



CERTIFICATE NUMBER
17-LD1622226-PDA

DATE
07 Jul 2017

ABS TECHNICAL OFFICE
London Engineering Department

CERTIFICATE OF DESIGN ASSESSMENT

This is to certify that a representative of this Bureau did, at the request of

BELMAN PRODUCTION A/S

assess design plans and data for the below listed product. This assessment is a representation by the Bureau as to the degree of compliance the design exhibits with applicable sections of the Rules. This assessment does not waive unit certification or classification procedures required by ABS Rules for products to be installed in ABS classed vessels or facilities. This certificate, by itself, does not reflect that the product is Type Approved. The scope and limitations of this assessment are detailed on the pages attached to this certificate.

Product: **Expansion Joints**

Model: **AN1FU-10-0050-028-0 AN1SU-10-0100-023-0 UN2FU-05-0250-036-0 AX2SU-10-0400-038-0 UN2FU-05-0350-006-0**

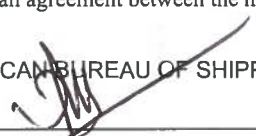
This Product Design Assessment (PDA) Certificate 17-LD1622226-PDA, dated 07/Jul/2017 remains valid until 06/Jul/2022 or until the Rules or specifications used in the assessment are revised (whichever occurs first).

This PDA is intended for a product to be installed on an ABS classed vessel, MODU or facility which is in existence or under contract for construction on the date of the ABS Rules or specifications used to evaluate the Product.

Use of the Product on an ABS classed vessel, MODU or facility which is contracted after the validity date of the ABS Rules and specifications used to evaluate the Product, will require re-evaluation of the PDA.

Use of the Product for non ABS classed vessels, MODUs or facilities is to be to an agreement between the manufacturer and intended client.

AMERICAN BUREAU OF SHIPPING


Mohammed K.M. Abbas
Engineer/Consultant

NOTE: This certificate evidences compliance with one or more of the Rules, Guides, standards or other criteria of ABS or a statutory, industrial or manufacturer's standards. It is issued solely for the use of ABS, its committees, its clients or other authorized entities. Any significant changes to the aforementioned product without approval from ABS will result in this certificate becoming null and void. This certificate is governed by the terms and conditions as contained in ABS Rules 1-1-A3/5.9 Terms and Conditions of the Request for Product Type Approval and Agreement (2010).

BELMAN PRODUCTION A/S

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Tier: 5 - Unit Certification Required

Product: Expansion Joints
Model: AN1FU-10-0050-028-0
AN1SU-10-0100-023-0
UN2FU-05-0250-036-0
AX2SU-10-0400-038-0
UN2FU-05-0350-006-0

Intended Service:

Expansion joints intended for use on liquefied gas carrier cargo piping outside the cargo tank

Description:

Five different types of stainless steel expansion joints:

- AN1FU-10-0050-028-0 DN 50 Angular expansion joint with flanged ends. This type contains one bellow. Bellow material 1.4541 / AISI 321; slip on flange material 1.4404 / AISI 316L
- AN1SU-10-0100-023-0 DN 100 Angular expansion joint with welding ends. This type contains one bellow. Bellow material 1.4541 / AISI 321; pipe end material 1.4404 / AISI 316L
- UN2FU-05-0250-036-0 DN 250 Universal expansion joint with flanged ends. This type contains two bellows joined by a middle pipe. Bellow material 1.4541 / AISI 321; slip on flange material 1.4404 / AISI 316L; middle pipe material 1.4301 / AISI 304
- AX2SU-10-0400-038-0 DN 400 Axial expansion joint with welding ends. This type contains two bellows joined by a middle pipe. Bellow material 1.4541 / AISI 321; pipe end material 1.4404 / AISI 316L; middle pipe material 1.4404 / AISI 316L
- UN2FU-05-0350-006-0 DN350 Universal expansion joint with flanged ends. This type contains two bellows joined by a middle pipe. Bellow material 1.4541 / AISI 321; pipe end material 1.4404 / AISI 316L; middle pipe material 1.4404 / AISI 316L

Rating:

- AN1FU-10-0050-028-0 Design pressure 10 barg; design temperature -50 / +125 °C. Axial Displacement at 8000 cycles +/- 7.5 mm.
- AN1SU-10-0100-023-0 Design pressure 10 barg; design temperature -165 / +125 °C. Axial displacement at 8000 cycles +/- 13.2 mm.
- UN2FU-05-0250-036-0 Design pressure 5 barg; design temperature -165 / +125 °C. Axial displacement at 8000 cycles +/- 13.2mm.
- AX2SU-10-0400-038-0 Design pressure 10 barg; design temperature -165 / +125 °C. Axial displacement at 8000 cycles +/- 9.6 mm.
- UN2FU-05-0350-006-0 Design pressure 5 barg; design temperature -55 / +50 °C. Axial displacement at 8000 cycles +/- 13.2 mm

Service Restriction:

- 1) Unit Certification is required for the materials of construction due to the cryogenic design temperature of this product as per section 5C-8-6/2.2 of the ABS Rules for Building and Classing Steel Vessels 2017. Surveyor is to witness the material testing unless the plant and product is approved under ABS's Quality Assurance Program.
- 2) This product has not been tested for cyclic fatigue (ship deformation) as per Part 5C-8-5/13.1.2.4 of the 2017 Rules. Accordingly this product is not to be used for applications where ship deformation loads are experienced.

Comments:

The Manufacturer has provided a declaration about the control of, or the lack of Asbestos in this product.

Notes/Drawing/Documentation:

- 1) Belman Production A/S drawings 3205-053-010-0, 3205-053-020-1, 3205-053-040-0 & 3205-053-050-0, 4716-09028-010-1
- 2) 4359_001 Belman Testing Program for IGC Type Approval
- 3) Material test report 120912 TUV NORD SysTec GmbH & Co. KG

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Tier: 5 - Unit Certification Required

4) Lifecycle Test type LA2SU-05-0350

Terms of Validity:

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STANDARDS

ABS Rules:

The Rules applicable to this assessment are:

2017 Rules for Building and Classing Steel Vessels 1-1-4/7.7, 1-1-A3, 1-1-A4, 5C-8-5/13.1.2, 5C-8-6/2.2, 4-6-2/5.8.2

2017 Rules for Offshore Units and Structures 1-1-4/9.7, 1-1-A2, 1-1-A3

National:

NA

International:

IMO IGC Code, 2016 Edition- Reference 5.13.1.2

EJMA (10th Edition)

Government:

NA

EUMED:

NA

OTHERS:

NA