



Certificate No:
TAP000028M

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)

HJB-CO, HJB-GT, HJB-CA, HJB-OT

Issued to

Hae Jo Industrial Co., Ltd

Gimhae-si, Gyeongsangnam-do, Republic of Korea

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems

DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018

Application :

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

Type:	Temperature range:	Max. working press.:	Sizes:
HJB-CO	0 to +550°C	4.71 bar	DN 250 to DN 550
HJB-GT	See page 2	See page 2	DN 50 - DN 2000
HJB-CA	0 to +250°C	4.31 bar	DN 150 - DN 700
HJB-OT	0 to +100°C	5 bar	DN 50 -DN 300

Issued at **Høvik** on **2021-05-03**

This Certificate is valid until **2026-05-02**.

for **DNV**

DNV local station: **Changwon**

Approval Engineer: **Thomas Wilhelm Juell**

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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: 2021-03

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Product description

Metallic expansion bellows designed according to EJMA 10th edition:

Type HJB-CO: Single bellows or universal type with flange with or without pipe, and without internal sleeve.
Type HJB-GT: Single bellow or universal type with flange with or without pipe, and with or without internal sleeve.
Type HJB-CA: Single bellow type with flange with or without pipe, and with or without internal sleeve.
Type HJB-OT: Single bellow with flange with or without pipe, and with or without internal sleeve.

Materials:

Part	Material grade
Bellow	SUS304, SUS316 or SUS321
Collar	SUS304, SB410 or SS400
Pipe & internal sleeve	SUS304, SUS316 or SUS321 A515-60/70 or A516-60/70 SB410, SB450 or SB480 SS400, STPG370, SGP, A106
Flanges	SUS304, SUS316 or SUS321 A515-60/70 or A516-60/70 SB410, SB450 or SB480 SS400, SF440, SM400B, A105

Application/Limitation

Expansion bellows covered by this certificate are found to be in compliance with the given design standard:

- All dimensional data, movements and weld details shall be in accordance with approved dimensional tables/drawings in HJ-DCB-001 rev.5.
- Maximum velocity for bellows without sleeves shall be in accordance with EJMA 10th edition table 4.10-1.

Type	Code	Design Pressure	Design Temperature	Sizes	Load Cycles
Single	HJB-CO	4.71 bar	550°C	DN 250 – DN 350	5000
Universal	HJB-CO	4.71 bar	550°C	DN 300 – DN 550	5000
Single	HJB-GT	4.31 bar	550°C	DN 50 – DN 1000	5000
Single	HJB-GT	2.06 bar	480°C	DN 1050 – DN 2000	5000
Single	HJB-GT	5.39 bar	600°C	DN 500 – DN 1100	5000
Universal	HJB-GT	4.31 bar	550°C	DN 50 – DN 1000	5000
Universal	HJB-GT	2.06 bar	480°C	DN 1050 – DN 2000	5000
Universal	HJB-GT	5.39 bar	600°C	DN 500 – DN 1100	5000
Single	HJB-CA	4.31 bar	250°C	DN 150 – DN 700	5000
Single	HJB-OT	5 bar	100°C	DN 50 – DN 300	5000

Maximum temperature limitation:

Material grade	Maximum allowable temperature
SS400, SGP, SF440, SM400B, STPG370	350°C
SB410, SB450, SB480	538°C
A105, A106, A515-60/70, A516-60/70	550°C

May be used in the following service:

HJB-CO: For exhaust for cylinder outlet immediately after exhaust valve
HJB-GT: For exhaust gas
HJB-CA: For charging air pipe
HJB-OT: For air, water, oil

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions.

The installation shall be done according to type approval holder's procedures.

Type Approval documentation

Tests carried out

Leakage test, Static burst test, Cycle test, Dimension check test

Production testing

Each expansion bellow shall be subjected to hydrostatic pressure test upon completion to at least 1.5 times the design pressure.

Certification

Whenever the piping system is subject to approval by the society, the below limitations shall be considered:

- Bellows covered by this certificate shall be delivered with test report with reference to this type approval certificate (see to DNVGL-RU-SHIP Pt.4 Ch.6 Sec.1 Table 3).
- Welding shall fulfill requirements in DNVGL-RU-SHIP Pt.2 Ch.4.
- Material of bellow shall have material certificates in accordance with DNVGL-RU-SHIP Pt.4 Ch.6 Sec.2 Table 3. Approval of manufacturer is required for VL or W material certificates.

Marking of product

For traceability to this type approval, the compensators are to be marked with:

- Manufacturer's trademark
- Type designation (as stated in the submitted drawings)
- Size
- Maximum working pressure
- The flow direction, if applicable

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 DNVGL-CP-0338.