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ARAB ENGINEERING BUREAUS

## **7 INSPECTION AND TEST**

### **7.1 INTRODUCTION**

#### **7.1.1 General**

- 1 The Contractor shall provide equipment, instruments, qualified personnel, and facilities necessary to inspect the work and perform the tests required by the QCS and Project Documentation.
- 2 The Contractor shall repeat tests and inspections after correcting nonconformity and until all work complies with the specified requirements. All re-testing and re-inspections shall be performed at no additional cost to the Owner.
- 3 The Engineer may elect at any time to perform additional inspections and tests at the place of the manufacture or the shipping point to verify compliance with applicable Specifications. Inspections and tests performed by the Engineer shall not relieve the Contractor of the responsibility to meet the Contractual Requirements and Specifications. Inspections and tests undertaken by the Engineer shall not be considered a guarantee that future deliveries of materials delivered will be acceptable. All costs associated with the foregoing shall be borne by the Contractor.
- 4 Inspections and tests conducted by persons or agencies other than the Contractor, shall not in any way relieve the Contractor of his responsibility and obligation to meet all Specifications and referenced standards.

#### **7.1.2 Inspections and Tests**

- 1 The Contractor shall establish a documented procedure for undertaking inspection & testing. The procedure must be submitted to the Engineer for review and non-objection prior to implementation.
- 2 Mandatory Product and Material Sampling and Testing Frequencies are included in Part 15, Appendix A of this section. The Contractor shall apply the Sampling and Testing Frequencies stipulated in Appendix A unless otherwise stated in the Contract or other relevant sections of the QCS or requested or approved by the engineer. The table in Appendix A shall be read and understood in conjunction with the footnotes in Appendix A.
- 3 Inspection and test procedures submitted for approval shall include, but not be limited to, the following:
  - (a) inspection/test procedure reference
  - (b) references to Clauses of this Specification and other standards along with applicable inspection/test levels specified therein
  - (c) prerequisites for the given inspection/test
  - (d) required tools, equipment
  - (e) necessary environmental conditions
  - (f) acceptance criteria
  - (g) data to be recorded
  - (h) reporting forms
  - (i) Identification of items inspected and tested.
  - (j) Contractors and Engineers Hold, Witness, Surveillance and Record Review Points

- 4 Approved procedures and instructions shall be readily available and used by inspection and test personnel at the time of inspection or test. Any revision to the approved procedures and instructions shall be review approval prior to being used to inspect or test the work. No deviations from the approved procedures and instructions shall be allowed without written authorisation from the Engineer.
- 5 Inspection and testing work shall be performed by personnel designated by the Contractor. Such personnel shall not be the same as those performing the work.
- 6 The Contractor shall furnish the Engineer with a signed inspection report for each item of work inspected and tested. The report shall indicate whether the item of work, material and/or equipment complies with all the inspection/test criteria. The Contractor shall submit inspection/test results to the Engineer prior to incorporating the item(s) into the work. Inspection/test failures shall be reported to the Engineer immediately.
- 7 The Contractor shall give the Engineer 12hrs prior notice when submitting an inspection or test request unless agreed otherwise.
- 8 Inspection and test reports shall, as a minimum, identify the following:
  - (a) inspection/test procedure reference
  - (b) name of inspector/tester
  - (c) observations/comments
  - (d) specified requirements
  - (e) acceptability
  - (f) deviations/non-conformance
  - (g) corrective action
  - (h) evaluation of results
  - (i) authorised signature

- 9 The Contractor shall clearly document the inspections and test status of all materials and equipment throughout the construction stage. Identification may be by means of stamps, tags, or other control devices attached to, or accompanying, the material or equipment.

#### **7.1.3    Inspection and Test Status**

- 1 The inspection and test status of materials, equipment and construction work shall be identified by suitable means, which indicates the conformance or non-conformance of materials, equipment, and construction work with regard to inspection and tests performed. The identification of inspection and test status shall be maintained, as defined in the Project Quality Plan and/or documented procedures, throughout the course of construction work to ensure that only materials, equipment and construction work that have passed the required inspections and tests are used or installed.

#### **7.1.4    Inspections by the Engineer during construction**

- 1 The Contractors Inspection and Test Plans will define Hold, Witness, Surveillance and Record Review points for the Engineer during construction. The contractor shall prepare, document and implement a Request for Inspection system that defines how the Engineer will be given sufficient notice to inspect the works in accordance with the Inspection and Test Plans.
- 2 Any Inspection Request and related QC documentation shall be prepared and maintained as Part 5 of this Section.

**7.1.5 Inspections by the Engineer during Defects Liability Period**

- 1 The Engineer will give the Contractor due notice of any intention to carry out any inspections during the defects liability period.
- 2 The Contractor shall arrange for a responsible representative to be present at the times and dates determined by the Engineer.
- 3 The Contractor's representative shall render all necessary assistance and take note of all matters to which his attention is directed by the Engineer

**7.1.6 Workmanship**

- 1 The Contractor shall comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- 2 Only persons qualified to produce workmanship of the required quality shall perform works. The Contractor is responsible to assess the competency of persons deployed on the works and maintain records.
- 3 The Contractor shall comply with manufacturers' published installation instructions / guides in full, including each step in sequence. Should instructions conflict with project documentation, the Contractor shall request clarification from the Engineer before proceeding.

**7.1.7 Measuring and Test Equipment**

- 1 The Contractor shall establish and maintain documented procedures which conform to accepted and approved national or international standards to control, calibrate and maintain inspection, measuring and test equipment used by the Contractor to demonstrate the conformance of materials, equipment and/or construction work with the requirements of the Project Documentation.
- 2 Inspection, measuring and test equipment shall be used in a manner which ensures that the measurement uncertainty is known and is consistent with the required measurement capability
- 3 The Contractor shall establish a unique identification number for each item of measuring and test equipment. This unique identification number shall be permanently affixed to each item of measuring and test equipment
- 4 The Contractor shall ensure that each item of inspection, measuring and test equipment is calibrated at intervals recommended by the manufacturer. Valid calibration certificates for measuring and testing equipment shall be present and available for inspection during inspections and tests.
- 5 The Contractor shall establish a log of all measuring and test equipment and record:
  - (a) equipment description
  - (b) identification number
  - (c) date of the last calibration
  - (d) date that the next calibration is due.
- 6 The Contractor shall assess and record the validity of the previous measuring results when the equipment is subsequently found not to confirm to requirements. The Contractor shall take appropriate action on the equipment and any product affected.

**END OF PART**