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*This certificate is not valid when presented without the full attached schedule composed of 7 sections*

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## TYPE APPROVAL CERTIFICATE

*This certificate is issued to*

**Hilti Corporation**  
SCHAAN - LIECHTENSTEIN

*for the type of product*

**MECHANICAL FASTENING SYSTEM**  
HILTI WELDED STUDS F-BT-MR MECHANICAL FASTENING SYSTEM

### Requirements:

BUREAU VERITAS Rules for the Classification of Steel Ships  
BUREAU VERITAS Rules for the Classification of Offshore Units  
BUREAU VERITAS Rules for the Classification of Naval Ships  
BUREAU VERITAS Rules for the Classification of Yachts

*This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.*

**This certificate will expire on: 25 May 2028**

**For Bureau Veritas Marine & Offshore,**

At BV HAMBURG, on 20 Mar 2026,

Heiko Lange

***This certificate was created electronically and is valid without signature***



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This certificate consists of 5 page(s)

## THE SCHEDULE OF APPROVAL

### 1. PRODUCT DESCRIPTION:

Mechanical fastening system: Hilti welded studs F-BT-MR.

The F-BT studs welded by Hilti CSF cordless stud fusion system. The Cordless Stud Fusion (CSF) process is a drawn arc stud welding process with shielding gas (process number 783) following EN ISO 14555. The purpose of Cordless Stud Fusion (CSF) is to weld studs to steel.

The Hilti F-BT mechanical fastening system comprises the surface preparation equipment, the stud fusion equipment, the installation equipment, the support plate and the measuring and testing equipment according to Hilti's technical manual.

#### 1.1 Identification of components:

| Component name             | Designation  |
|----------------------------|--|
| F-BT-MR M6x25 SN (4)       | Stainless steel stud F-BT-MR SN with sealing washer for thin parent material |
| F-BT-MR M8x25 SN (4)       | Stainless steel stud F-BT-MR SN with sealing washer for thin parent material |
| F-BT-MR 3/8x1 SN (5/32)    | Stainless steel stud F-BT-MR SN with sealing washer for thin parent material |
| F-BT-MR M6x25 SN (6)       | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR M8x25 SN (8)       | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR M10x25 SN (10)     | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR M10x50 SN (10)     | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR 3/8x1 SN (3/8)     | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR 3/8x1-1/2 SN (3/8) | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR 3/8x2 SN (3/8)     | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR 3/8x4 SN (3/8)     | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR M12x25 SN (10)     | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR M12x50 SN (10)     | Stainless steel stud F-BT-MR SN with sealing washer                          |
| F-BT-MR M6x25 (6)          | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR M8x25 (8)          | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR M10x25 (10)        | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR M10x50 (10)        | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR 3/8x1 (3/8)        | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR 3/8x1-1/2 (3/8)    | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR 3/8x2 (3/8)        | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR 3/8x4 (3/8)        | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR M12x25 (10)        | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR M12x50 (10)        | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR 1/2x1-1/2 (3/8)    | Stainless steel stud F-BT-MR without sealing washer                          |
| F-BT-MR 1/2x2 (3/8)        | Stainless steel stud F-BT-MR without sealing washer                          |

#### 1.2 Materials:

| Component               | Material                           |
|-------------------------|------------------------------------|
| F-BT-MR stud            | Stainless steel 1.4571 (A5), 316Ti |
| Sealing ring, metal cap | Stainless steel 1.4404 (A4), 316L  |
| Sealing ring, elastomer | Chloroprene rubber (CR)            |

### 2. DOCUMENTS AND DRAWINGS:

| Designation  | Revision / Date |
|--|-----------------|
| HILTI CORDLESS STUD FUSION Technical Manual                                | September 2025  |
| F-BT DATA SHEET: Stainless steel threaded studs for electrical connections | October 2024    |

### 3. TEST REPORTS:

According to the following tests:

- Evaluation report no. XE-23-10 at HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. March 9, 2023
- Test report no. L22/0862\_01 at gbd Lab GmbH, Dornbirn / AUSTRIA dd. 27.07.2022
- Test report no. L22/0862\_02 at gbd Lab GmbH, Dornbirn / AUSTRIA dd. 19.10.2022
- Test report no. L22/0862\_03a at gbd Lab GmbH, Dornbirn / AUSTRIA dd. 13.12.2022
- Test report no. XE\_23\_18 at HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. March 3, 2023
- Test report no. XE\_22\_17 at HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. 02 nd May 2022

- Test report no. XE-23-08 at HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. February 15, 2023
- Test report no. XE\_23\_04 at HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. 08 th March 2022
- Test report no. PW-2022-0115 at FOCP SPIEZ LABORATORY, Spiez / SWITZERLAND dd. 14.12.2022
- Test report no. PW-2022-0082 at FOCP SPIEZ LABORATORY, Spiez / SWITZERLAND dd. 25.08.2022
- Test report no. 2544\_FRM at DEHN SE, Neumarkt / GERMANY dd. 05.08.2024
- Test report no. 2545\_FRM at DEHN SE, Neumarkt / GERMANY dd. 05.08.2024
- Test report no. 2546\_FRM at DEHN SE, Neumarkt / GERMANY dd. 05.08.2024
- Test report no. 2550\_FRM at DEHN SE, Neumarkt / GERMANY dd. 30.10.2024
- Test report no. 2551\_FRM at DEHN SE, Neumarkt / GERMANY dd. 30.10.2024
- Test report no. 2552\_FRM at DEHN SE, Neumarkt / GERMANY dd. 30.10.2024
- Evaluation report no. XE-25-07 at HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. October 1, 2025
- Inspection report no. L25/1990\_01 at gbd Lab GmbH, Dornbirn / AUSTRIA dd. 15.07.2025
- Expert assessment no. 2024-12X at University of Stuttgart / GERMANY dd. July 24, 2024
- Test report no. 41-22 at FSRL HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. October 19, 2022
- Test report no. 42-22 at FSRL HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. March 21, 2023
- Test report no. 42-23 at FSRL HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. June 21, 2024
- Test report no. 5214\_021\_401/e at EMPA, Dübendorf / SWITZERLAND dd. April 8, 2024
- Test report no. XE-23-19 at HILTI Aktiengesellschaft, Schaan / LIECHTENSTEIN dd. October 18, 2023

#### **4. APPLICATION / LIMITATION:**

4.1 The mechanical fastening system is intended for fastening applications in shipbuilding, offshore and crane structures as far as the BUREAU VERITAS Rules are complied with:

- Multi-disciplinary support
- Welded support for cable trays
- Modular support for cable trays
- Individual support
- Welded support for pipe trays
- Modular support for pipes
- Suspending ceiling
- Equipment fastening
- Shipbuilding fastening
- Earthing (Grounding), bonding (e.g. for equipment, pipe flanges, storage tanks, junction boxes etc.)

4.2 Parent material specification: Subgroup 1.1, 1.2, 1.3 and 2.1 according to CEN ISO/TR 15608

| <b>Standard / application area</b>  | <b>Steel grade</b>                                      |
|-------------------------------------|---|
| EN 10025-2                          | S235JR +N (or +AR) to S460K2 +N (or +AR)                |
| EN 10025-3                          | S275N/NL to S460N/NL                                    |
| EN 10025-4                          | S275M/ML to S460M/ML                                    |
| EN 10225                            | S355NLO/MLO to S460NLO/MLO                              |
| ASTM                                | ASTM A36, ASTM 572 Grade 50                             |
| Shipbuilding steel                  | A, B, D, E, AH 32, DH 32, AH 36, DH 36, EH 36           |
| Shipbuilding steel high strength    | AQ43, AQ47, DQ43, DQ47 (each N/NL or TM)                |
| Carbon equivalent value: CEV ≤ 0.45 | $CEV = C + Mn / 6 + (Cr + Mo + V) / 5 + (Ni + Cu) / 15$ |
| Deoxidation                         | Al ≥ 0,02% or fully killed                              |

4.3 Thickness of the parent material:

|  | <b>t,min</b> | <b>t,max</b>   |
|--|--------------|----------------|
| F-BT-MR M6xL SN (4)<br>F-BT-MR M8xL SN (4)   | 4 mm         | 40 mm          |
| F-BT-MR M6xL SN (6)<br>F-BT-MR M6xL (6)  | 6 mm         | 40 mm          |
| F-BT-MR M8xL SN (8)<br>F-BT-MR M8xL (8)  | 8 mm         | 40 mm          |
| F-BT-MR M10xL SN (10)<br>F-BT-MR M10xL (10)<br>F-BT-MR M12xL SN (10)<br>F-BT-MR M12xL (10) | 10 mm        | 40 mm          |
| F-BT-MR 3/8xL SN (5/32)  | 5/32"/ 4 mm  | 1 9/16"/ 40 mm |
| F-BT-MR 3/8xL SN (3/8)<br>F-BT-MR 3/8xL (3/8)<br>F-BT-MR 1/2xL (3/8)                       | 3/8"/ 10 mm  | 1 9/16"/ 40 mm |

For F-BT fasteners without sealing washer, which are welded to uncoated parent material, the minimum parent material thickness amounts to 2 mm.

#### 4.4 Stud positioning in parent material:

|  | Spacing<br>between studs | Edge distance<br>$t \leq 30$ mm | Edge distance<br>$30$ mm $< t \leq 40$ mm |
|--|--------------------------|---------------------------------|---|
| F-BT-MR M6xL SN (4)<br>F-BT-MR M8xL SN (4)<br>F-BT-MR M6xL SN (6)<br>F-BT-MR M6xL (6)<br>F-BT-MR M8xL SN (8)<br>F-BT-MR M8xL (8)<br>F-BT-MR M10xL SN (10)<br>F-BT-MR M10xL (10)<br>F-BT-MR M12xL SN (10)<br>F-BT-MR M12xL (10) | 35 mm                    | 38 mm                           | 76 mm                                     |
| F-BT-MR 3/8xL SN (5/32)<br>F-BT-MR 3/8xL SN (3/8)<br>F-BT-MR 3/8xL (3/8)<br>F-BT-MR 1/2xL (3/8)  | 1 3/8" / 35 mm           | 1 1/2" / 38 mm                  | 3" / 76 mm                                |

#### 4.5 Thickness of the fastened material:

|  | t,min          | t,max        |
|--|----------------|--------------|
| F-BT-MR M6x25 SN (4)<br>F-BT-MR M8x25 SN (4)<br>F-BT-MR M6x25 SN (6)<br>F-BT-MR M8x25 SN (8)<br>F-BT-MR M10x25 SN (10)<br>F-BT-MR M12x25 SN (10) | 3.5 mm         | 10 mm        |
| F-BT-MR M6x25 (6)<br>F-BT-MR M8x25 (8)<br>F-BT-MR M10x25 (10)<br>F-BT-MR M12x25 (10)   | 4.5 mm         | 10 mm        |
| F-BT-MR M10x50 SN (10)<br>F-BT-MR M12x50 SN (10)   | 3.5 mm         | 20 mm        |
| F-BT-MR M10x50 (10)<br>F-BT-MR M12x50 (10)   | 4.5 mm         | 20 mm        |
| F-BT-MR 3/8x1 SN (5/32)<br>F-BT-MR 3/8x1 SN (3/8)  | 1/8" / 3.5 mm  | 3/8" / 10 mm |
| F-BT-MR 3/8x1 (3/8)  | 3/16" / 4.7 mm | 3/8" / 10 mm |
| F-BT-MR 3/8x1 1/2 SN (3/8)<br>F-BT-MR 3/8x2 SN (3/8)<br>F-BT-MR 3/8x4 SN (3/8)   | 1/8" / 3.5 mm  | 3/4" / 20 mm |
| F-BT-MR 3/8x1 1/2 (3/8)<br>F-BT-MR 3/8x2 (3/8)<br>F-BT-MR 3/8x4 (3/8)<br>F-BT-MR 1/2x1 1/2 (3/8)<br>F-BT-MR 1/2x2 (3/8)                          | 3/16" / 4.7 mm | 3/4" / 20 mm |

4.6 Hilti's recommendations regarding to the tightening torque and the max. values of tension load, shear load and bending moment are dependent on the size of stud and have to be complied with.

4.7 The F-BT studs are allowed to be used on structural members made from carbon steel that require fatigue verification. Fatigue verification of structural members in ship structures has to be made with the corresponding BUREAU VERITAS Rules and is subject to special consideration of BUREAU VERITAS.

Fatigue verification of construction members (e.g. crane-structures) is to be made in compliance with Eurocode 3 (EN 1993-1-9: Eurocode 3: Design of Steel structures – Part 1.9: Fatigue).

Detail category 80 according to EN 1993-1-9 applies for lower strength steel grades with a nominal yield strength  $< 355$  N/mm<sup>2</sup> (e.g. S235 or S275 according to EN 10025-2).

Detail category 100 according to EN 1993-1-9 applies for higher strength steel grades with a nominal yield strength  $\geq 355$  N/mm<sup>2</sup> (e.g. S355 to S460 according to EN 10025-3, EN 10025-4 or EN 10225).

In case of fatigue design, the minimum thickness of the base material is not to be less than 10 mm.

4.8 The manufacturer's assembly instructions and recommendations are to be complied with.

#### **5. PRODUCTION SURVEY REQUIREMENTS:**

- 5.1 The mechanical fastening system are to be supplied by **Hilti Corporation** in compliance with the type described in this certificate.
- 5.2 This type of product is within the category HBV of BUREAU VERITAS Rule Note NR320 and as such does not require a BUREAU VERITAS product certificate.
- 5.3 **Hilti Corporation** has to make the necessary arrangements to have its works recognised by BUREAU VERITAS in compliance with the requirements of NR320 for HBV products.
- 5.4 For information, **Hilti Corporation** has declared to BUREAU VERITAS the following production site:  
**Jiaxing Chuangyuan Machinery Manufacturing Co., Ltd., Jiaxing City / CHINA**

#### **6. MARKING OF PRODUCT:**

The mechanical fastening system should be clearly identified with:

- Manufacturer's name or logo
- Type designation

#### **7. OTHERS:**

- 7.1 The mechanical fastening systems will be delivered with the relevant documentation / user's guide.
- 7.2 It is **Hilti Corporation**'s responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.
- 7.3 This certificate supersedes the Type Approval Certificate N° 74483/A1 BV issued on 18 Jul 2025 by the Society.

\*\*\* END OF CERTIFICATE \*\*\*