

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the LR Type Approval System.

This certificate is issued to:

PRODUCER	B. D. Engineers
PLACE OF PRODUCTION	79/1, G.I.D.C., Phase-1, Near Water Tank, Vatva, Ahmedabad - 382 445, INDIA
DESCRIPTION	Metallic Expansion Bellows
TYPE	Type I : "BELOFLEX" Universal Expansion Bellows Type II : "BELOFLEX" Single Expansion Bellows Type III : "BELOFLEX" Single Expansion Bellows (High pressure)
APPLICATION	Type I : Marine piping systems for exhaust gases & water Type II : Marine piping systems for exhaust gases & water Type III : Marine piping systems for air, fresh & sea water, hot water, steam, oil fuel, lubricating oil and thermal oil [Note] In case of loose flange, application of Types I & II is limited to water.
STANDARD	Lloyd's Register Rules and Regulations for the Classification of Ships, July 2009 Standards of the Expansion Joint Manufacturers Association, Inc. (EJMA)

Certificate No.	10/10043
Issue Date	12 August 2010
Expiry Date	11 August 2015
Sheet	1 of 3



N. Nagamune
Yokohama Design Support Office
Lloyd's Register

*Lloyd's Register, registered office:
71 Fenchurch Street, London EC3M 4BS*

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RATINGS

Type I

Nominal size : 150 ~ 1400 mm
Design pressure : 4 kg/cm²
Design temperature : 450 °C

Type II

Nominal size : 150 ~ 1400 mm
Design pressure : 1 kg/cm²
Design temperature : 450 °C

Type III

Nominal size : 50 ~ 300 mm
Design pressure : 16 kg/cm²
Design temperature : 550 °C

PERFORMANCE TESTS

Representative samples of the expansion bellows tested in accordance with the manufacturer's test specifications, and the following tests have been carried out in accordance with EJMA standard:-

- 1) Hydraulic pressure test
- 2) Fatigue life test
- 3) Squirm test
- 4) Meridional yield-rupture test (Burst [pressure test])

OTHER CONDITIONS

Where expansion bellows are intended to be installed on board ships, classed or intended to be classed with Lloyd's Register, the following conditions are to be applied:-

- 1) Expansion bellows are to be protected against over extension and compression. The adjoining pipes are to be suitably aligned, supported, guided and anchored. Where necessary, expansion bellows are to be protected against mechanical damage.
- 2) Austenitic stainless pipe including bellows are not recommended for salt-water services as they are prone to pitting, particularly in polluted waters.
- 3) Where required by the Rules and Regulations for Classification of Ships, expansion bellows are to be constructed, tested and installed to the attending Surveyor's satisfaction.

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- 4) Type III "BELOFLEX" Single Expansion Joint (High pressure):-
- 4-1) Hydraulic tests before installation on board are to be in accordance with Part 5, Chapter 12, Section 8.1 of the Rules.
 - 4-2) Welding and non-destructive testing are to be in accordance with Part 5, Chapter 17 of the Rules, to the attending Surveyor's satisfaction.
 - 4-3) The dimensions and materials of flanges, gaskets and bolting, and the pressure-temperature rating of the bolted flanges in pressure pipelines, in accordance with national or other established standards.

"This Certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register of any modification or changes to the equipment in order to obtain a valid certificate."

The Design Appraisal Document No. 10/10043 and its supplementary Type Approval Terms and Conditions form part of this Certificate.

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