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HIGH PRESSURE (HP) TRANSMISSION SYSTEMS

WELDING INSPECTION OF PIPING FOR M/R STATION

QUALITY ASSURANCE PAGE

CHANGES LOG

REVISIONS LOG

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REFERENCE DOCUMENTS

Job Spec. No.-199/4
[Welding]
Job Spec. No. 599/2
[Welding of piping for M/R stations]

ELOT EN 12732
[Gas supply systems - Welding steel pipework - Functional requirements]

ELOT EN 287-1
[Qualification test of welders - Fusion welding - Part 1: Steels]

ELOT EN 473
[Non destructive testing - Qualification and certification of NDT personnel - General principles]

ELOT EN 571-1
[Non-destructive testing - Penetrant testing - Part 1: General principles]

ELOT EN 583-1
[Non-destructive testing - Ultrasonic examination - Part 1: General principles]

ELOT EN 1290
[Non-destructive testing of welds - Magnetic particle testing of welds]

ELOT EN 1435
[Non-destructive testing of welds - Radiographic testing of welded joints]

1.0 INTRODUCTION

This Specification covers welding inspection of piping at Metering and Regulating Stations including tie-in welds.

1.1 STANDARDS

For the performance of welding inspection, the requirements of the following shall be fulfilled.

- This Specification.
- Documents to which reference is made in the following.
- **ELOT EN 12732**
- **Job Spec. No. 599/2.**

2.0 GENERAL

All completed welding work shall be subject to a series of tests to control and assure the quality of the work.

The capacity of testing facilities and personnel shall correspond to the Contractor's welding capacity.

The Contractor shall schedule sufficient time within contract time for carrying out these tests.

The daily working cooperation with the welding supervising company shall be arranged by the Contractor.

Weld seams shall not be insulated or coated in any way before tests have been made and approval by Owner has been given.

If a weld selected for testing has been coated in any way, it shall be brought to the Contractor's attention, for subsequent removal of the applied material.

If the Accredited Inspector finds any weld seams without an explicit number, these shall be brought to the Contractor's attention for subsequent numbering according to the welding specification.

Any tests performed by the Accredited Inspector on weld seams which have no number will be regarded as invalid.

The weld Accredited Inspection Body shall be responsible for preventing access to those areas where X-rays or isotopes are used for testing.

The weld Accredited Inspection Body shall be responsible for forwarding all information to Owner's Representative, regarding all repair situations - before the repair takes place.

This information shall be rated with the same capacity as the welding work.

3.0 TEST METHODS

The following test methods shall be used as appropriate:

- Radiographic testing for butt-welds with all pipe materials and wall thicknesses shall be as per **ELOT EN 1435.**
  Evaluation shall be according to **Job Spec. No. 199/4.**

- Ultrasonic testing for materials with thickness exceeding 6.5 mm. Applicable standard: **ELOT EN 583-1.**
- Magnetic Particle or Eddy Current testing for stud connections, fillet welds, etc. Applicable standard: **ELOT EN 1290.**
- Dye Penetration testing for fillet welds, branch connections and for controlling that cracks in the weld seams are totally removed before repair. Applicable standard: **ELOT EN 571-1.**
- Destructive testing for certain girth welds, to be specified by Owner Representative. Applicable standard: **ELOT EN 12732.**

4.0 EXTENT OF TESTING

4.1 GIRTH WELDS

4.1.1 WORKSHOP WELDS

When the welding program is started, all workshop performed girth welds in pipes with external diameter DN ≥ 25 shall be tested along their entire circumference by radiography or ultrasonic testing as agreed on by Owner's Representative.

All workshop performed girth welds in pipes with external diameter DN < 25 shall be visually inspected along their entire length.

When Owner's Representative is satisfied that the quality of welding work has reached the desired level, the frequency of inspection may be decreased to cover 60% of the entire length of the weld seams.

Any subsequent increase of test frequency due to inferior weld quality shall be paid by the contractor, conforming to section 8.0.

4.1.2 SITE WELDS

All girth welds performed on site shall be 100% tested by radiography or ultrasonic testing, as upon by Owner's Representative.

4.2 TIE-IN WELDS

All seams shall be tested 100% with both radiographic and ultrasonic testing. If, during the evaluation, it is necessary to make additional testing by other methods, it will be agreed on by Owner's Representative.

4.3 REPAIR WELDS

All such seams shall be tested 100% with radiographic testing to be sure that all defects which necessitate the repair are removed.

If, during the evaluation, it is necessary to make additional testing by other methods, this shall be agreed on by Owner's Representative.

Type and extent of inspection will be agreed on by Owner's Representative.

Reference regarding possible extension of inspection due to high rejection rate of welds, is made in Section 8.0.

5.0 PERFORMANCE OF TESTS

For test work, only personnel skilled and experienced in the particular type of inspection may be used.

For ultrasonic testing, personnel shall be qualified according to **ELOT EN 473 - level II**.

For Radiographic testing, personnel shall be qualified according to **ELOT EN 473 - level II**.

The testing shall be performed in accordance with the standard mentioned in section 3.0, for the specific test.

Additionally, the following tests shall be applied.

5.1 RADIOGRAPHIC TESTING

Films shall be numbered with the number of the respective seam. For an indication of position, a circumferential tape measure with a centimeter division shall be used.

Reference point and circumferential direction shall be marked at the seam with water resistant chalk.

Welder identification number shall be marked at the seam.

5.2 ULTRASONIC TESTING

For items constructed of steel, with specified minimum yield strength corresponding to L360 (**ELOT EN 10208-2**) or higher, the ultrasonic examination shall be executed after at least 24 hours have elapsed since the completion of the seam. Exceptions to this may be made if directed by Owner's Representative.

5.3 DESTRUCTIVE TESTING

Owner's Representative is entitled to select some seams for destructive testing.

The Contractor is responsible for cutting out the seams, beveling the pipe ends and rewelding the joint. The destructive tests shall, unless otherwise agreed, be made in accordance with the requirements of **ELOT EN 12732** applicable qualification tests for welders.

6.0 EVALUATION AND TEST RECORD

The welding inspector shall have a suitable period (normally 1-2 days) after the testing for the evaluation of the quality of the welds.

The welds shall be evaluated according to **para 3.0** above.

The conclusion of the inspector's evaluation shall be one of the following statements:

- weld accepted,
- weld to be repaired,
- weld to be cut out.

Final evaluation and acceptance of welds will be made by Owner's Representative regarding the seam as a whole.

Special Precautions for Cracks:

Owner's Representative shall be informed immediately about the occurance of any cracks or possible cracks.

A crack may indicate one or more faults in the applied welding procedure, and therefore, the last welds made by the welder(s) in question as well as the neighboring seams shall be ultrasonically tested, even though they may previously have been radiographically tested.

Under these circumstances, the ultrasonic results shall take precedence over the radiographic results.

6.2 TEST RECORD

The test record, in accordance with the standard form used by the weld inspection company, shall be completed for each weld or type of weld.
A record, covering the testing performed, shall be completed each working day.

7.0 REJECTION OF WELDS

Where defects are present in the seams, the Contractor shall be informed of the character of the defect and on the necessary actions (e.g. removal and reweld, repair). The Contractor shall be given a copy of the test record.

The new or repaired weld is classified "Repair Weld" and shall be tested according to **Section 4.3** of the present specification.

8.0 COST OF INSPECTION

The costs of the initial testing of a weld within the extent stated in **section 4.0** shall be paid for by the Contractor.

For welds, which have been renewed or repaired, the Contractor will bear the costs for renewal or repair, retesting of the weld as well as for the testing of one additional weld, at the choice of Owner's Representative.

If this seam does not comply with the requirements, the control may be further extended.

Any expenses arising from an increase of the inspection rates, stated in **Section 4.1** shall be paid by the Contractor.

If the weld rejection rate exceeds 10% of the welds tested, Owner's Representative is allowed to increase the general extent of testing. The Contractor shall pay for the increased testing.

The extent of any such supplementary control work shall be decided by Owner's Representative, with the aim of establishing in a satisfactory manner whether the welding work satisfies the specified requirements.

All costs in connection with destructive testing will be paid by Owner if the results are acceptable. If the results are unacceptable, the Contractor shall pay these costs.