Certificate No:
TAP00002NA

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings, Flared or Welded Nipple Type

with type designation(s)
37° Flare fittings

Issued to
Hansun Engineering Co., Ltd.
Busan, Korea, Republic of

is found to comply with
DNV rules for classification – Ships Pt.4 Ch.6 Piping systems
DNV-OS-D101 – Marine and machinery systems and equipment, Edition July 2021
DNV class programme DNV-CP-0185 – Type approval – Mechanical joints

Application :

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

Temperature range:	**-28°C to +204°C**
Max. working press.:	**140 bar to 345 bar**
Sizes:	**-3, -4, -5, -6, -8, -10, -12, -14, -16, -20, -24, -32**

Issued at **Høvik** on **2023-09-04**
This Certificate is valid until **2028-09-03**.
DNV local unit: **Gimhae Station**

Approval Engineer: **Andreas Hansen**

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

37° Compression couplings of flared type as per type approval holders catalogue, designed according to SAE J514 and constructed from the following materials:

Part	Carbon steel	Stainless steel
Body	ASTM A108 / JIS G4051 S45C ASTM A105 / JIS G4051 S45C	ASTM A276/A479 Grade 316/316L ASTM A182 Grade F316/F316L
Nut and sleeve	ASTM A108 / JIS G4051 S45C	ASTM A276/A479 Grade 316/316L
O-ring	FKM	FKM

Designation	Fitting	Designation	Fitting
Tube to tube union		Tube to straight thread*	
JU	Straight	JMCS-G	O-seal male connector (PF)
JL	Elbow	JMCS-U	O-seal male connector (UNF)
JT	Tee	JLS-U	O-seal male elbow (UNF)
JX	Cross	JLBS-U	O-seal 45° male elbow (UNF)
JUB	Bulkhead union	JTRS-U	O-seal run tee (UNF)
JUBW	Weld buklhead union	JTBS-U	O-seal branch tee (UNF)
JBL	Bulkhead union elbow	Swivel fittings	
Tube to male pipe		JSMC	Swivel connector
JMC	Male connector	JSMCS-U	O-seal swivel connector (UNF)
JLM	Male elbow	JSCF	Swivel female connector
JTRM	Male connector	JSL	Swivel elbow
JTBM	Male branch tee	JSTR	Swivel run tee
JLBM	45° male elbow	JSTB	Swivel branch tee
Tube to female pipe		-	-
JCF	Female connector	-	-
JCBF	Bulkhead female connector	-	-
JLF	Female elbow	-	-
JTRF	Female run tee	-	-
JTBF	Female branch tee	-	-

*) Fittings delivered with non-metallic o-ring.

Application/Limitation

Maximum allowable working pressure:

SAE Dash Size	Tube O.D		Union and bulkhead fittings		Female swivel fittings		Pipe thread fittings	
	Inch	mm	psi	bar	psi	bar	psi	Bar
2	1/8	3	5000	345	5000	345	5000	345
3	3/16	4	5000	345	5000	345	5000	345
4	¼	6	5000	345	4500	310	5000	345
5	5/16	8	5000	345	4000	275	5000	345
6	3/8	10	5000	345	4000	275	4000	275
8	½	12	4500	310	4000	275	3000	210
10	5/8	16	3500	240	3000	210	3000	210
12	¾	18,20	3500	240	3000	210	2500	170
14	7/8	22	3000	210	2500	170	2500	170
16	1	25	3000	210	2500	170	2000	140
20	1-¼	32	2500	170	2000	140	1150	80
24	1-½	38	2000	140	1500	105	1000	70
32	2	50	1500	105	1125	80	1000	70

For couplings used at elevated temperatures, the maximum working pressure shall be reduced according to the following factors:

Temperature [°C]	20	50	100	150	200	250	300	350	400	450	500	550
Carbon steel	1.00	1.00	1.00	0.89	0.81	0.71	0.65	0.59	0.54	0.50	-	-
Stainless steel	1.00	0.95	0.85	0.77	0.71	0.67	0.63	0.60	0.58	0.57	0.56	0.55

For couplings with O-rings, allowable temperature range is as below:

Material	Minimum working temperature	Maximum working temperature
FKM	-20°C	+204°C

Minimum wall thickness of tubing shall follow the requirements stated in DNV-RU-SHIP Pt.4 Ch.6 Sec.9 [1].

The couplings covered by this certificate are approved to be used in Class I & II piping systems according to the latest requirements of governing rules in following applications:

- Flammable fluids (flash point ≤ 60°C)
  - Cargo oil lines (1)
  - Crude oil washing lines (1)
  - Vent lines (3)
- Inert gas
  - Water seal effluent lines
  - Scrubber effluent lines
  - Main lines (1)
  - Distribution lines (1)
- Flammable fluids (flash point ≥ 60°C)
  - Cargo oil lines (1)
  - Fuel oil lines (2)
  - Lubricating oil lines (2)
  - Hydraulic oil (2)
  - Thermal oil (2)
- Fresh water
  - Cooling water system (3)
  - Condensate return (3)
  - Non-essential system
- Sanitary/drains/scuppers
  - Deck drains (internal) (4)
  - Sanitary drains
  - Scuppers and discharge (overboard)
- Sounding/vent
  - Water tanks/dry spaces
  - Oil tanks (flash point > 60°C)
- Miscellaneous
  - Starting/control air (3)
  - Service air (non-essential)
  - Brine
  - CO_2 system (outside protected space)
  - CO_2 system (inside protected space) (5)
  - Steam
- Sea water(6)
  - Bilge lines (3)
  - Water filled fire extinguishing systems (2)
  - Non water filled fire extinguishing systems (2)
  - Fire main (2)
  - Ballast system (3)
  - Cooling water system (3)
  - Tank cleaning services
  - Non-essential systems

For all the mechanical joints containing non-metallic O-rings the following apply:

1) Not permitted in pump rooms and open decks.
2) Not permitted except in cases where such mechanical joints are installed on exposed open decks, as defined in SOLAS II-2/Reg. 9.2.3.3.2.2(10) and not used for fuel oil lines.
3) Not permitted in machinery spaces of category A.
4) Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.
5) Not permitted.
6) Mechanical joints manufactured from austenitic stainless steel material grades are not considered suitable for sea water applications.

Couplings covered by this certificate are not fire tested. Designs containing non-metallic materials shall therefore not be considered fire safe.

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions.

Threaded connections where pressure-tight joints are made on the threads with parallel or tapered threads shall not be used for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur. For other applications threaded connections with pressure tight joints on threads may be used for:

- In CO_2 systems inside protected spaces and in CO_2 cylinder rooms
- Threaded joints with tapered threads are allowed for:
  - Class I, outside diameter ≤ 33.7 mm
  - Class II and class III, outside diameter ≤ 60.3 mm
- Threaded joints with parallel thread shall be allowed for class III, outside diameters ≤ 60.3 mm.

This approval is only valid when the couplings are assembled with tubing of correct temper and tolerances as recommended by the manufacturer. These couplings should not be used on tube in cold fabricated (hard temper) conditions.

Type Approval documentation

Tests carried out

Tightness test, leakage test, repeated assembly test, pull-out test, vacuum test, vibration and pressure pulsation tests, and burst test.

Marking of product

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

- Manufacturers name or trade mark
- Type designation and size

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.