DNV·GL

Certificate No:
TAP00001SS

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)
CFZ, ARZ, AFZ, ASZ, URZ, UFZ, USZ

Issued to
Witzenmann GmbH
Pforzheim, Germany

is found to comply with
DNV GL rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Temperature range:	**0°C up to +150°C**
Max. working press.:	**10bar**
Sizes:	**DN25 up to DN200**

Issued at **Hamburg** on **2020-12-23**

This Certificate is valid until **2025-12-22**.

for **DNV GL**

DNV GL local station: **Augsburg**

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

This type approval includes the following expansion joint series, defined by three letters. The first letter defines the "Type" of expansion joint, the second the "Connection type" and the third the "Execution". Reference Witzenmann specification TB 600-002.

Expansion joint series	First letter	Second letter	Third letter
	Type of expansion joint	**Connection**	**Execution**
CFZ	**C**hamber Expansion Joint consisting of inner and outer bellows of universal type	**F**ixed Flange	**Z**: Special bellows design acc. to drawing
ARZ	**A**xial Expansion Joint (single bellows)	**S**: Special connection parts **R**: Weld ends (pipe) **F**: Fixed flange	**Z**: Special bellows design acc. to drawing
AFZ			
ASZ			
URZ	**U**niversal Expansion Joint (two bellows connected by intermediate pipe)		
UFZ			
USZ			

Bellows materials

DIN EN Code	US Grade	Chemical composition
1.4404	316L	X2CrNiMo17-12-2
1.4541	321	X6CrNiTi 1814
1.4571	316Ti	X6CrNiMoTi17-12-2

Flange materials

Material group acc. to ISO/TR20172	Material group
1.1, 1.2	Carbon steel
5.1, 5.2	Heat resistance steels
7.1	Ferritic stainless steel
8.1, 8.2	Low temperature stainless steel

Range of Application / Limitation

The following expansion joints series and size range are type approved for application in Fuel gas systems.

Types[1]	ARZ, AFZ, ASZ URZ, UFZ, USZ	CFZ
Nominal diameter[2]	DN25 up to DN200	DN25 up to DN200
Design pressure	10bar	Inner bellows 10bar
		Outer bellows 10bar[3]
Working temperature	0°C ≤ T ≤150°C	0°C ≤ T ≤150°C
Installation area	ESD protected machinery spaces	Gas safe machinery spaces

Notes

[1] Single welding seam of connecting flanges is approved due to the low stresses of the welds. Refer to EJMA 10th Ed., Section 7 – 7.1.1.

[2] Expansion joint types of other nominal diameter may exceptionally delivered based on approved EJMA Design bellows calculation and pressure tests. Type test reference IGF Code 16.7.2.1/2, all tests at room temperature.

[3] Maximum working pressure of inner pipe, reference Pt.6 Ch.2, Sec. 5 - 5.1.5.6.

Expansion bellows design

This type approval is based on bellows design calculations acc. to EJMA, Edition 10th based on 10.000 life cycle and safety factor of fc=0.8.

For application in gas piping systems on combustion engines in addition to the thermal expansion life cycle calculation the endurance against high frequency cycle is to be documented by an appropriate EJMA lifetime calculation of more than 10^7 cycles. Refer to Rules Pt.4 Ch.3, Sec.10.

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

Installation

For installation the requierements stipulated in the Rules Pt.6 Ch.2 Sec. 5 – 5.1.7 Expansion bellows are to be observed.

Production testing

Each batch is to be tested according to the Witzenmann "Inspection and test plans" applicable.
Appropriate works certificate to be issued.

Type Approval documentation

Tests carried out

Pressure test and Burst test, Cyclic test (thermal movement). All carried out at ambient temperature.

Marking of product

For traceability to this type approval certificate, the final product is marked with the following data:

Component		
Expansion joint	**Name plate**	
	Scope	Example
	Manufacturer's name or trade mark	Hydra or Witzenmann
	Fabrication number or batch number 10 digits	0012345678

Periodical assessment

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

End of certificate