

**TYPE APPROVAL CERTIFICATE****This is to certify:****That the Pipe Couplings, Bite and Compression Type**with type designation(s)  
**VR Series Tube Fittings**

Issued to

**DK Lok Corporation (ex. DK Tech Corp)**  
**Gimhae Gyungangnam-do, 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 July 2015****Application :****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**

<b>Temperature range:</b>	<b>-28 to 400 °C</b>
<b>Max. working press.:</b>	<b>351 bar (1/4"), 331 bar (3/8") &amp; 324 bar (1/2")</b>
<b>Sizes:</b>	<b>1/4" (thickness: 0.035 in.), 3/8" (thickness: 0.049 in.) &amp; 1/2" (thickness: 0.065 in)</b>

This Certificate is valid until **2020-12-03**.Issued at **Høvik** on **2015-12-04**for **DNV GL**DNV GL local station: **Gimhae MC & FIS**Approval Engineer: **Maheshraja Venkatesan**

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**for 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

- VR Series Tube Fittings - 'Hook' & 'Bushing' designs
- Materials:
  - Bar stock: Stainless steel ASTM A479 type 316 & ASTM A276 type 316

## Application/Limitation

- Couplings can be used in the following systems:
  - Flammable fluids (Flash point  $\leq 60$  °C)
    - Cargo oil lines
    - Crude oil washing lines
    - Vent lines
  - Inert Gas
    - Water seal effluent lines
    - Scrubber effluent lines
    - Main lines
    - Distribution lines
  - Flammable fluids (Flash point  $> 60$ °C)
    - Cargo oil lines
    - Fuel oil lines
    - Lubrication oil lines
    - Hydraulic oil
    - Thermal oil
  - Fresh water
    - Cooling water system
    - Condensate return
    - Non-essential system
  - Sanitary/Drains/Scuppers
    - Deck drains (internal)
    - Sanitary drains
    - Scuppers and discharge (overboard)
  - Sounding/ vent
    - Water tanks/Dry spaces
    - Oil tanks (flash point  $> 60$ °C)
  - Miscellaneous
    - Starting/control air
    - Service air (non-essential)
    - Brine
    - CO2 system
    - Steam
- 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 Type Approval Programme No. 5-792.20
- Maximum design temperature of the couplings shall be limited by the corresponding material delivery standard

## Type Approval documentation

- Manufacturer's catalogue no. VR-1 dated August 2015.
- DNV GL assessment report dated 2015-06-25

Job Id: **262.1-019955-1**  
Certificate No: **TAP0000039**

- Test reports according to 'DNV type approval programme 5-792.20, April 2010' witnessed by DNV GL Gimhae Station:
  - Pressure Pulsation test report no. TAJD-150507-002 dated 2015-05-07 & TAJD-150611-001 dated 2015-06-11
  - Vibration test report no. TAJD-150507-001 dated 2015-05-07 & TAJD-150611-002 dated 2015-05-07
  - Burst test report no. TAJD-150416-003 dated 2015-04-16
  - Pull out test report no. TAJD-150420-001 dated 2015-04-20
  - Tightness test report no. TAJD-150416-001 dated 2015-04-16
  - Repeated assembly test report no. TAJD-150416-002 dated 2015-04-16

### **Tests carried out**

The following tests are carried out in accordance with Type Approval Programme No. 5-792.20: Leakage, repeated assembly, burst, vibration & pressure pulsation, pull-out

### **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.

### **END OF CERTIFICATE**