Designated according to The Construction Products (Amendment etc.) (EU Exit) Regulations 2020

UK Technical Assessment	UKTA-0836-22/6561 of 03/02/2023
Technical Assessment Body issuing the UK Technical Assessment:	British Board of Agrément
Trade name of the construction product:	Hilti S-MDW; Hilti S-MDU
Product family to which the construction product belongs:	Product code 33 - Fixings *Fastening screws for metal members and sheeting*
Manufacturer:	Hilti Corporation Feldkircherstrasse 100, 9494 Schaan Liechtenstein
Manufacturing plant(s):	Hilti AG, Plant 6522
This UK Technical Assessment contains:	18 pages including 11 annexes which form an integral part of the document
This UK Technical Assessment is issued in accordance with The Construction Products (Amendment etc.) (EU Exit) Regulations 2020 on the basis of:	UKAD 330046-01-0602 *Fastening screws for metal members and sheeting*

1. Technical description of the product

The fastening screws are self-drilling screws made of carbon steel with anticorrosion coating (listed in Table 1). The fastening screws are normally completed with sealing washers consisting of metal washer and EPDM seal.

Table 1 – Fastening screws of the corresponding UKTA and their field of application.

Annex	Product	Washer	Component I	Component II
1	General Annex - Terms and explanations			
2	General Annex - Design			
3	General Annex – Installation and additional provisions			
4	Drawings and materials of the screws			
5	Regulations for perforated steel sheets			
6	Regulations for perforated steel sheets			
7	S-MDU 21 Z 6,3xL S-MDU 21 C 6,3xL	none	Steel S280GD to S420GD 0,63 mm ≤ t_I ≤ 2,00 mm	Steel S280GD to S420GD 0,63 mm ≤ t_{II} ≤ 2,00 mm
8	S-MDW 01 Z 6,5xL S-MDW 01 C 6,5xL	none	Steel S280GD to S450GD 0,40 mm ≤ t_I ≤ 1,50 mm	Structural timber
9	S-MDW 51 Z 6,5xL S-MDW 51 C 6,5xL	16 mm	Steel S280GD to S450GD 0,40 mm ≤ t_I ≤ 1,50 mm	Structural timber
10	S-MDW 61 Z 6,5xL S-MDW 61 C 6,5xL S-MDW 71 Z 6,5xL S-MDW 71 C 6,5xL	19 mm 22 mm	Steel S280GD to S450GD 0,40 mm ≤ t_I ≤ 1,50 mm	Structural timber
11	S-MDW 01 Z 6,5xL S-MDW 01 C 6,5xL S-MDW 51 Z 6,5xL S-MDW 51 C 6,5xL S-MDW 61 Z 6,5xL S-MDW 61 C 6,5xL S-MDW 71 Z 6,5xL S-MDW 71 C 6,5xL	none 16 mm 19 mm 22 mm	Aluminium alloy with Rm ≥ 185 N/mm^2 0,40 mm ≤ t_I ≤ 2,00 mm	Structural timber

2. Specification of the intended use(s) in accordance with the applicable UK Assessment Document (hereinafter UKAD)

The fastening screws are intended to be used for fastening metal sheeting made of steel according to EN 10346: 2015 or aluminium alloy according to EN 485-3: 2003 or EN 573-3: 2019 + A1: 2022, to substructures made of structural timber according to EN 14081-1: 2016 + A1: 2019, or substructures made of steel according to EN 10346: 2015. The sheeting can either be used as wall or roof cladding, or as load bearing wall and roof element. The fastening screws can also be used for the fastening of any other thin gauge metal members. The intended use comprises fastening screws and connections for indoor and outdoor applications.

Fastening screws which are intended to be used in external environments with ≥ C2 corrosion according to the standard EN ISO 12944-2: 2017 are made of stainless steel. Furthermore, the intended use comprises connections with predominantly static loads (e.g., wind loads, dead loads). The fastening screws are not intended for re-use.

The performances given in Section 3 are only valid if the fastening screws are used in compliance with the specifications and conditions given in Annex 1 to 11.

The provisions made in this United Kingdom Technical Assessment are based on an assumed intended working life of the screws of 25 years.

The indications given on the intended working life cannot be interpreted as a guarantee given by the producer or the Technical Assessment Body but are to be regarded only as a means for selecting the appropriate products in relation to the expected economically reasonable working life of the works.

The real working life might be, in normal use conditions, considerably longer without major degradation affecting the Basic requirements for construction works.

3. Performance of the product and references to the methods used for its assessment.

Performances of the fasteners, related to the basic requirements for construction works (hereinafter BWR), were determined according to UKAD 330046-01-0602.

These performances, given in the following paragraphs, are valid if the components are the ones described in § 1 and Annexes 1 to 11 of this UKTA.

3.1. Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Shear resistance of the connection	See Annex to this UKTA
Tension resistance of the connection	See Annex to this UKTA
Design resistance in case of combined tension and shear forces (interaction)	See Annex 2 to this UKTA
Check of deformation capacity in case of constraining forces due to temperature	See Annex 2 to this UKTA
Durability	See Annex 4, material of the fasteners

3.2. Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	The screws are made from steel classified as Euroclass A1 in accordance with EN 13501-1: 2018 and Commission Delegated Regulation 2016/364

3.3. Health, hygiene, and the environment (BWR 3)

Regarding dangerous substances, there may be additional legislative requirements falling outside of the scope of this document. These requirements must be complied with as appropriate.

3.4. Safety and accessibility in use (BWR 4)

Not relevant.

3.5. Protection against noise (BWR 5)

Not relevant.

3.6. Energy economy and heat retention (BWR 6)

Not relevant.

3.7. Sustainable use of natural resources (BWR 7)

No performance assessed.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied.

4.1. System of assessment and verification of constancy of performance

According to UKAD No. 330046-01-0602 and Annex V of the Construction Products Regulation (Regulation (EU) 305/2011) as brought into UK law and amended, the system of assessment and verification of constancy of performance (AVCP) 2+ applies.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable UKAD.

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited with the British Board of Agrément and made available to the UK Approved Bodies involved in the conformity attestation process.

5.1. UKCA marking for the product/ system must contain the following information:

- Identification number of the Approved Body
- Name/address of the manufacturer of the product/ system
- Marking with intention of clarification of intended use
- Date of marking
- Number of Certificate of Conformity of Factory Production Control
- UKTA number.

On behalf of the British Board of Agrément 	
Date of Issue: 3 February 2023	**Hardy Giesler** Chief Executive Officer

British Board of Agrément,
1st Floor Building 3,
Hatters Lane,
Croxley Park
Watford
WD18 8YG

ANNEX

This annex applies to the product described in the main body of the UK Technical Assessment.

Annex 1 – Terms and explanations

Annex 2 – Design

Annex 3 – Installation and additional provisions

Annex 4 – Drawings and materials

Annex 5 – Steel sheeting with hole pattern

Annex 6 – Steel sheeting with hole pattern

Annex 7 – Self-drilling screw

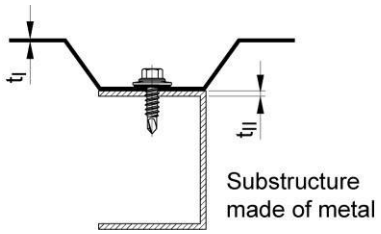
Annex 8 – Self-drilling screw

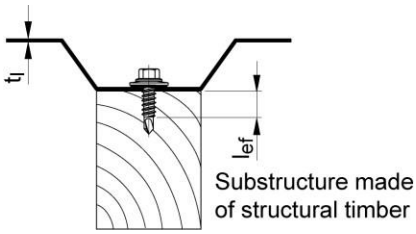
Annex 9 – Self-drilling screw

Annex 10 – Self-drilling screw

Annex 11 – Self-drilling screw

Examples of execution of a connection





Materials and dimensions

Design relevant materials and dimensions are indicated in the Annexes of the fastening screws:

Fastener	Material of the fastening screw
Washer	Material of the sealing washer
Component I	Material of the metal member or sheeting
Component II	Material of the substructure
t_I	Thickness of component I
t_{II}	Thickness of component II
l_{ef}	Effective screw-in length in component II made of structural timber (without drill point)

The thickness t_{II} corresponds to the load-bearing screw-in length of the fastening screw in component II if the load-bearing screw-in length does not cover the entire component thickness.

Performance characteristics

The design relevant performance characteristics of a connection are indicated in the Annexes of the fastening screws:

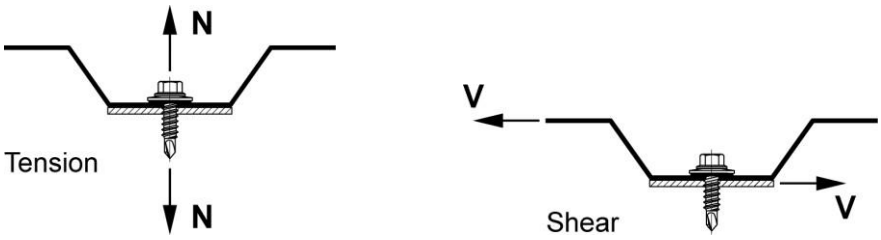
$N_{R,k}$	Characteristic value of tension resistance
$V_{R,k}$	Characteristic value of shear resistance

In some cases, component-specific performance characteristics are indicated for an individual calculation of the design relevant performance characteristics of a connection:

$N_{R,I,k}$	Characteristic value of pull-through resistance for component I
$N_{R,II,k}$	Characteristic value of pull-out resistance for component II
$V_{R,I,k}$	Characteristic value of hole bearing resistance for component I
$V_{R,II,k}$	Characteristic value of hole bearing resistance for component II
$M_{y,Rk}$	Characteristic value of yield moment of the fastening screw (for component II made of structural timber)
$f_{ax,k}$	Characteristic value of withdrawal strength for component II made of structural timber
$f_{h,k}$	Characteristic value of embedding strength for component II made of structural timber

Terms and explanations	
Fastening screws for metal members and sheeting	**Annex 1**

Occurred loadings of a connection



Design values

The design values of tension and shear resistance of a connection must be determined as follows:

$$N_{R,d} = \frac{N_{R,k}}{\gamma_M} \qquad V_{R,d} = \frac{V_{R,k}}{\gamma_M}$$

$N_{R,d}$	Design value of tension resistance
$V_{R,d}$	Design value of shear resistance
γ_M	Partial safety factor

The recommended partial safety factor γ_M is 1,33, provided no partial safety factor is given in national regulations or national Annexes to Eurocode 3.

Special conditions

If the component thickness t_I or t_{II} lies in between two indicated component thicknesses, the characteristic value may be calculated by linear interpolation.

For asymmetric components II made of metal (e.g. Z- or C-shaped profiles) with component thickness $t_{II} < 5$ mm, the characteristic value $N_{R,k}$ has to be reduced to 70%.

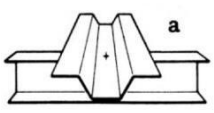
In case of combined loading by tension and shear forces the following interaction, equation must be considered:

$$\frac{N_{S,d}}{N_{R,d}} + \frac{V_{S,d}}{V_{R,d}} \leq 1{,}0$$

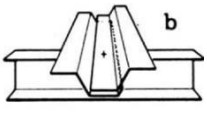
$N_{S,d}$	Design value of the applied tension forces
$V_{S,d}$	Design value of the applied shear forces

Types of connection

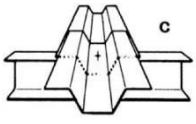
For the types of connection (a, b, c, d) given in the Annexes of the fastening screws, it is not necessary to consider the effect of constraints due to temperature. For other types of connection, the effect of constraints must be taken into account, unless they do not occur or are not significant (e.g., sufficient flexibility of the substructure).



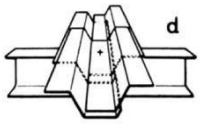
Single connection



Side lap connection



End overlap connection



Side lap + end overlap connection

Design	
Fastening screws for metal members and sheeting	**Annex 2**

Installation conditions

The installation is carried out according to the manufacturer's instruction.

The load bearing screw-in length of the fastening screw specified by the manufacturer must be considered.

The fastening screws must be processed with a suitable drill driver (e.g., cordless drill driver with depth stop). The use of an impact wrench is not allowed.

The fastening screws must be fixed rectangular to the surface of the component.

Component I and component II must be in direct contact with each other. The use of compression resistant thermal insulation strips up to a thickness of 3 mm is allowed.

Component I made of perforated sheeting

The characteristic values of tension or shear resistance of the connection may be determined as follows:

$$N_{R,k} = \min \begin{cases} N_{R,I,k} \\ N_{R,k} \text{ or } N_{R,II,k} \end{cases} \qquad V_{R,k} = \min \begin{cases} V_{R,I,k} \\ V_{R,k} \end{cases}$$

$N_{R,I,k}$ and $V_{R,I,k}$ are given in Annex 5 and 6.
$N_{R,II,k}$, $N_{R,k}$ and $V_{R,k}$ are given in the corresponding Annexes 7 to 11.

Component I made of aluminum alloy

The characteristic value of tension resistance may be determined as follows:

$$N_{R,k} = \min \begin{cases} N_{R,I,k} \\ N_{R,II,k} \end{cases}$$

$N_{R,I,k}$ is determined according to EN 1999-1-4: 2007 + A1: 2011, equation 8.8.
$N_{R,II,k}$ is given in Annex 11.
The characteristic value of shear resistance $V_{R,k}$ is given in Annex 11.

Component II made of timber

The characteristic values of tension and shear resistance for other k_{mod} or ρ_k as indicated in the Annex of the fastening screw can be determined as follows:

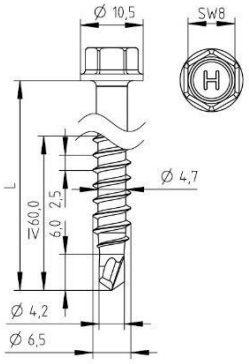
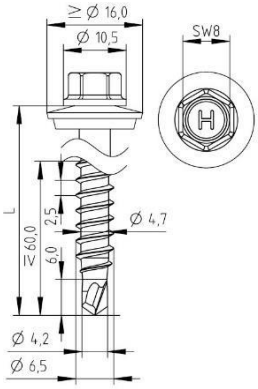
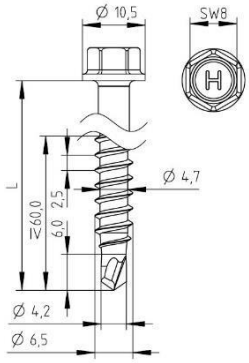
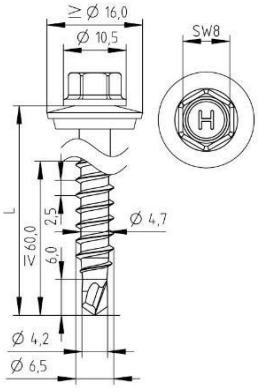
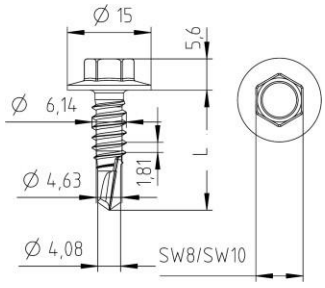
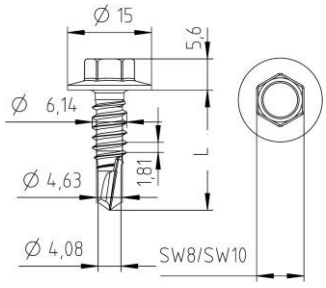
$$N_{R,k} = \min \begin{cases} N_{R,I,k} \\ N_{R,II,k} * k_{mod} \end{cases} \qquad V_{R,k} = \min \begin{cases} V_{R,I,k} \\ V_{R,II,k} * k_{mod} \end{cases}$$

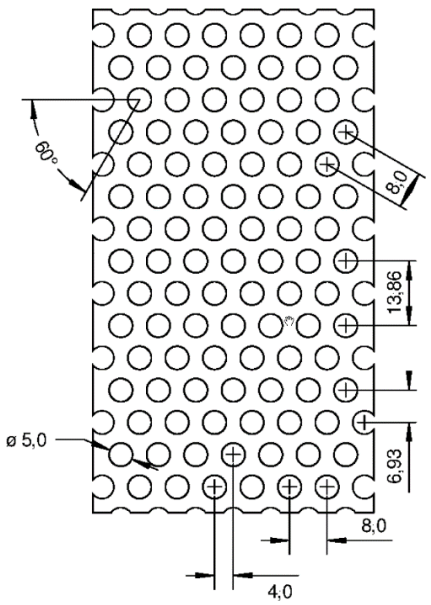
$N_{R,I,k}$ and $V_{R,I,k}$ are given in the annex of the fastening screw.

$N_{R,II,k}$ is determined according to EN 1995-1-1: 2004 + A2: 2014, equation (8.40a), with $f_{ax,k}$ given in the Annex of the fastening screw.

$V_{R,II,k}$ is determined according to EN 1995-1-1: 2004 + A2: 2014, equation (8.9), with $M_{y,Rk}$ given in the Annex of the fastening screw.

Installation and additional provisions	**Annex 3**
Fastening of screws for metal members and sheeting	

	Screw: Carbon steel - AISI 1018 to 1022 resp. C18D to C20D acc. to EN ISO 16120-2: 2017-02 Case hardened and zinc plated **Hilti S-MDW 01 Z 6,5xL**		Screw: Carbon steel - AISI 1018 to 1022 resp. C18D to C20D acc. to EN ISO 16120-2: 2017-02 Case hardened and zinc plated Washer: Carbon steel St 02 Z 275 – DIN 17162 zinc plated with EPDM seal **Hilti S-MDW 51 Z 6,5xL** **Hilti S-MDW 61 Z 6,5xL** **Hilti S-MDW 71 Z 6,5xL**
	Screw: Carbon steel - AISI 1018 to 1022 resp. 1.1141 to 1.1133 acc. to EN 10027-2: 2015-04 Case hardened with duplex-coating **Hilti S-MDW 01 C 6,5xL**		Screw: Carbon steel - AISI 1018 to 1022 resp. 1.1141 to 1.1133 acc. to EN 10027-2: 2015-04 Case hardened with duplex-coating Washer: Aluminium alloy with EPDM seal **Hilti S-MDW 51 C 6,5xL** **Hilti S-MDW 61 C 6,5xL** **Hilti S-MDW 71 C 6,5xL**
	Screw: Carbon steel - AISI 1018 to 1022 resp. 1.1141 to 1.1133 acc. to EN 10027-2: 2015-04 Case hardened and zinc plated **Hilti S-MDU 21 Z 6,3xL**		Screw: Carbon steel - AISI 1018 to 1022 resp. 1.1141 to 1.1133 acc. to EN 10027-2: 2015-04 Case hardened with duplex-coating **Hilti S-MDU 21 C 6,3xL**
Drawings and materials			**Annex 4**
Fastening of screws for metal members and sheeting			

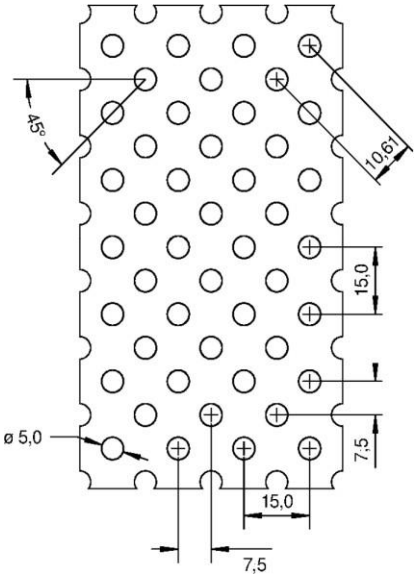


Fastening screws:	Self-tapping screws from Ø 6,3 mm to Ø 6,5 mm and Self-drilling screws from Ø 5,5 mm to Ø 6,5 mm
Materials:	
Fastener:	Carbon steel, case hardened and galvanized or coated
Washer:	Carbon steel, galvanized or coated with EPDM sealing washer
Component I:	S280GD to S450GD – EN 10346: 2015
Component II:	According to the Annex of the fastening screw

Sheet		Perforated sheets S280GD with $R_{m,min}$ = 360 N/mm²				Perforated sheets S320GD with $R_{m,min}$ = 390 N/mm²				Perforated sheets ≥ S350GD with $R_{m,min}$ ≥ 420 N/mm²			
Ø washer [mm]		16	19	22	25	16	19	22	25	16	19	22	25
$V_{R,I,k}$ [kN] for t_I [mm]	0,75	2,16	2,22	2,24	2,38	2,34	2,40	2,44	2,58	2,54	2,60	2,62	2,78
	0,88	2,56	2,64	2,64	2,78	2,78	2,86	2,86	3,02	3,00	3,10	3,10	3,26
	1,00	2,92	3,04	3,02	3,16	3,16	3,30	3,26	3,42	3,42	3,65	3,52	3,68
	1,13	3,32	3,48	3,42	3,56	3,60	3,76	3,70	3,86	3,88	4,10	4,00	4,16
	1,25	3,70	3,88	3,80	3,94	4,00	4,20	4,10	4,26	4,32	4,54	4,42	4,60
	1,50	4,46	4,74	4,56	4,72	4,84	5,12	4,96	5,10	5,22	5,54	5,34	5,50
$N_{R,I,k}$ [kN] for t_I [mm]	0,75	1,40	1,94	2,14	2,22	1,52	2,08	3,32	2,42	1,64	2,26	2,50	2,60
	0,88	1,82	2,34	2,62	2,70	1,96	2,54	2,82	2,92	2,12	2,74	3,04	3,14
	1,00	2,24	2,74	3,06	3,14	2,44	2,96	3,32	3,42	2,62	3,20	3,58	3,68
	1,13	2,74	3,18	3,58	3,64	2,98	3,44	3,88	3,96	3,20	3,70	4,18	4,26
	1,25	3,24	3,58	4,08	4,12	3,52	3,88	4,40	4,46	3,78	4,18	4,76	4,80
	1,50	4,36	4,46	5,12	5,12	4,74	4,84	5,56	5,56	5,10	5,22	5,98	5,98

The characteristic values $N_{R,k}$ and $V_{R,k}$ can be determined according to Annex 3.
The thickness t_I shall be at least 1,00 mm if component I is exposed to wind loads.

Steel sheeting with hole pattern I	**Annex 5**
Fastening screws for perforated steel sheeting	



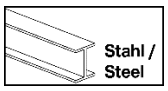
Fastening screws:	Self-tapping screws from Ø 6,3 mm to Ø 6,5 mm and Self-drilling screws from Ø 5,5 mm to Ø 6,5 mm
Materials:	
Fastener:	Carbon steel, case hardened and galvanized or coated
Washer:	Carbon steel, galvanized or coated with EPDM sealing washer
Component I:	S280GD to S450GD – EN 10346: 2015
Component II:	According to the Annex of the fastening screw

Sheet		Perforated sheets S280GD with $R_{m,min}$ = 360 N/mm²				Perforated sheets S320GD with $R_{m,min}$ = 390 N/mm²				Perforated sheets ≥ S350GD with $R_{m,min}$ ≥ 420 N/mm²			
Ø washer [mm]		16	19	22	25	16	19	22	25	16	19	22	25
$V_{R,I,k}$ [kN] for t_I [mm]	0,75	2,38	2,52	2,84	2,76	2,58	2,73	3,08	2,99	2,78	2,94	3,31	3,22
	0,88	3,02	3,12	3,42	3,32	3,27	3,38	3,70	3,60	3,52	3,64	3,99	3,87
	1,00	3,56	3,70	3,84	3,84	3,86	4,01	4,16	4,16	4,15	4,31	4,48	4,48
	1,13	4,14	4,26	4,40	4,40	4,48	4,61	4,77	4,77	4,83	4,97	5,13	5,13
	1,25	4,68	4,84	4,92	4,94	5,07	5,24	5,33	5,35	5,46	5,64	5,74	5,76
	1,50	5,76	6,04	5,90	6,10	6,24	6,54	6,39	6,61	6,72	7,04	6,88	7,11
$N_{R,I,k}$ [kN] for t_I [mm]	0,75	2,86	3,16	3,24	3,14	3,10	3,42	3,51	3,40	3,33	3,68	3,78	3,66
	0,88	3,40	3,72	3,76	3,70	3,68	4,03	4,07	4,01	3,96	4,34	4,38	4,31
	1,00	3,90	4,28	4,28	4,20	4,22	4,64	4,64	4,55	4,55	4,99	4,99	4,90
	1,13	4,44	4,86	4,88	4,72	4,81	5,26	5,29	5,11	5,18	5,67	5,69	5,50
	1,25	4,94	5,42	5,42	5,26	5,35	5,87	5,87	5,70	5,76	6,32	6,32	6,13
	1,50	6,00	6,60	6,60	6,38	6,50	7,15	7,15	6,91	7,00	7,70	7,70	7,44

The characteristic values NR,k and VR,k can be determined according to Annex 3.
The thickness tI shall be at least 1,00 mm if component I is exposed to wind loads.

Steel sheeting with hole pattern II	**Annex 6**
Fastening of screws for metal members and sheeting	

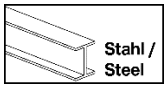
Application range:



Steel S280GD to S420GD

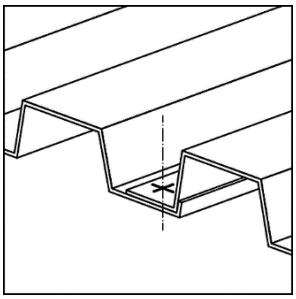
Component I: t_I = 0,63 to 2,00 mm

Component II: t_I = 0,63 to 2,00 mm



Steel S280GD to S420GD

Typical application:



Fastener:

S-MDU 21 Z 6,3 x L
S-MDU 21 C 6,3 x L

Washer: none

Drilling capacity in metal: $\Sigma t_i \leq 3{,}00$ mm

Performance for timber substructures not determined

	t_I[mm]	t_{II} [mm]								
		0,63	0,75	0,88	1,00	1,13	1,25	1,50	1,75	2,00
$V_{R,k}$ [kN]	0,63	1,39	1,39	1,39	1,39	1,39	1,39	1,39	1,39	1,39
	0,75	1,39	2,71	2,71	2,71	2,71	2,71	2,71	2,71	2,71
	0,88	1,39	2,71	3,36	3,36	3,36	3,36	3,36	3,36	3,36
	1,00	1,39	2,71	3,36	3,96	3,96	3,96	3,96	3,96	3,96
	1,13	1,39	2,71	3,36	3,96	4,65	4,65	4,65	4,65	--
	1,25	1,39	2,71	3,36	3,96	4,65	5,29	5,29	5,29	--
	1,50	1,39	2,71	3,36	3,96	4,65	5,29	6,62	--	--
	1,75	1,39	2,71	3,36	3,96	4,65	5,29	--	--	--
	2,00	1,39	2,71	3,36	3,96	--	--	--	--	--
$N_{R,k}$ [kN]	0,63	0,84	1,09	1,39	1,67	1,70	1,70	1,70	1,70	1,70
	0,75	0,84	1,09	1,39	1,67	2,01	2,22	2,22	2,22	2,22
	0,88	0,84	1,09	1,39	1,67	2,01	2,22	2,22	2,22	2,22
	1,00	0,84	1,09	1,39	1,67	2,01	2,22	2,22	2,22	2,22
	1,13	0,84	1,09	1,39	1,67	2,01	2,22	2,22	2,22	--
	1,25	0,84	1,09	1,39	1,67	2,01	2,22	2,22	2,22	--
	1,50	0,84	1,09	1,39	1,67	2,01	2,22	2,22	--	--
	1,75	0,84	1,09	1,39	1,67	2,01	2,22	--	--	--
	2,00	0,84	1,09	1,39	1,67	--	--	--	--	--

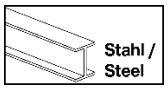
If both components I and II are made of S320GD the grey highlighted values may be increased by 8,3%.
If both components I and II are made of S350GD, S390GD or S420GD the grey highlighted values may be increased by 16,6%.

Self-drilling screw

Hilti S-MDU 21 Z 6,3 x L
Hilti S-MDU 21 C 6,3 x L
with hexagon head with collar

Annex 7

Application range:



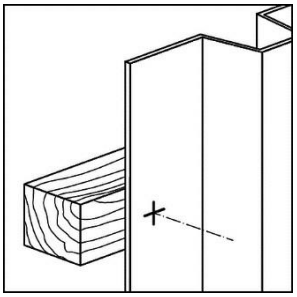
Steel S280GD to S450GD

Component I: t_I = 0,40 to 1,50 mm

Component II:

Structural timber

Typical application:



Fastener:

S-MDW 01 Z 6,5 x L
S-MDW 01 C 6,5 x L

Washer: none

Drilling capacity in metal: $\Sigma t_i \leq 2{,}00$ mm

Performance for timber substructures determined with:
$M_{y,Rk}$ = 22,640 Nm
$f_{ax,k}$ = 10,693 N/mm² for C24 and $l_{ef} \geq 30{,}0$ mm
$f_{ax,k}$ = 11,937 N/mm² for C40 and $l_{ef} \geq 30{,}0$ mm

	t_I [mm]	l_{ef} [mm] 30	35	40	45	55
$V_{R,k}$ [kN]	**0,40**	0,40	0,40	0,40	0,40	0,40
	0,50	0,88	0,88	0,88	0,88	0,88
	0,55	1,13	1,13	1,13	1,13	1,13
	0,63	1,54	1,54	1,54	1,54	1,54
	0,75	1,88	2,17	2,17	2,17	2,17
	0,88	1,88	2,20	2,51	2,83	2,90
	1,00	1,88	2,20	2,51	2,83	3,45
	1,25	1,88	2,20	2,51	2,83	3,45
	1,50	1,88	2,20	2,51	2,83	3,45
$V_{R,II,k}$ [kN]		1,88	2,20	2,51	2,83	3,45
$N_{R,k}$ [kN]	**0,40**	0,92	0,92	0,92	0,92	0,92
	0,50	1,35	1,35	1,35	1,35	1,35
	0,55	1,57	1,57	1,57	1,57	1,57
	0,63	1,88	1,91	1,91	1,91	1,91
	0,75	1,88	2,19	2,48	2,48	2,48
	0,88	1,88	2,19	2,50	2,81	3,09
	1,00	1,88	2,19	2,50	2,81	3,44
	1,25	1,88	2,19	2,50	2,81	3,44
	1,50	1,88	2,19	2,50	2,81	3,44
$N_{R,II,k}$ [kN]		1,88	2,19	2,50	2,81	3,44

	t_I [mm]
$V_{R,I,k}$ [kN]	0,40
	0,88
	1,13
	1,54
	2,17
	2,90
	3,59
	5,13
	6,79

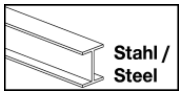
	t_I [mm]
$N_{R,I,k}$ [kN]	0,92
	1,35
	1,57
	1,91
	2,48
	3,09
	3,70
	4,91
	6,34

The values listed above in dependence on the screw-in length l_{ef} are valid for k_{mod} = 0,90 and timber strength grade C24 (ρ_a = 350 kg/m³). For other combinations of k_{mod} and timber strength grades see Annex 3.

For component I made of S320GD, the values $V_{R,I,k}$ and $N_{R,I,k}$ may be increased by 8%.
For component I made of S350GD or S450GD, the values $V_{R,I,k}$ and $N_{R,I,k}$ may be increased by 16%.

Self-drilling screw	
Hilti S-MDW 01 Z 6,5 x L **Hilti S-MDW 01 C 6,5 x L** with hexagon head	**Annex 8**

Application range:



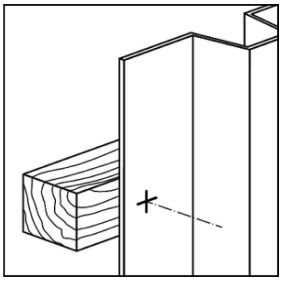
Steel S280GD to S450GD

Component I: t_I = 0,40 to 1,50 mm

Component II:

Structural timber

Typical application:



Fastener:

S-MDW 51 Z 6,5 x L
S-MDW 51 C 6,5 x L

Washer: Ø16

Drilling capacity in metal: $\Sigma t_i \leq 2{,}00$ mm

Performance for timber substructures determined with:
$M_{y,Rk}$ = 22,640 Nm
$f_{ax,k}$ = 10,693 N/mm² for C24 and $l_{ef} \geq 30{,}0$ mm
$f_{ax,k}$ = 11,937 N/mm² for C40 and $l_{ef} \geq 30{,}0$ mm

	t_I [mm]	l_{ef} [mm] 30	35	40	45	55
$V_{R,k}$ [kN]	**0,40**	0,40	0,40	0,40	0,40	0,40
	0,50	0,88	0,88	0,88	0,88	0,88
	0,55	1,13	1,13	1,13	1,13	1,13
	0,63	1,54	1,54	1,54	1,54	1,54
	0,75	1,88	2,17	2,17	2,17	2,17
	0,88	1,88	2,20	2,51	2,83	2,90
	1,00	1,88	2,20	2,51	2,83	3,45
	1,25	1,88	2,20	2,51	2,83	3,45
	1,50	1,88	2,20	2,51	2,83	3,45
$V_{R,II,k}$ [kN]		1,88	2,20	2,51	2,83	3,45
$N_{R,k}$ [kN]	**0,40**	1,28	1,28	1,28	1,28	1,28
	0,50	1,32	1,32	1,32	1,32	1,32
	0,55	1,60	1,60	1,60	1,60	1,60
	0,63	1,88	2,04	2,04	2,04	2,04
	0,75	1,88	2,19	2,50	2,70	2,70
	0,88	1,88	2,19	2,50	2,81	3,19
	1,00	1,88	2,19	2,50	2,81	3,44
	1,25	1,88	2,19	2,50	2,81	3,44
	1,50	1,88	2,19	2,50	2,81	3,44
$N_{R,II,k}$ [kN]		1,88	2,19	2,50	2,81	3,44

	$V_{R,I,k}$ [kN]
	0,40
	0,88
	1,13
	1,54
	2,17
	2,90
	3,59
	5,13
	6,79

	$N_{R,I,k}$ [kN]
	1,28
	1,32
	1,60
	2,04
	2,70
	3,19
	3,65
	4,87
	6,09

The values listed above in dependence on the screw-in length l_{ef} are valid for k_{mod} = 0,90 and timber strength grade C24 (ρ_a = 350 kg/m³). For other combinations of k_{mod} and timber strength grades see Annex 3.

For component I made of S320GD, the values $V_{R,I,k}$ and $N_{R,I,k}$ may be increased by 8%.
For component I made of S350GD or S450GD, the values $V_{R,I,k}$ and $N_{R,I,k}$ may be increased by 16%.

Self-drilling screw	
Hilti S-MDW 51 Z 6,5 x L **Hilti S-MDW 51 C 6,5 x L** with hexagon head	**Annex 9**

Application range:

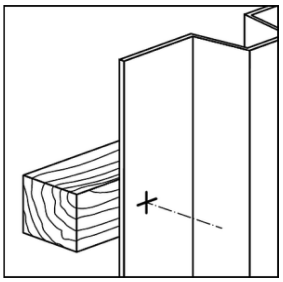
Steel S280GD to S450GD

Component I: t_I = 0,40 to 1,50 mm

Component II:

Structural timber

Typical application:



Fastener:

S-MDW 61 Z 6,5 x L
S-MDW 61 C 6,5 x L
S-MDW 71 Z 6,5 x L
S-MDW 71 C 6,5 x L

Washer: Ø19 / Ø22

Drilling capacity in metal: $\Sigma t_i \leq 2{,}00$ mm

Performance for timber substructures determined with:
$M_{y,Rk}$ = 22,640 Nm
$f_{ax,k}$ = 10,693 N/mm² for C24 and $l_{ef} \geq 30{,}0$ mm
$f_{ax,k}$ = 11,937 N/mm² for C40 and $l_{ef} \geq 30{,}0$ mm

	t_I [mm]	l_{ef} [mm] 30	35	40	45	55	
$V_{R,k}$ [kN]	**0,40**	0,40	0,40	0,40	0,40	0,40	0,40
	0,50	0,88	0,88	0,88	0,88	0,88	0,88
	0,55	1,13	1,13	1,13	1,13	1,13	1,13
	0,63	1,54	1,54	1,54	1,54	1,54	1,54
	0,75	1,88	2,17	2,17	2,17	2,17	2,17
	0,88	1,88	2,20	2,51	2,83	2,90	2,90
	1,00	1,88	2,20	2,51	2,83	3,45	3,59
	1,25	1,88	2,20	2,51	2,83	3,45	5,13
	1,50	1,88	2,20	2,51	2,83	3,45	6,79
	$V_{R,II,k}$ [kN]	1,88	2,20	2,51	2,83	3,45	
$N_{R,k}$ [kN]	**0,40**	1,50	1,50	1,50	1,50	1,50	1,50
	0,50	1,57	1,57	1,57	1,57	1,57	1,57
	0,55	1,83	1,83	1,83	1,83	1,83	1,83
	0,63	1,88	2,19	2,26	2,26	2,26	2,26
	0,75	1,88	2,19	2,50	2,81	2,90	2,90
	0,88	1,88	2,19	2,50	2,81	3,34	3,34
	1,00	1,88	2,19	2,50	2,81	3,44	3,74
	1,25	1,88	2,19	2,50	2,81	3,44	4,91
	1,50	1,88	2,19	2,50	2,81	3,44	6,08
	$N_{R,II,k}$ [kN]	1,88	2,19	2,50	2,81	3,44	

The values listed above in dependence on the screw-in length l_{ef} are valid for k_{mod} = 0,90 and timber strength grade C24 (ρ_a = 350 kg/m³). For other combinations of k_{mod} and timber strength grades see Annex 3.

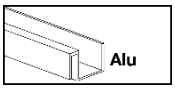
For component I made of S320GD, the values $V_{R,I,k}$ and $N_{R,I,k}$ may be increased by 8%.
For component I made of S350GD or S450GD, the values $V_{R,I,k}$ and $N_{R,I,k}$ may be increased by 16%.

Self-drilling screw

Hilti S-MDW 61 Z 6,5 x L / Hilti S-MDW 71 Z 6,5 x L
Hilti S-MDW 61 C 6,5 x L / Hilti S-MDW 71 C 6,5 x L
with hexagon head

Annex 10

Application range:



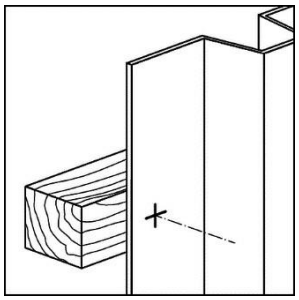
Aluminium alloy with $R_m \geq 185$ N/mm²

Component I: t_I = 0,40 to 2,00 mm

Component II:

Structural timber

Typical application:



Fastener:

S-MDW 01 Z 6,5 x L
S-MDW 01 C 6,5 x L
S-MDW 51 Z 6,5 x L
S-MDW 51 C 6,5 x L
S-MDW 61 Z 6,5 x L
S-MDW 61 C 6,5 x L
S-MDW 71 Z 6,5 x L
S-MDW 71 C 6,5 x L

Washer: none/Ø16/Ø19/Ø22

Drilling capacity in metal: $\Sigma t_i \leq 2{,}00$ mm

Performance for timber substructures determined with:
$M_{y,Rk}$ = 22,640 Nm
$f_{ax,k}$ = 10,693 N/mm² for C24 and $l_{ef} \geq 30{,}0$ mm
$f_{ax,k}$ = 11,937 N/mm² for C40 and $l_{ef} \geq 30{,}0$ mm

t_I [mm]	l_{ef} [mm] 30	35	40	45	55
0,40	0,38	0,38	0,38	0,38	0,38
0,50	0,57	0,57	0,57	0,57	0,57
0,60	0,74	0,74	0,74	0,74	0,74
0,70	0,92	0,92	0,92	0,92	0,92
0,80	1,09	1,09	1,09	1,09	1,09
0,90	1,25	1,25	1,25	1,25	1,25
1,00	1,42	1,42	1,42	1,42	1,42
1,50	1,88	2,18	2,18	2,18	2,18
2,00	1,88	2,20	2,51	2,83	2,85
$V_{R,II,k}$ [kN]	1,88	2,20	2,51	2,83	3,45
$N_{R,II,k}$ [kN]	1,88	2,19	2,50	2,81	3,44

$V_{R,k}$ [kN]

$V_{R,I,k}$ [kN]
0,38
0,57
0,74
0,92
1,09
1,25
1,42
2,18
2,85

Pull-through of component I according to the recommendations of the aluminum profile producers.
The characteristic value $N_{R,k}$ can be determined according to Annex 3.The values listed above in dependence on the screw-in length l_{ef} are valid for k_{mod} = 0,90 and timber strength grade C24 (ρ_a = 350 kg/m³). For other combinations of k_{mod} and timber strength grades see Annex 3.

For component I made of aluminium alloy with $R_m \geq 195$ N/mm², the values $V_{R,I,k}$ may be increased by 5,4%.
For component I made of aluminium alloy with $R_m \geq 205$ N/mm², the values $V_{R,I,k}$ may be increased by 10,8%.

Self-drilling screw

Hilti S-MDW 01 Z 6,5 x L / S-MDW 51 Z 6,5 x L / S-MDW 61 Z 6,5 x L / S-MDW 71 Z 6,5 x L
Hilti S-MDW 01 C 6,5 x L / S-MDW 51 C 6,5 x L / S-MDW 61 C 6,5 x L / S-MDW 71 C 6,5 x L
with hexagon head

Annex 11

British Board of Agrément,
1st Floor Building 3,
Hatters Lane,
Croxley Park
Watford
WD18 8YG