

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Plate Heat Exchanger

with type designation(s)
CBK410, CBMK410

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
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021

Application :

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

Type	Temperature range:	Design pressure:	Operating media:
CBK410			
CBMK410	See certificate	See certificate	See certificate

Issued at **Høvik** on **2023-05-04**

This Certificate is valid until **2028-05-03**.

for **DNV**

DNV local unit: **Sweden CMC**

Approval Engineer: **Jane Lozanov**

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.



Product description

Brazed Plate Heat Exchanger CBK410 and CBMK410 qualified according to EN 13445-3 Annex T.

Material of construction:

Frame plate, pressure plate, channel plate, adapter plate, reinforcement plate	1.4301, 1.4401, 1.4404 EN 10028-7
Connection tube, connection	1.4301, 1.4401, 1.4404 EN 10028-7, EN 10216-5, EN 10217-7, EN 10222-5, EN 10272
Welding neck flange EN as per EN 1092-1*	1.4301, 1.4401, 1.4404, 1.4948, 1.4571 EN 10222-5, EN 10272, EN 10028-7
Compact flange EN	1.4301, 1.4401, 1.4404, 1.4541, 1.4571 EN 10222-5, EN 10272 and EN 10028-7As per drawing 34562638 and 34562639
Welding neck flange ASME as per ASME B16.5*	F316L, F316, F316H, F304 ASME SA-182
Compact flange ASME	As per drawing 34562655 UNS S31603, S30400, S30403, S30409, S31600, S31609 ASME SA-182 and ASME SA-479

*Standard flanges

Brazing material: Cu, min. 99.9%

Manufacturing location:

Metallgatan 2, SE-372 38 Ronneby, Sweden

Application/Limitation

Maximum working pressure and temperature and materials references shall be as per following tables for the types designed according to EN13445-3:2021 Annex T:

Models	CBK410, CBMK410			
	Standard design pressure (bar)		IGC design pressure (bar)	
Design temperature (°C)	Side 1	Side 2	Side 1	Side 2
≤20	49	48.4	42.7	41.4
90	43.8	40.8	37.5	35
100	42.2	39.3	36.1	33.7
125	40.1	37.3	34.3	32
150	38	35.4	32.5	30.3
175	36.3	33.8	31.1	29
200	34.7	32.3	29.7	27.7
225	33.3	31.1	28.6	26.6
Maximum external pressure	-1 bar		-1 bar	
Minimum design temperature	-196°C		-165°C	
Corrosion allowance (mm)	0		0	

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.

Brazed plate heat exchangers are approved for the medium according to limitations referred in DNV ship rules Pt.4 Ch.7 Sec.1 Table 2 to specify the class for the heat exchanger.

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

The traditional stainless steels, (including type 304, 316, 316L or similar), should not be considered suitable for use in seawater systems.

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 500 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 Rules Ship Pt.4 Ch.6 Sec.6. The use of refrigerants belonging to Group 2 is not allowed,
- 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

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).

Delivery condition and mechanical properties for the materials shall fulfil relevant parts of DNV Rules for Ships Pt.2 Ch.2/DNV-OS-B101, as appropriate to the design conditions and selected material grade(s).

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.