

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Pipe Couplings, Bite and Compression Type**with type designation(s)
M type tube fittings

Issued to

HSME Corporation
Busan, 11, Republic of Korea

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
DNV GL class programme DNVGL-CP-0185 – Type approval – Mechanical joints**Application :****Product(s) approved by this certificate is/are accepted for installation on vessels classed by DNV GL.****Temperature range: -55°C to +600°C (see page 3)****Max. working press.: 352 bar to 650 bar****Sizes: 1/8", 3/16", 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 7/8", 1"**Issued at **Høvik** on **2020-03-30**for **DNV GL**This Certificate is valid until **2025-03-29**.DNV GL local station: **Busan**Approval Engineer: **Renata Rossi****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.



Job Id: **262.1-019355-2**
 Certificate No: **TAP000001Y**
 Revision No: **1**

Product description

M Tube Fittings with following configurations:

Designation	Coupling type	Designation	Coupling type
AU	Union	ATRS-UP	Positionable SAE Male Run Tee
AUR	Reducing Union	ATBS-UP	Positionable SAE Male Branch Tee
AUB	Bulkhead Union	ATRM-N	Male NPT Run Tee
ABL	Bulkhead Elbow Union	ATBM-N	Male NPT Branch Tee
AUA	AN Union	ATBM-R	Male BSPT Branch Tee
AUBA	AN Bulkhead Union	ACF-N	Female NPT Connector
AL	Union Elbow	ACF-R	Female BSPT Connector
ALR	Reducing Union Elbow	ACF-GG	Female Gauge Connector
AT	Union Tee	ACBF-N	Bulkhead Female NPT Connector
ATR	Reducing Union Tee	ALF-N	Female NPT Elbow
AX	Union Cross	ATRF-N	Female NPT Run Tee
AXR	Reducing Union Cross	ATBF-N	Female NPT Branch Tee
AMC-N	Male NPT Connector	AR	Port Reducer
AMCB-N	Bulkhead Male NPT Connector	AAB	Bulkhead Tube Adapter
AMC-R	Male BSPT Connector,	ALA	Elbow Tube Adapter
AMC-G	Male ISO Parallel Connector	ATRA	Run Tee Tube Adapter
AMC-GB	Male ISO Parallel Connector	ATBA	Branch Tee Tube Adapter
AMC-UF	Non-Positionable SAE Male Connector	ACSW	Tube Socket Weld Connector
AMF-UO	O-ring sealed SAE Male Connector	ALSW	Tube Socket Weld Connector
AMC-NO	O-ring sealed NPT Male Connector	ACBW	Pipe Butt Weld Connector
ALBM-N	45° Male NPT Elbow	ALBW	Pipe Butt Weld Elbow
ALBS-UP	Positionable 45° SAE Male Elbow	ABUW	Bulkhead Weld Union
ALM-N	Male NPT Elbow	AC	Tube Cap
ALM-R	Male BSPT Elbow	AF	Flange Adapter
ALM-GR	Positionable Male ISO Parallel Thread Elbow	AFC	Lap Joint Flange adapter
ALS-UP	Positionable SAE Male Elbow	AEU	Dielectric fitting

Materials:

Stainless Steel:-

Bar Stock : ASTM A276 Type 316/316L, ASTM A479 Type 316/316L, JIS G4303 SUS316/316L

Forging : ASTM A182 F316/F316L, JIS G3214 SUS F316/316L

Carbon Steel:-

Bar Stock : ASTM A108, JIS G4041 S20C- S53C

Forging : ASTM A105, JIS G4051 S20C-S53C

Application/Limitation

Couplings covered by this certificate are only to be used in piping classes I, II and III in below applications ⁽⁴⁾:

<p>1) Flammable fluids (flash point ≤ 60°C)</p> <ul style="list-style-type: none"> - Cargo oil lines ⁽³⁾ - Crude oil washing lines ⁽³⁾ - Vent lines ⁽²⁾ <p>2) Inert gas</p> <ul style="list-style-type: none"> - Water seal effluent lines - Scrubber effluent lines - Main lines ⁽³⁾ 	<p>4) Fresh water</p> <ul style="list-style-type: none"> - Cooling water system ⁽¹⁾ - Condensate return ⁽¹⁾ - Non-essential system <p>5) Sanitary/drains/scuppers</p> <ul style="list-style-type: none"> - Deck drains (internal) ⁽⁵⁾ - Sanitary drains <p>6) Sounding/vent</p>
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<ul style="list-style-type: none"> - Distributions lines ⁽³⁾ 3) Flammable fluids (flash point > 60°C) - Cargo oil lines ⁽³⁾ - Fuel oil lines ⁽²⁾ - Lubricating oil lines ⁽²⁾ - Hydraulic oil ⁽²⁾ - Thermal oil ⁽²⁾ 	<ul style="list-style-type: none"> - Water tanks/dry spaces - Oil tanks (f.p. > 60°C) ⁽²⁾ 7) Miscellaneous - Starting/control air ⁽¹⁾ - Service air (non-essential) - Brine - CO₂ system ⁽¹⁾ - Steam
<p>⁽¹⁾ Inside machinery spaces of category A - only approved fire resistant types*</p> <p>⁽²⁾ Approved fire resistant types* 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.</p> <p>⁽³⁾ Only in pump rooms and open decks - only approved fire resistant types*</p> <p>⁽⁴⁾ Not permitted in seawater applications</p> <p>⁽⁵⁾ Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.</p>	
<p>* approved fire resistant types – Coupling types with metallic parts only</p>	

Couplings covered by this certificate shall not be installed in systems subject to pressure below atmospheric or vacuum 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.

Threaded joints in CO₂ systems shall be allowed only inside protected spaces and in CO₂ cylinder rooms. Threaded joints for direct connectors of pipe lengths with tapered thread shall be allowed for:

- Threaded joints with tapered thread shall not be allowed for class I systems when outside diameter is more than 33.7 mm
- Threaded joints with parallel thread shall be allowed only for class III systems

The 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 tubes in cold fabricated (hard temper) conditions.

Maximum working pressure:

For tube O.D. size		Max. working pressure (Bar)
Fractional	Metric	
1/8"	3	650
3/16"	4	612
1/4"	6	584
5/16"	8	552
3/8"	10	527
1/2"	12	503
5/8"	16	474
3/4"	18	434
7/8"	22	366
1"	25	352

Temperature range:-

Stainless Steel : -55°C to +600°C

Carbon Steel : -28°C to +450°C

Couplings with seals on non-metallic material:

NBR : -25°C to +110°C

FKM : -28°C to +204°C

FFKM : -30°C to +315°C

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At elevated temperature the maximum working pressure has to be reduced using the reduction factors according to the below table:

Temperature	Unalloyed Carbon steels	Stainless steels
20°C	1.00	1.00
50°C	1.00	0.95
100°C	1.00	0.85
150°C	0.89	0.77
200°C	0.81	0.71
250°C	0.72	0.67
300°C	0.65	0.63
350°C	0.59	0.60
400°C	0.54	0.58
450°C	0.50	0.57
500°C	N/A	0.56
550°C	N/A	0.55
600°C	N/A	0.50

Type Approval documentation

<u>Document no.</u>	<u>Rev.</u>	<u>Title</u>
-	-	Manufacturer's catalogue "M Tube Fitting @ MT-3. 2013
-	-	Manufacturer's test reports repeated assembly test, tightness test, burst test, vibration and pressure pulsation, pull-out
HS-TR200129-01	-	Renewal burst test report dated 2020-01-29 witnessed by DNV GL Surveyor

Tests carried out

Leakage test, repeated assembly test, burst test, vibration test, pressure pulsation test, pull out test.

Marking of product

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

- Manufacturer's name or trade mark
- Type designation
- Size

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.