DNV·GL

Certificate No:
TAP0000049

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)
SMR7742950-TA

Issued to
OLEODINAMICA TOSCANA SRL
SERRAVALLE PISTOIESE PT, Italy

is found to comply with
Det Norske Veritas' Rules for Classification of Ships Pt.4, Ch.6 "Piping Systems"

Application :

Products may be used in air systems.

Temperature range:	**0°C to 530°C**
Max. working press.:	**27 bar (@490°C) / 21 bar (@530°C)**
Sizes:	**3"**

This Certificate is valid until **2019-10-20**.

Issued at **Høvik** on **2015-10-21**
DNV GL local station: **Genoa** for **DNV GL**

Approval Engineer: **Adel Samiei**

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:
Certificate No: **TAP0000049**

Product description

- Universal metallic expansion bellow designed according to EJMA 9th Edition. (Size:3")
  - Number of Convolutions: 2x6
  - Number of plies: 4
  - Thickness of each ply: 0,4 mm
  - Convolution pitch (mm): 10,60 mm
  - Convolution height (mm): 8,15 mm
  - Mean radius of U-shaped bellow convolution (mm): 2,65 mm
  - End tangent length (mm): 13 mm
  - Inside diameter of bellows convolution and end tangent (mm): 88,6 mm
  - Collar Thickness: 2 mm
  - Bellows tangent collar length: 13 mm

- Material of bellow & pipe: AISI 316
- Material of Collar: AISI316

Application/Limitation

- Design Data:
  - Design Pressure: 21 bar @530°C / 27 bar for temperature up to 490°C
  - Design Temperature (min/max): 0°C / 530°C
  - Lateral movement: 17 mm
  - Life time: 7388 cycles (@21 bar & 530°C)
    6999 cycles (@27 bar & 490°C)
  - Axial angular movements are considered equal to 0.

- 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 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.

- The pipeline in which an expansion bellow is to be fitted is to be adequately adjusted, aligned and clamped.

- When vibrations are present in the piping system, care shall be taken that the natural frequency of the expansion bellows does not coincide with the system frequency. (according to part 4.9.2 of EJMA 9th edition)

- Equivalent axial compression per convolution, e_c(rated), shall be greater than 1,385 and less than 3,7 mm. Similarly, equivalent axial extension per convolution, e_e(rated) shall be greater than 1,385 mm and less than 5,3 mm.

- The expansion bellows are not approved to be used in LNG/LPG systems.

Type Approval documentation

Test carried out

None.

Production test

- Full penetration welds are to be subject to 100% X-ray inspection. Bellows weld to pipe are to be subject to 100% dye penetrate testing.

- Each bellow is to be hydraulically tested to 1,5 x design pressure. No leakage, permanent deformation or instability (squirm) is permitted.

Certification

- Expansion bellows are subject to approval for their intended use and shall be delivered with the Society's Product Certificate.

- Material certificates are required in line with DNV GL Ship Pt.4 Ch.6 Section 2 Table 3. Materials delivered with VL or W certificate shall be manufactured at works which have been approved by the Society.

Marking of product

For traceability to this type approval the products are at least to be marked with:

- The manufacturer's name or trade mark
- Size designation
- Design Pressure

Periodical assessment

For retention of the Type Approval, a DNV GL surveyor shall perform periodical assessment every second year and before the expiry date of this certificate. The scope of the periodical assessment survey is to verify that the conditions stipulated for the type approval is complied with and that no alterations are made to the product design or choice of materials.

The main elements of the certificate retention survey are:

- Review of Type Approval documentation
- Review of possible changes in design, materials and performance
- Ensure traceability between manufacturer's product type marking and Type Approval Certificate.