DNV·GL

Certificate No:
TAP00000M1

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Plate Heat Exchanger

with type designation(s)
NT/NX/NH/LWC 250S CD/B, NT/NX/NH/LWC 250M B, NT/NX/NH/LWC 250L B

Issued to
Kelvion PHE GmbH
Sarstedt, Germany

is found to comply with
DNV GL rules for classification – Ships
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.

Temperature range:	**-40° C to 200° C**
Design pressure:	**See certificate**
Operating media:	**Sea water, fresh water, glycol, lube oil, thermal oil and refrigerant**

This Certificate is valid until **2020-06-30**.

Issued at **Høvik** on **2016-12-13**

for **DNV GL**

DNV GL local station: **Magdeburg**

Approval Engineer: **Zeinab Sharifi**

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.

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Product description

Plate heat exchanger with tie bolted frame plates designed according to DNV GL Rules Pt.4 Ch.7 (design code: AD-2000 Merkblatt).

Materials:

Loose/base plate:	S355J2+N according to EN 10025-2
Bolts:	8.8 DIN EN ISO 898-1 / 42CrMo4 DIN EN 10269
Channel plate/HE-plate:	Stainless steel or titanium depending on medium
Frame/beam/support:	S235JR according to EN 10025-2

Thickness of base plate:

- 45 mm Nominal pressure (P_n) = 6 bar
- 60 mm Nominal pressure (P_n) = 10 bar
- 70 mm Nominal pressure (P_n) = 16 bar
- 90 mm Nominal pressure (P_n) = 25 bar

Gasket dimensions (short span x long span)

- 698 x 1681 NT/NX/NH/LWC 250S
- 698 x 1978 NT/NX/NH/LWC 250M
- 698 x 2275 NT/NX/NH/LWC 250L

Different types based on corrugation of channel plates: (Tie bolts and pressure frames are same)
NT: New Technology and NH: New High pressure

DNV GL Pressure Equipment class: (Ref. to DNV GL Ship Rules Pt.4 ch.7 Sec.1 Table 2)

Medium	P_n=6 bar	P_n =10 bar	P_n =16 bar	P_n =25 bar
Sea water, fresh water, Glycol	Class III	Class III	Class III	Class II
Lubricating oil	T>150°C: Class I T≤150°C: Class II T≤60°C: Class III	T>150°C: Class I T≤150°C: Class II	T>150°C: Class I T≤150°C: Class II	Class I
Thermal Oil	Class II T≤150°C: Class III	Class II	Class II	Class I
Refrigerant Group 1 (*)	Not allowed	Not allowed	Class II (***)	Class II (***)
Refrigerant Group 2 (**)	Not allowed	Not allowed	Class I (***)	Class I(***)

(*) To be within the limits of DNV GL ship rules Pt.4 Ch.6 Section 6 Table 1.
(**) To be within the limits of DNV GL ship rules Pt.4 Ch.6 Section 6 Table 2.
(***) To be within the limits of DNVGL ship rules Pt.4 Ch.6 Section 6 Table 3

Application/Limitation

Maximum allowable pressure- temperature values shall not exceed limits in manufacturer's technical data sheets, doc. no.: 250-140-1/DNV, 250-130-1/DNV and 250-110-1/DNV. Dated 2016-12-02.

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

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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.

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.

Type Approval documentation

Document no.	Document title	Rev.	Date	Status
1250130-DNV GL	Plate heat exchanger NT250L B	2	2016-05-24	Type approved
1250140-DNV GL	Plate heat exchanger NT250M B	2	2016-05-24	Type approved
1250110-DNV GL	Plate heat exchanger NT250S B	2	2016-05-23	Type approved
1250120-DNV GL	Plate heat exchanger NT250S CD-6/10	2	2016-05-23	Type approved
1250800	Connection NT250	5	2016-05-23	Type approved
250-110-1/DNV	Technical design data NT/NH250S	0	2016-12-02	Type approved
250-140-1/ DNV	Technical design data NT/NH250M	0	2016-12-02	Type approved
250-130-1/DNV	Technical design data NT/NH250L	0	2016-12-02	Type approved
NT250L-B6-50°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B6-120°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B6-150°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B6-200°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B10-50°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B10-120°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B10-150°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B10-200°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B16-50°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B16-120°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B16-150°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B16-200°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B25-50°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B25-120°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B25-150°C	Design Calculation	0	24-11-2016	Used for information
NT250L-B25-200°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B6-50°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B6-120°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B6-150°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B6-200°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B10-50°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B10-120°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B10-150°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B10-200°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B16-50°C	Design Calculation	0	24-11-2016	Used for information

NT250M-B16-120°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B16-150°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B16-200°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B25-50°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B25-120°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B25-150°C	Design Calculation	0	24-11-2016	Used for information
NT250M-B25-200°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B6-50°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B6-120°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B6-150°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B6-200°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B10-50°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B10-120°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B10-150°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B10-200°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B16-50°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B16-120°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B16-150°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B16-200°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B25-50°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B25-120°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B25-150°C	Design Calculation	0	24-11-2016	Used for information
NT250S-B25-200°C	Design Calculation	0	24-11-2016	Used for information

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.