

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings

with type designation(s)

PYPLOK Connector DM series (DM20, DM60, DM80), PYPLOK Connector DP40N series

Issued to

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

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 January 2018

DNV GL class programme DNVGL-CP-0185 – Type approval – Mechanical joints

Application :

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

Type:	Temperature range:	Max. working press.:	Sizes:
PYPLOK Connector DM series (DM20, DM60, DM80)	-20°C to +200°C (dependent on the sealing)	215 bar to 483 bar (dependent on the material, size & type)	1/4" to 2" (DM20 and DM60) - 6 to 60 mm (DM80)
PYPLOK Connector DP40N series	-20°C to +200°C (dependent on the sealing)	25 bar - 35 bar (dependent on the size)	2 1/2" - 3" - 4"

Issued at **Høvik** on **2018-10-29**

for **DNV GL**

This Certificate is valid until **2021-12-31**.

DNV GL local station: **Montreal**

Approval Engineer: **Adel Samiei**

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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.



Job Id: **262.1-028341-1**
 Certificate No: **TAP0000021**
 Revision No: **1**

Product description

Compression swage type coupling with 2 O-ring seals at each end. Fire tested in accordance with ISO19921/2.

Materials: Carbon steel ASTM A350 Gr.LF2 Class 1
 Stainless steel ASTM A479 Gr.316, S32205, S32750, S31803
 70/30 CuNi, Alloy C71500

Application/Limitation

Maximum working pressure:

Size	DM20		
	Stainless Steel	Carbon Steel	Copper Nickel 70/30
1/4"	415 bar	345 bar	269 bar
3/8"	415 bar	345 bar	269 bar
1/2"	407 bar	339 bar	264 bar
5/8"	-	-	-
3/4"	400 bar	333 bar	260 bar
1"	393 bar	328 bar	255 bar
1 1/4"	390 bar	325 bar	253 bar
1 1/2"	390 bar	325 bar	253 bar
2"	330 bar	276 bar	215 bar

Size	DP40N series		
	Stainless Steel	Carbon Steel	Copper Nickel 70/30
2 1/2"	35 bar	35 bar	25 bar
3"	35 bar	35 bar	25 bar
4"	35 bar	35 bar	-

Size	DM60		
	Stainless Steel	Carbon Steel	Copper Nickel 70/30
1/4"	483 bar	402 bar	313 bar
3/8"	400 bar	333 bar	260 bar
1/2"	420 bar	350 bar	273 bar
5/8"	420 bar	350 bar	273 bar
3/4"	414 bar	345 bar	269 bar
1"	400 bar	333 bar	260 bar
1 1/4"	400 bar	333 bar	260 bar
1 1/2"	390 bar	325 bar	253 bar
2"	330 bar	275 bar	215 bar

Size	DM80		
	Stainless Steel	Carbon Steel	Copper Nickel 70/30
6	450 bar	375 bar	390 bar
8	430 bar	355 bar	370 bar
10	415 bar	345 bar	360 bar
12	400 bar	335 bar	345 bar
15	400 bar	335 bar	-
16	400 bar	335 bar	345 bar
18	310 bar	260 bar	-
20	390 bar	325 bar	335 bar
22	305 bar	255 bar	-
25	390 bar	325 bar	335 bar
28	300 bar	325 bar	-
30	390 bar	325 bar	335 bar
35	295 bar	245 bar	-
38	390 bar	325 bar	335 bar
42	390 bar	325 bar	335 bar
50	350 bar	295 bar	305 bar
60	330 bar	275 bar	285 bar

Couplings covered by this certificate may be used in piping classes I, II and III in below applications:

- | | |
|---|--|
| <ol style="list-style-type: none"> 1) Flammable fluids (flash point ≤ 60°C) <ul style="list-style-type: none"> - Vent lines - Cargo oil lines ⁽¹⁾ - Crude oil washing lines ⁽¹⁾ 2) Inert gas <ul style="list-style-type: none"> - Water seal effluent lines - Scrubber effluent lines - Main lines ⁽¹⁾⁽³⁾ - Distributions lines ⁽¹⁾ 3) Flammable fluids (flash point > 60°C) <ul style="list-style-type: none"> - Cargo oil lines ⁽¹⁾⁽³⁾ - Fuel oil lines ⁽³⁾ - Lubricating oil lines ⁽³⁾ - Hydraulic oil ⁽³⁾ - Thermal oil ⁽³⁾ 4) Fresh water <ul style="list-style-type: none"> - Cooling water system - Condensate return - Non-essential system 5) Sounding/vent <ul style="list-style-type: none"> - Water tanks/Dry spaces - Oil tanks (f.p. > 60°C) ⁽³⁾ | <ol style="list-style-type: none"> 6) Sea water ⁽²⁾ <ul style="list-style-type: none"> - Bilge lines - Water filled fire extinguishing systems, e.g. sprinkler systems - Non water filled fire extinguishing systems, e.g. foam, drencher systems - Fire main (not permanently filled) - Ballast system - Cooling water system - Tank cleaning services - Non-essential systems 7) Sanitary/drains/scuppers <ul style="list-style-type: none"> - Deck drains (internal) ⁽⁴⁾ - Sanitary drains - Scuppers and discharge (overboard) 8) Miscellaneous <ul style="list-style-type: none"> - Starting/Control air - Service air (non-essential) - Brine - CO2 system - Steam |
|---|--|

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- (1) Only in pump rooms and open decks
(2) Please consider that Carbon Steel and Stainless steel grade 316 are not seawater resistant materials and shall not be used in seawater applications.
(3) 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.
(4) Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.

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

Perbunan: -20°C to 180°C
Viton: -20°C to 200°C
EPDM: -20°C to +200°C (*)

(*) EPDM shall not be used in hydrocarbon services.

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

Temp.	20°C	50°C	100°C	150°C	200°C
Carbon Steel ASTM A350 Gr.LF2	1	1	1	0,89	0,81
Stainless Steel A479 Gr.316, S32205, S32750, S31803	1	0,95	0,85	0,77	0,71
Cu/Ni 70/30, C71500	1	0,97	0,96	0,92	0,87

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

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

Type Approval documentation

Tube-mac Catalogue for PYPLOK dated April-2017

Leakage test reports C5126A dated 2009-07-31 & C7513A dated 2009-08-01

Gas Leakage test reports C5126C & C7513C dated 2009-08-01

Burst pressure test reports C5126B dated 2009-07-31 & C7513B dated 2009-08-01

Impulse test reports C5126D & C7513D dated 2009-08-01

Vibration test reports C5126E & C7513E dated 2009-08-01

Southwest research institute fire test report 01.14432.01.205a dated 2009-04-27 & 01.14432.01.205b dated 2009-05-19 & 01.17787.01.802 dated 2013-03-14

Southwest research institute pull out test report 18.18055.16.612 dated 2016-10-11

Burst Pressure test & Leakage test report witnessed by DNVGL surveyor dated 2018-04-13 (DP40N – 4")

Pull-out test report SwRI 18.18055.18.108 witnessed by DNV GL surveyor dated 2018-03-21 (DP40N – 4")

Fire test report SwRI 01.23234.18.402 dated 2018-04-13 (DP40N – 4")

Vibration and impulse test report dated 2018-10-01 (DP40N – 4")

Tests carried out

Leakage test, burst pressure test, Hydraulic proof test, impulse test, vibration test, fire test, pull-out test

Marking of product

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

- Manufacturers name or trademark
- Size

Periodical assessment

For retention of the Type Approval, a DNV GL 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 DNVGL-CP-0338.

SURVEY REPORT

Report No:
N14073ND

Particulars of Product

Product Name: 4" Pyplok
 Type designation: DP40N100K64 and DP40N100G64
 Application/context: Witness of Pressure/Burst Test
 Serial/Tag no: N.A.

Particulars of Vendor and Purchaser

Vendor: Hydra Pipe AS
 Vendor reference: 31181
 Purchaser: N.A.
 Purchaser reference: N.A.

The product is intended for: N.A.

Requirements are based on: Customer Specification

Refer to page two for further details.

Issued at **Stavanger** on **2015-04-10**



for **DNV GL**
 This document has been digitally signed and will therefore not have handwritten signatures.
Dehn, Haakon Tobias Bull
Surveyor

Extent

This is to certify that the undersigned Surveyor did, at the request of Hydra Pipe AS, attend IKM Testing's, workshop at Sola in order to witness pressure testing of the above mentioned equipment.

Result

The equipment was tested in accordance with customer specification. No leaks or deformations was observed during the proof pressure test. The burst pressure test resulted in a burst exceeding minimum burst pressure. For details regarding Hydra Pipes testing, reference is made to IKM pressure charts. Survey was completed on 2015-04-08.

Product parameters:

Parameter name	Value	Unit
Working Pressure	500	PSI
Proof Pressure	750	PSI
Minimum Burst Pressure	2000	PSI

Report

The following has been Witnessed:

- Proof pressure at 1.5 working pressure with a hold time of 30 minutes
- Burst test with calculated minimum burst pressure of 2000 PSI
 - DP40N100G64 burst pressure: 6305 PSI
 - DP40N100K64 burst pressure: 7390 PSI
- Pressure/temperature transmitters calibration were verified