

# TYPE APPROVAL CERTIFICATE

**This is to certify:****That the Plate Heat Exchanger**with type designation(s)  
**PHE M15-FM, PHE M15-FG**

Issued to

**Alfa Laval Lund AB**  
**Lund, Skåne Län, Sweden**

is found to comply with

**DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment**  
**DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018****Application :****Product(s) approved by this certificate is/are accepted for installation on vessels classed by DNV GL.**

| Type              | Temperature range:     | Design pressure:                            | Operating media:       |
|-------------------|------------------------|---------------------------------------------|------------------------|
| <b>PHE M15-FM</b> | <b>-10°C to 200°C</b>  | <b>12,5 bar to 9 bar (See certificate)</b>  | <b>See certificate</b> |
| <b>PHE M15-FG</b> | <b>-10 °C to 200°C</b> | <b>19 bar to 15,5 bar (See certificate)</b> | <b>See certificate</b> |

Issued at **Høvik** on **2019-01-17**This Certificate is valid until **2022-12-31**.for **DNV GL**DNV GL local station: **Stockholm**Approval Engineer: **Mehdi Rowshan**

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**Marianne Spæren Marveng**  
**Head of Section**

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.



Job Id: **262.1-008784-4**  
Certificate No: **TAP00001MF**

## Product description

Plate heat exchanger types: PHE M15-FM, PHE M15-FG with tie bolted frame plates designed according to DNV GL ship rules Pt.4 Ch.7 (Parts not covered by Pt.4 Ch.7 are designed in accordance with EN13445

Material:

- Frame & Pressure Plate: P265GH (EN10028-2)
- Tightening bolts: 42CrMo4 (EN10269) / Class 8.8 (EN ISO 898-1)
- Nuts: 42CrMo4 (EN10269) / Class 8 (EN20898-2)
- Channel plates: Stainless steel / Titanium.

## Application/Limitation

The Gasketed plate heat exchanger (PHE) with tie bolted frame plates types are approved for the medium according to limitations referred in DNV GL ship rules Pt.4 Ch.7 Sec.1 Table 2 to specify the class for the heat exchanger.

Heat exchanger plates and gaskets shall withstand and meet the requirements of the operating media and temperature.

Stainless steel channel plates grades SUS304, 316 and 316L shall not be used in seawater systems.

Design Pressure for different maximum design Temperatures are resulted as below:

| Maximum design Temperature | Design Pressure |            |
|----------------------------|-----------------|------------|
|                            | PHE M15-FG      | PHE M15-FM |
| 50°C                       | 19 bar          | 12,5 bar   |
| 100°C                      | 18 bar          | 12 bar     |
| 150°C                      | 17 bar          | 11 bar     |
| 180°C                      | 16 bar          | 10 bar     |
| 200°C                      | 15.5 bar        | 09 bar     |

Corrosion allowance: 0 mm

Thickness of frame and pressure plates: PHE M15-FG Min. 49.7 mm  
PHE M15-FM Min. 39.7 mm

## Type Approval documentation

| Drawing No     | Rev. | Title                                  | Status          |
|----------------|------|----------------------------------------|-----------------|
| 3490019264     | 0    | Calculation drawing, M15-FG            | Approved        |
| 3490019265     | 0    | Calculation report, M15-FG             | For Information |
| 3490019266     | 0    | Finite Element Analysis report, M15-FG | For Information |
| 3490019267     | 0    | Calculation drawing, M15-FM            | Approved        |
| 3490019268     | 0    | Calculation report, M15-FM             | For Information |
| 3490019269     | 0    | Finite Element Analysis report, M15-FM | For Information |
| PC CHE 1701-10 | 3    | Report on calculation methodology      | For Information |
| PC CHE 1502-10 | -    | Media list (general)                   | For Information |

## Production Testing

Each heat exchanger shall be subjected to hydrostatic pressure test upon completion to at least 1.5 times the design pressure in the presence of a DNV GL Surveyor.

The hydrostatic pressure includes a differential pressure test between the chambers; each chamber is to be pressure tested.

## **Certification**

Materials used shall have certificates according to DNV GL Rules Pt.4 Ch.7 Sec.1 [3.2.2].  
Each heat exchanger shall be certified by a DNV GL surveyor and to be delivered with a DNV GL product certificate  
Manufacturer of pressure vessels of class I and II shall be approved manufacturer by DNV GL.  
DNV GL Approval of manufacturer is required for VL and W material certificates.

## **Marking of product**

For traceability to this Type Approval the products should at least be marked with:

- Manufacturer's name and address
- Type designation and serial number
- Year of manufacture
- Maximum allowable working pressure
- Hydrostatic test pressure
- Temperature range.

## **Periodical assessment**

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNVGL-CP-0338.