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TECHNICAL SPECIFICATION

Doc No: DSF-SPC-PIP-017

Rev. 1

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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

DRYING

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1 SCOPE AND OBJECTIVES

This specification covers the drying and preservation of natural gas lines.

For the drying and preservation works the requirements of the following, listed in order of precedence, shall be fulfilled:

- This specification including documents incorporated by reference and ATTACHMENT "A".

2 REFERENCES

2.1 Reference Documents

Job Spec. No. DSF-SPC-PIP-006

[Pressure Testing]

2.2 Reference Codes and Standards

N/A

3 ACRONYMS


N/A

4 GENERAL

After successful pressure testing, according to Job Specification No. DSF-SPC-PIP-006, the Contractor shall carry out drying of the pipeline. If air or vacuum drying is applied, the resultant dew point shall not be higher than corresponding to -20°C at atmospheric pressure.

Preservation shall be carried out by sealing the pipeline, making regular checks of the moisture content and carry out additional drying, if necessary, until the date for handing over the pipeline to the Owner.

Prior to drying, the Contractor shall submit for the Owner Representative approval a detailed written procedure for the works to be carried out in connection with drying and preservation. Contractor's personnel should be adequately trained and thoroughly familiar with the safety precautions and procedures.

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5 DRYING

5.1 COMMENCEMENT OF DRYING PROCEDURE

Drying of the pipeline shall take place (immediately) after the test certificate for the pressure testing has been issued, the pipeline is emptied of water and the applicable tie-ins have been performed. The length of sections in which drying shall be performed, shall be agreed with the Owner Representative.

5.2 SCOPE OF CONTRACTOR SERVICES

The Contractor shall supply and install all auxiliary facilities necessary for carrying out the drying, such as provisional scraper traps, scrapers, end caps, fittings, flanges, valves gaskets, pumps, compressors, measuring equipment, etc. He is also responsible for the supply and disposal of drying and propelling media, including measuring of the amount of the dried-out water.

Facilities used for drying operations will be inspected to ensure that they are free of defects, adequate for the purpose intended and correctly calibrated. Owner reserve the right to request rejection/replacement of the above facilities.

5.3 SAFETY

The Contractor is responsible for ensuring that the procedure is carried out in safe and sound manner in agreement with all relevant safety regulations.

If applicable, the Contractor shall obtain the necessary approval of the procedure by the relevant authorities.

5.4 DRYING METHOD

5.4.1 GENERAL

Upon the Owner Representative request one of the three methods described below shall be used for drying the pipeline.

5.4.2 AIR-DRYING



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The equipment to be used for this process shall be sufficient to ensure a continuous supply of dried, oil-free air, i.e. two moisture absorber vessels shall be available, to allow for regeneration (desorptive treatment of the absorptive medium). The changeover between these shall be automatic.

During the drying process pigs capable of absorbing superfluous water and distributing the residual water as a uniform thin film on the pipe wall, shall be driven through the pipeline at regular time intervals, all without interrupting the flow of the dry air.

In order to dry the by-pass piping including valves in valve stations, the valves to the main pipeline shall be closed and the station piping flushed with dry air.

The dew-point temperature shall be measured at the launching trap regularly, to confirm that the required moisture content is attained in the inlet air. As soon as no signs of moisture are present in the outlet air, measurements of the dew - point temperature shall be made at the receiving trap regularly until the required degree of dryness has been reached.

After achieving the required dew point the Contractor shall prepare the drying test report according to **paragraph 8**.

5.4.3 VACUUM DRYING

This method is only preferable when the filling of the pipeline with gas follows shortly after the drying.


The equipment to be used for this process shall be sufficient to ensure a continuous emptying of the pipeline for air and moisture.

In order to dry the line with vacuum, the Contractor must be sure that the pipeline section is totally sealed.

On both ends of one-section valves with minimum DN 100 diameter must be installed for flashing with dry air.

During the drying process, the valves in the section to be dried must be in half-open position.

The drying equipment should be installed, if possible, in the middle of each drying section. Operation at valves for closing and opening at relevant sections under drying will be the responsibility of Owner's personnel.

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During the drying process the leak-rate has to be measured for the later approval of the drying process.

The dew-point temperature shall be measured regularly to confirm that the required moisture content is obtained.

After the required dew point corresponding to -20°C at atmospheric pressure has been achieved the contractor shall prepare the drying test report according to paragraph 8.

5.4.4 DRYING WITH METHANOL

The primary drying of the pipeline with methanol shall be carried out by means of a "scraper train". The configuration of such a train may be a leading scraper followed by nearly pure methanol, a second intermediate scraper followed by methanol and finally a third trailing scraper. The methanol quantity must be calculated in accordance with the vertical profile and length of the pipeline.

In front of the train shall be approx. 100 m of nitrogen in order to prevent an explosive methanol/air mixture in the piping system.

Natural gas supplied by the client shall be used as the propelling medium at a pressure, which is calculated in accordance with the vertical profile of the pipeline sections.


The whole operation shall be planned and carried out in close cooperation with the Client.

5.4.5 OTHER METHODS

Contractor may select another drying method provided that this will get Owner's approval.

6 PRESERVATION IN CASE OF AIR DRYING

Immediately after drying the pipeline, the Contractor shall seal off the line completely, provide an over pressure in the line of min 2.0 bar and carry out and keep records of measurements of the moisture content and pressure at all valve stations.

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Control of the measurements will be carried out by the Owner at a two-week interval. The Contractor shall supply all instruments necessary for monitoring the dryness and pressure of the pipeline with the required accuracy.

The instruments shall be calibrated and be provided with adequate certificate.

These instruments shall at no extra cost be available to the Owner until the pipeline is filled with natural gas, i.e. sometime after the date of handing over the pipeline to the client, as specified in the contract.

The Contractor will be informed about the dates of control measurements and is - if wanted - allowed to participate.

The result of these control measurements will form the basis for possible reestablishment of the required moisture content and/or pressure. If this reinstatement is required after the handing over date, the costs will be paid as day works.

The Contractor shall inform the Owner where spare equipment is available, and guarantee that his equipment can be brought in place within max. 4 days.


The Contractor shall in cases where a maximum dew point corresponding to -10°C at atmospheric pressure is exceeded take action to reestablish the dew point as required in section 4 within 4 days. The time needed for reestablishment of the required dryness shall not exceed 2 weeks.

In cases where the pressure drops below 0.8 bar gauge, the same time limits for reestablishment of the 2.0 bar gauge pressure shall be kept.

7 PRESERVATION IN CASE OF VACUUM DRYING

Shortly after the drying, Owner will start filling the pipeline with gas. In the period between approval of drying operation and gas filling, the Contractor shall maintain the pressure in the pipeline at maximum dew point corresponding to -10°C at atmospheric pressure and carry out and keep records of pressure and dew point measurements.

Control of the measurements will be carried out by the Owner at a two-week interval. The Contractor shall supply all instruments necessary for monitoring the dryness and pressure of the pipeline with the required accuracy. These instruments shall at no extra cost be available to the Owner until the pipeline is filled with natural gas.

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The Contractor will be informed about the dates of Control measurements and is-if wanted-allowed to participate.

The result of these control measurements will form the basis for possible reestablishment of the required moisture content and/or pressure. If this reinstatement is required after the handing over date, the cost will be paid as day works.

The Contractor shall inform the Owner where spare equipment is available, and guarantee that his equipment can be brought in place within max. 4 days.

The Contractor shall take action for reestablishment of the required dryness within 4 days and the time need for the dryness shall not exceed 2 weeks.

8 DRYING TEST REPORT

This report shall contain a summary of the tests with main results and references to the forms and graphs containing test results.

The report should contain, but not limited to, the following elements:

- Amount of water dried out.
- Leak rates (vacuum drying).
- Achieved pressure (air and vacuum drying).
- Pressure in pipeline in case of drying in steps (vacuum drying).
- Amount of methanol (methanol drying).

9 ATTACHMENT "A"

COMPRESSED AIR AND GAS CONDITIONS

