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Authorised and notified according
to Article 29 of the Regulation (EU)
No 305/2011 of the European
Parliament and of the Council of 9
March 2011

MEMBER OF EOTA



European Technical Assessment ETA-20/0858 of 2022/06/08

I General Part

Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S

Trade name of the construction product:

Hilti S-MDW; Hilti S-MDU

Product family to which the above construction product belongs:

Fastening screws for metal members and sheeting

Manufacturer:

Hilti AG
Feldkircherstrasse 100
FL 9494 SCHAAN
Principality of Liechtenstein

Manufacturing plant:

Hilti AG – Plant 6522

This European Technical Assessment contains:

17 pages including 11 annexes which form an integral part of the document

This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:

EAD 330046-01-0602 Fastening Screws for Metal Members and Sheeting

This version replaces:

The ETA with the same number issued on 2020-12-10

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II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT

1 Technical description of the product

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 ETA 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 $0,63 \text{ mm} \leq t_i \leq 2,00 \text{ mm}$	Steel S280GD to S420GD $0,63 \text{ mm} \leq t_{ii} \leq 2,00 \text{ mm}$
8	S-MDW 01 Z 6,5xL S-MDW 01 C 6,5xL	none	Steel S280GD to S450GD $0,40 \text{ mm} \leq t_i \leq 1,50 \text{ mm}$	Structural timber
9	S-MDW 51 Z 6,5xL S-MDW 51 C 6,5xL	16 mm	Steel S280GD to S450GD $0,40 \text{ mm} \leq t_i \leq 1,50 \text{ mm}$	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 $0,40 \text{ mm} \leq t_i \leq 1,50 \text{ mm}$	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 $R_m \geq 185 \text{ N/mm}^2$ $0,40 \text{ mm} \leq t_i \leq 2,00 \text{ mm}$	Structural timber

2 Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

The fastening screws are intended to be used for fastening metal sheeting made of steel according to EN 10346 or aluminium alloy according to EN 485 or EN 573 to substructures made of structural timber according to EN 14081 or substructures made of steel according to EN 10346. 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 \geq C2 corrosion according to the standard EN ISO 12944-2 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 European 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 EAD 330046-01-0602.

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

Characteristic	Assessment of characteristic
3.1 Mechanical resistance and stability (BWR 1)	
Shear resistance of the connection	See Annex to this ETA
Tension resistance of the connection	See Annex to this ETA
Design resistance in case of combined tension and shear forces (interaction)	See Annex 2 to this ETA
Check of deformation capacity in case of constraining forces due to temperature	See Annex 2 to this ETA
Durability	See Annex 4, material of the fasteners
3.2 Safety in case of fire (BWR2)	
Reaction to fire	The screws are made from steel classified as Euroclass A1 in accordance with EN 13501-1 and Commission Delegated Regulation 2016/364

4 Attestation and verification of constancy of performance (AVCP)

4.1 AVCP system

According to the decision 1998/214/EC of the European Commission 1, as amended by 2001/596/EC, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is:

2+

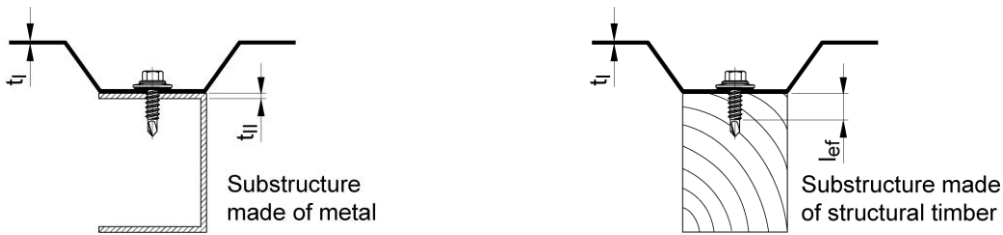
5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking.

Issued in Copenhagen on 2022-06-08 by



Thomas Bruun
Managing Director, ETA-Danmark

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:

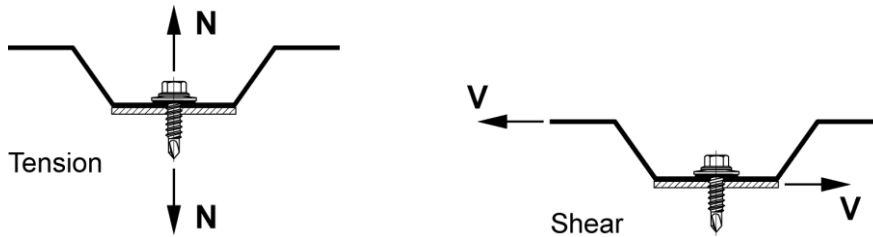
$N_{R,I,k}$	Characteristic value of pull-through resistance for component I
$N_{R,II,k}$	Characteristic value of pull-out resistance for component II
$V_{R,I,k}$	Characteristic value of hole bearing resistance for component I
$V_{R,II,k}$	Characteristic value of hole bearing resistance for component 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 have to be determined as follows:

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

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

- $N_{R,d}$ 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_1 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%.

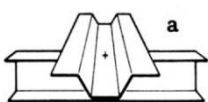
In case of combined loading by tension and shear forces the following interaction equation has to be taken into account:

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

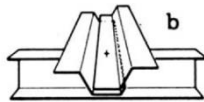
- $N_{S,d}$ Design value of the applied tension forces
- $V_{S,d}$ Design value of the applied shear forces

Types of connection

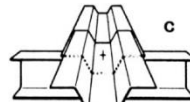
For the types of connection (a, b, c, d) given in the Annexes of the fastening screws, it is not necessary to take into account the effect of constraints due to temperature. For other types of connection, the effect of constraints have to be taken into account, unless they do not occur or are not significant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



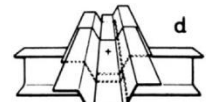
Single connection



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 manufacturer's instruction.

The load bearing screw-in length of the fastening screw specified by the manufacturer has to be taken into account.

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

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

Component I and component II have to be in direct contact to 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:

$$N_{R,k} = \min \left\{ \begin{array}{l} N_{R,I,k} \\ N_{R,I,k} \text{ or } N_{R,II,k} \end{array} \right. \quad V_{R,k} = \min \left\{ \begin{array}{l} V_{R,I,k} \\ V_{R,k} \end{array} \right.$$

$N_{R,I,k}$ 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:

$$N_{R,k} = \min \left\{ \begin{array}{l} N_{R,I,k} \\ N_{R,II,k} \end{array} \right.$$

$N_{R,I,k}$ is determined according to EN 1999-1-4:2007 + AC:2009, equation (8.13).

$N_{R,II,k}$ 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:

$$N_{R,k} = \min \left\{ \begin{array}{l} N_{R,I,k} \\ N_{R,II,k} * k_{mod} \end{array} \right. \quad V_{R,k} = \min \left\{ \begin{array}{l} V_{R,I,k} \\ V_{R,II,k} * k_{mod} \end{array} \right.$$

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

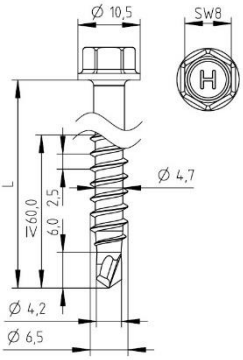
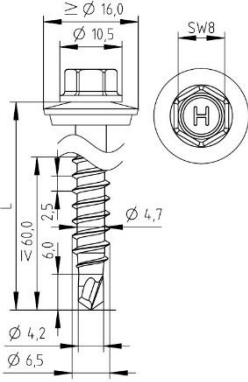
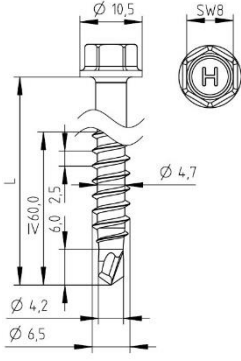
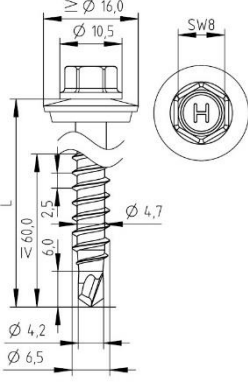
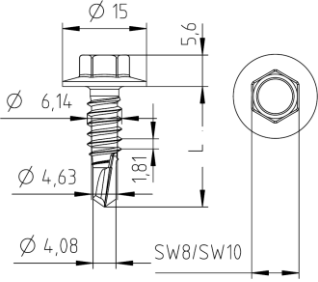
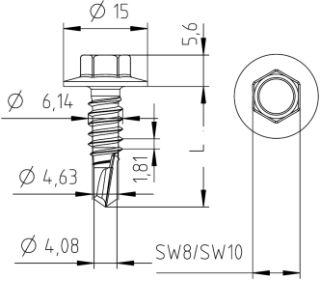
$N_{R,II,k}$ is determined according to EN 1995-1-1:2004 + A1:2008, equation (8.40a), with $f_{ax,k}$ given in the Annex of the fastening screw.

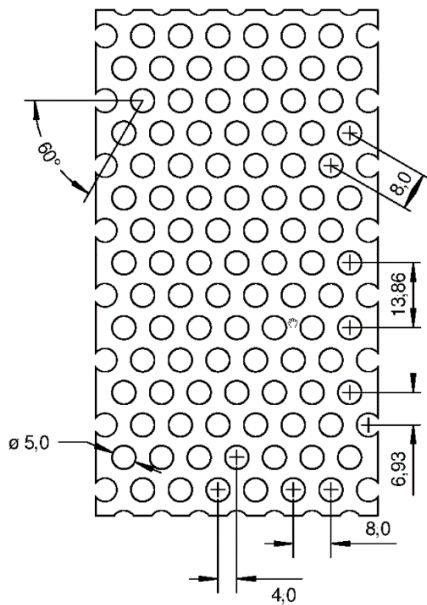
$V_{R,II,k}$ is determined according to EN 1995-1-1:2004 + A1:2008, equation (8.9), with $M_{y,Rk}$ given in the Annex of the fastening screw.

Installation and additional provisions

Fastening of screws for metal members and sheeting

Annex 3

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

**Fastening screws:**

Self tapping screws from \varnothing 6,3 mm to \varnothing 6,5 mm and
Self drilling screws from \varnothing 5,5 mm to \varnothing 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

Component II:

According to the Annex of the fastening screw

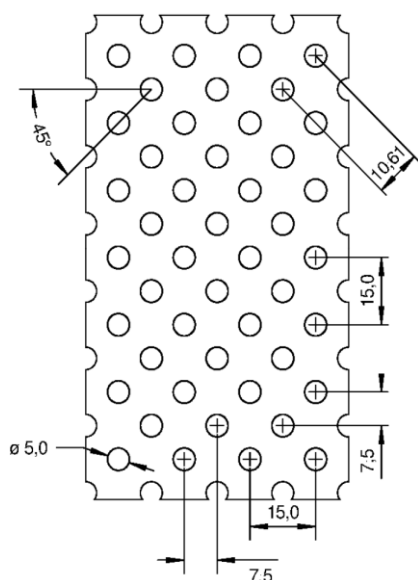
Sheet	Perforated sheets S280GD with $R_{m,min} = 360 \text{ N/mm}^2$				Perforated sheets S320GD with $R_{m,min} = 390 \text{ N/mm}^2$				Perforated sheets \geq S350GD with $R_{m,min} \geq 420 \text{ N/mm}^2$				
	\varnothing washer [mm]	16	19	22	25	16	19	22	25	16	19	22	25
$V_{R,k}$ [kN] for t_i [mm]	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
$N_{R,k}$ [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

Fastening screws for perforated steel sheeting

Annex 5

**Fastening screws:**

Self tapping screws from \varnothing 6,3 mm to \varnothing 6,5 mm and
Self drilling screws from \varnothing 5,5 mm to \varnothing 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

Component II:

According to the Annex of the fastening screw

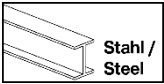
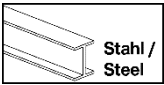
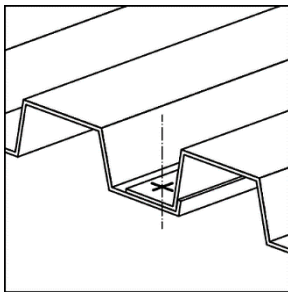
Sheet	Perforated sheets S280GD with $R_{m,min} = 360 \text{ N/mm}^2$				Perforated sheets S320GD with $R_{m,min} = 390 \text{ N/mm}^2$				Perforated sheets \geq S350GD with $R_{m,min} \geq 420 \text{ N/mm}^2$				
	\varnothing washer [mm]	16	19	22	25	16	19	22	25	16	19	22	25
$V_{R,k}$ [kN] for t_i [mm]	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
$N_{R,k}$ [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 $N_{R,k}$ 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 II

Fastening screws for perforated steel sheeting

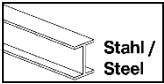

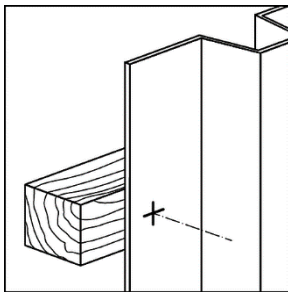
Annex 6

Application range:  Stahl / Steel Steel S280GD to S420GD Component I: $t_i = 0,63$ to 2,00 mm Component II: $t_i = 0,63$ to 2,00 mm  Stahl / Steel 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
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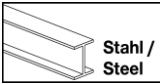

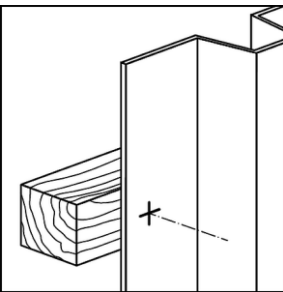
<p>Application range:</p>  <p>Stahl / Steel</p> <p>Steel S280GD to S450GD</p> <p>Component I: $t_i = 0,40$ to $1,50$ mm</p> <p>Component II:</p>  <p>Holz / Timber</p> <p>Structural timber</p>	<p>Typical application:</p> 	<p>Fastener:</p> <p>S-MDW 01 Z 6,5 x L S-MDW 01 C 6,5 x L</p> <p>Washer: none</p> <p>Drilling capacity in metal: $\Sigma t_i \leq 2,00$ mm</p> <p>Performance for timber substructures determined with:</p> <p>$M_{y,Rk} = 22,640$ 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</p>
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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	$V_{R,i,k}$ [kN]
	0,50	0,88	0,88	0,88	0,88	
	0,55	1,13	1,13	1,13	1,13	
	0,63	1,54	1,54	1,54	1,54	
	0,75	1,88	2,17	2,17	2,17	
	0,88	1,88	2,20	2,51	2,83	
	1,00	1,88	2,20	2,51	2,83	
	1,25	1,88	2,20	2,51	2,83	
	1,50	1,88	2,20	2,51	2,83	
$V_{R,II,k}$ [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	$N_{R,i,k}$ [kN]
	0,50	1,35	1,35	1,35	1,35	
	0,55	1,57	1,57	1,57	1,57	
	0,63	1,88	1,91	1,91	1,91	
	0,75	1,88	2,19	2,48	2,48	
	0,88	1,88	2,19	2,50	2,81	
	1,00	1,88	2,19	2,50	2,81	
	1,25	1,88	2,19	2,50	2,81	
	1,50	1,88	2,19	2,50	2,81	
$N_{R,II,k}$ [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 ($\rho_a = 350$ 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%.

<p align="center">Self drilling screw</p> <p align="center">Hilti S-MDW 01 Z 6,5 x L Hilti S-MDW 01 C 6,5 x L with hexagon head</p>	<p align="center">Annex 8</p>
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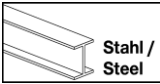

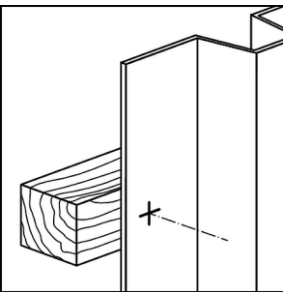
<p>Application range:</p>  <p>Stahl / Steel</p> <p>Steel S280GD to S450GD</p> <p>Component I: $t_i = 0,40$ to $1,50$ mm</p> <p>Component II:</p>  <p>Holz / Timber</p> <p>Structural timber</p>	<p>Typical application:</p> 	<p>Fastener:</p> <p>S-MDW 51 Z 6,5 x L S-MDW 51 C 6,5 x L</p> <p>Washer: $\varnothing 16$</p> <p>Drilling capacity in metal: $\Sigma t_i \leq 2,00$ mm</p> <p>Performance for timber substructures determined with:</p> <p>$M_{y,Rk} = 22,640$ 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</p>
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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	$V_{R,i,k}$ [kN]	
	0,50	0,88	0,88	0,88	0,88		
	0,55	1,13	1,13	1,13	1,13		
	0,63	1,54	1,54	1,54	1,54		
	0,75	1,88	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	$N_{R,i,k}$ [kN]	
	0,50	1,32	1,32	1,32	1,32		
	0,55	1,60	1,60	1,60	1,60		
	0,63	1,88	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		

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 ($\rho_a = 350$ 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%.

<p align="center">Self drilling screw</p> <p align="center">Hilti S-MDW 51 Z 6,5 x L Hilti S-MDW 51 C 6,5 x L with hexagon head</p>	<p align="center">Annex 9</p>
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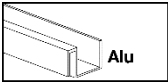

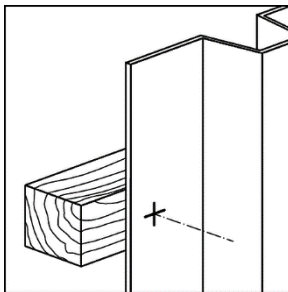
<p>Application range:</p>  <p>Stahl / Steel</p> <p>Steel S280GD to S450GD</p> <p>Component I: $t_i = 0,40$ to $1,50$ mm</p> <p>Component II:</p>  <p>Holz / Timber</p> <p>Structural timber</p>	<p>Typical application:</p> 	<p>Fastener:</p> <p>S-MDW 61 Z 6,5 x L S-MDW 61 C 6,5 x L S-MDW 71 Z 6,5 x L S-MDW 71 C 6,5 x L</p> <p>Washer: $\varnothing 19 / \varnothing 22$</p> <p>Drilling capacity in metal: $\Sigma t_i \leq 2,00$ mm</p> <p>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</p>
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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	$V_{R,i,k}$ [kN]
	0,50	0,88	0,88	0,88	0,88	
	0,55	1,13	1,13	1,13	1,13	
	0,63	1,54	1,54	1,54	1,54	
	0,75	1,88	2,17	2,17	2,17	
	0,88	1,88	2,20	2,51	2,83	
	1,00	1,88	2,20	2,51	2,83	
	1,25	1,88	2,20	2,51	2,83	
	1,50	1,88	2,20	2,51	2,83	
$V_{R,II,k}$ [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	$N_{R,i,k}$ [kN]
	0,50	1,57	1,57	1,57	1,57	
	0,55	1,83	1,83	1,83	1,83	
	0,63	1,88	2,19	2,26	2,26	
	0,75	1,88	2,19	2,50	2,81	
	0,88	1,88	2,19	2,50	2,81	
	1,00	1,88	2,19	2,50	2,81	
	1,25	1,88	2,19	2,50	2,81	
	1,50	1,88	2,19	2,50	2,81	
$N_{R,II,k}$ [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 ($\rho_a = 350$ 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%.

<p>Self drilling screw</p> <p>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</p>	<p>Annex 10</p>
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<p>Application range:</p>  <p>Aluminium alloy with $R_m \geq 185 \text{ N/mm}^2$</p> <p>Component I: $t_i = 0,40$ to $2,00 \text{ mm}$</p> <p>Component II:</p>  <p>Structural timber</p>	<p>Typical application:</p> 	<p>Fastener:</p> <p>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</p> <p>Washer: none/Ø16/Ø19/Ø22</p> <p>Drilling capacity in metal: $\Sigma t_i \leq 2,00 \text{ mm}$</p> <p>Performance for timber substructures determined with: $M_{y,Rk} = 22,640 \text{ Nm}$ $f_{ax,k} = 10,693 \text{ N/mm}^2$ for C24 and $l_{ef} \geq 30,0 \text{ mm}$ $f_{ax,k} = 11,937 \text{ N/mm}^2$ for C40 and $l_{ef} \geq 30,0 \text{ mm}$</p>
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t_i [mm]	l_{ef} [mm]				
	30	35	40	45	55
$V_{R,k}$ [kN]	0,38	0,38	0,38	0,38	0,38
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

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 ($\rho_a = 350 \text{ kg/m}^3$). For other combinations of k_{mod} and timber strength grades see Annex 3.

For component I made of aluminium alloy with $R_m \geq 195 \text{ N/mm}^2$, the values $V_{R,I,k}$ may be increased by 5,4%.
For component I made of aluminium alloy with $R_m \geq 205 \text{ N/mm}^2$, 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