Certificate no.:
TAP00002VU

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Heat Exchanger

with type designation(s)
DPK324G

issued to
Hydroniq Coolers AS
Ellingsøy, **Norway**

is found to comply with
DNV rules for classification – Ships Pt.4 Ch.7 Pressure equipment
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021

Application:

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Temperature range:	**0°C/+95°C**
Design pressure:	**16 bar**
Operating media:	**water, oil**

Issued at **Høvik** on **2024-06-12**

This Certificate is valid until **2029-06-11**.

for **DNV**

DNV local unit: **Mid-North Norway CMC**

Approval Engineer: **Alexandru Asmarandei**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.

Product description

Shell and tube heat exchangers. Parts not covered by DNV Rules (flanges, tube sheets, tube bundles, bolts etc.) are evaluated according to EN-13445.

Each type of the heat exchangers can be delivered with different shell-and tube side combinations/variations. Shell side is made of seamless pipe and the tube side is forged part made of ferritic nodular cast iron.

Materials:

Cylindrical shell:	P235GH according to EN 10216-2
Water box:	EN-GJS-400-15 according to EN 1563
Tube sheet/plate:	CuZn39Pb0.5according to EN 1653
Tube:	CuNi10Fe1Mn according to EN 12451
Flanges (Steel)	P355GH according to EN 10028-2
Flanges (Iron)	EN-GJS-400-15 according to EN 1563
Nozzles:	P235GH according to EN 10216-2
Bolts:	8.8 DIN 931

Application/Limitation

Design data for shell and tube side:

Heat exchanger DPK324G		Shell side	Tube side
Design pressure	bar	16	16
Hydrostatic test pressure	bar	24	24
Design temperature range	°C	0/95	0/95
Operating medium		Water, oil	
Joint efficiency		0.85	0.85
Corrosion allowance	mm	1	1
DNV Pressure vessel class [DNV-RU-SHIP Pt.4 CH.7 Sec.1 [2.5.1]		Class II	

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

	Pd=10 bar	Pd =12 bar	Pd =16 bar
Sea water, fresh water, Glycol	Td≤200°C: Class III Td>200°C: Class II	Td≤200°C: Class III Td>200°C: Class II	Td≤200°C: Class III Td>200°C: Class II
Lubricating oil	Td>150°C: Class I Td≤150°C: Class II	Td>150°C: Class I Td≤150°C: Class II	Td>150°C: Class I Td≤150°C: Class II
Thermal Oil	Class II	Class II	Class II
Compressed air/steam	Class II	Class II	Class II

* Pd is design pressure, and Td is design temperature

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions. Surface in contact with the medium shall be protected from corrosion by considering adequate corrosion allowance, and/or by applying suitable coatings. Surface preparation and coating shall be approved by the Society.

Selection of sealing/gaskets shall be suitable for the intended use and service.

Extent of Non-destructive testing shall be in accordance with DNV Ship Rules Pt.4 Ch.7 Sec.7 [4.1]

Type Approval documentation

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 Surveyor.

Certification

Materials for pressure retaining parts are to be delivered with material certificates according to DNV-RU-SHIP Pt. 4 Ch. 7 Sec. 1 Table5/Table 6/Table7 for the shell- and tube side. Also, the requirements in relevant parts of DNV-RU-SHIP Pt. 2 Ch. 2 shall be fulfilled.

Approval of manufacturer is required for pressure vessel class I and II.

Each heat exchanger shall be certified by a DNV surveyor and to be delivered with a DNV product certificate.

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 the heat exchanger 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
- design temperature range.

Periodical assessment

This certificate is only valid if required periodical assessments are carried out with satisfactory results.
For retention of the Type Approval, a DNV 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 DNV-CP-0338.