

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Plate Heat Exchanger**with type designation(s)
NT/NX/NH/ND/LWC 150S/150L/150X B/CD

Issued to

**Kelvion PHE GmbH
Sarstedt, Germany**

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 July 2015****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed
by DNV GL.****Temperature range: -40°C to +200°C****Design pressure: 6/10/16/25/33 bar****Operating media: Sea water, fresh water, glycol, lube oil, refrigerant, thermal oil**This Certificate is valid until **2020-06-30**.Issued at **Høvik** on **2016-01-05**for **DNV GL**DNV GL local station: **Magdeburg**Approval Engineer: **Ola E. Ruud**

**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:
Certificate No: **TAP00000RF**

Product description

Plate heat exchanger with tie bolted frame plates designed according to AD-2000 Merkblatt.

DNV GL Pressure Class: (Reference is made to DNV GL ship rules Pt.4 ch.7 Sec.1 Table2)

Medium	Design Pressure 10 bar	Design Pressure 16 bar	Design Pressure 25 bar/33 bar
Sea water, fresh water, Glycol	Class III	Class III	Class II
Lube oil	1) T>150°C: Class I 2) T≤150°C: Class II	1) T>150°C: Class I 2) T≤150°C: Class II	Class I
Thermal Oil	Class II	Class II	Class I
Refrigerant Group 1 (*)	Not allowed	Class II (***)	Class II (***)
Refrigerant Group 2 (**)	Not allowed	Class I (***)	Class I (***)

(*) Reference is made to DNV GL ship rules Pt.4 Ch.6 Section 6 Table 1.

(**) Reference is made to DNV GL ship rules Pt.4 Ch.6 Section 6 Table 2.

(***) Within the limits of DNVGL ship rules Pt.4 Ch.6 Section 6 Table 3

Materials:

- Base plate material: S355J2+N according EN 10025-2
- Bolt material: 8.8 DIN EN ISO 898-1 / 42CrMo4 DIN EN 10269
- Channel plate: Stainless steel / Titanium

Thickness of base plate:

- 30 mm Nominal pressure = 6 bar
- 40 mm Nominal pressure = 10 bar
- 50 mm Nominal pressure = 16 bar
- 60 mm Nominal pressure = 25 bar/33 bar

Gasket dimensions (short span x long span)

- 494 x 1272 NT 150S CD
- 494 x 1272 NT 150S B
- 494 x 1752 NT 150L CD
- 494 x 1752 NT 150L B

Different types based on corrugation of channel plates: (Tie bolts and pressure frames are same)

NT: New Technology/NX: New extra Narrow Gap/NH: New High pressure/ND: New double wall/NW: New wide gap/LWC: Laser welded cassette

Application/Limitation

Heat exchangers are approved for sea water, fresh water, and glycol, lube oil, thermal oil or refrigerant systems with the gasket materials and temperature ranges as specified by the Manufacturer:

Gasket material	Temperature range
Viton	All specified media: min. -40°C to max. 200°C
NBR (sulphur cured)	All specified media: min. -30°C to max. 85°C
NBR (Peroxide cured)	Min. -30°C to: Lube oil max.100°C, Fresh water, Glycol max.140°C, Sea water max.85°C
NBR (Low Temperature)	All specified media: min. -40°C to max. 100°C
EPDM	Min. -40°C to: Fresh water max.150°C, Sea water/ max.85°C, Glycol max.150°C. Not permitted for Hydrocarbons

The certificate covers the strength approval of the pressurized parts. The choice of the material for heat exchanger plates and gaskets shall comply with the service conditions of the heat exchanger - i.e. maximum operating temperature and pressure as well as the kind of the operating medium.

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Threaded connections without O-ring seals are not allowed for class I and II piping systems.

Materials for base plates are to meet Charpy V-notch energy values of minimum 27 J at 5°C below minimum design temperature or -20°C whichever is lower.

Materials used shall have certificates according to DNV GL ship Rules Pt.4 Ch.7 Sec. 2 Table1. Materials with VL or works certificates have to be supplied from an approved manufacturer of DNV GL for the type and grade of steel being supplied and for the relevant steelmaking and processing route.

Traditional stainless steels, e.g. SUS304, SUS316 & SUS316L, cannot be used as material of channel plates in seawater applications.

Each heat exchanger is to be hydraulic pressure tested to minimum 1,5 times design pressure certified by DNV GL and to be delivered with a product certificate.

At elevated temperatures, max. working pressure shall be in accordance with document no.150-110/130-1/DNV, dated 28.09.2016

Type Approval documentation

Dwg.no.	Rev.	Title	Date
1150110- DNV GL	-	Plattenvarmetauscher NT 150S CD	11.03.2011
1150130- DNV GL	-	Plattenvarmetauscher NT 150S B	11.03.2011
1150100- DNV GL	-	Plattenvarmetauscher NT 150L CD	11.03.2011
1150120- DNV GL	-	Plattenvarmetauscher NT 150L B	11.03.2011
Calculation Reports	-	Kelvion GPHE – Gasketed Plate Heat Exchanger	28.09.2016

Marking of product

The marking is to show the following particulars:

- the name and domicile of the manufacturer
- the manufacturer's type designation and serial number
- the year of manufacture
- the design pressure
- the design temperature (s) in °C
- the hydraulic test pressure
- DNV GL identifying mark

Periodical assessment

For retention of the Type Approval, a DNV GL surveyor shall perform periodical assessment every second year and before the expiry date of this certificate. The scope of the periodical assessment survey is to verify that the conditions stipulated for the type approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the certificate retention survey are:

- Review of Type Approval documentation
- Review of possible changes in design, materials and performance
- Ensure traceability between manufacturer's product type marking and Type Approval Certificate.