DNV·GL

Certificate No:
TAP000000H

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Plate Heat Exchanger

with type designation(s)
CBM400

Issued to
Alfa Laval Lund AB
LUND, Sweden

is found to comply with
Det Norske Veritas' Rules for Classification of Ships

Application :

See certificate.

Temperature range:	**Minimum -196°C / maximum 225°C (See certificate)**
Design pressure:	**Maximum 35 bar (See certificate)**
Operating media:	**See certificate.**

This Certificate is valid until **2019-07-20**.

Issued at **Høvik** on **2015-07-21**

for **DNV GL**

DNV GL local station: **Malmö**

Approval Engineer: **Adel Samiei**

On behalf of 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.

Job Id: **262.1-019484-1**
Certificate No: **TAP000000H**

Product description

- Brazed plate heat exchangers designed according to EN13445-3:2009 Annex T.
- Certified according to DNV ship rules Pt.4 Ch.7
- Material:
  - Frame Plate and Pressure Plate: 1.4401/1.4404 according to EN10028-7
  - Reinforcement Plate: 1.4404 according to EN10028-7
  - Connection & Connection tube: 1.4401, 1.4301,1.4404 (EN 10216-5)
    1.4401, 1.4301,1.4404 (EN10272:2007)
    1.4401, 1.4301,1.4404 (EN10217-7)
  - Channel plates: 1.4401 / 1.4404 (EN10028-7)

- DNV Pressure Class:
  - LPG, LNG and Refrigerants 2 as defined DNV Rules Pt.4 Ch.6 Sec.6 C100: Class I
  - Maximum design temperature > 150 °C : Class II
  - Maximum design temperature ≤ 150 °C : Class III

- Medium:
  - Water, Air: Fresh water, Steam, Air
  - Oil: Lube oil, Diesel oil, Fuel oil, Hydraulic oil, Thermal oil
  - Glycol: Ethylene glycol, Propylene glycol, Glycol Solution
  - CIP Solution: Detergent chemical comprising of Alkaline or Acid base
    Max. Temperature 70° C and concentration 4%
  - Refrigerant
    - Mixture: R404A, R407A, R-407B, R-407C, R407D, R410-A, R-410B, R-417A, R-422A, R-422B, R-422C, R422D, R-427A, R-507A, R-508A, R-508B
    - Compounds: R-22, R-23, R-32, R-125, R-134a, R-143a, R-227ea, R-236fa, R-245fa, R-290, R-600, R-600a, R717, R-718, R-723, R-744, R1270
  - LPG, LNG See drawing 34567995 Rev.1 (date 2015-07-16) for acceptable medium list

Application/Limitation

- Design data:

Side 1								
Minimum design Temperature °C	-196							
Maximum design Temperature °C	≤20	90	100	125	150	175	200	225
Design Pressure (bar)	35,0	29,2	28,4	27,1	25,7	24,8	23,8	23,2
Side 2								
Minimum design Temperature °C	-196							
Maximum design Temperature °C	≤20	90	100	125	150	175	200	225
Design Pressure (bar)	30,0	25,1	24,3	23,2	22,0	21,2	20,4	19,8

- Materials used shall have certificates according to DNV Rules Pt.4 Ch.7 Sec. 2 Table A1. Materials with NV or W certificates have to be supplied from an approved manufacturer of DNV GL for the type and grade of steel being supplied and for the relevant steelmaking and processing route.

- The mechanical properties of the material shall comply with the requirements specified in DNV Rules Pt.2 Ch.2 Sec.2 Table D2.

- Materials for heat exchangers contain LPG/ LNG shall comply with DNV Rules Pt.5 Ch.5 Sec. 2 Table D3.

- Each heat exchanger is to be:

- Hydraulic pressure tested to minimum 1,5 times design pressure when installed in thermal oil installations; 1,3 times design pressure otherwise.
- Certified by DNV GL and to be delivered with a product certificate when required by the DNV Rules or by the purchaser.

Type Approval documentation

- Test report no. TR13003 rev.0 dated 2013-01-22 Used for information

Tests carried out

Cyclic load/burst test according to EN13445 Annex T

Marking of product

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

- Manufacturer's name or trade mark
- Type designation
- Design Pressure
- Design Temperature

Periodical assessment

For retention of the Type Approval, a DNV GL surveyor shall perform periodical assessment every second year and before the expiry date of this certificate. The scope of the periodical assessment survey, is to verify that the conditions stipulated for the type approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the certificate retention survey are:

- Review of Type Approval documentation
- Review of possible changes in design, materials and performance
- Ensure traceability between manufacturer’s product type marking and Type Approval Certificate.

END OF CERTIFICATE