EXPRO
هيئة كفاءة الإنفاق والمشروعات الحكومية
Expenditure Efficiency & Projects Authority

EXPRO National Manual for Projects Management

Volume 9, chapter 4

Project Construction Piping Works Procedure

Document No. EPM-KCE-PR-000010 Rev 003

Document Submittal History:

Revision:	Date:	Reason For Issue
000	16/10/2017	For Use
001	29/11/2017	For Use
002	26/11/2018	For Use
003	10/08/2021	For Use

THIS NOTICE MUST ACCOMPANY EVERY COPY OF THIS DOCUMENT

IMPORTANT NOTICE

This document, (“Document”) is the exclusive property of Government Expenditure & Projects Efficiency Authority.

This Document should be read in its entirety including the terms of this Important Notice. The government entities may disclose this Document or extracts of this Document to their respective consultants and/or contractors, provided that such disclosure includes this Important Notice.

Any use or reliance on this Document, or extracts thereof, by any party, including government entities and their respective consultants and/or contractors, is at that third party’s sole risk and responsibility. Government Expenditure and Projects Efficiency Authority, to the maximum extent permitted by law, disclaim all liability (including for losses or damages of whatsoever nature claimed on whatsoever basis including negligence or otherwise) to any third party howsoever arising with respect to or in connection with the use of this Document including any liability caused by negligent acts or omissions.

This Document and its contents are valid only for the conditions reported in it and as of the date of this Document.

Table of Contents

1.0 PURPOSE

This procedure identifies the minimum controls, and responsible parties necessary to ensure the quality and documentation requirements for the work operations associated with Construction Piping Works.

This procedure applies to works performed under all Government construction projects executed throughout the Kingdom of Saudi Arabia.

For the purposes of the Construction Management Procedures the Project Management Company is the Entity Project Management Organization (EPMO) appointed by the Entity and references prefixed with "Site", such as Site Construction Department, Site Engineering Department, represent the Project Management Company at Project level, on construction sites.

2.0 SCOPE

This procedure includes the receiving, installing and testing of Piping Construction Works, as indicated below:

1. Field fabrication, inventory control, installation, erection and inspections of piping and the piping systems as required.
2. Installation of non-pressurized (gravity) piping systems;
3. Installation and inspection of pressurized piping including aboveground and underground piping.
4. Installation and inspection of permanent plant hanger/support assemblies and/or sub-assemblies.
5. Pipe system cleanliness in order to minimize flushing and cleaning activities during testing and startup. This procedure does not include external cleanliness of piping systems and does not apply to temporary piping systems. All flush piping, which is temporary, shall be cleaned
6. Performing pressure testing of piping, tubing, and components

The Construction Contractor shall be responsible to develop the following procedures as a minimum and as applicable under his contract:

1. Piping Material Management, Fabrication and Inspection
2. Underground Piping Installation
3. Above Ground Piping Installation
4. Pipe Supports
5. Pipe System Cleanliness
6. Pressure Testing of Piping, Tubing and Components

Please note that, this procedure does not apply to temporary construction piping systems but may be applied as stipulated by the Site Construction Department.

3.0 DEFINITIONS

Definitions	Description
Site Construction Department	Department within the Project Management Company that is responsible for Construction activities / operations
Site Engineering Department	Department within the Project Management Company that is responsible for Engineering or design activities / operations
Enterprise Content Management System (ECMS)	An information management and collaboration platform for managing and controlling program documents and records.
Inspection and Test Plan (ITP)	A document that outlines specific inspection and testing requirements relevant to a specific process, which is used to monitor the work installation quality. The ITP identifies the items, materials and work to be inspected or tested; by whom, and at what stage or frequency; as well as Hold (H) and Witness (W) points, and references to relevant standards.
Construction Contractor	The Main or Principal Contractor responsible for undertaking the Construction Works on the Project. Individual(s) or firm(s) engaged in the construction of buildings, either residences or

Definitions	Description
	commercial structures, as well as construction activities such as paving, highway construction, utility construction and landscape installation.
Entity Project Management Organization (EPMO)	An Entity Project Management Organization, this is an integrated team that comprises the Entity and its PMC responsible for managing all the Entity's projects.

4.0 REFERENCES

1. EPM-KCQ-PR-000005 - Project Construction Quality Management System Procedure
2. EPM-KCE-PR-000007 - Project Construction As-Built Drawings Procedure
3. EPM-KCC-PR-000002 - Project Construction Field Work Activities Procedure
4. EPM-KCE-PR-000009 - Project Construction Civil Works Procedure.

5.0 RESPONSIBILITIES

5.1 Construction Contractor

The Construction Contractor is responsible for planning and executing the works in accordance with the contract requirements, specifications and drawings.

5.2 Site Construction Department

The Construction Department shall be responsible for coordinating all project-based construction support and the management of Construction Contractors.

6.0 PROCESS

6.1 General

The Construction Contractor shall plan and execute the works in accordance with EPM-KCC-PR-000002 Project Construction Field Works Activities Procedure.

6.2 Pipework Installation

The Construction Contractor shall undertake the installation of pipework and equipment in accordance with the contract specification and drawings, and accepted shop drawings.

The Construction Contractor shall prepare a Construction Piping Work Plan which will describe the methods of installation for the Construction Piping Works and will also provide a tracking tool for the identification of components and installation progress of the piping work.

The Construction Contractor shall procure the necessary pipe to meet the project requirements. In general, the fabricator will prepare fabrication drawings for submission and acceptance by the Site Construction or Site Engineering Departments.

Fabrication drawings and materials acceptance, in accordance with EPM-KCQ-PR-000005 Project Construction Quality Management System Procedure, shall be reviewed and approved by the Site Construction Department prior to the placement of formal orders. Particular attention should be given to small bore piping and service piping where pipe routes may not be fully coordinated or pipe clamps / pipe supports to be employed may require review and approval by relevant structural engineers.

Where many similar pipe diameters are utilized on the project, the Construction Contractor shall ensure adequate segregation of different materials and grades of pipe.

Any below ground piping works will be undertaken in accordance with EPM-KCE-PR-000009: Project Construction Civil Works Procedure.

Inspection of pipework installation activities shall be in accordance with the contract requirements, however, shall at a minimum cover the items identified in Attachment 1, Project Construction Inspection and Test Plan Construction Piping Works Template (Sample).

Pressure testing of pipework shall be planned in accordance with the Construction Piping Works Plan and includes all the safety requirements provide by the Construction Contractors Safety Department. The Construction Contractor shall define and implement sufficient exclusion zones during the test pressurization.

Test plans and method statements shall be submitted by the Construction Contractor and reviewed by the Site Construction Department and Site Engineering Department prior to any pressure test being conducted.

The test medium shall to disposed on in accordance with local regulations.

6.3 Pipe Material Management, Fabrication and Inspection

The documents listed below are normally be used for purchase of material and piping installation activities. This list may be supplemented by project specific documents, vendor or project Entity requirements:

1. Piping Specifications
2. Applicable Local or Country Codes
3. Piping Layout Drawings and Piping Isometrics
4. Special piping components
5. Bill of Lading

Material Receipt and Control: Construction Contractor shall be responsible to ensure that spool fabricator data, including spool ID, length, weight size, etc., is maintained in the Construction Piping Work Plan tracking tool as developed by the Construction Contractor.

Construction Contractor shall establish a color code system for pipe material that allows easy visual identification of pipe materials when comingling of materials is a concern, (e.g., Carbon Steel, chrome, and cold service piping, various bolting materials).

When separation or segregation controls such as color coding of piping material are used, Construction Contractor shall ensure the project-established controls are maintained throughout the installation process.

Construction Contractor to consider color striping of different pipe & fitting materials, painting non-stamped end of studs, bolts, and color identify gasket edges by type, flange rating.

Construction Contractor shall ensure that materials (inks, paint, etc.) used for color coding are not detrimental to the material being color coded.

For cleanliness, the Construction Contractor shall:

1. Exercise care in all loading, unloading, hauling and installation operations to avoid introduction of debris or dirt into the pipe.
2. Position handling hooks/slings to properly balance the piping spools and prevent piping from coming in contact with the ground.
3. Inspect yard storage of pipe, valves, and piping system materials for proper protection and cleanliness.
4. Ensure that gaskets or seal lubricants for mechanical joint pipe are kept in a dirt-free environment.
5. Piping system material and components are inspected upon receipt to ensure cleanliness is as specified and not damaged.
6. All pipe and valves to be shipped with protection end caps, and remain in place until installation.

6.4 Underground Piping Installation

Receiving, Hauling and Storage: Construction Contractor shall ensure that pipe, valves, and coating materials are protected and maintained.

Trenching: Construction Contractor shall ensure that trenching is performed in accordance with EPM-KCE-PR-000009 Project Construction Civil Works Procedure

Construction Contractor shall ensure that the following materials are installed, tested and documented in Attachment 1 Project Construction Inspection and Test Plan Construction Piping Works Template (Sample):

1. Large Bore Welded and Mechanical Jointed Pipe
2. Small Bore Piping
3. Valves
4. Bolts and Studs
5. Gaskets
6. Pipe Supports and Expansion Joints
7. Seal Welding
8. Insulated Lines
9. Coated Lines

6.5 Aboveground Piping Installation

Receiving, Hauling and Storage: Construction Contractor shall ensure that pipe, valves, and coating materials are protected and maintained.

Construction Contractor shall ensure that the following materials are installed, tested and documented in Attachment 1 Project Construction Inspection and Test Plan Construction Piping Works Template (Sample):

1. Piping (spools, large bore and small bore)
2. Valves
3. Gaskets
4. Bolts and Studs
5. Flanged connections
6. Insulated Lines
7. Alloy Lines
8. Orifice Runs
9. Coated Lines
10. Miscellaneous Items (such as but not limited to Relief valves, pressure gauges, blinds, screens, strainers, instruments, etc.)

6.6 Pipe Supports

Construction Contractor shall ensure that the following activities are carried out and documented in Attachment 1 Project Construction Inspection and Test Plan Construction Piping Works Template (Sample):

1. Pre-Installation Checks
2. Pipe Support Installation
3. Pipe Alignment

6.7 Pipe System Cleanliness

Construction Contractor shall ensure that the following activities are carried out and documented in Attachment 1 Project Construction Inspection and Test Plan Construction Piping Works Template (Sample):

6.7.1 Piping

1. Ensure pipe ends are capped or covered.
2. Ensure piping is free of all construction debris such as tape, wire, slings and other installation tools and materials.

3. Check that cleaning and blowing activities are carried out in accordance with project specifications.

6.7.2 Valves/In-line Components

1. Ensure that valves and in-line components are verified clean prior to installation.
2. Ensure that drains or flushing connections to valve bodies are opened during hydrotest draining, and are blown clear with oil free, dry air.

6.7.3 Miscellaneous Items

1. Ensure that miscellaneous items (permanent or temporary) such as suction strainers are installed in line, as required.
2. Ensure that labelling, services indicators, location signage are installed in accordance with the design drawings and specification and where applicable.

6.8 Pressure Testing of Piping, Tubing and Components

Construction Contractor shall ensure that the following activities are performed and documented in 1 Project Construction Inspection and Test Plan Construction Piping Works Template (Sample):

6.8.1 Work Planning

Generates a pressure test work package in accordance with Project Procedure EPM-KCC-PR-000002 Project Construction Field Work Activities Procedure.

The pressure test package shall identify the appropriate Code and standard as identified by the specifications and drawings.

The pressure test package shall include all drawings, sketches to identify and to show the arrangement of all components utilized in the test.

Test procedure shall identify the required test pressure, test duration, temperatures (both ambient and fluid) and other items necessary to perform the test.

For pneumatic tests, identifies safety considerations and shall ensure appropriate hazards and controls are documented

Condensate, feedwater, and any steam piping is to be hydrotested with treated clean water per project specifications and drawings.

The test package shall include all safety requirements identified during the planning stages of the test.

6.8.2 Pre-Test Activities

Ensure that the general test calculations are completed and recorded per the requirements of the project Specifications, Codes and Standards.

Ensure the (sub)system to be tested is installed as described in the pressure test packages.

Review the completed pressure test package identifying the (sub)system and shall document acceptance.

Ensure the welding is reviewed and accepted by the relevant parties

Confirm that the system is complete per the pressure test package and the system is ready for testing.

6.8.3 Testing Activities

Verify that all safety requirements are in place.

Ensure the system is pressurized as described in the pressure test plan package.

Verify that the system is held at the required test pressure for the specified time before inspecting for leaks.

Document the test results and test acceptance on the applicable test record

Ensure the system is depressurized upon completion of the test.

Ensure that the pressure test medium is properly disposed of.

6.8.4 Post Test Activities

Ensure that the system is drained and restored, closed, capped or otherwise secured to prevent ingress of debris and contaminants. Blow clear with oil free, dry air as required to remove any remaining water.

Verify system restoration and preservation is complete; note that system restoration need not be verified for drainage/sewer piping systems.

Document that the (sub) system is drained, and that test blanks, suction strainers, gauges, valves, instruments, etc., that were removed for pressure testing are replaced.

7.0 ATTACHMENTS

1. EPM-KCE-TP-000018 - Project Construction Inspection and Test Plan Project Construction Piping Works Template

Attachment 1 - EPM-KCE-TP-000018 - Project Construction Inspection and Test Plan for Construction Piping Works Template

Activity No.	Activity Description	Inspection/Test Requirements		Reference Documentation		Method of Verification (see Legend)			Demonstrated Evidence Report / Checklist Reference No.
		Test or Inspection Performed	Stage/ Frequency	Code/Spec/ Etc.	Acceptance Criteria	Construction Contractor	Site Construction Department	Project	
1.0	Document review								
1.1		Confirm documents: • Design drawing • Method statement • Material submittal	Prior to commence ment	Project Specific	Documents available and latest revision from ECMS document management system				
2.0	Material receiving inspection								
2.1		Visual inspection for damage, deformity and correct label	Project Specific	Project Specific	Project Specific				Materials receipt
3.0	Storage								
3.1		Refer to method statement & manufacturer's recommendation	Project Specific	Project Specific	Project Specific				
4.0	Pre Fabrication								
4.1		Approval of the welding procedure specification	Project Specific	Project Specific	Project Specific				
4.2		Approval of the Welder Approval Record	Project Specific	Project Specific	Project Specific				
4.3		Verify the welding consumables	Project Specific	Project Specific	Project Specific				
5.0	Fabrication & Installation								
5.1		Pre-weld fit-up and pipe end preparation (Cutting / beveling / etc.)	Project Specific	Project Specific	Project Specific				