DNV·GL

Certificate No:
TAP000001Y

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, Republic of Korea

is found to comply with
Det Norske Veritas' Rules for Classification of Ships
Offshore Standard DNV-OS-D101, Marine and Machinery Systems and Equipment
Det Norske Veritas' Standards for Certification 2.9 No. 5-792.20

Application :

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

Temperature range:	**-196°C to +600°C**
Max. working press.:	**352 bar to 650 bar**
Sizes:	**1/8" (3), 3/16" (4), 1/4" (6), 5/16" (8), 3/8" (10), 1/2" (12), 5/8" (16), 3/4" (18), 7/8" (22), 1" (25)**

This Certificate is valid until **2019-12-31**.

Issued at **Høvik** on **2015-07-21**

for **DNV GL**

DNV GL local station: **Pusan**

Approval Engineer: **Tom Berg-Nielsen**

on behalf of Marianne Spæren Marveng
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.

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Product description

M Tube Fittings
Configurations:

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

May be used for:
All couplings:
Steam and Condensate, fresh water and sanitary

Couplings with metallic parts only may in addition be used for:
Hydraulic, Fuel oil, lubrication oil Thermal oil

Maximum working pressure:

For tube O.D. size		Working pressure
Fractional	Metric	Bar
1/8″	3	650
3/16″	4	612
¼″	6	584
5/16″	8	552
3/8″	10	527
½″	12	503
5/8″	16	474
¾″	18	434
7/8″	22	366
1″	25	352

Temperature range:
Stainless Steel: -196°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

Limitation

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
20ºC	1,00	1.00
50ºC	1,00	0.95
100ºC	1,00	0.85
150ºC	0.89	0.77
200ºC	0.81	0.71
250ºC	0,72	0.67
300ºC	0.65	0.63
350ºC	0.59	0.60
400ºC	0.54	0.58
450ºC	0.50	0.57
500ºC	N/A	0.56
550ºC	N/A	0.55
600ºC	N/A	0.50

Type Approval documentation
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 DNVGL Surveyor shall perform a survey every second year and before the expiry date of this certificate to verify that the conditions for the type approval are complied with. The Surveyor shall witness burst testing of samples (both fractional (imperial) and metric sizes) of couplings selected at random from stock or from the running production as a part of this survey.

END OF CERTIFICATE