



Certificate No:
TAP00002AM

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)
Single

Issued to

MACOGA, S.A.
Ordenes, LA CORUÑA, Spain

is found to comply with

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: -163°C to 60°C

Max. working press.: -0.43 bar/ 0.05 bar

Sizes: DN3150

Issued at **Høvik** on **2021-12-07**

This Certificate is valid until **2026-12-06**.

DNV local station: **NB/CMC Team West**

for **DNV**

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

One single type expansion bellows with internal sleeve and backing ring, designed according to EJMA 10th edition.

Designation	MWA DN-3150
Size (DN)	3150
Number convolutions	11
Number of plies	1
Thickness of ply (mm)	1
Height of convolution (mm)	46
Length of convolution (mm)	33.5

Material:

Bellow, internal sleeve, backing ring & pipe: SA-240 316L
1.4404 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 LNG/LPG systems.

Approved movement:

Designation	MWA DN-3150
Axial Movement (x)	+22mm
Lateral Movement (y)	6mm
Angular Movement (z)	N/A

Approved life cycles: 1000

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.

Ship deformation loads shall not be considered in the piping arrangement.

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

Production testing

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

Certification

Material of bellow shall have material certificates in accordance with DNV-RU-SHIP Pt.5 Ch.7 Sec.1 Table 8:

- Minimum design temperature < -55°C: VL certificate
- Minimum design temperature > -55°C: Works certificate

All materials delivered with VL or works certificate shall be made at works approved by DNV manufacturers.

Bellows covered by this certificate shall be delivered with a DNV product certificate (see DNV-RU-SHIP Pt.5 Ch.7 Sec.1 Table 7).

Type Approval documentation

Tests carried out

Burst pressure testing (int. and ext. pressure), Hydrostatic pressure testing at minimum design temperature (int. and ext. pressure), Cyclic testing (thermal movement)

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



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- 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.