

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Heat Exchanger**with type designation(s)
E2214, E2414, E2614, E2814, E3014

Issued to

PROVIDES METALMECCANICA S.R.L.
Latina, Italy

is found to comply with

DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018
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 vessels classed by DNV GL.****Temperature range:** Shell side: -10°C to 60°C / Tube side: -10°C to 55°C**Design pressure:** Shell side: 16 bar / Tube side: 10 bar**Operating media:** Shell side: refrigerants group 1/ Tube side: fresh waterIssued at **Høvik** on **2019-12-05**This Certificate is valid until **2024-12-04**.for **DNV GL**DNV GL local station: **Naples**Approval Engineer: **Maheshraja Venkatesan**

Zeinab Sharifi
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

5 types of Shell and tube heat exchangers with fixed tubesheet: E2214, E2414, E2614, E2814 & E3014.

In accordance with DNVGL Pt.4 Ch.7 Sec.4 [1.1.4] the heat exchangers are designed according to ASME Sec. VIII Div.1.

Material of construction for all types:

Model no.	E2214, E2414, E2614 & E2814	E3014
Shell	SA 53 Gr. B Type E / SA 106 Gr. B	SA 516 Gr. 70N
Tubesheet	SA 516 Gr. 70N	
Tubes	SB 359 C12200 H55 or C70600/C71500 O61	
Nozzles	SA 105	

Application/Limitation

Design data	Shell side	Tube side
Medium	Refrigerants Group 1	Fresh water
Design pressure (bar)	16	10
Test pressure (bar)	24	15
Design temperature (°C)	-10/60	-10/55
Mean metal temperature (°C)	6	9
Pressure vessel class	II	III
Joint efficiency	0.85	0.85
Corrosion allowance (mm)	1	1 (except tubes)

In accordance with DNVGL Pt.4 Ch.7 Sec.1 [3.1.4] the water end boxes have not been subject to design approval and certification are to be based on visual inspection, review of material certificates and pressure testing witnessed by DNVGL surveyor.

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.

The tubesheets shall be delivered with material certificate as per DNVGL-RU-SHIP Pt. 2 Ch. 2 Sec. 3, impact testing shall be carried out at the following temperatures with impact values of 41 J in longitudinal direction (or 27 J in transverse direction):

- Model E2214 and E2414: -20°C
- Model E2614 and E2814: -25°C
- Model E3014: -30°C

Type Approval documentation

Production Testing

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.

Certification

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

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.

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.

Periodical assessment

For retention of the Type Approval, a DNV GL 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 DNVGL-CP-0338.