TYPE APPROVAL CERTIFICATE
No. **FPE278318CS**

This is to certify that the product identified below is in compliance with the regulations herewith specified

Description	**Fixing System with Screw-in Threaded Stud**
Type	**Hilti S-BT**
Applicant	**Hilti Italia S.p.A.** **Piazza Indro Montanelli, 20** **20099 Sesto San Giovanni (MI)** **ITALY**
Manufacturer *Place of manufacture*	**HILTI AKTIENGESELLSCHAFT** **FELDKIRCHERSTRASSE 100** **9494 Schaan** **LIECHTENSTEIN**
Reference standards	**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 16701:2015 corrosion of metals and alloys - Corrosion in artificial atmosphere - Accelerated corrosion test involving exposure under controlled conditions of humidity cycling and intermittent spraying of a salt solution / ISO 9227:2017 Corrosion tests in artificial atmospheres - Salt spray tests / IEC 62561-1:2017 Lightning protection system components (LPSC) - Part 1: Requirements for connection components / 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**
Reference documents	**RINA Type Approval System**

Issued in **Genoa** on **September 4, 2018**

RINA Services S.p.A.
Paolo Brocca

This certificate consists of this page and 1 enclosure

RINA Services S.p.A.
Via Corsica, 12 - 16128 Genova
Tel +39 010 53851
Fax +39 010 5351000

TYPE APPROVAL CERTIFICATE
No. **FPE278318CS**
1 of 6
HILTI S-BT

Technical characteristics and Description

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

Materials		
Stud	hardened Carbon Steel 1038	
	Stainless steel 1.4462 DIN-EN 10088-1 (AISI 316 SS equivalent)	
Sealing (ship's structure side)	Carbon Steel studs	D. 10 mm Aluminum washer with chloroprene rubber CR 3.1102 sealing ring
	Stainless Steel studs	D. 12 mm Stainless Steel washer with chloroprene rubber CR 3.1102 sealing ring
Couplings		
Type	***Side of stud***	***Size***
Threaded (male)	embedment to ship's structure	D. 5.8 mm
	side for fastening	M8, M10 (male)
		W 10 (male)
Application		
Hull/Structure material	***Thickness (t_{II}) mm [inches]***	***Treatment***
Steel	$3\ [0.12] \leq \mathbf{t_{II}} < 6\ [0.24]$	re-coating on back side[(1)]
Aluminum	$5\ [0.20] \leq \mathbf{t_{II}} < 6\ [0.24]$	
All materials	$\mathbf{t_{II}} \geq 6\ [0.24]$	none
Grating fastener	***Grating height (HG) mm [inches]***	***Material***
X-FCM-R	$25\ [0.98] \leq \mathbf{HG} \leq 50\ [1.97]$	Stainless steel
X-FCM-R (+ extension adapter)	$55\ [2.16] \leq \mathbf{HG} \leq 80\ [3.15]$	Stainless Steel
X-FCM-M	$25\ [0.98] \leq \mathbf{HG} \leq 50\ [1.97]$	Carbon steel duplex coated
X-FCS-R	$31\ [1.22] \leq \mathbf{HG} \leq 41\ [1.61]$	Stainless steel
[(1)]: pre drilled-through holes		

RINA Services S.p.A.
Via Corsica, 12 - 16128 Genova
Tel +39 010 53851
Fax +39 010 5351000

TYPE APPROVAL CERTIFICATE
No. **FPE278318CS**
2 of 6
HILTI S-BT

Product Types and Models

Type of fastening	*Stud material*	*Code and Size*
Multipurpose	Carbon Steel	S-BT-MF M8/7 AN 6
		S-BT-MF M8/15 AN 6
		S-BT-MF M10/15 AN 6
		S-BT-MF W10/15 AN 6
	Stainless Steel	S-BT-MR M8/7 SN 6
		S-BT-MR M8/7 SN 6 AL
		S-BT-MR M8/15 SN 6
		S-BT-MR M8/15 SN 6 AL
		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
Gratings fastening	Carbon Steel	S-BT-GF M8/7 AN 6
	Stainless Steel	S-BT-GR M8/7 SN 6
		S-BT-GR M8/7 SN 6 AL
Electrical connections	Carbon Steel	S-BT-EF M8/15 AN 6
		S-BT-EF M10/15 AN 6
		S-BT-EF W10/15 AN 6
	Stainless Steel	S-BT-ER M8/15 SN 6
		S-BT-ER M10/15 SN 6
		S-BT-ER W10/15 SN 6
Electrical connections (high current)	Carbon Steel	S-BT-EF M10 HC 35
		S-BT-EF W10 HC AWG2
		S-BT-EF M10 HC 120
		S-BT-EF W10 HC AWG4/0
	Stainless Steel	S-BT-ER M10 HC 35
		S-BT-ER W10 HC AWG2
		S-BT-ER M10 HC 120
		S-BT-ER W10 HC AWG4/0

RINA Services S.p.A.
Via Corsica, 12 - 16128 Genova
Tel +39 010 53851
Fax +39 010 5351000

Reference documents

1. Drawings (RINA Approval N.)

- N. PSST-20301 : Specification and Technical Binder - Hilti_S-BT - Rev.08/2018
- N. PSST-20302 : Nut HDG - 5249460 / 01 / 603918
- N. PSST-20303 : Threaded stud S-BT F - 5181496 / 07 / 620401
- N. PSST-20304 : Nut A4 - 5249450 / 01 / 603918
- N. PSST-20305 : Washer SN/AN assy - 5179764 / 01 / 607297
- N. PSST-20306 : Threaded Stud S-BT R - 5179696 / 07 / 607297
- N. PSST-20307 : Tech. Manual S-BT Product Pages Ed.06/2018 - Hilti_S-BT - Rev.06/2018
- N. PSST-20308 : Tech. Manual S-BT-ER/EF (for Electrical Connect.) Product Pages Ed.08/2018 - Hilti_S-BT-ER/EF
- N. PSST-20309 : Application Fields in Shipbuilding - Hilti S-BT App

2. Declarations (RINA Filing N.)

- N. PSST-20310 : Hilti Declaration on use in shipbuilding - Hilti S-BT 17_01_2018
- N. PSST-20311 : Hilti Declaration annotations by Shipyard - LR PRJ11074092

3. Test Reports (RINA Filing N.)

- N. PSST-20312 : Test Report FTP Code No.1 - 2016614_en
- N. PSST-20313 : Test Report FTP Code No.2 (Water-tightness) - 20161614-01_en
- N. PSST-20314 : Test Report FTP Code No.3 - 20170384_en
- N. PSST-20315 : Test Report Corrosion - UB_903 0160 000/Bf
- N. PSST-20316 : Test Report Galvan. Corrosion - TM_414-14_2
- N. PSST-20317 : Test Report Fatigue Loading - 5214011585/e
- N. PSST-20318 : Test Report Fatigue Loading - 5214014601/e
- N. PSST-20319 : Test Report Fatigue Loading - 5214013022/e
- N. PSST-20320 : Test Report Tension Shear & Bending - 279-15
- N. PSST-20321 : Test Report Fatigue loading - 2017-38X
- N. PSST-20322 : Test Report High Current M10 - 1795_FRM_02
- N. PSST-20323 : Test Report High Current M10 50 kA - FRM-1648
- N. PSST-20324 : Test Report High Current M10 50 kA - FRM-1649
- N. PSST-20325 : Test Report High Current M10 100 kA - FRM-1650
- N. PSST-20326 : Test Report Short-time Current - FRM-1689
- N. PSST-20327 : Electrosuisse Testing Plan S02 - 16-IK-0021.S02 Annex
- N. PSST-20328 : Electrosuisse Experts Report S02 - 17-IK-0093.S02
- N. PSST-20798 : Test Report Lighting Current M10 100 kA - 1798_FRM_00
- N. PSST-20798 : Test Report Lighting Current M10 HC35 100 kA - 1834_PAM_1
- N. PSST-20798 : Hilti Evaluation Report Electrical Connections - XSMSse-02-18
- N. PSST-20798 : Electrosuisse Testing Plan S04 - 17-IK-0021.S04 Annex
- N. PSST-20798 : Electrosuisse Experts Report S04 - 17-IK-0021.S04

RINA Services S.p.A.
Via Corsica, 12 - 16128 Genova
Tel +39 010 53851
Fax +39 010 5351000

Fields of application and Acceptance conditions

Hilti S-BT 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 (electrcial 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: supports 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, bulkhead structures, balcony separation panels, C class bulkheads.
- Grounding and bonding equipment.

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

Aluminum Base Materials			
Material Characteristics	**Thickness (t_{II}) mm**	**Drill Hole Type**	**Recommended Loads[(1)]**
$R_m \geq 270$ N/mm^2	$t_{II} \geq 6$	Pilot (no through)	• Tension: 1.0 kN • Shear: 1.5 kN • Moment: 4.8 Nm
	$5 \leq t_{II} < 6$	Drill through	
Steel Base Materials			
Material Characteristics	**Thickness (t_{II}) mm**	**Drill Hole Type**	**Recommended Loads[(1)]**
S235 / A36	$t_{II} \geq 6$	Pilot (no through)	• Tension: 1.8 kN • Shear: 2.6 kN • Moment: 7.0 Nm
	$5 \leq t_{II} < 6$	Drill through	
	$3 \leq t_{II} < 5$	Drill through	• Tension: 1.0 kN • Shear: 1.5 kN • Moment: 7.0 Nm
S355 / Grade 50	$t_{II} \geq 6$	Pilot (no through)	• Tension: 2.3 kN • Shear: 3.2 kN • Moment: 7.0 Nm
	$5 \leq t_{II} < 6$	Drill through	
	$3 \leq t_{II} < 5$	Drill through	• Tension: 1.0 kN • Shear: 1.5 kN • Moment: 4.8 Nm
Conditions: 1. Minimum edge distance = 6 mm, spacing ≥ 18 mm 2. Redundancy (multiple fastening) to be provided			
[(1)] **Design Resistance:** as per indications given in Hilti SB-T Specification and Technical Binder Edition 08/2018			

RINA Services S.p.A.
Via Corsica, 12 - 16128 Genova
Tel +39 010 53851
Fax +39 010 5351000

Steel Fire resisting A0 to A60 Class Boundaries			
Material Characteristics	**Thickness (t_{II}) mm**	**Drill Hole Type**	**Recommended Loads**[1]
Ultimate Tensile Strength $\mathbf{R_m}$ $340 \leq \mathbf{R_m} \leq 630$ Mpa	$\mathbf{t_{II}} \geq 6$	Pilot (no through)	• Tension R60: 0.50 kN • Shear R60: 0.50 kN
	$5 \leq \mathbf{t_{II}} < 6$	Drill through	
	$3 \leq \mathbf{t_{II}} < 5$	Drill through	• Tension R60: 0.25 kN • Shear R60: 0.25 kN
Conditions: 1. Minimum edge distance = 6 mm, spacing ≥ 18 mm 2. Redundancy (multiple fasten.) to be provided and studs installed on the unexposed face of the bulkhead 3. Insulation turn-up typical for 450 mm and over standard brackets to be applied			

Watertight Boundaries and Tanks			
Material Characteristics	**Thickness (t_{II}) mm**	**Drill Hole Type**	**Recommended Loads**[1]
Standard for Tanks	$\mathbf{t_{II}} \geq 6$	Pilot (no through)	---
Conditions: 1. On curved surfaces: minimum outer diameter ≥ 150 mm 2. Maximum pressure in tanks: 3.0 bar			

Structural Members requiring Fatigue design		
Material Characteristics	**Thickness (t_{II}) mm**	**Design S-N Curve and Fatigue Class (EN 1993-1-9)**
Ultimate Tensile Strength $\mathbf{R_m}$ $340 \leq \mathbf{R_m} \leq 630$ Mpa	$\mathbf{t_{II}} \geq 3$	Category 100 m = 5
Note A detailed verification of the fatigue stress is considered not necessary in case of: 1. Decks "*Micro Openings* ": circular openings with D ≤ 250 [mm] (e.g. scuppers, small pipes, etc. 2. Transversal bulkheads "*Micro Openings* ": inside and outside the Construction Monitoring Area: circular openings D < 250 [mm] may be accepted if isolated (and plasma cut or equivalent when in Construction Monitoring Area only. 3. Longitudinal bulkheads "*Micro Openings* ": inside and outside the Construction Monitoring Area: circular openings D < 250 [mm] may be accepted if isolated (and plasma cut or equivalent).		

2. For all installation cases the S-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.

RINA Services S.p.A.
Via Corsica, 12 - 16128 Genova
Tel +39 010 53851
Fax +39 010 5351000

TYPE APPROVAL CERTIFICATE
No. **FPE278318CS**
6 of 6
HILTI S-BT

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 RSSE/2018/00448/PBR dated September 4, 2018, form part of the present 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 September 4, 2018

RINA Services S.p.A.
Via Corsica, 12 - 16128 Genova
Tel +39 010 53851
Fax +39 010 5351000