Certificate no.:
TAP00002WV

TYPE APPROVAL CERTIFICATE

This is to certify:

that the Metallic Expansion Joints

with type designation(s)
Single, Universal

issued to
Teddington Engineered Solutions Ltd
Llanelli, **United Kingdom**

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.

Type:	Temperature range:	Max. working press.:	Sizes:
Single	-163/+80°C (see page 2)	10 bar (see page 2)	DN150/200/300/400/500/700
Universal	-165/+80°C (see page 2)	10 bar (see page 2)	DN40/DN150/250/300/400/500/600/750

Issued at **Høvik** on **2024-11-21**

This Certificate is valid until **2029-11-20**.

for **DNV**

DNV local unit: **UK & Ireland CMC & VMC**

Approval Engineer: **Thomas Wilhelm Juell**

Product description

Single and universal type metallic expansion joint with flanged and butt welded ends designed according to EJMA 10th edition.

Type	Code	Size	Bellows inner diameter	Pitch	Height	Ply x thk.	Convolutions
Single	M52571	DN150	162 mm	12.02 mm	16.367 mm	2 x 0.5 mm	12
	M52574	DN200	212 mm	13.8 mm	19.915 mm	3 x 0.5 mm	11
	M52586	DN200	212 mm	12.22 mm	18.4 mm	2 x 0.5 mm	9
	M52600	DN300	316.2 mm	17.24 mm	28.85 mm	2 x 0.7 mm	10
	M52601	DN400	403.9 mm	15.91 mm	27.0 mm	2 x 0.5 mm	11
	M52602	DN500	505.5 mm	16.67 mm	25.0 mm	2 x 0.5 mm	9
	M52603	DN700	708.7 mm	20.0 mm	29.4 mm	2 x 0.5 mm	5
Universal	M60502	DN40	47mm	6.28 mm	8.22 mm	2 x 0.3 mm	6
	M52612	DN150	162 mm	11.02 mm	16.367 mm	2 x 0.5 mm	5
	M52609	DN250	266 mm	14.08 mm	17.75 mm	3 x 0.5 mm	5
	M52578	DN250	266 mm	13.733 mm	19.665 mm	3 x 0.5 mm	6
	M52617	DN300	316.2 mm	14.03 mm	19.315 mm	3 x 0.5 mm	7
	M52624	DN400	403.9 mm	13.595 mm	19.815 mm	2 x 0.7 mm	11
	M53067	DN400	403.9 mm	17.86 mm	19.815 mm	2 x 0.7 mm	7
	M53068	DN500	505.5 mm	14.063 mm	19.915 mm	3 x 0.5 mm	8
	M53069	DN500	505.5 mm	18.813 mm	26.738 mm	3 x 0.7 mm	8
	M52588	DN600	607.1 mm	23.6 mm	29.35 mm	3 x 0.7 mm	6
	M52590	DN600	607.1 mm	19.02 mm	26.95 mm	4 x 0.5 mm	5
	M53063	DN750	749.3 mm	28.47 mm	36.9 mm	3 x 0.9 mm	7

Materials:

Part	**Material**
Bellow	SA-240 TP316L / Inconel 625 (NO6625) / Incoloy 825 (NO8825)
Internal sleeve	SA-240 TP316L / Inconel 600 series / Incoloy 800 series
Flange	SA-182 F316L (ASME B16.5 #150 and #300)
Pipe	SA-312 TP316L

Application/Limitation

For use on open deck on LNG/LPG cargo systems on LNG/LPG carriers:

Code	Size	Temperature range	Design pressure	Movement			Fatigue life cycles
				Axial	Lateral	Angular	
M52571	DN150	-163°C/+45°C	-0.8/10 bar(g)	-3/+17 mm	1.6 mm	-	7000
M52574	DN200	-163°C/+45°C	-0.8/10 bar(g)	-4.3/+24.3 mm	0 mm	-	7000
M52586	DN200	-163°C/+45°C	1 bar(g)	-5.8/+1.1 mm	4.2 mm	-	7000
M52600	DN300	-163°C/+80°C	10 bar(g)	-11.5/+12.6 mm	2.7 mm	-	7000
M52601	DN400	-163°C/+21°C	1 bar(g)	-6.5 mm	5.8 mm	-	7000
M52602	DN500	-163°C/+80°C	1 bar(g)	-6.6/+2.4 mm	2.3 mm	-	7000
M52603	DN700	-163°C/+21°C	1 bar(g)	-6.1 mm	0.1 mm	-	7000
M60502	DN40	-165°C/+80°C	FV/10 bar(g)	0 mm	90.3 mm	-	7000
M52612	DN150	-163°C/+80°C	10 bar(g)	0 mm	10.7 mm	-	7000
M52609	DN250	-163°C/+80°C	10 bar(g)	0 mm	9.9 mm	-	7000
M52578	DN250	-163°C/+45°C	5 bar(g)	-4/+18 mm	31.4 mm	-	7000
M52617	DN300	-163°C/+80°C	10 bar(g)	0 mm	7.6 mm	-	7000
M52624	DN400	-163°C/+80°C	10 bar(g)	-1.6/+4.1 mm	4.8 mm	-	7000
M53067	DN400	-163°C/+45°C	10 bar(g)	0 mm	12.7 mm	-	7000
M53068	DN500	-163°C/+80°C	10 bar(g)	0 mm	20.3 mm	-	7000
M53069	DN500	-163°C/+80°C	10 bar(g)	-9.6/+26 mm	9.4 mm	-	7000
M52588	DN600	-163°C/+21°C	10 bar(g)	0 mm	36.4 mm	-	7000
M52590	DN600	-163°C/+21°C	10 bar(g)	+44.2 mm	6.7 mm	-	7000
M53063	DN750	-163°C/+21°C	10 bar(g)	0 mm	13.7 mm	-	7000

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.

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

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

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 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 (AoM).

Expansion Bellows covered by this certificate shall be delivered with a product certificate issued by the society.

Type Approval documentation

Tests carried out
Burst test – Hydraulic Test - Cyclic loading test (thermal movement) – Cyclic loading test (ship deformation).

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
This certificate is only valid if required periodical assessments are carried out with satisfactory results.

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.

To check the validity of this certificate, please look it up in https://approvalfinder.dnv.com.