DNV·GL

Certificate No:
TAP000004K

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings, Bite and Compression Type

with type designation(s)
Gyrolok, twin ferrule design

Issued to
Hoke Inc.
Spartanburg SC, United States

is found to comply with
DNV GL rules for classification – Ships Pt.4 Ch.6 Piping systems

Application :

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

Temperature range:	**-55 to 426 °C**
Max. working press.:	**350 to 870 bar (see table-1 & 2)**
Sizes:	**1/4", 3/8" & 1/2" (Tube material: AISI 316); DN 10, DN 12 & DN 20 (Tube material: 6Mo)**

This Certificate is valid until **2020-06-30**.
Issued at **Høvik** on **2016-03-10**

DNV GL local station: **Norfolk**

Approval Engineer: **Maheshraja Venkatesan**

for **DNV GL**

Digitally Signed By: Marveng, Marianne Spæren
Location: DNV GL Høvik, Norway
Signing Date: 10.03.2016

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.

Product description

Pipe couplings, cutting ring type with double ferrule

Materials:

- for variants specified in Table-1: AISI 316
- for variants specified in Table-2: AISI 316 & 6Mo

Configurations:-

- Standard Fittings: Male Connector (CM), Male Thermocouple Connector (CMT), Female Connector (CF), Union (U), Reducing Union (RU), Reducer (R), Male Adapter (AM), Female Adapter (AF), Port Connector and Reduced Port Connector (PC), Bulkhead Adapter (BA), Male Bulkhead Connector (BCM), Female Bulkhead Connector (BCF), Bulkhead Union (BU), Male Elbow (LM), Female Elbow (LF), Union Elbow (LU), Male Run Tee (TMT), Male Branch Tee (TTM), Female Run Tee (TFT) Female Branch Tee (TTF), Union Tee (TTT), Heat Exchanger Tee (XT), Union Cross (C), Cap (CP), Plug (P), Lapped Flange Connector (CLF), Pre-setting Tool (PST)
- Fittings with O-ring Seals: O-ring Male Connector (COM), O-ring Straight Connector (COS), O-ring Male Adapter (AOM), O-ring Straight Adapter (AOS)
- Fittings with Weld Ends: Socket Weld Connector (CW), Butt Weld Connector (CBW), Socket Weld Elbow (LW), Butt Weld Elbow (LBW)
- Fittings with AN Ends: AN Union (UAN), Bulkhead AN Union (BUAN), O-ring AN Union (UANO), AN Adapter (AAN)
- Fittings with BSP/ISO Threads: Male Connector with RP End (CM/RP), Male Connector with RS End (CM/RS), Male Connector with RT End (CM/RT), Female Connector with RG End (CF/RG), Female Connector with RT End (CF/ RT), Male Adapter with RS End (AM/RS), Male Adapter with RT End (AM/RT), Female Adapter with RG End (AF/RG), Female Adapter with RT End (AF/RT), Male Elbow with RT End (LM/RT)

Maximum allowable Working Pressure & Dimensional data for Stainless Steel Tubing at room temperature:

- **Table-1:**

Coupling material	Tube material	Tube O.D. (inch)	Tube wall thickness (inch)	Maximum allowable Working Pressure (barg)
AISI 316	AISI 316	1/4"	0.065	810
AISI 316	AISI 316	3/8"	0.065	520
AISI 316	AISI 316	1/2"	0.083	500

- **Table-2:**

Coupling material	Tube material	Diameter (mm)	Wall thickness (mm)	Maximum allowable Working Pressure (barg)
AISI 316	6Mo	20	2.5	398
AISI 316	6Mo	20	2.0	312
AISI 316	6Mo	12	2.0	547
AISI 316	6Mo	10	1.5	484
6Mo	6Mo	20	2.0	312
6Mo	6Mo	12	2.0	547
6Mo	6Mo	10	1.5	484

Application/Limitation

Couplings can be used in the following systems:

- Flammable fluids (Flash point ≤ 60 °C)
  - Cargo oil lines[5)]
  - Crude oil washing lines[5)]
  - Vent lines[3)]
- Inert Gas
  - Water seal effluent lines

  - Scrubber effluent lines
  - Main lines[2) 5)]
  - Distribution lines[5)]
- Flammable fluids (Flash point > 60°C)
  - Cargo oil lines[5)]
  - Fuel oil lines[3) 2)]
  - Lubrication oil lines[2) 3)]
  - Hydraulic oil[2) 3)]
  - Thermal oil[2) 3)]
- Fresh water
  - Cooling water system[1)]
  - Condensate return[1)]
  - Non-essential system
- Sanitary/Drains/Scuppers
  - Deck drains (internal) [1)]
  - Sanitary drains
  - Scuppers and discharge (overboard)
- Sounding/ vent
  - Water tanks/Dry spaces
  - Oil tanks (flash point > 60°C) [2) 3)]
- Miscellaneous
  - Starting/control air
  - Service air (non-essential)
  - Brine
  - CO2 system
  - Steam

Notes:
[1)] Inside machinery spaces of category A - only approved fire resistant types
[2)] Not inside machinery spaces of category A or accommodation spaces. May be accepted in other machinery spaces provided the joints are located in easily visible and accessible positions.
[3)] Approved fire resistant types
[4)] Above free board deck only
[5)] In pump rooms and open decks - only approved fire resistant types

The approval is only valid when the couplings are assembled with tubing of correct temper and tolerances as recommended by the manufacturer

Each coupling is to be hydraulic pressure tested to at 1.5 times of maximum working pressure

Pressure reduction factors at elevated temperatures & maximum metal temperatures shall be considered as per clause 3.2.2 from DNV TAP No. 5-792.20:

Temp.	20°C	50°C	100°C	150°C	200°C	250°C	300°C	350°C	400°C	426°C
Reduction factor	1	0.95	0.85	0.77	0.71	0.67	0.63	0.6	0.58	0.57

Couplings shall not be used for sea water applications & in systems having oxygen content by volume of more than 25%.

Couplings with studded ends with threads where packing is performed on threads are not accepted. When a packing ring of artificial (non-metallic) material is used, the couplings are not to be used in systems where fire resistance is required according to DNV rules Pt. 4 Ch. 6 Sec. 6 Table E3

Installation & operation of couplings shall be done in accordance with manufacturer's instructions

These couplings are not to be used on tubes in cold fabricated (hard temper) conditions

Type Approval documentation

- Manufacturer's catalogues "Hoke Gyrolok® Tube Fittings 79002R029825K0298SP Fractional sizes" and "Hoke Gyrolok® Tube Fittings 79021-R0397-25K0398SP Metric sizes"
- Test Report from Associated Testing Laboratories Inc dated 03.05.1972, test report no. NT-8562-22 and test report dated 22.12.1966
- Test report from American Environments Company Inc. No. STR-28694-1, dated 13. December 1994, (Hoke document ER-633)
- DNV's retention survey report dated 2006-12-14
- DNV's retention survey report dated 2010-09-21
- Manufacturer's catalogues Hoke Gyrolok®
- DNV report 54102165 dated 2010-12-07
- HOKE document ER-744
- Qualification test report from American environments Company Inc. STR-55610-1 dated 2011-01-13
- Manufacturer's test reports dated 2010-09-01, 2010-09-02, 2010-09-22, 2010-11-04, 2010-10-21, 2010-08-31, 2010-09-21, 2010-09-20, 2010-11-11, 2010-12-08, 2010-08-13, 2010-08-24, 2010-08-30, 2010-08-16, 2010-09-10, 2010-08-06, 2010-08-27, 2010-08-02, 2010-10-20
- Manufacturer's test reports dated 2015-06-17 & 2015-06-18
- DNV GL's renewal survey report dated 2015-06-22

Tests carried out

Type tests done according to LDNV type approval programme 5-792.20:
Leakage, repeated assembly, burst, pull-out, vibration & pressure pulsation

Marking of product

For traceability to this type approval, each coupling is at least to be marked with:

- Manufacturer's trade mark
- Type designation
- Size

Periodical assessment

For retention of the Type Approval, a DNV GL Surveyor shall perform a periodical assessment – every second year and before the expiry date of this certificate - to verify that the conditions for the type approval are complied with and to witness burst testing of samples of couplings selected at random from stock or from the running production.