

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Plate Heat Exchanger**

with type designation(s)

NT80M CDL-10, NT80M B-10, NT80M B-16, NT80M B-25

Issued to

**Kelvion PHE GmbH
Sarstedt, Germany**

is found to comply with

**DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment
Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

Type	Temperature range:	Design pressure:	Operating media:
NT80M CDL-10, NT80M B-10	-40°C to +200°C	10 bar	Sea water, fresh water, glycol, lube oil, thermal oil
NT80M B-16, NT80M B-25	-40°C to +200°C	16 / 25 bar	Sea water, fresh water, glycol, lube oil, thermal oil, refrigerant

This Certificate is valid until **2021-08-14**.Issued at **Hamburg** on **2016-08-15**DNV GL local station: **Magdeburg**Approval Engineer: **Arthur Ivombo**for **DNV GL**

**Harald Pauli
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

- Gasketed plate heat exchanger with tie bolted frame plates of series type NT80M (NT: New Technology) intended for
 - Sea water
 - Fresh water
 - Glycol
 - Lube oil
 - Thermal oil
 - Refrigerants
- Materials:
 - Base plate material: S355J2+N acc. EN 10025-2
 - Bolt material: 8.8 DIN EN ISO 898-1, 42CrMo4 DIN EN 10269
 - Channel plate/HE-plate: Stainless steel or titanium depending on medium
 - Gasket material: Viton, NBR(SC), NBRPC), NBR(LT) and EPDM depending on operating temperature and medium

For details of the plate heat exchangers (e.g. dimensions) see drawings as specified below under "Type Approval documentation".

Application/Limitation

Applied Rules and Design Code:

- DNV GL SHIP Pt.4 Ch.7 "Pressure Equipment"
- AD-2000 Merkblatt.

Each heat exchanger is to be

- Constructional tested and hydraulic pressure tested to minimum 1.5 times design pressure.
- Certified by DNV GL and delivered with a product certificate when required by the DNV GL rules or by the purchaser.

DNV GL Pressure Equipment Classes according to DNV GL SHIP rules Pt.4 Ch.7 Sec.1 Table 2:

Medium	Design Pressure 10 bar		Design Pressure 16 bar		Design Pressure 25 bar
Sea water, fresh water, Glycol	Class III		Class III		Class II
Lubricating oil	T>150°C T≤150°C	Class I Class II	T>150°C T≤150°C	Class I 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 and Table 2

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

Gasket materials depending on medium and operation temperature as specified by the manufacturer:

Gasket Material	Medium	Temperature Range
Viton	All specified media	-40°C to +200°C
NBR (Sulphur cured)	All specified media	-30°C to +85°C
NBR (Peroxide cured)	Sea water Fresh water, Glycol Lube oil	-30°C to +85°C -30°C to +140°C -30°C to +100°C
NBR (Low Temperature)	All specified media	-45°C to +110°C
EPDM	Sea water Fresh water, Glycol Not permitted for Hydrocarbons	-40°C to +85°C -40°C to +150°C

The chosen gasket materials as well as the materials of the heat transfer plates shall be suitable for the operating conditions and the intended medium.

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

Materials used shall have certificates according to DNV GL Rules SHIP Pt.4 Ch.7 Sec. 2 Table 1. Materials with VL or W certificates have to be supplied from a manufacturer approved by 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 and SUS316L, cannot be used as material of channel plates in seawater applications.

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

Type Approval documentation

Drawing No.	Drawing Title	Rev.	Date
1.080-112-DNV GL	Plattenwaermetauscher, NT80M CDL-10	00	2015-10-27
1.080-142-DNV GL	Plattenwaermetauscher, NT80M B-10	00	2015-11-12
1.080-143-DNV GL	Plattenwaermetauscher, NT80M B-16	00	2015-11-12
1.080-144-DNV GL	Plattenwaermetauscher, NT80M B-25	00	2015-11-12
1.134-800/1.080-800	Anschlussvarianten/Connection VT20, NT80	02	2014-12-04

Marking of product

For traceability to this type approval the products are at least to be marked with:

- Name and domicile of the manufacturer
- Manufacturer's type designation and serial number
- Year of manufacture
- Design pressure
- Design temperature(s) in °C
- Hydraulic test pressure
- DNV GL's identifying mark

Periodical assessment

The objective of the periodical assessment is to verify that the conditions for the type approval (TA) have not been altered.

The main scope of the periodical assessment will normally include:

- verification of the TA applicant's production and quality system w.r.t. ensuring continued consistent production of the TA products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products
- review of TA documentation and that this is still used as basis for the production
- review of possible changes in the design, the materials and the performance of the product
- verification of the product marking

For retention of the TA certificate in its validity period the periodical assessments will be carried out bi-yearly.

Unscheduled assessments for retention of the certificate may be carried out when there is reason to believe that the type approval applicant has not adhered to the obligations stipulated in the Type Approval certificate.

END OF CERTIFICATE