

# TYPE APPROVAL CERTIFICATE

## This is to certify:

that the **Pipe Couplings, Bite and Compression Type**

with type designation(s)  
**Hoke Gyrolok® Tube & Pipe Fittings**

issued to

**CRANE Instrumentation & Sampling PFT Corp**  
**Spartanburg, SC, USA**

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 all vessels classed by DNV.

**Temperature range:** up to + 550°C (1.050°F)  
**Max. working press.:** 10.000 psi  
**Sizes:** 1/4" through 1" (6 mm through 25 mm)

Issued at **Hamburg** on **2024-10-04**

This Certificate is valid until **2029-10-03**.

DNV local unit: **Certification & Inspection Services**

Approval Engineer: **Ana Cristina Do Carmo Insfran**

for **DNV**



Digitally Signed By:  
Sven Klinger  
Location: DNV Hamburg,  
Germany

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 USD 300 000.



## Product description

Stainless steel Hoke® Gyrolok® Tube Fittings.

### Tube fittings

This type approval includes tube fittings as specified in the catalogue “GYROLOK® Tube Fittings”.

Excluded are

- SAE Thread O-Ring Seal Fittings

**For the following tube fittings limitations as specified in the RU-SHIP Rules Pt.4 Ch.6 Piping systems are to be observed:**

### Bulkhead fittings

Bulkhead coupling types BU, BCM, BCF are not approved through tank walls, watertight decks and bulkheads. For application through fire divisions a separate type approval is required.

### Pipe connectors where pressure -tight joints are made on the threads

Pipe connector design	Range of application <sup>1</sup>	
..with tapered or parallel thread	not approved for toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur	
..with parallel thread	approved for pipe class III	up to outside diameter 60.3mm
..with tapered thread	approved for pipe class I	up to outside diameter 33.7mm
	approved for pipe class II, III	up to outside diameter 60.3mm

Note

<sup>1</sup> Refer to DNV RU-SHIP Rules Pt.4 Ch.6 – Section 9 – 5.2.6.

## Overview of threaded tube fittings with limitations

Type	Name
CM	Male connector
LM	Male elbow 90°
LMF	Male elbow 45°
LF	Female elbow
TTM	Male branch tee
TMT, TFT, TTF	Male, female run tee
BCM, BCF	Bulkhead Connector Male, Female

All other tube fittings with thread connection not listed in the above table may be used without limitations.

## Materials

Component	Type	Standard / Specification
Coupling body, nuts, ferrules	Stainless steel 316/316L	ASTM A269 and A213
O - Rings (standard)	Buna N Rubber NBR	Note 1

Note 1:

- Silicone 50 Durometer ZZ-R-765 CL.1 GR.50 (AMS-3335)
- Buna-N (Nitrile) 70 Durometer U.L. approved
- Buna-N 90 Durometer Astem D200/ SAEJ200/ 6BG915A14-B14E014-E034
- Fluorocarbon (VitonE60C or Fluorel FC-2174) 90Durometer MIL-R-83248 TY IClass2 AMS7259

### Selection of materials

It shall be noted that the selection of the materials considers the applicable service condition with respect to type of media, flow velocity, media temperature and installation area of the piping system.

In particular, the resistance to corrosion, erosion, oxidation, and other deterioration during projected service life are to be considered.

### Sea water application

The term sea water application includes piping systems conveying sea water and piping systems installed on the open deck.

The stainless-steel materials AISI 316L (1.4404), AISI 316 (1.4401) are approved for sea water systems.

Tubing made of AISI 304/304L are considered not corrosion resistance in marine atmospheric environment, and in piping systems with flowing or stagnant seawater.

Even the stainless-steel grade specified above cannot be considered immune to attack under all situations, avoidance of stagnant seawater conditions and removal of welding oxides after welding are some of the important factors to the successful use in piping systems for sea water and installation on open deck.

### References

- DNV Rules Pt.4 Ch.6 – Section 2 – Materials
- HOKE “GYROLOK® Tube Fittings” catalogue

### Tubes

For selection of the tubes the general recommendations in the Hoke - “GYROLOK® Tube Fittings” catalogue are to be observed.

In addition the following DNV RU-SHIP Rules are to be observed

- Pt. 2 Materials and welding – Ch. 2 Metallic material – Section 5 Steel pipes and fittings – Para 2 Pipes for pressure systems
- Pt.4 Ch.6, Section 9, Minimum wall thickness, para. 9(1) and - Tables 2 (carbon steel) and 3 (stainless steel).

## Application/Limitation

The compression coupling Hoke Gyrolok® Tube & Pipe Fittings are type approved for installation in pipe systems of pipe class I, II and III as listed in the below table. Couplings with soft seals are limited regarding installation location for the use in pipe systems with fire endurance test condition wet, dry/wet, dry, see limitation in below table  
 Reference: DNV-RU-SHIP Pt.4 Ch.6 Piping systems, Section Table 9 Application of mechanical joints

Pipe systems		Limitation couplings with soft seals	Fire endurance test condition
<b>Flammable fluids (flash point ≤ 60°C)</b>			
1	Cargo oil lines	Not approved for installation in pump rooms or open deck	dry
2	Crude oil washing lines		dry
3	Vent lines	Exceptionally approved installed on exposed open decks, as defined in SOLAS II-2/Reg.9.2.3.3.2.2(10).	dry
<b>Inert gas</b>			
4	Water seal effluent lines	Not approved for installation in pump rooms or open deck	wet
5	Scrubber effluent line		wet
6	Main lines	Not approved for installation in pump rooms or open deck	dry
7	Distribution lines		dry
<b>Flammable fluids (flash point &gt; 60 °C)</b>			
8	Cargo oil lines	Not approved for installation in pump rooms or open deck	dry
9	Fuel oil lines	Not approved	wet
10	Lubricating oil lines	Exceptionally approved installed on exposed open decks, as defined in SOLAS II-2/Reg.9.2.3.3.2.2(10).	wet
11	Hydraulic oil		wet
12	Thermal oil		wet
<b>Seawater</b>			
13	Bilge lines	Not approved for installation in machinery spaces of category A	dry/wet
14	Water filled fire extinguishing systems, e.g. fire main, sprinkler systems	Exceptionally approved installed on exposed open decks, as defined in SOLAS II-2/Reg.9.2.3.3.2.2(10).	wet
15	Non water filled fire extinguishing systems, e.g., drencher systems		dry/wet
16	Fire main (not permanently filled)		dry/wet
17	Ballast systems	Not approved for installation in machinery spaces of category A	wet
18	Cooling water systems		wet
19	Tank cleaning services	None	Fire endurance test not required
20	Non-essential systems		
<b>Fresh water</b>			
21	Cooling water systems	Not approved for installation in machinery spaces of category A	wet
22	Condensate return systems		wet
23	Non-essential piping systems	None	Fire endurance test not required
<b>Sanitary/drains/scuppers</b>			
24	Deck drains (internal)	Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.	Fire endurance test not required
25	Sanitary drains	None	
26	Scuppers and discharge (overboard)	None	
<b>Sounding/vent</b>			
27	Water tanks/dry spaces	None	Fire endurance test not required
28	Oil tanks (flash point > 60 °C)		
<b>Miscellaneous</b>			
29	Starting/control air	Not approved for installation in machinery spaces of category A	dry
30	Service air piping systems (non-essential)	None	Fire endurance test not required
31	Brine		
32	CO2 systems	Couplings with soft seals are not approved	dry
33			
34	Steam	None. Limitation temperature range acc. to soft seal material.	Fire endurance test not required

### Limitations

The couplings are not approved:

- for high-pressure fuel injection systems on diesel engines.
- for use in vacuum lines or in systems contains more than 25% oxygen by volume.

### Maximum allowable working pressures MAWP

GYROLOK® fitting ends are rated for working pressures higher than the tubing recommended for use with GYROLOK®. Under no circumstances should tubing be utilized at pressures above its maximum allowable working pressure. Reference: HOKE® Tubing Data Charts for specific information

### Maximum Working Pressure (psi) for Fractional Sizes

304 & 316 Stainless Steel Annealed Seamless Tubing

OD (inch)	MAWP psig
1/4	10,200
3/8	6,500
1/2	6,700
5/8	5,200
3/4	4,200
7/8	4,200
1	4,200

### Maximum Working Pressure (psi) for metric sizes

304 & 316 Stainless Steel Annealed Seamless Tubing

OD (mm)	MAWP bar
6	670
10	470
12	430
16	330
18	330
22	300
25	260

For elevated media service temperatures, the MAWP shall be reduced by multiplication with reduction factors in the below table.

Temp. [°F]	100	200	300	400	500	600	650	700	750	800	850	950	1000	1050
Temp. [°C]	38	93.33	148.9	204.4	260	315.6	343.3	398.9	398.9	426.7	454.4	510	538	550
Reduction factor <sup>1</sup>	1	1	1	0.97	0.90	0.85	0.84	0.82	0.81	0.80	0.79	0.77	0.77	0.73

Note

<sup>1</sup> Reference ASME BPVC, Section II-D

### Type Approval documentation

TAP00002XK

#### Product documents

- Tubing Data Charts in HOKE catalogue Twin Ferrule Tube Fittings Tubing Data Charts, 79308ENG • 06/21/23 • APS3037
- Manufacturer's Catalogues :  
7900 ENG 05/06/20 APS 46  
Hoke – Twain Ferrule Tude Fittings Data Charts
- Hoke Process specification HPS -65, Rev. AB dated 2023-09-21
- Crane Quality Management instructions – Material traceability – QMI-113, Rev. 11
- Test results Table of conformance dated 2024-07-11
- Drawings – Fitting Assemblies Union, Elbow and Tee- configuration Rev. C dated on 2023-08-31

**Type test reports**

Test laboratory Crane I&S  
 Test Plan DNV CP-0185 (edition Sept. 2021) Crane Instrumentation & Sampling  
 Hoke Gyrolok® Tube & Pipe Fittings (Spec.) Rev. C dated Sept. 2021

**Test laboratory Southwest Research Institute SwRI**

Final Test report SwRI Project 18.28526, 2024-09-26  
 Test scope  
 Tightness test, consisting of the static gas pressure and hydrostatic tests conducted prior to the pressure impulse/vibration test.  
 Pressure impulse conducted at the same as the vibration test.

Test report SWRI Project 18.28527.01.001 dated on 2024-07-18  
 Test scope: Pull-out acc. to ASTM - F1387-23 – Tensile Test

**Test laboratory Crane**

Certificate of Conformance dated on 2024-04-05  
 Test scope: Repeat assembly test, static gas pressure test, burst test  
 Test report dated 2024-07-11, “Excel spread sheet with results”  
 Test Report witnessed Doc. No.: Hoke-Gyrolok -DNV-2024 dated on 2024-07-11

Miscellaneous documents :

- Type Approval Application dated on 2023-XX-XX
- Type Approval Assessment Report dated on 2024-07-11

**Tests carried out**

Tightness test, Re-assembling test, Static gas pressure and hydrostatic tests, Burst pressure test, Combined pressure impulse/vibration test, Pull-out test.

**Marking of product**

For traceability to this Type Approval the products are to be at least marked with:

Component	Scope	Example
Fitting body, Nut, Front ferrule, Back ferrule	Material	316, 316L
	Heat code	PKR, MFTR
	Tubing system metric	MM
	Tubing system inch	No indication

**Periodical assessment**

For retention of the Type Approval, a DNV Surveyor shall perform periodical assessment to verify that the conditions for the Type Approval are complied with. Refer to the Class Programme DNV-CP-0338, Section 4.

In addition, burst pressure testing on selected sizes to be carried out during renewal of the certificate.

To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>.

**Ende of Certificate**