DNV·GL

Certificate No:
TAP000009U

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Pipe Couplings

with type designation(s)
Hydratight Morgrip 1000, 2000, 3000, 3000R, 3000Ri Series, 150 Series, HDC; Including Couplings, Quickflange, Pipe Adapters, Flange Adapters and End Cap.

Issued to
Hydratight Ltd
Darlaston, WEST MIDLANDS, United Kingdom

is found to comply with
DNV-OS-F101 Submarine Pipeline Systems
DNV-RP-F113 Pipeline Subsea Repair
API Spec 6FB Fire Test for End Connectors 1998, with modifications

Application :

Material:	**Carbon, Stainless & Duplex Stainless Steels**
Temperature range:	**-40 °C to 250 °C**
Max. working press.:	**Up to and including 2500 lb ANSI rating**
Sizes:	**½ to 42 in.**

This Certificate is valid until **2019-06-30**.

Issued at **Høvik** on **2016-03-09**

for **DNV GL**

DNV GL local station: **Manchester**

Approval Engineer: **Jonathan Wiggen**

Afzal Hussain
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.

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Product description

PIPE COUPLINGS
Types: Hydratight Morgrip 1000 Series
- 150 Series

Hydratight Morgrip 2000 Series
Hydratight Morgrip 3000 Series
- QUICKFLANGE Series

Hydratight Morgrip 3000R Series
Hydratight Morgrip 3000Ri Series
Hydratight Displacement Connectors
Approval include: Couplings, Pipe Adapters, Flange Adapters and End Cap.

Design:
The couplings consist of
- a centre housing
- one or more gripping segments on either side of centre section (quantity depends on the pressure rating of the coupling)
- spring loaded ball bearings in bores tapered against the ends of the coupling. Balls equi-spaced circumferential around inside bore of the gripping segments.

Each end of the coupling body acts as flange for the through-going stud bolts used for the axial pull-up. The couplings are equipped with radial seals.

Sizes: 1/2, 1, 1 1/2, 2, 3, 4, 5, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40 and 42 inch.

Materials shall be in accordance with specifications and data given in the Hydratight technical report (referred to below).

Remarks

1. Due consideration shall be taken of appropriate corrosion protection, when necessary.

2. The use of Morgrip couplings in riser piping will have to be evaluated in each separate case.

3. Couplings are approved with ratings up to and including 2500 lbANSI rating (with reduction in max. allowable pressure according to max. temperature and material selection). Extended temperature limitations may be obtained, upon special consideration by DNV GL, dependant on choice of coupling and bolt materials and seal material.

4. It is a type approval condition that calculation of initial gap necessary to obtain the calculated pre-stress of the seals is a part of the standard documentation for each coupling.

5. The seals shall be replaced by new ones each time the couplings are disassembled.

6. The seal materials shall be compatible with the medium contained in the system.

7. Each coupling shall be subjected to hydrostatic pressure test after installation. The test pressure shall be specified by the purchaser and shall be typically 1.5-times the maximum design pressure of the system, unless otherwise restricted by the relevant design code.

8. Seal test pressure, as defined in the design manual, is to be applied via external ports to the cavity between the two seals.

9. The environmental seal is not a pressure retaining seal, but a barrier to stop the free flow of oxygenated seawater through the connector, with the aim of reducing corrosion.

Type Approval documentation

The Type Approval is based on the following main documentation:
Hydratight Ltd. Technical Reports:
- Design Procedure for Design of Mechanical Pipe Connectors, T-ENG-0024 revision AH (2015-02-24) and
- Design Procedure for HDC connectors, T-ENG-21595 revision AC (2016-02-11)

with the following content:
* Product Description.
* Design Procedure and Verification.
* Generic Documents, including documentation of materials of construction.
* Quality Documents including test procedures and tolerance calculations.
* Installation Procedure.

Further Test Reports
- Report on Burst Testing of 1", 3", 6" and 12" 900lbs rating Morgrip Flanges performed by Veritec.
- Report on Fire Pressure Test and Fire Bending Test performed by Veritec, report no. 93-3112, which also cover API spec 6FB, part II requirements.
- TWI's "Report on Fatigue Testing on 4 1/2" Hydra-Tight Ltd. Morgrip Weldless Pipeline Coupling System", June 1991.
- TWI's Report no. 621001/3/96 on "Fatigue Testing of 24" Class 900lb Morgrip Pipe Line Coupling."
- Hydratight – Pre-production qualification tests reports (POP Report), T-1011010959-27 - POP 4 Test Results Report, revision 02.

Burst Test, Fire Pressure Test, Fire Bending Test, Fatigue Test TWI followed by a theoretical evaluation of the fatigue properties performed by DNV GL. The coupling applied to the specified pipe was found to have a fatigue strength corresponding to weld of class W according to NS 3472.

Survey arrangement
Manufacturing Survey Arrangement number: R-3279 regulates the arrangement for DNV GL product certification of couplings.

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**.

Marking of product

For traceability to this Type Approval Certificate the couplings are to be marked with:
- Manufacturers name or trade mark.
- Type designation.
- Serial number.
- Nominal pressure.
- Maximum and minimum working temperature.

The marking of the product is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV GL Type Approval Certificate.

Periodical assessment

Before the expiry date of this certificate or every second year if no normal DNV GL Product Certification has taken place, DNV GL's Surveyor shall be provided access to the manufacturers' premises to survey sample products and the implementation of the production quality control procedures. A witness proof pressure testing of sample of couplings selected at random from stock or from the running production shall also be undertaken.

The scope of the Periodical Assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

Periodical Assessment to be performed after two (2) years (Certificate Retention) and at renewal after four (4) years (Certificate Renewal).

The main elements of the Periodical Assessment are to:

- Ensure that **Type Approval documentation** is available.
- Review design, materials, production process, and performance with respect to possible changes, in order to ensure compliance with **Type Approval documentation** and/or referenced material specifications.
- Ensure traceability between manufacturer's product marking and the DNV GL Type Approval Certificate.

This certificate replaces Type Approval Certificates No. P-15197 and P-13467 by including references to Hydratight Ltd. Technical Reports - Design Procedure for Design of Mechanical Pipe Connectors (T-ENG-0024 rev. AH, 2015-02-24), Hydratight Ltd. Technical Report - Design Procedure for HDC connectors (T-ENG-21595 rev. AC, 2016-02-11) and the 2013 revision of DNV-OS-F101 – Submarine Pipeline Systems.

END OF CERTIFICATE