Certificate No: LR25371178TA
Issue Date: 28/10/2025
Expiry Date: 27/10/2030

Type Approval Certificate

This is to certify that the undernoted product(s) has/have been tested with satisfactory results in accordance with the relevant requirements of the Lloyd's Register Type Approval System.

Manufacturer	**UnisonHKR Co.,Ltd**
Address	53, Ugakgol-gil, Susin-myeon, Dongnam-gu, Cheonan-si, Chungcheongnam-do, 31252, South Korea
Type	Expansion Bellows
Description	HSW (welded end type – single) HSF (flanged type – single) HSF_T (flanged type – single tied) HUF (flanged type – universal) HUF_T (flanged type – universal tied) HGDP (gas dome bellows – primary) HGDS (gas dome bellows – secondary) NHGD (Weld end type - Single, Gas dome) NHSF (Flanged type - Single Untied) NHUF (Flange Type - Universal Untied) NHUF-T (Flanged Type - Universal Tied) NHUFB-T(Flanged Type - Universal Elbow Tied) NHPB-T (Pressure Balanced Tied)
Trade Name	Universal & Single Type Metallic Expansion Bellows
Application	Marine use for cargo and associated piping systems, etc. in ships constructed for the carriage of liquefied gases in bulk at the following locations: · Nitrogen pressurization line at tank inlet/outlet – HSF, HSF_T, HUF, HUF-T, NHSF, NHUF, NHUF_T,NHUF-T, NHPB_T

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· Gas line on trunk deck – HSW,HSF, HSF_T, HUF, HUF-T, NHSF, NHUF, NHUF_T,NHUF-T, NHPB_T
· Gas line in cargo compressor room – HSF, HSF_T, HUF, HUF-T, NHSF, NHUF, NHUF_T,NHUF-T, NHPB_T
· Gas line at tank relief valve outlet - HSF, HSF_T, HUF, HUF-T, NHSF, NHUF, NHUF_T,NHUF-T, NHPB_T
· Liquid line in cargo tank - HSF,HSF_T, HUF, HUF-T, NHSF, NHUF, NHUF_T,NHUF-T, NHPB_T
· Trunk deck penetration – HSW
· Gas dome – HGDP, HGDS, NHGD

Specified Standard

Lloyd's Register's Rules and Regulation for the Classification of Ships, July 2025, Part 5, Chapter 12
Lloyd's Register's Rules and Regulation for the Construction and Classification of Ships for the Carriage of Liquefied Gases in Bulk(July 2025), Chapter 5
Lloyd's Register's Rules and Regulations for the Classification of Ships using Gases or other Low-flashpoint Fuels (July 2025), Part B-1, 16.7.2
Standards of the Expansion joint Manufactures Association, Inc. 10th Edition

Ratings

HSW type (HKR-EJ-120439)

Location	: see application above.
Design pressure(bar)	: 1
Design temperature (˚C)	: -165~+150
Nominal pipe diameter (mm)	: 200A~ 700A
Convolution pitch/height (mm)	: 25/25 ~ 40/40
Number of plies	: 1

HSF type (HKR-EJ-120440-1 &HKR-EJ-120440-2)

Location	: see application above.
Design pressure(bar)	: 10
Design temperature (˚C)	: -165~+150
Nominal pipe diameter (mm)	: 32A ~ 700A
Convolution pitch/height (mm)	: 15/15 ~ 40/40
Number of plies	: 2~3

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HSF_T type(HKR-EJ-1801093 & HKR-EJ-1801094)
Location : see Application above.
Design pressure(bar) : 13.5
Design temperature (˚C) : -165~+150
Nominal pipe diameter (mm) : 100A , 150A
Convolution pitch/height(mm) : 20/16, 20/25
Number of plies : 2

HUF type (HKR-EJ-120441-1 &HKR-EJ-120441-2)
Location : see application above.
Design pressure(bar) : 10
Design temperature (˚C) : -165~+150
Nominal pipe diameter (mm) : 32A ~ 750A
Convolution pitch/height (mm) : 15/15 ~ 40/40
Number of plies : 2~3

HUF_T type(HKR-EJ-120442-1 & HKR-EJ-120442-2)
Location : see application above.
Design pressure(bar) : 10/13.5
Design temperature (˚C) : -165~+150
Nominal pipe diameter (mm) : 32A ~ 750A
Convolution pitch/height (mm) : 15/15 ~ 40/40
Number of plies : 2~3

HGDP & HGDS type (HKR-EJ-120443& HKR-EJ-120444)
Location : see application above.
Design pressure(bar) : -0.8~+0.84
Design temperature (˚C) : -165~+80
Nominal pipe diameter (mm) : 1428 & 1465
Convolution pitch/height (mm) : 45/45 & 45/50
Number of plies : 1

NHSF type (HKR-EJ-1910123)
Location : see application above.
Design pressure(bar) : 10

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Design temperature (˚C) : -165~+180
Nominal pipe diameter (mm) : 300
Convolution pitch/height (mm) : 30/34
Number of plies : 2

NHUF type (HKR-EJ-1910124)
Location : see application above.
Design pressure(bar) : 10
Design temperature (˚C) : -165~+180
Nominal pipe diameter (mm) : 250A~900A
Convolution pitch/height (mm) : 30/30~40/43
Number of plies : 2~3

NHUF_T type (HKR-EJ-1910125)
Location : see application above.
Design pressure(bar) : 16/25
Design temperature (˚C) : -165~+180
Nominal pipe diameter (mm) : 40A~50A
Convolution pitch/height (mm) : 15/16~15/14
Number of plies : 2

NHUF_T type (HKR-EJ-1910126)
Location : see application above.
Design pressure(bar) : 10/16/25
Design temperature (˚C) : -165~+180
Nominal pipe diameter (mm) : 65A~900A
Convolution pitch/height (mm) : 15/14~42/43
Number of plies : 2~3

NHUFB-T type (HKR-EJ-1910127)
Location : see application above.
Design pressure(bar) : 10/16
Design temperature (˚C) : -165~+180
Nominal pipe diameter (mm) : 300A/400A/600A
Convolution pitch/height (mm) : 30/33~40/40
Number of plies : 3

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NHGD type (HKR-EJ-1910128)

Location	: see application above.
Design pressure(bar)	: 1
Design temperature (˚C)	: -165~+180
Inner pipe diameter (mm)	: 446
Convolution pitch/height (mm)	: 18/26
Number of plies	: 2

NHPB-T type (HKR-EJ-1910129)

Location	: see application above.
Design pressure(bar)	: 10/16
Design temperature (˚C)	: -165~+180
Nominal pipe diameter (mm)	: 300A~600A
Convolution pitch/height (mm)	: 30/33~40/43
Number of plies	: 2~3

Other Conditions

Where intended to be installed on an Lloyd's Register (LR) class ship, the following points are applicable:-

1) Plans showing full details of construction with design conditions specified for the bellows intended duty in a specific piping system for a specific ship are to be submitted for approval.

2) The bellows are to be constructed, tested and installed onboard in accordance with Part 5, Chapter 12 of Lloyd's Register's Rules and Regulations for the Classification of Ships and Chapter 5 of Lloyd's Register's Rules and Regulations for the Construction and Classification of Ships for the carriage of Liquefied Gases in Bulk to the satisfaction of the attending Surveyors.

This certificate is not valid for equipment, the design, ratings or operating parameters of which have been varied from the specimen tested. The manufacturer should notify Lloyd's Register Asia of any modification or changes to the equipment in order to obtain a valid Certificate.

Previous Version: LR22205613TA

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Type Approval Certificate

The Design Appraisal Document BTS/ENG/M254005 and its supplementary Type Approval Terms and Conditions form part of this Certificate.

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