DNV·GL

Certificate No:
TAP000003F

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Plate Heat Exchanger

with type designation(s)
AlfaNova HP 76 / AlfaNovaM HP 76

Issued to
Alfa Laval Lund AB
LUND, Sweden

is found to comply with
Det Norske Veritas' Rules for Classification of Ships Pt.4 Ch.7, Pressure Vessels, 2012

Application :

See certificate.

Temperature range:	**-196°C to 550°C**
Design pressure:	**40 bar @ 20°C**
Operating media:	**See certificate**

This Certificate is valid until **2019-11-17**.

Issued at **Høvik** on **2015-11-18**

for **DNV GL**

DNV GL local station: **Malmö**

Approval Engineer: **Adel Samiei**

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.

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

Job Id: **262.1-019996-1**
Certificate No: **TAP000003F**

Product description

Fusion bonded plate heat exchangers designed according to EN13445-3:2009 Annex T with no corrosion allowance for Frame/pressure plates

Material:

- Frame Plate and Pressure Plate: 1.4401/1.4404 according to EN10028-7
- Channel Plate / sealing plate: 1.4401 according to EN10028-7
- Connection tube: 1.4401/1.4404/1.4571 according to EN10216-5 or EN10217-7
  or
  ASME SA-312 Gr. TP316, TP316L
- Connection bends: 1.4401/1.4404/1.4571 according to EN10216-5 or EN10217-7
  ASME SA-312 Gr. TP316, TP316L
  ASME SA 403 Gr. WP316, WP316L
- Reinforcement plate: 1.4404 according to EN10028-7 or
  ASME SA-240 Gr. 316L
- Connection: 1.4401/1.4404/1.4571 according to EN10216-5 or EN10217-7 or EN10272
- Connection plate: 1.4301/1.4306/1.4401/1.4404/1.4432/1.4436
  According to EN10272 or EN10028-7
- Gasket for flange connections: Non asbestos fibre gasket - thickness less than 1.6 mm & gasket factors: m=2,75 and Y=25,5 MPa

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, R-410A, 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 34568167 Rev.1 (date 2015-08-06) for acceptable medium list

Application/Limitation

Design Data:

Both Sides							
Min. design Temp. °C	-196						
Max. design Temp. °C	≤20	90	100	125	150	175	200
Design Pressure (bar)	40	31,78	30,62	29,24	27,85	26,77	25,69

Both Sides							
Min. design Temp. °C	-196						
Max. design Temp. °C	225	250	300	400	450	500	550
Design Pressure (bar)	24,92	24,15	22,31	20,77	20,00	19,69	19,54

Materials used shall have certificates according to DNV Rules Pt.4 Ch.7 Sec. 2 Table A1 (Except for LPG/LNG plate heat exchangers which shall have certificates in accordance with DNV Rules Pt.5 Ch.5 Sec. 2 Table D3.). Materials delivered with NV or W certificates shall be manufactured at works which have been approved by the society.

No specific fatigue analysis is made. The approval is limited to 500 full pressure cycles.

The design pressure of plate heat exchangers in the refrigerating plant shall be based on the pressures specified in Table C3 in DNV ship rules Pt.4 Ch.6 Sec.6.

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
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.