



The following pages are an excerpt from the North American Product Technical Guide, Volume 1: Direct Fastening Technical Guide, Edition 24.

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 24](#)

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.

US: 877-749-6337 or [HNATechnicalServices@hilti.com](mailto:HNATechnicalServices@hilti.com)

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### 3.2.15 S-BT HL FASTENING SYSTEMS

#### 3.2.15.1 Product Description

The Hilti S-BT HL Fastening System is an innovative method of fastening to steel or a aluminum base materials. The system consists of threaded stud fasteners and matched installation tools which help ensure proper setting of the fasteners.

The S-BT HL fasteners are 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 mm, both with an EPDM sealing ring, and are cleanly set in a pre-drilled hole in the base steel. The S-BT system is designed to work on carbon steel from 1/8" to 3/16" thick with a pre-drilled

through hole and both carbon steel and Aluminum base materials ≥ 1/4" with a pre-drilled pilot hole.

#### Product Features

- No propellants required for installation.
- 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".
- Fastening options for both stainless and carbon steel materials.
- Increased load capacity compared to the original S-BT threaded studs.



#### 3.2.15.2 Material Specifications

Product	Part	Material designation	Tensile strength, F <sub>u</sub> ksi (N/mm <sup>2</sup> )
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	Aluminium	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

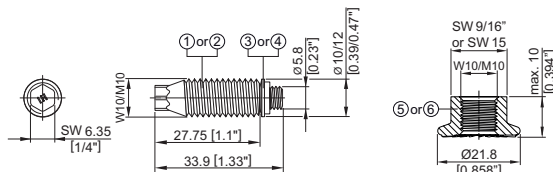
3.2.15.1	Product description
3.2.15.2	Material specifications
3.2.15.3	Technical data
3.2.15.4	Installation instructions
3.2.15.5	Ordering information

#### Listings/Approvals

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

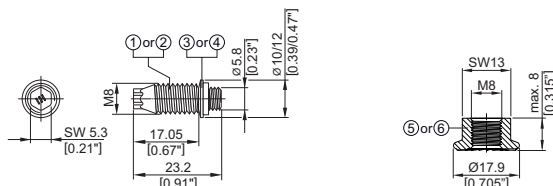


S-BT-MR W10/15 SN6 HL  
 S-BT-MF W10/15 AN6 HL  
 S-BT-MR M10/15 SN6 HL  
 S-BT-MF M10/15 AN6 HL



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

\* package does not include serrated flange nuts



### 3.2.15.3 Technical Data

#### 3.2.15.3.1 Load tables

##### Allowable loads in minimum ASTM A36 ( $F_y \geq 36$ ksi; $F_u \geq 58$ ksi) steel<sup>1,2,3</sup>

Fastener	Steel Thickness in.				Moment lb-ft (Nm)
	1/8, 3/16"		$\geq 1/4$		
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	
S-BT-GR M8/7 SN 6 HL S-BT-MR M8/15 SN 6 HL S-BT-MR W10 or M10/15 SN 6 HL	345 (1.53)	675 (3.00)	640 (2.85)	725 (3.23)	8.0 (11.1)
S-BT-GF M8/7 AN 6 HL S-BT-MF W10 or M10/15 AN 6 HL	345 (1.53)	475 (2.11)	640 (2.85)	525 (2.34)	5.0 (6.7)

1 The tabulated allowable values are for the S-BT HL fasteners only, using a safety factor determined as per ICC-ES Acceptance Criteria 499.

2 Multiple fasteners are recommended for any attachment.

3 Allowable loads are applicable to static and seismic loads.

##### Allowable loads in minimum ASTM G50 ( $F_y \geq 50$ ksi; $F_u \geq 65$ ksi) steel<sup>1,2,3</sup>

Fastener	Steel Thickness in.				Moment lb-ft (Nm)
	1/8, 3/16"		$\geq 1/4$		
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	
S-BT-GR M8/7 SN 6 HL S-BT-MR M8/15 SN 6 HL S-BT-MR W10/15 SN 6 HL	380 (1.7)	760 (3.4)	720 (3.2) <sup>4</sup>	810 (3.6)	8.0 (11.1)
S-BT-GF M8/7 AN 6 HL S-BT-MF W10 or M10/15 AN 6 HL	380 (1.7)	510 (2.3)	720 (3.2)	535 (2.4)	5.0 (6.7)

1 The tabulated allowable values are for the S-BT HL fasteners only, using a safety factor calculated as per ICC ES Acceptance Criteria 499.

2 Multiple fasteners are recommended for any attachment.

3 Allowable loads are applicable to static and seismic loads, unless noted otherwise.

4 Allowable tension load for X-BT GR and S-BT MR fasteners is application to static loads only; for seismic loads, multiply this number by 0.94.

##### Allowable loads in minimum $F_u \geq 39$ ksi aluminum<sup>1,2</sup>

Fastener	Aluminum thickness $t_{II}$ in.		Moment lb-ft (Nm)
	$t_{II} \geq 1/4$		
	Tension lb (kN)	Shear lb (kN)	
S-BT-GR M8/7 SN 6 HL S-BT-MR M8/15 SN 6 HL S-BT-MR W10/15 SN 6 HL	470 (2.1)	675 (3.0)	8.0 (11.1)

1 The tabulated allowable values are for the S-BT HL fasteners only.

2 Multiple fasteners are recommended for any attachment.

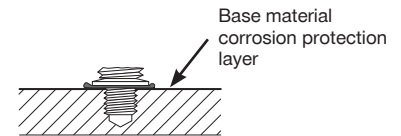
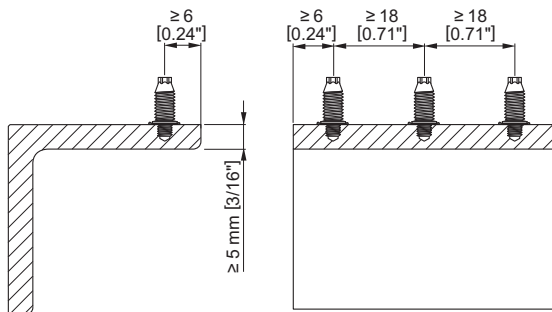
3.2.15.3.2 Additional technical information

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.
	$1/8 \leq t_{II} < 3/16$ Torque 5.9 (8)	$3/16 \leq t_{II} < 1/4$ Torque 11.8 (16)	$t_{II} \geq 1/4$ Torque 11.8 (16)	$t_{II} \geq 1/4$ Torque 5.9 (8)
S-BT-GR M8/7 SN 6 HL S-BT-MR W10 or M10/15 SN6 HL S-BT-GF M8/7 AN 6 HL S-BT-MF W10 or M10/15 AN 6 HL	 Drill through hole*	 Drill through hole*	 Pilot 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



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

Application requirements

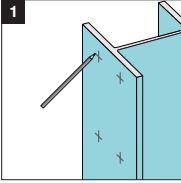
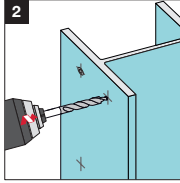
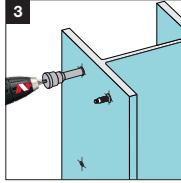
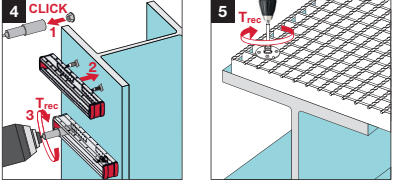
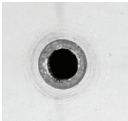
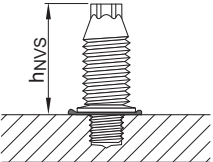
Thickness of fastened materials	Checking stand-off from the base material
S-BT-MF W10 or M10/15 AN6 HL: $1.6$ mm [0.063"] $\leq t_{II} \leq 15.0$ mm [0.59"]	S-BT-MF W10 or M10/15 AN6 HL: $h_{NVS} = 29.3$ mm to $29.8$ mm [1.15" to 1.17"]

Applications

Multipurpose fastening	Grating with X-FCM*
S-BT-MR W10 or M10/15 SN6 HL	S-BT-GR M8/7 SN6 HL
S-BT-MF W10 or M10/15 AN6 HL	S-BT-GF M8/7 AN6 HL
 Junction box, etc.	 Grating fastening
 Channel installation	
 Signage	

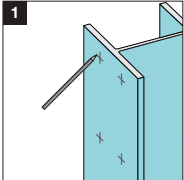
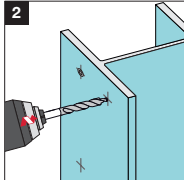
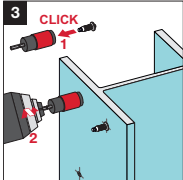
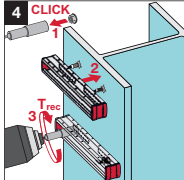
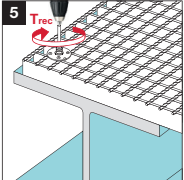
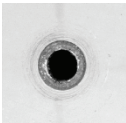
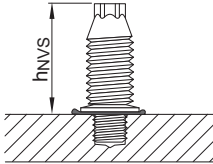
\* Load data, application requirements, corrosion information, fastener selection, system recommendation, material specification and coating refer to section X-FCM Grating Fastening

### 3.2.15.4.1 Installation with Calibrated Depth Gauge S-DG BT

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 component or grating on base material														
																	
	<p>Usage of drill driver SBT 4-A22 or SF 6-(A)22. Pre-drill until the shoulder grinds a shiny ring to assure proper drilling depth.</p>  <p><b>Before fastener installation:</b> The drilled hole and the area around the drilled hole must be clear of liquids and debris.</p>	<p>Usage of drill driver SBT 4-A22 or SF 6-(A)22 in combination with the calibrated depth gauge S-DG BT.</p> <p>Verify stud stand-off <math>h_{NVS}</math> with check S-CG-BT or S-CC BT 6.</p>  <p>Sealing washer must be properly compressed.</p>	<p>Position component or grating on S-BT studs and hold in place. Tighten the nuts or grating fastener with the suited tightening torque T.</p> <p>Tighten using:</p> <ul style="list-style-type: none"> <li>• Torque wrench and wrench socket, or</li> <li>• Torque tool S-BT 1/4" - 8 Nm or S-BT 1/4" - 16 Nm, or</li> <li>• Drill driver SBT 4-A22 or SF 6-(A)22 and suitable wrench socket S-NS</li> </ul> <table border="1" data-bbox="907 823 1445 1058"> <thead> <tr> <th rowspan="2">Hilti screwdriver:</th> <th colspan="2">T*)</th> </tr> <tr> <th>8 Nm</th> <th>16 Nm</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;">Torque setting:</td> </tr> <tr> <td>SBT 4-A22</td> <td>7</td> <td>n.a.</td> </tr> <tr> <td>SF 6-(A)22</td> <td>3</td> <td>4</td> </tr> </tbody> </table> <p>*) T for grating application: refer to Product Data Sheet for X-FCM grating faster.</p>	Hilti screwdriver:	T*)		8 Nm	16 Nm	Torque setting:			SBT 4-A22	7	n.a.	SF 6-(A)22	3	4
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**Important:** These are abbreviated instructions which may vary by application. ALWAYS review/follow the instructions for use (IFU) accompanying the product. In case of a drill through hole, rework of the coating on the back side of the plate/profile may be needed.

### 3.2.15.4.2 Installation with Hilti SBT 6-22 Cordless Drill Driver

① Mark location for each fastening	② Pre-drill with TS-BT 5.3-65 S stepped drill bit	③ Screw-in S-BT studs into drilled hole	④ Fasten component or grating on base material											
			 											
	<p>Usage of drill driver SBT 6-22.</p> <p>Using “Drill assist” mode. Set the gear selector switch to 2 and BT clutch setting. Speed of the tool reduces automatically when the hole is drilled to the correct depth. A shiny ring should be visible around the borehole after the drilling process.</p>  <p><b>Before fastener installation:</b> The drilled hole and the area around the drilled hole must be clear of liquids and debris.</p>	<p>Usage of drill driver SBT 6-22 in combination with the stud holder S-SH BT.</p> <p>Using “Fasten S-BT stud” mode. Set the gear selector switch to 1 and BT clutch setting. Insert the S-BT stud into the stud holder. The torque limiter trips when the stud reaches the correct depth.</p> <p>Verify stud stand-off <math>h_{NVS}</math> with check S-IC BT.</p>  <p>Sealing washer must be properly compressed.</p>	<p>Position component or grating on S-BT studs and hold in place. Tighten the nuts or grating fastener with the suited tightening torque T.</p> <p>Tighten using:</p> <ul style="list-style-type: none"> <li>• Torque wrench and wrench socket, or</li> <li>• Torque tool S-BT 1/4" - 8 Nm or S-BT 1/4" - 16 Nm, or</li> <li>• Drill driver SBT 6-22 and suitable wrench socket S-NS</li> </ul> <table border="1" data-bbox="992 821 1528 1010"> <tr> <td rowspan="2">Hilti screwdriver:</td> <td colspan="2">T*)</td> </tr> <tr> <td>8 Nm</td> <td>16 Nm</td> </tr> <tr> <td></td> <td colspan="2">Clutch setting:</td> </tr> <tr> <td>SBT 6-22</td> <td>3</td> <td>4</td> </tr> </table> <p>*) T for grating application: refer to Product Data Sheet for X-FCM grating faster.</p>	Hilti screwdriver:	T*)		8 Nm	16 Nm		Clutch setting:		SBT 6-22	3	4
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**Important:** These are abbreviated instructions which may vary by application. ALWAYS review/follow the instructions for use (IFU) accompanying the product. In case of a drill through hole, rework of the coating on the back side of the plate/profile may be needed..

### Fastening inspection for installation with calibrated depth gauge S-DG BT

The installer is responsible for the correct setting of the S-BT studs. For the periodic verification of the correct stud stand-off the S-CG BT check gauge or S-CC BT 6 calibration card can be used.

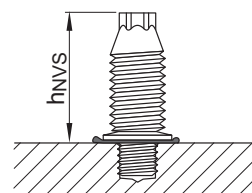
Verify stud stand-off  $h_{NVS}$  with S-CG BT or S-CC BT 6.

S-BT-\_\_\_/7\_\_\_6  $h_{NVS} = 18.6 \text{ mm to } 19.1 \text{ mm}$   
(0.732" to 0.752")

S-BT-\_\_\_/15\_\_\_6  $h_{NVS} = 29.3 \text{ mm to } 29.8 \text{ mm}$   
(1.153" to 1.173")



Design and functionality of the check gauge S-CG BT



## Fastener quality assurance for installation with calibrated depth gauge S-DG BT

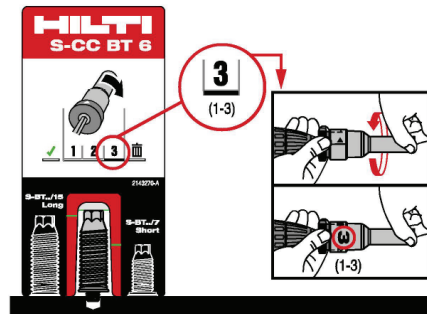
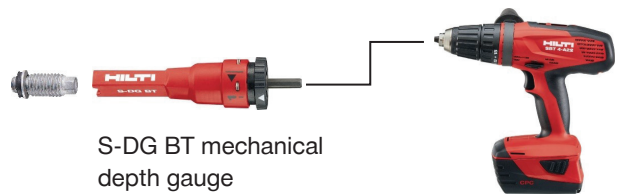
In order to ensure the exact screw-in depth and a properly compressed sealing washer, the S-BT HL studs have to be installed with the appropriate depth gauge. With this tool the screw-in depth can be adjusted in a range of ~0-1.5 mm (3 steps, ~0.5 mm per step).

The S-CC BT calibration card is needed to check the initial stand-off of the S-BT HL stud and to adjust/calibrate the S-DG BT depth gauge. After finding the right adjustment level for the S-DG BT depth gauge, the gauge can be adjusted and the studs can be installed without additional check of the S-DG BT depth gauge.

The correct stud stand-off has to be checked and, if necessary, 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) and base material (thickness, strength, type)
- Installer change
- After each package change after the installation of 100 S-BT studs

The lifetime of the S-DG BT depth gauge is  $\geq 1000$  settings.



## Fastener quality assurance for installation with SBT 6-22 and S-SH BT

In order to ensure the exact screw-in depth and a proper compressed sealing washer, the S-BT HL studs may be installed with the SBT 6-22 tool. With this tool the screw-in depth of the S-BT HL studs is controlled.

The S-IC BT inspection card can be used to check the stand-off in cases where the washer compression of the S-BT HL is assessed as incorrect (over or under compressed). Based on the coating thickness specified, the user can see if the

inspection card shows green in this region. Green indicates the stud is set within the correct embedment depth range. Orange indicates that the stud is under set. To achieve the correct embedment depth, the user can place the tool over the stud and re-trigger in BT mode. This will incrementally add 1/4 rotations. After each trigger the user shall check with the inspection card and stop when the inspection card shows green. If the card shows red, this indicates that the stud is overset and should not be used.