



TYPE APPROVAL CERTIFICATE
No. FPE247421CS/001

This is to certify that the product identified below satisfies the requirements of the standard quoted under "Reference standard"

<i>Description</i>	Fixing System with Screw-in Threaded Stud
<i>Type</i>	Hilti X-BT
<i>Applicant</i>	Hilti Italia S.p.A. Piazza Indro Montanelli, 20 20099 Sesto San Giovanni (MI) ITALY
<i>Manufacturer</i>	HILTI AKTIENGESELLSCHAFT
<i>Place of manufacture</i>	FELDKIRCHERSTRASSE 100 9494 Schaan LIECHTENSTEIN
<i>Reference standards</i>	Chap. II-2 of SOLAS 74 Convention, as amended; IMO 2010 FTP CODE Annex 1 Part 3; RINA Rules for Type Approval products, equipment and machinery; EN 1993-1-9:2005 Eurocode 3: Design of steel structures - Part 1-9: Fatigue; ISO 9223:2012 Corrosion of metals and alloys — Corrosivity of atmospheres — Classification, determination and estimation; ISO 9224:2012 Corrosion of metals and alloys — Corrosivity of atmospheres — Guiding values for the corrosivity categories; IEC 60947-7-1:2009 Low-voltage switchgear and controlgear - Part 7-1: Ancillary equipment - Terminal blocks for copper conductors; IEC 60947-7-2:2009 Low-voltage switchgear and controlgear - Part 7-2: Ancillary equipment - Protective conductor terminal blocks for copper conductors; IEC 62561-1:2017 Lightning protection system components (LPSC) - Part 1: Requirements for connection components; EAD 333037-00-0602: European Assessment Document (EAD): Threaded studs for connection of materials to structural steel and aluminium members
<i>Reference documents</i>	RINA Type Approval System

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RINA Services S.p.A.
Paolo Brocca

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Hilti X-BT

Technical characteristics and Description

X-BT fastening system alternative to welding, using threaded studs screwed in into a pre-drilled hole.

<i>Materials</i>		
Stud and flange nut	Stainless steel S31803 (1.4462) DIN-EN 10088-1 (A4/AISI 316 equivalent)	
SN Washer	Stainless steel S31635 (X2CrNiMo 17-12-2, 1.4404)	
Sealing	Elastomer, black, resistant to UV, salt water, water, ozone, oils, etc.	
<i>Couplings</i>		
<i>Type</i>	<i>Side of stud</i>	<i>Size</i>
Threaded (male)	embedment to ship's structure	D. 4.7 mm
	side for fastening	M6, M8, M10 (male)
		W6, W10 (male)
<i>Application</i>		
<i>Hull/Structure material</i>	<i>Thickness (t_n) mm</i>	<i>Treatment</i>
Spheroidal graphite cast iron	t _n ≥ 20	none ⁽¹⁾
All materials	t _n ≥ 8	
<i>Grating fastener model</i>	<i>Grating element length (L) mm</i>	<i>Grating height (h) mm</i>
X-FCM-R 25/30	23	25 - 30
X-FCM-R 1"/1 1/4"	27	29 - 34
X-FCM-R 35/40	33	35 - 40
X-FCM-R 45/50	43	45 - 50
<i>Grating fastener model</i>	<i>Grating height (HG), range mm [inch], without extension adaptor</i>	<i>Grating height (HG), range mm [inch] with extension adaptor</i>
X-FCM-R HL 25/30	28 [0.98] ≤ HG ≤ 33 [1.18]	58 [2.16] ≤ HG ≤ 63 [2.36]
X-FCM-R HL 1"/1 1/4"	32 [1.14] ≤ HG ≤ 37 [1.34]	62 [2.32] ≤ HG ≤ 67 [2.52]
X-FCM-R HL 35/40	38 [1.38] ≤ HG ≤ 43 [1.57]	68 [2.56] ≤ HG ≤ 73 [2.75]
X-FCM-R HL 45/50	48 [1.77] ≤ HG ≤ 53 [1.97]	78 [2.91] ≤ HG ≤ 83 [3.15]
<i>Grating fastener model</i>	<i>Bar spacing (w) mm x bar thickness (t) mm</i>	<i>Grating height (h) mm</i>
X-FCS-R-3-25 31/35	25 x 5	31 - 35
X-FCS-R-3-25 37/41		37 - 41
X-FCS-R-4-25 31/35		31 - 35
X-FCS-R-4-25 37/41		37 - 41
⁽¹⁾ : pre drilled-through holes		

Product Types and Models

<i>Type of fastening</i>	<i>Application</i>	<i>Code and Size</i>
Multipurpose	Channel system, metal brackets, clips, metal tracks, etc. to steel	X-BT-MR M10
		X-BT-MR W10
		X-BT-MR M8
		X-BT-MR M6
		X-BT-MR W6
	Mechanical and electrical for petro-chemical industry, shipbuilding, etc.	X-BT-MR M10
		X-BT-MR W10
		X-BT-MR M8
		X-BT-MR M6
		X-BT-MR W6
Gratings fastening	Metal / fiberglass grating to steel for upstream and high corrosion environment	X-BT-GR M8
		X-FCM-R HL
		X-FCM-R
		X-FCS-R
Functional bonding and terminals in a circuit (low permanent current)	Max allowable current 40 A Cable size $\leq 10 \text{ mm}^2$ copper	X-BT-ER M10/7 SN 8
		X-BT-ER W10/7 SN 8
		X-BT-ER M8/7 SN 8
		X-BT-ER M6/3 SN 8, M6/7 SN 8
		X-BT-ER W6/3 SN 8, W6/7 SN 8
Electrical connections Protective bonding circuit	Max short circuit current $1s = 1250 \text{ A}$ Cable size $\leq 10 \text{ mm}^2$ copper	X-BT-ER M10/7 SN 8
		X-BT-ER W10/7 SN 8
		X-BT-ER M8/7 SN 8
		X-BT-ER M6/3 SN 8, M6/7 SN 8
		X-BT-ER W6/3 SN 8, W6/7 SN 8
	Max short circuit current $1s = 1800 \text{ A}$ Cable size $\leq 16 \text{ mm}^2$ copper (Double-point connection only)	X-BT-ER M10/7 SN 8
		X-BT-ER W10/7 SN 8
		X-BT-ER M8/7 SN 8
		X-BT-ER M6/7 SN 8
		X-BT-ER W6/7 SN 8
Lightning protection (High temporary current)	Max test current $2 \text{ ms} \leq 50 \text{ kA}$ (Single point connection)	X-BT-ER M10/7 SN 8
		X-BT-ER W10/7 SN 8
		X-BT-ER M8/7 SN 8
		X-BT-ER M6/3 SN 8, M6/7 SN 8
		X-BT-ER W6/3 SN 8, W6/7 SN 8

1. Drawings (RINA Approval N.)

- N. PSST-26944 : X-BT-GR/MR/ER Threaded Fastener - Specification Binder Ed. 04/2021
- N. PSST-26945 : Evaluation Report on Threaded Fasteners X-BT-GR/MR/ER - XE-18-12
- N. PSST-26946 : Data sheet X-FCM Grating Fastener System
- N. PSST-26947 : Data sheet X-FCM-R-HL
- N. PSST-26948 : Data sheet X-FCS-R
- N. PSST-26962 : Application fields in shipbuilding

2. Test Reports and Declarations (RINA Filing N.)

- N. PSST-26949 : IMO-Fire-Test_DX_UL-1999 1 - R13240
- N. PSST-26950 : IMO-Fire-Test_BT_2008 - 170433
- N. PSST-26951 : MPA-Stuttgart_Corrosion resistance marine environment & sea water - 9004742000G/Bf
- N. PSST-26952 : MPA-Stuttgart Investigation report on corrosion - 9034407000
- N. PSST-26953 : HTL-Rankweil Tension & Shear test - 254/17
- N. PSST-26954 : X-FCS Tension & Shear test - ID 04112018
- N. PSST-26955 : EMPA Report constant amplitude fatigue tests - 5214015649/e
- N. PSST-26956 : EMPA Report Constant amplitude fatigue test - 5214017145/e
- N. PSST-26957 : Univ-Stuttgart Fatigue Classification - 2018-13X
- N. PSST-26958 : EMPA Report Tensile Tests - 5214017148/e
- N. PSST-26959 : Electrosuisse Grounding Bounding and Lightning Protection - 17-IK-0260-S01
- N. PSST-26960 : Test of Lightning Impulse Current EN 62561-1:2012-01 - FRM-1659 T4
- N. PSST-26961 : Powder-actuated Fasteners+Screw in Steel Construction
- N. PSST-26962 : Hilti X-BT - ISO 9000 Certificates

Fields of application and Acceptance conditions

1. Locations and conditions for use in shipbuilding as per following table:

<i>Base Material</i>			
Type	Characteristics	Thickness (t_{II}) mm	Recommended Loads ⁽¹⁾
Construction Steel	S235, S275 A36	$t_{II} \geq 8$	<ul style="list-style-type: none"> Tension N_{REC}: 3.6 kN Shear V_{REC}: 4.3 kN Moment M_{REC}: 20.0 Nm Torque T_{REC}: 20.0 Nm
	S355, S960 \geq Grade 50		<ul style="list-style-type: none"> Tension N_{REC}: 4.6 kN Shear V_{REC}: 5.3 kN Moment M_{REC}: 20.0 Nm Torque T_{REC}: 20.0 Nm
Cast Iron	Spheroidal graphite cast iron EN 1563 (Strength class EN-GJS-400 to 600)	$t_{II} \geq 20$	<ul style="list-style-type: none"> Tension N_{REC}: 1.0 kN Shear V_{REC}: 1.5 kN Moment M_{REC}: 16.0 Nm
Conditions for recommended loads on steel: <ol style="list-style-type: none"> Minimum edge distance $c \geq 10$ mm In case of edge distance $6 \leq c < 10$ mm, N_{REC}, V_{REC} and M_{REC} need to be reduced with the reduction factor $a_c = 0.65$ ⁽¹⁾ Design Resistance: as per indications given in Hilti X-BT Specification and Technical Binder Edition 07/2019			
<i>Application Requirements and Limits</i>			
Thickness of Fastened Material X-BT-MR	Type of Fastener	Thickness (t_d) mm	
	X-BT-GR M8	$2.0 \leq t_d \leq 7$	
	X-BT-MR M10/W10	$2.0 \leq t_d \leq 15$	
	X-BT-MR M8	$2.0 \leq t_d \leq 14$	
	X-BT-MR M6/W6	$2.0 \leq t_d \leq 10$ ⁽¹⁾	
⁽¹⁾ : If base material sits on the collar of the stud $t_{L,min} = 1.0$ mm.			
Thickness of Cable Lug X-BT-ER	Type of Fastener	Thickness (t_d) mm	
	X-BT-ER M8/M10/W10	$t_d \leq 7$ (Double-point connection)	
	X-BT-ER M6/W6 /7 SN 8		
	X-BT-ER M8/M10/W10	$t_d \leq 3$ (Single point connection)	
	X-BT-ER M6/W6 /7 SN 8		
X-BT-ER M6/W6 /3 SN 8			
Spacings	Edge distance (c) mm	$6.0 \leq c < 10$ ⁽²⁾	
		$c \geq 10$ ⁽³⁾	
	Spacing (s) mm	$s \geq 15$	
	Outer diameter of installed surface mm	≥ 150	
⁽²⁾ : load reduction factor $a_c = 0.65$ ⁽³⁾ : load reduction factor $a_c = 1.00$			
Application limit/thickness of base material: $t_{II} \geq 8$ mm. No through-penetration. No limits with regard to steel strength.			

2.

For all installation cases the X-BT studs must not be positioned in the thickness change areas (e.g. reinforcements in the corners of the holes) or positioned so as to pierce the welding seam.

3.

Adequate corrosion resistance of both the base and fastened materials are to be checked by the installation user for their suitability to the environment in which they are provided.

Hilti X-BT New Generation screw-in threaded studs, are approved in shipbuilding for fastening of:

- Electrical systems: fastening of brackets and supports for cables (e.g. cables, cable trays, ladders and baskets, etc.) and fastening of electrical equipment (electrical and junction boxes, lamps, switches, CCTV cameras, telephones, instrumentation, etc.)
- Piping systems: fastening of brackets and support for piping and accessories (drains, scuppers, etc.)
- HVAC systems: fastening of brackets and support for heating, ventilation and air conditioning systems and relevant accessories (e.g. internal and external grilles, etc.)
- Safety and ship's equipment: support and brackets for safety and ship equipment (e.g. portable fire-extinguishers, hydrants, fire boxes, low-location lighting supports and frames, manholes, handrails, etc.) and furniture (e.g. tables, seats, etc.)
- Gratings, bulkheads structures, balcony separation panels, C class bulkheads
- Grounding and bonding equipment

Remarks

The validity of this Certificate refers to the design, rating, and installations parameters of the equipment specimens tested as per Reference Documents section. The manufacturer shall notify RINA of any modification or changes to the equipment in order to request for a valid certificate.

All approved drawings, test reports and other documents mentioned in the approval letter PSST/2021/00523/PBR, dated July 1, 2021.

The documents forms part of the present Type Approval Certificate.

On board of RINA Classified ships, the location, system and conditions are to be verified for their compliance with the present Certificate to the satisfaction of the attending surveyor in charge.

Genoa July 1, 2021