

TYPE APPROVAL CERTIFICATE

This is to certify:

that the **Metallic Expansion Joints**

with type designation(s)
S-W43

issued to

MASINO INDUSTRY OY
Ylöjärvi, Finland

is found to comply with

DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
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: 0°C to 70°C

Max. working press.: 10 bar(g)

Sizes: DN125 (inner) / DN175 (outer)

Issued at **Høvik** on **2024-03-13**

This Certificate is valid until **2029-03-12**.

for **DNV**

DNV local unit: **Finland CMC**

Approval Engineer: **Thomas Wilhelm Juell**

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

One double walled universal (inner) and single (outer) type metallic expansion bellows with end flanges, designed according to EJMA 10th edition:

Code	Size	Internal Diameter	Pitch	Height	Ply x thk.	Convolutions
S-W43	DN125 (inner)	139.7 mm	9.5 mm	12.0 mm	3 x 0.3 mm	5 + 5
	DN175 (outer)	195.0 mm	16.4 mm	20.5 mm	3 x 0.5 mm	6

Materials:

Bellows: 1.4404 according to EN 10088-2
Pipe: 1.4404 according to EN 10217-7
Flange: 1.4404 according to EN 10028-7

Application/Limitation

Expansion bellows covered by this certificate are found to be in compliance with the given design standard and may be installed in gaseous fuel and LNG/LPG systems (inner bellows) and air applications (outer bellows).

Code	Size	Movement			Life cycles
		Axial	Lateral	Angular	
S-W43	DN125 (inner)	±3 mm	3 mm	-	1000
	DN175 (outer)	±3 mm	3 mm	-	1000

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

For application in fuel gas systems on combustion engines the endurance against high frequency cycle is to be documented by EJMA lifetime calculation confirming fatigue life > 10⁷ cycles. See DNV-RU-SHIP Pt.4 Ch.3 Sec.10 [10.2.8.6].

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

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.

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

Ship deformation loads has not been considered.

Production test:

Each expansion bellow shall be subjected to minimum hydrostatic test pressure equal to 1.5 times internal design pressure in the presence of a DNV surveyor.

Certification:

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 NV 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 pressure test – Hydraulic Test - Cyclic loading test (thermal movement)

Marking of product

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

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

Periodical assessment



Job ID: **262.1-031793-1**
Certificate no.: **TAP00002UD**

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.