

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)

Lateral (MFL DN-800), Angular (MFP DN-800), Axial + Lateral (MFD DN-2324)

Issued to

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

is found to comply with

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

Application :

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

Type:	Temperature range:	Max. working press.:	Sizes:
Lateral (MFL DN-800)	+20°C to +230°C	1 bar / FV	32"
Angular (MFP DN-800)	+20°C to +230°C	1 bar / FV	32"
Axial + Lateral (MFD DN-2324)	+20°C to +120°C	0.75 bar / FV	92"

Issued at **Høvik** on **2020-03-17**

This Certificate is valid until **2025-03-16**.

DNV GL local station: **VIGO**

Approval Engineer: **Adel Samiei**



for **DNV GL**

Digitally Signed By: **Zeinab Sharifi**

Location: **DNV GL Høvik, Norway**

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.



Job Id: **262.1-032746-1**
Certificate No: **TAP0000213**

Product description

Three metallic expansion bellows with internal sleeve designed according to EJMA 10th edition

Designation	Type	Ply & thickness	Number of convolutions	Pitch	Height
MFL DN-800	Universal	2*0.7 mm	2 x 5	25 mm	30 mm
MFP DN-800	Single	2*0.7 mm	7	25 mm	30 mm
MFD DN-2324	Universal	3*0.7 mm	2 x 7	36 mm	62 mm

Material:

Designation	Bellow	Flange	Sleeve	Pipe
MFL DN-800	AISI 321	SA516 Gr.60	AISI 304/304L	SA516 Gr.60
MFP DN-800	AISI 321	SA516 Gr.60	AISI 304/304L	SA516 Gr.60
MFD DN-2324	AISI 321	A516 Gr.70N / P355NL1	AISI 304/304L	A516 Gr.70N / P355NL1

Application/Limitation

Expansion bellows covered by this certificate are found to be in compliance with the given design standard and may be installed in systems conveying steam in below design conditions:

Designation	Movement			Number of Cycles
	Axial	Lateral	Angular	
MFL DN-800	0	±3 mm	0	100000
MFP DN-800	0	0	±1°	
MFD DN-2324	-7.99 mm	±8.06 mm	0	

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

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 4).
- 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.

Type Approval documentation

Drawing numbers: 73242 Rev.0 dated 2019-09-25, 73241 Rev.0 dated 2019-09-25, 73002 Rev.1 dated 2019-10-18

Calculation numbers C5412R0J-ED10-MFL0800 dated 2019-07-25, C5411R0J-ED10-MFP0800 dated 2019-07-25, C5410R0J-ED10-MFD2324 dated 2019-10-18

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

For retention of the Type Approval, a DNV GL 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.



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**

Approval Engineer: **Thomas Wilhelm Juell**

for **DNV**



Digitally Signed By: Zeinab, Sharifi

Location: DNV Høvik, Norway

Zeinab Sharifi
Head of Section

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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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