DNV·GL

Certificate No:
TAP00000UF

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Condenser for Refrigerating Plant

with type designation(s)
C-Plus (CPS, CDEW, CDEW-E, McDEW), CRF, CRM, CXF

Issued to
Alfa Laval S.p.A.
Alonte VI, Italy

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment

Application :

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

Temperature range:	**-10°C +120°C**
Operating media:	**Shell side: refrigerants R22, R134a, R404a, R407a/b/c, R410, R507.** **Tube side: sea water, fresh water**
Design pressure:	**35 bar (only C-Plus) or 30 bar**

Issued at **Hamburg** on **2017-03-14**
This Certificate is valid until **2022-03-13**.
DNV GL local station: **Venice**

Approval Engineer: **Stefan Wiemer**

for **DNV GL**

Harald Pauli
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.

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

Product description

Shell and tube heat exchanger with types C-Plus, CRF/CRM and CXF, sizes 2, 3, 3.1, 4, 5, 5.1, 6, 7, 8 and 9, details according to approved drawings in Type Approval documentation.

Application/Limitation

Applied Rules:
- DNV GL Rules Ship Pt.4 Ch.7 'Pressure Equipment' (Edition January 2017),
- DNV GL Rules Ship Pt.4 Ch.6 Sec. 6 'Refrigeration Systems' (Edition January 2017),

Design pressure:	30 bar (35 bar only for type C-Plus),
Design temperature:	-10°C + 120°C,
DNV GL Pressure Equipment Classes:	II / III for shell side / tube side,

In case of condenser types CRF and CXF the use of the refrigerant R410A is excluded, as the required design pressure of the high pressure side is 34 bar (DNVGL Rules Ship Pt.4 Ch.6 Sec.6 Table 3). For all other refrigerants not mentioned on the first page of this certificate, an individual approval in each individual case is necessary.

The manufacturer is responsible to choose suitable and sufficient corrosion resistant materials (e. g. carbon steel, copper, CuNi10 or stainless steel) depending on the specific environmental conditions like the applicable fluids (sea water, fresh water), the applicable service temperature and possible abrasive flow conditions.

Steel materials used shall conform DNVGL Rules Pt.2 Ch.2 Sec.3, e.g. test temperature of impact testing according to the minimum design temperature. All used material shall be delivered with material certificates according to DNVGL Rules Ship Pt.4 Ch.7 Sec.1 Table 6 or 7,

Manufacturing, workmanship and testing shall be done according to DNV Rules Pt.4 Ch.7 Sec.7, extent of non-destructive testing shall be in line with DNV Rules Pt.4 Ch.7 Sec.7 No. 4.1.2,

Each cooler is to be:
- Hydraulic pressure tested to minimum 1.5 x design pressure,
- Certified by DNV GL and to be delivered with a product certificate when required by DNV GL Rules or by the purchaser.

Type Approval documentation

Marking of product

For traceability to this type approval the products are at least to be marked with:

- the name and domicile of the manufacturer,
- the manufacturer's type designation and serial number,
- the year of manufacture,
- the design pressure,
- the design temperature in °C,
- the hydraulic test pressure, and
- DNV GL's identifying mark

Periodical assessment

The objective of the periodical assessment is to verify that the conditions for the type approval (TA) have not been altered.

The main scope of the periodical assessment will normally include:

- verification of the TA applicant's production and quality system w.r.t. ensuring continued consistent production of the TA products at the TA applicant's own premises and at other companies that are given the responsibility for manufacturing of the products
- review of TA documentation and that this is still used as basis for the production
- review of possible changes in the design, the materials and the performance of the product
- verification of the product marking

For retention of the TA certificate in its validity period the periodical assessments will be carried out bi-yearly.

Unscheduled assessments for retention of the certificate may be carried out when there is reason to believe that the type approval applicant has not adhered to the obligations stipulated in the type approval certificate.