

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Metallic Expansion Joints**with type designation(s)
GFZ

Issued to

**Witzenmann GmbH Metallschlauch-Fabrik
Pforzheim, Germany**

is found to comply with

DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems**Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.****Temperature range: -55°C up to +160°C****Max. working press.: 12 bar****Sizes: DN32, DN40, DN50**Issued at **Hamburg** on **2020-04-29**This Certificate is valid until **2025-04-28**.DNV GL local station: **Augsburg**for **DNV GL**Approval Engineer: **Hagen Markus**

**Olaf Drews
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.



Product description

Elbow hinged expansion joint consisting of three angular joints connected by pipe sections.

Technical data

Size range	DN32, DN40, DN50
Nominal design pressure	PN30
Maximum service pressure at maximum service temperature	12bar
Temperature range	- 55°C to + 160°C
Pressure pulses	30bar
Materials Bellows, Flanges	1.4541/1.4571

Requirements according to pipe classes

Depending on pipe class appropriate material certificates for the bellow sheet material and flanges are to be provided.

Refer to:

- DNV GL Rule Pt.4, Ch.6, Sec.1 – Table 1 Pipe classes
- DNV GL Rule Pt.4, Ch.6, Sec.2 – Table 3 Material certificates
- DNV GL Rule Pt.2, Ch.1, Sec.2 – Approval of manufacturers (AoM)

Selection of materials

The materials 1.4541, 1.4571 are considered not corrosion resistance to sea water and sea water atmosphere and therefore considered not suitable for application in unprotected installation areas subject to sea water spray or green sea, e.g. open deck or in wet exhaust gas respectively exhaust gas scrubber systems and similar application with high corrosive media.

This is also applicable to combination of carbon steel flanges with any bellow material.

Material SUS316L (1.4404) may be used in marine atmospheric environment and flowing sea water but is considered not suitable if stagnant sea water.

In addition to the above it shall be noted that the selection of the materials shall always consider the applicable service condition with respect to type of media, flow velocity, media temperature etc. and installation area of the piping system.

In particular, the resistance to corrosion, erosion, oxidation and other deterioration during projected service life are to be taken into account.

Reference is made to DNVGL Rules Pt.4, Ch.6 – Section 2 – Materials.

Application/Limitation

The expansion joints made of type GFZ elbow hinged expansion joints are type approved for application in the following piping systems:

- Fuel oil, lubricating oil and
- Steam and condensate
- Compressed air lines, Fresh water cooling
- Non-essential piping systems

For application in piping system with service temperature above 50°C the pressure reduction factors specified by Witzenmann are to be observed.

Expansion bellows design

Job Id: **262.1-028917-1**
Certificate No: **TAP00001V8**

This type approval is based on bellows design calculations acc. to EJMA, Edition 9th and 10th, minimum life cycle of 1000 and minimum safety factor of 1.

The life time of expansion bellows depends on the service conditions, such as working pressure, axial and lateral stroke and bending angle. Accordingly, for each application the bellows design shall be based on the applicable service condition and lifetime. This is to be documented in the bellows design drawing for each delivery.

Installation

The bellows must only be fitted in places where they are always accessible. Possible exceptions to be considered in each case.

The pipe line, in which an expansion bellows is to be fitted, is to be adequately adjusted, aligned and clamped.

Production testing

Each batch of metallic expansion joints are to be hydraulically pressure tested up to 1.5 times the design pressure respectively as specified in the "Classification Inspection and Test Plan Templates acc. to DNV GL Rules Pt.4, Ch.6 Piping systems".

Appropriate works certificate to be issued and enclosed to each delivery.

Type Approval documentation

Tests carried out

Pressure test with 2times PN, burst pressure test with 4times PN, cyclic test with 1x10⁶ Cycles at 7,0 bar

Marking of product

For traceability to this type approval certificate, the final product is marked with at least as follows:

Scope	Example
Manufacturer's name or trade mark	Hydra or Witzenmann
Fabrication number or batch number	0012345678

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment. Refer to the Class Programme DNVGL-CP-0338, Sec.4.

To check the validity of this certificate, please look it up in <https://approvalfinder.dnvgl.com>

End of certificate