DNV·GL

Certificate No:
TAP0000181

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)
AB1, AB6, AB6 /SW, AB30, SB1, SB6, SB6 /SW, SB10, SB10 /SW and SB16

Issued to
Duro Dakovic KOMPENZATORI d.o.o.
SLAVONSKI BROD, Croatia

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems
DNVGL-OS-D101 – Marine and machinery systems and equipment, Edition January 2018

Application :

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

Temperature range:	**0ºC to 500ºC (see cert.)**
Max. working press.:	**1-30 bar (see cert.)**
Sizes:	**DN 40 - 2000 (see cert.)**

Issued at **Høvik** on **2018-05-22**
This Certificate is valid until **2022-12-31**.
DNV GL local station: **Rijeka**

for **DNV GL**

Approval Engineer: **Zeinab Sharifi**

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.

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Job Id: **262.1-009469-3**
Certificate No: **TAP0000181**

Product description

Metallic expansion joints designed according to EJMA 10th edition. Safety factors according to AD2000 used for the allowable stresses.
The expansion bellows are systematically presented in the table below. Further technical design parameters for each type and size shall be as specified in calculation reports, and drawings listed in this certificate.

*Type of expansion joint**	*Type of bellows**	*End connection*	*Sizes [mm]*	*Bellow material*	*Drawing nos.*
AR	SB1	Pipe or flange	DN65 to DN2000	1.4571, EN10028-7	SB 8139, SB8140, SB8141, SB8142, SB8143, SB8144
UD	AB1			1.4571, EN10028-7	SB8145, SB8146, SB8147, SB8148
AR, UD, HS, HD,GS,GD	SB6)		DN40 to DN300	1.4541, EN10028-7	SB 8491, SB8494
AR, UD, HS, HD,GS,GD	SB10			1.4541, EN10028-7	SB8492, SB8496
AR, UD, HS, HD,GS,GD	SB16/SW	Flange	DN50 to DN300	Incoloy 825/Monel 400	SB8497
AR, UD, HS, HD,GS,GD	SB10/SW			Incoloy 825/Monel 400	SB8495
AR, UD, HS, HD,GS,GD	SB6/SW			Incoloy 825/Monel 400	SB8493
UD	AB6			1.4541, EN10028-7	SB8499
UD	AB6 /SW			Incoloy 825/Monel 400	SB8498
TD, TS, TM	AB30	Flange w/tied bolts	DN50 to DN150	1.4541, EN10028-7	SB8500

**AR-axial, UD-untied double, HS-hinged single, HD-hinged double, TS-tied single, TD-tied double, TM-multi tied double, GS-gimbal single, GD-gimbal double. SB- single bellows, AB- universal bellows, SW-seawater.*

Flange standard: ASME B16.5 or EN1092-1.
Flange material: BS-1501-151 Gr. 26A or equivalent.

Application/Limitation

Expansion bellows covered by this certificate are found to be in compliance with the given design standard and may be installed in bellows systems and design conditions:

Type of bellow	*Applicable Systems*	*Design Pressure*	*Temperature range*
SB1	Exhaust gas	1 bar	0 to 500 °C (see remarks)
AB1			
SB6	Type A: Water & lubrican oil	6 bar	0 to 200 °C
SB10	Type B: Steam & cruide oil	10 bar	
SB16	Seawater	16 bar	0 to 100 °C
SB10 /SW		10 bar	
SB6 /SW		6 bar	
AB6	Type A: Water & lubrican oil Type B: Steam & cruide oil	6 bar	0 to 200 °C
AB6 /SW	Seawater	6 bar	0 to 100 °C

AB30	Compressed air	30 bar	0 to 80 °C

- Maximum velocity for bellows without sleeves shall be in accordance with EJMA 10th edition table 4.10-1.
- Allowable movements shall be in accordance with the technical drawings, mentioned in this certificate.
- Number of fatigue cycles for each type/size: 1000.
- Pressure- temperature rating for flanges shall be according to ASME B16.5/EN1092-1.

Whenever the piping system is subject to approval by the society, the below limitations shall be considered:

- Bellows covered by this certificate shall be delivered with a reference to this type approval certificate (see to DNVGL-RU-SHIP Pt.4 Ch.6 Sec.1 Table 4).
- Welding shall fulfill requirements in DNVGL-RU-SHIP Pt.2 Ch.4.
- Material of bellow shall have material certificates in accordance with DNVGL-RU-SHIP Pt.4 Ch.6 Sec.2 Table 3. All materials delivered with VL or works certificate shall be made at works approved by DNV GL manufacturers.
- This type approval covers the design of the product with respect to internal pressure. External loading/pipe loads have not been considered.
- The installation shall be done according to type approval holder's procedures.

Production test:

Each expansion bellow shall be subjected to minimum hydrostatic test pressure equal to 1.5 times internal design pressure.

Type Approval documentation

Impulse test report, vibration test report, burst test report, cyclic life test report and leakage test report issued by TOZD INSTITUT ZA KONSTRUKCIJE

Tests carried out

Impulse test, vibration test, burst test, cyclic life test and leakage test

Marking of product

For traceability to this type approval, the final products are to be marked with:

- Manufacturer's name
- Design pressure and temperature
- Type designation and size
- Arrow pointing to the direction of flow

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform periodical assessment after two years (+/- 90 days) and after 3.5 years (+/- 90 days) to verify that the conditions for the approval are complied with. Reference is made to DNVGL-CP-0338.