

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Plate Heat Exchanger**with type designation(s)
TS20-FM, TS6-FG, TS20-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:
TS20-FM	-10°C to 210 °C	9.7 bar to 13.1 bar (See Certificate)	See Certificate
TS6-FG	-10°C to 200 °C	16 bar to 24 bar (See Certificate)	See Certificate
TS20-FG	-10°C to 210°C	16 bar to 21 bar (See Certificate)	See Certificate

Issued at **Høvik** on **2019-01-17**This Certificate is valid until **2023-06-30**.for **DNV GL**DNV GL local station: **Stockholm**Approval Engineer: **Mehdi Rowshan**

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.



Product description

Three types of Plate heat exchangers with tie bolted frame plates designed according to EN-13445:2014 Annex B (Design by Analysis – Direct Route) and Annex G (Alternative design rules for flanges and gasketed flange)

Material Designations for all three types:

Frame & Pressure Plate:	P265GH EN10028-2
Tightening Bolts:	EN ISO 898-1 Class 8.8 (alternative material: 42CrMo4 according to EN10269)
Gasket Material:	Non asbestos fiber Gaskets
Channel Plates:	Stainless Steel or Titanium

Bolted data:

TS20 FM	8 * M30
TS6 FG	6 * M20
TS20 FG	4 * M30 and 4 * M39

Frame Plate thickness:

Type	Holed	Unholed
TS20 FM	Min. 49.7 mm	Min. 44.7 mm
TS6 FG	Min. 29.7 mm	Min. 24.7 mm
TS20 FG	Min. 59.7 mm	Min. 49.7 mm

Application/Limitation

Gasketed plate heat exchanger (PHE) with tie bolted frame plates of series with type designations as : TS20-FM, TS6-FG, TS20-FM 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.

Corrosion allowance 0 mm

Design Pressure and Life cycle for different maximum design Temperatures are shown below:

- PHE TS20-FM

Design Temperature	Design Pressure	Maximum life cycles
50°C	13.1 bar	457
100°C	11.9 bar	680
150°C	11 bar	754
180°C	10.5 bar	775
210°C	9.7 bar	835

- PHE TS6-FG

Design Temperature	Design Pressure	Maximum life cycles
50°C	24 bar	560
100°C	22 bar	681
150°C	21 bar	709
180°C	20 bar	757
200°C	16 bar	1108

- PHE TS20-FG

Design Temperature	Design Pressure	Maximum life cycles (M30)	Maximum life cycles (M39)
50°C	21 bar	13612	7588
100°C	19 bar	16755	9391
150°C	18 bar	18164	10312
180°C	17 bar	19344	10899
210°C	16 bar	20483	11598

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.

Type Approval documentation

Drawing No	Rev.	Title	Status
3490019788	0	Calculation drawing, TS6-FG	Approved
3490019789	0	Calculation report, TS6-FG	For Information
3490019790	0	Finite Element Analysis report, TS6-FG	For Information
3490019791	0	Calculation drawing, TS20-FG	Approved
3490019792	0	Calculation report, TS20-FG	For Information
3490019793	0	Finite Element Analysis report, TS20-FG	For Information
3490019794	0	Calculation drawing, TS20-FM	Approved
3490019795	0	Calculation report, TS20-FM	For Information
3490019796	0	Finite Element Analysis report, TS20-FM	For Information
PC CHE 1502-10	-	Media list (general)	For Information

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



Job Id: **262.1-001533-15**
Certificate No: **TAP00001JY**

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.