Certificate no.:
TAP0000361

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Metallic Expansion Joints

with type designation(s)
Axial double wall

issued to
BOA Metal Solutions GmbH
Stutensee, Baden-Württemberg, Germany

is found to comply with
DNV rules for classification – Ships Pt.5 Ch.7 Liquefied gas tankers
DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
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.

Temperature range:	**0°C to 60°C**
Max. working press.:	**10 bar**
Sizes:	**DN 150/200**

Issued at **Høvik** on **2026-03-30**
This Certificate is valid until **2031-03-29**.
DNV local unit: **Essen**

for **DNV**

Approval Engineer: **Tobias Berntsen**

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 USD 300 000.

Product description

1 type of axial double walled metallic expansion bellow, designed according to EJMA 10th edition.

Type	**Single doublewall metallic expansion joint (Inner /Outer)**
Designation	Axial Doublewall
Size	DN150 / DN200
Drawing	5078614, 5077720, 5078579
Design Pressure	10 bar g
Design Temperature	0°C / +60°C
Number of plies	4
Thickness of each ply (mm)	0.3
Number of convolutions	7 / 6
Conv. Height (mm)	14.65 / 18
Conv. Pitch (mm)	11.5 / 16.3
Axial Movement (mm)	+0.7 – 1.0
Lateral Movement (mm)	±0.25
Angular movement	0
Life cycle	> 1 000 000

Application/Limitation

Expansion bellows covered by this certificate are found to be in compliance with the given design standard and may be installed in Natural gas/nitrogen systems (inner bellow) and air applications (outer bellow).

Flow velocities in each bellow shall be limited as specified in EJMA 10th edition Table 4.10-1 when there is no sleeve installed.

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions. Bellows of austenitic stainless steel shall not be used in direct contact with seawater.

Welding shall fulfil requirements in DNV-RU-SHIP Pt.2 Ch.4.

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

The certificate covers only the expansion bellows; the related piping are excluded

Production test 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).

Material of bellows shall have material certificates in accordance with DNV-RU-SHIP Pt.5 Ch.7 Sec.1 Table 8. All materials delivered with VL or works certificate shall be made at works approved by the Society.

Expansion Bellows covered by this certificate shall be delivered with a product certificate issued by the society.

Type Approval documentation

Tests carried out

Burst test, Hydraulic Test, cyclic loading test, fatigue test.

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
- Temperature range
- The flow direction, if applicable

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.

Manufactured by:

BOA Metal Solutions GmbH
Stutensee, Baden-Württemberg, Germany