



# X-FCM DATA SHEET

Grating fastening system





## Load data

### Recommended tensile loads $N_{rec}$ [kN]

#### Grating opening type

	Rectangular		Square	
	Bar spacing [mm]		Bar spacing [mm]	
	18	30	18	30
<b>X-FCM</b>	0.8 <sup>2)</sup>	0.8 <sup>2)</sup>	2.4 <sup>1)3)</sup>	0.8 <sup>2)</sup>
<b>X-FCM-M</b>	0.8 <sup>2)</sup>	0.8 <sup>2)</sup>	1.8 <sup>1)3)</sup>	0.8 <sup>2)</sup>
<b>X-FCM-R</b>	1.4 <sup>2)3)</sup>	1.0 <sup>2)</sup>	1.8 <sup>1)3)</sup>	1.0 <sup>2)</sup>

#### Grating opening type

	Rectangular		Square	
	Bar spacing [mm]		Bar spacing [mm]	
	30	57	30	60
<b>X-FCM-M_L</b>	0.8 <sup>2)</sup>	0.8 <sup>2)</sup>	1.8 <sup>1)3)</sup>	0.8 <sup>2)</sup>

- 1) Loading is limited by recommended load for threaded stud.
- 2) Loading is limited by elastic limit of the **X-FCM** disk. Exceeding recommended loads can result in plastic deformation of disk.
- 3)  $N_{rec} = 1.0$  kN  
 For S-BT-GR M8/7 SN 6 AL in aluminum base material.  
 For S-BT-GR M8/7 SN 6 and S-BT-GF M8/7 AN 6 in steel base material  $3 \text{ mm} \leq t_{II} < 5 \text{ mm}$  (drill through hole)  
 $N_{rec} = 1.8$  kN  
 For S-BT-GR M8/7 SN 6 and S-BT-GF M8/7 AN 6 in steel base material  $t_{II} \geq 5 \text{ mm}$ .

#### Notes:

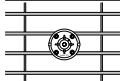
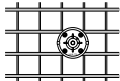
**X-FCM, X-FCM-M, X-FCM-R, X-FCM-M\_L** resist shear by friction and are not suitable for explicit shear load designs, e.g. diaphragms. Depending on surface characteristics, shear loads of up to about 0.3 kN will not result in permanent deformation. Therefore small unexpected shear loads can generally be accommodated without damage.

### Characteristic tensile loads $N_{Rk}$ :

Type	Grating – bar spacing	X-FCM-R with		X-CRM / X-ST-GR
		X-BT (X-BT-GR M8/7 SN 6 for $t_{II} \geq 6 \text{ mm}$ ) S235 / A36 steel	S355 / Grade 50 steel	
	Rectangle 18 mm	4.2 kN / 945 lb*	4.2 kN / 945 lb*	4.2 kN / 945 lb*
	Rectangle 30 mm	3.0 kN / 675 lb*	3.0 kN / 675 lb*	3.0 kN / 675 lb*
	Square 18 mm	5.4 kN / 1215 lb	6.9 kN / 1550 lb	5.4 kN / 1215 lb
	Square 30 mm	3.0 kN / 675 lb*	3.0 kN / 675 lb*	3.0 kN / 675 lb*

\* Loading is limited by elastic limit of the **X-FCM-R** disc.

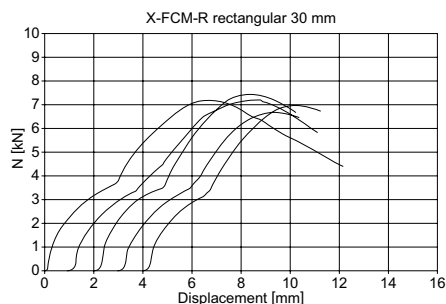
**Characteristic tensile loads  $N_{Rk}$ :**

Type	Grating – bar spacing	X-FCM-R with		
		S-BT-GR M8/7 SN 6, pilot hole, $t_{II} \geq 6$ mm S235 / A36 steel	S355 / Grade 50 steel	Aluminum $R_m \geq 270$ N/mm <sup>2</sup>
	Rectangle 18 mm	4.2 kN / 945 lb*	4.2 kN / 945 lb*	3.0 kN / 675 lb
	Rectangle 30 mm	3.0 kN / 675 lb*	3.0 kN / 675 lb*	3.0 kN / 675 lb
	Square 18 mm	5.4 kN / 1215 lb	6.9 kN / 1550 lb	3.0 kN / 675 lb
	Square 30 mm	3.0 kN / 675 lb*	3.0 kN / 675 lb*	3.0 kN / 675 lb

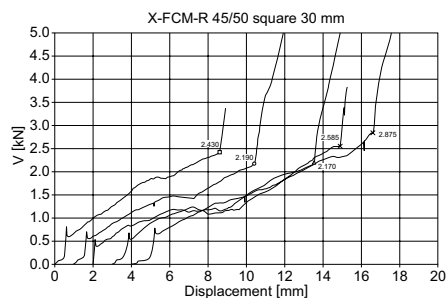
\* Loading is limited by elastic limit of the X-FCM-R disc.

**Load displacement behaviour – examples:**

Tensile load



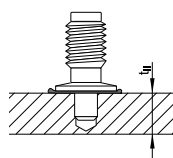
Shear load



**Application requirements**

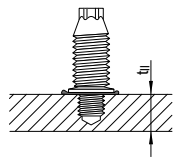
**Thickness of base material**

X-BT

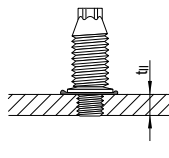


$t_{II} \geq 8$  mm

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

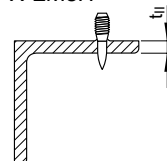


$t_{II} \geq 6$  mm  
pilot hole



steel:  $3$  mm  $\leq t_{II} < 6$  mm, aluminum:  $5$  mm  $\leq t_{II} < 6$  mm  
drill through hole

X-ST-GR,  
X-CRM and  
X-EM8H



$t_{II} \geq 6$  mm

\*) for use in aluminum base material

### Thickness of fastened material

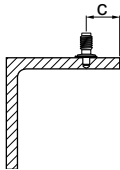
**Grating height: 25–50 mm** with standard X-FCM. For other dimensions special X-FCM are available on demand.

### Spacing and edge distances

#### X-ST-GR, X-CRM, X-EM8H

Edge distances:  $c \geq 15 \text{ mm}$

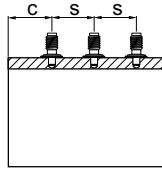
Spacing:  $s \geq 15 \text{ mm}$



#### X-BT, S-BT

Edge distance:  $c \geq 6 \text{ mm}$

Spacing:  $s \geq 15 \text{ mm}$



### Corrosion information

For coastal and offshore applications, X-BT or S-BT-GR stainless steel fasteners have to be used, see fastener selection.

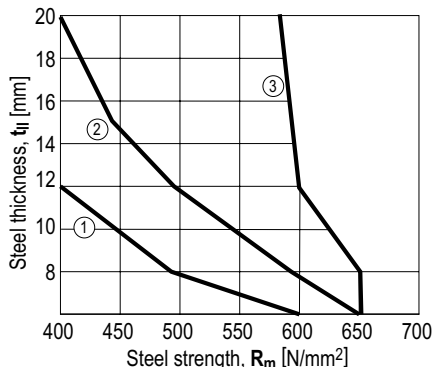
The coating of the carbon steel S-BT fasteners consists of an electroplated Zn-alloy for cathodic protection and a top coat for chemical resistance (Duplex-coating). The thickness of the coating is 35  $\mu\text{m}$ . The use of this coating is limited to the corrosion category C1, C2 and C3 according the standard EN ISO 9223. For higher corrosion categories stainless steel fasteners should be used. In case of a **drill through hole**, rework of the coating on the back side of the plate / profile may be needed.

The intended use of the X-ST-GR and X-CRM fasteners comprises fastenings exposed to outdoor environments in mildly corrosive conditions where HDG coated parts are commonly specified or used. Not for use in atmospheres with chlorides (marine atmospheres) or in heavily polluted environments (e.g. sulphur dioxide).

The intended use of the X-EM8H carbon steel fasteners only comprises fastenings which are not directly exposed to external weather conditions or moist atmospheres.

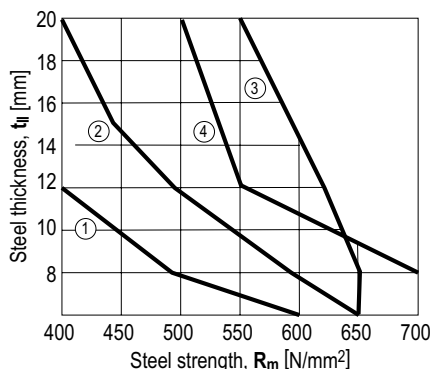
**Application limits**

DX 460, DX 5



- X-CRM8-15-12 P8** / DX 460, DX 5 (impact)
- X-CRM8-15-12 P8** / DX 460, DX 5 (co-acting)
- X-EM8H-15-12 P8** / DX 460, DX 5 (impact)

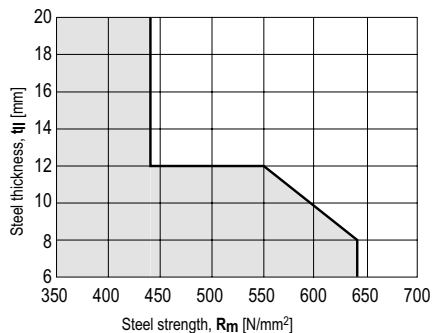
DX 76, DX 76 PTR



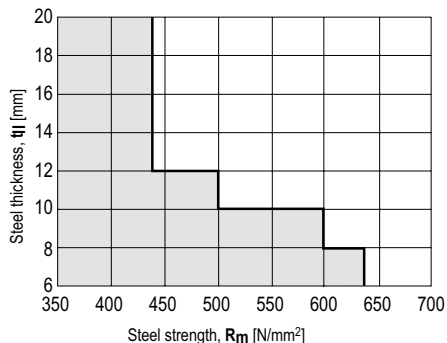
- X-CRM8-15-12 FP10** / DX 76, DX 76 PTR (impact)
- X-CRM8-15-12 FP10** / DX 76, DX 76 PTR (co-acting)
- X-EM8H-15-12 FP10** / DX 76, DX 76 PTR (impact)
- X-EM8H-15-12 P8** / DX 76, DX 76 PTR (impact)

**X-ST-GR:**

DX 460, DX 5



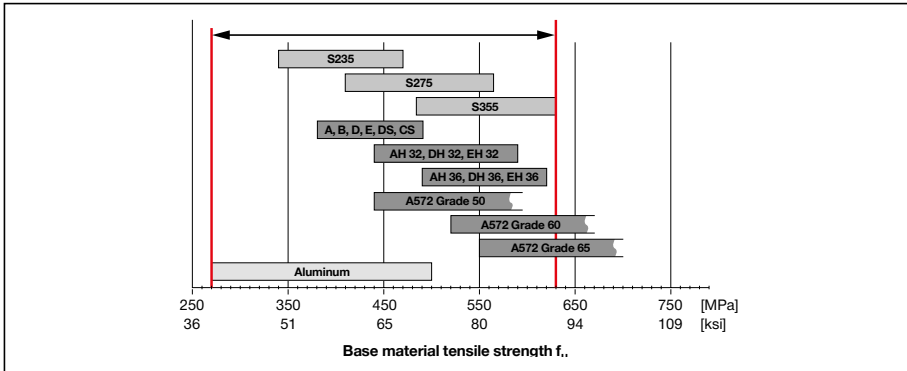
DX 76 PTR



**X-BT: No application limits** → using in high strength steel ( $f_u$  up to 1000 MPa)  
**No through penetration** →  $t_{II} \geq 8 \text{ mm}$  [ $\frac{5}{16}''$ ]

**S-BT:**

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



**Fastener selection and system recommendation**
**Fastener program**
**Application areas**

Indoors, dry and non corrosive environment

Indoors, mildly corrosive environment, or for limited lifetime use

Marine, offshore, petrochemical, caloric (coal, oil) power plants, etc.

**X-FCM system**

X-FCM

Zinc plated

Item no.

X-FCM-M

Duplex coated

Item no.

X-FCM-R

Stainless steel

Item no.

**Dimensions**  
 Grating height  
 L [mm] height [mm]

**Tools**
**X-FCM 25/30**

 26582  
 or  
 2117353

**X-FCM-M 25/30**

 378683  
 or  
 2117357

**X-FCM-R 25/30** 247181  
 or  
 2117391

**23**
**25-30**

1)

**X-FCM 1''-1 1/4''**

 247175  
 or  
 2117354

**X-FCM-M 1''-1 1/4''**

 378686  
 or  
 2117358

**X-FCM-R 1''-1 1/4''** 247184  
 or  
 2117392

**27**
**29-34**

1)

**X-FCM 35/40**

 26583  
 or  
 2117355

**X-FCM-M 35/40**

 378684  
 or  
 2117359

**X-FCM-R 35/40** 247182  
 or  
 2117393

**33**
**35-40**

1)

**X-FCM 45/50**

 26584  
 or  
 2117356

**X-FCM-M 45/50**

 378685  
 or  
 2117390

**X-FCM-R 45/50** 247183  
 or  
 2117394

**43**
**45-50**

1)

**X-FCM-M 31/36 L** 2042852\*

 \*For use with  
 X-BT M8-15-6 SN12-R  
 S-BT-GR M8  
 S-BT-GF M8

 Note:  
 Not for use in marine atmosphere or in heavily polluted environment.

 Note:  
 Not for use in automobile tunnels, swimming pools or similar environments

**25**
**31-36**

1)

1) SF 100-A, SF 11-A, SF 150-A, SF 121-A, SF 14-A, SF 18-A, SFC 18-A, SF 22-A, SFC 22-A, SBT 4-A22,

Hilti Torque tool X-BT 1/4"



Threaded studs		Item no.	Tools
X-EM8H-15-12 P8		271981	²)
X-EM8H-15-12 FP10		271982	²)
	X-BT M8-15-6 SN12-R	377074	³)
	X-CR M8-15-12 P8	372033	²)
	X-CR M8-15-12 FP10	372034	²)
	S-BT-GF M8/7 AN 6	2140527	⁴), ⁵)
	S-BT-GR M8/7 SN 6	2140529	⁴), ⁵)
	S-BT-GR M8/7 SN 6 AL	2140742	⁴), ⁵)
	X-ST-GR M8/10 P8	2122460	²)

²) DX 76 PTR, DX 460, DX 5

⁴) SF BT 18-A, SF BT 22-A and SBT 4-A22 for drilling the hole

³) BX 3-BTG, DX 351-BTG

⁵) SFC 18-A, SFC 22-A and SBT 4-A22 for screw-in the fastener

### Cartridge selection and tool energy setting

- X-BT:** 6.8/11M high precision brown cartridges
- X-CRM:** 6.8/11M yellow or red cartridges with DX 460, DX 5  
6.8/18M blue cartridges with DX 76 and DX 76 PTR
- X-ST-GR:** 6.8/11M black or red cartridges with DX 460, DX 5  
6.8/18M yellow or red cartridges with DX 76 PTR
- X-EM8H:** 6.8/11M red or black cartridges with DX 460, DX 5  
6.8/18M blue, red or black cartridges with DX 76 and DX 76 PTR

Tool energy adjustment by setting tests on site.

### Material specifications and coatings

#### X-FCM system

	X-FCM-R		X-FCM-M + X-FCM-M_L		X-FCM		All systems
	Disk	Threaded stem	Disk	Threaded stem	Disk	Threaded stem	
Material designation	X2CrNiMo17122	X2CrNiMo17122	DC 04	11SMNPB30+C	DC 04	11SMNPB30+C	Polyurethane Black
Coating	none	none	Duplex *	Duplex *	≥ 20µm Zn	10-20 µm Zn	-

¹) resistant to: UV, saltwater ozone, oil, grease

\*) comparable to 45 µm HDG steel (480 h Salt spray test per DIN 50021)

### Threaded studs

	X-BT			X-ST-GR		X-EM8H
	Shank	Threaded sleeve SN12-R washer	Sealing ring of sealing washer <sup>1)</sup>	Shank	Threaded sleeve	
Material designation	Stainless steel CR 500 (A4 / AISI316)	X2CrNiMo17132 X5CrNiMo17122+2H (A4 / AISI316)	Elastomer, black	P558 (CrMnMo alloy)	(A4 / AISI316)	Carbon steel  Ck 67 MOD
Coating	none	none		none	none	5–13 µm Zn <sup>2)</sup>

<sup>1)</sup> resistant to: UV, saltwater ozone, oil, grease

<sup>2)</sup> Zinc applied by electroplating. Intended for corrosion protection during shipment, storage, construction and service in protected environment. It is not adequate for protection against corrosion in outside or otherwise corrosive applications

### Threaded studs

	S-BT- <u>R</u>			S-BT- <u>F</u>		
	Threaded Shank	SN 12-R washer	Sealing ring of sealing washer <sup>1)</sup>	Threaded Shank	AN 10-F washer	Sealing ring of sealing washer <sup>1)</sup>
Material designation	Stainless steel 1.4462 (A4 / AISI316)	Stainless steel 1.4404 (A4 / AISI316)	Elastomer, black	Carbon steel 1038	Aluminum	Elastomer, black
Coating	Zinc	none	none	Duplex-coating	none	HDG

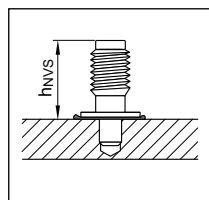
<sup>1)</sup> resistant to: UV, salt water, ozone, oil, grease

<sup>2)</sup> The surface of the S-BT stainless steel fasteners is zinc plated (anti-friction coating) in order to reduce the thread forming torque when the stud is screwed in into the base material.

## Fastening quality assurance

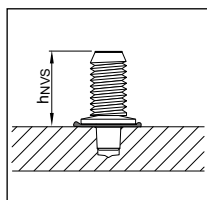
### Fastening inspection

X-BT M8-15-6 SN12-R



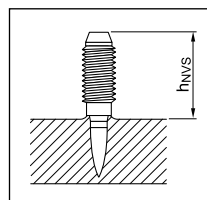
$h_{NVS} = 15.7\text{--}16.8 \text{ mm}$

X-BT-GR M8/7 SN8



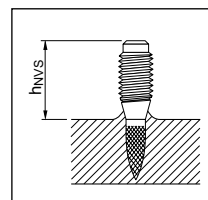
$h_{NVS} = 15.7\text{--}16.8 \text{ mm}$

X-CRM8-15-12



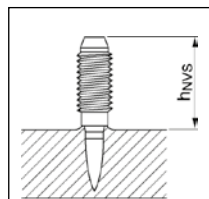
$h_{NVS} = 17\text{--}20 \text{ mm}$

X-EM8H-15-12

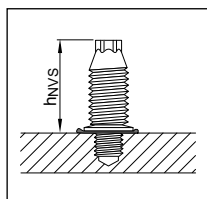


$h_{NVS} = 15.5\text{--}19.5 \text{ mm}$

X-ST-GR M8/10 P8

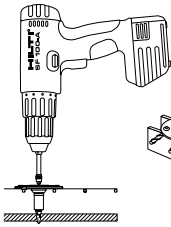


$h_{NVS} = 17.0\text{--}20.0 \text{ mm}$



$h_{NVS} = 18.6\text{--}19.1 \text{ mm} [0.732\text{''} - 0.752\text{''}]$

S-BT-\_\_\_/7\_\_\_6



Tighten the disk



**Tightening torque**

$T_{rec} = \text{max. } 8 \text{ Nm}$

$T_{rec} = \text{max. } 5 \text{ Nm } ^1)$

<sup>1)</sup> For S-BT-GR M8/7 SN 6 AL in

aluminum base material

For S-BT-GR M8/7 SN 6 and

S-BT-GF M8/7 AN 6 in steel base material

$3 \text{ mm} \leq t_{II} < 5 \text{ mm}$  (drill through hole)

**Tightening tool:**

- Screwdriver with torque release coupling (TRC)
- 5 mm Allen-type bit
- Hilti Torque tool X-BT 1/4", which gives 8 Nm

Hilti screwdriver

	$T_{rec}$	
	5 Nm	8 Nm
	Torque setting	
SF 121-A	5	6
SF 150-A	4	5
SF 14	4	5
SF 14-A	5	6
SF 18-A	4	5
SFC 18-A	4	5
SF 22-A	4	5
SFC 22-A	4	5
SBT 4-A22	4	5