DNV·GL

Certificate No:
TAP00001CX

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Heat Exchanger

with type designation(s)
E1610, E2010, E2410

Issued to
PROVIDES METALMECCANICA S.R.L.
Latina, LT, Italy

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment
DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018

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: HFC refrigerant / Tube side: water**

Issued at **Høvik** on **2019-04-09**
This Certificate is valid until **2024-04-08**.
DNV GL local station: **Naples**

for **DNV GL**

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.

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Product description

Pressure vessel class shell side: II
Pressure vessel class tube side: III

Corrosion allowance: 1 mm

Materials:

Shell	SA 53 Gr. B Type E / SA 106 Gr. B
Tubesheet	SA 516 Gr. 60N/70N
Tubes	SB 359 C12200 H55/C70600/C71500

Application/Limitation

The tubeside (front and back header including bolts) have not been included in review, and shall be accepted based on visual inspection, review of material certificates and pressure testing witnessed by the DNVGL surveyor.

The tubesheets shall be delivered with material certificate showing impact testing at the following temperatures with impact values of 27 J in transverse direction and 41 J in longitudinal direction:

- Model E1610: -15°C
- Model E2010: -25°C
- Model E2410: -30°C

The shells shall be delivered with material certificate showing impact testing at -15°C with impact values of 27 J in transverse direction and 41 J in longitudinal direction.

Mean metal temperature during operation:
Shell side: 5°C
Tube side: 9°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 delievered 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.