



X-FCM NG DATA SHEET

Grating Fastening System

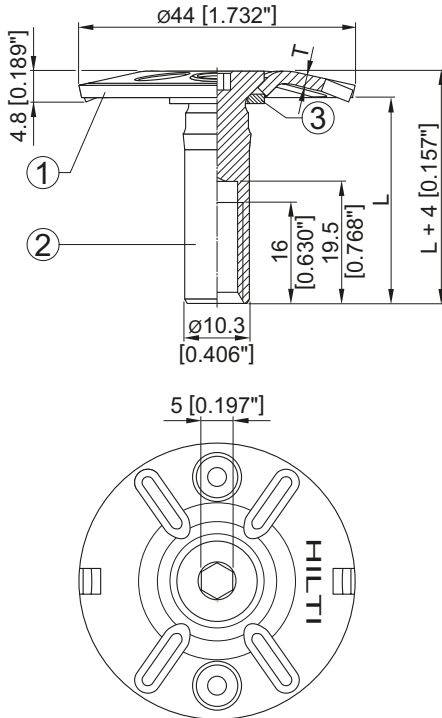


X-FCM NG Grating Fastening System

Product data

Dimension

X-FCM-R NG X-FCM-M NG



Material specification

- | | |
|-------------------------|--------------|
| ① Disc: Stainless steel | (X-FCM-R NG) |
| X2CrNiMo17-12-2 | |
| S 31603 (1.4404) 316L | |
| ① Disc: Carbon steel | (X-FCM-M NG) |
| DC 04/duplex coated | |
| ② Threaded stem: | |
| Stainless steel | (X-FCM-R NG) |
| X2CrNiMo17-12-2 | |
| S 31603 (1.4404) 316L | |
| ② Threaded stem: | |
| Carbon steel | (X-FCM-M NG) |
| ML08AL/duplex coated | |
| ③ O-Ring | |
| Polyurethane, black | |

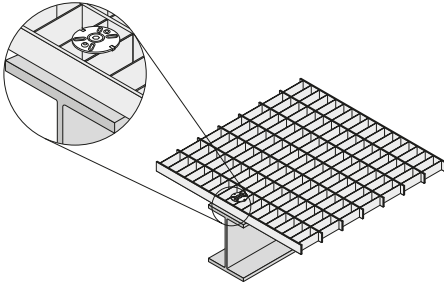
Recommended fastening tool

Refer to section "Fastener selection and system recommendation" for more details.

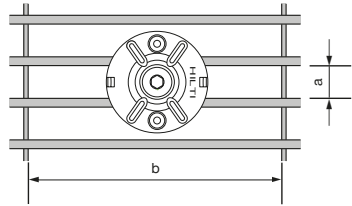
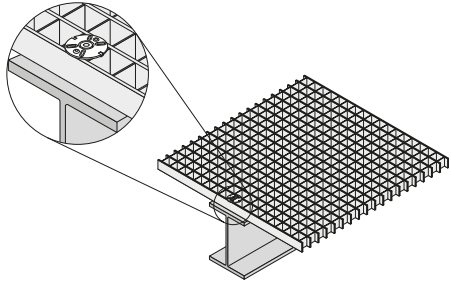
Approval/certificate

Application

Securing rectangular grating

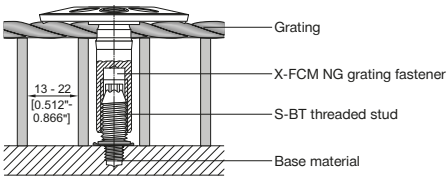


Securing square grating



Grating with grating openings* a = 13 mm to 22 mm and b ≥ 18 mm (steel and fibreglass reinforced)

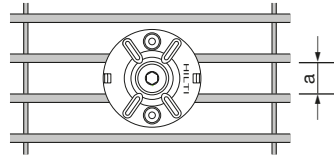
* Real grating opening, not nominal grating opening. If grating opening a is < 13 mm and b is < 18 mm the installation of the S-BT threaded stud is not possible.



Load Data

Recommended resistance under tension load for grating fastening system

Rectangular grating opening



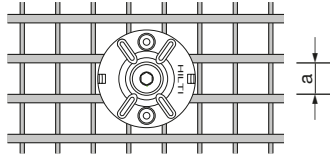
	Recommended resistance N_{rec} for X-FCM-R NG + S-BT-GR NG				
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Rectangular grating Bar spacing $a = 13 \text{ mm}$	1.9 kN	2.3 kN	1.9 kN	1.8 kN	2.1 kN
Rectangular grating Bar spacing $a = 18 \text{ mm}$	1.9 kN	2.3 kN	1.9 kN	1.8 kN	2.1 kN
Rectangular grating Bar spacing $a = 22 \text{ mm}$	1.9 kN	2.1 kN ¹⁾	1.9 kN	1.8 kN	2.1 kN

	Recommended resistance N_{rec} for X-FCM-M NG + S-BT-GR NG				
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Rectangular grating Bar spacing $a = 13 \text{ mm}$	1.9 kN	2.3 kN	1.9 kN	1.8 kN	2.1 kN
Rectangular grating Bar spacing $a = 18 \text{ mm}$	1.9 kN	2.1 kN ¹⁾	1.9 kN	1.8 kN	2.1 kN
Rectangular grating Bar spacing $a = 22 \text{ mm}$	1.2 kN ¹⁾	1.2 kN ¹⁾	1.2 kN ¹⁾	1.2 kN ¹⁾	1.2 kN ¹⁾

	Recommended resistance N_{rec} for X-FCM-M NG + S-BT-GF NG				
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Rectangular grating Bar spacing $a = 13 \text{ mm}$	2.0 kN	2.4 kN	n.a.	1.9 kN	2.3 kN
Rectangular grating Bar spacing $a = 18 \text{ mm}$	2.0 kN	2.1 kN ¹⁾	n.a.	1.9 kN	2.1 kN ¹⁾
Rectangular grating Bar spacing $a = 22 \text{ mm}$	1.2 kN ¹⁾	1.2 kN ¹⁾	n.a.	1.2 kN ¹⁾	1.2 kN ¹⁾

¹⁾ Loading is limited by elastic limit of the X-FCM NG disk. Exceeding the load value can result in plastic deformation of the X-FCM NG disk.

²⁾ For base material thickness $3 \text{ mm [0.12"]} \leq t_{II} < 6 \text{ mm [0.24"]}$ rework of the coating on the back side of the plate/profile may be needed.

Square grating opening


	Recommended resistance N_{rec} for X-FCM-R NG + S-BT-GR NG				
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Square grating Bar spacing $a = 18 \text{ mm}$	1.9 kN	2.3 kN	1.9 kN	1.8 kN	2.1 kN
Square grating Bar spacing $a = 22 \text{ mm}$	1.9 kN	2.3 kN	1.9 kN	1.8 kN	2.1 kN

	Recommended resistance N_{rec} for X-FCM-M NG + S-BT-GR NG				
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Square grating Bar spacing $a = 18 \text{ mm}$	1.9 kN	2.3 kN	1.9 kN	1.8 kN	2.1 kN
Square grating Bar spacing $a = 22 \text{ mm}$	1.7 kN ¹⁾	1.7 kN ¹⁾	1.7 kN ¹⁾	1.7 kN ¹⁾	1.7 kN ¹⁾

	Recommended resistance N_{rec} for X-FCM-M NG + S-BT-GF NG				
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Square grating Bar spacing $a = 18 \text{ mm}$	2.0 kN	2.4 kN	n.a.	1.9 kN	2.3 kN
Square grating Bar spacing $a = 22 \text{ mm}$	1.7 kN ¹⁾	1.7 kN ¹⁾	n.a.	1.7 kN ¹⁾	1.7 kN ¹⁾

¹⁾ Loading is limited by elastic limit of the X-FCM NG disk. Exceeding the load value can result in plastic deformation of the X-FCM NG disk.

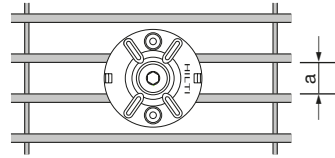
²⁾ For base material thickness $3 \text{ mm [0.12"]} \leq t_{II} < 6 \text{ mm [0.24"]}$ rework of the coating on the back side of the plate/profile may be needed.

The recommended resistance under tension load N_{rec} for grating fastening system (X-FCM NG + S-BT) is determined as follows:

$$N_{rec} = \min \left\{ \begin{array}{l} N_{rec, X-FCM \text{ NG}} \\ N_{rec, S-BT} \end{array} \right.$$

Design resistance under tension load for grating fastening system

Rectangular grating opening



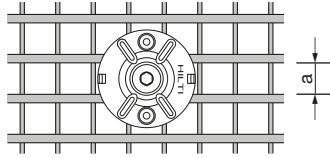
Design resistance N_{Rd} for X-FCM-R NG + S-BT-GR NG					
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Rectangular grating Bar spacing $a = 13 \text{ mm}$	2.7 kN	3.2 kN	2.7 kN	2.5 kN	3.0 kN
Rectangular grating Bar spacing $a = 18 \text{ mm}$	2.7 kN	3.2 kN	2.7 kN	2.5 kN	3.0 kN
Rectangular grating Bar spacing $a = 22 \text{ mm}$	2.7 kN	2.9 kN ¹⁾	2.7 kN	2.5 kN	3.0 kN

Design resistance N_{Rd} for X-FCM-M NG + S-BT-GR NG					
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Rectangular grating Bar spacing $a = 13 \text{ mm}$	2.7 kN	3.2 kN	2.7 kN	2.5 kN	3.0 kN
Rectangular grating Bar spacing $a = 18 \text{ mm}$	2.7 kN	2.9 kN ¹⁾	2.7 kN	2.5 kN	3.0 kN
Rectangular grating Bar spacing $a = 22 \text{ mm}$	1.7 kN	1.7 kN ¹⁾	1.7 kN ¹⁾	1.7 kN ¹⁾	1.7 kN ¹⁾

Design resistance N_{Rd} for X-FCM-M NG + S-BT-GF NG					
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Rectangular grating Bar spacing $a = 13 \text{ mm}$	2.8 kN	3.3 kN	n.a.	2.7 kN	3.2 kN
Rectangular grating Bar spacing $a = 18 \text{ mm}$	2.8 kN	2.9 kN ¹⁾	n.a.	2.7 kN	2.9 kN ¹⁾
Rectangular grating Bar spacing $a = 22 \text{ mm}$	1.7 kN ¹⁾	1.7 kN ¹⁾	n.a.	1.7 kN ¹⁾	1.7 kN ¹⁾

¹⁾ Loading is limited by elastic limit of the X-FCM NG disk. Exceeding the load value can result in plastic deformation of the X-FCM NG disk.

²⁾ For base material thickness $3 \text{ mm [0.12"]} \leq t_{II} < 6 \text{ mm [0.24"]}$ rework of the coating on the back side of the plate/profile may be needed.

Square grating opening


Design resistance N_{Rd} for X-FCM-R NG + S-BT-GR NG					
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Square grating Bar spacing $a = 18 \text{ mm}$	2.7 kN	3.2 kN	2.7 kN	2.5 kN	3.0 kN
Square grating Bar spacing $a = 22 \text{ mm}$	2.7 kN	3.2 kN	2.7 kN	2.5 kN	3.0 kN

Design resistance N_{Rd} for X-FCM-M NG + S-BT-GR NG					
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Square grating Bar spacing $a = 18 \text{ mm}$	2.7 kN	3.2 kN	2.7 kN	2.5 kN	3.0 kN
Square grating Bar spacing $a = 22 \text{ mm}$	2.4 kN ¹⁾	2.4 kN ¹⁾	2.4 kN ¹⁾	2.4 kN ¹⁾	2.4 kN ¹⁾

Design resistance N_{Rd} for X-FCM-M NG + S-BT-GF NG					
Base material thickness ²⁾	$t_{II} \geq 5 \text{ mm [0.20"]}$			$3 \text{ mm [0.12"]} \leq t_{II} < 5 \text{ mm [0.20"]}$	
Base material type	Steel S235 A36	Steel S355, S420 Grade 50	Aluminum $f_u \geq 270 \text{ MPa}$	Steel S235 A36	Steel S355, S420 Grade 50
Square grating Bar spacing $a = 18 \text{ mm}$	2.8 kN	3.3 kN	n.a.	2.7 kN	3.2 kN
Square grating Bar spacing $a = 22 \text{ mm}$	2.4 kN ¹⁾	2.4 kN ¹⁾	n.a.	2.4 kN ¹⁾	2.4 kN ¹⁾

1) Loading is limited by elastic limit of the X-FCM NG disk. Exceeding the load value can result in plastic deformation of the X-FCM NG disk.

2) For base material thickness $3 \text{ mm [0.12"]} \leq t_{II} < 6 \text{ mm [0.24"]}$ rework of the coating on the back side of the plate/profile may be needed.

The design resistance under tension load N_{Rd} for grating fastening system (X-FCM NG + S-BT) is determined as follows

$$N_{Rd} = \min \left\{ \begin{array}{l} N_{Rd, X-FCM \text{ NG}} \\ N_{Rd, S-BT} \end{array} \right.$$

Note:

- X-FCM NG resist shear by friction and are not suitable for explicit shear load designs, e.g. diaphragms. Depending on surface characteristics, shear loads of up to about 0.3 kN will not result in permanent deformation. Therefore, small unexpected shear loads can generally be accommodated without damage.
- The fasteners are not to be used in wave zones due to the high load impact. For applications in wave zones please contact Hilti.

Conditions for recommended load and design load:

- Global safety factor Ω resp. partial safety factor γ_m (based on 5% fractile ultimate test value):
Recommended load: $\Omega = 2.80$
Design load: $\gamma_m = 2.00$
- Effect of base metal vibration and stress (e.g. areas with tensile stress) considered.
- Redundancy (multiple fastening) must be provided.

Application requirement**Base material**

All requirements for the base material (type, strength, thickness, spacing and edge distances, application limits, etc.) are given in the Product Data Sheet (PDS) of the S-BT fastener.

Thickness of fastened material

Grating height: 28–53 mm with standard X-FCM-M NG/X-FCM-R NG. For other dimensions please contact Hilti.

Corrosion information

The coating of the X-FCM-M NG carbon steel grating fasteners consists of an electroplated Zn-alloy for cathodic protection and a top coat for chemical resistance (duplex-coating). The intended use of this coating is limited to the corrosion category C1, C2 and C3 according to the standard EN ISO 9223 (indoors, mildly corrosive environment). The carbon steel grating fasteners are to be used for fastening gratings made of coated or galvanized carbon steel or gratings made of reinforced fibreglass.

Note:

The fasteners are not for use in marine atmospheres or in heavily polluted environments.

The X-FCM-R NG stainless steel grating fasteners are made from the stainless-steel type 1.4404, which is equivalent to AISI 316L (A4) steel grade. This grade of stainless steel is classified in the corrosion resistance class III according to DIN EN 1993-1-4:2015, which makes the material suitable for aggressive environments like in marine, offshore, petrochemical, caloric (coal, oil) power plants, etc. applications.

The stainless-steel grating fasteners are to be used for fastening gratings made of stainless steel or gratings made of reinforced fibreglass.

Note:

The fasteners are not for use in automobile tunnels, swimming pools or similar environments.

Fastener selection and system recommendation

Fastener program

X-FCM NG grating fastener	Grating height	Tool	S-BT threaded studs
X-FCM-M NG 28/33	28 – 33 mm	SBT 4-A22	S-BT-GF NG M8/7 AN 6 S-BT-GR NG M8/7 SN 6
X-FCM-M NG 32/37	32 – 37 mm	SBT 4-A22	S-BT-GF NG M8/7 AN 6 S-BT-GR NG M8/7 SN 6
X-FCM-M NG 38/43	38 – 43 mm	SBT 4-A22	S-BT-GF NG M8/7 AN 6 S-BT-GR NG M8/7 SN 6
X-FCM-M NG 48/53	48 – 53 mm	SBT 4-A22	S-BT-GF NG M8/7 AN 6 S-BT-GR NG M8/7 SN 6
X-FCM-R NG 28/33	28 – 33 mm	SBT 4-A22	S-BT-GR NG M8/7 SN 6
X-FCM-R NG 32/37	32 – 37 mm	SBT 4-A22	S-BT-GR NG M8/7 SN 6
X-FCM-R NG 38/43	38 – 43 mm	SBT 4-A22	S-BT-GR NG M8/7 SN 6
X-FCM-R NG 48/53	48 – 53 mm	SBT 4-A22	S-BT-GR NG M8/7 SN 6

Installation recommendation

Tightening torque for X-FCM-M NG

	Fastener: S-BT-GF, S-BT-GR, S-BT-GR AL
Element: X-FCM-M NG	5 Nm

Tightening tool recommendation for tightening with cordless screwdriver

Cordless screwdriver	Clutch type (stop detection)	Gear	Clutch
SF 2-A12	TRC	1	15
SF 2H-A12	TRC	1	15
SF 4-A22	TRC	1	4
SF 6-A22	ESC (SJ)	1	5
SF 6H-A22	ESC (SJ)	1	5
SBT 4-A22	TRC	1	5



- Tool power level adjustment:

Gear:



Clutch:



- The setting of the torque via the Hilti screwdriver with torque release coupling (TRC) can change as the clutch wears over time. The specified torque setting is only a rough guide value and applies to a new Hilti screwdriver. To ensure recommended torque is applied, Hilti recommends the use of a calibrated torque wrench or the Hilti torque tool.
- The specified torque setting for the Hilti screw drivers with electronic slip clutch (ESC) is only a rough guide value as the ESC has 2 stop detections; Soft Joint (SJ) detection and Hard Joint (HJ) detection. The hard joint detection is activated due to drop in speed (fast stop) and can lead to a torque spike. The installation torque may vary depending on the user and the application. To ensure recommended torque is applied, Hilti recommends the use of a calibrated torque wrench or the Hilti torque tool.

Tightening tool recommendation for tightening with Hilti torque tool

Hilti torque tool

Torque tool S-BT 1/4" - 5 Nm

Tightening torque for X-FCM-R NG

	Fastener: S-BT-GR
Element: X-FCM-R NG	8 Nm

Tightening tool recommendation for tightening with cordless screwdriver

Cordless screwdriver	Clutch type (stop detection)	Gear	Clutch
SF 4-A22	TRC	1	8
SF 6-A22	ESC (SJ)	1	7
SF 6H-A22	ESC (SJ)	1	7
SBT 4-A22	TRC	1	7



• Tool power level adjustment:



Clutch:



- The setting of the torque via the Hilti screwdriver with torque release coupling (TRC) can change as the clutch wears over time. The specified torque setting is only a rough guide value and applies to a new Hilti screwdriver. To ensure recommended torque is applied, Hilti recommends the use of a calibrated torque wrench or the Hilti torque tool.
- The specified torque setting for the Hilti screw drivers with electronic slip clutch (ESC) is only a rough guide value as the ESC has 2 stop detections; Soft Joint (SJ) detection and Hard Joint (HJ) detection. The hard joint detection is activated due to drop in speed (fast stop) and can lead to a torque spike. The installation torque may vary depending on the user and the application. To ensure recommended torque is applied, Hilti recommends the use of a calibrated torque wrench or the Hilti torque tool.

Tightening tool recommendation for tightening with Hilti torque tool

Hilti torque tool
Torque tool X-BT 1/4" – 8 Nm

System program

Designation	Item no.	Product name	Comment
X-FCM-M NG 28/33	2279753	Grating Fastener	Carbon steel
X-FCM-M NG 32/37	2279754	Grating Fastener	Carbon steel
X-FCM-M NG 38/43	2279755	Grating Fastener	Carbon steel
X-FCM-M NG 48/53	2279756	Grating Fastener	Carbon steel
X-FCM-R NG 28/33	2279757	Grating Fastener	Stainless steel
X-FCM-R NG 32/37	2279758	Grating Fastener	Stainless steel
X-FCM-R NG 38/43	2279759	Grating Fastener	Stainless steel
X-FCM-R NG 48/53	2279752	Grating Fastener	Stainless steel
S-BT-GF NG M8/7 AN 6	2302143	Threaded stud	Carbon steel use with X-FCM-M NG grating disc grating
S-BT-GR NG M8/7 SN 6	2302142	Threaded stud	Stainless steel use with X-FCM-R NG grating disc or with X-FCM-M NG grating disc
TS-BT 5.5-110 S	2201685	Stepped drill bit	For use in combination with the S-CS NG centering spacer
S-CS NG	2310191	Centering Spacer	For perpendicular pilot hole drilling and precise location of studs
S-DG BT M8/7 Short 6	2279735	Depth gauge	For exact setting of the S-BT
S-BT ¼" – 5 Nm	2143271	Torque tool	Manual torque tool (5 Nm)
X-BT ¼" – 8 Nm	2119272	Torque tool	Manual torque tool (8 Nm)
5 mm Allen-type bit			