



MARINE DIVISION

Certificate number: 12894/B3 BV

File number: ACM 188/2511/001

Product code: 21011

This certificate is not valid when presented without the full attached schedule composed of 7 sections

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TYPE APPROVAL CERTIFICATE

This certificate is issued to

BELMAN PRODUCTION A/S

Esbjerg - DENMARK

for the type of product

METALLIC EXPANSION JOINTS / BELLOWS

AX, AN, LA, UN and US

Requirements:

- BUREAU VERITAS Rules for the Classification of Steel Ships
- BUREAU VERITAS Rules for the Classification of Offshore Units
- IGC code

This certificate is issued to attest that BUREAU VERITAS did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 11 Mar 2014

For BUREAU VERITAS,

At BV FREDERICIA, on 18 Jan 2011,

Jesper Braagaard

J. B. Niels



This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with BUREAU VERITAS. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of BUREAU VERITAS Marine Division available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against BUREAU VERITAS for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION

Metallic Expansion Bellows

1.1 Design (metallic bellows with or without inner sleeves)

| | |
|-----------|-------------------|
| AX | Axial bellows |
| AN | Angular bellows |
| LA | Lateral bellows |
| UN | Universal bellows |
| US | Exhaust bellows |

- Axial, lateral and/or angular movements as per drawings

1.2 Rating (depending on type)

| | |
|------------------------|--|
| Nominal size (DN) | DN 40 to DN 2200 DN 40 to DN 400 for IGC cargo and process piping |
| Nominal pressure (PN) | PN 40 / PN 25 / PN 16 / PN 10 / PN 6 / PN 2.5 |
| Pressure range * | PN 40 (DN 40 to DN 100) PN 25 / PN 16 / PN 2.5 (DN 125 to DN 400) PN 2.5 Exhaust (up to DN 2200) |
| Temperature range (°C) | -55 / 550 -165 / 125 for IGC cargo and process piping |

* For IGC cargo, the design pressure is not to be less than 10 bar except for open-ended lines where it is to be not less than 5 bar.

1.3 Ends

| | | | |
|----------|----------------------|----------|-------------|
| S | Welding ends | U | No fittings |
| F | Slip on flanges | T | Tie rods |
| B | Loose flanges | H | Hinges |
| H | Welding neck flanges | | |

1.4 Materials

| Items | General use | IGC cargo use |
|---------|--|--|
| Bellows | 1.4301/AISI 304, 1.4306/AISI 304L, 1.4541/AISI 321, 1.4401/AISI 316, 1.4404/AISI 316L, 1.4571/AISI 316 Ti, 1.4539/AISI 904L / 1.4547 (254SMO) / 1.4835 (253 MA) | 1.4301/AISI 304, 1.4306/AISI 304L, 1.4401/AISI 316, 1.4404/AISI 316L, 1.4541/AISI 321, 1.4550/AISI 347 |
| Ends | 1.4301/AISI 304, 1.4306/AISI 304L, 1.4541/AISI 321, 1.4401/AISI 316, 1.4404/AISI 316L, 1.4571/AISI 316 Ti, 1.4539/AISI 904L, St 37-2, 1.0305/St 35.8, 1.0345/Hi, 1.0425/HII, 1.0460/C22.8, 1.0473/St 52-3 / ASTM A 106 Grade B (C≤0.23%) / ASTM A 105 / 1.0432 (C≤0.23%) | 1.4301/AISI 304, 1.4306/AISI 304L, 1.4401/AISI 316, 1.4404/AISI 316L, 1.4541/AISI 321, 1.4550/AISI 347 |

Alternative materials are possible subject to Society's agreement.

2. DOCUMENTS AND DRAWINGS

- Manufacturer's catalogue and drawings
- Bellows calculation of pressure strength and cyclic life according to EJMA
- Mounting and maintenance instructions

No departure from the above documentation shall be made without the prior consent of the Society. The manufacturer must inform the Society of any modification or changes to these documents and drawings.

3. TEST REPORTS

Type tests performed in the manufacturer's laboratory, witnessed by a Society's Surveyor:

- Hydraulic test at twice the maximum service pressure
- Burst test at 4/5 times the maximum service pressure
- Cyclic expansion test