Certificate no.:
TAP000030W

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Plate Heat Exchanger

with type designation(s)
AlfaNova HP 27 / AlfaNovaM HP 27

issued to
Alfa Laval Technologies AB
Lund, Skåne Län, Sweden

is found to comply with
DNV rules for classification – Ships Pt.4 Ch.7 Pressure equipment
DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers

Application:

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

Temperature range:	**-196°C to 550°C (see page 2)**
Design pressure:	**Max. 50bar (see page 2)**
Operating media:	**See page 2**

Issued at **Høvik** on **2025-06-30**

This Certificate is valid until **2030-06-29**.

for **DNV**

DNV local unit: **Denmark CMC**

Approval Engineer: **Marc Avice**

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

Fusion bonded heat exchangers qualified according to EN13445-3: 2014 Annex T with DNV calibrated safety factors according to DNV-RU-SHIP Pt.4 Ch.7.

Material of construction:

- Frame, pressure & replacement plates : 1.4301, 1.4401 or 1.4404 (EN10028-7)
- Channel & sealing plates : 1.4401 or 1.4404 (EN10028-7)
- Reinforcement & adapter plates : 1.4301, 1.4401 or 1.4404 (EN10028-7)
- Connection & connection tube : 1.4301, 1.4401 or 1.4404 (EN 10028-7/ EN 10216-5/ EN 10217-7/ EN 10222-5/ EN 10272)
- Welding stud : A2-50 or A2-70 (EN ISO 3506-1/ EN ISO 13918)
  1.4301, 1.4303 or 1.4307
  (EN10088-3/ EN 10269/ EN 10272)
  ISO 15608 Group 8.1
- Flanges with pipes and elbows : 1.4401 or 1.4404 (EN 10222-5/ EN 10216-5)
  ASME SA-312, UNS S31600 or UNS S31603

Application/Limitation

Fusion bonded plate heat exchangers covered by this certificate are approved for the medium according to limitations referred in DNV Rules for Ships Pt.4 Ch.7 Sec.1 Table 2 to specify the class for the heat exchanger. (Corrosion allowance: 0 mm)

Design data:

Side 1								
Minimum design Temperature °C	-196 (standard)/ -165 (IGC code)							
Maximum design Temperature °C	≤20	90	100	125	150	175	200	225
Standard design Pressure (bar)	50.0	46.8	45.1	43.1	41.0	39.4	37.9	35.6
IGC Code design pressure (bar)	42.8	36.1	34.8	33.2	31.7	30.4	29.2	28.3
Side 2								
Minimum design Temperature °C	-196 (standard)/ -165 (IGC code)							
Maximum design Temperature °C	≤20	90	100	125	150	175	200	225
Standard design Pressure (bar)	48.8	41.2	39.7	37.9	36.1	34.7	33.3	32.3
IGC Code design pressure (bar)	37.6	31.8	30.6	29.2	27.8	26.7	25.7	24.9

Side 1							
Minimum design Temperature °C	-196 (standard)/ -165 (IGC code)						
Maximum design Temperature °C	250	300	350	400	450	500	550
Standard design Pressure (bar)	35.6	32.9	31.5	30.6	29.5	29.0	28.8
IGC Code design pressure (bar)	27.5	25.4	24.3	23.6	22.7	22.4	22.2
Side 2							
Minimum design Temperature °C	-196 (standard)/ -165 (IGC code)						
Maximum design Temperature °C	250	300	350	400	450	500	550
Standard design Pressure (bar)	31.3	28.9	27.7	26.9	25.9	25.5	25.3
IGC Code design pressure (bar)	24.1	22.3	21.4	20.8	20.0	19.7	19.5

The maximum permissible design pressures for the connections are outlined in the table provided in the calculation drawing of welded neck flanges with pipes/elbows referenced in “Type Approval Document” section below.

Maximum design pressure of complete plate heat exchanger shall be combination of the frame heat exchanger design pressure and flange design pressure for particular design temperature.

Maximum design pressure for non-standard flanges shall be as per submitted drawings.

For LNG/LPG applications material requirements shall fulfil DNV Rules for Ships Pt.5 Ch.7 Sec.6.

Plate heat exchangers with threaded joints connections shall not be used for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur and otherwise follow limitations in DNV Rules for Ships Pt.4 Ch.6 Sec.9 [5.2.6].

Following additional limitations are to be observed:

- the application of the fusion bonded plate heat exchangers is limited to prevailing static pressure loading with a maximum number of 500 full pressure cycles;

- the use of fusion bonded heat exchangers as heater in fuel oil supply systems and mounted directly at the engine is not allowed;
- piping must be well supported so that no loads are transferred to the heat exchanger during operation;
- the heat exchangers shall not be used in seawater systems;
- 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.

Type Approval documentation

Tests carried out
Cyclic load/burst test according to EN13445 Annex T.

Production Testing and Certification
Production Testing and Certification for the actual intended application shall follow the latest applicable edition of the Rules (as mentioned on the front page of this certificate).

The hydrostatic pressure includes a differential pressure test between the chambers; each chamber is to be pressure tested.

Marking of product
Minimum marking requirements shall be as outlined in the edition of the Rules (as mentioned on the front page of this certificate).

Periodical assessment
This certificate is only valid if required periodical assessments are carried out with satisfactory results.

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

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com.