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General requirements for pipeline corrosion control engineering life cycle

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Foreword

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee *[for Project Committee]* ISO/TC *156*, *[corrosion of metals and alloys]*, Subcommittee SC 1, *[corrosion control engineering life cycle]*.

Introduction

The document is one of the intermediate-level standards in corrosion control engineering life cycle system, as well as the top-level standard in industrial pipeline system. This document whose object is the pipeline corrosion control engineering life cycle is based on ISO/CD 23123, integrating the specific conditions of pipeline industry, to develop control requirements for all elements affecting pipeline corrosion control engineering life cycle. Considering that pipelines of different industries, such as: oil and gas pipeline, process pipelines, buried pipelines for municipal engineering, etc., have their diverse corrosive environment, conditions and corrosive control demands, the standard should not focus on the specific corrosive environment and conditions. The generality should exist. Hence, with the characteristics of holistic, systematic and comprehensive, the document mutually coordinates and adopts the specific corrosion control technology, method and management of related standards in existing ISO standard system, and ensures the performance of existing standards as well.

The document only stipulates the fundamental working procedures and requirements of all related elements in pipeline corrosion control engineering life cycle, and aims at integrating all related elements in the corrosion control engineering as a whole system to work. The document also establishes a traceable and supportive management system, taking each element in pipeline corrosion control engineering life cycle as object, to realize the overall control and continuous improvement in pipeline corrosion control engineering life cycle.

General requirements for pipeline corrosion control engineering life cycle

1 Scope

This document specifies overall requirements and general requirements for control elements of pipeline corrosion control engineering life cycle.

It is applicable to all types of pipeline corrosion control engineering programs.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/CD 23123, *Corrosion control engineering life cycle - General requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
Pipeline corrosion testing and monitoring system
Technology for real-time testing and feedback of corrosion or damage in and out of pipelines to avoid accidents.

3.2
Pre-control
Precautions should be taken, and counteractions should be prepared against deviation of the expected objectives or corresponding standards, etc., during the process of pipeline corrosion control life cycle.

3.3
Forewarning
Giving emergency signal and taking appropriate measures in advance before a disaster or other dangers those need to be watched, so as to prevent the occurrence of hazard without knowledge or preparation, thereby minimizing or avoiding the damage caused by the disaster or danger.

3.4
Green environmental protection
A behaviour of human beings to protect nature.

3.5
Green plan
The corresponding measures for environmental protection, resource consumption, engineering waste generation and recycling of pipeline corrosion control engineering in the stage of pipeline construction and operation.

4 General Principles

4.1 This document is the intermediate-level standard of ISO/CD 23123. It should fulfil the requirements of item 4.1 in ISO/CD 23123.

4.2 This document is the top-level standards of industrial pipeline system. It does not formulate the specific professional technology, professional management standards, specifications and test methods. This document, whose object is each element of the pipeline corrosion control engineering life cycle, provides adoption and selection principles of corresponding technology and management standards.

4.3 A traceable and supportive management system should be established for each element to achieve overall control and continuous improvement of pipeline corrosion control engineering life cycle.

5 Objective

5.1 The objectives of corrosion control engineering should satisfy the requirement of item 5.1 in ISO/CD 23123.

5.2 The objectives of corrosion control engineering should be communicated, implemented, and maintained in all aspects of pipeline life cycle. The objectives should be regularly reviewed and improved to ensure their suitability.

5.3 All elements of pipeline corrosion control engineering life cycle should be optimized and mutually coordinated. The life cycle of pipeline corrosion control engineering should be adapted to the life cycle of protected pipeline.

6 Corrosion sources

6.1 Corrosion sources include:

a) Internal corrosion sources, including but not limited to pipeline transmission medium, flow rate, temperature, pressure, etc.;

b) External corrosion sources, including but not limited to environmental factors and corrosive medium which react with pipeline in different environmental conditions;

6.2 New corrosion sources in the operation of pipeline, including but not limited to cathodic disbonding, maintenance and electrochemical corrosion caused by replacing pipeline of different materials etc.;

6.3 Corrosion sources caused by changing working conditions, which include both conditions of the main program and corrosion control engineering.

6.4 All of corrosion sources should be identified systematically, comprehensively and accurately by referring cases and corresponding standards. For example, the atmospheric corrosion of pipeline may refer ISO 9223 and the corrosion of buried pipeline may refer EN 12501.

6.5 Fulfil the requirement of item 6.3 in ISO/CD 23123.

7 Pipeline

7.1 Select the optimal corrosion-resistant pipeline.

7.2 Pipeline should be selected based on corresponding inspection standards. For example, the selection of pipeline in petroleum and natural gas industries may refer ISO 13623.

7.2.1 The pipeline selection principles should be followed:

a) The selecting pipeline and its applied environment should be researched and investigated, to ensure the corrosion resistance as well as green environmental protection.

b) Consider the processability, applicability and economy on the basis of satisfying application requirement.

7.2.2 The selection of pipeline should follow the procedures:

a) Carry out the field survey of corrosion in the applied pipeline environment. Ensure the corrosion sources, parameters and grade;

b) Select appropriate pipeline to satisfy the corrosion resistance by referring the corresponding standards and manuals.

c) Evaluate the resistance of pipeline. In the condition of lacking of similar engineering and application, the stimulation tests in laboratory or field analysis should be the reference to select pipeline.

d) Consider the applicability and durability prior to economy on the basis of guaranteed working life.

7.3 The selected pipeline should be reviewed and assessed by specific procedures, documented and archived.

8 Technology

8.1 One or more appropriate technologies should be implemented for pipeline corrosion control according to the corrosion sources. Technologies include but not limited to:

a) rational design of structural processes: insulation technique, the installation of electrical isolation points and isolation devices, the detailed integrated plan of sleeve, facilities and other electrical affected zone, prevention of unpredicted corrosion, such as cathode screening or cathodic disbanding, etc.;

b) coating protection: select coating which adapt the expected operation conditions and feasible construction process. The optimal coating protection scheme of environmental protection and technical economy should be adopted;

c) electrochemical protection: evaluate the total cost and current density which is required to fully polarize the pipeline to protect against corrosion, or current using in cathodic protection;

d) corrosion inhibitor selection: fully investigate the cause of the internal corrosion and the chemical property of pipeline transmission medium; select optimal type, frequency and dose; evaluate the cost;

e) cleaning: include chemical and physical cleaning. The type and amount of collected feculence should be analysed in order to inspect the control effect and ensure the frequency of pigging;

f) environment protection: adopt environment-friendly pipeline corrosion control and construction technology in priority;

g) composite technology: adopt composite pipe technology without electrochemical corrosion in priority.