Certificate No:
TAP000022V

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Metallic Expansion Joints

with type designation(s)
YLE-EXP

Issued to
YLE IND. CO., LTD.
Geochang-gun, Gyeongsangnam-do, Republic of Korea

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 vessels classed by DNV.

Temperature range:	**See page 3**
Max. working press.:	**2, 3, 5, 10, 20 kgf/cm^2**
Sizes:	**See page 2**

Issued at **Høvik** on **2021-09-10**
This Certificate is valid until **2026-09-09**.
DNV local station: **Gimhae Station**

Approval Engineer: **Renata Rossi**

for **DNV**

Zeinab Sharifi
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.

Product description

Single and Universal Bellows designed according to EJMA 10th edition

Item No.	Quantity	Type	Drawing no.	Material	Total Length (mm)	Bellow Length (mm)	No. of Convolution	Bellow thickness (mm)	Ply
001	27 sizes	Single	YLE-EXP-2K-001(1/2)	SA-240 S31254 (254SMO)	250~1000	120~220	4~12	0.3~0.8	1~3
	27 sizes	Universal	YLE-EXP-2K-001(2/2)		250~1000	166~284	2~5	0.3~1.0	2~3
002	34 sizes	Single	YLE-EXP-2K-002(1/2)	JIS G4303SUS904L	250~800	120~264	5~12	0.3~1.0	1~3
	34 sizes	Universal	YLE-EXP-2K-002(2/2)		250~800	176~308	3~5	0.3~1.0	2~3
003	57 sizes	Single	YLE-EXP-2K-003(1/2)	JIS G4303 SUS321	250~1000	120~315	4~12	0.4~1.0	1~3
	57 sizes	Universal	YLE-EXP-2K-003(2/2)		250~1000	190~420	2~5	0.4~1.0	2~3
004	21 sizes	Single	YLE-EXP-3K-004(1/2)	JIS G4303S32750	250~800	120~240	4~12	0.3~1.0	1~2
	21 sizes	Universal	YLE-EXP-3K-004(2/2)		250~800	170~278	3~5	0.3~0.8	1~2
005	8 sizes	Single	YLE-EXP-5K-005(1/2)	JIS G4303SUS904L	250~600	110~160	7~12	0.3~0.6	2
	8 sizes	Universal	YLE-EXP-5K-005(2/2)		250~600	160~236	4~5	0.3~0.8	2
006	8 sizes	Reinforced Single	YLE-EXP-5K-006(1/2)	JIS G4303 SUS321	500~1000	304	8	0.8	2~3
	8 sizes	Reinforced Universal	YLE-EXP-5K-006(2/2)		500~1000	374	4	0.8	2~3
007	2 sizes	Single	YLE-EXP-10K-007(1/2)	JIS G4902 NFC625 Gr. 1	250~500	156~168	12~14	0.5~0.6	2
	2 sizes	Universal	YLE-EXP-10K-007(2/2)		250~500	194	6	0.5	2
008	17 sizes	Reinforced Single	YLE-EXP-10K-008(1/2)	JIS G4303 SUS321	400~1000	156~342	6~16	0.6~1.2	2~4
	17 sizes	Reinforced Universal	YLE-EXP-10K-008(2/2)		400~1000	240~364	3~7	0.6~1.0	2~4
009	8 sizes	Reinforced Single	YLE-EXP-20K-009(1/2)	JIS G4303 SUS304	400~700	204~240	6~12	0.6~1.0	3
	8 sizes	Reinforced Universal	YLE-EXP-20K-009(2/2)		400~700	270~360	3~5	0.6~1.0	3

Item No.	Size range (DN)
001	DN50, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400, DN450, DN500, DN550, DN600, DN650, DN700, DN750, DN800, DN850, DN900, DN950, DN1000, DN1050, DN1100, DN1150, DN1200, DN1250
002	DN50, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400, DN450, DN500, DN550, DN600, DN650, DN700, DN750, DN800, DN850, DN900, DN950, DN1000, DN1050, DN1100, DN1150, DN1200, DN1250, DN1300, DN1350, DN1400, DN1450, DN1500, DN1600, DN1700
003	DN50, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400, DN450, DN500, DN550, DN600, DN650, DN700, DN750, DN800, DN850, DN900, DN950, DN1000, DN1050, DN1100, DN1150, DN1200, DN1250, DN1300, DN1350, DN1400, DN1450, DN1500, DN1600, DN1700, DN1800, DN1900, DN2000, DN2100, DN2200, DN2300, DN2400, DN2500, DN2600, DN2700, DN2800, DN2900, DN3000, DN3100, DN3200, DN3300, DN3400, DN3500, DN3600, DN3700, DN3800, DN3900, DN4000
004	DN50, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400, DN450, DN500, DN550, DN600, DN650, DN700, DN750, DN800, DN850, DN900, DN950
005	DN50, DN80, DN100, DN125, DN150, DN200, DN250, DN300
006	DN600, DN700, DN750, DN800, DN900, DN1000, DN1100, DN1200
007	DN50, DN80
008	DN50, DN80, DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400, DN700, DN750, DN800, DN900, DN1000, DN1100, DN1200
009	DN100, DN125, DN150, DN200, DN250, DN300, DN350, DN400

Material specifications:
Flanges: S31254, S32750, NFC625 Gr. 1, SUS904L, SS400, SF440, SB450, SUS304, SUS316L, SUS321
Sleeves: S31254, S32750, NFC625 Gr. 1, SUS904L, SUS304, SUS316L, SUS321
End pipes: S31254, S32750, NFC625 Gr. 1, SUS904L, SS400, STPG370, SB450, SUS304, SUS316L, SUS321

Flanges are according to standard JIS B2220 and JIS F7805.

Weld efficiency factor: 1

Application/Limitation

Expansion bellows covered by this certificate are found to be in compliance with the given design standard and may be installed in exhaust gas and steam systems with below allowable movements:

Item No.	Drawing no.	Max. work. press. (Kg/cm2)	Min. / Max. work. temp. (°C)	Movement	
				Axial (mm)	Lateral (mm)
001	YLE-EXP-2K-001(1/2)	2	0° / 400°C	+5 / -20~-35	2
	YLE-EXP-2K-001(2/2)		0° / 400°C	+5 / -20	2
002	YLE-EXP-2K-002(1/2)	2	0° / 375°C	+5 / -20~-35	2
	YLE-EXP-2K-002(2/2)		0° / 375°C	+5 / -20~-35	2
003	YLE-EXP-2K-003(1/2)	2	0° / 550°C	+5 / -15~-35	2
	YLE-EXP-2K-003(2/2)		0° / 550°C	+5 / -10~-20	4~8
004	YLE-EXP-3K-004(1/2)	3	0° / 315°C	+5 / -20~-25	2
	YLE-EXP-3K-004(2/2)		0° / 315°C	+5 / -20~-25	5
005	YLE-EXP-5K-005(1/2)	5	0° / 375°C	+5 / -20	2
	YLE-EXP-5K-005(2/2)		0° / 375°C	+5 / -20	2
006	YLE-EXP-5K-006(1/2)	5	0° / 550°C	+5 / -25	5
	YLE-EXP-5K-006(2/2)		0° / 550°C	+5 / -25	8
007	YLE-EXP-10K-007(1/2)	10	0° / 550°C	+5 / -20	2
	YLE-EXP-10K-007(2/2)		0° / 550°C	+5 / -20	2
008	YLE-EXP-10K-008(1/2)	10	0° / 550°C	+5~+10 / -10	2~4
	YLE-EXP-10K-008(2/2)		0° / 550°C	+5~+10 / -10	5~8
009	YLE-EXP-20K-009(1/2)	20	0° / 350°C	+5 / -10	5
	YLE-EXP-20K-009(2/2)		0° / 350°C	+5 / -10	5~10

Each expansion bellow is approved for 6000 life cycles. Allowable movements (axial and lateral – no angular) shall be in accordance with the documents listed in this certificate.

The installation shall be done according to type approval holder's procedures.

Production testing

Each expansion bellow shall be subjected to hydrostatic pressure test upon completion to at least 1.5 times the design pressure.

Certification

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 test report with reference to this type approval certificate (See to DNV-RU-SHIP Pt.4 Ch.6 Sec.1 Table 4).
- Welding shall fulfill requirements in DNV-RU-SHIP Pt.2 Ch.4.
- Material of bellow shall have material certificates in accordance with DNV-RU-SHIP Pt.4 Ch.6 Sec.2 Table 3. Approval of manufacturer is required for VL or W material certificates.

Type Approval documentation

Marking of product

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

- Manufacturer's trade mark
- 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 DNVGL-CP-0338.