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TECHNICAL SPECIFICATION

Doc No : DSF-SPC-PIP-040

Rev. 1

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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

STRENGTH AND TIGHTNESS TESTING OF M/R STATIONS

JUNE 2021

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1 SCOPE AND OBJECTIVES

This specification specifies strength and tightness testing of piping at Metering and Regulating Stations.

For the strength and tightness testing, the requirements of the following, listed in order of precedence, shall be fulfilled:

- This Specification.
- "Technische Regeln, Arbeitsblatt G469" of DVGW, to the extent referred to in this specification.
- **ELOT EN 1594**
- **ELOT EN 12732**

2 REFERENCES

2.1 Reference Documents

N/A

2.2 Reference Codes and Standards

ELOT EN 1594

[Gas supply systems - Pipelines for maximum operating pressure over 16 bar - Functional requirements]

ELOT EN 12327

[Gas supply systems - Pressure testing, commissioning and decommissioning procedures - Functional requirements]

ELOT EN 837

[Pressure gauges - Part 1: Bourdon tube pressure gauges; dimensions, metrology, requirements and testing]

DVGW 469

[Deutscher Verein des Gas - und Wasserfaches e.V.]

ELOT EN 1435



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3 ACRONYMS

N/A

4 TEST METHODS

The test methods to be used are mentioned below:

4.1 TESTING OF WORKSHOP CONSTRUCTED PIPING

4.1.1 WORKSHOP STRENGTH TEST OF MODULE PIPING AND OTHER PREFEBRICATED PIPING

The test method shall be according to DVGW Arbeitsblatt G-469, Method A1.

Test Pressure : 1.43 x design pressure

Hold Time : four (4) hours

Medium : water

4.1.2 WORKSHOP TIGHTNESS TEST OF MODULE PIPING AND OTHER PREFEBRICATED PIPING

The test method shall be according to DVGW Arbeitsblatt G 469, Method A3

Test Pressure : 1.1 x design pressure

Hold Time : as required to prove tightness

Medium : nitrogen or dry air

4.2 TESTING OF PIPING CONSTRUCTED ON SITE

When tests according to sections 4.2.1 and 4.2.2 are carried out and accepted, the underground piping may be coated and backfilled.

4.2.1 STRENGTH TEST OF PIPING CONSTRUCTED ON SITE:

The test method shall be according to DVGW Arbeitsblatt G-469, Method A1

Test Pressure : 1.43 x design pressure



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Hold Time : four (4) hours

Medium : water

4.2.2 TIGHTNESS TEST OF PIPING CONSTRUCTED ON SITE:

The test method shall be according to DVGW Arbeitsblatt G 469, Method A3

Test Pressure : 1.1 x design pressure

Hold Time : as required to prove tightness

Medium : nitrogen or dry air

4.3 FINAL TEST OF COMPLETED STATION PIPING

4.3.1 TIGHTNESS TEST OF STATION PIPING WITHOUT TIE INS TO TRANSMISSION AND DISTRIBUTION LINES

The test method shall be according to DVGW Arbeitsblatt G 469, Method A3

Test Pressure : 1.1 x design pressure

Hold Time : as required to prove tightness

Medium : nitrogen or dry air

4.3.2 TIGHTNESS TEST DURING COMMISSIONING OF STATION

Piping shall be tested during the commissioning period with either a gas detector or soapy water.

5 GENERAL REQUIREMENTS

All Module piping and other prefabricated items shall undergo tests 4.1.1., 4.1.2, 4.3.1 and 4.3.2.

Above ground piping constructed on site shall undergo tests 4.2.1, 4.2.2, 4.3.1 and 4.3.2.

Underground piping constructed on site shall undergo tests 4.2.1 and 4.2.2.

Owner's Representative will supervise the strength and tightness test. The test will be considered as completed, when acceptance has been given by Owner's Representative together with the Accredited Inspection Body.



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6 SCOPE OF CONTRACTOR SERVICES

The Contractor shall supply and install all auxiliary facilities necessary for the strength and tightness tests, such as:

- provisional end caps
- fittings
- flanges
- gaskets
- pumps
- compressors
- measuring equipment
- temporary reservoirs, etc.

The above mentioned equipment shall conform to DVGW G 469.

The Contractor is also responsible for the supply and disposal of water. Contacts with the authorities, etc. and costs in connection with the provision and disposal of water are also the responsibility of the Contractor.

7 COMMENCEMENT OF THE STRENGTH AND TIGHTNESS TESTS

The Contractor shall give adequate notice to all competent Authorities as required about his intention to commence the strength and tightness tests.

Contractor shall verify prior to commencement of the tests that all piping is free from debris and foreign materials.

The Contractor shall start the strength and tightness tests immediately after the construction/installation of a piping section has been completed and the Owner's Representative has declared it ready for testing.

The extent and the schedule of the test sections shall be agreed with Owner's Representative.



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Module piping and other prefabricated items may be painted first after tests as per paragraphs 4.1.1 and 4.1.2 herein above have been performed and accepted.

Above ground main process piping constructed on site shall be painted after tests specified in para 4.2.1 and 4.2.2 have been performed and have been accepted.

Instrument piping and other small piping which shall not be strength tested with water, have to be painted soon after test specified in paragraph 4.3.1 has been performed and has been accepted.

Underground piping constructed on site, with the exception of works-coated pipe and fittings, may first be coated and backfilled after tests 4.2.1 and 4.2.2 have been performed and accepted.

In all cases, the entire piping shall be easily accessible during all the applicable tests.

Metal temperature shall not be allowed to fall below 7°C or its Nil Ductility Temperature (NDT), whichever is higher, while the metal is under stress. This limitation shall also apply to tightening of bolts to seal flange leaks which the test has disclosed.

8 WATER

The Water used for the strength and tightness tests shall be free of dirt and other impurities.

The pH-value shall be between 6.0 and 7.0 for test water which is to be re-used or which is stored in the piping section for more than 8 days. Storage of water for less than 8 days in the piping section is allowed if the pH- value is between 5.0 and 8.0.

The content of dissolved salts shall not exceed 500 mg/lit (i.e. seawater shall not be used).

Water with a high chloride shall not be used for testing austenitic stainless steel piping. Water of moderate chloride content (50 to 100ppm) may be used provided 2% to 4% sodium nitrate is added.

Test water shall not be left in contact with austenitic stainless steel for more than 72 hours.

9 FILLING OF WATER

The piping section shall be as free of air during the strength test as is practically possible.

10 PERFORMANCE OF STRENGTH AND TIGHTNESS TEST

The test methods are outlined in section 4 for different purposes.



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Reference is made to DVGW Arbeitsblatt G 469 regarding requirements for instrumentation for the strength test.

The maximum rate for pressuring up shall not exceed 3 bar/min. After pressuring up to test pressure, drain tests shall be made to ensure that the piping section under test is free of air.

If any leaks are discovered during the test, they shall be located and repaired and the test shall be repeated.

A pressure recorder shall be used for recording the pressure for the whole test duration.

11 EMPTYING OF WATER

Upon completion of the test, the piping section shall be completely emptied of water using dry compressed air or other suitable methods. The Contractor is Responsible for the drying of the section and for the disposal of the water in a suitable manner.

12 TEST GAUGE CALIBRATION

Instruments and gauges used for testing shall be calibrated prior to each test. Calibration shall be according to EN 837.

Calibration shall be indicated by stickers on the instruments and gauges themselves. Certificates of Calibration shall also be available for review. Gauges shall have full scale range not to exceed twice the test Pressure.

13 DOCUMENTATION

In connection with the strength and tightness tests, test certificates shall be drawn up. This shall be approved by the Contractor's representative, Owner's Representative and the Accredited Inspection Body. The certificate shall give the following information:

- name of the company conducting the test
- station unit name
- piping section
- type of test (paragraphs 4.1 to 4.3 herein above)
- pressure induced during test
- information concerning location and repair or leaks



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- date and signatures/approval by Owner, the Contractor, and the Accredited Inspection Body.

The pressure recorder printouts, endorsed by the Accredited Inspection Body shall be attached in the issued test certificate.