



TYPE APPROVAL CERTIFICATE

Certificate No:
TAP0000022
Revision No:
1

This is to certify:

That the Pipe Couplings

with type designation(s)
RFC34, RFC64, RFC74, RFAC48

Issued to

Tube-Mac Piping Technologies Ltd
Stoney Creek, ON, Canada

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: See certificate
Max. working press.: See certificate
Sizes: 1 1/2", 2", 2 1/2", 3", 4", 5"

Issued at **Høvik** on **2022-11-16**

This Certificate is valid until **2026-12-31**.

DNV local unit: **Montreal**

Approval Engineer: **Jane Lozanov**

for **DNV**



Digitally Signed By: Sedlan, Sinisa
Location: DNV Høvik, Norway

Sinisa Sedlan
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

The coupling is designed with retain ring in grooved pipe, loose flange with o-ring seals in seal plate.

Flanges RFC34, DN38, DN51, DN64, DN76 drilled to ISO 6162-1

Flanges RFC64, DN38, DN51 drilled to ISO 6162-2

Flanges RFC74, DN64, DN76, DN100 drilled to ISO 6164

Flanges RFAC48, DN115, DN127 drilled to TM1 property – 8 bolt standard

Materials:

Pipe: E235 & E355 (EN10305-4), 1.4401, 1.4404 & 1.4462 (EN10216-5)

Flange: S355J2+N (EN10025), AISI C1045, ASTM A519 1026,
1.4401, 1.4404 & 1.4462 (EN10028-7)

Retain Ring: AISI 302

Bolt and nut: ISO898-1 Grade 10.9 min., SAE J429 Grade 8 min.

Bolt and nut for 350 bar RFAC48-450/500/600: Brighton MET L9, min tensile 180 Ksi.

O-ring material: Nitrile (Buna N), Fluoroelastomer (Viton)

Application/Limitation

maximum working pressure:

| Part No. | Size | | Pressure Rating |
|-----------|------|------|-----------------|
| | DN | inch | |
| RFC34-150 | 38 | 1 ½" | 210 |
| RFC34-200 | 51 | 2" | 210 |
| RFC34-250 | 64 | 2 ½" | 175 |
| RFC34-300 | 76 | 3" | 140 |
| RFC64-150 | 38 | 1 ½" | 420 |
| RFC64-200 | 51 | 2" | 420 |

| Part No. | Size | | Pressure Rating |
|------------|------|------|-----------------|
| | DN | inch | |
| RFC74-250 | 64 | 2 ½" | 400 |
| RFC74-300 | 76 | 3" | 400 |
| RFC74-400 | 100 | 4" | 400 |
| RFAC48-450 | 115 | 4 ½" | 275 |
| RFAC48-500 | 127 | 5" | 275 |

For couplings at elevated operating temperatures, the maximum working pressure has to be reduced with the following factors:

| Temperature | 20°C | 50°C | 100°C | 150°C | 200°C |
|-----------------|------|------|-------|-------|-------|
| Carbon Steel | 1 | 1 | 1 | 0.89 | 0.81 |
| Stainless Steel | 1 | 0.95 | 0.85 | 0.77 | 0.71 |

Couplings covered by this certificate are only to be used in piping classes I(≤60.3mm), II(≤60.3mm) and III in below applications ⁽⁴⁾:

| | |
|--|--|
| <p>1) Inert gas</p> <ul style="list-style-type: none"> - Water seal effluent lines - Scrubber effluent lines <p>2) Flammable fluids (flash point > 60°C)</p> <ul style="list-style-type: none"> - Fuel oil lines ⁽¹⁾ - Lubricating oil lines ⁽¹⁾ - Hydraulic oil ⁽¹⁾ - Thermal oil ⁽¹⁾ <p>3) Fresh water</p> <ul style="list-style-type: none"> - Cooling water system ⁽²⁾ - Condensate return ⁽²⁾ - Non-essential system | <p>4) Sanitary/drains/scuppers</p> <ul style="list-style-type: none"> - Deck drains (internal) ⁽³⁾ - Sanitary drains - Scuppers and discharge (overboard) <p>5) Sounding/vent</p> <ul style="list-style-type: none"> - Water tanks/dry spaces - Oil tanks (f.p. > 60°C) ⁽¹⁾ <p>6) Miscellaneous</p> <ul style="list-style-type: none"> - Service air (non-essential) - Brine - Steam |
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⁽¹⁾ 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.

⁽²⁾ Fire endurance test shall be applied when mechanical joints are installed in machinery spaces of category A.

⁽³⁾ Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.

⁽⁴⁾ Carbon Steel and Stainless-steel grade 316 covered by this certificate are not seawater resistant and shall not be used in seawater applications

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

Minimum and maximum operating temperature is limited by the non-metallic seals:

Nitrile: -20°C to +180°C

Viton: -20°C to +200°C

Compliance and testing requirements related to ISO 6162 and ISO 6164 flange ends are not covered under this scope of approval.

Type Approval documentation

Assembly drawing No. RFC34-050-26mm, RFC34-075-36mm, RFC34-100-39mm, RFC34-125-46mm, RFC34-150-56mm, RFC34-200-66mm, RFC34-250-80mm, RFC34-300-97mm, RFC64-050-26mm, RFC64-075-36mm, RFC64-100-39mm, RFC64-125-46mm, RFC64-150-56mm, RFC64-200-66mm, RFC74-250-80mm, RFC74-300-97mm, RFC74-400-115mm, RFAC48-450 ASSY, RFAC48-500-SCHXXS, RFAC48-600-SCHXXS, RFAC48-800-SCHXXS
Type Approval Test Report, Burst Test, Impulse and Vibration Test, DNV witnessed (Jan. 15, 2003).
Fire Test Report SwRI project No. 01.10085.01.706d, 01.10085.01.706e, 01.10085.01.706f, dated 2004-04-14 & 01.19577.01.803 dated 2014- 06-18
Test Results for Increased Pressure Rating for 5",6",8", dated August 12, 2008
Pull out test report number 18.18055.18.116 dated 2018-06-06
Renewal burst test reports: DNV-007, DNV-008, DNV-009

Tests carried out

Hydraulic Proof Pressure Test, Hydraulic Burst Pressure Test, Simultaneous Pressure Pulsation and Vibration Test, Fire tests

Marking of product

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

- manufacturer's 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.