

# **Union Wharf - London**

## **Soffit Subframe - Structural Calculation Report**

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4479 MHT-CA-003

Issue P01

26/03/2026

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## Soffit Subframe - Structural Calculation Report

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### 4479 MHT-CA-003

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- A1. Nvelope NVF2F System
- B1. Rockpanel- Recommendation form. Project related fixing distance calculation

# Executive Summary

Meinhardt (UK) Ltd has been appointed to provide consulting engineering services for selected aspects of the façade systems at 25 Bentinck Road, also known as Union Wharf.

Due to the building undergoing remedial works, which consist of the replacement of the existing timber soffit with a fibre- cement panel supported by aluminium rails and helping hand brackets, a structural assessment has been required.

This report has been prepared to detail the structural assessment of the subframe components for the two soffits located at coves 2 and 3 to the rear elevation.

The soffit replacement panel (Rockpanel Colours 9mm) has been specified by the specialist sub-contractor (SDP). The suitability of this panel has not been reviewed or commented on as this is outside of Meinhardt's scope of services; it has been included in the report for coordination purposes only. The panels, and the securing rivets, have been structurally assessed by Rockpanel (refer to Appendix B1) and their requirements have been incorporated into the sub-structure design by Meinhardt.

The following loads were considered in this assessment:

Description	
Peak velocity pressure	0.78 kPa (as per Wind load calculation report by RD consulting)
Dead Load	0.31 kPa

Each element was evaluated against the requirements of its relevant design standard or guidance. The key design considerations adopted in this assessment are shown below. Please note, that the accompanying sketch is provided solely to illustrate the general design principles applied

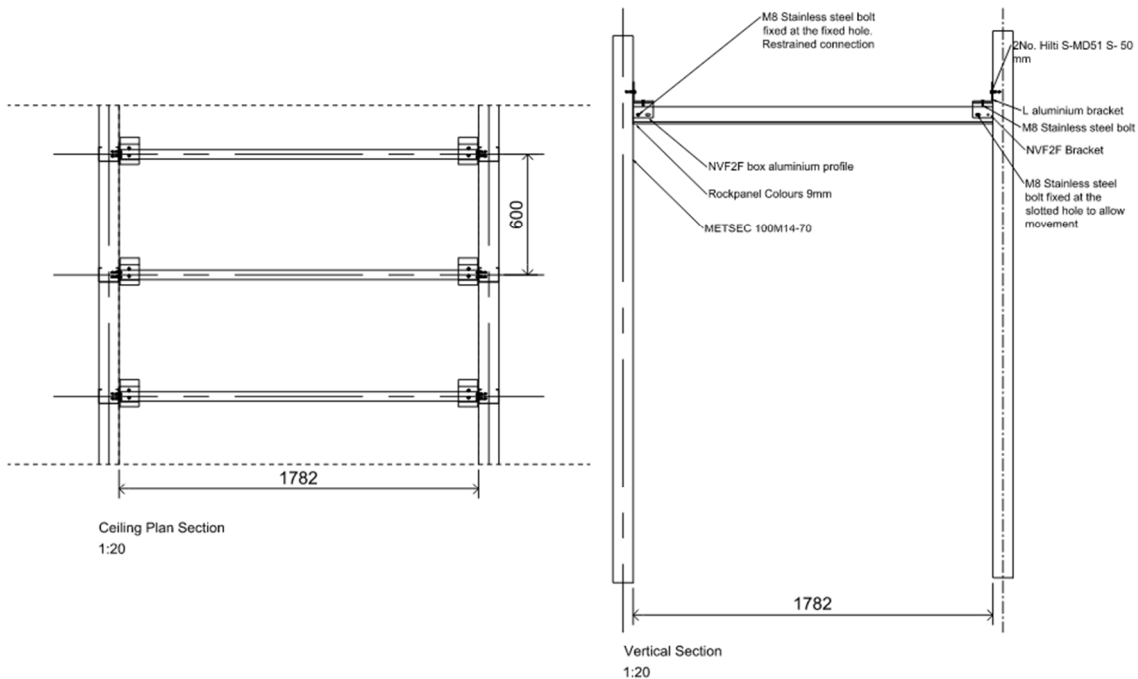


Figure 1. Union Wharf – Soffit construction rules

The design of the components that comprise the soffit build- up is as summarised below:

Designed by Rockpanel:

- **Rockpanel Colours 9mm:** 1200mm, supported by the subframes (NVF2F box profiles) at 600mm c/c span, fixed to the subframes with rivets at 320mm c/c

Designed by Meinhardt:

- Designed by Meinhardt: **NVF2F box aluminium profile:** 6063-T6 46.5mm x 75mm x 3mm aluminium profiles
- **A4-70 stainless steel M8 bolts with nylon washers and nyloc nuts:** used for fixing the NVF2F box profile to NVF2F2 Bracket. One of the bolts will be fixed through a slotted hole, while the other will be fixed through a fixed hole.
- **NVF2F2 bracket:** 6005A-T6 125mm x 75mm x 3mm aluminium bracket
- **NV2F2 T box aluminium profile 125mmx 75mm x3mm** to be used in locations where 2 panels are secured to the aluminium profile.
- **A4-70 stainless steel M8 bolt with nylon washers and nyloc nuts:** used for fixing the NVF2F2 Bracket to the L brackets.
- **L-bracket:** 6005A-T6 100mm x100mm x 5mm aluminium
- **2 No. Hilti S-MD 51 S 50mm long:** used for fixing the aluminium L-bracket to the SFS
- 

# 1 Introduction

## 1.1 Project Description

25 Bentinck Road, also known as Union Wharf, is a residential development comprising a single block of varying heights, with a maximum height of 16 metres. The building faces Bentinck Road to the southwest elevation and the canal to the northeast elevation.



Figure 2. Union Wharf - Front elevation - Remediation works

## 1.2 Scope Assessment

At the request of AD Construction Group Ltd, Meinhardt (UK) Ltd has been appointed to provide structural engineering calculation services for the soffits at the rear elevation. As part of this work, Meinhardt have undertaken structural assessments of the aluminium sub-structure to the soffit system including the fasteners for the panels to the substructure, between rails and brackets and the fasteners back to the SFS. We have not reviewed or commented on the suitability of the products which have been specified by others beyond the structural aspects outlined above.

The structural calculation report includes the following items:

- Assessment of the proposed soffit supporting aluminium subframe system, including aluminium rails, brackets and fixings.

Items excluded from scope:

- I. Wind load calculations- Refer to RD consulting report
- II. SFS system – Refer to Meinhardt structural report No. 4479-MHT-XX-XX-CAL-O-0001
- III. Rainscreen subframe – Refer to Meinhardt structural report No. UW-MHT-RP-701-Issue-C01R



Figure 3. Union Wharf – Plan view- Soffit location



Figure 4. Soffit location 1

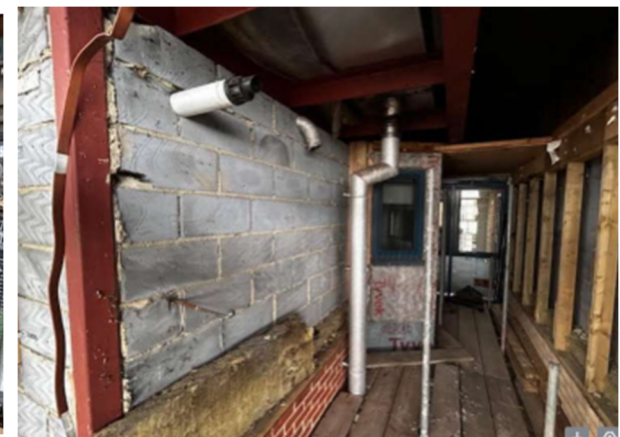


Figure 5. Soffit location 2

## 1.3 Received Documentation

**Table 1. Reference drawings**

Description	Date	Version	File type	Originator
Union Wharf- Elevations (dimensions and photos)	26/11/25	01	PDF	SDP
Union House detail and Information Pack Cladding -MD 18-11-25	26/11/26	01	PDF	SDP
Wind load calculations No. 25005 dated 22/07/25	25/11/26	01	PDF	RD Consulting
union-wharf-aov-soffit-measurements-21-38-side (002)	11/02/26	01	PDF	SDP

**Table 2. Reference technical submittals**

Description	Reference	Version	File type	Originator
Rock panel colours technical data sheet	10/02/2026	P01	PDF	SDP

## 1.4 Design Standards

The assessment is based on the following standards:

**Table 3. Design standards**

Description	Reference
Basic of structural design.	BS EN 1990:2002+A1:2005
Actions on structures.	BS EN 1991-1-1:2010
Eurocode 9: Design of aluminium structures – Part 1-1: General structural rules	BS EN 1999-1-1: 2007
Eurocode 3: Design of steel structures – Part 1-8: Design of joints	BS EN 1993-1-8: 2005
Fasteners – Mechanical properties of corrosion-resistant stainless-steel fasteners Part 1: Bolts, screws and studs with specified grades and property classes	BS EN ISO 3506-1: 2020
Eurocode 3 - Cold-formed members and sheeting	BS EN 1993 - 1-3 2024 Part 1-3
CWCT Guidance on the actions on non- loadbearing building envelopes	

## 2 Design Criteria

### 2.1 Wind load

The wind load analysis conducted by RD Consulting, report No. 25005 dated 22-07-2025, indicates that the worst-case characteristic wind load is 0.78 kN/m<sup>2</sup>

Zone	Ext pressure coeff C <sub>pe</sub>	Peak velocity pressure q <sub>p</sub> (kN/m <sup>2</sup> )
F (-ve)	-1.80	0.78
G (-ve)	-1.20	0.78
H (-ve)	-0.60	0.78
I (-ve)	-0.40	0.78
J (-ve)	-0.90	0.78

Figure 6. Excerpt from wind load calculations report No. 25005 (RD Consulting) – Wind load Cladding – Building B

As the soffit cladding is designed with open joints, installed externally, and separated from the internal building envelope, the applied wind loads may be treated in accordance with those for a drained and ventilated rainscreen system. Consequently, and in line with CWCT guidance, the design wind pressure has been determined as outlined below:

	Drained and ventilated	Pressure equalised*
Rainscreen	q <sub>p</sub> x C <sub>pe</sub>	0.67 x q <sub>p</sub> x C <sub>pe</sub>
Air barrier	q <sub>p</sub> x (C <sub>pe</sub> -C <sub>pi</sub> )	q <sub>p</sub> x (C <sub>pe</sub> -C <sub>pi</sub> )
Windows and doors	q <sub>p</sub> x (C <sub>pe</sub> -C <sub>pi</sub> )	

Figure 7. Excerpt from CWCT Guidance on the actions on non-loadbearing building envelopes

Table 4. Applicable wind loads

Wind Zone	Net pressure
G	q <sub>p</sub> x C <sub>pe</sub> = 0.78 x -1.20 = <b>-0.936 kPa</b>

### 2.2 Dead Load

The proposed soffit cladding is Rockpanel Colours. The panel self-weight, as stated in the relevant BBA Certificate and manufacturer’s data sheet, has been adopted for this assessment and is summarised in the table below:

#### Key product properties

Rockpanel Colours	A2 8 mm	A2 9 mm	Unit	Test/classification method
Optical properties				
Colours	ProtectPlus: 4-5 Colours: 3-4	ProtectPlus: 4-5 Colours: 3-4	Class on greyscale	ISO 105 A02
Fire				
Fire classification	A2-s1,d0	A2-s1,d0	Euroclass	EN 13501-1
Physical properties				
Weight	9.4	11.25	kg/m <sup>2</sup>	EN 323

Figure 8. Excerpt from Rockpanel technical data sheet with its key properties

Table 5. Applicable dead loads

Cladding Components	Dead Load
Rockpanel Colours	0.11 kPa
Aluminium subframe	0.20 kPa
Total load	<b>0.31 kPa</b>

## 2.3 Deflection Limit

For the aluminium rail subframe, the deflection limit is taken as span/360, measured between fixing centres, in accordance with CWCT Guidance for the Design of Rainscreen Cladding requirement for frames supporting cladding with brittle finishes.

Edge of window opening		L/360 or 15mm whichever is the lesser (SCI ED017)
Gypsum board	Plastered	L/360 or 10mm whichever is the lesser (CWCT)
	Dry wall	L/250 (SCI ED017)
Brickwork		L/360 including the stiffening effect of the brick work L/500 ignoring the stiffening of the brickwork (SCI ED017)
Natural stone		L/360 or 3mm whichever is the lesser
Brittle finishes		L/360

Figure 9. Excerpt from CWCT Guidance on the actions on non-loadbearing building envelopes

## 2.4 Load Combination and Safety Factors

The load combinations considered in this assessment are based on BS EN 1990-1-1 (Basis of Structural Design).

### Partial factors

Serviceability limit state

- Permanent load factor,  $Y_G = 1.00$
- Variable load factor,  $Y_Q = 1.00$

Ultimate limit state

- Permanent load factor,  $Y_G = 1.35$
- Variable load factor,  $Y_Q = 1.50$

### Load combinations

- Serviceability limit state:  $1.00 G + 1.00 Q$
- Ultimate limit state:  $1.35 G + 1.50 Q$

G = Dead loads

Q = Variable loads (Wind, Occupancy, Maintenance, etc)

### 3 Panel’s fixings calculations to aluminium rails

We have consulted with the technical support engineers from Rockpanel and provided them with the relevant project-specific information.

Following their review, Rockpanel has issued a technical report outlining their recommended fixing methodology for the proposed application.

As this is a proprietary system, we defer to the manufacturer’s design guidance and fixing recommendations. The fixing specification and methodology from the panel to the frames is also covered in the document below. Please note that this is a proprietary, tested system, therefore, all fixing methodologies, spacing, and edge distances are the responsibility of the manufacturer.

Rockpanel carried out their own wind load calculations based on the information provided by Meinhardt (location and building height). It is noted that they calculated a more conservative wind loading.

The following are extracted from the Rockpanel report (UK 2026 022 – A2 9 mm soffit) detailing their considerations in order to achieve a structurally adequate design:

**1. Basic data <sup>1</sup>**

to determine the fixing distances of Rockpanel façade boards:

Location:	West Drayton UB7 7RG
Distance to town border:	1 < d < 5 km
Distance to coast:	10 < d < 100 km
Site altitude:	28 m
Terrain category:	town
Basic wind velocity:	21.5 m/s
Maximum building height:	17 m
Application:	Soffit
Sub-construction:	Aluminium
Product Quality:	A2
Product Design:	Colours
Board thickness:	9 mm
European Technical Assessment:	ETA-13/0340 - Rockpanel A2 9 mm

<sup>1</sup> The determination of the basic data was carried out by the client’s building information.

**Figure 10. Excerpt from Rockpanel calculations for Union Wharf**

### 3. Fastening system

#### Aluminium sub-construction

The panels are attached to the building by fixing to a sub-frame of aluminium. The minimum thickness of the vertical aluminium profiles is 1.5 mm. The aluminium quality is AW-6060 according to EN 755-2. The  $R_m/R_{p0,2}$  value is  $\geq 170/140$  for profile T6 and  $\geq 195/150$  for profile T66.

#### Rivets

Rockpanel aluminium rivets for fixing onto an aluminium sub-frame according to ETA and Rockpanel guidelines.

- Rivet, head diameter 14 mm, shank diameter 5 mm, EN AW-5019 (AlMg5).
  - A2 9 mm:

supplier	code
SFS	AP14-50180-S
MBE	FN-AI5-5x18 K14
- **For correct fixing, a riveting tool with rivet spacer must be used, see ETA annex 3 Table 8.4.**

Table 1: Hole dimensions [mm] for Rockpanel boards mechanically fixed

Fixing type	Fixed point	Moving point	Slotted points	Board dimensions considered
Rivet [a]	5.1	8.0	5.1 x 8.0	1200 x 3050
Edge distances: $a_{R1} \geq 20$ mm and $a_{R2} \geq 50$ mm				

[a] For correct fixing, a riveting tool with rivet spacer must be used.

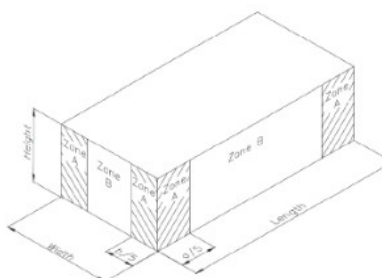
Figure 11. Excerpt from Rockpanel calculations Section 3 – Fastening System

### 5. Calculation

Calculated for a horizontal (soffit) application according to BS-EN 1991-1-4. The calculation is based upon the maximum wind load at zone A as shown in the picture on the right.

$$q_D \times c_p \times \gamma_F = -0.96 \times 1.5 = -1.45 \text{ kN/m}^2$$

*Customers are recommended to have our calculation and/or technical advice on their specific projects confirmed by the involved architects, specialist engineers, designers and/or contractors. This calculation does not constitute a static verification and is purely intended as orientation. ROCKWOOL B.V / Rockpanel cannot warrant the completeness and accuracy of the information stated, the performance of its products, the calculation and/or any advice based on this.*



- Application of 1 field span has to be calculated separately.
- Application in 2 field span or more (b).

Weight of the board in a horizontal application: 11.25 kg/m<sup>2</sup>

Table 2: Partial factors for material properties and resistances

Rockpanel	$\gamma_M$	2.00
Partial load factor	$\gamma_F$	1.50
Aluminium rivet / aluminium profile	$\gamma_m$	1.25
Timber constructions	$\gamma_m$	1.30

Figure 12. Excerpt from Rockpanel Section 5 – Calculation

5.1 Recommendation for an application of 2 or more field span:

Application in 2 field span (b) or more and 3 or more fixings (a).  
Fixed with Rivets onto a Aluminium subframe.

Maximum span (b):	600	mm (c/cs)
Maximum distance between fixings ( $a_m / a_R$ ):	320	mm
Edge distances:	$a_{R1} \geq 20$	mm
	$a_{R1} \geq 50$	mm

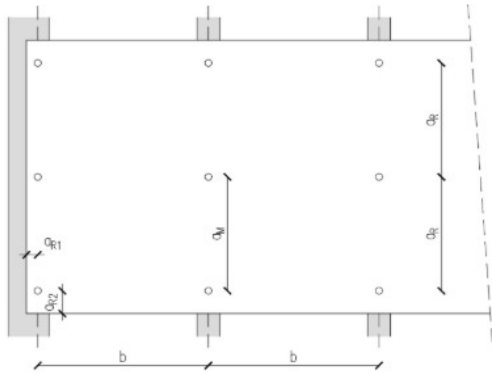


Figure 13 - Excerpt from Rockpanel Section 5.1 – Recommendation for an application of 2 or more field span

# 4 Aluminium rails

## 4.1 Aluminium Rails Design

The proposed subframe system is the Nvelope NVF2F system which is comprised of box aluminium profiles 46.5mm x 75mm x 3mm, grade 6005A-T6 spaced at 600mm c/c.

### Codes and Standards

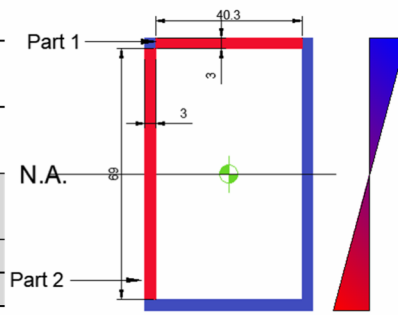
BS EN 1999-1-1:2007

BS EN 14024: 2004

DIMENSIONS	
Length	1763.00 mm

SLENDERNESS PARAMETERS						
Characteristic value of 0.2% proof strength - 6005A-T6	BS EN 1999-1-1: 2007 Table 3.2b		$f_o$		215.00 MPa	
Coefficient	BS EN 1999-1-1: 2007 Table 6.2		$\sqrt{\frac{250}{f_o}}$		$\epsilon$ 1.08	
BS EN 1999-1-1: 2007 Table 6.2	Internal Part			Outstand Part		
	$\beta_1$	$\beta_2$	$\beta_3$	$\beta_1$	$\beta_2$	$\beta_3$
Class A, w ithout w elds	11.86	17.25	23.72	3.23	4.85	6.47

SECTION CLASSIFICATION						
BS EN 1999-1-1: 2007 Table 6.3	Internal Part		Outstand Part			
	$C_1$	$C_2$	$C_1$	$C_2$		
Class A, w ithout w elds	32.00	220.00	10.00	24.00		
Reduction factor for local buckling	BS EN 1999-1-1: 2007 (6.11)		$\beta \leq \beta_3$	$\rho_c = 1.00$		
	BS EN 1999-1-1: 2007 (6.12)		$\beta > \beta_3$	$\rho_c = \frac{C_1}{(\beta/\epsilon)} - \frac{C_2}{(\beta/\epsilon)^2}$		
Flat internal parts w ith no stress gradient or flat outstands w ith no stress gradient or peak compression at toe						
Internal						
Part	b	t	$\beta = b/t$	Class	$\rho_c$	$t_{eff} = t \times \rho_c$
1	40.30	3.00	13.43	2	1.00	3.00
Internal parts w ith a stress gradient that results in a neutral axis at the centre						
Internal						
Part	b	t	$\beta = 0.40 b/t$	Class	$\rho_c$	$t_{eff} = t \times \rho_c$
2	69.00	3.00	9.20	1	1.00	3.00



EFFECTIVE SECTION			
Modulus of elasticity of aluminium	BS EN 1999-1-1: 2007 Section 3.2.5	E	70000.00 MPa
Elasticity constant of the thermal barrik		c	30.00 MPa
Section 1			
Section area	$A_1$		691.80 mm <sup>2</sup>
Major axis moment of inertia	$I_{x1}$		524491.65 mm <sup>4</sup>
Minor axis moment of inertia	$I_{y1}$		243988.04 mm <sup>4</sup>
Vertical distance from centroid of the section to extreme fibre		y	37.5 mm
Effective major axis section modulus	$\frac{I_{xref}}{y}$	$W_{sef}$	13986.44 mm <sup>3</sup>
Horizontal distance from centroid of the section to extreme fibre		x	27.35 mm

Effective minor axis section modulus		$\frac{I_{y,ef}}{x}$	$W_{y,ef}$	8920.95 mm <sup>3</sup>
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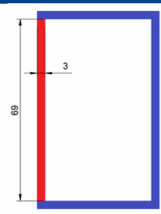
**RESISTANCE AGAINST TENSION**

Gross cross section	BS EN 1999-1-1: 2007 Section 6.2.3	$A_t$	$A_g$	691.80 mm <sup>2</sup>
Partial safety factor, resistance of cross-section	BS EN 1999-1-1: 2007 Table 6.1		$\gamma_{M1}$	1.10
Design resistance to tension force	BS EN 1999-1-1: 2007 (6.18)	$\frac{A_g \cdot f_o}{\gamma_{M1}}$	$N_{t,Rd}$	135215.45 N

**RESISTANCE AGAINST BENDING**

Partial safety factor, resistance of cross-section	BS EN 1999-1-1: 2007 Table 6.1		$\gamma_{M1}$	1.10
Major axis - bending moment resistance	BS EN 1999-1-1: 2007 (6.25)	$\frac{W_{x,ef} \cdot f_o}{\gamma_{M1}}$	$M_{x,Rd}$	2733714.05 N-mm
Minor axis - bending moment resistance	BS EN 1999-1-1: 2007 (6.25)	$\frac{W_{y,ef} \cdot f_o}{\gamma_{M1}}$	$M_{y,Rd}$	1743640.63 N-mm

**RESISTANCE AGAINST SHEAR**



Shear area	BS EN 1999-1-1: 2007 Table 6.30	$\sum_{i=1}^n (h_w) (t_w)_i$	$A_v$	207.00 mm <sup>2</sup>
Partial safety factor, resistance of cross-section	BS EN 1999-1-1: 2007 Table 6.1		$\gamma_{M1}$	1.10
Design shear resistance	BS EN 1999-1-1: 2007 (6.29)	$\frac{A_v \cdot f_o}{\sqrt{3} \gamma_{M1}}$	$V_{Rd}$	23359.07 N

**RESISTANCE AGAINST LATERAL TORSIONAL BUCKLING**

Inperfection factor	BS EN 1999-1-1: 2007 Section 6.3.2.2		$\alpha_{LT}$	0.20
Limit of the horizontal plateau	BS EN 1999-1-1: 2007 Section 6.3.2.2		$\bar{\lambda}_{0,LT}$	0.40
Shear modulus	BS EN 1999-1-1: 2007 Section 3.2.5		$G$	27000.00 MPa
Torsional constant			$J$	186593.00 mm <sup>4</sup>
Elastic critical moment, $M_{cr}$ conservatively taken as 0	BS EN 1999-1-1: 2007 Annex I.1	$\frac{\pi \sqrt{E \cdot I_{y,ef} \cdot G \cdot J}}{L}$	$M_{cr}$	16529526.15 N-mm
Relative slenderness	BS EN 1999-1-1: 2007 Section 6.3.2.3	$\sqrt{\frac{W_{x,ef} \cdot f_o}{M_{cr}}}$	$\bar{\lambda}_{LT}$	0.43
Value to determine reduction factor	BS EN 1999-1-1: 2007 Section 6.3.2.2	$0.5 [1 + \alpha_{LT} (\bar{\lambda}_{LT} - \bar{\lambda}_{0,LT}) + \bar{\lambda}_{LT}^2]$	$\phi_{LT}$	0.59
Reduction factor for lateral torsional buckling	BS EN 1999-1-1: 2007 Section 6.3.2.2	$\frac{1}{\phi_{LT} + \sqrt{\phi_{LT}^2 - \bar{\lambda}_{LT}^2}} \leq 1$	$\chi_{LT}$	0.99
Design buckling resistance moment	BS EN 1999-1-1: 2007 Section 6.3.2.1	$\chi_{LT} \cdot M_{x,Rd}$	$M_{b,Rd}$	2716127.09 Nmm

**DESIGN BENDING MOMENT**

Dead load			$G$	0.11 kPa
Wind load			$Q$	1.45 kPa
Ultimate load		1.35 G + 1.50 Q	$E_d$	0.0023 kPa
Tributary area			$t_w$	600.00 mm
Uniformly distributed load		$E_d \cdot t_w$	$w$	1.39 N/mm
Design value for bending moment		$\frac{wL^2}{8}$	$M_{Ed}$	541637.30 Nmm
Utilisation		$\frac{M_{Ed}}{\min(M_{x,Rd}, M_{b,Rd})}$		19.94 %

SHEAR			
Design value for shear	$\frac{wL}{2}$	$V_{Ed}$	1228.90 N
Utilisation	$\frac{V_{Ed}}{V_{Rd}}$		<b>5.26 %</b>

DEFLECTION (SERVICIBILITY LIMIT STATE)			
Serviceability load	1.00 G + 1.00 Q	$E_d$	1.56 kPa
Tributary area		$t_w$	600.00 mm
Uniformly distributed load	$E_d \cdot t_w$	$w$	0.94 N/mm
Maximum deflection	$\frac{5 \cdot w \cdot L^4}{384 \cdot E \cdot I}$	$\delta$	3.21 mm
Deflection limit	$\frac{L}{360}$	$\Delta$	4.90 mm
Utilisation	$\frac{\delta}{\Delta}$		<b>65.48 %</b>

## 5 Aluminium Bracket Design

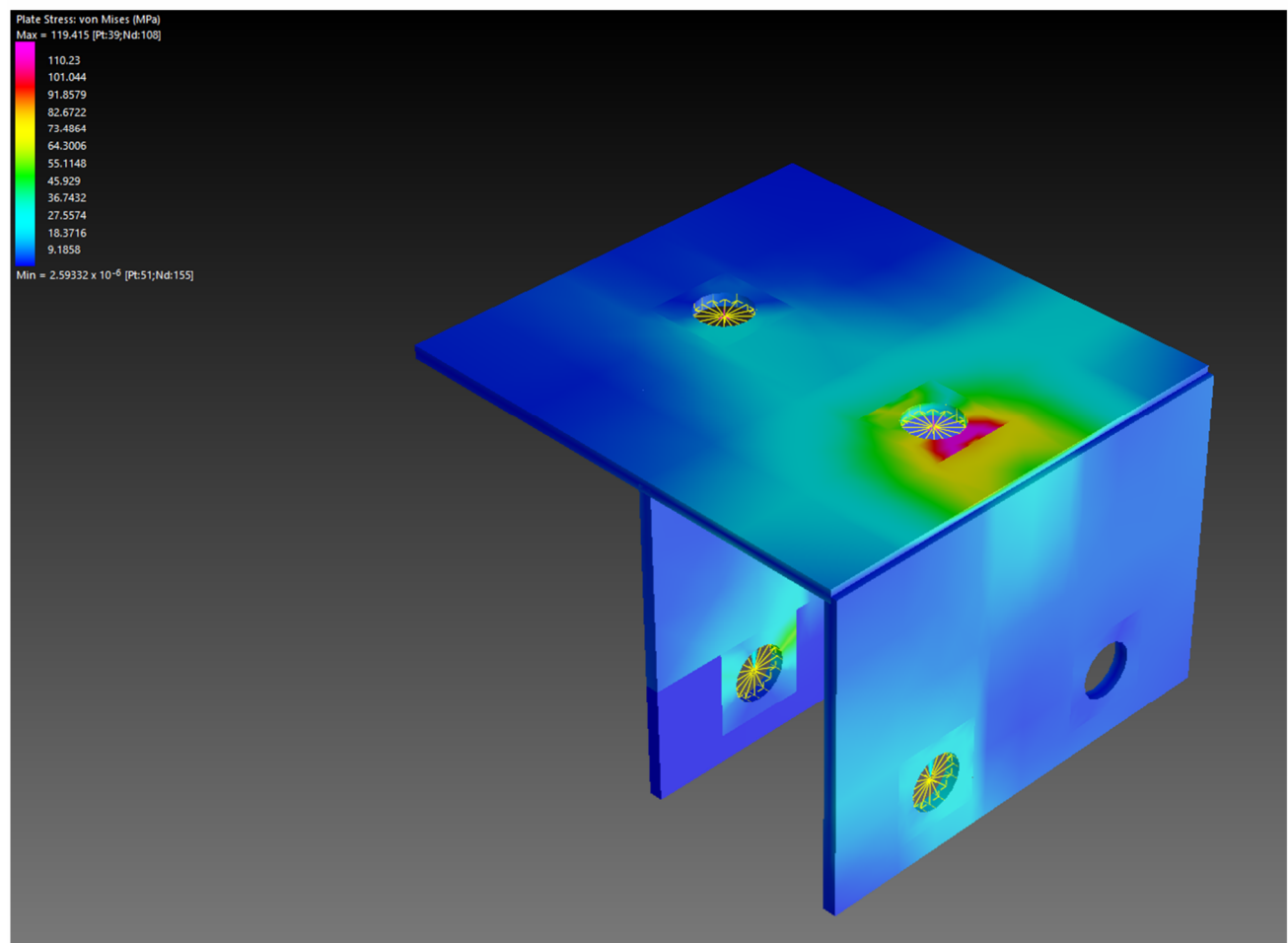
### 5.1 NVF2F2 Bracket

The Nvelope bracket system NVF2F2, is a 6005A-T6 125mm x 75mm x 3mm aluminium bracket. The following calculations detail the structural assessment of this bracket using finite element method in order to identify the maximum applicable stress.

REACTION FORCES		
Maximum vertical reaction	$R_v$	1228.90 N
Maximum horizontal reaction	$R_h$	0.00 N

BRACKET ANALYSIS	
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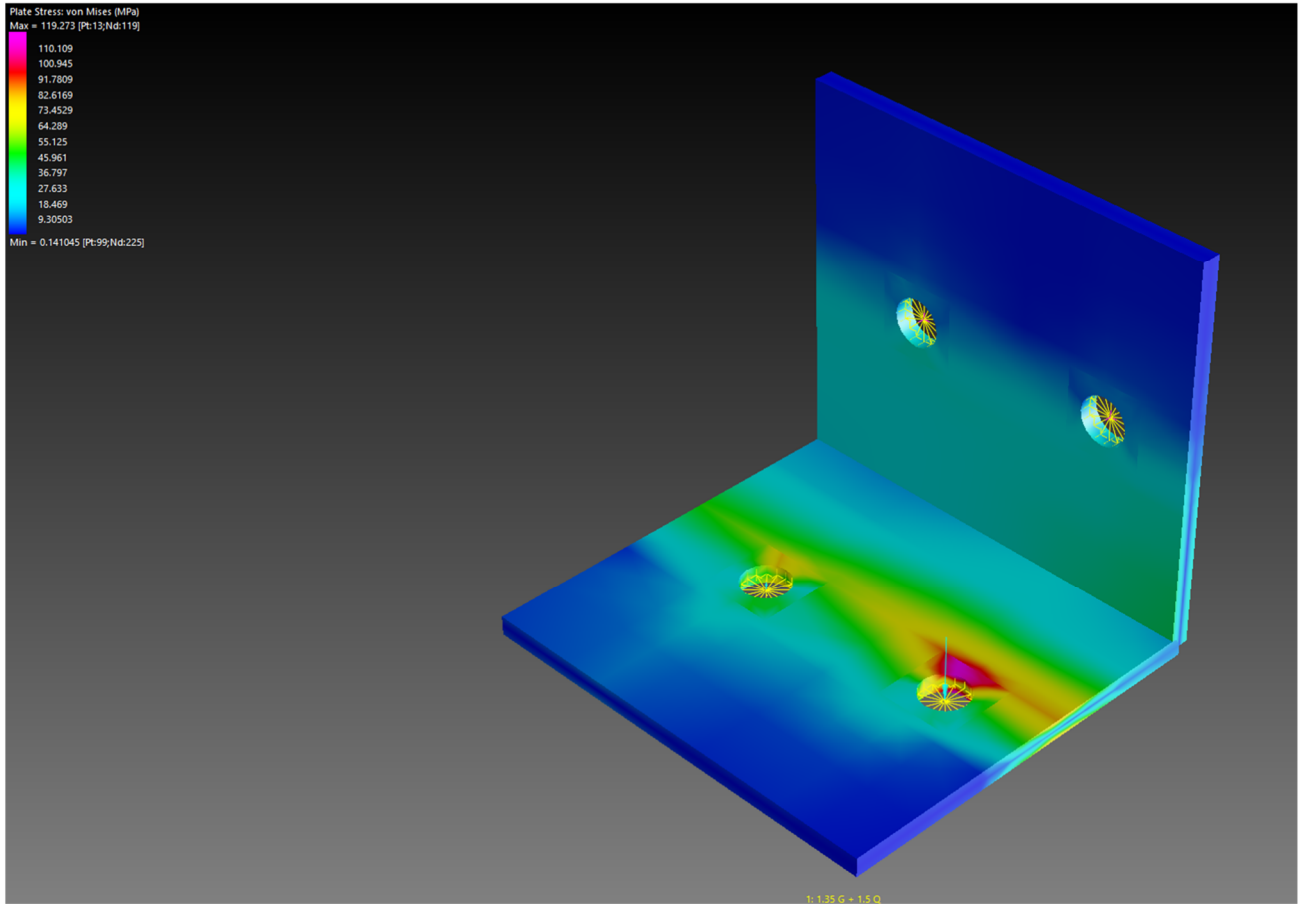


Maximum stress		$\sigma_{Ed}$	119.42 N/mm <sup>2</sup>
Partial factor for resistance	BS EN 1999-1-1: 2007 Table 3.2b	$\gamma_{M1}$	1.10
Characteristic value of 0.2% proof strength - 6005A-T6	BS EN 1999-1-1:2007 Table 3.2a	$f_o$	215.00 N/mm <sup>2</sup>
Resistance		$\frac{f_o}{\gamma_{M1}}$	$f_d$ 195.45 N/mm <sup>2</sup>
Utilisation		$\frac{\sigma_{Ed}}{f_d}$	61.10 %

## 5.2 L-bracket

In order to support the cladding system to the SFS, bespoke L-bracket is proposed. This L-bracket is proposed to be 100x100x5mm 6005-T6 aluminium.

### L BRACKET ANALYSIS



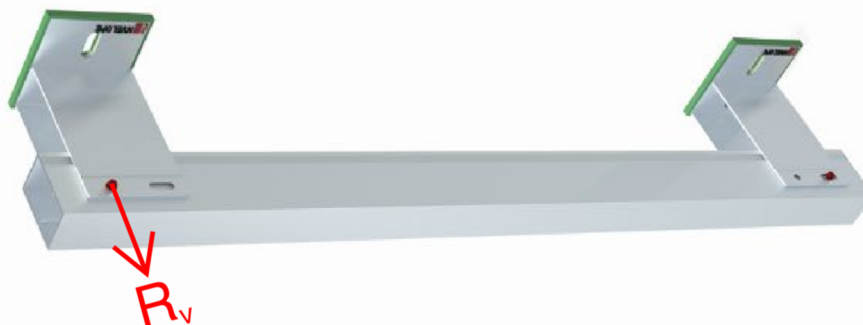
Maximum stress		$\sigma_{Ed}$	119.27 N/mm <sup>2</sup>
Partial factor for resistance	BS EN 1999-1-1: 2007 Table 3.2b	$\gamma_{M1}$	1.10
Characteristic value of 0.2% proof strength - 6005A-T6	BS EN 1999-1-1:2007 Table 3.2a	$f_o$	215.00 N/mm <sup>2</sup>
Resistance		$\frac{f_o}{\gamma_{M1}}$	$f_d$ 195.45 N/mm <sup>2</sup>
Utilisation		$\frac{\sigma_{Ed}}{f_d}$	61.02 %

## 6 Fixing design

### 6.1 Fixing from aluminium rail to NVF2F bracket

A4-70 stainless steel M8 bolt with nylon washers and nyloc nuts are proposed in order to assemble the bracket system.

**FRAME TO BRACKET BOLT CONNECTION**



Material type		Type	A4-70
Ultimate tensile strength of the bolt	BS EN 1993-1-4: 2006 Table 2.3	$f_{ub}$	700.00 N/mm <sup>2</sup>
Bolt size		Size	M8
Nominal stress area	BS EN ISO 3506-1: 2020 Table 4	$A_{s,nom}$	36.60 mm <sup>2</sup>
Partial factor, resistance of bolts	BS EN 1993-1-4: 2006 Table 5.1	$\gamma_{M2}$	1.25
Factor for shear resistance	BS EN 1993-1-8:2005 Table 3.4	$\alpha$	0.50
Shear resistance per shear plane	BS EN 1993-1-8:2005 Table 3.4	$\frac{\alpha \cdot f_{ub} \cdot A_{s,nom}}{\gamma_{M2}}$	$F_{v,Rd}$ <b>10248.00 N</b>
Number of bolts		n	1.00
Design shear force per bolt		$R_v / 2n$	$F_{v,Ed}$ <b>614.45 N</b>
Characteristic ultimate strength of the connected parts (6005A-T6)	BS EN 1999-1-1:2007 Table 3.2b	$f_u$	255.00 N/mm <sup>2</sup>
Factor for parallel edge distance	BS EN 1999-1-1:2007 Table 8.5	$\min a_d; \frac{f_{ub}}{f_u}; 1$	$a_b$ 0.70
		$\frac{f_{ub}}{f_u}$	2.75
Perpendicular to the direction of the lia		$\frac{e_1}{3 \cdot d_0}$	$a_d$ 0.70
Factor for perpendicular edge distance	BS EN 1999-1-1:2007 Table 8.5	$2,8 \cdot \frac{e_2}{d_0} - 1,7$	$k_1$ 1.94
End distance $e_1$		$e_1$	26.25 mm
Edge distance $e_2$		$e_2$	16.25 mm
Hole diameter $d_0$		$d_0$	12.50 mm
Bolt diameter		d	8.00 mm
Thickness of component		t	3.00 mm
Bearing resistance	BS EN 1999-1-1:2007 Table 8.5	$\frac{k_1 \cdot \alpha_b \cdot f_u \cdot d \cdot t}{\gamma_{M2}}$	$F_{b,Rd}$ <b>6648.77 N</b>
<b>Utilisation</b>			
	Force (N)	Resistance (N)	%
Shear	614.45	10248.00	$\frac{F_{v,Ed}}{F_{v,Rd}}$ <b>6.00</b>
Bearing	614.45	6648.77	$\frac{F_{v,Ed}}{F_{b,Rd}}$ <b>9.24</b>

## 6.2 Fixing from NVF2F bracket to L bracket

### BRACKET TO L- BRACKET BOLT ANALYSIS



Material type		Type	A4-70
Ultimate tensile strength of the bolt	BS EN 1993-1-4: 2006 Table 2.3	$f_{ub}$	700.00 N/mm <sup>2</sup>
Bolt size		Size	M8
Nominal stress area	BS EN ISO 3506-1: 2020 Table 4	$A_{s,nom}$	36.60 mm <sup>2</sup>
Partial factor, resistance of bolts	BS EN 1993-1-4: 2006 Table 5.1	$\gamma_{M2}$	1.25
Number of bolts		n	2.00
Factor for tension resistance	BS EN 1999-1-1:2007 Table 8.5	$k_2$	0.90
Tension resistance	BS EN 1999-1-1:2007 Table 8.5	$\frac{k_2 \cdot f_{ub} \cdot A_s}{\gamma_{M2}}$	$F_{t,Rd}$ <b>18446.40 N</b>
Design tension force per bolt		$R_v / n$	$F_{t,Ed}$ <b>614.45 N</b>
Utilisation			
	Force (N)	Resistance (N)	%
Tension	614.45	18446.40	$\frac{F_{t,Ed}}{F_{t,Rd}}$ <b>3.33</b>

## 6.3 Fixing from L bracket to SFS

The proposed fixing to be used to fix the bracket assembly to the SFS is the HILTI S-MD 51 S - 50mm long, which is a stainless-steel screw from Hilti with ETA certificate 18/0880 of 2024/04/11 Annex 22. Refer to the ETA data sheet in the following pages.

### Tension resistance

$F_{t,Ed} = 1.23 \text{ kN} / 2 \text{ no. fixings} = 0.62 \text{ kN} < F_{t,Rd} = 2.1 \text{ kN} / 1.33 = 1.58 \text{ kN}$ , Utilisation = **40%**



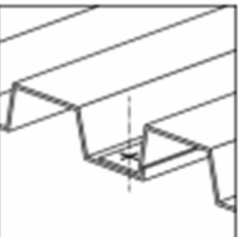
### Shear resistance

$F_{v,Ed} = 1.23 \text{ kN} + 0.075 \text{ kN} = 1.31 \text{ kN} < F_{v,Rd} = 5.1 \text{ kN} / 1.33 = 3.84 \text{ kN}$ , Utilisation = **34%**

### Combined tension and shear

$$\frac{F_{v,Ed}}{F_{v,Rd}} + \frac{F_{t,Ed}}{1.4F_{t,Rd}} = 74\%$$

Therefore, the proposed fixings are structurally adequate.

<b>Application range:</b>  Steel S320GD to S350GD <b>Component I:</b> $t_1 = 0,50$ to $2,00$ mm <b>Component II:</b> $t_2 = 0,63$ to $2,00$ mm  Steel S275 Steel S320GD to S350GD		<b>Typical application:</b> 	<b>Fastener:</b> S-MD 51 S(S) 5,5 x L Washer: Ø16																																																																																																																																																																																																																																							
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<table border="1"> <thead> <tr> <th rowspan="2"><math>t_1</math> [mm]</th> <th colspan="8"><math>t_2</math> [mm]</th> </tr> <tr> <th>0,63</th> <th>0,75</th> <th>0,88</th> <th>1,00</th> <th>1,13</th> <th>1,25</th> <th>1,50</th> <th>2,00</th> </tr> </thead> <tbody> <tr> <td rowspan="11"><math>V_{Rk}</math> [kN]</td> <td>0,50</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td> </tr> <tr> <td>0,55</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td><td>—</td> </tr> <tr> <td>0,63</td><td>1,10</td><td>—</td><td>1,40</td><td>—</td><td>1,80</td><td>—</td><td>2,20</td><td>—</td> </tr> <tr> <td>0,75</td><td>1,40</td><td>—</td><td>1,90</td><td>—</td><td>2,20</td><td>—</td><td>2,60</td><td>—</td> </tr> <tr> <td>0,88</td><td>1,40</td><td>—</td><td>1,90</td><td>—</td><td>2,20</td><td>—</td><td>2,90</td><td>—</td> </tr> <tr> <td>1,00</td><td>1,40</td><td>—</td><td>1,90</td><td>—</td><td>2,50</td><td>—</td><td>3,20</td><td>—</td> </tr> <tr> <td>1,13</td><td>1,50</td><td>—</td><td>1,90</td><td>—</td><td>2,50</td><td>—</td><td>3,60</td><td>—</td> </tr> <tr> <td>1,25</td><td>1,50</td><td>—</td><td>1,90</td><td>—</td><td>3,00</td><td>—</td><td>4,00</td><td>—</td> </tr> <tr> <td>1,50</td><td>1,50</td><td>—</td><td>1,90</td><td>—</td><td>3,00</td><td>—</td><td>4,00</td><td>—</td> </tr> <tr> <td>1,75</td><td>1,50</td><td>—</td><td>1,90</td><td>—</td><td>3,00</td><td>—</td><td>4,00</td><td>—</td> </tr> <tr> <td>2,00</td><td>1,50</td><td>—</td><td>1,90</td><td>—</td><td>3,00</td><td>—</td><td>4,00</td><td>—</td> </tr> <tr> <td rowspan="11"><math>N_{Rk}</math> [kN]</td> <td>0,50</td><td>0,38</td><td>—</td><td>0,54</td><td>—</td><td>0,70</td><td>—</td><td>0,88</td><td>—</td> </tr> <tr> <td>0,55</td><td>0,48</td><td>—</td><td>0,68</td><td>—</td><td>0,89</td><td>—</td><td>1,09</td><td>—</td> </tr> <tr> <td>0,63</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td>0,75</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td>0,88</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td>1,00</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td>1,13</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td>1,25</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td>1,50</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td>1,75</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td>2,00</td><td>0,70</td><td>—</td><td>1,00</td><td>—</td><td>1,30</td><td>—</td><td>1,60</td><td>—</td> </tr> <tr> <td><math>M_{T,perm}</math> [Nm]</td> <td colspan="8">5 Nm</td> </tr> </tbody> </table>									$t_1$ [mm]	$t_2$ [mm]								0,63	0,75	0,88	1,00	1,13	1,25	1,50	2,00	$V_{Rk}$ [kN]	0,50	—	—	—	—	—	—	—	—	0,55	—	—	—	—	—	—	—	—	0,63	1,10	—	1,40	—	1,80	—	2,20	—	0,75	1,40	—	1,90	—	2,20	—	2,60	—	0,88	1,40	—	1,90	—	2,20	—	2,90	—	1,00	1,40	—	1,90	—	2,50	—	3,20	—	1,13	1,50	—	1,90	—	2,50	—	3,60	—	1,25	1,50	—	1,90	—	3,00	—	4,00	—	1,50	1,50	—	1,90	—	3,00	—	4,00	—	1,75	1,50	—	1,90	—	3,00	—	4,00	—	2,00	1,50	—	1,90	—	3,00	—	4,00	—	$N_{Rk}$ [kN]	0,50	0,38	—	0,54	—	0,70	—	0,88	—	0,55	0,48	—	0,68	—	0,89	—	1,09	—	0,63	0,70	—	1,00	—	1,30	—	1,60	—	0,75	0,70	—	1,00	—	1,30	—	1,60	—	0,88	0,70	—	1,00	—	1,30	—	1,60	—	1,00	0,70	—	1,00	—	1,30	—	1,60	—	1,13	0,70	—	1,00	—	1,30	—	1,60	—	1,25	0,70	—	1,00	—	1,30	—	1,60	—	1,50	0,70	—	1,00	—	1,30	—	1,60	—	1,75	0,70	—	1,00	—	1,30	—	1,60	—	2,00	0,70	—	1,00	—	1,30	—	1,60	—	$M_{T,perm}$ [Nm]	5 Nm							
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Hilti S-MD 51 S 5,5 x L / Hilti S-MD 51 SS 5,5 x L with hexagon head and sealing washer $\geq \text{Ø}16$ mm																																																																																																																																																																																																																																										

## 7 Conclusion

Meinhardt's design is based on the Rockpanel Colours 9mm fibre-cement panel with a 1200mm width which has been specified by the specialist contractor, SDP. The suitability of this panel has not been reviewed or commented on as this is outside of Meinhardt's scope of services. It has been included in the report for coordination purposes only. The panels, and the securing rivets, have been structurally assessed by Rockpanel (refer to Appendix B1) and their requirements have been incorporated into the sub-structure design by Meinhardt.

The following components have been assessed to be structurally adequate and therefore proposed to be used to form the soffit build-up replacing the currently installed external soffits at the rear elevation of the development known as Union Wharf:

Designed by Rockpanel:

- **Rockpanel Colours 9mm:** 1200mm, supported by the subframes (NVF2F box profiles) at 600mm c/c span, fixed to the subframes with rivet fasteners (head diameter 14mm, shank diameter 5mm) at 320mm c/c.

Designed by Meinhardt:

- **NVF2F box aluminium profile:** 6063-T6 46.5mm x 75mm x 3mm aluminium profiles at 600mm c/c.
- **A4-70 stainless steel M8 bolts with nylon washers and nyloc nuts:** used for fixing the NVF2F box profile to NVF2F2 Bracket. One of the bolts will be fixed through a slotted hole, while the other will be fixed through a fixed hole.
- **NVF2F2 bracket:** 6005A-T6 125mm x 75mm x 3mm aluminium bracket
- **NV2F2 T box aluminium profile 125mm x 75mm x 3mm** to be used in locations where 2 panels are secured to the aluminium profile.
- **A4-70 stainless steel M8 bolt with nylon washers and nyloc nuts:** used for fixing the NVF2F2 Bracket to the L brackets.
- **L-bracket:** 6005A-T6 100mm x 100mm x 5mm aluminium
- **2 No. Hilti S-MD 51 S 50mm long:** used for fixing the aluminium L-bracket to the SFS

# Appendices

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4479-MHT-CA-003

Issue **P01**

**26/03/2026**

# A1. Nvelope NVF2F System

# SFS Group Fastening Technology Ltd

Unit A  
City Park  
Watchmead, Welwyn Garden City  
Hertfordshire AL7 1LT

Tel: 0330 0555 888

e-mail: info-nvelope@sfs.com

website: uk.sfs.com



**Agrement Certificate**

**19/5671**

Product Sheet 4

## NVELOPE RAINSCREEN SYSTEMS

### NVELOPE NVF2F RAINSCREEN CLADDING SUPPORT SYSTEM

This Agrément Certificate Product Sheet<sup>(1)</sup> relates to Nvelope NVF2F Rainscreen Cladding Support System, for use as a sub-frame, typically spanning floor slab to floor slab, to support cladding on the external or internal wall structure of new or existing buildings.

(1) Hereinafter referred to as 'Certificate'.

#### CERTIFICATION INCLUDES:

- factors relating to compliance with Building Regulations where applicable
- factors relating to additional non-regulatory information where applicable
- independently verified technical specification
- assessment criteria and technical investigations
- design considerations
- installation guidance
- regular surveillance of production
- formal three-yearly review.

#### KEY FACTORS ASSESSED

**Mechanical resistance and stability** — the system can be designed to support the cladding and to transfer the design loads to the end of the floor slab or substrate wall structure safely (see section 6).

**Behaviour in relation to fire** — the system (fixings, brackets, and rails) has an A1 reaction to fire classification in accordance with BS EN 13501-1 : 2018 (see section 7).

**Drainage and ventilation** — provided correct details are adopted, the system can provide adequate drainage and ventilation behind the cladding (see section 8).

**Durability** — the system will have a service life in excess of 35 years (see section 10).



The BBA has awarded this Certificate to the company named above for the systems described herein. This system have been assessed by the BBA as being fit for their intended use provided it is installed, used and maintained as set out in this Certificate.

On behalf of the British Board of Agrément

Date of First issue: 10 June 2022

Hardy Giesler  
Chief Executive Officer

The BBA is a UKAS accredited certification body – Number 113.

The schedule of the current scope of accreditation for product certification is available in pdf format via the UKAS link on the BBA website at [www.bbacerts.co.uk](http://www.bbacerts.co.uk)  
Readers **MUST** check the validity and latest issue number of this Agrément Certificate by either referring to the BBA website or contacting the BBA directly.

Any photographs are for illustrative purposes only, do not constitute advice and should not be relied upon.

#### British Board of Agrément

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[www.bbacerts.co.uk](http://www.bbacerts.co.uk)

## Regulations

In the opinion of the BBA, Nvelope NVF2F Rainscreen Cladding Support System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements of the following Building Regulations (the presence of a UK map indicates that the subject is related to the Building Regulations in the region or regions of the UK depicted):



### The Building Regulations 2010 (England and Wales) (as amended)

<b>Requirement:</b>	<b>A1</b>	<b>Loading</b>
Comment:		The system can be designed to adequately transfer the design loads from the cladding to the substrate wall structure. See sections 6.7 and 6.8 of this Certificate.
<b>Requirement:</b>	<b>B4(1)</b>	<b>External fire spread</b>
Comment:		The system is unrestricted by this Requirement. See section 7.1 of this Certificate.
<b>Regulation:</b>	<b>7(1)</b>	<b>Materials and workmanship</b>
Comment:		The system is acceptable. See section 10.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>7(2)</b>	<b>Materials and workmanship</b>
Comment:		The systems is unrestricted by this Regulation. See section 7.1 of this Certificate.



### The Building (Scotland) Regulations 2004 (as amended)

<b>Regulation:</b>	<b>8(1)</b>	<b>Durability, workmanship and fitness of materials</b>
Comment:		The system is acceptable. See section 10.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>9</b>	<b>Building standards applicable to construction</b>
Standard:	1.1(a)(b)	Structure
Comment:		The system can be designed to adequately transfer the design loads from the cladding to the substrate wall structure, with reference to clause 1.1.1 <sup>(1)(2)</sup> of this Standard. See sections 6.7 and 6.8 of this Certificate.
Standard:	2.6	Spread to neighbouring buildings
Comment:		The system is unrestricted by this Standard with respect to clauses 2.6.4 <sup>(1)(2)</sup> , 2.6.5 <sup>(1)</sup> and 2.6.6 <sup>(2)</sup> . See section 7.1 of this Certificate.
Standard:	2.7	Spread on external walls
Comment:		The system is unrestricted by this Standard with respect to clauses 2.7.1 <sup>(1)(2)</sup> . See section 7.1 of this Certificate.
Standard:	7.1(a)	Statement of sustainability
Comment:		The system can contribute to meeting the relevant Requirements of Regulation 9, Standards 1 to 6, and therefore will contribute to a construction meeting a bronze level of sustainability as defined in this Standard.

(1) Technical Handbook (Domestic).

(2) Technical Handbook (Non-Domestic).



### The Building Regulations (Northern Ireland) 2012 (as amended)

<b>Regulation:</b>	<b>23</b>	<b>Fitness of materials and workmanship</b>
Comment:		The system is acceptable. See section 10.1 and the <i>Installation</i> part of this Certificate.
<b>Regulation:</b>	<b>30</b>	<b>Stability</b>
Comment:		The system can be designed to adequately transfer the design loads from the cladding to the substrate wall structure. See section 6.7 and 6.8 of this Certificate.

<b>Regulation:</b>	<b>36(a)</b>	<b>External fire spread</b>
<b>Comment:</b>	The system is unrestricted by this Regulation. See section 7.1 of this Certificate.	

## Construction (Design and Management) Regulations 2015 Construction (Design and Management) Regulations (Northern Ireland) 2016

Information in this Certificate may assist the client, designer (including Principal Designer) and contractor (including Principal Contractor) to address their obligations under these Regulations.

See section: 3 *Delivery and site handling* (3.2 and 3.6) of this Certificate.

### Additional Information

#### NHBC Standards 2022

In the opinion of the BBA, the Nvelope NVF2F Rainscreen Cladding Support System, if installed, used and maintained in accordance with this Certificate, can satisfy or contribute to satisfying the relevant requirements in relation to *NHBC Standards, Part 6 Superstructure (excluding roofs)*, Chapter 6.9 *Curtain walling and cladding*, Clauses 6.9.4 *Loads*, 6.9.5 *Supports and fixings*, and 6.9.6 *Durability*.

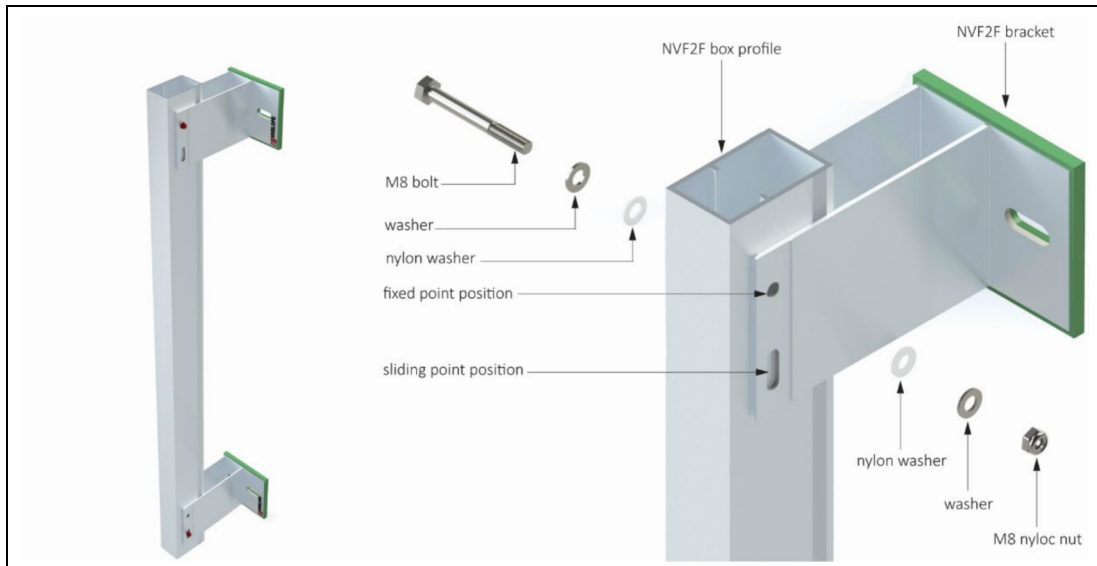
### Technical Specification

#### 1 Description

1.1 The Nvelope NVF2F Rainscreen Cladding Support System is typically attached to the end of the floor slab, to support the cladding on the external or internal wall structure of buildings (see Figure 1), and consists of:

- NVF2F Brackets — brackets fitted to the substrate using appropriate fixings (outside the scope of this Certificate):
  - brackets have a leg length of 72 to 222 mm (see Figure 2 and Table 1)
  - brackets have a height of 100 mm. They are supplied with two base hole-diameter sizes of 37 x 12.5 mm
  - brackets have a thickness of 3.0 mm, with a standard foot width of 110 mm
  - brackets feature a 5 mm thick polypropylene isolator/thermal break (insulating properties outside the scope of this Certificate) fitted to the foot
- NVF2F box profiles — rails of Box and 'T' Box profile with a 3.0 mm thickness and the dimensions shown in Figure 2, fixed to the NVF2F brackets using M8 bolts, which provide a fixing area for the cladding panels. Lengths are project specific, up to 7200 mm maximum
- NVF2F spigots – 40 x 40 x 200 mm box profiles with a 3.0 mm thickness, used to connect NVF2F box profiles
- brackets and box profiles are uncoated as standard.

Figure 1 Typical rail/bracket arrangement

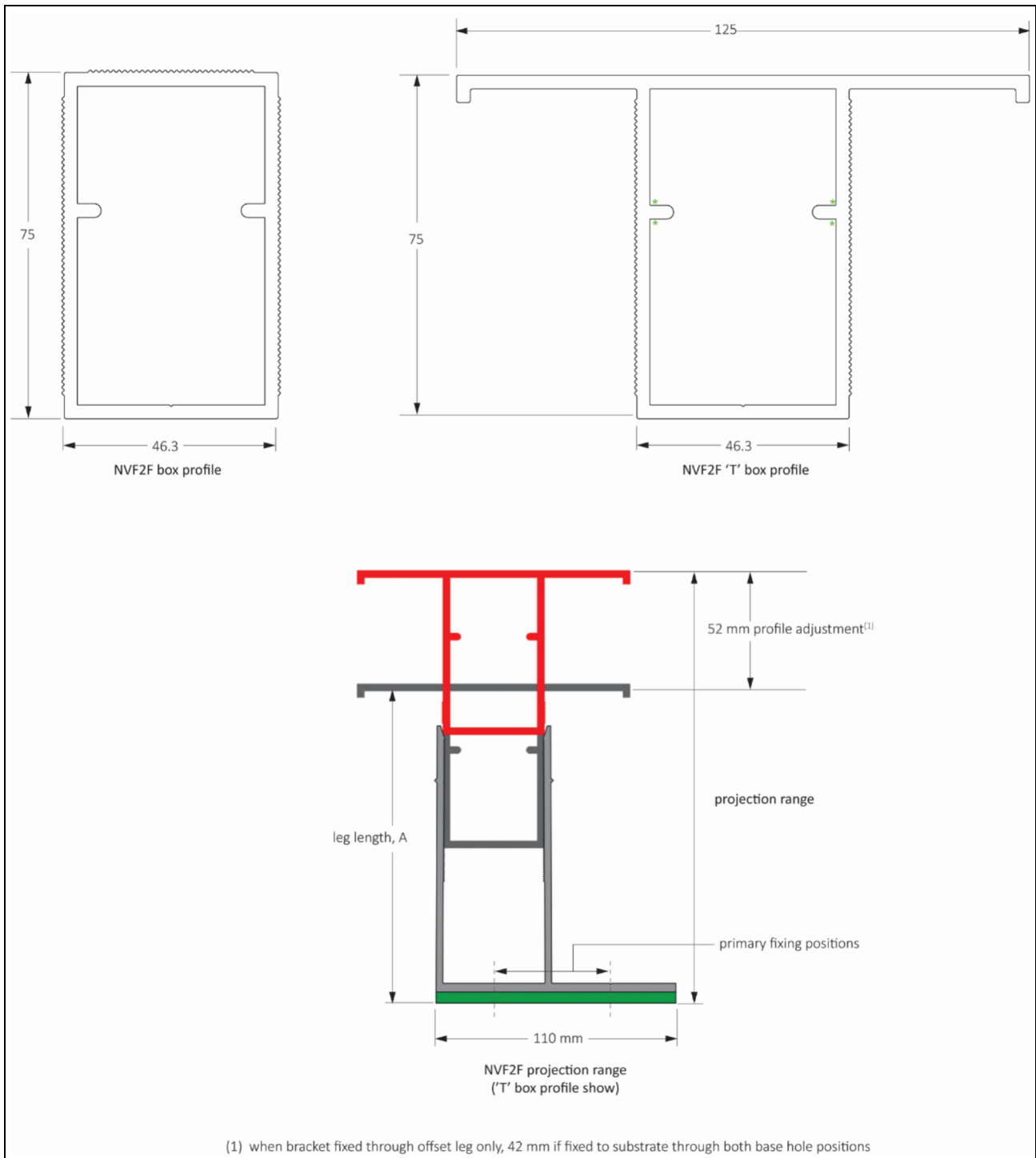


1.2 The components (see Figure 2) are manufactured from aluminium alloy, to a minimum grade of EN AW 6005A T6 to BS EN 573-3 : 2019, with the exception of the Isolator/thermal breaks, which are manufactured from green injection moulded polypropylene.

1.3 The components have the characteristics described in Tables 1 and 2 (see section 6 of this Certificate).

1.4 The brackets are fixed to the end of the floor slab using stainless steel anchors of a predetermined size. The box profiles are secured to the brackets using stainless steel M8 bolts and washers with nylon M8 washers and nyloc nuts as shown in Figure 1.

Figure 2 Component details and projection range



1.5 Components specified for use with the system, recommended by the Certificate holder but outside the scope of this Certificate, include:

- rails can be ordered with anodised or polyester powder coated finishes (uncoated as standard)
- 12 mm diameter primary fixing— stainless steel screw, used as primary fixing to the end of the floor slab
- stainless steel M8 bolts and washers with nylon M8 washers and nyloc nuts, used for fixing NVF2F box profiles to brackets
- SX3 Fastening Screws — 29 mm self-drilling and self-tapping screws made of austenitic stainless steel grade A4 with a washer made of aluminium, or stainless steel A4 with vulcanised EPDM sealant, used to connect NVF2F box profiles using spigots
- vapour permeable membrane (also known as breather membrane) – in line with BS 5250 : 2021
- insulation

- cavity
- cavity barriers
- protection to ventilation openings eg mesh, perforated sheet, or similar
- external cladding (and fixings).

## 2 Manufacture

2.1 The components are manufactured from extruded sections of aluminium alloy with the exception of the isolator/thermal breaks which are made from green injection moulded polypropylene.

2.2 As part of the assessment and ongoing surveillance of product quality, the BBA has:

- agreed with the manufacturer the quality control procedures and product testing to be undertaken
- assessed and agreed the quality control operated over batches of incoming materials
- monitored the production process and verified that it is in accordance with the documented process
- evaluated the process for management of nonconformities
- checked that equipment has been properly tested and calibrated
- undertaken to carry out the above measures on a regular basis through a surveillance process, to verify that the specifications and quality control operated by the manufacturer are being maintained.

2.3 The manufacturer's management systems have been assessed and registered as meeting the requirements of BS EN ISO 9001 : 2015.

## 3 Delivery and site handling

3.1 The aluminium rails are wrapped on pallets. Every pallet carries a label bearing the manufacturer's name.

3.2 Packs of rails should be stacked horizontally, on sufficient bearers to prevent distortion, to a maximum height of one metre. Other components should be stored safely until ready for use.

3.3 The pallets should be stored on a dry, flat and level surface, suitably protected from the weather. Ancillary items should be stored in separate boxes.

3.4 The brackets are delivered to site in cartons of a size suitable for manual handling. Isolation pads, when required, are supplied attached to the base of the aluminium brackets. The cartons are palletted and shrink-wrapped.

3.5 The system components should be handled with care. Damaged items should be discarded.

3.6 Protective clothing should be worn, as required, and all health and safety regulations observed. Care should be taken when handling long lengths of rail, especially at height.

## Assessment and Technical Investigations

The following is a summary of the assessment and technical investigations carried out on Nvelope NVF2F Rainscreen Cladding Support System.

## Design Considerations

### 4 Use

4.1 Nvelope NVF2F Rainscreen Cladding Support Systems, when installed in accordance with this Certificate, are satisfactory for use in back-ventilated and drained cavity rainscreen cladding systems, as well as for internal cladding systems as a sub-frame to support cladding to the end of the floor slab, or the external or internal wall structure, of new and existing buildings.

4.2 The system is applied to the outside of the external or internal wall structures of new or existing buildings, typically spanning floor slab to floor slab. Application must be carried out strictly in accordance with this Certificate and the Certificate holder's instructions, by cladding contractors who are suitably qualified.

4.3 The substrate wall to which the systems are to be fixed must be structurally sound, and satisfy the requirements of the relevant national Building Regulations and Standards.

4.4 It is important for designers, planners, contractors and/or installers to ensure that the system and the substrate wall have adequate structural capacity to support cladding panels in accordance with the design and installation requirements of the cladding panel supplier.

## 5 Practicability of installation

The system is designed to be installed by cladding contractors who are suitably qualified.

## 6 Mechanical resistance and stability

6.1 The substrate wall to which the cladding components are to be fixed should be designed and constructed in accordance with the requirements of the relevant national Building Regulations and Standards.

6.2 Assessment of structural performance of the systems for individual buildings must be carried out by a designer or a suitably qualified and experienced individual to ensure that:

- the support systems and cladding to be supported are compatible
- any thermal expansion effects of both the support systems and the cladding to be supported are taken into account in the design and detailing.
- the specified fixings have adequate tensile and pull-out strength to resist the applied actions
- the fixing of the support brackets to the supporting wall has adequate tensile, shear and pull-out strength, and corrosion resistance (outside the scope of this Certificate). An appropriate number of site-specific pull-out tests must be conducted on the substrate wall to determine the minimum pull-out resistance to failure of the fixings
- The characteristic pull-out resistance to concrete should be determined in accordance with the guidance given in EOTA TR055 : 2018, using 50% of the mean value of the five smallest measured values at the ultimate load.

6.3 The supporting floor slab or wall must be able to resist the gravity load from the self-weight of the cladding, the wind actions and any racking loads, on its own. No contribution from the cladding system may be assumed in this respect.

6.4 The wind actions on the wall should be calculated in accordance with BS EN 1991-1-4 : 2005 and its UK National Annex. Due consideration should be given to the high-pressure coefficients applicable to corners of the building as recommended in this Standard. In accordance with BS EN 1990 : 2002 and its UK National Annex, it is recommended that partial load factors are used to determine the ultimate wind load to be resisted by the system.

6.5 A combination of horizontal and vertical actions must be checked by an appropriately qualified design engineer, in accordance with BS EN 1999-1-1 : 2007 and BS EN 1999-1-3 : 2007, and their UK National Annexes, in conjunction with BS EN 1990 : 2002 and all relevant standard parts and its corresponding UK National Annex.

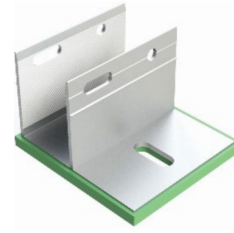
6.6 For combined loads, check that (actual vertical load / allowable vertical load) + (actual horizontal load/allowable horizontal load)  $\leq$  1.0, in line with BS EN 1999-1-1 : 2007.



6.7 Details of the brackets, with their design loadbearing resistances, are shown in Table 1. The design loadbearing resistance of the connections should be greater than that of the bracket and adaptor as tabulated.

**Table 1 NVF2F Bracket — design resistances (for bracket out-stand leg)**

Bracket leg length (A) <sup>(1)</sup> (mm)	Projection range <sup>(2)</sup> (mm)	Design resistance (kN) <sup>(3)(4)</sup>	
		Vertical (shear)	Horizontal (axial)
72	79 – 127	8.81	15.94
122	125 – 177	8.00	11.24
172	175 – 227	5.00	7.68
222	225 – 277	1.27	7.02



- (1) Includes isolator/thermal break (see Figure 2).
- (2) Distance between back face of isolator pad to face of rail profile, assuming fixing to offset leg only (see Figure 2).
- (3) Unfactored loads limited to lower of tested ULS or 6 mm maximum deflection.
- (4) Partial material factor of 1.1 applied in line with BS EN 1999-1-1 : 2007 and its UK National Annex.

6.8 The geometric properties of the box profiles (Box and 'T' Box Profiles) can be found in detail in Table 2, for use by the structural designer for the rail design.

**Table 2 Box and 'T' Box Profile section details**

	Dimension		thickness (mm)	area (mm <sup>2</sup> )	Second moment of area		Product of Inertia <i>I<sub>xy</sub></i> (mm <sup>4</sup> )	Radius of gyration		Distance to centre of gravity	
	X	Y			<i>I<sub>xx</sub></i>	<i>I<sub>yy</sub></i>		Axis x-x	Axis y-y	x	y
	(mm)	(mm)			(mm <sup>4</sup> )	(mm <sup>4</sup> )		(mm)	(mm)	(mm)	(mm)
F2F Box Profile	47.3 <sup>(1)</sup>	75.5 <sup>(2)</sup>	3	744	542851	264554	0	27	18.9	23.65	38.3
F2F T Box Profile	125	75	3	988	767665	793241	0	27.9	28.3	62.5	46.9

- (1) Including 0.5 mm deep corrugations to side of profile. See Figure 2.
- (2) Including 0.5 mm deep corrugations to face of profile. See Figure 2.

6.9 Details of the bolts for connecting the support rails to the brackets can be found in section 1.5 and Figure 1.

6.10 The design of the rails and associated connections must satisfy the requirements of BS EN 1999-1-1 : 2007, using the mechanical properties of the aluminium grade adopted. Mid-span deflections should be limited to span/200 and cantilever deflections limited to span/150.

6.11 To allow for deflection limits used in Table 1, a minimum rail gap of 10 mm is recommended.

6.12 In general, the rails should be fixed at mid-length using normal clearance holes (fixed point), and allowed to expand toward the ends using slotted holes (flexible or sliding point) (see Figures 1 and 2). When single spanning between floor slabs, one rail end will be a fixed point and the other end a flexible or sliding point. To allow for expansion, a minimum gap of 2.5 mm per metre length should be provided. For calculation purposes, the coefficient of thermal expansion for aluminium may be taken as  $23 \times 10^{-6} \cdot K^{-1}$ . Existing movement joints in the supporting structure should be maintained through the rail system. For three-metre-long rails, a gap of 10 to 15 mm between adjacent rails is recommended.

6.13 The design and the installation must be checked by a suitably competent and experienced engineer or other appropriately qualified person.

6.14 Any insulation behind the cladding must be suitably fixed to the supporting wall and protected, to resist the forces of wind suction. Insulation should be, at least, of the semi-rigid type (eg boards or batts).

**Impact loading**

6.15 The impact resistance of a cladding system is a function of the support framing arrangement and the cladding panel used. The structural engineer should ensure that the cladding system incorporating the Nvelope NVF2F

Rainscreen Cladding Support System has adequate impact resistance for the support frame arrangement and cladding panels used, for the intended use category as defined in EAD 090062-00-0404 : 2018, Table G.2, which is reproduced (in part) in Table 3 of this Certificate.

*Table 3 Definition of impact use categories (reproduced from EAD 090062-00-0404 : 2018)*

Use Category	Description
I	A zone readily accessible at ground level to the public and vulnerable to hard body impacts but not subjected to abnormally rough use.
II	A zone liable to impacts from thrown or kicked objects, but in public locations where the height of the kit will limit the size of the impact; or at lower levels where access to the building is primarily to those with some incentive to exercise care.
III	A zone not likely to be damaged by normal impacts caused by people or by thrown or kicked objects.
IV	A zone out of reach from ground level.

## 7 Behaviour in relation to fire



7.1 The aluminium NVF2F brackets, rails and associated rail-to-bracket fixings have a reaction to fire classification of A1 in accordance with BS EN 13501-1 : 2018 and are not subject to any restriction on building height or proximity to boundaries.

7.2 Aluminium NVF2F brackets feature polypropylene isolator/thermal breaks, used for isolation and to reduce the risk of thermal bridging across the bracket/wall interface. They are largely protected by the cladding panels and, considered to be present in relatively small quantities, are unlikely to significantly affect the overall fire performance of the cladding.

7.3 The aluminium components are non-toxic during fabrication and in normal use and do not produce toxic effects when exposed to fire.

7.4 Designers should refer to the relevant national Building Regulations and guidance for detailed conditions of use, particularly in respect of requirements for substrate fire performance, cavity barriers, service penetrations and combustibility limitations for other materials and components used in the overall wall construction, for example, thermal insulation or external cladding.

## 8 Drainage and ventilation

8.1 The system, when incorporated in back-ventilated and drained cavity rainscreen cladding systems, will not have an adverse effect on the removal of water from the cavity by drainage and ventilation.

8.2 For the effective removal of moisture from the cavity, a minimum ventilation area of 5000 mm<sup>2</sup> per metre run of cladding must be provided at the building base point and at the roof edge. To prevent the ingress of birds, vermin, insects and/or rain, all ventilation openings should be suitably protected with a ventilation protection mesh, perforated sheet or similar, or should be baffled.

8.3 The air space between the back of the cladding panels and the supporting wall (or insulation where installed within the cavity) should be as wide as possible, allowing for normal building tolerances. Guidance on recommended cavity widths is given in *NHBC Standards 2022*, Chapter 6.9, Clause 6.9.18 *Rainscreen Cladding*.

8.4 The ventilation pathways behind the cladding must not be allowed to become blocked, or the insulation dislodged, where it may be vulnerable to wetting.

## 9 Maintenance

The system is confined behind the cladding panels and does not require special maintenance.

## 10 Durability



10.1 The system, when used as prescribed in this Certificate, can be expected to have a service life in excess of 35 years in normal UK conditions.

10.2 NVF2F brackets should be used with polypropylene isolator/thermal breaks (supplied with the brackets) when used with cement-based materials or where there is a risk of bi-metallic contact. Unprotected aluminium interacts with these materials, resulting in severe corrosion.

## 11 Reuse and recyclability

The polypropylene and aluminium components can be recycled.

## Installation

## 12 General

12.1 The system must be installed in accordance with the manufacturer's recommendations, the requirements of this Certificate, and any specifications laid down by the project consulting engineer or designer.

12.2 The Certificate holder can provide technical assistance at the design stage, and installation assistance at the start of the installation.

## 13 Procedure

13.1 Based on a preliminary survey of the wall and architectural/structural design, a grid layout for the sub-frame is first prepared.

13.2 The brackets (with isolator pad, if required) are fixed to the end of the floor slab or substrate wall using stainless steel fixings of an appropriate size as determined by design (see sections 1.5, 6.2 and 6.4).

13.3 The box profiles are inserted into the brackets and, after adjustment for line and level, fixed to the brackets using M8 bolts, as determined by design (see sections 1.5, 6.8 and 13.4). To allow the M8 bolt to be installed, fully drill through the box profile at the relevant fixed or sliding point location on the bracket, using a suitable 9 mm drill bit.

13.4 The box profiles are normally attached to the end of the floor slab or substrate wall to span one or more storey heights. The box profiles are normally anchored at the top bracket position using the round holes on the brackets (fixed point/dead loads) and allowed to expand at all other bracket position using the elongated holes on the brackets (flexible point).

13.5 Where specified, NVF2F spigots slide into and are used to connect NVF2F box profiles. Fixed through the side of the lower box profile with a SX3 fastener at a minimum distance of 20 mm from the box profile end to allow the upper box profile to remain free for thermal expansion.

13.6 Where specified, insulation should be tightly butted around the brackets and secured to the substrate wall using the appropriate fixings.

13.7 Where required to protect the substrate wall or insulation from wind-driven rain, an appropriate vapour permeable membrane should be applied to the surface. Guidance on recommended vapour control is given in *NHBC Standards 2022*, Chapter 6.9, Clause 6.9.9 *Damp proofing and vapour control*.

13.8 Cladding panels (outside the scope of this Certificate) deemed to be compatible with the system are appropriately fixed to the vertical rails.

## Technical Investigations

### 14 Tests

Tests were carried out and the results assessed to determine:

- bracket ultimate limit strength
- bracket compression and shear strength when deflection limited.

### 15 Investigations

15.1 The manufacturing process was evaluated, including the methods adopted for quality control, and details were obtained of the quality and composition of the materials used.

15.2 An assessment was made to the system in relation to:

- resistance to permanent and variable actions
- section properties for profiles
- behaviour in relation to fire
- durability.

15.3 Based on a visit to a site installation, an assessment was made of the system practicability of installation and performance in use.

## Bibliography

BS 5250 : 2021 *Management of moisture in buildings. Code of practice*

BS EN 573-3 : 2019 *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition and form of products*

BS EN 1990 : 2002 + A1: 2005 *Eurocode — Basis of structural design*

NA to BS EN 1990 : 2002 + A1 : 2005 *UK National Annex for Eurocode — Basis of structural design*

BS EN 1991-1-4 : 2005 + A1 : 2010 *Eurocode 1: Actions on structures — General actions — Wind actions*

NA to BS EN 1991-1-4 : 2005 + A1 : 2010 *UK National Annex to Eurocode 1 — Actions on structures — General actions — Wind actions*

BS EN 1999-1-1 : 2007 + A2 : 2013 *Eurocode 9 Design of aluminium structures — General structural rules*

NA to BS EN 1999-1-1 : 2007 + A1 : 2009 *UK National Annex to Eurocode 9 — Design of aluminium structures — General structural rules*

BS EN 1999-1-3 : 2007 + A1: 2011 *Eurocode 9 — Design of aluminium structures — Structures susceptible to fatigue*

NA to BS EN 1999-1-3 : 2007 + A1 : 2011 *UK National Annex to Eurocode 9 — Design of aluminium structures — Structures susceptible to fatigue*

BS EN ISO 9001 : 2015 *Quality management system — Requirements*

EAD 090062-00-0404 : 2018 – *Kits for external wall claddings mechanically fixed*

EOTA TR055 : 2018 *Design of fasteners based on EAD 330232-00-0601*

### 16 Conditions

16.1 This Certificate:

- relates only to the product/system that is named and described on the front page
- is issued only to the company, firm, organisation or person named on the front page – no other company, firm, organisation or person may hold or claim that this Certificate has been issued to them
- is valid only within the UK
- has to be read, considered and used as a whole document – it may be misleading and will be incomplete to be selective
- is copyright of the BBA
- is subject to English Law.

16.2 Publications, documents, specifications, legislation, regulations, standards and the like referenced in this Certificate are those that were current and/or deemed relevant by the BBA at the date of issue or reissue of this Certificate.

16.3 This Certificate will remain valid for an unlimited period provided that the product/system and its manufacture and/or fabrication, including all related and relevant parts and processes thereof:

- are maintained at or above the levels which have been assessed and found to be satisfactory by the BBA
- continue to be checked as and when deemed appropriate by the BBA under arrangements that it will determine
- are reviewed by the BBA as and when it considers appropriate.

16.4 The BBA has used due skill, care and diligence in preparing this Certificate, but no warranty is provided.

16.5 In issuing this Certificate the BBA is not responsible and is excluded from any liability to any company, firm, organisation or person, for any matters arising directly or indirectly from:

- the presence or absence of any patent, intellectual property or similar rights subsisting in the product/system or any other product/system
- the right of the Certificate holder to manufacture, supply, install, maintain or market the product/system
- actual installations of the product/system, including their nature, design, methods, performance, workmanship and maintenance
- any works and constructions in which the product/system is installed, including their nature, design, methods, performance, workmanship and maintenance
- any loss or damage, including personal injury, howsoever caused by the product/system, including its manufacture, supply, installation, use, maintenance and removal
- any claims by the manufacturer relating to CE marking.

16.6 Any information relating to the manufacture, supply, installation, use, maintenance and removal of this product/system which is contained or referred to in this Certificate is the minimum required to be met when the product/system is manufactured, supplied, installed, used, maintained and removed. It does not purport in any way to restate the requirements of the Health and Safety at Work etc. Act 1974, or of any other statutory, common law or other duty which may exist at the date of issue or reissue of this Certificate; nor is conformity with such information to be taken as satisfying the requirements of the 1974 Act or of any statutory, common law or other duty of care.



# NV**F2F** Installation guide

# Component guide

**NVELOPE floor to floor (NVF2F) brackets and framework provide a framing system capable of larger spans than other bracket systems. Brackets are anchored to the building using primary fixings, and each bracket allows for final alignment and adjustment to suit the external cladding.**

## Brackets

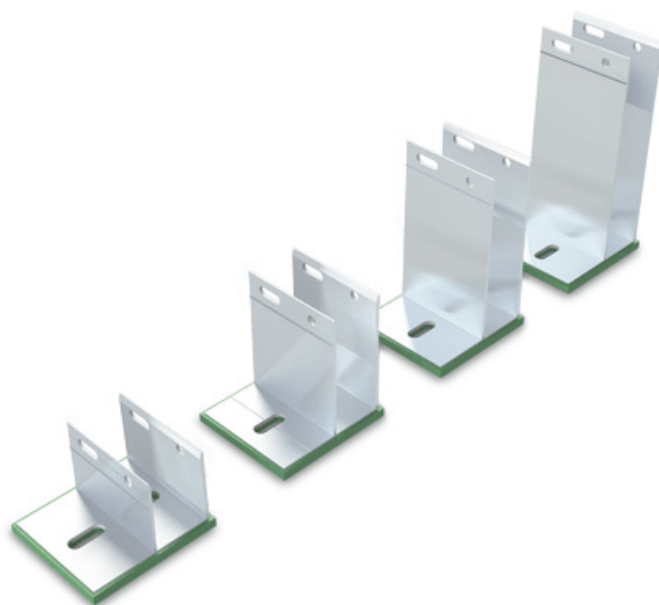
NVF2F brackets are supplied in different sizes ranging from 72 mm to 222 mm. See table below for cavity depths that can be formed with the NVF2F system.

All brackets are supplied with hole sizes of 12.5 mm.

The NVF2F system is suitable for spanning between floor levels. Fixed and sliding points are determined by the rail fixing position.

## Range of adjustment

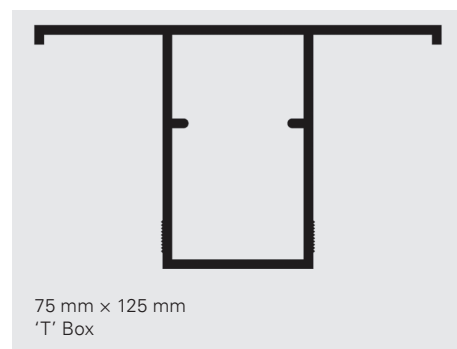
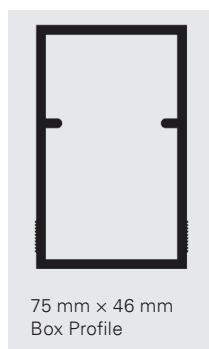
Size (mm)	Min (mm)	Max (mm)
72	79	127
122	125	177
172	175	227
222	225	277



## Box profiles

NVF2F box profiles are made from 6005A-T6 Aluminium.

They are extruded specifically to suit each project, with standard lengths of 3.6 m, and up to a maximum length of 7.2 m.



## Fixings

Description	Article number	Image
Primary Fixing: MULTI-MONTI® Concrete Fixing	1520732	
Secondary Fixing: SX3 Fixing (Spigot)	1141978	
Secondary Fixing: includes M8 Bolt, M8 Washer, Nylon M8 Washer, M8 Nyloc Nut	1600079	

# Installation guide

## 1. Secure NVF2F brackets to concrete substrate

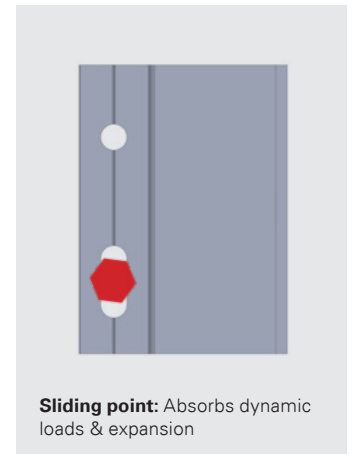
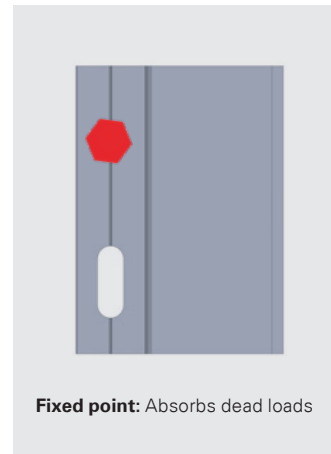
- 1.1 Position the brackets at slab level.
- 1.2 Secure NVF2F brackets directly to the new/existing concrete substrate or structural steel frame using the MULTI-MONTI® primary anchor fixing.

**Note:** Due to the nature of the system, site pull-out tests are recommended for NVF2F. Please liaise directly with SFS for technical guidance on pull-out data.

## 2. Insert box profiles

Once a line of NVF2F brackets have been installed, 75 mm × 46 mm box profile or 75 mm × 125 mm T box profile can be slotted into the bracket leg at each position. It is important that time is taken to align/level the framework to a high standard.

- 2.1 Place the profiles in each of the brackets using the slot.
- 2.2 Move the profile into its vertical position allowing 10–15 mm 'expansion' between profiles.
- 2.3 Ease the profile outwards to form the specified cavity depth.
- 2.4 Check for line and level.
- 2.5 Secure the profile using M8 nut and bolt through holes created at the relevant fixed and sliding positions – please refer to Project Builder output for correct bracket positioning, fixed and sliding point positions.



## 3. Affix box profiles

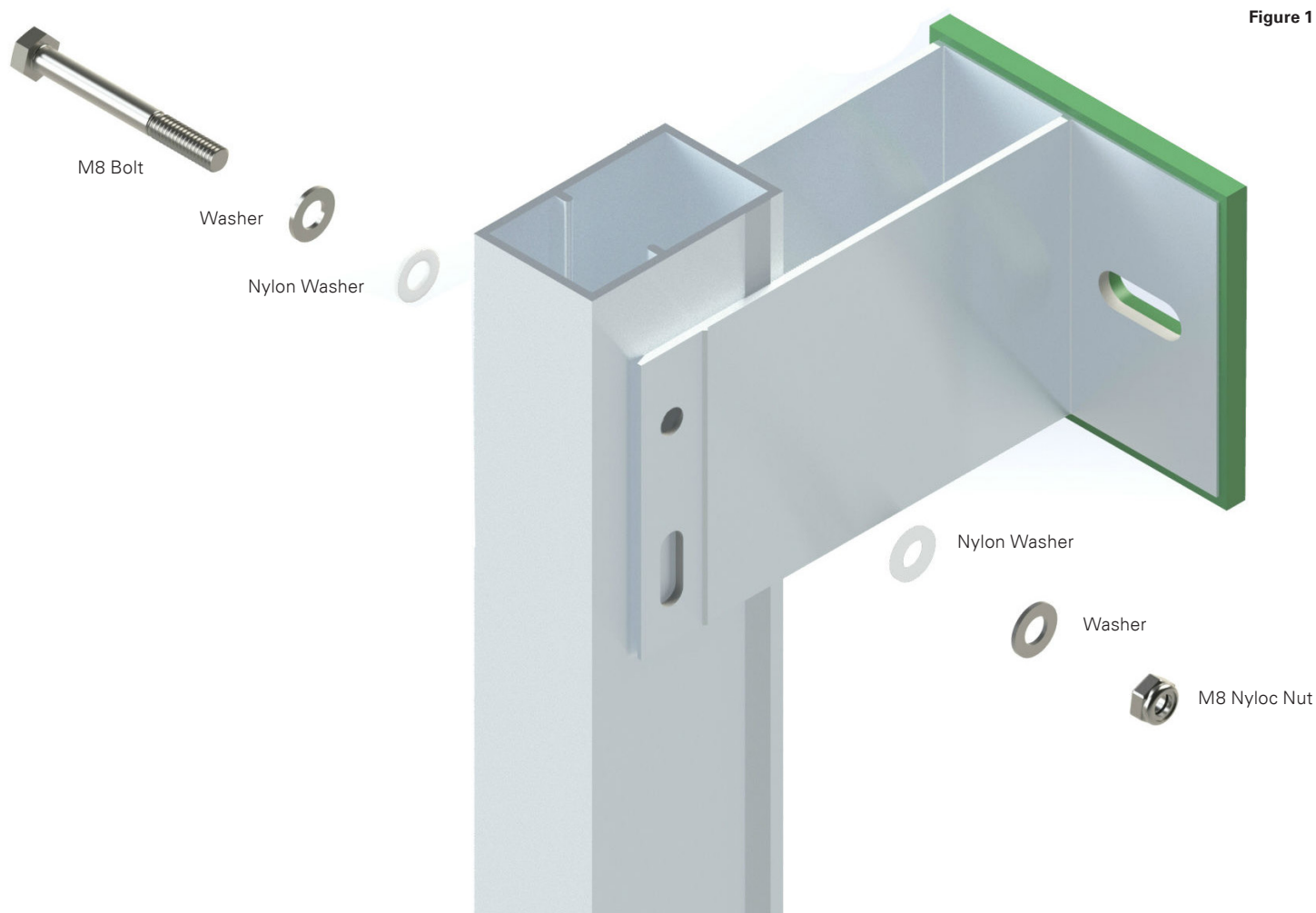
Once the brackets have been fixed to the substrate, and the box profiles have been adjusted for line and level, the box profiles are then secured through relevant fixed and sliding points located on the brackets.

As each profile is secured to the brackets, the top position bracket must be connected in the Fixed Point position. The bottom position bracket should be fixed in the Sliding Point position.

- 3.1 Using a suitable 9 mm drill bit, drill through the relevant fixed or sliding point location to allow an M8 bolt to be installed.
- 3.2 Ensure that the M8 bolt is installed correctly, observing the position of the nylon washers to separate the metal washer from the bracket. See Figure 1.

Get in touch  
for a project  
specific static  
calculation

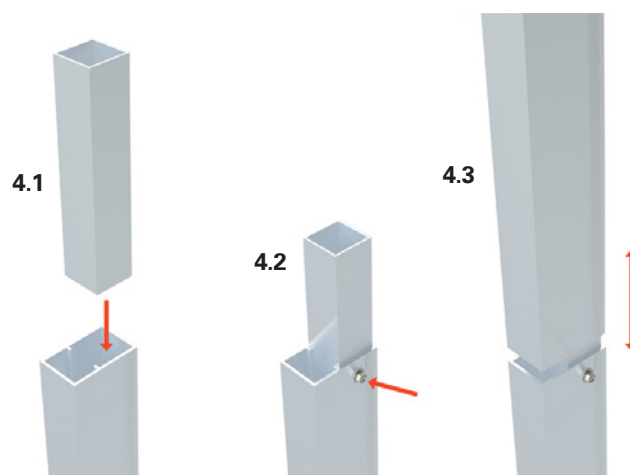
# Installation guide



## 4. Join NVF2F box profiles together

Spigots are used to join NVF2F box profiles together by securing at one end and slotting into the next profile to be installed. This allows for thermal expansion as the profile is free to move in a vertical orientation.

- 4.1** Insert spigot into NVF2F box profile channel to the half way position.
- 4.2** Fix the spigot through the side of the lower box profile using a 29 mm SX3 fixing.
- 4.3** The next box profile is then installed by slotting over the spigot but do not fix, the profile must remain free to move allowing for thermal expansion.



# Installation guide

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## 5. Check over

Once all brackets and profiles are installed to an area of cladding, final checks should be carried out:

- On the MULTI-MONTI® primary anchor torque settings
- To the line and level of the NVELOPE profiles in relation to each other
- To the position of bolts in each NVELOPE bracket

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## 6. Install panels

- 6.1** Check profile positions in relation to actual panel positions and joints.
- 6.2** Raise the panel and support in horizontal position.
- 6.3** Adjust level and height of panel before fitting next panel above.
- 6.4** Repeat on next panels.
- 6.5** Panel joints should follow the manufacturers recommendations re: joint gaps horizontal and vertical.

**Note:** Typically, profiles are cut so that the panel(s) are located on one set of vertical profiles and do not 'bridge' an expansion gap between two profiles.

## Notes

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### Fixings

Suitable primary anchors are designed to fix the brackets to a pre-determined grid to suit the cladding panel layout. Stainless steel fixings also assist in preventing bimetallic corrosion.

The size and type of primary fixing for the connectors will always be determined by the dynamic and dead loads they have to resist. Please liaise with us if you need further details.

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### Insulation

Where insulation is specified, it should be cut and tightly butted around the brackets and secured with the appropriate fixings. Sufficient insulation fixings should be provided to ensure that the insulation cannot block the ventilated cavity.



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## B1. Rockpanel- Recommendation form.Project related fixing distance calculation



Recommendation form  
Project related fixing distance calculation

Project-no.:	UK 2026 022
Project name:	Bentinck Rd, Yiewsley
Location:	25 Bentinck Rd, Yiewsley
Postal code / address:	West Drayton UB7 7RG
Document reference:	UK 2026 022 – A2 9 mm soffit
Date:	February 11, 2026
Contact person Rockpanel:	Mr. Darren Gormer, Tel +44 7880 007427

## 1. Basic data <sup>1</sup>

to determine the fixing distances of Rockpanel façade boards:

Location:	West Drayton UB7 7RG
Distance to town border:	1 < d < 5 km
Distance to coast:	10 < d < 100 km
Site altitude:	28 m
Terrain category:	town
Basic wind velocity:	21.5 m/s
Maximum building height:	17 m
Application:	Soffit
Sub-construction:	Aluminium
Product Quality:	A2
Product Design:	Colours
Board thickness:	9 mm
European Technical Assessment:	ETA-13/0340 - Rockpanel A2 9 mm

<sup>1</sup> The determination of the basic data was carried out by the client's building information.

### Links:

Rockpanel boards need to be applied well-ventilated and with a proper water drainage, in all according ETA and our guidelines / documentation. On the website additional information can be found and downloaded.

[Rockpanel \(rockpanel.co.uk\)](http://rockpanel.co.uk)

## 2. Remarks

The calculation was made by Technical Service of Rockpanel. This calculation does not constitute a static verification and is intended as orientation. For further questions, please contact your Rockpanel contact person.

ROCKWOOL B.V. / Rockpanel recommends the application of non-combustible (Euroclass A1 – A2) cladding and insulation for high-rise buildings and high-risk buildings. The Euroclass reaction to fire classification for all Rockpanel products are based on tests with non-combustible mineral wool insulation. See the relevant Declaration of Performance and or ETA for the field of application of the classification.

### 3. Fastening system

#### Aluminium sub-construction

The panels are attached to the building by fixing to a sub-frame of aluminium. The minimum thickness of the vertical aluminium profiles is 1.5 mm. The aluminium quality is AW-6060 according to EN 755-2. The  $R_m/R_{p0,2}$  value is  $\geq 170/140$  for profile T6 and  $\geq 195/150$  for profile T66.

#### Rivets

Rockpanel aluminium rivets for fixing onto an aluminium sub-frame according to ETA and Rockpanel guidelines.

- Rivet, head diameter 14 mm, shank diameter 5 mm, EN AW-5019 (AlMg5).
  - A2 9 mm:
 

supplier	code
SFS	AP14-50180-S
MBE	FN-AI5-5x18 K14
- **For correct fixing, a riveting tool with rivet spacer must be used, see ETA annex 3 Table 8.4.**

Table 1: Hole dimensions [mm] for Rockpanel boards mechanically fixed

Fixing type	Fixed point	Moving point	Slotted points	Board dimensions considered
Rivet [a]	5.1	8.0	5.1 x 8.0	1200 x 3050
Edge distances: $a_{R1} \geq 20$ mm and $a_{R2} \geq 50$ mm				

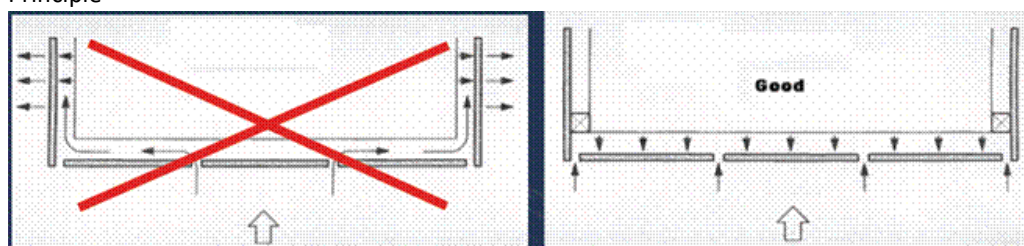
[a] For correct fixing, a riveting tool with rivet spacer must be used.

#### Pressure equalization cannot be applied

Pressure equalization cannot be applied because the joints are closed with an aesthetical profile or one of the other pre-conditions for reduction of the wind load with pressure equalization is not fulfilled.

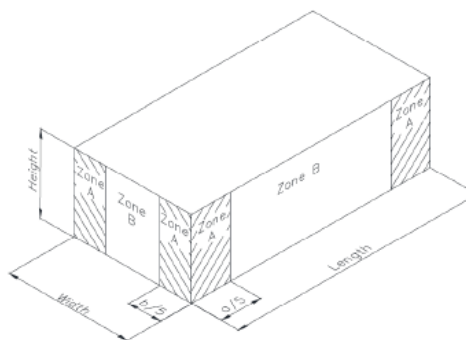
When joints are open, the use of cavity closers on the corners of the facades are recommended to prevent accumulation of the wind load (see picture beneath).

#### Principle



## 5. Calculation

Calculated for a horizontal (soffit) application according to BS-EN 1991-1-4. The calculation is based upon the maximum wind load at zone A as shown in the picture on the right.



$$q_p \times c_p \times \gamma_f = -0.96 \times 1.5 = -1.45 \text{ kN/m}^2$$

*Customers are recommended to have our calculation and/or technical advice on their specific projects confirmed by the involved architects, specialist engineers, designers and/or contractors. This calculation does not constitute a static verification and is purely intended as orientation. ROCKWOOL B.V / Rockpanel cannot warrant the completeness and accuracy of the information stated, the performance of its products, the calculation and/or any advice based on this.*

- Application of 1 field span has to be calculated separately.
- Application in 2 field span or more (b).

Weight of the board in a horizontal application: **11.25 kg/m<sup>2</sup>**

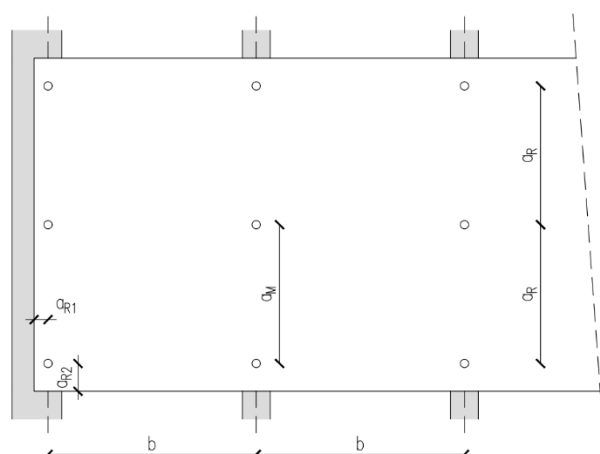
Table 2: Partial factors for material properties and resistances

Rockpanel	$\gamma_M$	2.00
Partial load factor	$\gamma_F$	1.50
Aluminium rivet / aluminium profile	$\gamma_m$	1.25
Timber constructions	$\gamma_m$	1.30

### 5.1 Recommendation for an application of 2 or more field span:

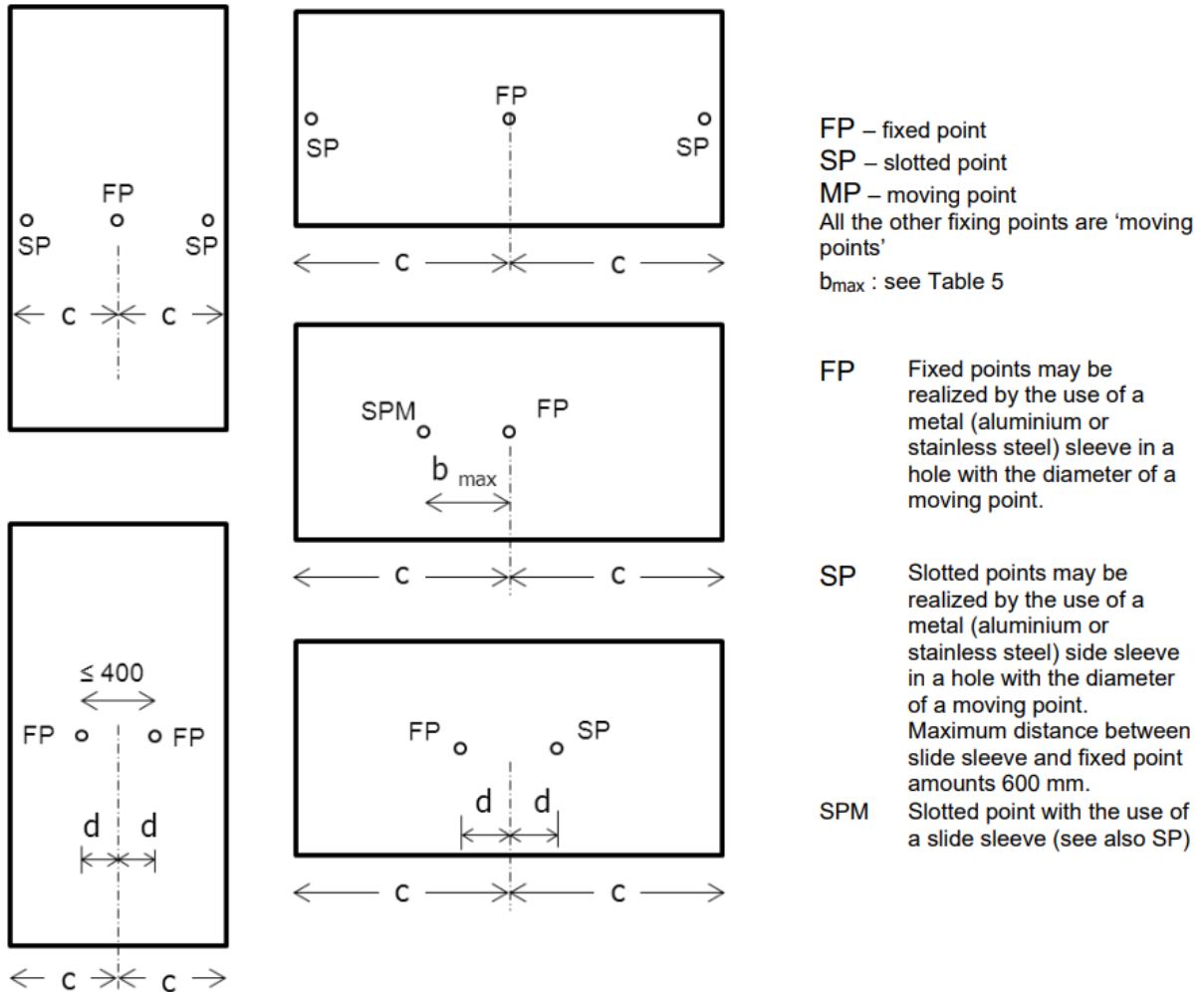
Application in 2 field span (b) or more and 3 or more fixings (a).  
Fixed with Rivets onto a Aluminium subframe.

Maximum span (b): **600 mm (c/cs)**  
 Maximum distance between fixings ( $a_m / a_R$ ): **320 mm**  
 Edge distances:  $a_{R1} \geq 20 \text{ mm}$   
 $a_{R1} \geq 50 \text{ mm}$



## Annex 1. Examples of possible installation methods

Figure 1: Examples of possible installation methods with the use of fixed points and slotted points





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