TYPE APPROVAL CERTIFICATE

Certificate No:
TAP00000KN
Revision No:
4

This is to certify:

That the Pipe Couplings

with type designation(s)
Pipe couplings with retaining ring connection

Issued to
I.M.M. Hydraulics S.p.A.
Atessa, CH, Italy

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:	**-40°C to +200°C (see page 3)**
Max. working press.:	**50 bar to 420 bar (see page 3)**
Sizes:	**1/2" to 10" (see page 3)**

Issued at **Høvik** on **2024-01-11**

This Certificate is valid until **2028-06-29**.
DNV local unit: **Italy/Malta CMC**

Approval Engineer: **Maheshraja Venkatesan**

for **DNV**
Digitally signed by Bosman van der Merwe

Bosman van der Merwe
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 with retaining ring connection

Material of construction:

Flanges	:	Carbon steel: S355, P355NL1, 1.7225 4145H Stainless steel: 1.4401, 1.4404, 1.4462 (UNS S32205) from EN 10028-7
Piping connection	:	P235GH, ASTM A106 gr. B, E235 and E355 Stainless steel: 1.4401, 1.4404, 1.4462 (UNS S32205) from EN 10028-7 Duplex stainless steel: ASTM A928 (UNS S32760) from EN 10028-7
Retaining ring	:	Stainless steel: 1.4401, 1.4404 from EN 10088-2,1.4310 from EN 10270-3
Sealing material	:	NBR, FKM90, S355J2+N

Application/Limitation

Couplings covered by this certificate are approved to be used according to the latest requirements of governing rules in following applications:

Systems		***Classification of Piping system***	***Approved fire resistant type[6)]***	***Non-fire resistant type***
Flammable fluids (flash point ≤ 60 °C)				
1.	Cargo oil lines	dry	+[1)]	+[1)]
2.	Crude oil washing lines	dry	+[1)]	+[1)]
3.	Vent lines	dry	+[2)]	+[2)]
Inert gas				
4.	Water seal effluent lines	wet	+	NP
5.	Scrubber effluent lines	wet	+	NP
6.	Main lines	dry	+[1)]	+[1)]
7.	Distribution lines	dry	+[1)]	+[1)]
Flammable fluids (flash point > 60 °C)				
8.	Cargo oil lines	dry	+[1)]	+[1)]
9.	Fuel oil lines	wet	+	+[2)]
10.	Lubricating oil lines	wet	+	+[2)]
11.	Hydraulic oil	wet	+	+[2)]
12.	Thermal oil	wet	+	+[2)]
Seawater[5)]				
13.	Bilge lines	dry/wet	+[3)]	+[3)]
14.	Water filled fire extinguishing systems, e.g. sprinkler systems	wet	+	+[2)]
15.	Non water filled fire extinguishing systems, e.g. foam, drencher systems	dry/wet	+[2)]	+[2)]
16.	Fire main (not permanently filled)	dry/wet	+[2)]	+[2)]
17.	Ballast system	wet	+	+[3)]
18.	Cooling water system	wet	+	+[3)]
19.	Tank cleaning services	dry	+	+
20.	Non-essential systems	dry, dry/wet, wet	+	+
Fresh water				
21.	Cooling water system	wet	+	+[3)]
22.	Condensate return	wet	+	+[3)]
23.	Non-essential systems	dry, dry/wet, wet	+	+
Sanitary/drains/scuppers				
24.	Deck drains (internal)	dry	+[4)]	+[4)]
25.	Sanitary drains	dry	+	+
26.	Scuppers and discharge (overboard)	dry	+	+
Sounding/vent				
27.	Water tanks/dry spaces	dry/wet	+	+
28.	Oil tanks (f.p > 60 °C)	dry	+[2)]	+[2)]

Systems		***Classification of Piping system***	***Approved fire resistant type[6)]***	***Non-fire resistant type***
Miscellaneous				
29.	Starting/control air	dry	+[3)]	+[3)]
30.	Service air (non-essential)	dry	+	+
31.	Brine	wet	+	+
32.	CO_2 system (outside protected space)	dry	NP	NP
33.	CO_2 system (inside protected space)	dry	NP	NP
34.	Steam	wet	+	+

Abbreviations

+ Application permitted (with limitations, if any, as in the footnotes below)
NP Application not permitted

Footnotes

1) Not permitted when mechanical joints are installed in pump rooms and open decks.
2) Not permitted 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) Not permitted when mechanical joints are installed in machinery spaces of category A.
4) Permitted only above bulkhead deck of passenger ships and freeboard deck of cargo ships.
5) Couplings made of specific material grade 1.4462 (UNS S32205) only are allowed in sea water systems, and only at room temperature conditions.
6) *Approved fire-resistant types* as per this certificate are those couplings of various sizes and types as provided in Table 1 below that are allowed to be used in wet piping systems fulfilling fire testing at '30 min wet' conditions as per DNV-RU-SHIP Pt.4 Ch.6 Sec.9 Table 9.

The temperature range is dependent on the sealing material as follows:
NBR : -25 to +100 °C
FKM90 : -40 to +200 °C

Table 1: Maximum working pressure [MWP]:

Type	Size ["]	Pipe OD (mm)		MWP [bar]
		'Schedule series'	'Metric size'	
308	½	21.3	26	350
608	½	21.3	26	420
312	¾	26.7	36	350
612	¾	26.7	36	420
316	1	33.4	39	350
616	1	33.4	39	420
320	1 ¼	42.4	46	280
620	1 ¼	42.4	42.4	420
124	1 ½	48.3	50	50
324	1 ½	48.3	56	280
424	1 ½	48.3	50	400
624	1 ½	42.4	46	420
132	2	60.3	60	50
332	2	60.3	66	280
432	2	60.3	66	400
632	2	60.3	66	420
140	2 ½	73	73	50
340	2 ½	73	80	210
440	2 ½	73	80	400
148	3	88.9	90	50
348	3	88.9	97	210
448	3	88.9	97	400
156	3 ½	101.6	100	50
164	4	114.3	115	50
456	4	114.3	115	345

Type	Pipe OD (mm)		Size ["]	MWP [bar]
	'Schedule series'	'Metric size'		
GS210SH15	½	21.3	26	210
GS210SS15	½	21.3	26	210
GS280K15	½	21.3	26	280
GS350K15	½	21.3	26	350
GS210SH20	¾	26.7	36	210
GS210SS20	¾	26.7	36	210
GS280K20	¾	26.7	36	280
GS350K20	¾	26.7	36	350
GS210SH25	1	33.4	39	210
GS210SS25	1	33.4	39	210
GS280K25	1	33.4	39	280
GS350K25	1	33.4	39	350
GS210SH32	1 ¼	42.4	46	210
GS210SS32	1 ¼	42.4	46	210
GS280K32	1 ¼	42.4	46	280
GS350K32	1 ¼	42.4	46	350
GS210SH40	1 ½	48.3	56	210
GS210SS40	1 ½	48.3	56	210
GS280K40	1 ½	48.3	56	280
GS350K40	1 ½	48.3	56	350
GS210SH50	2	60.3	66	210
GS210SS50	2	60.3	66	210
GS280K50	2	60.3	66	280
GS350K50	2	60.3	66	350
GS210SH65	2 ½	73	73	210

Type	Size [“]	Pipe OD (mm)		MWP [bar]
		‘Schedule series’	‘Metric size’	
860	4 ½	130	130	350
180	5	139.7	140	50
864	5	139.7	150	350
196	6	168.3	165	50
880	6	168.3	190	280
228	8	219.1	220	50
888	8	219.1	220	350
896	8	250	250	350
260	10	273	273	50
8160	10	273	273	250/ 350*

Type	Pipe OD (mm)		Size [“]	MWP [bar]
	‘Schedule series’	‘Metric size’		
GS210SS65	2 ½	73	80	210
GS280K65	2 ½	73	80	280
GS350K65	2 ½	73	80	350
GS210SH80	3	88.9	97	210
GS210SS80	3	88.9	97	210
GS280K80	3	88.9	97	280
GS350K80	3	88.9	97	350

* Type 8160 with increased pressure of 350 bar is allowed only in systems where no pressure pulsation or fire resistance is required

Materials and material protection chosen for the specific system shall be suitable for the intended medium and environmental conditions. For elevated temperatures, pressure reduction factors as specified in DNV-CP-0185 Sec.2 shall be followed.

The approval is only valid when the couplings are assembled with tubing of correct temper and tolerances as recommended by the manufacturer. These couplings should not be used on tubes in cold fabricated (hard temper) conditions.

For low temperature applications, impact testing requirements as given in relevant chapters of DNV-RU-SHIP Pt.2 Ch.2 shall be followed for the corresponding piping components (E.g., flanges & bolting)

The installation of mechanical joints is to be in accordance with the manufacturer’s assembly instructions.

Type Approval documentation

Catalogue 8990306602 ‘GS-FLANGE SYSTEM’ Revision February 2016
Technical data sheet for: GS-JIS F7806 350K retain ring flanges, GS-JIS F7806 280K retain ring flanges & GS-JIS B2291 SH/SS retain ring flanges
Material data sheet for gasket FKM90: M01010000056-en_08.04.2016
Test reports:-

- Repeated assembly test for Type 124 dated 16.02.2010 witnessed by Surveyor
- Repeated assembly test for Type 312 dated 11.06.2010 witnessed by Surveyor
- Repeated assembly test for type 608 under drawing no. 2017-011-98 dated 2018-09-04
- Repeated assembly test for Type 632 dated 11.06.2010 witnessed by Surveyor
- Repeated assembly test for Type 164 dated 28.04.2010 witenssed by Surveyor
- Burst test dated 11.06.2010 witnessed by Surveyor
- Burst test for type 124 dated 16.02.2010 witnessed by Surveyor
- Burst test for Type 164 dated 28.04.2010 witnessed by Surveyor
- Burst test for Type 312 dated 11.06.2010 witnessed by Surveyor
- Burst test for type 612 under drawing no. 2017-011-80 witnessed by DNV Surveyor dated 2018-09-04
- Burst test for type 880 under drawing no. 2017-011-87 witnessed by DNV Surveyor dated 2018-09-04
- Burst test for type 348 dated 28.04.2010 witnessed by Surveyor
- Burst test for type 448 dated 11.06.2010 witnessed by Surveyor
- Burst test for type 456 under drawing no. 2017-011-82 witnessed by DNV Surveyor dated 2018-09-04
- Burst test report no. 2014XF206 witnessed by RINA dated 2014-08-26
- Fire test report no. VTT-S-4647-09, VTT-S-3335-09
- Leakage test after fire dated 2009-02-10, 2009-03-20 and 2009-05-20
- Leakage test after fire dated 2011-03-31
- Vibration & impulse test report no. VTT-S-03301-18
- Vibration & pressure impulse test no. VTT-S-04947-18
- Vibration & pressure impulse test report no. 2A2010-0422 dated 2010-12-29
- Tightness and Pull out test report no. S-04482-18
- Pull out test report no. VTT-S-02319-10 dated 2010-03-22

Authorization letter QA016/18 for change of ownership from GS Hydro to IMM Hydraulics
‘Statement of specimen tightness tests’ from Eurofins Expert Services Oy dated 2019-01-11
'Statement' from DNV Surveyor related to witnessed tests dated 2019-01-17
Documentation related to Type 8160 350 bar pressure connection:

- Report No.: 2021-3170, Rev. 0 - FEA FOR RETAIN RING FLANGE 10INCH CONNECTIONS - FE analysis of retain ring flange
- Drawings: 30660004 dated 2020-02-10, 715160001 dated 2015-03-30, 31516003 Rev. B dated 2020-02-06, 715160005 Rev. B dated 2015-03-30, 2020-01-007 dated 2020-02-29, 2020-01-005 dated 2020-02-28, 2020-01-009 dated 2020-04-02.
- Material test no. 388705 and PM 29136/14
- Renewal burst test reports 2023-009-01, 2023-002-01 and 2023-010-01 witnessed by DNV dated 2023-07-11

Tests carried out

Tightness, Repeated assembly, Burst, Pull-out, fire, impulse and vibration.

Marking of product

For traceability to this type approval, the couplings are at least to be marked with:

- manufacturer's name or trade mark
- type designation
- 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.