GS-HYDRO

GS-Hydro Type Approval Tests

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Successfully passing these tests proves and strengthens the technological benefits of GS-Hydro's non-welded connection technology. It ensures it is usable in the most demanding conditions and applications – in offshore, marine and land-based industries.

Fire resistance test

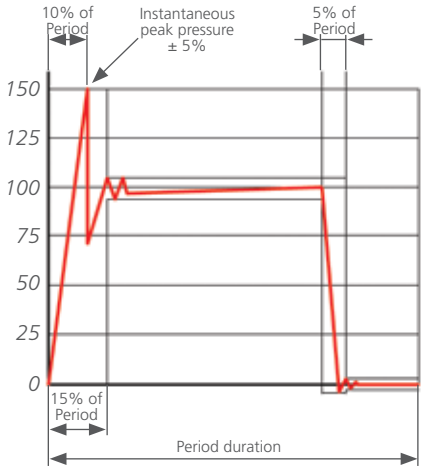
In order to establish the mechanical connection's ability to withstand the effects of fire, the following fire tests were carried out successfully:
As a test specimen GS-connections were subjected to fire for 30 minutes at a temperature of 800°C, while water at a temperature 80°C and at a pressure of 5 bar circulated inside the pipe connection. Specimen was completely engulfed in the flame envelope.

Test standard references:
• *ISO 19921:2005 Ships and Marine technology – Fire resistance of metallic pipe components with resilient and elastomeric seals – test methods*
• *ISO 19922:2005 Ships and Marine technology – Fire resistance of metallic pipe components with resilient and elastomeric seals – requirements imposed on the test bench*

Combined vibration & pressure pulsation test

In order to establish the mechanical connection's ability to withstand fatigue, which is likely to occur due to vibrations under severe conditions, GS-pipe flange connections were tested with combined load of mechanical bending and pulsating internal hydraulic pressure. In addition to this test, the same specimens are subject to a vacuum, tightness, pull out and fire endurance tests.

The specimen has to withstand 10 million cycles of bending load and simultaneously 500 000 pressure cycles, where maximum operating pressure is 1.5 x working pressure with a rising curve as shown in picture 1. Conclusions of the vibration tests should show no leakage or damage, which could subsequently lead to a failure.



Picture 1. Impulse pressure diagram

Tightness test

Test specimens are connected to the pipe, filled with test fluid (hydraulic oil) and de-aerated. Pressure inside the joint assembly is to be slowly increased to 1.5 times the design pressure. This pressure is to be retained for a minimum period of 5 minutes. In the event the pressure drops and/or there is a visual indication of leakage, the test is repeated.

Burst pressure test

In the burst pressure test the specimens are connected to the pipe, filled with test fluid (hydraulic oil) , de-aerated and pressurised to the test pressure with an increasing rate of 10 percent per minute of test pressure. The duration of this test is not to be less than 5 minutes at the maximum pressure. No leakage or visible cracks are permitted.

Increase Customer's Revenue

- Short delivery times
- High cleanliness – improved longevity

Improve Efficiency

- Shorter on-site installation
- Quick flushing

GS-Hydro Non-Welded Value

Eliminate Risks

- Schedule risk
- Quality risk
- Welding risk

Pull-out test

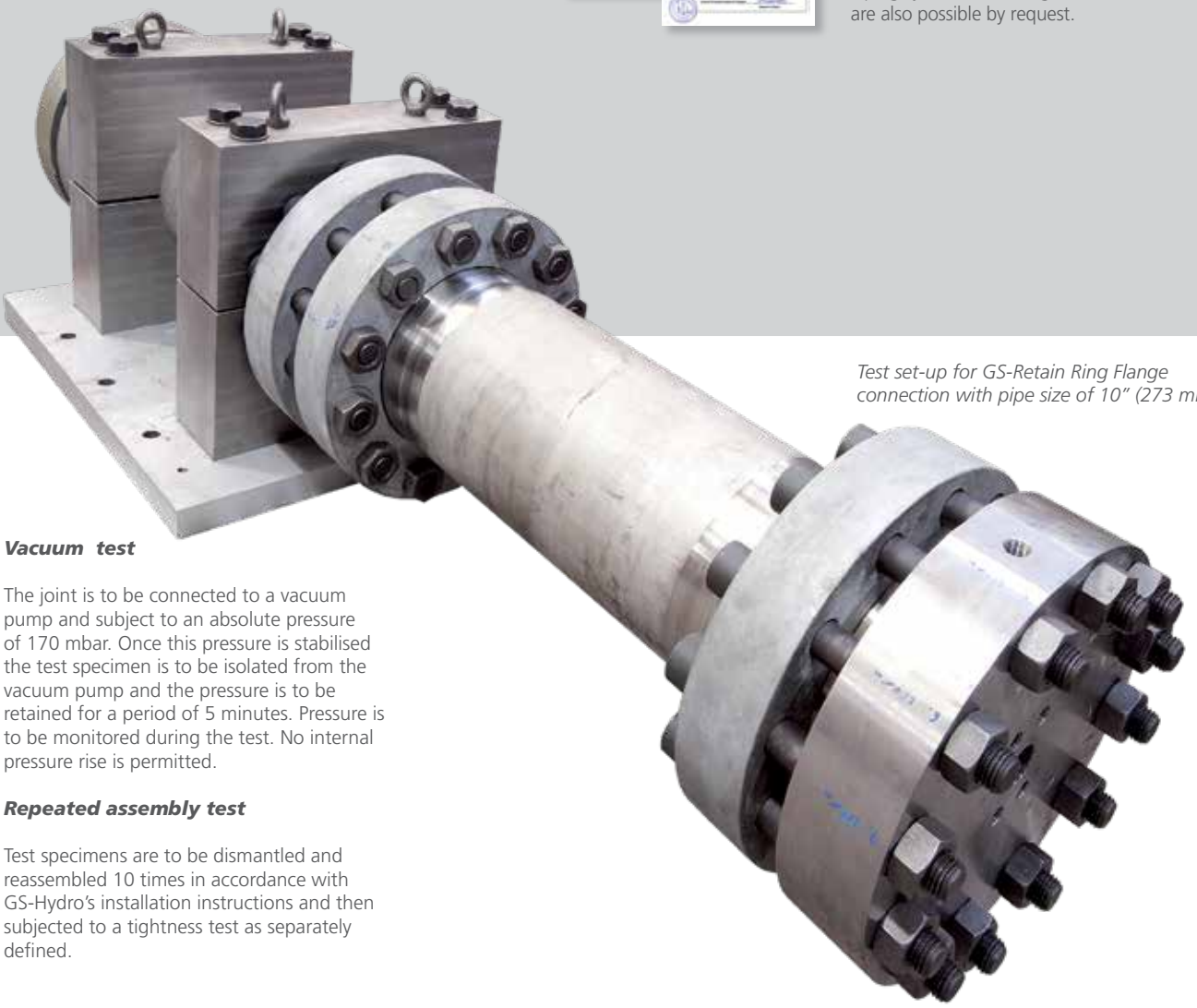
During the pull-out test the specimens are to be pressurised to the design pressure, and axial load is applied and maintained for a period of 5 minutes. During the test, pressure is to be monitored and relative movement between the joint assembly and the pipe is measured. The connection is to be visually examined for a drop in pressure and signs of any leakage or damage. There is to be no movement between joint and connecting pipes.

Type Approvals

The GS-Flange System is type approved by the following classification companies:

DNV GL	DNV GL Group
LR	Lloyd's Register of Shipping
ABS	American Bureau of Shipping
BV	Bureau Veritas
RINA	Registro Italiano Navale Group
RS	Russian Maritime Register of Shipping
NKK	Nippon Kaiji Kyokai
CCS	China Classification Society
KRS	Korean Register of Shipping

Piping systems according to other standards are also possible by request.



Test set-up for GS-Retain Ring Flange connection with pipe size of 10" (273 mm).

Vacuum test

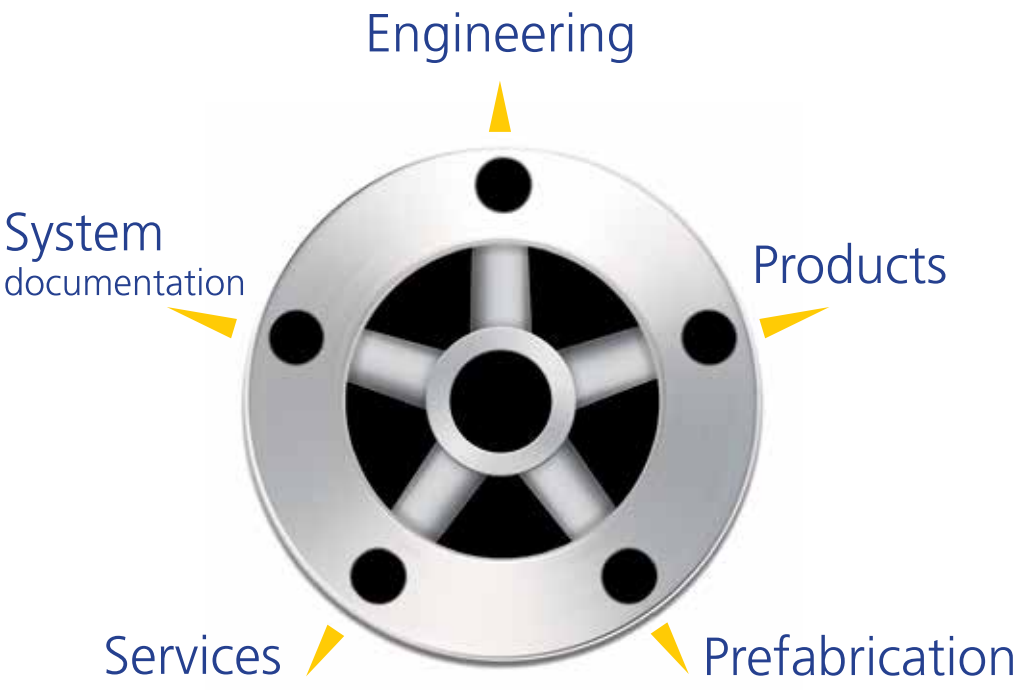
The joint is to be connected to a vacuum pump and subject to an absolute pressure of 170 mbar. Once this pressure is stabilised the test specimen is to be isolated from the vacuum pump and the pressure is to be retained for a period of 5 minutes. Pressure is to be monitored during the test. No internal pressure rise is permitted.

Repeated assembly test

Test specimens are to be dismantled and reassembled 10 times in accordance with GS-Hydro's installation instructions and then subjected to a tightness test as separately defined.

GS-Hydro is the original provider of non-welded piping solutions with numerous benefits for a wide variety of demanding applications. We create value together with our customers by providing innovative fluid transfer solutions which enable safe operation, reduced environmental impact and lower total cost of ownership. We deliver our piping and hose solutions globally in more than twenty-five countries through own companies and partners.

GS-Hydro system offering



MANAGEMENT SYSTEM CERTIFICATION
DNV·GL
ISO 9001 = ISO 14001
OHSAS 18001

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INTERPUMP GROUP

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