



Certificate No:
TAP00002KF

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)
YWDW-001/2/3/4/5/6

Issued to

Yulwon Co.,Ltd
Paju-si, Gyeonggi-do, Korea, Republic of

is found to comply with

DNV rules for classification – Ships Pt.6 Ch.2 Sec.5 Gas fuelled ship installations – Gas fuelled LNG

Application :

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

Temperature range: See page 2

Max. working press.: See page 2

Sizes: See page 2

Issued at **Høvik** on **2022-10-07**

This Certificate is valid until **2027-10-06**.

for **DNV**

DNV local station: **Seoul**

Approval Engineer: **Thomas Wilhelm Juell**

Sinisa Sedlan
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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



Form code: TA 251

Revision: 2021-03

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Product description

Six types of single type double walled metallic expansion bellow, made of SUS316L (Bellow, flange, and pipe) and designed according to EJMA 10th edition.

Type	YWDW					
Bellow type	Inner /Outer					
	Single					
Designation	YWDW-001	YWDW-002	YWDW-003	YWDW-004	YWDW-005	YWDW-006
Size, I.D (mm)	156/208	105/152	79/111.9	88.4/112.3	60.5/83.1	40.1/72.1
Design Pressure	10 bar	10 bar	15 bar	15 bar	10 bar/6 bar	10 bar/5 bar
Design Temperature	0°C/+60°C	0°C/+60°C	0°C/+60°C	0°C/+60°C	-20°C/+100°C	0°C/+70°C
Number of plies	2/2	2/2	2/2	2/2	2/2	2/2
Ply thickness (mm)	0.8/0.8	0.8/0.8	0.4/0.4	0.4/0.4	0.4/0.4	0.3/0.3
No. of convolutions	6/6	7/6	10/10	10/10	10/10	9/9
Conv. Height (mm)	17/20	14/20	11/12	6/6	9/12	8/11
Conv. Pitch (mm)	18/19	18/18	10/12	10/10	12.5/12	12/12

Application/Limitation

Expansion bellows covered by this certificate are found to be in compliance with the given design standard and may be installed in Natural gas systems (inner bellow) and air applications (outer bellow).

All expansion bellows covered by this approval are approved for 7000 life cycles, allowable movements shall be in accordance with the type approved drawings mentioned below.

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 EJMA lifetime calculation confirming fatigue life > 10⁷ cycles. See DNV-RU-SHIP Pt.4 Ch.3 Sec.1 [10.2.8.6].

Flow velocities in each bellow shall be limited as specified in EJMA 10th edition Table 4.10-1 when there is no sleeve installed.

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions. Bellows of austenitic stainless steel shall not be used in direct contact with seawater.

Welding shall fulfil requirements in DNV-RU-SHIP Pt.2 Ch.4.

Production test:

Each expansion bellow shall be subjected to minimum hydrostatic test pressure equal to 1.5 times internal design pressure in the presence of a DNV surveyor.

Type Approval documentation

Tests carried out

Burst test – Hydraulic Test - cyclic loading test – Fatigue test (ship deformation)

Marking of product

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

- Manufacturer's trademark
- Type designation (as stated in the submitted drawings)
- Size
- Maximum working pressure
- Temperature range
- The flow direction, if applicable

Periodical assessment

For retention of the Type Approval, a DNV 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 DNV-CP-0338.