

TYPE APPROVAL CERTIFICATE**This is to certify:****That the Pipe Couplings**with type designation(s)
37° flared flanged connections

Issued to

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

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.****Temperature range:** -40°C to +200°C (see page 2)
Max. working press.: 50 bar to 420 bar (see page 2)
Sizes: 1/2" to 10" (see page 2)Issued at **Høvik** on **2019-02-11**for **DNV GL**This Certificate is valid until **2023-06-30**.DNV GL local station: **Helsinki**Approval Engineer: **Maheshraja Venkatesan****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: **262.1-021477-3**
 Certificate No: **TAP00000KM**
 Revision No: **1**

Product description

37° Flared Flange Connection – compression coupling flared type.

Material of construction for flanges:

- Carbon steel: S355, P355NL1
- Stainless steel: 1.4401, 1.4404, 1.4462 (UNS S32205) from EN 10028-7

Material of construction for flared tube:

- P235GH, ASTM A106 gr. B, E235 and E355
- Stainless steel: AISI 316, 1.4462 (UNS S32205) from EN 10028-7

Sealing material: NBR & FKM90

Application/Limitation

Maximum working pressure (MWP) details:

| Type | Size ["] | Pipe OD (mm) | | MWP [bar] |
|---------|-------------|----------------------|------------------|--------------|
| | | 'Schedule series' | 'Metric size' | |
| 308F | ½ | 21.3 | 25 | 350 |
| 608F | ½ | 21.3 | 25 | 350 |
| 312F | ¾ | 26.7 | 30 | 350 |
| 612F | ¾ | 26.7 | 30 | 420 |
| 316F | 1 | 33.4 | 38 | 350 |
| 616F | 1 | 33.4 | 38 | 420 |
| 320F | 1 ¼ | 42.4 | 42 | 280 |
| 620F | 1 ¼ | 42.4 | 42/46 | 420 |
| 124F | 1 ½ | 48.3 | 50 | 50 |
| 324F | 1 ½ | 48.3 | 50 | 280 |
| 624F | 1 ½ | 48.3 | 50/56 | 420 |
| 132F | 2 | 60.3 | 60 | 50 |
| 332F | 2 | 60.3 | 60 | 280 |
| 432F | 2 | 60.3 | 60/66 | 350 |
| 632F | 2 | 60.3 | 60/66 | 420 |
| 140F | 2 ½ | 73 | 73 | 50 |
| 340F | 2 ½ | 73 | 73 | 210 |
| 440F | 2 ½ | 73 | 73 | 350 |
| 148F | 3 | 88.9 | 90 | 50 |
| 348F | 3 | 88.9 | 90 | 210 |
| 448F | 3 | 88.9 | 90 | 350 |
| 156F | 3 ½ | 101.6 | 100 | 50 |
| 164F | 4 | 114.3 | 115 | 50 |
| 164-64F | 4 | 114.3 | 115 | 64 |
| 456F | 4 | 114.3 | 115 | 350 |
| 180F | 5 | 139.7 | 140 | 50 |
| 180-64F | 5 | 139.7 | 140 | 64 |
| 196F | 6 | 168.3 | 165 | 50 |
| 196-64F | 6 | 168.3 | 165 | 64 |
| 228F | 8 | 168.3 | 165 | 50 |
| 228-64F | 8 | 168.3 | 165 | 64 |
| 260F | 10 | 273 | 273 | 50 |

| Type | Size ["] | Pipe OD (mm) | | MWP [bar] |
|------------|-------------|----------------------|------------------|--------------|
| | | 'Schedule series' | 'Metric size' | |
| GS210SH15F | ½ | 21.3 | 25 | 210 |
| GS210SS15F | ½ | 21.3 | 25 | 210 |
| GS280K15F | ½ | 21.3 | 25 | 280 |
| GS350K15F | ½ | 21.3 | 25 | 350 |
| GS210SH20F | ¾ | 26.7 | 30 | 210 |
| GS210SS20F | ¾ | 26.7 | 30 | 210 |
| GS280K20F | ¾ | 26.7 | 30 | 280 |
| GS350K20F | ¾ | 26.7 | 30 | 350 |
| GS210SH25F | 1 | 33.4 | 38 | 210 |
| GS210SS25F | 1 | 33.4 | 38 | 210 |
| GS280K25F | 1 | 33.4 | 38 | 280 |
| GS350K25F | 1 | 33.4 | 38 | 350 |
| GS210SH32F | 1 ¼ | 42.4 | 42 | 210 |
| GS210SS32F | 1 ¼ | 42.4 | 42 | 210 |
| GS280K32F | 1 ¼ | 42.4 | 42/46 | 280 |
| GS350K32F | 1 ¼ | 42.4 | 42/46 | 350 |
| GS210SH40F | 1 ½ | 48.3 | 50 | 210 |
| GS210SS40F | 1 ½ | 48.3 | 50 | 210 |
| GS280K40F | 1 ½ | 48.3 | 50/56 | 280 |
| GS350K40F | 1 ½ | 48.3 | 50/56 | 350 |
| GS210SH50F | 2 | 60.3 | 60 | 210 |
| GS210SS50F | 2 | 60.3 | 60 | 210 |
| GS280K50F | 2 | 60.3 | 60/66 | 280 |
| GS350K50F | 2 | 60.3 | 60/66 | 350 |
| GS210SH65F | 2 ½ | 73 | 73 | 210 |
| GS210SS65F | 2 ½ | 73 | 73 | 210 |
| GS280K65F | 2 ½ | 73 | 73 | 280 |
| GS350K65F | 2 ½ | 73 | 73 | 275 |
| GS210SH80F | 3 | 88.9 | 90 | 210 |
| GS210SS80F | 3 | 88.9 | 90 | 210 |
| GS280K80F | 3 | 88.9 | 90 | 280 |
| GS350K80F | 3 | 88.9 | 90 | 350 |

The temperature range is dependant on the sealing material as follows:

NBR : -25 to +100 °C
 Viton : -40 to +200 °C

Job Id: **262.1-021477-3**
 Certificate No: **TAP00000KM**
 Revision No: **1**

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

| | |
|---|--|
| <p>1) Flammable fluids (flash point ≤ 60°C)</p> <ul style="list-style-type: none"> - Cargo oil lines ⁽²⁾ - Crude oil washing lines ⁽²⁾ - Vent lines <p>2) Inert gas</p> <ul style="list-style-type: none"> - Water seal effluent lines - Scrubber effluent lines - Main lines ⁽¹⁾⁽²⁾ - Distributions lines ⁽²⁾ <p>3) Flammable fluids (flash point > 60°C)</p> <ul style="list-style-type: none"> - Cargo oil lines ⁽²⁾ - Fuel oil lines ⁽¹⁾ - Lubricating oil lines ⁽¹⁾ - Hydraulic oil ⁽¹⁾ - Thermal oil ⁽¹⁾ <p>4) Sea water ⁽⁴⁾</p> <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 | <p>5) Fresh water</p> <ul style="list-style-type: none"> - Cooling water system - Condensate return - Non-essential system <p>6) Sanitary/drains/scuppers</p> <ul style="list-style-type: none"> - Deck drains (internal) ⁽³⁾ - Sanitary drains - Scuppers and discharge (overboard) <p>7) Sounding/vent</p> <ul style="list-style-type: none"> - Water tanks/dry spaces - Oil tanks (f.p. > 60°C) ⁽¹⁾ <p>8) Miscellaneous</p> <ul style="list-style-type: none"> - Starting/control air - Service air (non-essential) - Brine - CO₂ system - Steam |
| <p>(1) 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.</p> <p>(2) Only in pump rooms and open decks</p> <p>(3) Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.</p> <p>(4) Couplings made of specific material grade 1.4462 (UNS S32205) only are allowed in sea water systems, and only at room temperature conditions.</p> | |

Materials chosen for the specific system shall be suitable for the intended medium and environmental conditions.

This 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 GL Pt. 2 Ch. 2 shall be followed for the corresponding piping components (E.g., Flanges, bolts & nuts).

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

Job Id: **262.1-021477-3**
Certificate No: **TAP00000KM**
Revision No: **1**

Type Approval documentation

Catalogue 8990306602 'GS-FLANGE SYSTEM' Revision February 2016

Technical data sheet for: GS-JIS F7806 280K 37° flare flanges, GS-JIS F7806 350K 37° flare flanges, GS-JIS B2291 SH/SS 37° flare flanges, ISO 6162-1 64 bar 37° flare flanges & ISO 6164 GS-37° flare flange connections

Material data sheet for gasket FKM90: M01010000056-en_08.04.2016

Test reports:

Test Report No . VTT-S-10268-10

Tightness and pull-out test no. S-04482-18

Impulse & vibration test report no. VTT-S-03301-18

Test report dated 31.03.2011 witnessed by DNV Helsinki

Burst test report dated 31.03.2011 witnessed by DNV Helsinki

Burst test for type 456F under drawing 2017-011-88 witnessed by DNVGL Surveyor dated 2018-09-04

Burst test for type GS350K65F73 under drawing 2017-011-85 witnessed by DNVGL Surveyor dated 2018-09-04

Burst test for type 196-64F under drawing 2017-011-86 witnessed by DNVGL Surveyor dated 2018-09-03

Burst test for type 260F under drawing 2017-011-90 witnessed by DNVGL Surveyor dated 2018-09-19

Fire test report nos. VTT-S-2789-11, VTT-S-4647-09, VTT-S-3335-09

Burst test report for 612F under drawing no. 2017-011-92 witnessed by DNV GL Surveyor dated 2018-12-19

Burst test report for 424F under drawing no. 2017-011-91 witnessed by DNV GL Surveyor dated 2018-12-19

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 GL Surveyor related to witnessed tests dated 2019-01-17

Tests carried out

Tightness, burst, fire, Pull out, impulse and vibration.

Marking of product

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

- Manufacturers name or trade mark
- Type designation
- 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.

TYPE APPROVAL CERTIFICATE**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 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.****Temperature range: -40°C to +200°C (see page 3)****Max. working press.: 50 bar to 420 bar (see page 2)****Sizes: 1/2" to 10" (see page 2)**Issued at **Høvik** on **2019-02-04**for **DNV GL**This Certificate is valid until **2023-06-30**.DNV GL local station: **Helsinki**Approval Engineer: **Maheshraja Venkatesan****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: **262.1-021477-2**
 Certificate No: **TAP00000KN**
 Revision No: **1**

Product description

Pipe couplings with retaining ring connection

Material of construction for flanges:

- Carbon steel: S355, P355NL1
- Stainless steel: 1.4401, 1.4404, 1.4462 (UNS S32205) from EN 10028-7

Material of construction for piping connection:

- P235GH, ASTM A106 gr. B, E235 and E355
- Stainless steel: AISI 316, 1.4462 (UNS S32205) from EN 10028-7

Sealing material: NBR, FKM90

Application/Limitation

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 |
| 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 |

| 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 |
| 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 |

Job Id: **262.1-021477-2**
 Certificate No: **TAP00000KN**
 Revision No: **1**

The temperature range is dependant on the sealing material as follows:

NBR : -25 to +100 °C
 FKM90 : -40 to +200 °C

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

| | |
|---|--|
| <p>1) Flammable fluids (flash point ≤ 60°C)</p> <ul style="list-style-type: none"> - Cargo oil lines ⁽²⁾ - Crude oil washing lines ⁽²⁾ - Vent lines <p>2) Inert gas</p> <ul style="list-style-type: none"> - Water seal effluent lines - Scrubber effluent lines - Main lines ⁽¹⁾⁽²⁾ - Distributions lines ⁽²⁾ <p>3) Flammable fluids (flash point > 60°C)</p> <ul style="list-style-type: none"> - Cargo oil lines ⁽²⁾ - Fuel oil lines ⁽¹⁾ - Lubricating oil lines ⁽¹⁾ - Hydraulic oil ⁽¹⁾ - Thermal oil ⁽¹⁾ <p>4) Sea water ⁽⁴⁾</p> <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 | <p>5) Fresh water</p> <ul style="list-style-type: none"> - Cooling water system - Condensate return - Non-essential system <p>6) Sanitary/drains/scuppers</p> <ul style="list-style-type: none"> - Deck drains (internal) ⁽³⁾ - Sanitary drains - Scuppers and discharge (overboard) <p>7) Sounding/vent</p> <ul style="list-style-type: none"> - Water tanks/dry spaces - Oil tanks (f.p. > 60°C) ⁽¹⁾ <p>8) Miscellaneous</p> <ul style="list-style-type: none"> - Starting/control air - Service air (non-essential) - Brine - CO₂ system - Steam |
| <p>(1) 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.</p> <p>(2) Only in pump rooms and open decks</p> <p>(3) Only above bulkhead deck of passenger ships and freeboard deck of cargo ships.</p> <p>(4) Couplings made of specific material grade 1.4462 (UNS S32205) only are allowed in sea water systems, and only at room temperature conditions.</p> | |

Materials chosen for the specific system shall be suitable for the intended medium and environmental conditions.

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

For low temperature applications, impact testing requirements as given in relevant chapters of DNV GL Pt. 2 Ch. 2 shall be followed for the corresponding piping components (E.g., Flanges, bolts & nuts)

These couplings should not be used on tubes in cold fabricated (hard temper) conditions.

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

Job Id: **262.1-021477-2**
Certificate No: **TAP00000KN**
Revision No: **1**

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 GL Surveyor
Repeated assembly test for Type 312 dated 11.06.2010 witnessed by GL 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 GL Surveyor
Repeated assembly test for Type 164 dated 28.04.2010 witnessed by GL Surveyor
Burst test dated 11.06.2010 witnessed by GL Surveyor
Burst test for type 124 dated 16.02.2010 witnessed by GL Surveyor
Burst test for Type 164 dated 28.04.2010 witnessed by GL Surveyor
Burst test for Type 312 dated 11.06.2010 witnessed by GL Surveyor
Burst test for type 612 under drawing no. 2017-011-80 witnessed by DNV GL Surveyor dated 2018-09-04
Burst test for type 880 under drawing no. 2017-011-87 witnessed by DNV GL Surveyor dated 2018-09-04
Burst test for type 348 dated 28.04.2010 witnessed by GL Surveyor
Burst test for type 448 dated 11.06.2010 witnessed by GL Surveyor
Burst test for type 456 under drawing no. 2017-011-82 witnessed by DNV GL 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 GL Surveyor related to witnessed tests dated 2019-01-17

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 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.