



Certificate No:
TAP00002TE

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Plate Heat Exchanger

with type designation(s)
AXP112/AXPM112

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 vessels classed by DNV.

Temperature range: -50°C/+150°C (see page 2)

Design pressure: Maximum 120 bar (see page 2)

Operating media: See page 2

Issued at **Høvik** on **2023-11-30**

This Certificate is valid until **2028-11-29**.

for **DNV**

DNV local unit: **Denmark CMC**

Approval Engineer: **Thomas Wilhelm Juell**

Zeinab Sharifi
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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Form code: TA 251

Revision: 2022-12

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Product description

Brazed plate heat exchangers qualified according to EN 13445-3: 2021 Annex T with DNV calibrated safety factors according to DNV-RU-SHIP Pt.4 Ch.7.

Material of construction:

- External frame : P295GH or P355GH (EN 10028-2)
- Frame, reinforcement, adapter & pressure plates : 1.4301, 1.4401 or 1.4404 (EN 10028-7)
- Channel plate : 1.4301 or 1.4401 (EN 10028-7)
- Connection : 1.4301, 1.4401 or 1.4404 (EN 10028-7 / EN 10216-5 / EN 10217-7 / EN 10222-5 / EN 10272)
- Bolt : 8.8 (ISO 898-1)

Brazing material: Cu, min. 99.9%

Application/Limitation

Brazed plate heat exchangers covered by this certificate are approved for the medium according to limitations referred in DNV-RU-SHIP 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	-50				
Maximum design Temperature °C	≤20	90	100	125	150
Standard design Pressure (bar)	113.4	95.7	92.1	87.5	83.0
IGC Code design pressure (bar)	103.8	87.6	84.3	80.1	75.9
Minimum design pressure (bar)	-1				
Side 2					
Minimum design Temperature °C	-50				
Maximum design Temperature °C	≤20	90	100	125	150
Standard design Pressure (bar)	120.0	103.5	99.6	94.7	89.7
IGC Code design pressure (bar)	98.7	83.3	80.2	76.2	72.2
Minimum design pressure (bar)	-1				

For LNG/LPG applications material requirements shall fulfil DNV-RU-SHIP 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.

Otherwise:

- Plate heat exchangers with threaded joints connections in CO₂ systems shall be allowed only inside protected spaces and in CO₂ cylinder rooms.
- Plate heat exchangers with tapered threaded joints connections are only allowed for:
 - Class I, outside diameter not more than 33.7 mm
 - Class II and class III, outside diameter not more than 60.3 mm.
 - Plate heat exchangers with parallel threaded joints connections are only allowed for class III, outside diameter not more than 60.3 mm.

Following additional limitations are to be observed:

- the application of the brazed plate heat exchangers is limited to prevailing static pressure loading with a maximum number of 5500 full pressure cycles;
- the use of brazed heat exchangers as heater in fuel oil supply systems and mounted directly at the engine is not allowed;
- the use of the heat exchangers in refrigerant systems shall follow the requirements as defined in DNV-RU-SHIP Pt.4 Ch.6 Sec.6. The use of refrigerants belonging to Group 2 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



Job Id: **262.1-040100-1**
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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).

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

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.