

TYPE APPROVAL CERTIFICATE

This is to certify:

That the **Metallic Expansion Joints**

with type designation(s)
M-33406, M-33405

Issued to

Nippon Metal Hose Co., Ltd.
Ohi-gun, Fukui Pref., Japan

is found to comply with

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

Application :

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

Type:	Temperature range:	Max. working press.:	Sizes:
M-33406	0°C to 70°C	10 bar(g)	ø151
M-33405	0°C to 100°C	10 bar(g)	50A (inner)/80A (outer)

Issued at **Høvik** on **2022-09-20**

This Certificate is valid until **2027-09-19**.

for **DNV**

DNV local station: **Kobe**

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 single and one double wall single type metallic expansion bellows designed according to EJMA 10th edition with end flanges.

Type	M-33405	M-33406
	Inner / Outer	
Size	50A/80A	ø151
Number of plies	2/2	2
Number of convolutions	10/9	11
Thickness of each ply (mm)	0.6/0.6	0.3
Conv. Height (mm)	13/16	8
Conv. Pitch (mm)	18/20	9

Material:

Bellow: SUS304
Pipe: SUS 304TP-S
Flange: SUS304 (JIS10K),
SUSF304

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 fuel gas systems (inner bellow) and air applications (outer bellow).

Type	M-33405	M-33406
Design Pressure (bar(g))	10 bar	10 bar
Axial Movement (mm)	±10	0~5
Lateral Movement (mm)	±10	0
Angular movement	0	0
Life cycle	3000	3000

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.

Ship deformation loads has not been considered.

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

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

Type Approval documentation

Production Testing 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).

Tests carried out

Burst 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 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.