

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Heat Exchanger

with type designation(s)
Coil Tube Type Heat Exchangers

Issued to

Kajiwara Iron Works Matsunomoto Factory
Himeji, Hyogo Pref, Japan

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 vessels classed by DNV.

Temperature range: See page 2

Design pressure: See page 2

Operating media: Shell side: oil, Tube side: steam

Issued at **Høvik** on **2022-12-22**

This Certificate is valid until **2027-12-21**.

for **DNV**

DNV local station: **Kobe**

Approval Engineer: **Andreas Hansen**

Bosman van der Merwe
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.

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

60 types of DNV class I and II heat exchangers (shell side: oil / tube side: steam) designed according to DNV-RU-SHIP Pt.4 Ch.7.

Shell

Material: STPG370 according to JIS G3454

Shell can be manufactured by either the seamless or the electric resistance welding process

B100 types:	Ø114.3 mm , thk.=4.9 mm
B125 types:	Ø139.8 mm , thk.=5.1 mm
B150 types:	Ø165.2 mm , thk.=5.5 mm
B200 types:	Ø216.3 mm , thk.=7.0 mm
B250 types:	Ø267.4 mm , thk.=7.8 mm
B300 types:	Ø318.5 mm , thk.=8.4 mm or 10.3 mm

Inner tube

Material: STPG370 according to JIS G3454

Tube can be manufactured by either the seamless or the electric resistance welding process

B100,125,150 types:	Ø34.0 mm , thk.=3.9 mm
B200,250,300 types:	Ø76.3 mm , thk.=6.0 mm

Material of flange: SS400 according JIS G3101 or SF440A according JIS G3201

Material of end plate & hemispherical end: SB410 according to JIS G3103

Application/Limitation

Design pressure of shell side for different types:

DP5	DP10	DP16	NP20	NP40
0.49 MPa	0.98 MPa	1.57 MPa	2.16 MPa	4.32 MPa

Design pressure of tube side: 1.18 MPa (for all types)

Design temperature of shell side (min/max): 0°C / 160°C

Design temperature of tube side (min/max): 0°C / 220°C (DP5/DP10/DP16)

Design temperature of tube side (min/max): 0°C / 250°C (NP20/NP40)

Non-destructive testing shall be done according to DNV-RU-SHIP Pt.4 Ch.7 Sec.7 [4].

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions.

Type Approval documentation

Production testing

Each heat exchangers hall be tested 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 [Table 5] or [Table 6] and shall meet the requirements of relevant parts of DNV-RU-SHIP Pt.2 Ch.2.

Manufacturing facility for heat exchangers of class I and II shall be approved by DNV in accordance with DNV-CP-0261.

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.

For traceability to this type approval, the final products are to be marked with:

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

Periodical assessment

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 type approval are complied with. Reference is made to DNV-CP-0338.