

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Heat Exchanger**with type designation(s)
V11, V16, V22, V27, V32

Issued to

Kelvion Machine Cooling B.V.
Almere Flevoland, Netherlands

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure 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:
V11	0°C to 300°C	16 bar (see page 2)	See page 2
V16	0°C to 300°C	16 bar (see page 2)	See page 2
V22	0°C to 300°C	16 bar (see page 2)	See page 2
V27	0°C to 300°C	16 bar (see page 2)	See page 2
V32	0°C to 300°C	16 bar (see page 2)	See page 2

Issued at **Høvik** on **2017-11-16**This Certificate is valid until **2021-06-30**.for **DNV GL**DNV GL local station: **Rotterdam**Approval Engineer: **Iselinn Vindstad**

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

U-tube heat exchangers of the following types: V11, V16, V22, V27 and V32 with EN 1092-1 (PN16 – PN40) or SAE flanges:

Design pressure	16 bar maximum (limited according to pressure/temperature ratings of the standard EN 1092-1 nozzle flanges used)
Test pressure	24 bar
Design temperature	300°C maximum; (limited according to pressure/temperature ratings of the standard EN 1092-1 nozzle flanges used)
Joint efficiency	0.85
DNV GL vessel class	I/II/III*
Medium shell side	Fresh water or oil**
Medium tube side	Fresh water, sea water, oil** or steam
Corrosion allowance	1 mm***

* Depending on design parameters, reference is made to DNVGL-RU-SHIP Pt. 4 Ch. 7 Sec. 1 Table 2.

** Oil may be lubricating oil, thermal oil, MDO or HFO

*** For tubesheet of material CuNi30MnFe1 and X2CrNiMo the corrosion allowance and fabrication tolerance have been considered as 0 mm

Material of construction:

Component	For type V11		For types V16, V22, V27 and V32	
	Material grade	Material standard	Material grade	Material standard
Shell	P235GH	EN 10216-2	API 5L-B ERW	-
Tubes	P235GH	EN 10216-2	P235GH	EN 10216-2
	CuNi30Mn1Fe R370	EN 12451	CuNi30Mn1Fe R370	EN 12451
	X2CrNiMo17-12-2	EN 10217-7	X2CrNiMo17-12-2	EN 10217-7
Tube plates	P265GH	EN 10028-2	P265GH	EN 10028-2
	CuNi30Mn1Fe R320	EN1653	CuNi30Mn1Fe R320	EN1653
	X2CrNiMo17-12-2	EN 10088-2	X2CrNiMo17-12-2	EN 10088-2
Flanges	P250GH	DIN EN 10222-2	P250GH	DIN EN 10222-2

Application/Limitation

Materials for pressure retaining parts are to be delivered with material certificates according to DNVGL-RU-SHIP Pt. 4 Ch. 7 Sec. 1 Tables 5, 6 or 7, and shall meet the requirements of relevant parts of DNVGL-RU-SHIP Pt. 2 Ch. 2.

Material grade API 5L-B ERW shall be delivered with material certificates with the following conditions:

- Maximum carbon content: 0.23 %
- Charpy V-notch impact toughness requirement: minimum 27 J at 0°C for pipes with thickness 6 mm and above.

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

NDT shall be performed as per DNVGL-RU-SHIP Pt. 4 Ch. 7 Sec. 7 [4.1].

Each heat exchanger shall be certified by a DNV GL surveyor and to be delivered with a DNV GL product certificate when it is required by DNV GL Rules or by purchaser.

Steel components in direct contact with seawater shall be protected against corrosion.

Job Id: **262.1-001131-4**
Certificate No: **TAP000011R**

Type Approval documentation

Tests carried out

N/A

Marking of product

Each heat exchanger shall be permanently and legibly marked on the pressure part or on a nameplate permanently attached to a principal pressure part to show its identity and origin.

The marking of pressure vessels shall show at least the following particulars:

- manufacturer's name and address
- type designation and serial number
- year of manufacture
- maximum allowable working pressure
- hydrostatic test pressure.

Periodical assessment

For retention of the Type Approval, a DNV GL surveyor shall perform a survey - every second year and before the expiry date of this certificate – to verify that the conditions for the type approval are complied with.