

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings, Bite and Compression Type

with type designation(s)
POWERLOK

Issued to

SHINHWHA HI-TEC CO.,LTD.
Busan, Korea, Republic of

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: **-60 °C to 550 °C (see page 2 for more details)**
Max. working press.: **300 bar**
Sizes: **Tube OD: 1/8" to 1" (3mm to 18mm), see page 2**

Issued at **Høvik** on **2023-04-19**

This Certificate is valid until **2028-04-18**.

for **DNV**

DNV local unit: **Gimhae Station**

Approval Engineer: **Sarah Miller**

Zeinab Sharifi
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

POWERLOK – Bite-type compression tube fittings with following configurations:

Symbol	Item Name	Symbol	Item Name
R	Reducer	G-MAO*	Male Adapter O-Ring BSP Parallel Threaded
U	Straight Union	N-FA	Female Adapter NPT Threaded
RU	Reducing Union	R-FA	Female Adapter BSP Taper Threaded
BU	Bulkhead Union	G-FA	Female Adapter BSP Parallel Threaded
N-MC	Male Connector NPT Threaded	UE	Union Elbow
R-MC	Male Connector BSP Taper Threaded	N-ME	Male Elbow NPT Threaded
G-MC	Male Connector BSP Parallel Threaded	R-ME	Male Elbow Taper Threaded
N-BMC	Bulkhead Male Connector NPT Threaded	TSWE	Tube Socket Welding Elbow
U-MC	Male Connector SAE/MS Straight Threaded	N-FE	Female Elbow NPT Taper Threaded
U-MCO*	Male Connector O-Ring SAE/MS Threaded	R-FE	Female Elbow BSP Taper Threaded
G-GC	Gauge Connector BSP Parallel Threaded	UT	Union Tee
N-FC	Female Connector NPT Threaded	RT	Reducing Tee
R-FC	Female Connector BSP Taper Threaded	MRT	Male Run Tee Run NPT Threaded
N-MA	Male Adapter NPT Threaded	MBT	Male Branch Tee Branch NPT Threaded
R-MA	Male Adapter BSP Parallel Threaded	FRT	Female Run Tee Run NPT Threaded
G-MA	Male Adapter BSP Parallel Threaded	FBT	Female Branch Tee Branch NPT Threaded

* comprises of non-metallic O-rings

Material of construction:

Component	Material grade	Standard
Fitting body, nut, front and back ferrules	316/ 316L	ASTM A276 or A479 (bar stock) ASTM 182 (forgings)
O-ring sealing	FKM, PTFE, NBR	

Sizes covered

- Inches - 1/8", 3/16", 1/4", 5/16", 3/8", 1/2", 5/8", 3/4", 7/8" and 1"
- Metric(mm) – 3, 4, 6, 8, 10, 12, 14, 15, 16 and 18

Temperature range is depending on the material used:

Type	Material	Temperature range	Type	Material	Temperature range
Body	316	-60 °C to 550 °C	Sealing	FKM	-20 °C to 180 °C
				NBR	-23 °C to 120 °C
	316L	-60 °C to 400 °C		PTFE	-60 °C to 240 °C

Application/Limitation

Couplings covered by this certificate are approved to be used in class I, II, and III piping systems according to the latest requirements of governing rules in following applications:

- | | |
|---|--|
| <p>1) Flammable fluids (flash point $\leq$ 60°C)</p> <ul style="list-style-type: none"> - Cargo oil lines ⁽¹⁾ - Crude oil washing lines ⁽¹⁾ - Vent lines ⁽³⁾ <p>2) Inert gas</p> <ul style="list-style-type: none"> - Water seal effluent lines - Scrubber effluent lines - Main lines ⁽¹⁾ - Distributions lines ⁽¹⁾ <p>3) Flammable fluids (flash point > 60°C)</p> <ul style="list-style-type: none"> - Cargo oil lines ⁽¹⁾ - Fuel oil lines ⁽²⁾ - Lubricating oil lines ⁽²⁾ - Hydraulic oil ⁽²⁾ - Thermal oil ⁽²⁾ | <p>4) Fresh water</p> <ul style="list-style-type: none"> - Cooling water system ⁽³⁾ - Condensate return ⁽³⁾ - Non-essential system <p>5) Sanitary/drains/scuppers</p> <ul style="list-style-type: none"> - Deck drains (internal) ⁽⁴⁾ - Sanitary drains - Scuppers and discharge (overboard) <p>6) Sounding/vent</p> <ul style="list-style-type: none"> - Water tanks/dry spaces - Oil tanks (f.p. > 60°C) ⁽²⁾ <p>7) Miscellaneous</p> <ul style="list-style-type: none"> - Starting/control air ⁽³⁾ - Service air (non-essential) - Brine - CO₂ system (outside protected space) - CO₂ system (inside protected space) |
|---|--|

- Steam

Pipe couplings without O-rings covered by this certificate are of 'approved fire resistant' types whereas the ones with O-rings shall not be used in systems where fire resistance is required:

- 1) Approved fire resistant types to be used when mechanical joints are installed in pump rooms and open decks.
- 2) 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.
- 3) Approved fire resistant types shall be applied when mechanical joints are installed in machinery spaces of category A.
- 4) Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.

Materials chosen for the specific system shall be suitable for the intended medium and environmental conditions. Mechanical joints covered by the approval are not considered a seawater resistant material and shall not be used in direct contact with seawater.

Pipe minimum wall thickness shall be as per DNV-RU-SHIP Pt.4 Ch.6 Sec.9 [1.2.1]. Requirements for pipe material are further defined in DNV-RU-SHIP Pt.4 Ch.6 Sec.2 [1.8.1].

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

Couplings covered by this certificate shall not be installed in systems subject to pressure below atmospheric or vacuum conditions.

Maximum allowable working pressure: 300 bar(g)

Design temperature range: -55 degree C to 550 degree C

At elevated temperatures the maximum pressure shall be reduced as per factors in DNV-CP-0185 Sec.2 [Table 1].

Threaded connections where pressure-tight joints are made on the threads with parallel or tapered threads shall not be used for piping systems conveying toxic or flammable media or services where fatigue, severe erosion or crevice corrosion is expected to occur. For other applications threaded connections with pressure-tight joints on threads may be used for outside diameters:

- In CO₂ systems shall be allowed only inside protected spaces and in CO₂ cylinder rooms
- Threaded joints for direct connectors of pipe lengths with tapered thread shall be allowed for class I applications only when the outside diameter not more than 33.7 mm
- Threaded joints with parallel thread shall be allowed only for class III systems

Type Approval documentation

Tests carried out

Tightness, repeated assembly, burst pressure, pull-out, combined vibration, and pressure pulsation tests.

Marking of product

For traceability to this type-approval, each fitting is to be marked with:

- Manufacturer's name or trademark
- 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.