521FR has been installed to a good standard and in accordance with our KIWA certified and approved installation method.

The following points were checked off as carried out correctly.

- 0521FR bond strength to the substrate – Good
- 0521FR bond width onto the substrate – Good
- 0521FR application over all workmanship – Good
- 0521FR lap sequence – Good
- 0521FR edge sealed correctly – Good

A question was raised around some areas the membrane has come unbonded, this isn't a problem as long as all overlaps and edges of the membrane are sealed then it is still performing as a breathable layer between sheathing board and insulation.
It is good practice for all membrane to be installed from the bottom and working upwards - there is a few overlaps that are the opposite way around, along as these overlaps are fully bonded it isn't an issue.

Matthew Mann

Site Reporting Manager

Telephone +44 (0)1905 337800
Mobile 07487 673011
Email matthew@obexuk.com

Disclaimer

This Quality Assurance (QA) site report is provided by OBEX Protection Ltd. ("OBEX") following a general inspection and is not intended to be, nor should it be considered as, an exhaustive or comprehensive inspection. The inspection covers only the areas specifically identified and does not imply inspection or approval of the entirety of the work. OBEX makes no warranties, expressed or implied, regarding errors or omissions and assumes no legal liability or responsibility for loss or damage resulting from the use of information contained within this report. Any reliance placed on such information is therefore strictly at the user's own risk. It is also important to note that OBEX is not in any contractual agreement related to the work inspected. This inspection is limited to ensuring that, to the best of our knowledge based on the areas inspected, the installation appears to conform to the standards outlined in our BBA certificate. This report does not relieve the parties involved of their contractual obligations. All parties must satisfy themselves that all materials, workmanship, and construction methods comply with the appropriate regulations, standards, and contract documents.

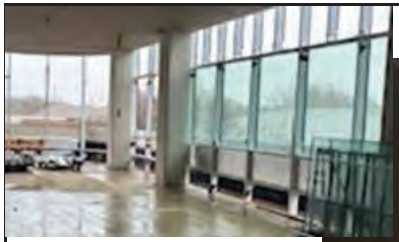
OBEX accepts no responsibility or liability for any failure to achieve this. This disclaimer is applicable to the fullest extent permitted by law. By reading and using the information provided in this report, you indicate your understanding and agreement with the above.

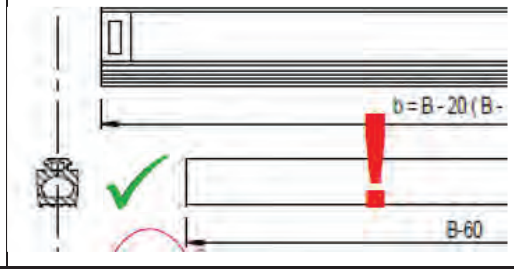
Visit Report

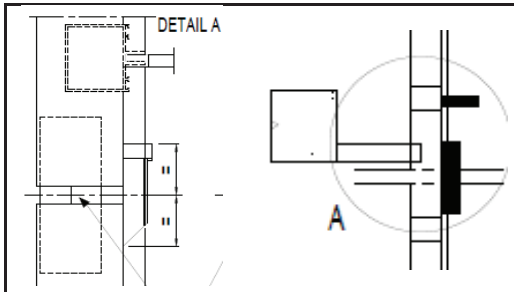
○ Factory ◉ Site ○ Other

Report No. & Project -	SVR 25-002 Greenheys Manchester
Visit Date & Reynaers Personnel -	JAN 14 2025 - Paul Guest
Customer / Client Attendees -	RED = Chris + Anthony

Visit Reason	System(s)	Project area / Block / Level - etc
customer request	CW50	general view 2nd floor

Support photo / image	Comment / Findings	Specific parts / Items
 	grid work continues in a general good work state with some glass now being placed, observation from both inside + outside relates to this follow up visit	
	curved ends are at start point grid set out where temporary facet cut profiles are used	
	grid joints (inner transom to mullion box) are generally tighter & more closed than past observation - a few occasional grid joints are still slightly open so continued check is wise given the screen extent (complete façade) plus inner cosmetic view	

 	inner glazing gaskets are applied well & glue sealed as expected - the gasket junction at transom bar end is generally OK but a few areas show overlong gasket that needs trimming (we note the drain channel of the mulion seems clear & free but this gasket termination is good practice to reflect standard tested system)	
	the transom front nosing gasket (push into pvc isolator) termination was shown for clarity - some items are ok others either overlong or varied 	
	transom nosing pvc isolator is locally glue sealed at junction to glass support which is good practice for a watertight profile surface	
	a small amount of glass units are placed with temp (fuller lenghts not stitch) pressure plates - glass is central with a common / equal gap to the grid as packed with correct size plastic piece (NON Reynaers) a few local areas shown correct nylon washer under the screw head - we reitated the need for these + screw tightness setting of 4nm	



mullion joints are tight with sealed pvc cover + drain chute placed at next transom level above as expected



drain chute at transom level above joint





at base cill level no drain chutes are witnessed (a QA photo image was shown of them used) - we discussed this on the past NOV 24 visit as the chute type / position intended was mixed, this detail brought up several discussion points as below + adjacent image proof

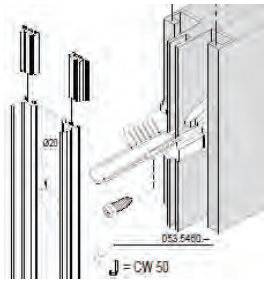
detail A = mullion joint with pvc cover





there is a large build joint void between transom & concrete floor - feedback is the EPDM (yet to be placed to correct slot position behind mullion drain channel) is the closing detail responsibility of RED - a panel by others will be added

it is unclear at this stage on the junction of the panel & the system drain chute - what we can highlight is that the chute MUST come though the panel zone to the outside build face for correct water evaciuation as per test system (normally chute is through the pressure plate)



General Summary:-	Recommendations
work to date is OK with only a few points to monitor as listed > > > > > > > > > >	monitor transom gasket lenghts / junctions & review base cill panel detail to ensure drain chute can divert water to external face of system as expected
Catalogue ref & Page (if any)	

AAI SELBY LTD
Façade Testing Specialists
1 Wilfreds Grove, Barlby, Selby YO8 5JB
M: 07841920329

Issued Date:	11.08.2025
Report Date:	10.08.2025
Test Dates:	23.05.25 / 19th & 20th 08.25
Our Job Ref:	0126-01
Project:	Greenhays
Client:	Red Systems
Main Contractor:	Wilmot Dixon
Test Inspector:	Geoff Northern
Compiled by:	John Northern
Authorised & checked by:	
Test Sheet No:	0012-01

Calibrated & Controlled Test Equipment Register								
Nozzle	Nozzle Ext	Gauge	Gauge	Gauge	Flow Meter	Flow Pot	Stop Watch	Tape
	AA/124	AA/269				AA/405	AA/829	AA/726
					/		/	/

All flow rates & testing equipment, calibrated and checked prior to commencing the CWCT test
***Calibration certificates available on request*:**

Test Report:
Reporting on samples tested and the method of test carried out, in order to determine the watertightness of the areas selected and requested for testing by the client. The history of results stating Pass, Fail or No Water Ingress Observed (NWO) as detailed within our interim test result register, are traceable and cannot be amended.

No Water Ingress Observed (NWO):
All inspectors must be satisfied that they have been able to fully inspect the inside of the test area(s) before they can confirm a pass/fail result, if it is not possible to fully monitor the inside of the test area(s) due to internal finishes being in place, our report must state: **No Water Ingress Observed (NWO)**.

Final Certificate of Test:
The final certificate of test will identify the areas that have successfully passed or achieved a no water ingress observed (NWO) result as underlined within the preceding interim report(s). The certificate shall include the relevant test standards and marked up elevation drawings as provided by the client to demonstrate all of the areas that have been tested as requested by the client. The final certificate of test and will be made available to the client within 10 working days of request. The final certificate of test only applies to the specified areas tested as per the interim test report register.

The results within this report certify that the specified areas, as selected by the client, have been tested to the relevant test standards and procedures and documented in the interim test report register, conforming to ISO/IEC 17025: 2017.

Accredited Testing Standards:
Testing in accordance with the CWCT Standard Test Method for Water Penetration Hose and Spray Bar Tests from the CWCT Standards for Systemized Building Envelopes, 2006**.**

Hose Test: (HT)
Testing in accordance with CWCT Standard Test Method for Water Penetration Hose Test from the CWCT Standards for Systemized Buildings: 2006 Chapter 9, CWCT Technical Note (TN) 41, CWCT Technical Update (TU) 24, AAMA 501.2-15 and NHBC Standards 6.9 (2022).

Spray Bar Test: (SB)
Testing to the CWCT Standard Test Method for Water Penetration Spray Bar Test from the CWCT Standards for Systemized Buildings: 2006 Chapter 10, BS EN 13051: 2001, CWCT Technical Update (TU) 24 and NHBC Standards 6.9 (2022).

Façade Testing Specialists
1 Wilfreds Grove, Barlby, Selby YO8 5JB
M: 07841920329

Result Statements:

This report and the results documented within the register, are based upon the information, elevation drawings and site plan as provided by the client and from the tests carried out by AAI Selby Ltd competent personnel.

The results of testing as detailed within the interim test report register, verify the results of the specified areas tested as selected and requested by the client.

All results are valid for the conditions under which the test was conducted.

All measurement devices, instruments and other relevant equipment were calibrated to traceable National Standards and/or subject to quarterly in-house verification checks carried out by AAI Selby Ltd qualified personnel.

Test Procedure (Hose Test)

The water reservoir and pump equipment - set up and located on ground level with the water supply to the equipment being sourced from the buildings rising main and hose run off to the specified test area and testing equipment.

The hose testing was carried out using the recommended Monarch B-25 6.030 nozzle with a calibrated pressure gauge and control valve to produce a flow rate of a nominal pressure of 220 ± 20kPa providing a flow rate of 22 ± 2 Litres/minute.

With the water directed at the joint and perpendicular to the face of the cladding, the nozzle was moved slowly back and forth at a distance of 300mm from the sample under test for a period of five minutes for each 1.5m of joint (modification: pro rata for shorter joint lengths) while an observer on the inside inspected for any water leakage, monitoring and recording the results of the test.

After completing the test, the specified sample was observed for a further 30 minutes recording any water leakage noted during this period, stating its time and position.

Disclaimer:

Opinions and recommendations made by AAI Selby Ltd operatives relating to remedial works and causes of failure are outside the scope of our Schedule.

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AAI Selby Ltd and its personnel accept no liability for any damages, charges, cost or expenses in relation to any damage to any property or loss arising either directly or indirectly from the testing carried out and/or use of this report.

Test Result Register:

Date:	Test: SB / HT	Our Ref:	Area:	Elevation Ref:	Drawing Ref:	Description:	L M SQ M L/Min	Results:
22.05.25	HT	AA/01	2nd FL	Grid L-K	DR-X-01105	Schuco Curtain Wall	N/A	PASSED
23.05.25	HT	AA/01	2nd FL	Grid L-K	DR-X-01105	Schuco Curtain Wall	N/A	PASSED
19.08.25	HT	AA/02	2nd FL	Grid E-F	DR-X-01122	Schuco Curtain Wall	N/A	PASSED

20.08.25	HT	AA/03	2nd FL	Grid H-I	DR-X-O1125	Schuco Curtain Wall	N/A	PASSED
20.08.25	HT	AA/03	4th FL	Grid H-I	DR-X-01125	Schuco Curtain Wall	N/A	PASSED
20.08.25	HT	AA/03	2ND FL	Grid I-J	DR-X-01126	Schuco Curtain Wall	N/A	PASSED
20.08.25	HT	AA/03	4TH FL	Grid I-J	DR-X-01126	Schuco Curtain Wall	N/A	PASSED

Test Report

Date:		**Block:**		**Elevation:**		**Level**		**Our Ref No:**	
	22.05.25		MAIN		Grid 2		2		AA/01
	23.05.25		MAIN		Grid 2		2		AA/01
	19.08.25		MAIN		Grid 5		2		AA/02
	20.08.25		MAIN		Grid 5		2		AA/03
	20.08.25		MAIN		Grid 5		4		AA/03

Test Sample:
Schuco Curtain Wall system comprised of Fixed Glazed DGUs and Panels

Hose Testing – , testing the interface seals and all fixed joints within the specified marked up area in accordance with CWCT Chapter 9.

Hose Test:	
PASSED:	**REF**
	AA/01 **AA/02** **AA/03**
N.W.O:	

Spray Bar Test:	
Failed:	
N/A	**N/A**
No Water OBS	
Nozzles Used:	
Litres/Minute	
Square Meters	

Test Carried Out:

Hose Testing – Testing the integrity of the installed Schuco Curtain Wall system, testing interface seals and critical fixed joints.

Interface Weathering:

Pressure Plate and capped system

External Finishes: Complete

Complete

Internal Finishes:

Available for Investigation

Remedial Works:

N/A

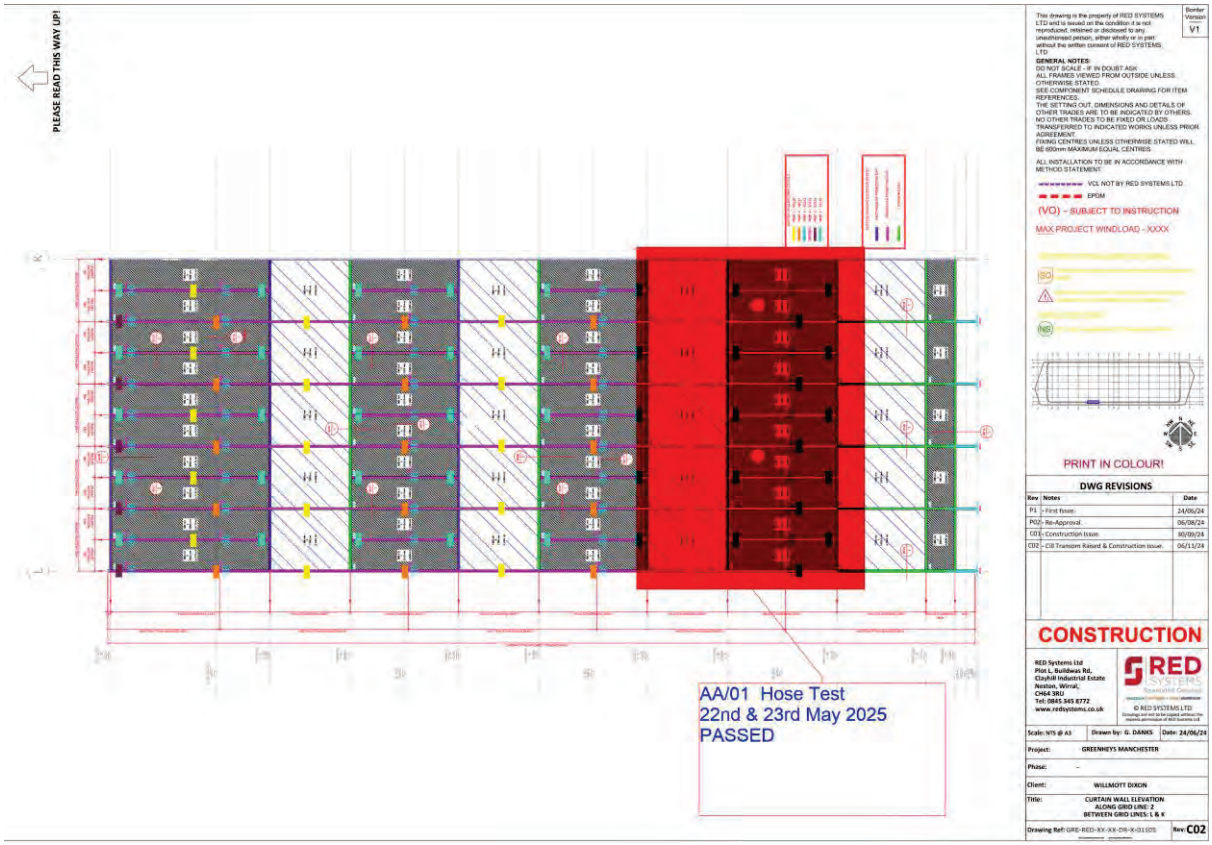
Test Inspection:

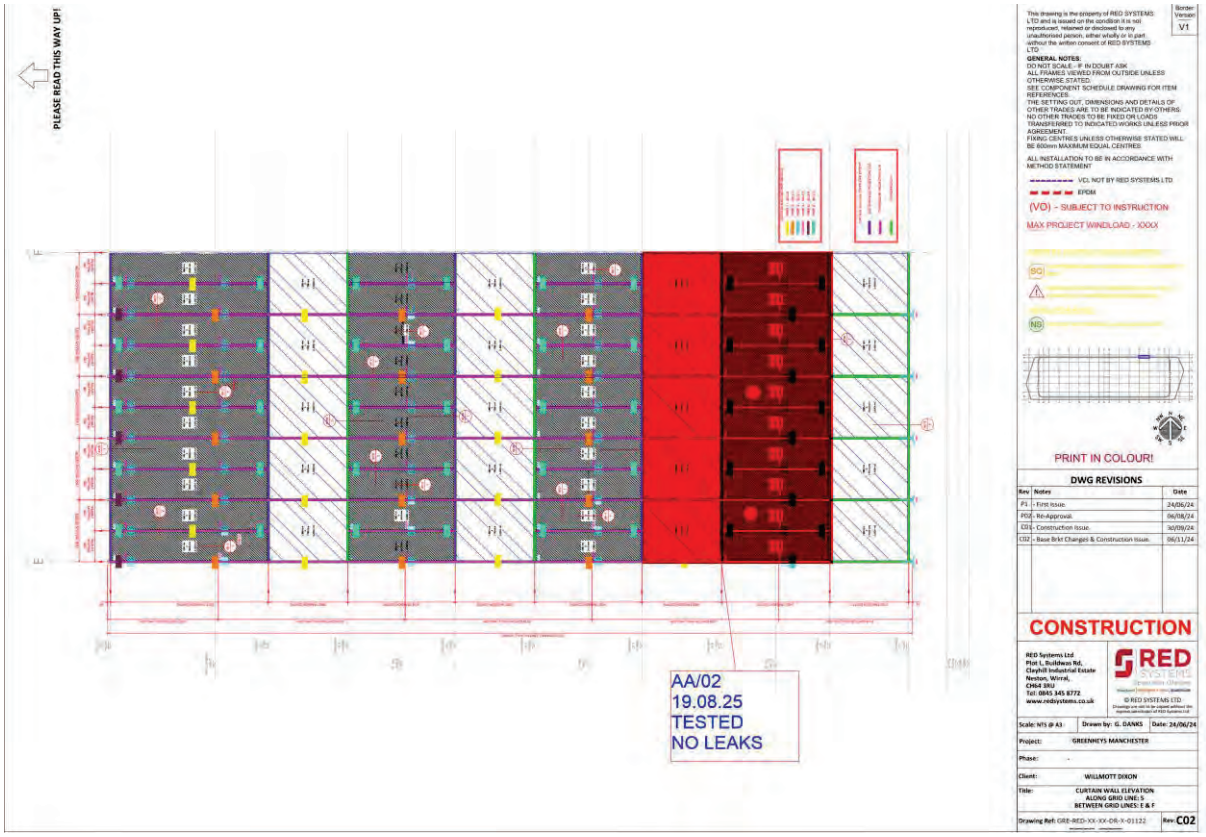
During the test, internal interface seals, backing wall and critical fixed joints were checked for any signs of water leakage and re-inspected after the required 30 minutes as per the CWCT standards and procedures.

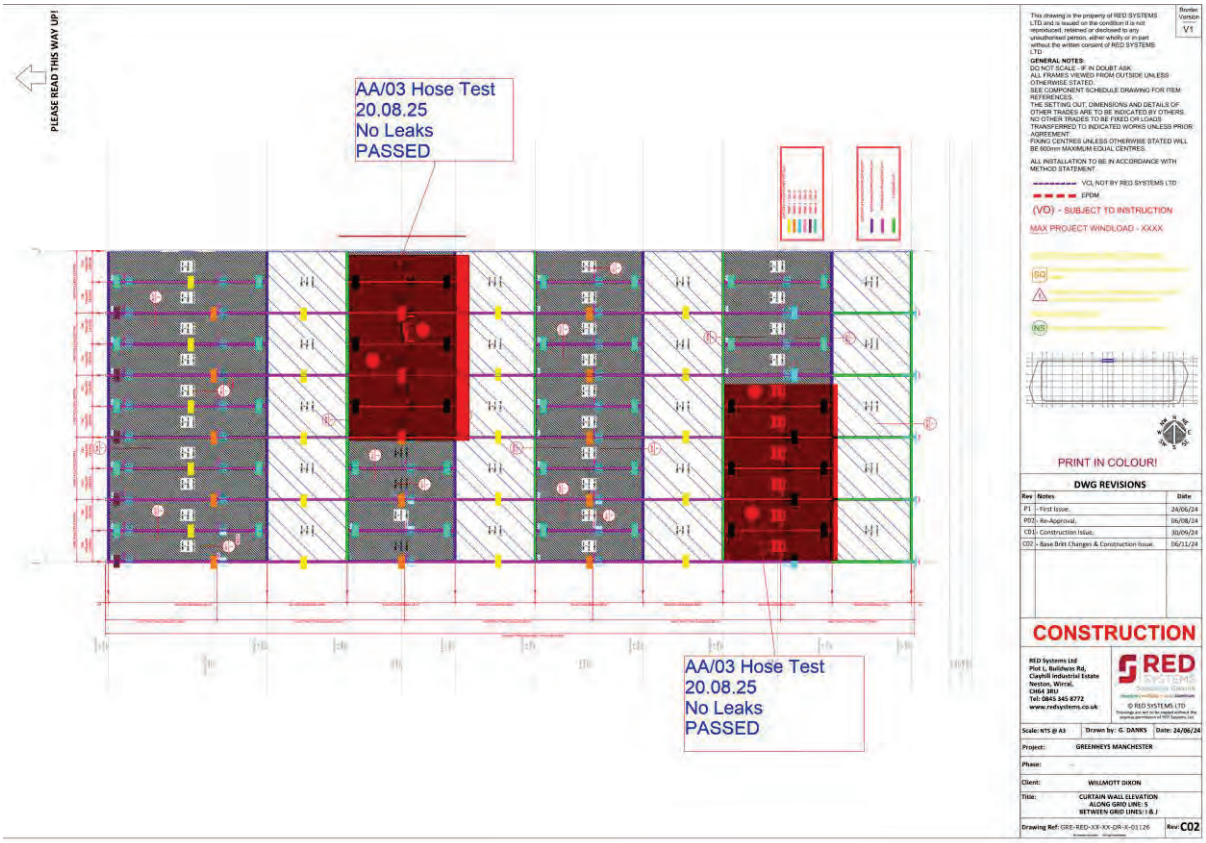
Test Results : PASSED

Note:

The results are valid only for the conditions under which the test was conducted.







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Border Version: V1

GENERAL NOTES:
DO NOT SCALE - IF IN DOUBT ASK.
ALL FRAMES VIEWED FROM OUTSIDE UNLESS OTHERWISE STATED.
SEE COMPONENT SCHEDULE DRAWING FOR ITEM REFERENCES.
THE SETTING OUT, DIMENSIONS AND DETAILS OF OTHER TRADES ARE TO BE INDICATED BY OTHERS.
NO OTHER TRADES TO BE FIXED OR LOADS TRANSFERRED TO INDICATED WORKS UNLESS PRIOR AGREEMENT.
FIXING CENTRES UNLESS OTHERWISE STATED WILL BE 600mm MAXIMUM EQUAL CENTRES.

ALL INSTALLATION TO BE IN ACCORDANCE WITH METHOD STATEMENT.

VCL NOT BY RED SYSTEMS LTD
EPDM
(VO) - SUBJECT TO INSTRUCTION
MAX PROJECT WINDLOAD - XXXX

PRINT IN COLOUR!

DWG REVISIONS

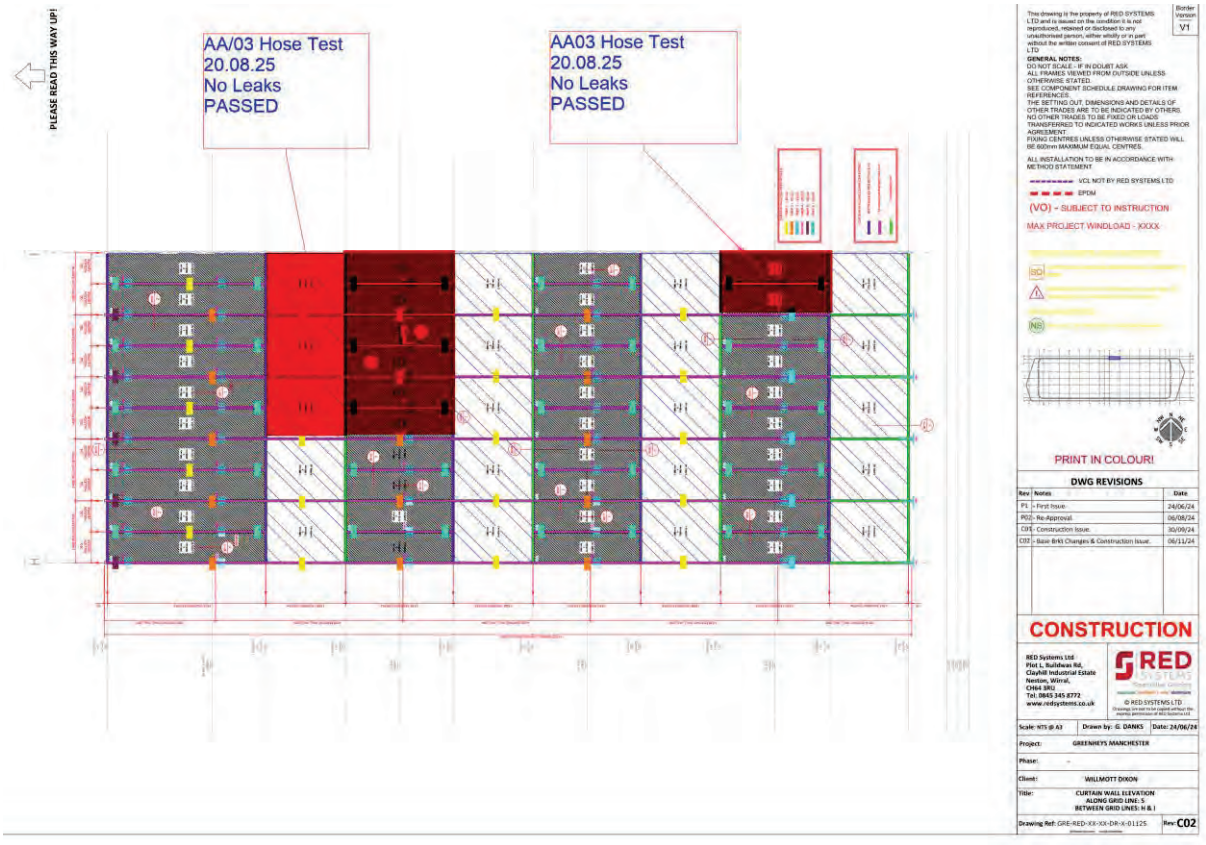
Rev	Notes	Date
P1	- First Issue.	24/06/24
P02	- Re-Approval.	06/08/24
C01	- Construction Issue.	30/09/24
C02	- Base Brkt Changes & Construction Issue.	06/11/24

CONSTRUCTION

RED Systems Ltd
Plot L, Buildwas Rd,
Clayhill Industrial Estate
Neston, Wirral,
CH64 3RU
Tel: 0845 345 8772
www.redsystems.co.uk

© RED SYSTEMS LTD

Scale: NTS @ A3	Drawn by: G. DANKS	Date: 24/06/24
Project:	GREENHEYS MANCHESTER	
Phase:	-	
Client:	WILLMOTT DIXON	
Title:	CURTAIN WALL ELEVATION ALONG GRID LINE: 5 BETWEEN GRID LINES: H & J	
Drawing Ref:	GRE-RED-XX-XX-DR-X-01126	Rev: C02



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CONSTRUCTION

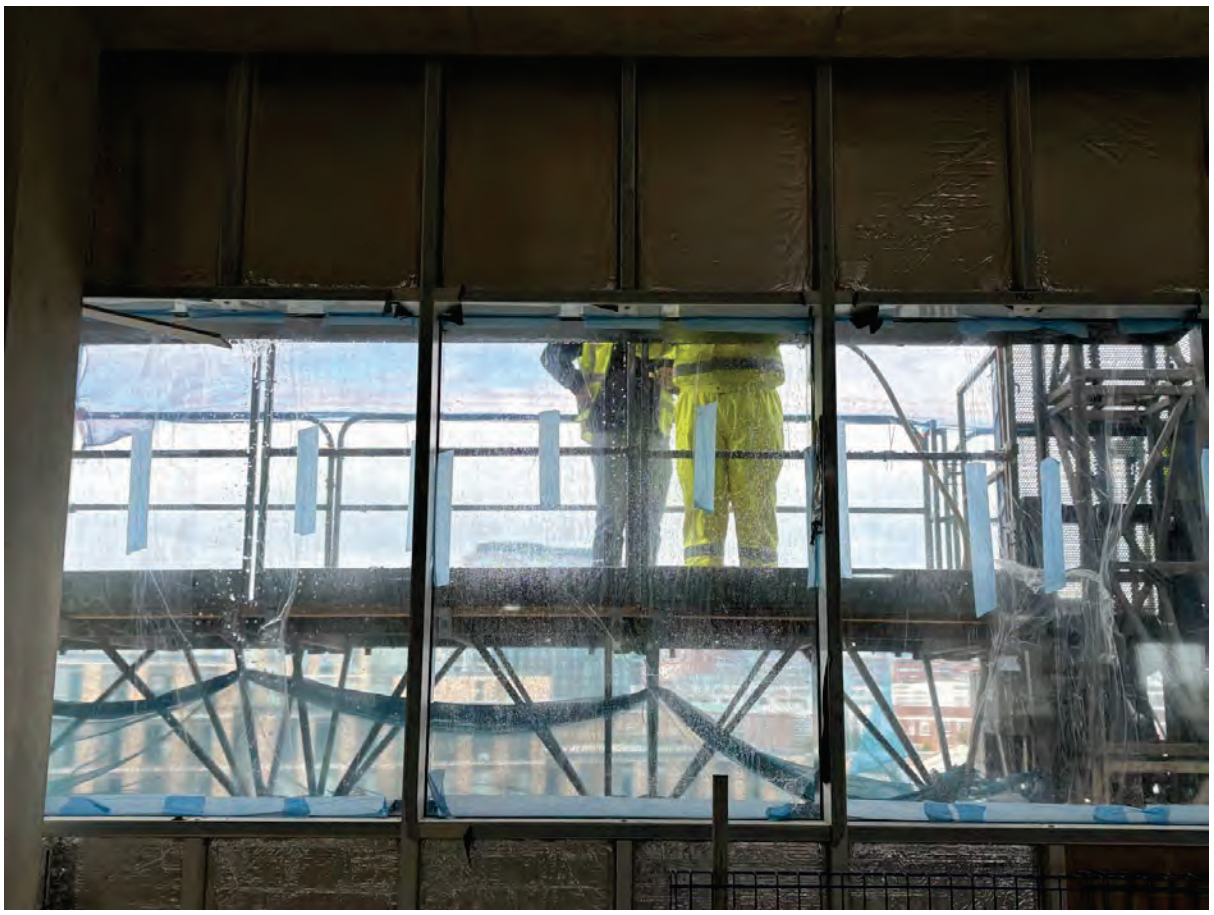
RED Systems Ltd
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Scale: NTS @ A3	Drawn by: G. DANKS	Date: 24/06/24
Project:	GREENHEYS MANCHESTER	
Phase:	-	
Client:	WILLMOTT DIXON	
Title:	CURTAIN WALL ELEVATION ALONG GRID LINE: 5 BETWEEN GRID LINES: H & J	
Drawing Ref:	GRE-RED-XX-XX-DR-X-01125	Rev: C02


WILLMOTT DIXON
APOLLO
DEFENDER
DEFENDER












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PSI
KPA



End of Report

SFS Toolbox Talk Record Form

Form Reference	F454279.1
Owned By	Dawson Myers (Remagin - Newton Aycliffe)
Date	11/11/2024 12:53:38
Status	Closed
Project Name	F2057 - Greenheys
Project Address	Greenheys Lane Manchester M15 6JJ
Client Project Reference	RED Systems / Willmott Dixon
Location	F2057 - Greenheys

Brief Description of the Job (Including non-standard items)	Primary structure is Concrete. 2 storeys of SFS Infill.

Document Name	Type	Created By	Date
GRE-EOS-ZZ-00-DR-X-00001.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:03:51
GRE-EOS-ZZ-00-DR-X-00002.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:03:59
GRE-EOS-ZZ-01-DR-X-00003.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:04:04
GRE-EOS-ZZ-01-DR-X-00004.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:04:10
GRE-EOS-ZZ-XX-DR-X-00005.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:04:16
GRE-EOS-ZZ-XX-DR-X-00006.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:05:16
GRE-EOS-ZZ-XX-DR-X-00007.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:05:27
GRE-EOS-ZZ-XX-DR-X-00008.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:05:33
GRE-EOS-ZZ-XX-DR-X-00009.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:05:40
GRE-EOS-ZZ-XX-DR-X-00010.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:05:47
GRE-EOS-ZZ-XX-DR-X-00100.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:05:57
GRE-EOS-ZZ-XX-DR-X-00101.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:06:05
GRE-EOS-ZZ-XX-DR-X-00200.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:06:11
Greenheys - Drawing Register.pdf	Pdf	Dawson Myers (Remagin - Leeds)	11/11/2024 17:06:19

Training Checklist

Delivery / Packs / Logistics

#	Check Item	Yes or No	Additional Comments
1	Stillage Sheets	Yes	
2	Colour Coding	Yes	Labels show the level in writing and colour (ground floor - orange, level 1 - red etc)
3	Labelling	Yes	Labels show the grid line reference, product length, width, gauge etc, weight of the product in kg, what the product is SS - single stud, DS - double stud, TJ - triple jamb etc.
4	Ancillary Products	Yes	Stock material such as base and head track, Swaged cripple tracks etc as well as fixings and drill bits, bit holders.

Tracks

#	Check Item	Yes or No	Additional Comments
1	Fixing Positions / Types	Yes	
2	Stock Track (Plain & DHT)	Yes	

Studs

#	Check Item	Yes or No	Additional Comments
1	Orientation	Yes	
2	Swaging Explanation	Yes	
3	Deflection System (EDB & DHT)	Yes	Fixings to be central of the slot in the deflection head track (DHT). +/- 25mm
4	Cloaking (EDB only)	Yes	
5	Brick Ties	N/A	N/A

Jambs

#	Check Item	Yes or No	Additional Comments
1	Single Studs	Yes	
2	Double Studs	Yes	Triple Jambs & Quad Jambs.

Cills / Lintels

#	Check Item	Yes or No	Additional Comments
1	Single Tracks	Yes	Cill and lintels come to site pre cut and labelled up. Swaged Cripple tracks come pre cut and are referred to as ST on the stillage sheet.
2	Double Cills / Lintels	Yes	Same as above.
3	Cripple Studs	Yes	No3 fixings in a staggered/diagonal line or a triangle pattern.

Windposts

#	Check Item	Yes or No	Additional Comments
1	Double Studs	N/A	N/A
2	Base Plates	N/A	N/A

Parapets

#	Check Item	Yes or No	Additional Comments
1	Capping Track	N/A	N/A
2	Unsupported at Head	N/A	N/A

Training Sign Off

Stillage Sheets Reviewed	Yes

Remagin Representative Site Sign Off

Position	Project Support & Quality Manager
Signature	



Dawson Myers (Remagin - Newton Aycliffe)

11/11/2024 16:50:22

Client Representative Site Sign Off

Position	Managers & Installers
Signature	



Anthony Bowen (RED Systems Ltd)

11/11/2024 13:03:35





Will Griffiths (RED Systems Ltd)

11/11/2024 13:07:44





Radoslav Dedelyanov (RED Systems Ltd)

11/11/2024 13:08:11





Ventsislav Prangov (RED Systems Ltd)

11/11/2024 13:08:29



Dimitar Sandarov (RED Systems Ltd)	Gary Blackwell (RED Systems Ltd)	Ventsislav Chavdarov (RED Systems Ltd)	Asen Pehlivanov (RED Systems Ltd)
11/11/2024 13:08:51	11/11/2024 13:09:13	11/11/2024 13:09:29	11/11/2024 13:09:47

QD Checklist-P1-Cavity Barriers External

Mast 8 gl f-b see bespoke items for all areas

Form Reference	F486347.12
Owned By	Lily Pringle (Willmott Dixon Construction)
Date	04/04/2025 11:08:31
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 8 GL F - B>South Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 8 GL F - B
Supply Chain	RED Systems Ltd
Area of Work/Location	Mast 8 gl f-b see bespoke items for all areas

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	04/04/2025	04/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	2400808 R02 MA23146 OFR FIRE STRATEGY	ab	ab
2	Confirm Drawing	GRE BDP ZZ XX DR A 22101	ab	ab

#	Document Name	Created By	Date	
1	240808-R02-MA23146-OFR_Stage_4_Strategy-DF-CIC.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:05:46
2	GRE-BDP-ZZ-XX-DR-A-21306 (12) acoustic barrier.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:06:03
2	GRE-BDP-ZZ-XX-DR-A-21307 (13).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:06:06
2	GRE-BDP-ZZ-XX-DR-A-22101 (2).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:06:08
2	Siderise-CW-Quick-Ref-Instructions-v2.05.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:06:10

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes

Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes
Check installing SCP has been accredited and certified to install Cavity Barriers	Yes
Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes
HOLD POINT 1 - Pre-start checks completed	



Abi Belfield (Willmott Dixon Construction)

24/04/2025 07:31:39



Anthony Bowen (RED Systems Ltd)

24/04/2025 07:31:48

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	



Abi Belfield (Willmott Dixon Construction)

24/04/2025 07:31:54



Anthony Bowen (RED Systems Ltd)

24/04/2025 07:32:05

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	Yes
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	Yes
Check barriers are tightly abutted at ends and corners	Yes
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	Yes

	Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	Yes
	If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	Yes
	If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	Yes
	HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)

24/04/2025 07:32:17



Anthony Bowen (RED Systems Ltd)

24/04/2025 07:32:27

Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable		
	If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	N/A
	Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	N/A
	The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	N/A
	HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	

Abi Belfield (Willmott Dixon Construction)

02/07/2025 14:47:32

Fire Consultant inspection		
	HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	

Abi Belfield (Willmott Dixon Construction)

02/07/2025 14:47:34

	HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



Abi Belfield (Willmott Dixon Construction)

02/07/2025 14:47:35

Bespoke Items - Additional Hold Points/Additional Checks		
#	**Additional Hold Point**	**Additional check**
1	level 6 slab gl	

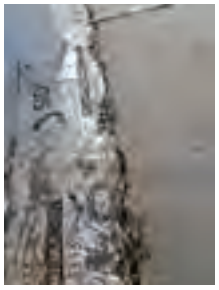
#	Additional Hold Point	Additional check
2	level 3 mast 8	
3	level 5	
4	level 4	

#	Reference	Description	Date	Status	Issued To Package	Issued To Organisation
2	T421609.459	mast 8 gl F is this gap compliant?	12/04/2025 10:55:25	Signed Off	External Windows, Doors & Curtain Walling	RED Systems Ltd

Images



12/04/2025 10:55:25



12/04/2025 10:55:25

Images

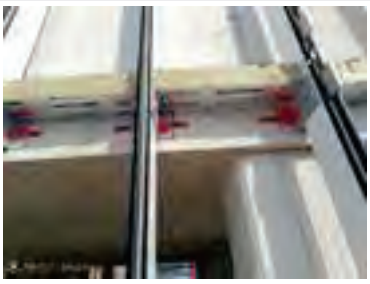
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04/04/2025 12:40:49



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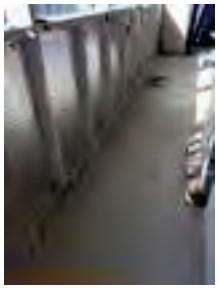



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12/04/2025 10:54:18


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#3


21/05/2025 10:32:53


21/05/2025 10:32:59

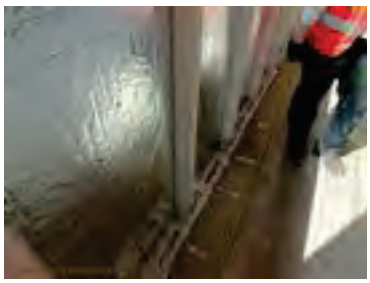

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21/05/2025 10:33:19


21/05/2025 10:33:30


21/05/2025 10:33:38







21/05/2025 10:33:49 | 21/05/2025 10:33:55 | 21/05/2025 10:34:03



21/05/2025 10:34:44

#4





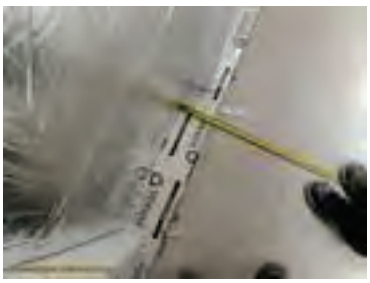
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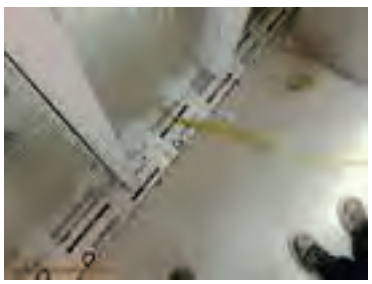


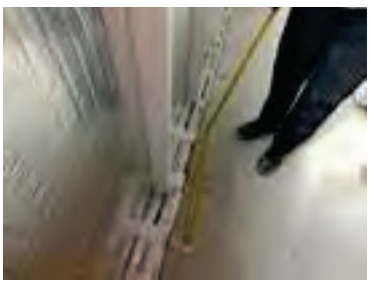
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21/05/2025 10:54:53 | 21/05/2025 10:54:58 | 21/05/2025 10:55:03





21/05/2025 10:55:09 | 21/05/2025 10:55:14 | 21/05/2025 10:55:26



21/05/2025 10:55:33



21/05/2025 10:55:42



21/05/2025 10:55:54



21/05/2025 10:56:31



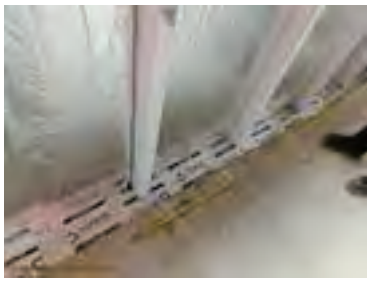
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21/05/2025 10:56:45



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21/05/2025 10:57:02



21/05/2025 10:57:08



21/05/2025 10:57:16



21/05/2025 10:57:23



21/05/2025 10:57:30



21/05/2025 10:57:35



21/05/2025 10:57:42



21/05/2025 10:57:53



21/05/2025 10:58:07

Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure	
All Evidence available & actions closed Supply Chain Partner	



Abi Belfield (Willmott Dixon Construction)

02/07/2025 14:47:45

All Evidence available & actions closed Willmott Dixon	



Abi Belfield (Willmott Dixon Construction)

02/07/2025 14:47:52

Date Closed	10/08/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast 1 0- SEE BESPOKE ITEMS FOR EACH LEVEL OF CAVITY BARRIERS
FULL SCAN ON OCULO

Form Reference	F421609.283
Owned By	Anthony Bowen (RED Systems Ltd)
Date	08/04/2025 11:24:58
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 1 - Annexe>North Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 1 - Annexe
Supply Chain	RED Systems Ltd
Area of Work/Location	mast 1 0- SEE BESPOKE ITEMS FOR EACH LEVEL OF CAVITY BARRIERS FULL SCAN ON OCULO

Document Name	Type	Created By	Date
mast 1 and 2 firestop.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	08/07/2025 10:31:27

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	08/04/2025	08/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	GRE-BDP-ZZ-XX-DR-A-68001 OFR	AB	AB
2	Confirm Drawing	GRE-BDP-ZZ-XX-DR-A-21305 GRE-BDP-ZZ-XX-DR-A-21306 GRE-BDP-ZZ-XX-DR-A-21306	AB	AB

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes
Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes

Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes
Check installing SCP has been accredited and certified to install Cavity Barriers	Yes
Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes
HOLD POINT 1 - Pre-start checks completed	




Abi Belfield (Willmott Dixon Construction)
08/07/2025 10:26:58

Anthony Bowen (RED Systems Ltd)
08/07/2025 10:27:06

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	N/A
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	N/A
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	N/A
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	N/A
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	N/A
HOLD POINT 2 - Installation of Brackets complete	




Abi Belfield (Willmott Dixon Construction)
08/07/2025 10:27:19

Anthony Bowen (RED Systems Ltd)
08/07/2025 10:27:33

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	N/A
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	N/A
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	N/A
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	N/A
Check barriers are tightly abutted at ends and corners	N/A
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	N/A
Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	N/A
If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	N/A

	If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	N/A
	HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	

Abi Belfield (Willmott Dixon Construction)

08/07/2025 10:27:58

	Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable	
	If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	N/A
	Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	N/A
	The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	N/A
	HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)

08/07/2025 10:47:58



Anthony Bowen (RED Systems Ltd)

08/07/2025 10:48:05

	Fire Consultant inspection	
	HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	



Abi Belfield (Willmott Dixon Construction)

08/07/2025 10:28:17

	HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



Anthony Bowen (RED Systems Ltd)

08/07/2025 10:28:22

Bespoke Items - Additional Hold Points/Additional Checks

#	Additional Hold Point	Additional check
1	level 3	
2	Level 5	
3	Level 4	

#	Reference	Description	Date	Status	Issued To Package	Issued To Organisation
1	T421609.463	fix strap	12/04/2025 11:27:10	Signed Off	External Windows, Doors & Curtain Walling	RED Systems Ltd

Images



12/04/2025 11:27:10

Images

#1



12/04/2025 11:27:25



12/04/2025 11:27:25



12/04/2025 11:27:25



12/04/2025 11:27:26



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12/04/2025 11:27:27



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12/04/2025 11:27:27



12/04/2025 11:27:28



12/04/2025 11:27:34

#2


21/05/2025 10:23:20


21/05/2025 10:24:50


21/05/2025 10:24:50


21/05/2025 10:24:51


21/05/2025 10:24:51


21/05/2025 10:24:52


21/05/2025 10:24:52


21/05/2025 10:24:53


21/05/2025 10:26:50


21/05/2025 10:27:08


21/05/2025 10:27:14

#3


21/05/2025 10:46:47


21/05/2025 10:46:54


21/05/2025 10:47:03







21/05/2025 10:47:07 21/05/2025 10:47:16 21/05/2025 10:47:27

Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure	
All Evidence available & actions closed Supply Chain Partner	



Anthony Bowen (RED Systems Ltd)

08/07/2025 10:48:12

All Evidence available & actions closed Willmott Dixon	

Abi Belfield (Willmott Dixon Construction)

08/07/2025 10:33:56

Date Closed	08/07/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast 7

Form Reference	F421609.277
Owned By	Anthony Bowen (RED Systems Ltd)
Date	08/04/2025 11:19:08
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 7 GL 5-6>East Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 7 GL 5-6
Supply Chain	RED Systems Ltd
Area of Work/Location	mast 7

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	08/04/2025	08/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	2400808 R02 MA23146 OFR FIRE STRATEGY	ab	ab
2	Confirm Drawing	GRE BDP ZZ XX DR A 22101	ab	ab

#	Document Name	Created By	Date	
1	240808-R02-MA23146-OFR_Stage_4_Strategy-DF-CIC.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:12:40
2	GRE-BDP-ZZ-XX-DR-A-21306 (12) acoustic barrier.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:12:58
2	GRE-BDP-ZZ-XX-DR-A-21307 (13).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:12:59
2	GRE-BDP-ZZ-XX-DR-A-22101 (2).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:13:01
2	Siderise-CW-Quick-Ref-Instructions-v2.05.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:13:03

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes

Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes
Check installing SCP has been accredited and certified to install Cavity Barriers	Yes
Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes
HOLD POINT 1 - Pre-start checks completed	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:59:37

Chris Ward (RED Systems Ltd)
16/09/2025 13:59:49

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:59:54

Chris Ward (RED Systems Ltd)
16/09/2025 14:00:01

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	Yes
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	Yes
Check barriers are tightly abutted at ends and corners	Yes
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	Yes
Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	Yes

	If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	Yes
	If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	Yes
	HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 14:00:12



Chris Ward (RED Systems Ltd)

16/09/2025 14:00:23

Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable	
If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	Yes
Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	Yes
The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	Yes
HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	

Abi Belfield (Willmott Dixon Construction)

16/09/2025 14:00:33

Fire Consultant inspection	
HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 14:00:35

HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



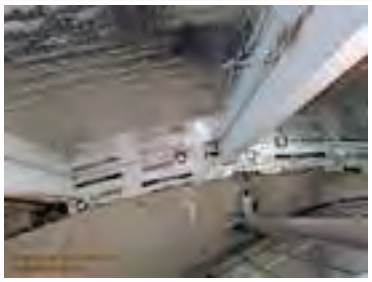
Abi Belfield (Willmott Dixon Construction)

16/09/2025 14:00:37

Bespoke Items - Additional Hold Points/Additional Checks		
#	**Additional Hold Point**	**Additional check**
1	level 6	
2	level 3 corner	
3	level 5	
4	level 4	

Images

#2



12/04/2025 10:58:01



12/04/2025 10:58:12

#3



21/05/2025 10:32:00

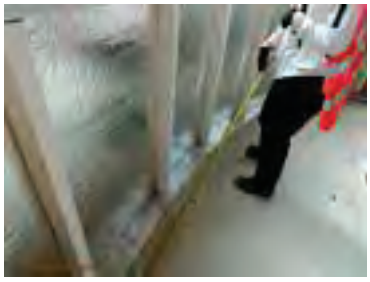


21/05/2025 10:32:08

#4



21/05/2025 10:53:12



21/05/2025 10:53:20



21/05/2025 10:53:25



21/05/2025 10:53:34



21/05/2025 10:53:45

Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure

All Evidence available & actions closed Supply Chain Partner	



Chris Ward (RED Systems Ltd)

16/09/2025 14:00:50

All Evidence available & actions closed Willmott Dixon	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 14:00:44

Date Closed	16/09/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast 2

Form Reference	F421609.281
Owned By	Anthony Bowen (RED Systems Ltd)
Date	08/04/2025 11:24:23
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 2>North Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 2
Supply Chain	RED Systems Ltd
Area of Work/Location	mast 2 see bespoke checks for each level and oculo for full scan

Document Name	Type	Created By	Date
mast 1 and 2 firestop.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	08/07/2025 10:37:37

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	08/04/2025	08/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	GRE-BDP-ZZ-XX-DR-A-68001	AB	AB
2	Confirm Drawing	GRE-BDP-ZZ-XX-DR-A-21305 GRE-BDP-ZZ-XX-DR-A-21306 GRE-BDP-ZZ-XX-DR-A-21307	AB	AB

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes
Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes

Check installing SCP has been accredited and certified to install Cavity Barriers	Yes
Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes
HOLD POINT 1 - Pre-start checks completed	




Abi Belfield (Willmott Dixon Construction)
08/07/2025 10:44:22

Anthony Bowen (RED Systems Ltd)
08/07/2025 10:44:29

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	




Abi Belfield (Willmott Dixon Construction)
08/07/2025 10:44:36

Anthony Bowen (RED Systems Ltd)
08/07/2025 10:44:44

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	N/A
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	N/A
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	Yes
Check barriers are tightly abutted at ends and corners	Yes
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	Yes
Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	Yes
If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	Yes
If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	Yes

HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)

08/07/2025 10:44:55

Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable	
If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	N/A
Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	N/A
The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	N/A
HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)

08/07/2025 10:45:05

Fire Consultant inspection	
HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	



Abi Belfield (Willmott Dixon Construction)

08/07/2025 10:45:07

HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



Abi Belfield (Willmott Dixon Construction)

08/07/2025 10:45:10

Bespoke Items - Additional Hold Points/Additional Checks		
#	**Additional Hold Point**	**Additional check**
1	level 3	
2	level 6	
3	level 5	
4	level 4	

Images

#1



12/04/2025 11:19:56



12/04/2025 11:20:00



12/04/2025 11:20:10



12/04/2025 11:22:34



12/04/2025 11:22:34



12/04/2025 11:22:34



12/04/2025 11:22:34



12/04/2025 11:22:35



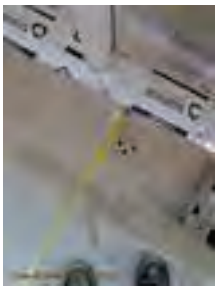
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12/04/2025 11:22:37



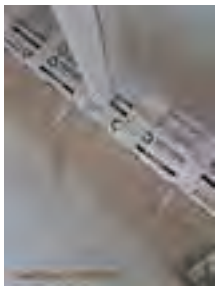
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12/04/2025 11:22:37


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12/04/2025 11:22:38

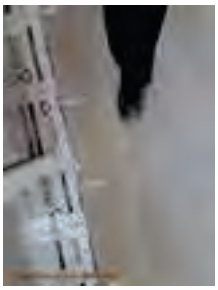

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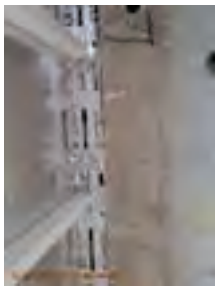

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12/04/2025 11:22:39


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12/04/2025 11:22:40


12/04/2025 11:22:40



12/04/2025 11:22:40


12/04/2025 11:22:41


12/04/2025 11:22:41

#2



26/04/2025 10:39:11



26/04/2025 10:39:11



26/04/2025 10:39:11



26/04/2025 10:39:12



26/04/2025 10:39:12



26/04/2025 10:39:12



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26/04/2025 10:39:13



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26/04/2025 10:39:13



26/04/2025 10:39:14



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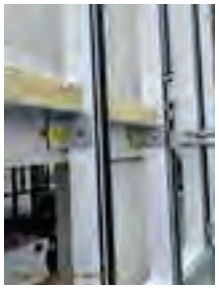


26/04/2025 10:39:14



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26/04/2025 10:39:15 | 26/04/2025 10:39:15 | 26/04/2025 10:39:15

#3




21/05/2025 10:27:50 | 21/05/2025 10:28:00

#4





21/05/2025 10:47:50 | 21/05/2025 10:47:56 | 21/05/2025 10:48:04




21/05/2025 10:48:16 | 21/05/2025 10:48:26

Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure	
All Evidence available & actions closed Supply Chain Partner	

Abi Belfield (Willmott Dixon Construction)
08/07/2025 10:45:24

All Evidence available & actions closed Willmott Dixon	

Anthony Bowen (RED Systems Ltd)
08/07/2025 10:45:29

Date Closed	08/07/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast 12

Form Reference	F421609.275
Owned By	Anthony Bowen (RED Systems Ltd)
Date	08/04/2025 11:18:32
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 12 2a - P>West Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 12 2a - P
Supply Chain	RED Systems Ltd
Area of Work/Location	mast 12

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	08/04/2025	08/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	2400808 R02 MA23146 OFR FIRE STRATEGY	ab	ab
2	Confirm Drawing	GRE BDP ZZ XX DR A 22101	ab	ab

#	Document Name	Created By	Date	
1	240808-R02-MA23146-OFR_Stage_4_Strategy-DF-CIC.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:10:38
2	GRE-BDP-ZZ-XX-DR-A-21306 (12) acoustic barrier.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:10:53
2	GRE-BDP-ZZ-XX-DR-A-21307 (13).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:10:55
2	GRE-BDP-ZZ-XX-DR-A-22101 (2).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:10:56
2	Siderise-CW-Quick-Ref-Instructions-v2.05.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:10:58

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes

Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes
Check installing SCP has been accredited and certified to install Cavity Barriers	Yes
Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes
HOLD POINT 1 - Pre-start checks completed	



Chris Ward (RED Systems Ltd)

16/09/2025 13:55:36

Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:55:40

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:55:48

Chris Ward (RED Systems Ltd)

16/09/2025 13:55:55

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	Yes
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	Yes
Check barriers are tightly abutted at ends and corners	Yes
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	Yes
Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	Yes

	If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	Yes
	If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	Yes
	HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:56:05



Chris Ward (RED Systems Ltd)

16/09/2025 13:56:27

Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable		
	If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	Yes
	Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	Yes
	The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	Yes
	HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	

Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:56:30

Fire Consultant inspection		
	HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:56:32

	HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:56:34

Bespoke Items - Additional Hold Points/Additional Checks		
#	**Additional Hold Point**	**Additional check**
1	level 5	
2	level 4	
3	3	

WILLMOTT DIXON SINCE 1852

Images

#1



21/05/2025 10:19:34



21/05/2025 10:19:42



21/05/2025 10:19:50

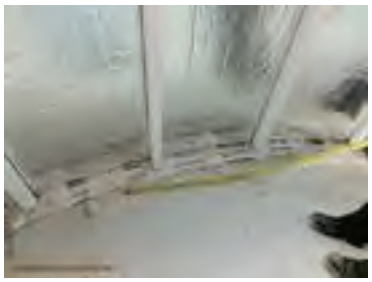


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21/05/2025 10:20:18

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21/05/2025 10:43:53



21/05/2025 10:43:58



21/05/2025 10:44:05

#3



29/05/2025 14:17:10



29/05/2025 14:17:14

Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure

All Evidence available & actions closed Supply Chain Partner	



Chris Ward (RED Systems Ltd)

16/09/2025 13:56:46

All Evidence available & actions closed Willmott Dixon	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:56:38

Date Closed	16/09/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast

Form Reference	F421609.273
Owned By	Anthony Bowen (RED Systems Ltd)
Date	08/04/2025 11:16:30
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 13 CL - 2a>West Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 13 CL - 2a
Supply Chain	RED Systems Ltd
Area of Work/Location	mast

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	08/04/2025	08/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	2400808 R02 MA23146 OFR FIRE STRATEGY	ab	ab
2	Confirm Drawing	GRE BDP ZZ XX DR A 22101	ab	ab

#	Document Name	Created By	Date	
1	240808-R02-MA23146-OFR_Stage_4_Strategy-DF-CIC.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:07:02
2	GRE-BDP-ZZ-XX-DR-A-21306 (12) acoustic barrier.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:07:18
2	GRE-BDP-ZZ-XX-DR-A-21307 (13).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:07:19
2	GRE-BDP-ZZ-XX-DR-A-22101 (2).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:07:20
2	Siderise-CW-Quick-Ref-Instructions-v2.05.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:07:23

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes

Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	
Check installing SCP has been accredited and certified to install Cavity Barriers	
Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	
HOLD POINT 1 - Pre-start checks completed	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:52:04

Chris Ward (RED Systems Ltd)
16/09/2025 13:52:10

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:52:17

Chris Ward (RED Systems Ltd)
16/09/2025 13:52:24

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	Yes
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	Yes
Check barriers are tightly abutted at ends and corners	Yes
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	Yes
Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	Yes

	If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	Yes
	If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	Yes
	HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:52:35

Chris Ward (RED Systems Ltd)

16/09/2025 13:52:46

Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable		
	If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	Yes
	Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	Yes
	The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	Yes
	HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:52:56

Fire Consultant inspection		
	HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:53:01

	HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:53:03

Bespoke Items - Additional Hold Points/Additional Checks		
#	**Additional Hold Point**	**Additional check**
1	level 6	
2	level 5	
3	level 4	
4	3	

Images

#1



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26/04/2025 10:17:49



26/04/2025 10:17:49



26/04/2025 10:17:49

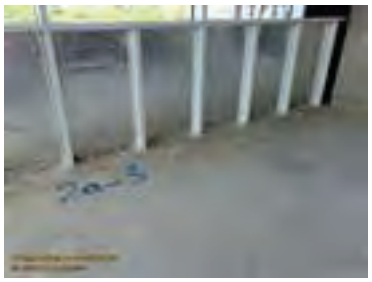


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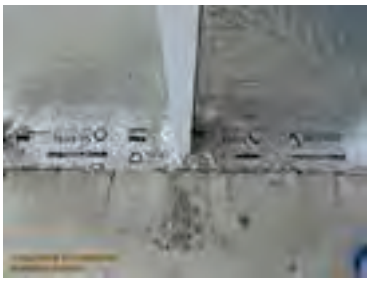
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21/05/2025 10:16:37



21/05/2025 10:16:43



21/05/2025 10:16:47



21/05/2025 10:16:53



21/05/2025 10:17:11



21/05/2025 10:17:22



21/05/2025 10:17:56

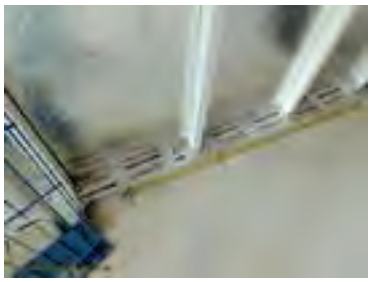


21/05/2025 10:18:11



21/05/2025 10:18:35

#3



21/05/2025 10:44:33



21/05/2025 10:44:39



21/05/2025 10:44:47

#4



29/05/2025 14:15:59

Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure	
All Evidence available & actions closed Supply Chain Partner	

Chris Ward (RED Systems Ltd)

16/09/2025 13:53:10

All Evidence available & actions closed Willmott Dixon	

Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:53:13

Date Closed	16/09/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast 11

Form Reference	F421609.259
Owned By	Abi Belfield (Willmott Dixon Construction)
Date	27/03/2025 10:23:28
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 11 P-L>South Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 11 P-L
Supply Chain	RED Systems Ltd
Area of Work/Location	mast 11 see bespoke items for all areas and locations checked

Document Name	Type	Created By	Date
south 1 firestop forms.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	08/07/2025 10:50:34

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	27/03/2025	27/03/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	gre bdp zz xx Dr a 21306 21307	ab	ab
2	Confirm Drawing	gre red xx xx Dr x 03118	ab	ab

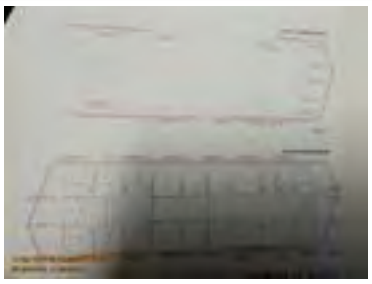
Images

#1



17/04/2025 14:01:49

#2



15/04/2025 12:58:45



15/04/2025 12:58:59

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes

Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes

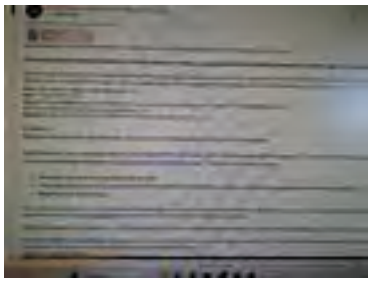
Images



17/04/2025 14:05:22

Agree the 3rd party inspection schedule with the external Fire Consultant	Yes

Images



17/04/2025 14:08:54

Comments	Created By	Date
21.03 side rise on site	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:09:06
ofr, building control and bruntwood fire consultant have checked. report on sharepoint	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:09:33

Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes

Images



15/04/2025 13:03:20



17/04/2025 14:12:31

Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes

Images



17/04/2025 14:13:48

Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes
Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes
Check installing SCP has been accredited and certified to install Cavity Barriers	Yes

Images



15/04/2025 13:02:12



15/04/2025 13:02:24



15/04/2025 13:02:30



15/04/2025 13:02:38



15/04/2025 13:02:49



17/04/2025 14:14:43

Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes

Comments	Created By	Date
see above	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:14:29

HOLD POINT 1 - Pre-start checks completed	





Abi Belfield (Willmott Dixon Construction)

17/04/2025 14:14:47

Anthony Bowen (RED Systems Ltd)

24/04/2025 07:27:13

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes

Comments	Created By	Date
ALL ITEMS CHECKED IN BESPOKE ITEMS	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:15:06

Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	





Abi Belfield (Willmott Dixon Construction)

24/04/2025 07:27:17

Anthony Bowen (RED Systems Ltd)

24/04/2025 07:28:58

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	N/A
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	Yes

Images



12/04/2025 10:27:48

Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes

Comments	Created By	Date
100mm panel installed into barrier	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:17:33

If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	N/A
Check barriers are tightly abutted at ends and corners	Yes

Images



12/04/2025 10:28:24

	Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	Yes

Images



12/04/2025 10:28:41

	Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	Yes

Images



12/04/2025 10:29:00



12/04/2025 10:29:10

	If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	N/A
	If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	N/A
	HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	

Abi Belfield (Willmott Dixon Construction)	Abi Belfield (Willmott Dixon Construction)	Anthony Bowen (RED Systems Ltd)
24/04/2025 07:27:37	24/04/2025 07:28:34	24/04/2025 07:28:47

Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable

	If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	N/A

	Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	N/A
	The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	N/A
	HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	



Anthony Bowen (RED Systems Ltd)

08/04/2025 11:29:13

Fire Consultant inspection		
	HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	



Anthony Bowen (RED Systems Ltd)

08/04/2025 11:29:35

Comments	Created By	Date
ofr checked 07.04.25	Anthony Bowen (RED Systems Ltd)	08/04/2025 11:29:46

	HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



Abi Belfield (Willmott Dixon Construction)

02/07/2025 14:45:45

Bespoke Items - Additional Hold Points/Additional Checks		
#	**Additional Hold Point**	**Additional check**
1	level 6 Roof slab barrier	
2	level 3	photos attached for mast 11. gridlines chalked on slab
3	level 4	
4	level 5	

Images

#2



12/04/2025 10:22:53



12/04/2025 10:23:48



12/04/2025 10:24:02



12/04/2025 10:24:15



12/04/2025 10:26:04



12/04/2025 10:26:14



12/04/2025 10:26:19



12/04/2025 10:26:28



12/04/2025 10:26:34



12/04/2025 10:26:45



12/04/2025 10:27:07



12/04/2025 10:27:15



12/04/2025 10:27:23



12/04/2025 10:27:28



12/04/2025 10:29:36



12/04/2025 10:29:45

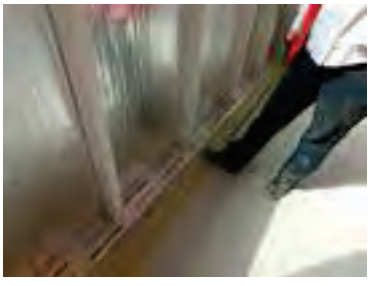


12/04/2025 10:29:54

#3







21/05/2025 11:01:09



21/05/2025 11:01:16



21/05/2025 11:01:22



21/05/2025 11:01:29



21/05/2025 11:01:35



21/05/2025 11:01:41

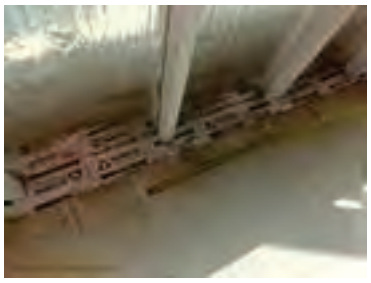
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21/05/2025 11:01:54

#4



21/05/2025 10:40:49



21/05/2025 10:40:54



21/05/2025 10:41:04



21/05/2025 10:41:10



21/05/2025 10:41:18



21/05/2025 10:41:29



21/05/2025 10:41:36



21/05/2025 10:41:49



21/05/2025 10:41:57

#	Document Name	Created By	Date	
1	IMG_9348.HEIC	Unknown	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:37:15
1	IMG_9348.MOV	Unknown	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:37:16
1	IMG_9349.MOV	Unknown	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:37:18

1	IMG_9348.HEIC	Unknown	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:38:03
1	IMG_9348.MOV	Unknown	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:38:04
1	IMG_9349.MOV	Unknown	Abi Belfield (Willmott Dixon Construction)	17/04/2025 14:38:06

Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure	
All Evidence available & actions closed Supply Chain Partner	

Anthony Bowen (RED Systems Ltd)

02/07/2025 14:45:34

All Evidence available & actions closed Willmott Dixon	



Abi Belfield (Willmott Dixon Construction)

02/07/2025 14:45:26

Date Closed	02/07/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast14

Form Reference	F421609.274
Owned By	Anthony Bowen (RED Systems Ltd)
Date	08/04/2025 11:18:18
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 14 GL 5a- CL>West Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 14 GL 5a- CL
Supply Chain	RED Systems Ltd
Area of Work/Location	mast14

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	08/04/2025	08/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	2400808 R02 MA23146 OFR FIRE STRATEGY	ab	ab
2	Confirm Drawing	GRE BDP ZZ XX DR A 22101	ab	ab

#	Document Name	Created By	Date	
1	240808-R02-MA23146-OFR_Stage_4_Strategy-DF-CIC.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:09:31
2	GRE-BDP-ZZ-XX-DR-A-21306 (12) acoustic barrier.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:09:44
2	GRE-BDP-ZZ-XX-DR-A-21307 (13).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:09:47
2	GRE-BDP-ZZ-XX-DR-A-22101 (2).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:09:48
2	Siderise-CW-Quick-Ref-Instructions-v2.05.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	23/04/2025 17:09:50

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes

Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes
Check installing SCP has been accredited and certified to install Cavity Barriers	Yes
Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes
HOLD POINT 1 - Pre-start checks completed	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:53:58

Chris Ward (RED Systems Ltd)
16/09/2025 13:54:03

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:54:09

Chris Ward (RED Systems Ltd)
16/09/2025 13:54:15

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	Yes
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	Yes
Check barriers are tightly abutted at ends and corners	Yes
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	Yes
Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	Yes

	If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	Yes
	If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	Yes
	HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:54:26

Chris Ward (RED Systems Ltd)
16/09/2025 13:54:43

	Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable	
	If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	Yes
	Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	Yes
	The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	Yes
	HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:54:49

	Fire Consultant inspection	
	HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:54:51

	HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



Abi Belfield (Willmott Dixon Construction)
16/09/2025 13:54:53

Bespoke Items - Additional Hold Points/Additional Checks

#	Additional Hold Point	Additional check
1	6	
2	5	
3	4	
4	3	

Images

#1



26/04/2025 10:28:38



26/04/2025 10:28:39



26/04/2025 10:28:39



26/04/2025 10:28:39



26/04/2025 10:28:39



26/04/2025 10:28:40



26/04/2025 10:28:40

#2



21/05/2025 10:23:11



21/05/2025 10:23:40



21/05/2025 10:23:44



21/05/2025 10:23:48



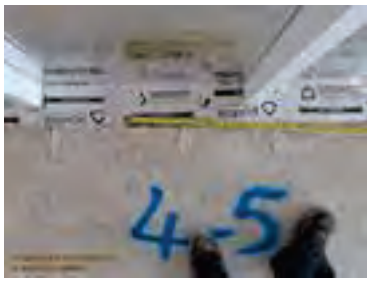
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21/05/2025 10:24:00



21/05/2025 10:24:13



21/05/2025 10:24:17

#3



21/05/2025 10:45:28



21/05/2025 10:45:33



21/05/2025 10:45:40



21/05/2025 10:45:48



21/05/2025 10:45:57



21/05/2025 10:46:11

#4



29/05/2025 14:15:09



29/05/2025 14:15:16

Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure	
All Evidence available & actions closed Supply Chain Partner	

Chris Ward (RED Systems Ltd)

16/09/2025 13:55:07

All Evidence available & actions closed Willmott Dixon	



Abi Belfield (Willmott Dixon Construction)

16/09/2025 13:55:00

Date Closed	16/09/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast 4

Form Reference	F421609.282
Owned By	Anthony Bowen (RED Systems Ltd)
Date	08/04/2025 11:24:43
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 4 GL G-B>North Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 4 GL G-B
Supply Chain	RED Systems Ltd
Area of Work/Location	mast 4

General

#	Work Section	Element	Date Planned	Date Accepted
1	External works	Fire Protection	08/04/2025	08/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	GRE-BDP-ZZ-XX-TX-A-02101	ab	ab
2	Confirm Drawing	GRE RED XX XX DR X 01120 - 0113	ab	ab

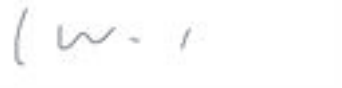
Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes
Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes
Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes
Check installing SCP has been accredited and certified to install Cavity Barriers	Yes

Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes
HOLD POINT 1 - Pre-start checks completed	



Abi Belfield (Willmott Dixon Construction)
09/07/2025 17:05:07

Chris Ward (RED Systems Ltd)
16/09/2025 13:48:26

Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	

Abi Belfield (Willmott Dixon Construction)
09/07/2025 17:05:10

Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	N/A
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	N/A
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	N/A
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	N/A
Check barriers are tightly abutted at ends and corners	N/A
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	N/A
Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	N/A
If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	N/A
If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	N/A

HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)
09/07/2025 17:05:23

Chris Ward (RED Systems Ltd)
16/09/2025 13:48:34

Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable	
If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	N/A
Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	N/A
The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	N/A
HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	



Abi Belfield (Willmott Dixon Construction)
09/07/2025 17:05:29

Chris Ward (RED Systems Ltd)
16/09/2025 13:48:42

Fire Consultant inspection	
HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	

Abi Belfield (Willmott Dixon Construction)
09/07/2025 17:05:39

HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



Chris Ward (RED Systems Ltd)
16/09/2025 13:48:50

Bespoke Items - Additional Hold Points/Additional Checks		
#	**Additional Hold Point**	**Additional check**
1	level 3	
2	level 4	
3	level 5	

Images

#1



12/04/2025 11:14:32



12/04/2025 11:14:32



12/04/2025 11:14:32



12/04/2025 11:14:32



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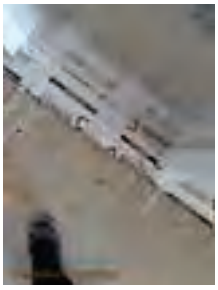
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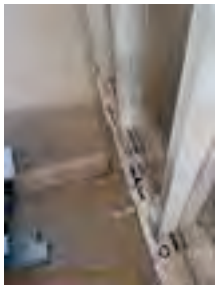



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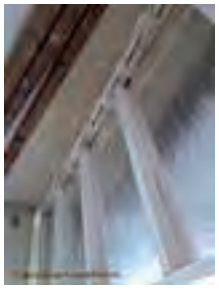

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#2


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#3





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Complete for Quality				
#	**Check Item**	**S/C Initial**	**WD Initial**	**Type of Evidence**
1	Works adequately protected			
2	Work area cleaned			

Closure	
All Evidence available & actions closed Supply Chain Partner	



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16/09/2025 13:48:55

All Evidence available & actions closed Willmott Dixon	



Chris Ward (RED Systems Ltd)

16/09/2025 13:49:01

Date Closed	16/09/2025
Approval to pay	

QD Checklist-P1-Cavity Barriers External

mast 3

Form Reference	F421609.280
Owned By	Anthony Bowen (RED Systems Ltd)
Date	08/04/2025 11:24:07
Status	Completed & Signed Off
Project Name	K00290 - Greenheys Building, Bruntwood
Location	Mast 3>North Elevation>Curtain Wall - REDs>Facades>QUALITY DELIVERY

Form Location	Mast 3
Supply Chain	RED Systems Ltd
Area of Work/Location	mast 3

General

#	Work Section	Element	Date Planned	Date Accepted
1	External elevation works	Windows & Curtain Walling	08/04/2025	08/04/2025

Prepare and Plan

#	Check Item	No & Revision	S/C Initial	WD Initial
1	Confirm Specification	GRE-BDP-ZZ-XX-TX-A-02101	ab	ab
2	Confirm Drawing	GRE RED XX XX DR X 01120 - 01132	ab	ab

#	Document Name	Created By	Date	
2	GRE-BDP-ZZ-XX-DR-A-21306 (12) acoustic barrier.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	24/04/2025 07:18:47
2	GRE-BDP-ZZ-XX-DR-A-21307 (13).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	24/04/2025 07:18:48
2	GRE-BDP-ZZ-XX-DR-A-22101 (2).pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	24/04/2025 07:18:50
2	Siderise-CW-Quick-Ref-Instructions-v2.05.pdf	Pdf	Abi Belfield (Willmott Dixon Construction)	24/04/2025 07:18:52

Apply & Control

Note - This QD Checklist relates to external fire/cavity barriers only. Please refer to the QD checklist - Building Envelope - Cavity barrier Internal for any cavity barriers work elements located within the building (above ceilings, below floors etc)

Pre-start checks

Check SCP & WD site management have a thorough understanding of the projects external envelope	Yes
Agree the QD checklist regime/frequency is relevant to the type of façade being installed (i.e. brickwork by lift)	Yes
Does Fire Safety Strategy and/or façade details specify location type & manufacturer of all cavity barriers (horizontal, vertical & to perimeter of openings)	Yes
Has the Fire Consultant reviewed façade design/specification to confirm compliance, including the review of products?	Yes
Agree the 3rd party inspection schedule with the external Fire Consultant	Yes
Check cavity barrier has been tested & certified by UKAS accredited testing authority for the situation that they are being installed	Yes
Check barrier type is suitable for its location - vertical, horizontal or party wall types, as applicable to Fire strategy/Architect's details	Yes
Check product manual & installation instructions are available & have been understood by the SCP/operatives/WD site team	Yes
Check proposed/designed cavity void dimensions & ensure correct width/thickness of barrier delivered to suit compression/friction fit required by manufacture	Yes
Check to establish if there are any differing installation/orientation requirements between horizontal & vertical cavity barriers (i.e. open or closed state)	Yes
Check all openings & interfacing elements are within positional, verticality, alignment tolerances & ready for installation of fire barriers	Yes

Is the proposed line of cavity barrier installation clear of any obstructions such as balcony connections, secondary steelwork, duct penetrations or scaffold ties etc…	Yes
Check cavity barrier materials, brackets-length & gauge of steel, non-combustible fixings, joint tape are available & all relate correctly to manufacturer's requirements	Yes
Check installing SCP has been accredited and certified to install Cavity Barriers	Yes
Check SCP's SSS supervisor has required competency, as dictated by Willmott Dixon Fire Safety Requirements Policy. Same person being authorised signatory on this checklist	Yes
Check operative installation training has been conducted in accordance with requirements of Willmott Dixon Fire Safety Requirements Policy	Yes
HOLD POINT 1 - Pre-start checks completed	




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Installation of Brackets (as applicable) to all locations, including window and door openings	
Fix cavity barrier brackets to inner wall (sheathing boards, internal blockwork etc.) with suitable fixings specified by manufacturer & as per Willmott Dixon Fixings & Anchors Policy	Yes
Install brackets for horizontal cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Install brackets for vertical cavity barriers at correct centres, noting setting out requirements from each end of barriers (barriers are typically 1200mm long)	Yes
Check the bracket is of the correct type (size/gauge) to suit to the specified cavity/void width	Yes
Check bracket is correct length to ensure it can be impaled into the barrier by specified amount. This is typically impaled by 75% of barrier width	Yes
HOLD POINT 2 - Installation of Brackets complete	




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Installation of vertical / horizontal cavity barriers to all locations, including window and door openings	
Where polythene sleeved cavity barriers are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
Where friction fit cavity barrier slabs are installed, check they are tightly fitted (i.e. no gaps between outer and inner wall constructions)	Yes
Where compression fit cavity barrier slabs are installed, ensure compression is as per manufacturers recommendations (e.g. 10% or 10mm)	Yes
If applicable, check site cut cavity barrier slabs when installed against masonry have a DPC/Cavity Tray to the external leaf side	Yes
Check barriers are tightly abutted at ends and corners	Yes
Check all joints are sealed with foil tape or other as specified by cavity barrier manufacturer & as applicable	Yes
Check where brackets fully penetrate barrier they extend beyond its front face & are folded back by the specified amounts	Yes

	If cavity barrier is an "Open State type" (ventilated cavity) check intumescent strip is positioned outwards, towards cladding and the right way up	Yes
	If cavity barrier is an "Open State type", check the specified gap has been achieved between the cladding and barrier	Yes
	HOLD POINT 3 - Installation complete - proprietary fire rated cavity barriers to all locations, including perimeter of all window & door openings, fitted in accordance with manufacturer's guidance	



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Chris Ward (RED Systems Ltd)

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	Installation of fire rated cavity closers to window and door openings, with masonry outer skin, as applicable	
	If using "1st fix option" i.e built into opening as work proceeds, check supplied wall ties fixed as dictated by manufacture	Yes
	Check cavity closer completely closes the cavity (at cills, jambs & head) & is tight fitted between inner & outer wall constructions or jointed sections. Any cavity insulation must be cut back	Yes
	The PVC up-stand should be fitted against the external leaf to deflect any moisture penetration through the brick	Yes
	HOLD POINT 4 - Installation complete - proprietary fire rated cavity closers to the perimeter of all window & door openings fitted in accordance with manufacturer's guidance	



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	Fire Consultant inspection	
	HOLD POINT 5 - Final checks before proceeding to next lift or floor level, as applicable. Include details of Fire Consultant inspection - see under evidence for details.	



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	HOLD POINT 6 - Confirm any remedial works identified by Fire Consultants' cavity barrier inspection have been recorded, completed & verified as complete. Void closure now authorised	



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16/09/2025 13:51:23

Bespoke Items - Additional Hold Points/Additional Checks

#	Additional Hold Point	Additional check
1	level 3	
2	Level 6 mast 3	
3	level 4	
4	level 5	

Images

#1



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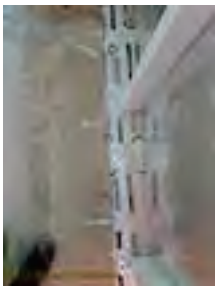
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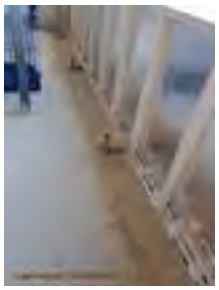
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