

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)
EXP

Issued to

SJM Co., Ltd.
Siheung-si Gyeonggi-do, Korea

is found to comply with
DNV GL 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 GL.

Temperature range: -196°C to +176°C

Max. working press.: -0,8 / 1 / 10 bar (see certificate)

Sizes: DN 50 - 1000 (see certificate)

Issued at **Høvik** on **2018-04-04**

This Certificate is valid until **2018-12-31**.

DNV GL local station: **Seoul**

for **DNV GL**

Approval Engineer: **Adel Samiei**

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Marianne Spæren Marveng
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: **262.1-005515-6**
Certificate No: **TAP000016A**

Product description

Expansion bellows designed according to EJMA 9th edition:

Designation	Drawing number	Size	Type	Design pressure
EXP01	JBF817-3-19865-00	200A	Single bellow, BW	1 bar
EXP02		200A		
EXP03		200A		
EXP04		300A		
EXP05		400A		
EXP06		500A		
EXP07		700A		
EXP08	JBF817-3-21452-00	125A	Single bellow, FL	10 bar
EXP09		150A		
EXP10		250A		
EXP11		300A		
EXP12		300A		
EXP13		300A		
EXP14		300A		
EXP15		350A		
EXP16		500A		
EXP17		500A		
EXP18		600A		
EXP19		600A		
EXP20		600A		
EXP21		700A		
EXP31		250A		
EXP22	JBU814-3-21453-00	300A	Universal bellows, FL	
EXP23		300A		
EXP24		300A		
EXP25		300A		
EXP26		350A		
EXP27		400A		
EXP28		400A		
EXP29		500A		
EXP30		500A		
EXP32	JBU814-3-21454-00	65A	Universal bellows, FL, Tie rod	10 bar
EXP33		250A		
EXP34		300A		
EXP35		300A		
EXP36		400A		
EXP37		500A		
EXP38		600A		
EXP39		600A		
EXP40	JBBL823-3-21455-00	200A	Balanced bellows, Branched, FL, Tie rod	10 bar
EXP41	JBBL823-3-21456-00	400A		
EXP42	JBF817-3-26659-00	150A	Single bellow	10 bar
EXP43		200A		
EXP44		250A		
EXP45		300A		
EXP46		350A		
EXP47		400A		
EXP48		600A		
EXP49		700A		
EXP50		750A		
EXP51		800A		

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Designation	Drawing number	Size	Type	Design pressure
EXP52	JBU814-3-26685-00	150A	Universal bellows, FL	5 bar
EXP53		250A		
EXP54		300A		
EXP55		450A		
EXP56	JBU814-3-26661-00	50A	Universal bellows, FL, Tie rod	10 bar
EXP57		65A		
EXP58	JBU814-3-26660-00	100A	Universal bellows, FL	
EXP59		150A		
EXP60		150A		
EXP61	JBU814-3-26661-00	200A	Universal bellows, FL, Tie rod	
EXP62	JBU814-3-26660-00	200A	Universal bellows, FL	
EXP63		200A		
EXP64		250A		
EXP65		300A		
EXP66		300A		
EXP67		300A		
EXP68		300A		
EXP69		300A		
EXP70		350A		
EXP71		350A		
EXP72	JBU814-3-26661-00	400A	Universal bellows, FL, Tie rod	
EXP73	JBU814-3-26660-00	400A	Universal bellows, FL	
EXP74		450A		
EXP75		450A		
EXP76		450A		
EXP77		500A		
EXP78		500A		
EXP79		550A		
EXP80		600A		
EXP81		600A		
EXP82		600A		
EXP83	JBU814-3-26661-00	650A	Universal bellows, FL, Tie rod	
EXP84	JBU814-3-26660-00	650A	Universal bellows, FL	
EXP85		650A		
EXP86	JBU814-3-26661-00	700A	Universal bellows, FL, Tie rod	
EXP87		700A		
EXP88	JBU814-3-26660-00	750A	Universal bellows, FL	
EXP89	JBU814-3-26661-00	750A	Universal bellows, FL, Tie rod	
EXP90	JBU814-3-26660-00	800A	Universal bellows, FL	
EXP91	JBU814-3-26662-00	ID446	Single bellow	1 bar
EXP92	JBU 814-3-30813-00	150A	Universal bellow	10 bAR
EXP93		250A		
EXP94		250A		
EXP95		300A		
EXP96	JBU 814-3-30814-00	700A	Balanced bellows, Branched, FL, Tie rod	5 bar
EXP97	JBU 814-3-30815-00	750A		10 bar
EXP98	JBU 814-3-30813-00	450A	Universal bellows, FL, Tie rod	10 bAR
EXP99		550A		
EXP100		350A		
EXP104	JBU814-3-31253-00	100A	Universal bellows, FL, Tie rod	5 bar
EXP105		450A		7 bar
EXP106	JBU814-3-31254-00	400A	Universal bellows, FL, Tie rod	12 bar
EXP107		500A		12 bar

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Designation	Drawing number	Size	Type	Design pressure
EXP108	JBF817-3-31266-00	1000A	Single bellows, BW	7 bar
EXP109		200A		1 bar
EXP110		250A		
EXP111		300A		
EXP112		400A		
EXP113		450A		
EXP114		700A		

All dimensional data shall be in accordance to the drawings mentioned in the above table.

Material: Bellows : Outer layer: Nickel alloys 625 & 825 (UNS numbers N06625 & N08825)
Inner & Middle layer: SA240-316L
Sleeve : SA240-316L
Pipes : SA240-316L, SA312-TP316L
Flange: SA182-316L (150#)

Application/Limitation

Expansion bellows covered by this certificate are approved to be used in LNG/LPG applications.

Each expansion bellow has to be hydraulically tested to 1.5 times the design pressure in presence of DNV GL surveyor and delivered with a DNV GL product certificate.

Vibrations and movements due to mounting misalignment during engine operation shall be taken into consideration before installation.

Flow velocities in each bellow shall be limited as specified in EJMA 9th edition Table 4.10-1 when there is no sleeve installed.

Material of bellow shall have material certificates in accordance with DNV GL rules for classification of ships Pt.5 Ch.7 Sec.1 Table 8. All materials delivered with VL or works certificate shall be made at works approved by the society.

All expansion bellows covered by this approval are approved for 8000 life cycles (movements as indicated in the drawings) or 2000000 cycles (caused by ship deformation).

Welding shall fulfill requirements in DNV GL Rules Pt.2 Ch.4.

This type approval covers the design of the product with respect to internal pressure. External loading/pipe loads have not been considered. The installation/location shall fulfil below conditions:

1. The installation/location of expansion joints is to be approved in each case. Piping system drawings shall be sent to DNV GL whenever expansion joints are to be installed in a ship classed by the society. The piping system design drawing(s) shall specify the location of all anchors, guides, supports, fixed points and type and location of all expansion joints.
2. The pipeline in which an expansion bellow shall be fitted, shall be adequately adjusted, lined and clamped. When found necessary, protection against mechanical damage of the expansion bellows may be required.

Type Approval documentation

Tests carried out

Burst testing, Hydrostatic pressure testing at minimum design temperature, Cyclic testing (thermal movement), Cyclic fatigue testing (mechanical movement)

Marking of product



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For traceability to this type approval, the final products are to be at least marked with:
Manufacturer's name or trade mark / Type designation / Arrow to indicate direction of flow

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.