

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Plate Heat Exchanger**with type designation(s)
BH and BL

Issued to

Jiangsu Baode Heat Exchanger Co., Ltd.
Jiangyin, Chinais found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.7 Pressure equipment**Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

Type:	BH	BL
Temperature range:	See certificate	200 °C
Design pressure:	16 bar	30 bar
Operating media:	See certificate	See certificate

This Certificate is valid until **2021-10-14**.Issued at **Høvik** on **2016-10-15**for **DNV GL**DNV GL local station: **Jiangyin FiS&CMC**Approval Engineer: **Sinisa Sedlan**

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.

Product description

Two different constructions of plate heat exchangers – gasketed plate heat exchangers (type BH) and brazed plate heat exchangers (type BL).

Types and sizes:

BH

Plate Heat Exchanger with tie bolts (BH 30, BH 60, BH100, BH150 and BH 200)

Materials:

End plates: Q235 B

Note: There must be no contact between end plates and sea water

Intermediate plates: Titanium Plates TA1-A, AISI 316L and AISI 304

Note: Only titanium plates shall be used when medium of heat exchanger is sea water

Gasket: NBR, EPDM & FKM

Maximum design pressure: 16 bar

Hot side medium: Heavy oil, lubricating oil, thermal oil, hydraulic oil, and steam

Cold side medium: Fresh water, sea water and oil

BL

Brazed plate heat exchangers (BL 30, BL 50, BL 95, BL 120 and BL 200)

Materials:

plates: AISI 316L and AISI 304

Maximum design pressure: 30 bar

Hot side medium: Steam, fresh water, lubricating oil, thermal oil, hydraulic oil and fuel oil

Cold side medium: Refrigerant, lubricating oil, hydraulic oil and fuel oil

Application/Limitation

- Heat exchanger plates and gaskets shall withstand and meet requirements of the operating media and temperature.
- Threaded end connections may not be used in refrigerant, lubrication-, fuel-, and thermal oil in machinery spaces of Category A.
- The maximum working pressures for each type of plate heat exchanger is to be in accordance with the manufacturer's specifications and the type approved drawings.
- Brazed heat exchangers have not been evaluated against fatigue loadings.

For type BH, the maximum and minimum working temperatures are depending on the gasket materials as listed in the table below:

Type of gasket	Minimum temperature °C	Maximum temperature °C		
		Dry air	Seawater / Steam	Hydrocarbons
Nitrile (NBR)	-10 to -30	100	80-90	60-90
EPDM	-40 to -70	130	100-130	N/A
FKM (Viton)	-20 to -45	200	150	170

For elevated temperatures the maximum allowable pressure may have to be reduced as following:

Temperature °C	50	100	150	200	250
Reduction factors (BL)	1	0.85	0.77	0.71	0.67
Reduction factors (BH)	1	1	0.89	N/A	N/A

Type Approval documentation

Tests carried out

Burst test at four times the design pressure (type BL only)

Production testing

Each heat exchanger is to be hydraulic pressure tested to minimum 1.5 x design pressure. The hydraulic pressure test is to include a differential pressure test between the chambers, each chamber is to be pressure tested.

Certification

Each heat exchanger is to be certified by DNV GL and to be delivered with a product certificate when required by DNV GL Rules or by the purchaser.

Materials used shall have certificates according to DNV GL ship Rules Pt.4 Ch.7 Sec. 2 Table1. Materials with VL or works 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.

Marking of product

For traceability to this type approval the valves are to be marked as a minimum with:

- Manufacturers 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, to verify that the conditions for the type approval are complied with.

When possible, this assessment may be harmonised with normal surveys for product certification and / or other surveys and audits carried out.

The main elements of the certificate retention survey are:

- Verification of the TA applicant's production and quality system w.r.t. ensuring continued
- consistent production of the type approved products at the TA applicant's own premises
- Review of Type Approval documentation and assurance that it is still used as basis for production
- Review of possible changes in design, materials and performance
- Assurance of traceability between manufacturer's product type marking and Type Approval Certificate.

Renewal should be applied for in writing before the certificate expires.