The following pages are an excerpt from the North American Product Technical Guide, Volume 1: Direct Fastening Technical Guide, Edition 22.

Please refer to the publication in its entirety for complete details on this product including data development, base materials, general suitability, installation, corrosion, and product specifications.

Direct Fastening Technical Guide, Edition 22

To consult directly with a team member regarding our direct fastening products, contact Hilti's team of technical support specialists between the hours of 7:00am - 5:00pm CST.

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3.2.15 S-BT FASTENING SYSTEMS

3.2.15.1 PRODUCT DESCRIPTION

The Hilti S-BT Fastening System is an innovative method of fastening to steel or a aluminum base materials. The system consists of a Hilti installation tool equipped with depth gauge for use with setting the S-BT studs.

The S-BT fasteners are threaded studs manufactured from carbon steel or stainless steel with thread diameters 8 mm (M8) and 3/8" (W10). Carbon steel studs are supplied with an aluminum sealing washer Ø10 mm, stainless steel studs are supplied with a stainless steel sealing washer Ø12, both with an EPDM sealing ring, are cleanly set in a pre-drilled hole in the base steel. The S-BT system is designed to work on carbon steels from 1/8'' to 3/16'' and Aluminum base materials from 0.2 to 1/4'' thick with a pre-drilled through hole and both carbon steels and Aluminum base materials ≥ 1/4'' with a pre-drilled pilot hole.

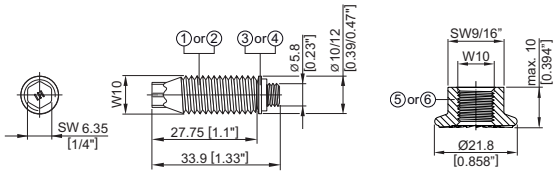
Product Features

- No propellants required.
- No through penetration of steel and aluminum base materials 1/4" and thicker.
- Little to no rework of coated steel required for non-through hole applications with base material thickness larger than 1/4''.
- Offer fastening options for both stainless and carbon steel materials.
- Easy removal — S-BT fastener is removable.

3.2.15.2 MATERIAL SPECIFICATIONS

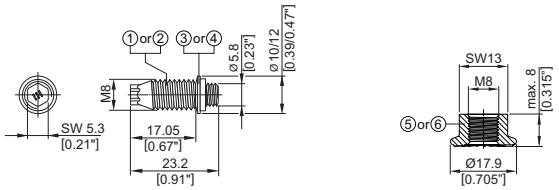
Product	Part	Material designation	Tensile strength, F_u ksi (N/mm²)
Stainless steel (S-BT-_R)	① **Shank**	Corrosion resistant stainless steel S 31803 (1.4462)	≥ 190 (320)
	③ **SN washer**	Corrosion resistant stainless steel S 31603 (1.4404)	N/A
	⑤ **Serrated flange Nut**	Corrosion resistant stainless steel grade A4 – 70/80	≥ 100 (700)
Carbon steel (S-BT-_F)	② **Shank**	Carbon steel 1038 duplex coated	≥ 130 (900)
	④ **AN washer**	Aluminum	N/A
	⑥ **Serrated flange nut**	Carbon steel HDG	≥ 125 (870)
Both stainless steel (S-BT-_R) and carbon steel (S-BT-_F)	**Sealing washer**	Elastomer, black resistant to: UV, water, ozone, oils, etc.	N/A

S-BT-MR W10/15 SN6
S-BT-MF W10/15 AN6



S-BT-GR M8/7 SN 6*)
S-BT-GF M8/7 AN 6*)

*): package does not include serrated flange nuts



Listings/Approvals

ICC-ES (International Code Council)
ESR-4185 with LABC/LARC Supplement
ABS (American Bureau of Shipping)
LR (Lloyd's Register)
DNV-GL
RS (Russian Maritime Register of shipping)
BV (Bureau Veritas)

3.2.15.3 TECHNICAL DATA

3.2.15.3.1 North American load tables

Allowable loads in minimum ASTM A36 (F_y ≥ 36 ksi; F_u ≥ 58 ksi) steel[1,2]

Fastener	Steel Thickness in.						Moment lb-ft (Nm)
	1/8		3/16		≥ 1/4		
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	
S-BT-GR M8/7 SN 6 S-BT-MR W10/15 SN 6	225 (1.00)	340 (1.50)	225 (1.00)	340 (1.50)	405 (1.80)	535 (2.35)	8.0 (11.1)
S-BT-GF M8/7 AN 6 S-BT-MF W10/15 AN 6	225 (1.00)	340 (1.50)	225 (1.00)	340 (1.50)	405 (1.80)	450 (2.00)	5.0 (6.7)

1 The tabulated allowable values are for the S-BT fasteners only, using a safety factor that is greater than or equal to 5.0.

2 Multiple fasteners are recommended for any attachment.

Allowable loads in minimum ASTM G50 (F_y ≥ 50 ksi; F_u ≥ 65 ksi) steel[1,2]

Fastener	Steel Thickness in.						Moment lb-ft (Nm)
	1/8		3/16		≥ 1/4		
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	
S-BT-GR M8/7 SN 6 S-BT-MR W10/15 SN 6	295 (1.30)	430 (1.90)	295 (1.30)	430 (1.90)	520 (2.30)	600 (2.65)	8.0 (11.1)
S-BT-GF M8/7 AN 6 S-BT-MF W10/15 AN 6	295 (1.30)	430 (1.90)	295 (1.30)	430 (1.90)	520 (2.30)	470 (2.10)	5.0 (6.7)

1 The tabulated allowable values are for the S-BT fasteners only, using a safety factor that is greater than or equal to 5.0.

2 Multiple fasteners are recommended for any attachment.

Allowable loads in minimum F_u ≥ 39 ksi aluminum[1,2]

Fastener	Aluminum thickness t_{II} in.				Moment lb-ft (Nm)
	0.2 ≤ t_{II} < 1/4		t_{II} ≥ 1/4		
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	
S-BT-GR M8/7 SN 6 S-BT-MR W10/15 SN 6	135 (0.60)	205 (0.90)	135 (0.60)	205 (0.90)	8.0 (11.1)
S-BT-GF M8/7 AN 6 S-BT-MF W10/15 AN 6					5.0 (6.7)

1 The tabulated allowable values are for the S-BT fasteners only, using a safety factor that is greater than or equal to 5.0.

2 Multiple fasteners are recommended for any attachment.

3.2.15.3.2 European load tables

Recommended loads in steel base materials[1,2]

Load type	Minimum ASTM A36 steel		Minimum grade 50 steel	
	1/8" - 3/16" Thick	≥ 7/32" Thick	1/8" - 3/16" Thick	≥ 7/32" Thick
Tension, lb (kN)	405 (1.8)	425 (1.9)	470 (2.1)	515 (2.3)
Shear, lb (kN	540 (2.4)	560 (2.5)	560 (2.5)	625 (2.8)
Moment, ft-lb (Nm)	5.0 (6.7)	5.0 (6.7)	5.0 (6.7)	5.0 (6.7)

1 Recommended loads are based on a global safety factor of 2.8 applied to the characteristic resistance for static tension or shear, which are derived from the 5% fractile of the ultimate load. Recommended moment values are based on a global safety factor of 1.75. This safety concept is commonly used in regions outside of North America, where design is carried out in accordance with the Eurocode.

2 Multiple fasteners are recommended for any attachment.

Design resistance in steel base materials[1,2]

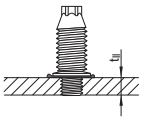
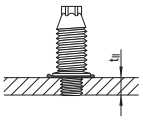
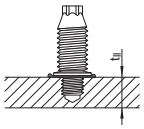
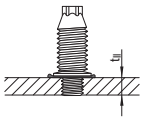
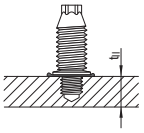
Load type	Minimum ASTM A36 steel		Minimum grade 50 steel	
	1/8" - 3/16" Thick	≥ 7/32" Thick	1/8" - 3/16" Thick	≥ 7/32" Thick
Tension, lb (kN)	560 (2.5)	605 (2.7)	670 (3.0)	715 (3.2)
Shear, lb (kN	760 (3.4)	785 (3.5)	785 (3.5)	875 (3.9)
Moment, ft-lb (Nm)	7.0 (9.4)	7.0 (9.4)	7.0 (9.4)	7.0 (9.4)

1 Design resistance is based on a safety factor of γM = 2.0 applied to the characteristic resistance for static tension or shear, which is derived from the 5% fractile of the ultimate load. Moment design resistance values are based on a safety factor of γM = 1.25. Design resistance should be greater than calculated demand that has been reduced by a partial safety factor. This safety concept is commonly used in regions outside of North America, where design is carried out in accordance with the Eurocode.

2 Multiple fasteners are recommended for any attachment.

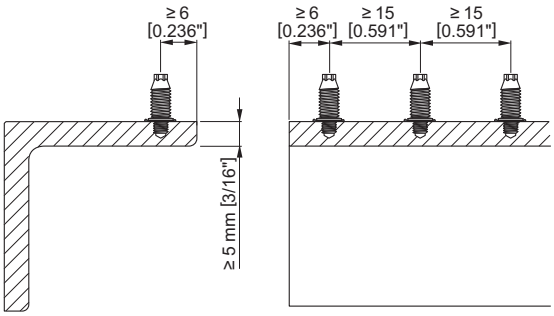
3.2.15.3.3 Additional technical information

Maximum tightening torque on serrated flange nut, ft-lb (Nm) and type of bore hole

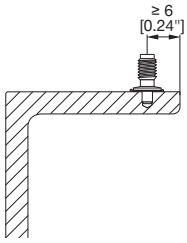
Fastener	Steel thickness t_{II} in.			Aluminum thickness t_{II} in.	
	1/8 ≤ t_{II} < 3/16 Torque 3.6 (5)	**3/16 ≤ t_{II} < 1/4** Torque 5.9 (8)	**t_{II} ≥1/4** Torque 5.9 (8)	**0.2 ≤ t_{II} < 1/4** Torque 3.6 (5)	**t_{II} ≥1/4** Torque 3.6 (5)
S-BT-GR M8/7 SN 6 **S-BT-MR W10/15 SN6** **S-BT-GF M8/7 AN 6** **S-BT-MF W10/15 AN 6**					
	Drill through hole*	Drill through hole*	Pilot hole*	Drill through hole*	Pilot hole*

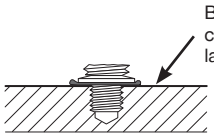
* In case of a drill through hole, or a pilot hole in steel with thickness of 1/4 inch, rework of the coating on the back side of the plate / profile may be needed.

Spacing and edge distances



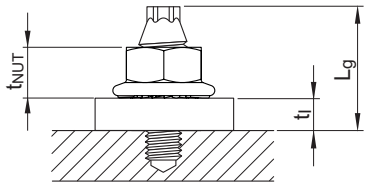
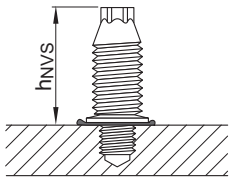
Edge distance: ≥ 6 mm



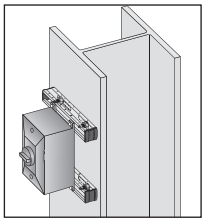
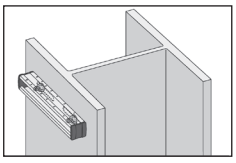
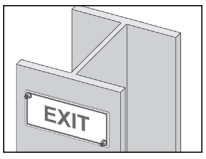
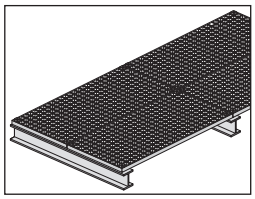


Remark: thickness of base material corrosion protection layer ≤ 0.8 mm [0.032"].
For thicker coatings, please contact Hilti.

Application requirements

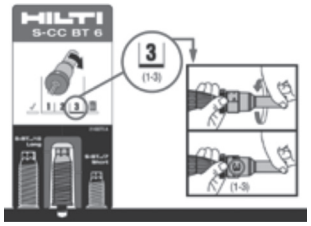
Thickness of fastened materials	Checking stand-off from the base material
	
S-BT-MF W10/15 AN6 1.6 mm [0.063''] ≤ t_I ≤15.0 mm [0.59'']	S-BT-MF W10/15 AN6 h_{NVS} = 29.3 mm to 29.8 mm [1.15'' to 1.17'']

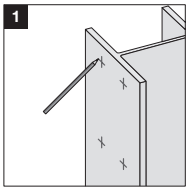
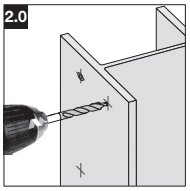
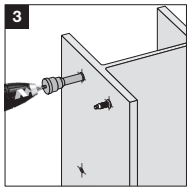
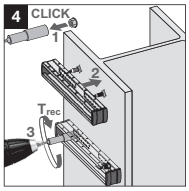
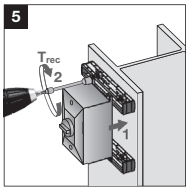
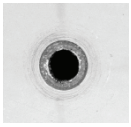
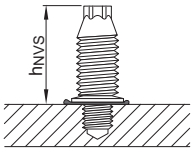
Applications

Multipurpose fastening			Grating with X-FCM*
S-BT-MR W10/15 SN6			S-BT-GR M8/7 SN6
S-BT-MF W10/15 AN6			S-BT-GF M8/7 AN6
			
Junction box, etc.	Channel installation	Signage	Grating fastening

* Load data, application requirements, corrosion information, fastener selection, system recommendation, material specification and coating refer to section X-FCM Grating Fastening

3.2.15.4 INSTALLATION INSTRUCTIONS[1]

 S-DG BT mechanical depth gauge	To help ensure the exact screw-in depth and a proper compressed sealing washer are obtained, the S-BT studs have to be installed with the S-DG BT mechanical depth gauge for M8 or M10/W10 S-BT fasteners. With this gauge the screw-in depth can be adjusted in a range of 0 - 1.5 mm (3 steps, 0.5mm per step).
 Design and functionality of the mechanical calibration card S-CC BT	The S-CC BT calibration card is needed to check the initial stand-off of the S-BT stud and to adjust/calibrate the S-DG depth gauge. After finding the right adjustment level for the S-DG depth gauge, the gauge can be adjusted to the level number shown in the calibration card accordingly and the studs can be installed without additional check of the S-DG depth gauge. The depth gauge has to be re-adjusted (calibrated) at following times: • Start of the installation process • Change of the working position (upwards, downwards, horizontal) • Installer change The lifetime of the S-DG BT depth gauge is ≥ 1000 settings.

① Mark location for each fastening	② Pre-drill with TS-BT stepped drill bit	③ Screw-in S-BT studs into drilled hole	④ Fasten channel on base material	⑤ Fasten accessory on channel
				
	Usage of SBT 4-A22, SF BT 18-A or SF BT 22-A. Pre-drill until the shoulder grinds a shiny ring to assure proper drilling depth.  **Before fastener installation:** The drilled hole and the area around the drilled hole must be clear of liquids and debris.	Usage of SBT 4-A22, SFC 18-A or SFC 22-A in combination with the calibrated depth gauge S-DG BT. Verify stud stand-off h_{NVS} with check gauge S-CC BT  Sealing washer must be properly compressed!	Position channel on S-BT studs and hold in place. Tighten the nuts with the suited tightening torque T_{rec}. T_{rec} ref. to table below. Tighten the nuts using • SBT 4-A22, SFC 18-A / 22-A with socket S-NS • torque tool X-BT 1/4", 5.9 ft-lbf (8Nm) or S-BT 1/4", 3.6 ft-lbf (5 Nm) • torque wrench	Tighten the bolts with the suited tightening torque T_{rec} (see IFU of the Hilti wing nuts).

Hilti screwdriver:	T_{rec} (ft-lbs)	
	3.6	5.9
	Torque setting:	
SBT 4-A22 SFC 18-A SFC 22-A	4	5

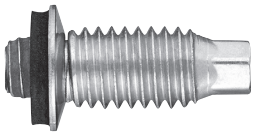
Warning: Do not install the S-BT fastener with a power-actuated tool. The S-BT is intended to be screwed into the base material only.

1 Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.hilti.com. Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.

3.2.15.5 ORDERING INFORMATION

S-BT Threaded Studs

Ordering designation	Thread diameter	Thread length in. (mm)	Maximum thickness of fastened material (mm)	Package contents
S-BT-GF M8/7 AN 6 (use with X-FCM-M grating disc, serrated flange nut not included)	**M8**	**11/16** (17.05)	7	100
S-BT-GR M8/7 SN 6 (use with X-FCM-R grating disc, serrated flange nut not included)	**M8**	**11/16** (17.05)	7	100
S-BT-MF W10/15 AN 6 (incl. serrated flange nut)	**W10**	**1-1/16** (27.75)	15	100
S-BT-MR W10/15 SN6 (incl. serrated flange nut)	**W10**	**1-1/16** (27.75)	15	100



Box includes: 100 studs, 100 flange nuts (except S-BT-GF and S-BT-GR), M8 or W10 check gauge and 1 TS-BT step drill bit for steel base material.

TS-BT Drill Bits for S-BT Threaded Studs

5.5 mm drill bit diameter

Ordering designation	Bit length in. (mm)	Drilling depth in. (mm)	Package contents	For use with
TS-BT 5.5-74 S	2-7/8 (74)	0.185 (4.7)	10	Steel Base Material
TS-BT 5.5-74 AL	2-7/8 (74)	0.185 (4.7)	10	Aluminum Base Material

Tool sets

Ordering designation	Package contents	For use with
S-BT Set	1	S-BT fastener

Set includes: 1 SBT 4-A22 cordless drill driver (or alternatively 1 SFC 18/22-A cordless setting tool, and 1 SF BT 18/22-A cordless drill), 1 charger, 2 compact batteries, 1 information sheet, packed complete in a Hilti softbag.

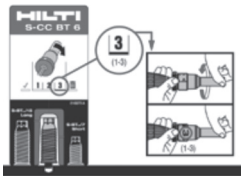
Tool sets

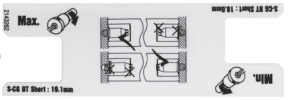
Ordering designation	Package contents	For use with
SBT 4-A22 cordless drill driver	1	S-BT Depth Gauge and TS-BT drill bits
SFC 22-A cordless setting tool	1	S-BT Depth Gauge
SF BT 22-A cordless drill	1	TS-BT drill bits
Supplied in an impact-resistant plastic toolbox		

Accessories

Ordering designation	Part	Package contents	For use with
S-DG BT M8/7 Short 6 Depth Gauge	①	1	SFC 22-A
S-DG BT M10-W10/15 Long 6 Depth Gauge	①	1	SFC 22-A
S-CC BT 6 Calibration Card	②	1	S-DG BT
S-CG BT / 7 Short 6 Check Gauge	③	1	S-BT
S-CG BT / 15 Long 6 Check Gauge	③	1	S-BT
X-BT 1/4'' Manual Torque Tool - 8 Nm	④	1	X-NSD sockets
S-BT 1/4'' Manual Torque Tool - 5 Nm	④	1	X-NSD sockets
S-NS 9/16'' C 95/3 3/4'' X-NSD socket	⑤	1	W10 nut with flange

① 

② 

③ 

④ 

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