S-BT screw-in stainless steel and carbon steel threaded studs

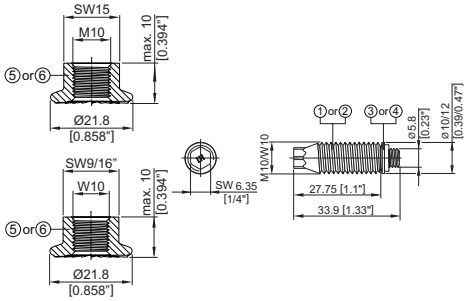
Product data

Dimensions

S-BT-MR M10/15 SN 6
S-BT-MR M10/15 SN 6 AL**)
S-BT-MR W10/15 SN 6
S-BT-MR W10/15 SN 6 AL**)

S-BT-MF M10/15 AN 6
S-BT-MF W10/15 AN 6

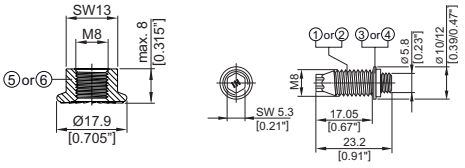
S-BT-MR M10/15 SN 5 ***)
S-BT-MR W10/15 SN 5 ***)



S-BT-MR M8/7 SN 6
S-BT-MR M8/7 SN 6 AL**)
S-BT-GR M8/7 SN 6*)
S-BT-GR M8/7 SN 6 AL*) **)

S-BT-MF M8/7 AN 6
S-BT-GF M8/7 AN 6*)

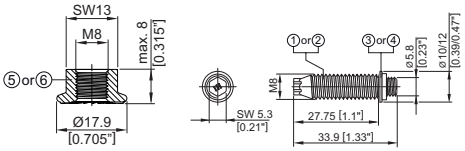
S-BT-MR M8/7 SN 5 ***)
S-BT-GR M8/7 SN 5*) ***)



S-BT-MR M8/15 SN 6
S-BT-MR M8/15 SN 6 AL**)

S-BT-MF M8/15 AN 6

S-BT-MR M8/15 SN 5***)



General information

Material specifications

① Threaded shank:	Stainless steel “S 31803 (1.4462)” zinc-coated	(S-BT-_R)
② Threaded shank:	Carbon steel “1038 / duplex-coated”	(S-BT-_F)
③ SN12-R washers:	Ø 12 mm [0.47”] Stainless steel “S 31635 (1.4404)”	(S-BT-_R)
④ AN10-F washers:	Ø 10 mm [0.39”] Aluminum	(S-BT-_F)
⑤ Serrated flange nut*):	Stainless steel grade A4 – 70/80	(S-BT-MR)
⑥ Serrated flange nut*):	Carbon steel HDG, grade 8	(S-BT-MF)
Sealing ring of sealing washers:	Chloroprene rubber CR 3.1107, black resistant to UV, salt water, water, ozone, oils, etc.	

Drilling tool, setting tool, accessories and inserts

Refer to section **“Fastener selection and system recommendation”** for more details.

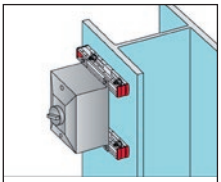
Reports and type approvals

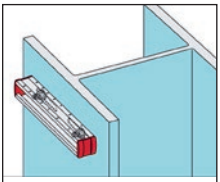
*) S-BT-GR and S-BT-GF for grating fastening: package does not include serrated flange nuts
**) for use in aluminum base material
***) this items are not available at the moment

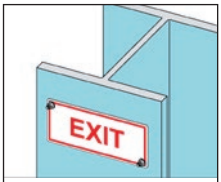
Applications

Examples

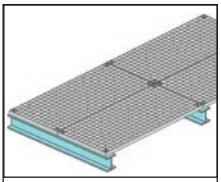
Multipurpose Fastening	Grating with X-FCM *)
S-BT-**M**R_____	S-BT-**G**R_____
S-BT-**M**F_____	S-BT-**G**F_____


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 System in the Direct Fastening Technology Manual.

Load data

Recommended loads

	S-BT-_____6					S-BT-_____5 *)	
Drill hole type and base material thickness	Pilot hole, $t_{II} \geq 6$ mm [0.24"] Drill through hole, 5 mm [0.20"] ≤ t_{II} < 6 mm [0.24"]			Drill through hole, 3 mm [0.12"] ≤ t_{II} < 5 mm [0.20"]		Pilot hole, 5 mm [0.20"] ≤ t_{II} < 6 mm [0.24"]	
Base material	Steel S235 A36	Steel S355 Grade 50	Aluminum $f_u \geq 270$ MPa	Steel S235 A36	Steel S355 Grade 50	Steel S235 A36	Steel S355 Grade 50
Tension, $\mathbf{N_{rec}}$ [kN/lb]	1.8 / 405	2.3 / 520	1.0 / 225	1.0 / 225	1.3 / 290	1.0 / 225	1.3 / 290
Shear, $\mathbf{V_{rec}}$ [kN/lb]	2.6 / 585	3.2 / 720	1.5 / 340	1.5 / 340	1.9 / 430	1.5 / 340	1.9 / 430
Moment, $\mathbf{M_{rec}}$ [Nm/lbft]	7.0 / 5.2	7.0 / 5.2	4.8 / 3.5	7.0 / 5.2	7.0 / 5.2	6.2 / 4.6	6.2 / 4.6

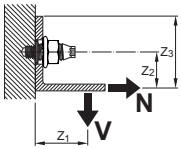
Design resistance

	S-BT-_____6					S-BT-_____5 *)	
Drill hole type and base material thickness	Pilot hole, $t_{II} \geq 6$ mm [0.24"] Drill through hole, 5 mm [0.20"] ≤ t_{II} < 6 mm [0.24"]			Drill through hole, 3 mm [0.12"] ≤ t_{II} < 5 mm [0.20"]		Pilot hole, 5 mm [0.20"] ≤ t_{II} < 6 mm [0.24"]	
Base material	Steel S235 A36	Steel S355 Grade 50	Aluminum $f_u \geq 270$ MPa	Steel S235 A36	Steel S355 Grade 50	Steel S235 A36	Steel S355 Grade 50
Tension, $\mathbf{N_{Rd}}$ [kN/lb]	2.5 / 560	3.2 / 720	1.4 / 315	1.4 / 315	1.8 / 405	1.4 / 315	1.8 / 405
Shear, $\mathbf{V_{Rd}}$ [kN/lb]	3.6 / 810	4.5 / 1010	2.1 / 470	2.1 / 470	2.7 / 610	2.1 / 470	2.7 / 610
Moment, $\mathbf{M_{Rd}}$ [Nm/lbft]	9.8 / 7.2	9.8 / 7.2	6.7 / 4.9	9.8 / 7.2	9.8 / 7.2	8.7 / 6.4	8.7 / 6.4

*) this items are not available at the moment

Conditions for recommended loads:

- Use S-BT-MR and S-BT-MF (multipurpose fastening) only with the supplied Hilti serrated flange nuts M8, M10, W10 (⑤ or ⑥ as per according to General Information – Material specifications)
- Global factor of safety Ω for static pull-out and static shear ≥ 3 (based on 5% fractile ultimate test value)
- Minimum edge distance = 6 mm [0.24"], spacing ≥ 18 mm [0.709"]
- Effect of base metal vibration and stress (e.g. areas with tensile stress) considered.
- Redundancy (multiple fastening) must be provided.
- If eccentric loading exists (e.g. use of an angle clip), moments caused by off-center loading must be considered.



Recommended interaction formula for combined loading – steel and aluminum base material

V–N (shear and tension) $\frac{V}{V_{rec}} + \frac{N}{N_{rec}} \le 1.2$ with $\frac{V}{V_{rec}} \le 1.0$ and $\frac{N}{N_{rec}} \le 1.0$

V–M (shear and bending) $\frac{V}{V_{rec}} + \frac{M}{M_{rec}} \le 1.2$ with $\frac{V}{V_{rec}} \le 1.0$ and $\frac{M}{M_{rec}} \le 1.0$

N–M (tension and bending) $\frac{N}{N_{rec}} + \frac{M}{M_{rec}} \le 1.0$

V–N–M (shear, tension and bending) $\frac{V}{V_{rec}} + \frac{N}{N_{rec}} + \frac{M}{M_{rec}} \le 1.0$

Cyclic loading:

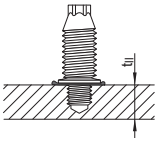
S-BT threaded studs are only to be used for fastenings subject to static or quasi-static loading. Inquire at Hilti for test data if cyclic loading has to be considered in the design.

Application Requirements

Base material thickness t_{II} and type of bore hole

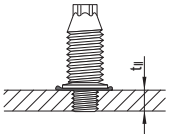
S-BT-MR M8/7 SN 6 S-BT-MR M8/7 SN 6 AL*) S-BT-MF M8/7 AN 6 S-BT-GR M8/7 SN 6 S-BT-GR M8/7 SN 6 AL*) S-BT-GF M8/7 AN 6	S-BT-MR M8/15 SN 6 S-BT-MR M8/15 SN 6 AL*) S-BT-MF M8/15 AN 6	S-BT-MR M10/15 SN 6 S-BT-MR M10/15 SN 6 AL*) S-BT-MF M10/15 AN 6 S-BT-MR W10/15 SN 6 S-BT-MR W10/15 SN 6 AL*) S-BT-MF W10/15 AN 6	S-BT-MR M8/7 SN 5 **) S-BT-MR M8/15 SN 5 **) S-BT-GR M8/7 SN 5 **) S-BT-MR M10/15 SN 5 **) S-BT-MR W10/15 SN 5 **)

Pilot hole



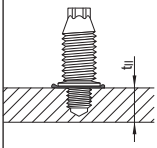
Base material thickness steel and aluminum: $t_{II} \geq 6$ mm

Drill through hole



Base material thickness steel: 3 mm ≤ t_{II} < 6 mm aluminum: 5 mm ≤ t_{II} < 6 mm

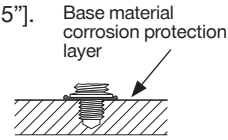
Pilot hole



Base material thickness steel: 5 mm ≤ t_{II} < 6 mm

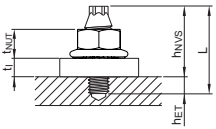
*) for use in aluminum base material
**) this items are not available at the moment

Thickness of base material corrosion protection layer ≤ 0.8 mm [0.0315”].
For thicker coatings, please contact Hilti.



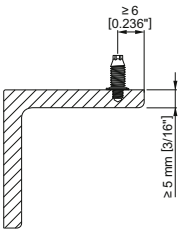
Thickness of fastened material t_I

S-BT-_____/7_____ 1.6 mm [0.063”] ≤ t_I ≤ 7.0 mm [0.28”]
S-BT-_____/15_____ 1.6 mm [0.063”] ≤ t_I ≤ 15.0 mm [0.59”]

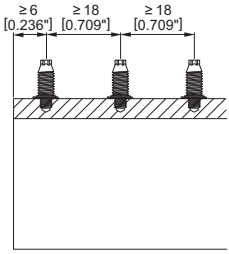


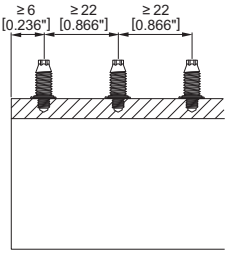
Spacing & edge distances

Edge distance: ≥ 6 mm [0.24”]



Spacing: ≥ 18 mm [0.709″] for all S-BT M8
≥ 22 mm [0.866″] for all S-BT M10 and S-BT W10





Corrosion information

The S-BT stainless steel fasteners are made from the duplex stainless steel type 1.4462, which is equivalent to AISI 316 (A4) steel grade. This grade of stainless steel is classified in the corrosion resistance class IV according to DIN EN 1993-1-4:2015, which makes the material suitable for aggressive environments like in coastal and offshore applications.

The microstructures of duplex stainless steels consist of a mixture of austenite and ferrite phases. Compared to the austenitic stainless steel grades, duplex stainless steels are magnetic. The surface of the S-BT stainless steel fasteners is zinc-coated (anti-friction coating) in order to reduce the thread forming torque when the stud is screwed in into the base material.

The coating of the carbon steel S-BT fasteners consists of an electroplated Zn-alloy for cathodic protection and a top coat for chemical resistance (Duplex-coating). The thickness of the coating is 35 µm. The use of this coating is limited to the corrosion category C1, C2 and C3 according the standard EN ISO 9223. For higher corrosion categories stainless steel fasteners should be used.

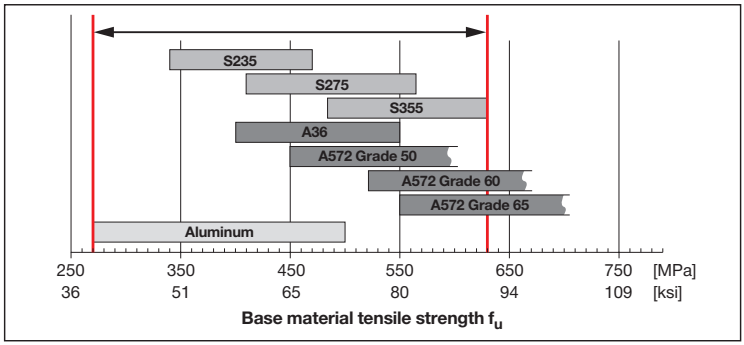
In case of a **drill through hole or a pilot hole in thin base material**, rework of the coating on the back side of the plate/profile may needed.

	S-BT-_____AN 6		**S-BT-_____SN 6**		**S-BT-_____SN 5** [4]	
Corrosivity category C	C3 medium corrosive		C5 very high corrosive		C5 very high corrosive	
Drill hole type and base material thickness t_{II} [1]	Topside protection	Backside protection	Topside protection	Backside protection	Topside protection	Backside protection
Drill through hole 3 mm [0.12"] ≤ t_{II} < 6 mm [0.24"]	✓	x[2]	✓	x[2]	n.a.	n.a.
Pilot hole 5 mm [0.20"] ≤ t_{II} < 6 mm [0.24"]	n.a.	n.a.	n.a.	n.a.	✓	✓[3]
Pilot hole 6 mm [0.24"] ≤ t_{II} < 7 mm [0.28"]	✓	✓	✓	✓[3]	✓	✓
Pilot hole t_{II} ≥ 7 mm [0.28"]	✓	✓	✓	✓	✓	✓

1) Real base material thickness, not nominal material thickness or material thickness with coating.
2) Damage of the coating on the back side of the plate/profile require a rework of the coating.
3) Damage of the coating on the back side of the plate / profile require a rework of the coating, if the drilling tools SF BT 22-A or SF BT 18-A were used for drilling the bore hole. If the tool SBT 4-A22 was used for drilling the bore hole, no damage of the coating on the back side of the plate / profile will occur.
4) This items are not available at the moment.

Application limit

The base material is limited to steel grade with a maximum tensile strength f_u = 630 MPa [91 ksi].
The minimum tensile strength of steel is $f_u \geq 340$ MPa [49 ksi].
The minimum tensile strength of aluminum is $f_u \geq 270$ MPa [39 ksi].
Minimum thickness of base material t_{II}: refer to section “Application Requirements”.
Maximum thickness of base material t_{II}: no limits.



Fastener selection and system recommendation

	Fastener	Drilling tool	Setting tool	Drill bit	Depth gauge
Stainless steel	S-BT-MR M8/7 SN 5 *)	SBT 4-A22, SF BT 18-A or SF BT 22-A	SBT 4-A22, SFC 18-A or SFC 22-A	TS-BT 4.3-74 S *)	S-DG BT M8/7 Short 5 *)
	S-BT-MR M8/15 SN 5 *)				S-DG BT M8/15 Long 5 *)
	S-BT-GR M8/7 SN 5 *)				S-DG BT M8/7 Short 5 *)
	S-BT-MR M8/7 SN 6			TS-BT 5.5-74 S	S-DG BT M8/7 Short 6
	S-BT-MR M8/7 SN 6 AL			TS-BT 5.5-74 AL	
	S-BT-MR M8/15 SN 6			TS-BT 5.5-74 S	S-DG BT M8/15 Long 6
	S-BT-MR M8/15 SN 6 AL			TS-BT 5.5-74 AL	
	S-BT-GR M8/7 SN 6			TS-BT 5.5-74 S	S-DG BT M8/7 Short 6
	S-BT-GR M8/7 SN 6 AL			TS-BT 5.5-74 AL	
	S-BT-MR M10/15 SN 5 *)			TS-BT 4.3-74 S *)	S-DG BT M10-W10/15 Long 5 *)
	S-BT-MR W10/15 SN 5 *)				
	S-BT-MR M10/15 SN 6			TS-BT 5.5-74 S	S-DG BT M10-W10/15 Long 6
	S-BT-MR M10/15 SN 6 AL			TS-BT 5.5-74 AL	
	S-BT-MR W10/15 SN 6			TS-BT 5.5-74 S	
	S-BT-MR W10/15 SN 6 AL			TS-BT 5.5-74 AL	
Carbon steel	S-BT-GF M8/7 AN 6			TS-BT 5.5-74 S	S-DG BT M8/7 Short 6
	S-BT-MF M8/7 AN 6				
	S-BT-MF M8/15 AN 6				S-DG BT M8/15 Long 6
	S-BT-MF M10/15 AN 6				S-DG BT M10-W10/15 Long 6
	S-BT-MF W10/15 AN 6				

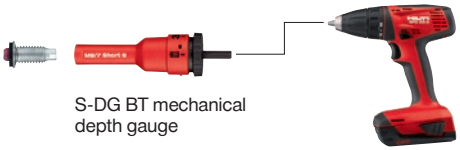
*) this items are not available at the moment

Fastener quality assurance

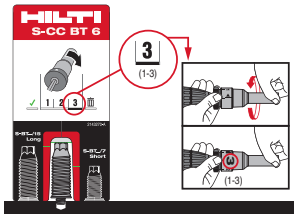
In order to ensure the exact screw-in depth and a proper compressed sealing washer, the S-BT studs have to be installed with the appropriate depth gauge. With this tool the screw-in depth can be adjusted in a range of 0 - 1.5 mm (3 steps, 0.5mm per step).
The S-CC BT calibration card is needed to check 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 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) and base material (thickness, strength, type)
- Installer change
- After each packaging respectively after the installation of 100 S-BT studs

The lifetime of the S-DG BT depth gauge is ≥ 1000 settings.



S-DG BT mechanical depth gauge



Design and functionality of the mechanical calibration card S-CC BT

Fastening inspection

The installer is responsible for the correct setting of the S-BT studs.
For the periodical verification of the correct stud stand-off the S-CG BT check gauge can be used.

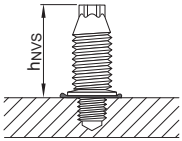
Verify stud stand-off h_{NVS} with check gauge S-CG BT

S-BT-____/7_____6 h_{NVS} = 18.6 mm to 19.1 mm [0.732” to 0.752”]

S-BT-____/15____6 h_{NVS} = 29.3 mm to 29.8 mm [1.153” to 1.173”]

S-BT-____/7_____5 *) h_{NVS} = 19.6 mm to 20.1 mm [0.772” to 0.791”]

S-BT-____/15____5 *) h_{NVS} = 30.3 mm to 30.8 mm [1.193” to 1.213”]



*) this items are not available at the moment

Designation	Product name	Comment
S-DG BT M8/7 Short 6	Depth gauge	for exact setting of S-BT M8/7 _N 6
S-DG BT M8/15 Long 6	Depth gauge	for exact setting of S-BT M8/15 _N 6
S-DG BT M10-W10/15 Long 6	Depth gauge	for exact setting of S-BT M10/W10 _N 6
S-CC BT 6	Calibration card	for calibration of the depth gauge (short/long studs)
S-CG BT /7 Short 6	Check gauge	for verification of the stand-off for short studs (7 mm)
S-CG BT /15 Long 6	Check gauge	for verification of the stand-off for long studs (15 mm)

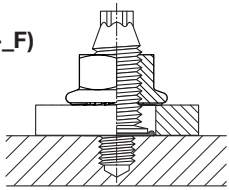
Installation

S-BT fasteners made of stainless steel with washer-⌀ 12mm (S-BT-_R)

Fastened material hole ⌀ ≥ 13 mm [0.51”]

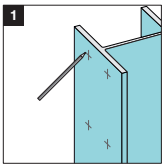
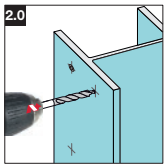
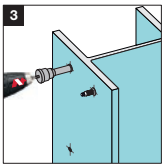
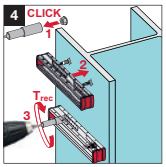
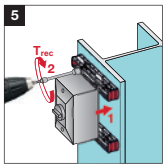
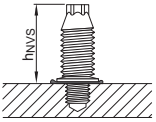
S-BT fasteners made of carbon steel with washer-⌀ 10mm (S-BT-_F)

Fastened material hole ⌀ ≥ 11 mm [0.43”]



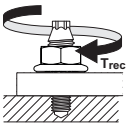
Important: for group fastenings subjected to shear loading the fastened material hole diameter should not exceed 14 mm [0.55”] (S-BT-_R) and 12 mm [0.47”] (S-BT-_F) respectively.

Installation

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-CG 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 ¼” (8 Nm) or S-BT ¼” (5 Nm) • Torque wrench Trec Hilti screw-driver: 5 Nm / 8 Nm Torque-setting: SBT 4-A22 4 5 SFC 18-A 4 5 SFC 22-A 4 5	Tighten the bolts with the suited tightening torque T_{rec} (see IFU of the Hilti wing nuts).

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.

Tightening torque serrated flange nut



	S-BT-_____6					S-BT-_____5 *)	
Drill hole type and base material thickness	Pilot hole, t_{II} ≥ 6 mm [0.24”] Drill through hole, 5 mm [0.20”] ≤ t_{II} < 6 mm [0.24”]			Drill through hole, 3 mm [0.12”] ≤ t_{II} < 5 mm [0.20”]		Pilot hole, 5 mm [0.20”] ≤ t_{II} < 6 mm [0.24”]	
Base material	Steel S235 A36	Steel S355 Grade 50	Aluminum f_u ≥ 270 MPa	Steel S235 A36	Steel S355 Grade 50	Steel S235 A36	Steel S355 Grade 50
Tightening torque serrated flange nut T_{rec} [Nm/lbft]	8 / 5.9	8 / 5.9	5 / 3.6	5 / 3.6	5 / 3.6	5 / 3.6	5 / 3.6

Important: The tightening torque (T_{rec}) for the serrated flange nut is dependent on the stud type, the base material type and thickness, and the drill hole type. Exceeding the tightening torque (T_{rec}) leads to damage of the S-BT stud's anchorage with negative impact on the load values and the sealing function.

*) this items are not available at the moment

Fastener program

Designation	Item no.	Product name	Comment	Application
S-BT-GF M8/7 AN 6	2140527	Threaded stud	use with X-FCM grating disc	Grating
S-BT-MF M8/7 AN 6	2139174	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MF M8/15 AN 6	2148618	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MF M10/15 AN 6	2140528	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MF W10/15 AN 6	2139173	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-GR M8/7 SN 5 *)	2149240	Threaded stud	use with X-FCM grating disc	Grating
S-BT-GR M8/7 SN 6	2140529	Threaded stud	use with X-FCM grating disc	Grating
S-BT-GR M8/7 SN 6 AL	2140742	Threaded stud	use with X-FCM grating disc	Grating
S-BT-MR M8/7 SN 5 *)	2139171	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR M8/7 SN 6	2139172	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR M8/7 SN 6 AL	2140743	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR M8/15 SN 5 *)	2148622	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR M8/15 SN 6	2148612	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR M8/15 SN 6 AL	2148614	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR M10/15 SN 5 *)	2148623	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR M10/15 SN 6	2140740	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR M10/15 SN 6 AL	2140744	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR W10/15 SN 5 *)	2148624	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR W10/15 SN 6	2140741	Threaded stud	package includes serrated flange nut	Multipurpose
S-BT-MR W10/15 SN 6 AL	2140745	Threaded stud	package includes serrated flange nut	Multipurpose
TS-BT 5.5-74 S	2143137	Stepped drill bit	for base material steel	
TS-BT 5.5-74 AL	2143138	Stepped drill bit	for base material aluminum	
TS-BT 4.3-74 S *)	2143139	Stepped drill bit	for base material steel	
S-DG BT M8/7 Short 6	2143260	Depth gauge	for exact setting of the S-BT	
S-DG BT M10-W10/15 Long 6	2143261	Depth gauge	for exact setting of the S-BT	
S-DG BT M8/15 Long 6	2148575	Depth gauge	for exact setting of the S-BT	
S-DG BT M8/7 Short 5 *)	2149241	Depth gauge	for exact setting of the S-BT	
S-DG BT M10-W10/15 Long 5 *)	2149242	Depth gauge	for exact setting of the S-BT	
S-DG BT M8/15 Long 5 *)	2149243	Depth gauge	for exact setting of the S-BT	
S-CG BT /7 Short 6	2143262	Check gauge	for verification of the stud stand-off	
S-CG BT /15 Long 6	2143263	Check gauge	for verification of the stud stand-off	
S-CC BT 6	2143270	Calibration card	for calibration of the depth gauge	
S-BT 1/4" – 5 Nm	2143271	Torque tool	manual torque tool (5 Nm)	
X-BT 1/4" – 8 Nm	2119272	Torque tool	manual torque tool (8 Nm)	
S-NS 13 C 95/3 3/4"	2149244	Nut setter	for serrated flange nut M8	
S-NS 15 C 95/3 3/4"	2149245	Nut setter	for serrated flange nut M10	
S-NS 9/16" C 95/3 3/4"	2149246	Nut setter	for serrated flange nut W10	

*) this items are not available at the moment