26 September 2019

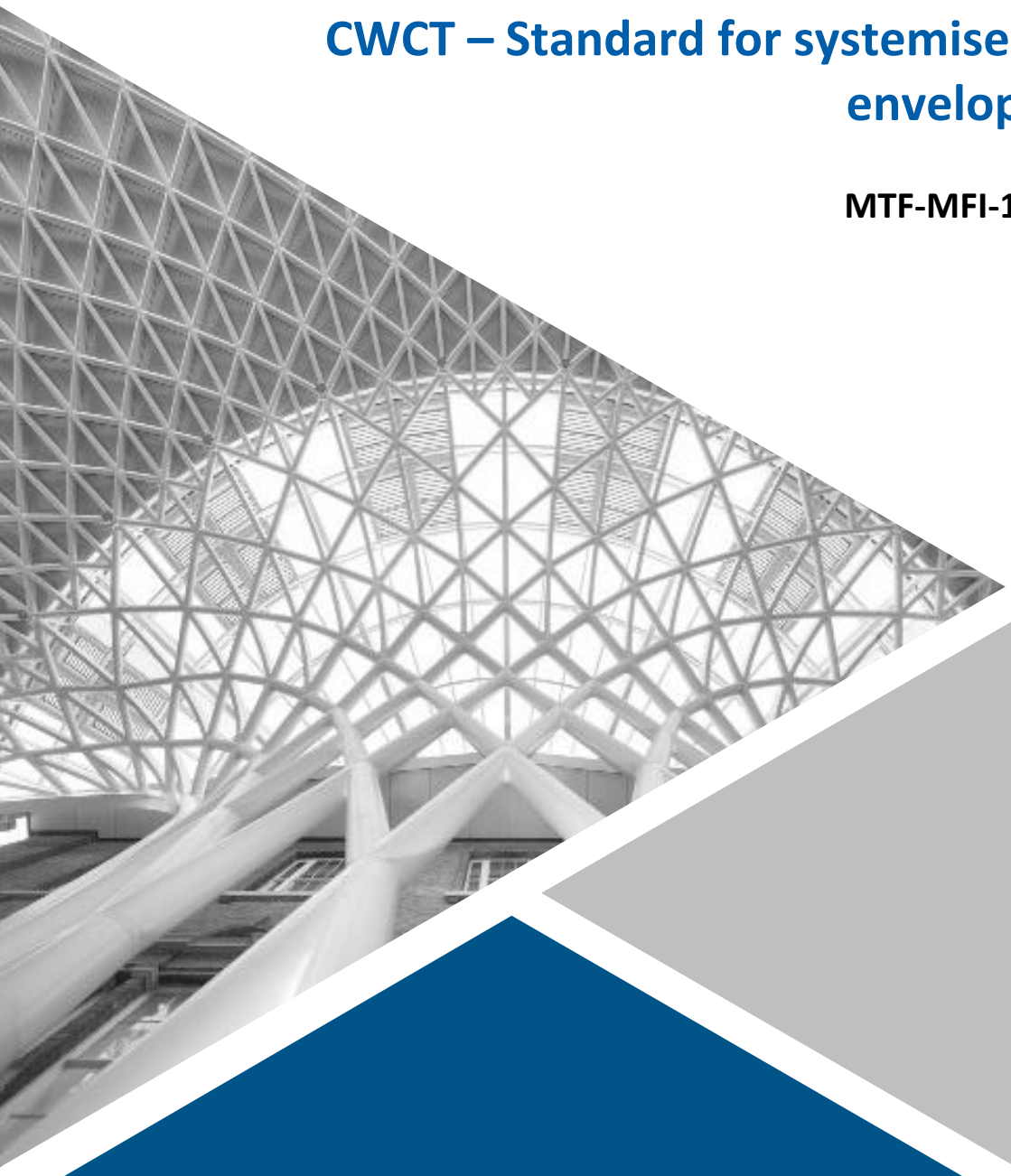
WINTECH
TESTING & CERTIFICATION
by UL

UKAS TESTING
2223

Technical Report – R19481 - Rev 1
CWCT – Standard for systemised building envelopes – 2005

Hilti GB

MTF-MFI-1L Rail System



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Contents

Rev 1 – this report has been amended as shown in Section 3 and it replaces previous report number R19481 dated 28th August 2019

1. Introduction

This report describes tests carried in order to determine the weather tightness of the sample with respect to water penetration, wind and impact resistance on sample supplied as follow:

Test Details	
Customer:	Hilti GB 1 Trafford Wharf Road Trafford Park Manchester M17 1BY
Product Tested:	MTF-MFI-1L Rail System
Date of Test:	8th March 2019 9th August 2019
Test Conducted at:	Wintech Engineering Limited Halesfield 2 Telford Shropshire TF7 4QH
Test Conducted by:	R Cadwallader- Test Engineer K Alden- Test Technician/Fabrication Support D Reynolds – Senior Test Engineer J Dove – Laboratory Apprentice
Test Supervised by:	M Cox – Engineering Leader
Test Witnessed by:	A Keiller – CWCT M Arreghini – Hilti GB

Report Authorisation	
Report Compiled by:	D Price – Senior Test Engineer
Authorised by:	M Wass – Technical Manager

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

2. Summary of Results

2.1 The test methods

The test methods were in accordance with the following standards:

CWCT Standard Test Methods for Building Envelopes - December 2005	
Wind Resistance – Serviceability	CWCT Section 11
Wind Resistance – Safety	CWCT Section 12
Impact – Retention to Performance & Safety to Persons	CWCT TN 76

2.2 Summary of Results

The following summarises the results of testing carried out, in accordance with the relevant testing and classification standards.

The performance of the sample tested has been assessed against the criteria described in below standards. The results as reported will be used to determine the conformance or non-conformance with the specification without making any consideration of the uncertainty.

Test Type	Peak Test Pressure	Result	Date of Test
Test 1 – Wind Resistance (Serviceability) – Backing Wall	1800 Pa	Pass	09.07.19
Test 2 – Wind Resistance (Serviceability) – Cavity	1800 Pa	Pass	09.07.19
Test 3 - Wind Resistance – Safety – Backing Wall	2700 Pa	Pass	09.07.19
Test 4 - Wind Resistance – Safety – Cavity	2700 Pa	Pass	09.07.19
Test 5 - Impact Resistance – Retention of Performance	Cat B	Class 1	08.03.19
Test 6 - Impact Resistance – Safety to Persons	Cat B	Neg Risk	08.03.19
Dismantle, Inspect & Report	**Sample Passed**		

Note: During the above test sequence, deflections were recorded on the vertical support rails and fixing brackets only as per the requirements of Hilti GB. The panels were installed to allow the required loads to be applied to the support rails system during the test.

More comprehensive details are reported in Section 6.

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

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

3. Description of Test Sample

The description of the test sample in this section has been supplied by the customer and has not been verified by Wintech Engineering Limited.

See Section 7 for test sample drawings as supplied by Hilti GB.

Product Description

Full product name:	MFT-MFI-1L
Product type:	Ventilated façade substructure
Product description:	L shaped brackets fixed to the structural wall + vertical L- and T-Profiles which are fixed with self-drilling screws to the brackets. Rainscreen panels are fixed to the vertical rails.
Manufactured by:	EUROFOX GmbH

Support Framing and bracketry

Material:	Aluminium
Finish:	EN AW 6063 T66
Vertical rail Ref:	MFT-L / MFT-T
Fixing method (rail to backing wall):	S-MD 53 S
Fixing Ref:	S-AD 01 S
Max Span between vertical rails:	600mm
Brackets ref:	MFT-MFI

Panels/tiles

Material:	Aluminium composite
Material ref (source, spec):	Alucobond A2: The panels comprise two 0.5 mm thick aluminium alloy (EN AW-5005[Al Mg1 (B)]/H22 to BS EN 485-2: 2004) sheets, bonded to either side of a 3 mm thick mineral core
Thickness:	4 mm
Max panel height tested:	1500 mm
Max width of panel:	3000 mm
Max size of panel by area (m2):	3,88 m²
Fixing method:	Rivets
Screws/fixings ref:	Ø 5mm K11, K14 or K16

Backing Wall

Structural support type:	SFS
Insulation type:	Mineralwool
Insulation thickness:	100mm
Airtight membrane:	Dupont Tyvek Housewrap
Particle board detail:	Cement boards 12,5mm
Sealants and tapes:	Dupont Tyvek the Original / Isover Varion Multi Tape SL

Drawings

Drawing/s must be provides covering the below; -Full drawing of sample including front elevation -Cross Sections (Panels/Rails Etc.) -Hardware Locations -Fixings -Drainage Points Note: drawings are required to show all relevant dimensions.	Drawings attached
Test sample size:	5.0m wide x 6.0m high

Confirmation

Please confirm that the samples provided for testing are representative of standard production?	I confirm

Sample during testing

Photograph No. 1

Photograph No. 2

4. Test Arrangement

4.1 Test Chamber

A 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 Deflection

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

4.2.3 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.

4.2.4 Barometric Pressure

A digital barometer capable of measuring barometric pressure with an accuracy of ± 1 kPa was used.

4.2.5 General

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

4.3 Pressure Generation

4.3.1 Static Air Pressure

The air supply system comprised of a centrifugal fan assembly and associated ducting and control valves and was 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.

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.

4.4 Impactors

4.4.1 Soft (S1) Body Impactor

A spherical/conical, glass bead filled impactor with a mass of 50 Kg, as required in CWCT TN76

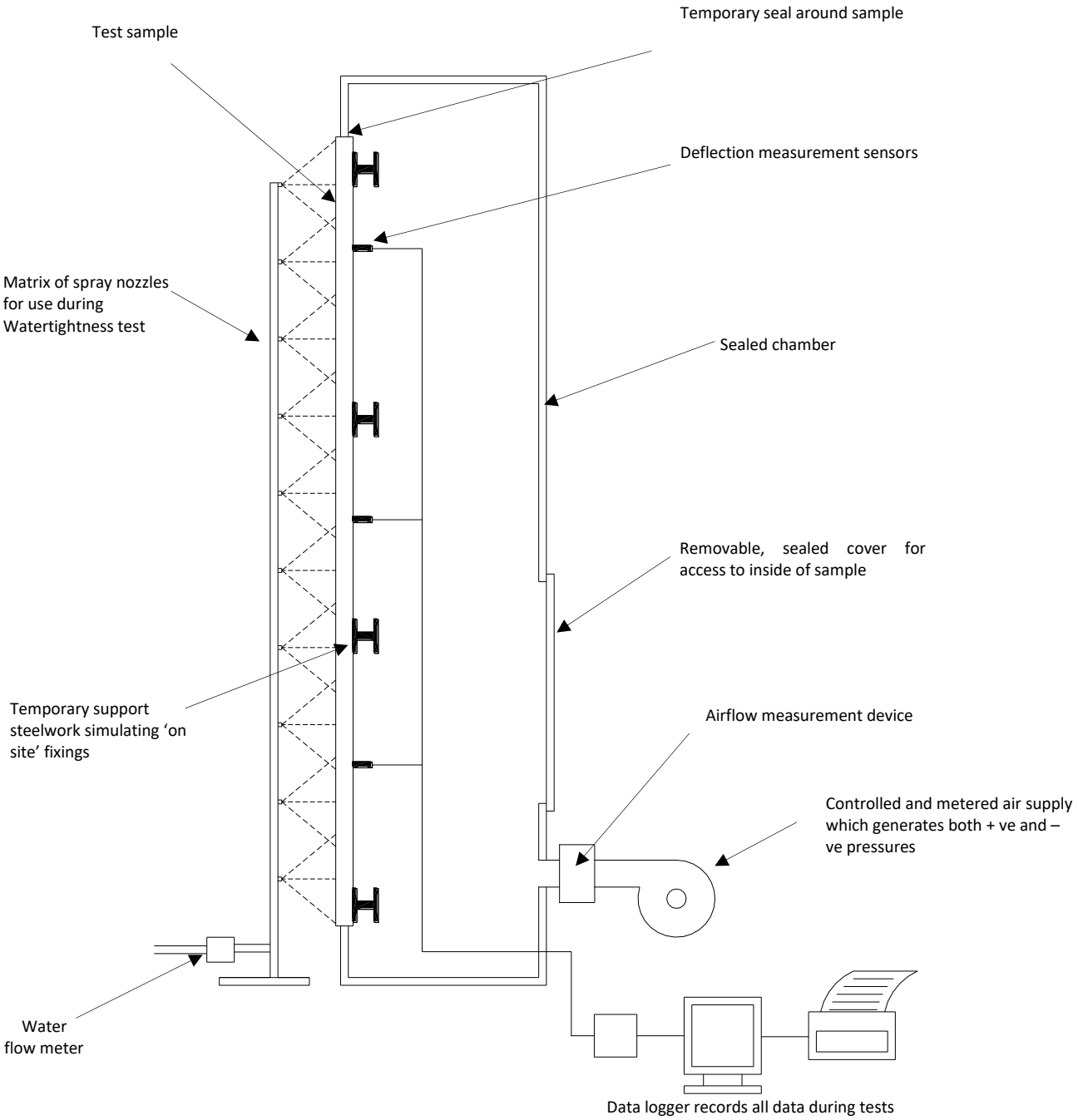
4.4.2 Hard (H2) Body Impactor

A steel ball with a diameter of 62.5 mm and a mass of 1.135 Kg, was released from the height, calculated to result in the required impact energies and allowed to fall under gravity until it impacted the designated test zone of the sample.

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

Figure 1 – Test arrangement

General Arrangement of a Typical Test Assembly



5. Test Procedures

5.1 Sequence of Testing

Test 1 – Wind Resistance - Serviceability – Backing Wall
Test 2 – Wind Resistance - Serviceability - Cavity
Test 3 – Wind Resistance – Safety – Backing Wall
Test 4 – Wind Resistance – Safety – Cavity
Test 5 – Impact Resistance – Retention of Performance
Test 6 – Impact Resistance - Safety to Persons

5.2 Wind Resistance

5.2.1 Wind Resistance - Serviceability

Three (3) preparatory pulses of 900 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. All deflection sensors were then zeroed.

The sample was then subjected to positive pressure stages of 450, 900, 1350 and 1800 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 preparation pulses, at a negative pressure differential.

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

5.2.2 Wind Resistance - Safety

Three preparatory positive air pressure pulses of 900 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 2700 Pa (1800 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 preparation pulses, at a negative pressure differential. 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.

5.3 Impact Resistance

5.3.1 Impact Test Procedure – Retention of performance – CWCT TN 76

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

The Impactors, as described in section 4.4.1 and 4.4.2, were suspended on a wire/Nylon cord and allowed to swing freely, without initial velocity, in a pendulum motion until they hit the sample normal to its face. Only one impact was performed at any single position during the hard body impacting and three times at each position during the soft body impacting.

Tests were conducted at the required impact energies as shown in section 6.2.1 and 6.2.2 to the selected impact points.

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

5.3.2 Impact Test Procedure – Safety to persons – CWCT TN 76

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

The Impactors, as described in section 4.4.1 and 4.4.2 were suspended on a wire/Nylon cord and allowed to swing freely, without initial velocity, in a pendulum motion until they hit the sample normal to its face. Only one impact was performed at any single position.

Tests were conducted at the required impact energies as shown in section 6.2.3 and 6.2.4 to the selected impact points and the impactors were not allowed to strike the sample more than once.

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

6. Test Results

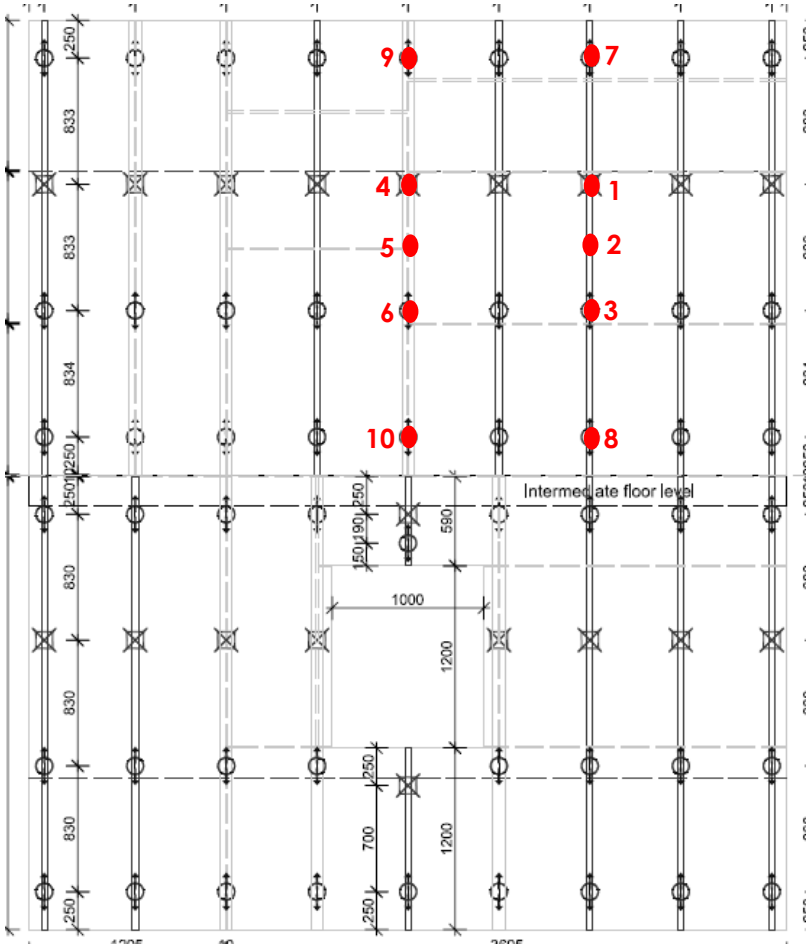
6.1 Wind Resistance

Probe Group Identification	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 C comprised of probes 7, 2 & 8	= Probe 2 – ((Probe 7 + Probe 8)/2)
Group D comprised of probes 9, 5 & 10	= Probe 5 – ((Probe 9 + Probe 10)/2)

An inspection carried out following tests 1, 2, 3 and 4, after both positive and negative pressure testing, showed no evidence of any permanent deformation or damage to the test sample.

Figure 2

Positions of Deflection Measurement Probes



View from Outside
Not to Scale

- Deflection probe position

6.1.1 Tests 1 & 2 - Wind Resistance, Serviceability

Temperatures (°C)	Ambient	19.2

Measured Length of Framing Member (mm)		Allowable Deflection	
		Ratio	Calculated (mm)
Group A	835	L/200	4.2
Group B	835	L/200	4.2
Group C	2500	L/200	12.5
Group D	2510	L/200	12.6

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

6.1.1.1 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
450	0.0	0.1	0.0	0.1
900	0.1	0.1	0.1	0.0
1350	0.2	0.3	0.2	0.2
1800	0.3	0.4	0.3	0.2
Residuals Immediately following test	0.0	0.1	0.1	0.2

6.1.1.2 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
450	0.1	0.0	0.1	0.0
900	0.2	0.1	0.2	0.0
1350	0.4	0.2	0.4	0.1
1800	0.6	0.2	0.7	0.1
Residuals Immediately following test	0.1	0.0	0.1	0.1

6.1.2 Tests 3 & 4 - Wind Resistance, Safety

Temperatures (°C)	Ambient	25.0

Measured Length of Framing Member (mm)		Allowable Residual Deformation	
		Ratio	Calculated (mm)
Group A	835	L/500	1.7
Group B	835	L/500	1.7
Group C	2500	L/500	5.0
Group D	2510	L/500	5.0

6.1.2.1 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
2700	0.6	0.5	0.5	0.1
Residuals Immediately following test	0.1	0.1	0.1	0.1

6.1.2.2 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
2700	1.1	0.3	1.1	0.3
Residuals Immediately following test	0.0	0.1	0.0	0.1

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

6.2 Impacting

6.2.1 Test 5 – Impact – Retention of performance (Soft Body S1)

Ambient Temperatures (°C)	6.4
Humidity (%RH)	72.0

Impact Energy	120 Nm
Class Achieved	Class 1

Photograph No. 3

Showing Soft Body (S1) impact of 120Nm.

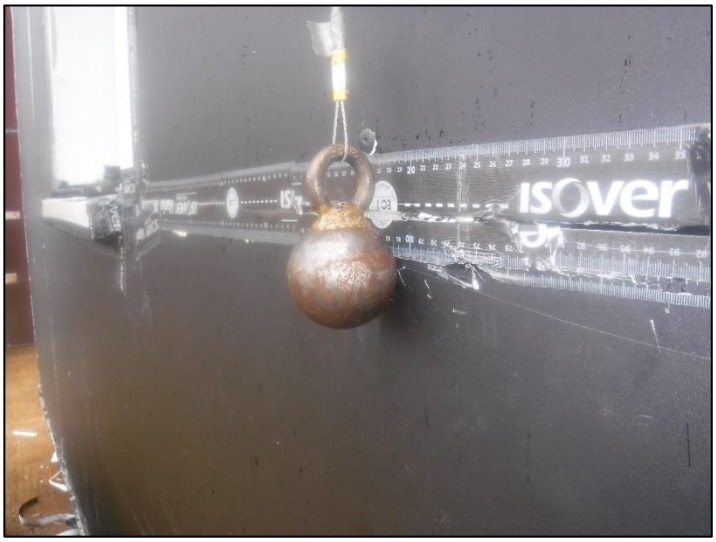
During the above test, no damage was observed.

6.2.2 Test 5 – Impact – Retention of performance (Hard Body H2)

Ambient Temperatures (°C)	6.4
Humidity (%RH)	72.0

Impact Energy	10 Nm
Class Achieved	Class 1

Photograph No. 4



Showing Hard Body (H2) impact of 10 Nm.

During the above test, no damage was observed.

6.2.3 Test 6 - Impact – Safety to Persons (Soft Body S1)

Ambient Temperatures (°C)	6.4
Humidity (%RH)	72.0

Impact Energy	500 Nm
Risk Category	Negligible Risk

Photograph No. 5

Showing Soft Body (S1) impact of 500 Nm.

Photograph No. 6

Showing damage caused following Soft Body (S1) impact of 500 Nm.

Photograph No. 7

Showing damage caused following Soft Body (S1) impact of 500 Nm.

Photograph No.8

Showing damage caused following Soft Body (S1) impact of 500 Nm.

6.2.4 Test 6 – Impact – Safety to Persons (Hard Body H2)

Ambient Temperatures (°C)	6.4
Humidity (%RH)	72.0

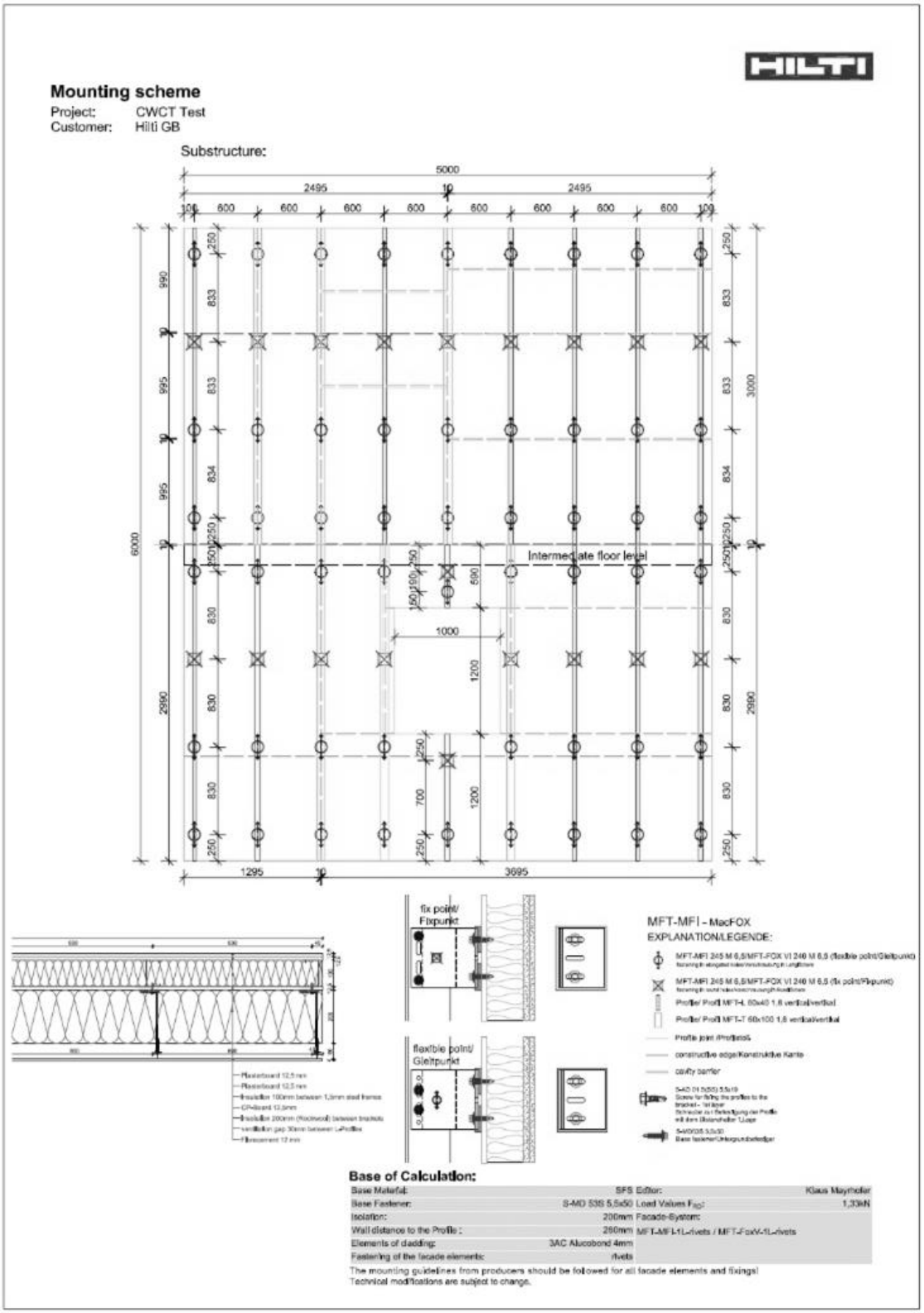
Impact Energy	10 Nm
Risk Category	Negligible Risk

Photograph No. 9

Showing Hard Body (H2) impact of 10 Nm.

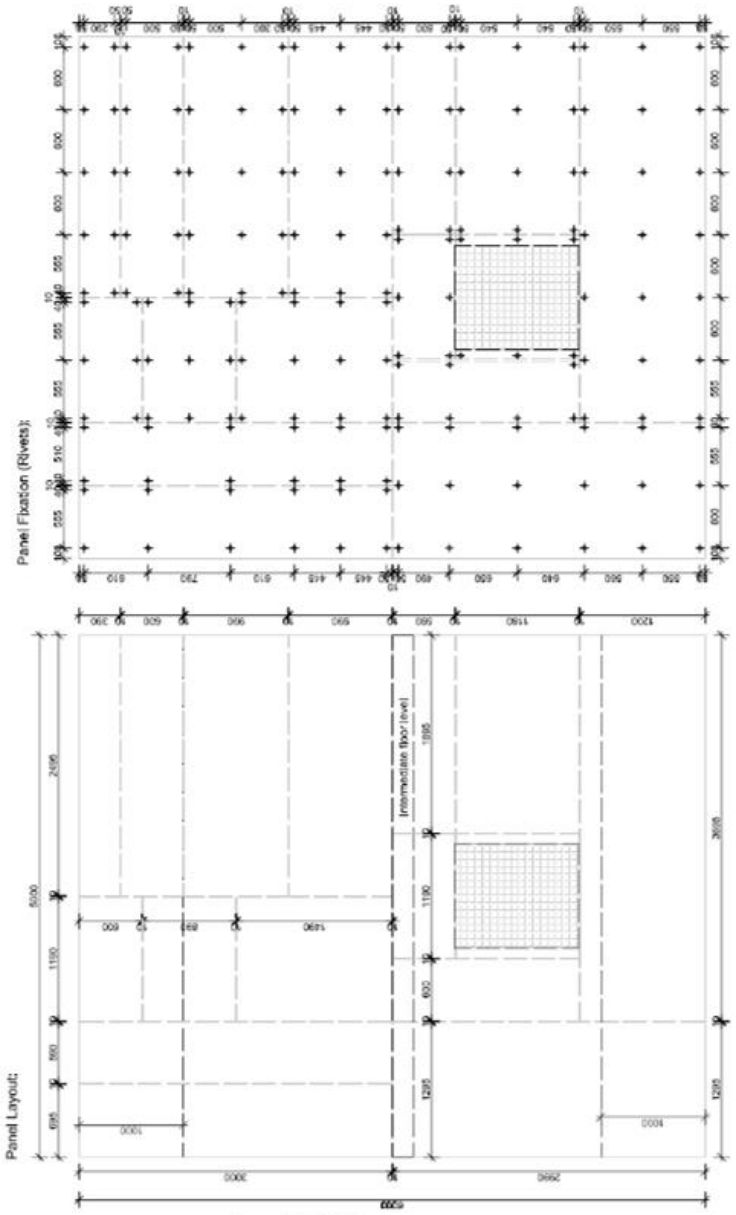
During the above test, no damage was observed.

7. System Drawings



Mounting scheme

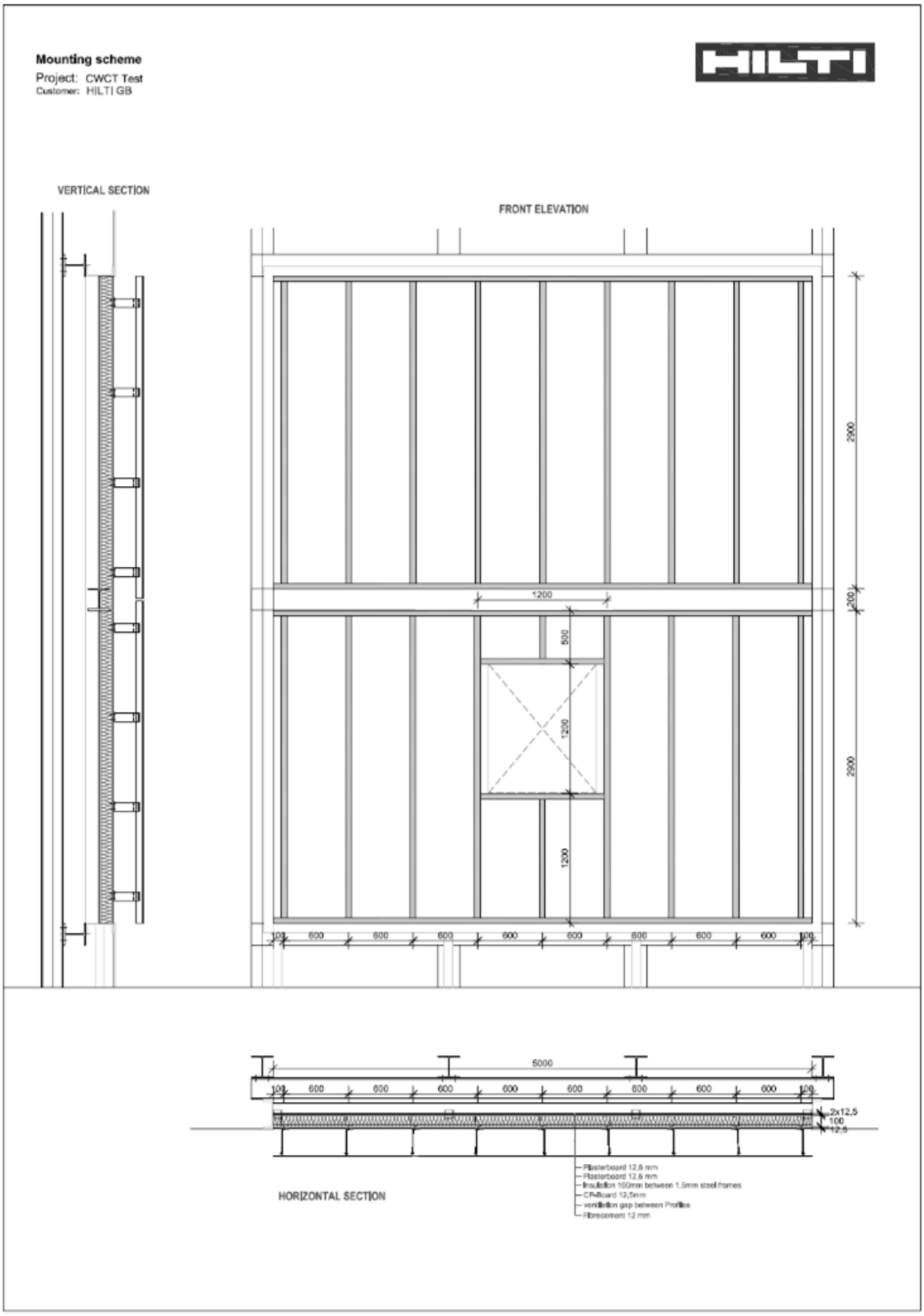
Project: CWCT Test
Customer: Hilti GB

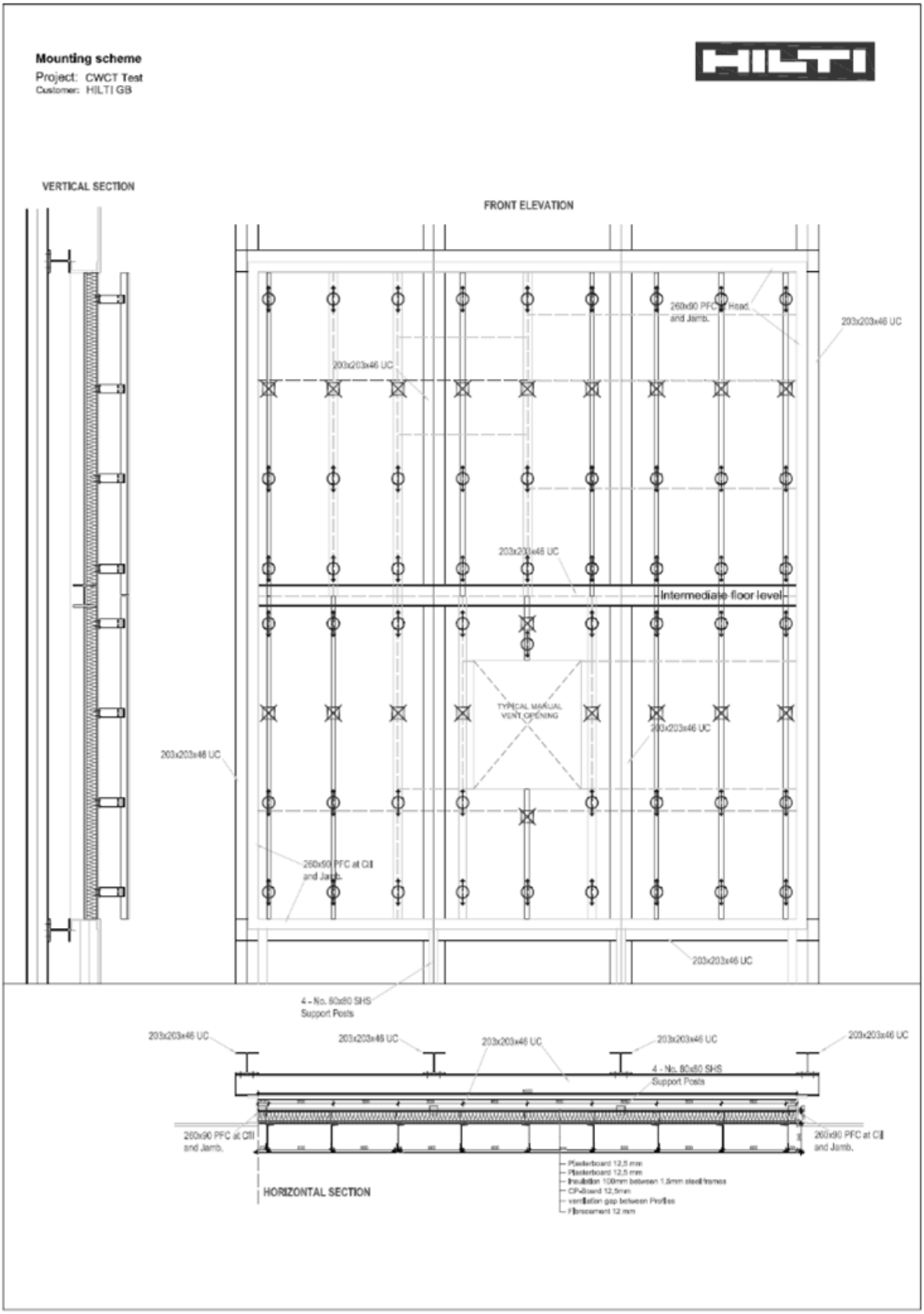


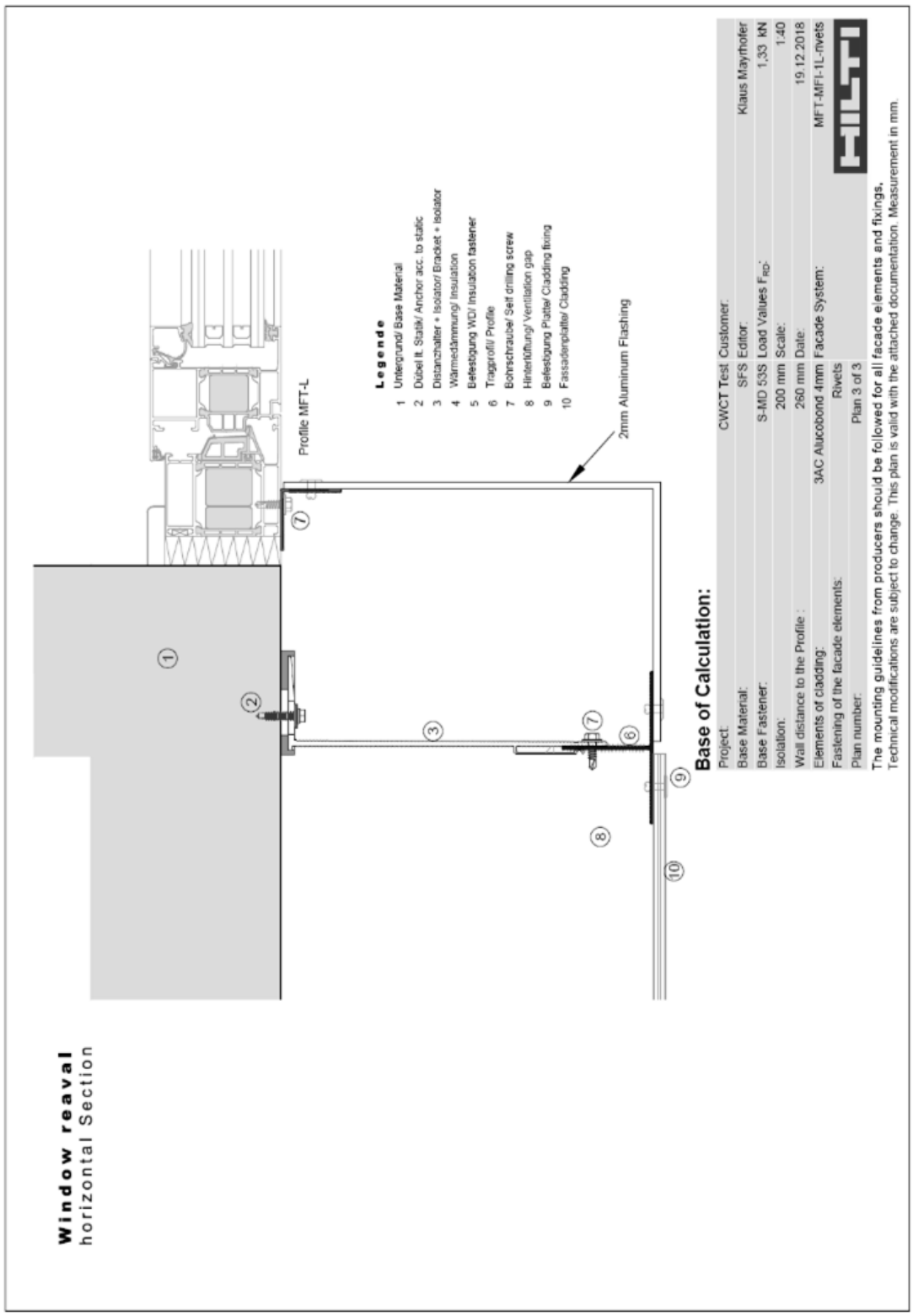
Base of Calculation:

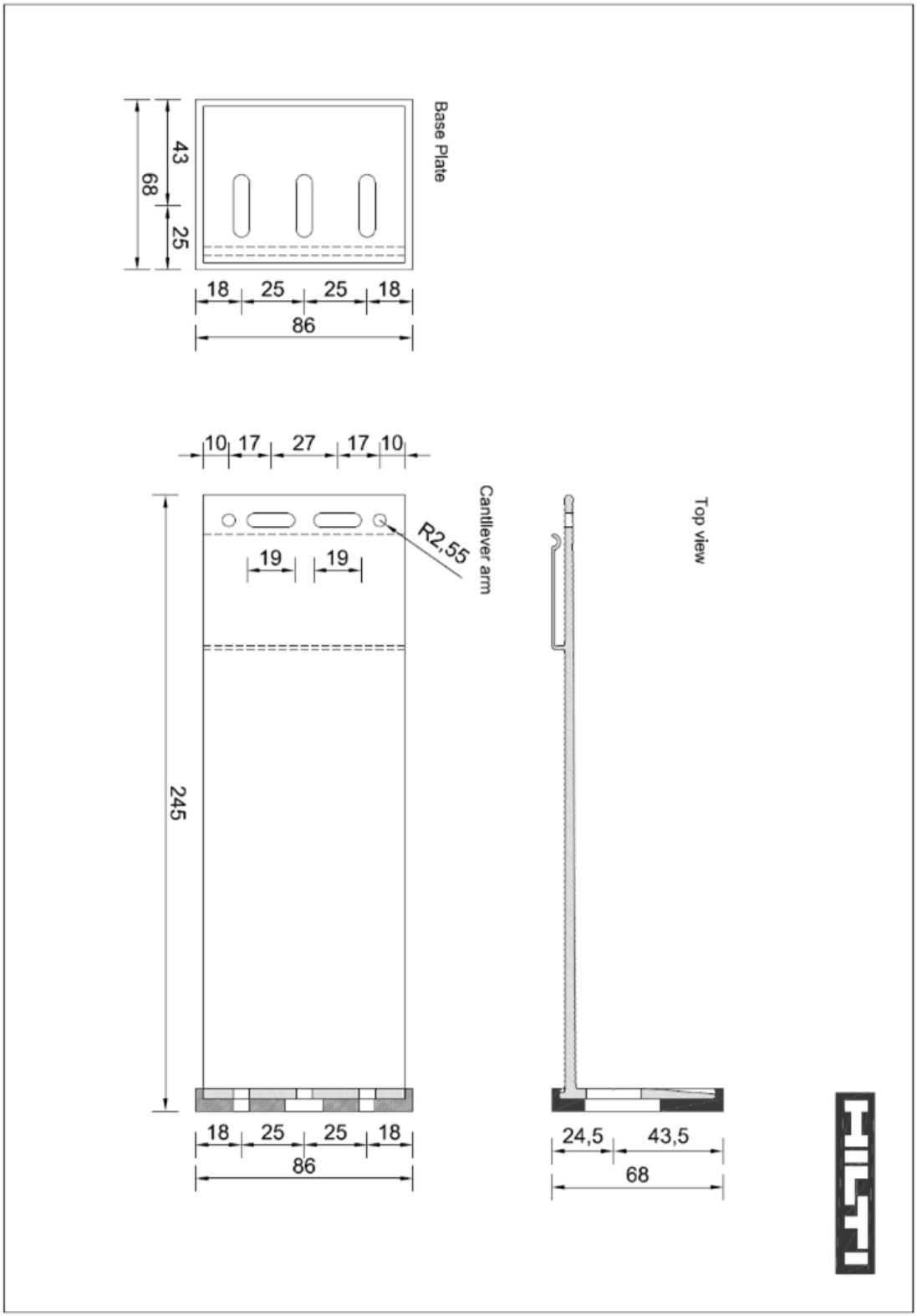
Base Material:		SFS Editor:	Klaus Mayrhofer
Base Fastener:	S-MD S3S 5.5x50	Load Values F_{RD}:	1,33kN
Isolation:	200mm	Facade-System:	
Wall distance to the Profile:	250mm	MFT-MFI-1L-rivets / MFT-FoxW-1L-rivets	
Elements of cladding:	3AC Alucobond 4mm		
Fastening of the facade elements:	rivets		

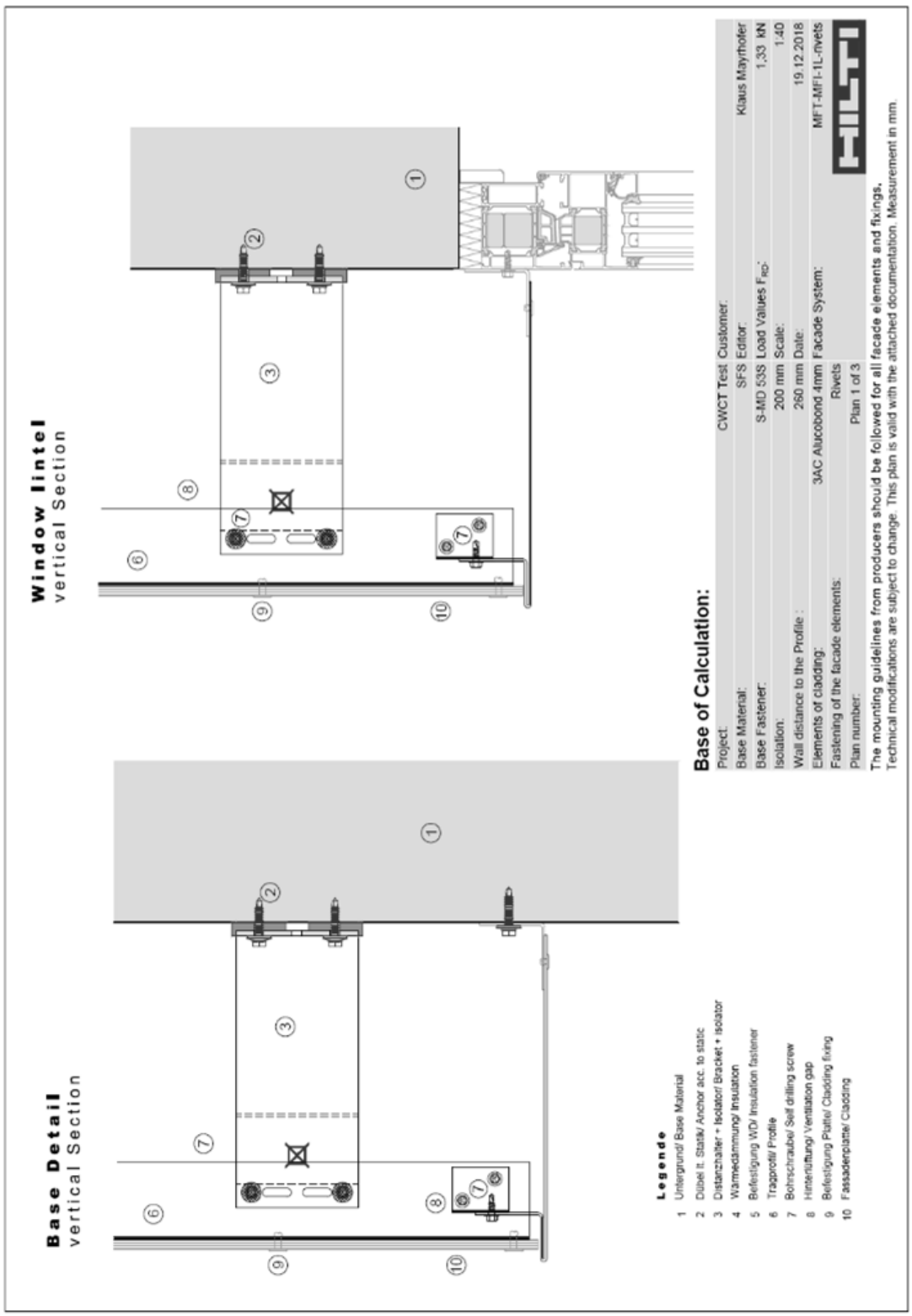
The mounting guidelines from producers should be followed for all facade elements and fixings!
Technical modifications are subject to change.

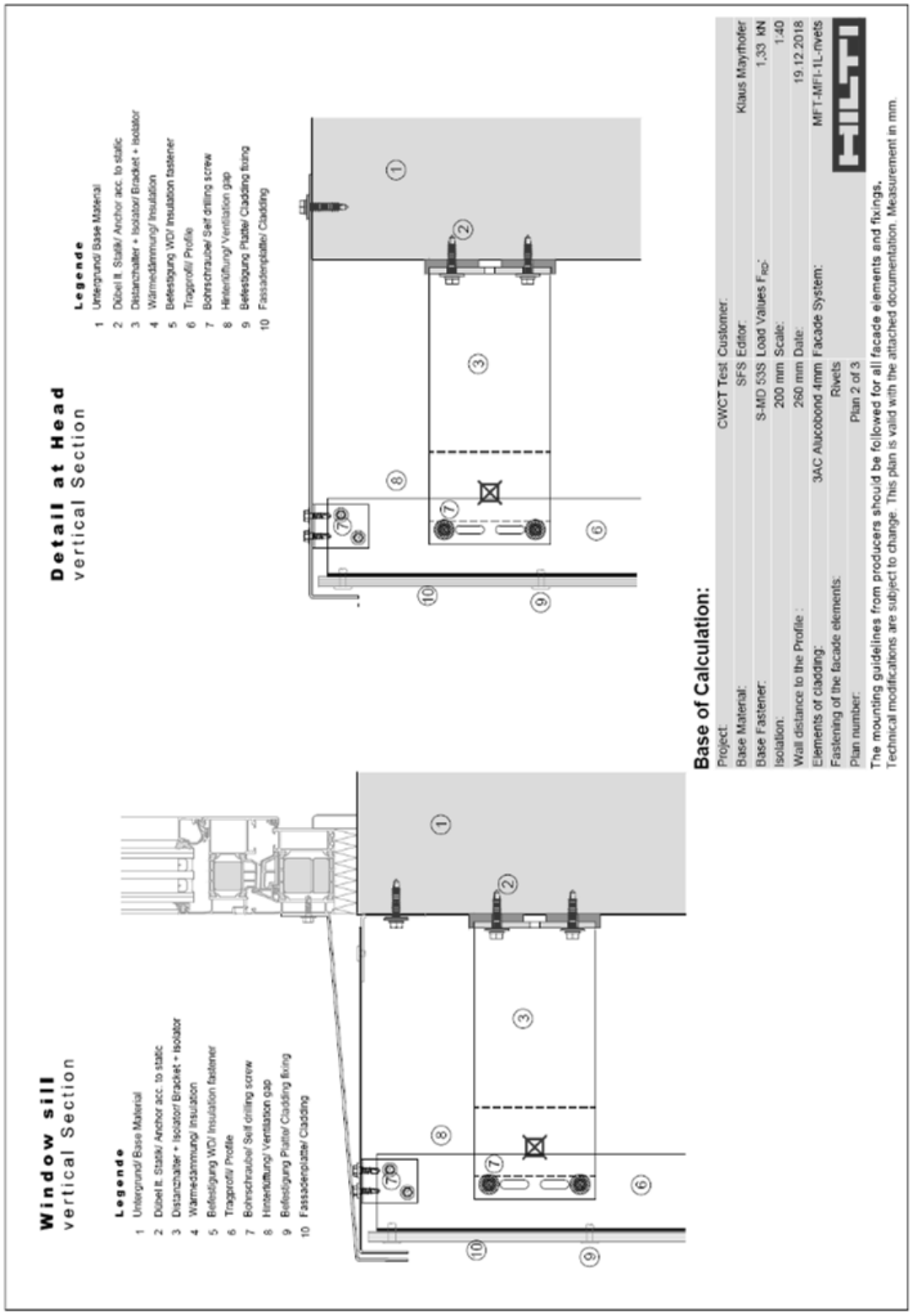

Mounting scheme
Project: CWCT Test
Customer: HILTI GB
VERTICAL SECTION
FRONT ELEVATION
1200
500
1200
1200
2000
200
2000
100
600
600
600
600
600
600
600
600
100
5000
100
600
600
600
600
600
600
600
600
100
2x12,5
100
12,5
HORIZONTAL SECTION
Plasterboard 12,5 mm
Plasterboard 12,5 mm
Insulation 100mm between 1,5mm steel frames
CP-Board 12,5mm
ventilation gap between Profiles
Fibrecement 12 mm


Mounting scheme
Project: CWCT Test
Customer: HILTI GB
VERTICAL SECTION
FRONT ELEVATION
260x90 PFC Head and Jamb.
203x203x46 UC
Intermediate floor level
TYPICAL MANUAL VENT OPENING
260x90 PFC at Cill and Jamb.
4 - No. 80x80 SHS Support Posts
HORIZONTAL SECTION
Plasterboard 12.5 mm
Plasterboard 12.5 mm
Insulation 100mm between 1.5mm steel frames
CP-Board 12.5mm
ventilation gap between Profiles
Fibrecement 12 mm

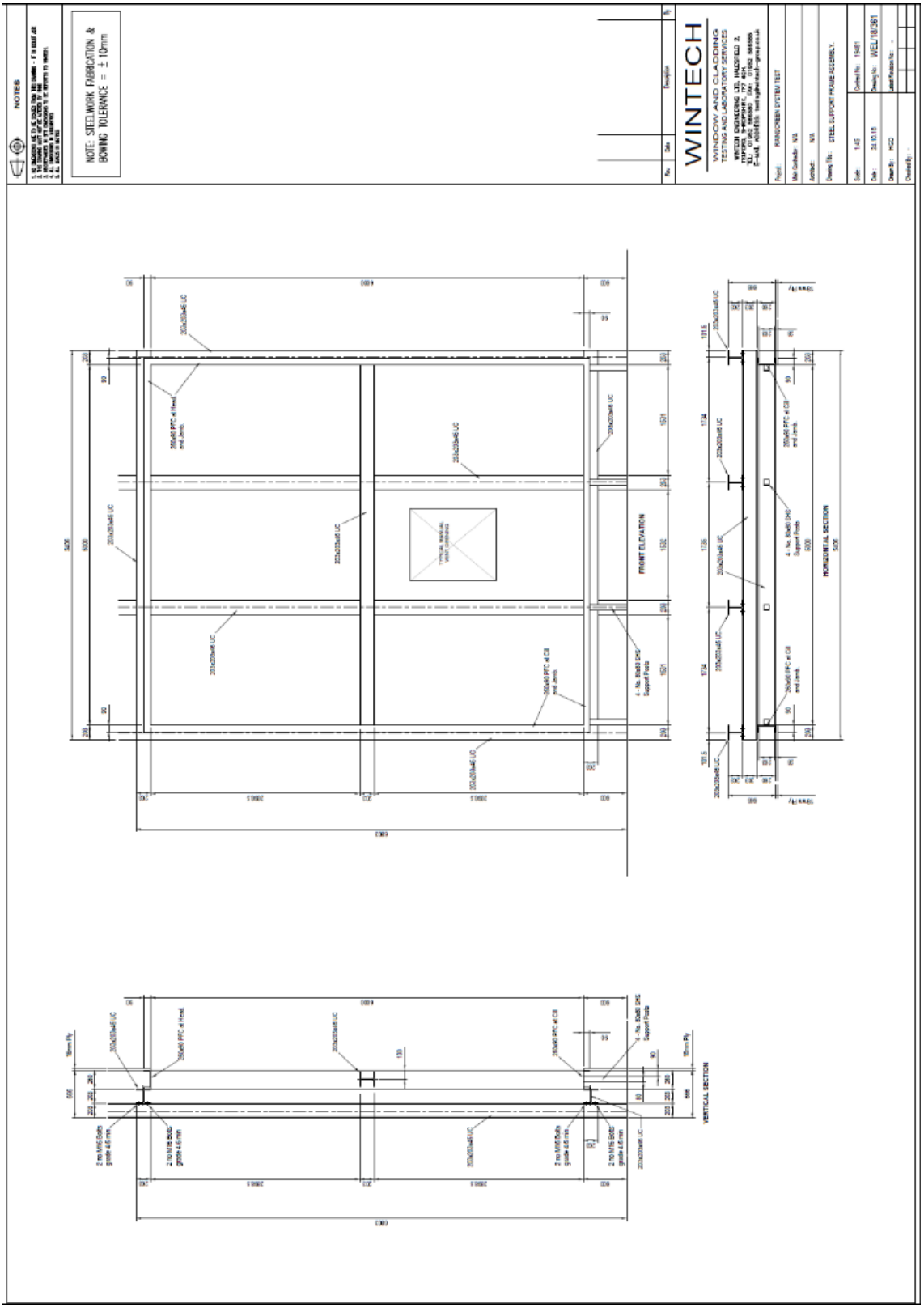

Profile MFT-L
2mm Aluminium Flashing
Legende
1 Untergrund/ Base Material
2 Dübel lt. Statik/ Anchor acc. to static
3 Distanzhalter + Isolator/ Bracket + Isolator
4 Wärmedämmung/ Insulation
5 Befestigung WD/ Insulation fastener
6 Tragprofil/ Profile
7 Bohrschraube/ Self drilling screw
8 Hinterlüftung/ Ventilation gap
9 Befestigung Platte/ Cladding fixing
10 Fassadenplatte/ Cladding
Base of Calculation:
Project: CWCT Test Customer:
Base Material: SFS Editor: Klaus Mayrhofer
Base Fastener: S-MD 53S Load Values F_{RD}: 1,33 kN
Isolation: 200 mm Scale: 1:40
Wall distance to the Profile : 260 mm Date: 19.12.2018
Elements of cladding: 3AC Alucobond 4mm Facade System: MFT-MFI-1L-rivets
Fastening of the facade elements: Rivets
Plan number: Plan 3 of 3
The mounting guidelines from producers should be followed for all facade elements and fixings.
Technical modifications are subject to change. This plan is valid with the attached documentation. Measurement in mm.
Window reaval
horizontal Section


Base Plate
43
68
25
18
25
25
18
86
10
17
27
17
10
Cantilever arm
R2,55
19
19
245
18
25
25
18
86
Top view
24,5
43,5
68


Window lintel
vertical Section
Base Detail
vertical Section
Legende
1 Untergrund/ Base Material
2 Dübel lt. Statik/ Anchor acc. to static
3 Distanzhalter + Isolator/ Bracket + isolator
4 Wärmedämmung/ Insulation
5 Befestigung WDV/ Insulation fastener
6 Trapprofil/ Profile
7 Bohrschraube/ Self drilling screw
8 Hinterlüftung/ Ventilation gap
9 Befestigung Platte/ Cladding fixing
10 Fassadenplatte/ Cladding
Base of Calculation:
Project: CWCT Test Customer:
Base Material: SFS Editor: Klaus Mayrhofer
Base Fastener: S-MD 53S Load Values Frep: 1,33 kN
Isolation: 200 mm Scale: 1:40
Wall distance to the Profile : 260 mm Date: 19.12.2018
Elements or cladding: 3AC Alucobond 4mm Facade System: MFT-MFI-1L-/rivets
Fastening of the facade elements: Rivets
Plan number: Plan 1 of 3
The mounting guidelines from producers should be followed for all facade elements and fixings.
Technical modifications are subject to change. This plan is valid with the attached documentation. Measurement in mm.


Detail at Head
vertical Section
Legende
1 Untergrund/ Base Material
2 Dübel lt. Statik/ Anchor acc. to static
3 Distanzhalter + Isolator/ Bracket + Isolator
4 Wärmedämmung/ Insulation
5 Befestigung WDV Insulation fastener
6 Tragprofil/ Profile
7 Bohrschraube/ Self drilling screw
8 Hinterlüftung/ Ventilation gap
9 Befestigung Platte/ Cladding fixing
10 Fassadenplatte/ Cladding
Window sill
vertical Section
Legende
1 Untergrund/ Base Material
2 Dübel lt. Statik/ Anchor acc. to static
3 Distanzhalter + Isolator/ Bracket + Isolator
4 Wärmedämmung/ Insulation
5 Befestigung WDV Insulation fastener
6 Tragprofil/ Profile
7 Bohrschraube/ Self drilling screw
8 Hinterlüftung/ Ventilation gap
9 Befestigung Platte/ Cladding fixing
10 Fassadenplatte/ Cladding
Base of Calculation:
Project: CWCT Test Customer:
Base Material: SFS Editor: Klaus Mayrhofer
Base Fastener: S-MD 53S Load Values F_{Rd}: 1,33 kN
Isolation: 200 mm Scale: 1:40
Wall distance to the Profile : 260 mm Date: 19.12.2018
Elements of cladding: 3AC Alucobond 4mm Facade System: MFT-MFI-1L-rivets
Fastening of the facade elements: Rivets
Plan number: Plan 2 of 3
The mounting guidelines from producers should be followed for all facade elements and fixings.
Technical modifications are subject to change. This plan is valid with the attached documentation. Measurement in mm.

8. Support Steelwork Drawing



9. Dismantling

The dismantling was conducted on 9th and 13th August 2019 by representatives of Hilti GB and was witnessed by representatives of Wintech Engineering Ltd.

It was found that the system fully complied with the system drawings in Section 7 provided by Hilti GB at the time of the dismantle.

Photograph No. 10

Sample prior to dismantle

Photograph No. 11

Vertical support rail with bolt positioned for deflections

Photograph No. 12

Showing panel removed with positioning of bolt used to measure deflection on bracket

Photograph No. 13

Panel removed showing support rails location where bolts were installed for measuring during testing

Photograph No. 14

Helping hand brackets and rails

Photograph No. 15

Helping hand bracket
connection to SFS backing wall

Photograph No. 16

Helping hand bracket connection to
vertical rail and bolt positioned for
measuring during testing

Photograph No. 17

Helping hand bracket
connection to support rail

Photograph No. 18

Vertical support rail and bolts positioned for measuring during testing

Photograph No. 19

Vertical support rail and bolts positioned for measuring during testing

10. Amendments

Revision No.	Amendments	Date of Amendment
Rev 1	Sample description updated in Section 3, reference material spec and maximum panel height tested wording	26th September 2019

----- END OF REPORT -----

WINTECH

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