

# TYPE APPROVAL CERTIFICATE

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## This is to certify:

**That the Metallic Expansion Joints**

with type designation(s)  
**S-W29/S-W30/S-W36**

Issued to

**Masino Industry Oy**  
**Ylöjärvi, Finland**

is found to comply with

**DNV rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG**

## Application :

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

**Temperature range:** 0°C/+80°C

**Max. working press.:** 10 bar(g)

**Sizes:** DN100 (inner) / DN150 (outer)

Issued at **Høvik** on **2022-10-07**

This Certificate is valid until **2027-10-06**.

DNV local station: **Finland CMC**

for **DNV**

Approval Engineer: **Thomas Wilhelm Juell**

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**Sinisa Sedlan**  
**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

One double walled metallic expansion bellow without internal sleeve and with flanged ends, designed according to EJMA 10<sup>th</sup> edition.

| Designation                | S-W29 / S-W30 / S-W36 |            |
|----------------------------|-----------------------|------------|
| Type                       | Inner wall            | Outer wall |
| Bellows type               | Universal             | Single     |
| Size                       | DN100                 | DN150      |
| Design Pressure            | 10 bar(g)             | 10 bar(g)  |
| Design Temperature         | 0°C/+80°C             | 0°C/+80°C  |
| Number of plies            | 2                     | 3          |
| Thickness of each ply (mm) | 0.5                   | 0.5        |
| Number of convolutions     | 5 + 5                 | 9          |
| Conv. Height (mm)          | 15                    | 20.6       |
| Conv. Pitch (mm)           | 15                    | 16         |
| Axial Movement (mm)        | ±3                    | ±3         |
| Lateral Movement (mm)      | 3                     | 3          |
| Angular movement           | 0°                    | 0°         |
| Life cycle                 | 1000                  | 1000       |

### Materials:

Bellows: 1.4307 according to EN 10028-7  
 Pipe: 1.4301/ 1.4307/ 1.4404 according to EN 10217-7  
 Flange: 1.4301/ 1.4404 according to EN 10088-4

## 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 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.

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 > 10<sup>7</sup> cycles. See DNV-RU-SHIP Pt.4 Ch.3 Sec.10 [10.2.8.6].

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.

## 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.

## Type Approval documentation

### Tests carried out

Burst test – Hydraulic Test - cyclic loading test – Fatigue test (ship deformation)

### 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

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.