

**Training Title**

**API 570: PIPING INSPECTION CODE**

**Training Duration**

**5 days**

**Training Venue and Dates**

REF WC020	API 570: Piping Inspection Code	5	20-24 January, 2019	\$4,000	Dubai, UAE
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**In any of the 5 star hotels. The exact venue will be informed once finalized.**

**Training Fees**

- **4,000 US\$ per participant for Public Training. . Fees Includes Course Materials/ Handouts, Tea/Coffee, refreshments, International Buffet Lunch.**

**Training Certificate**

**Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.**

**TRAINING OVERVIEW**

**TRAINING DESCRIPTION**

**Web Definition: Piping Systems are interconnected piping subject to the same set or sets of design conditions. Piping refers to assemblies of piping components used to convey fluids.**

**Pipeline Integrity Management is a hot bed of discussion these days. It is because many transmission pipelines are now over 20 years old and are in their "middle age". Even the best designed and maintained pipeline will become defective as it progresses through its design life. Therefore, operators need to be aware of the effect these defects will have on their pipeline, and — more importantly — be able to assess their significance in terms of the continuing integrity of the pipeline.**

**The increasing use of high-technology maintenance is helping pipeline owners to assess the condition of their lines, and if these modern maintenance methods are combined with modern defect-assessment methods, they can provide a very powerful, and cost-effective, tool. This course will present the latest inspection and maintenance methods to pipeline engineers and managers.**

**This course provides an opportunity to gain the knowledge and necessary skills as required to develop and manage a piping system inspection, integrity assessment and rehabilitation program.**

**Finally a brief introduction to Pipeline Integrity Management as a structured process by which operators can:**

- **Determine the major threats and risks to the integrity of their system**
- **Develop plans to address the identified threats**
- **Conduct appropriate inspections to determine the condition of the system**
- **Assess the results of the inspections**

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- **Control and Maintenance**

This course will also provide the participants with an in-depth understanding of the most popular Codes and Standards used in piping and pipelines inspection, maintenance and integrity assessment, such as ASME B31 code rules and API standards.

The participants will be able to recognize causes of degradation in-service, whether mechanically induced (pressure, vibration, fatigue, and pressure transients, external damage) or due to corrosion (wall thinning, pitting, cracking), and apply integrity analysis techniques to make run-or-repair decisions.

The course covers all familiar inspection techniques, such as PT, MT, UT, RT and PA and indirect assessment (laboratory techniques) for maintenance programs by periodic inspections and evaluation of results.

The course will review the various repair techniques, their advantages and shortcomings, and the step-by-step logic to be followed in making repair decisions and selecting the applicable repair.

### **TRAINING OBJECTIVES**

The Major Objective of this course is to enhance the knowledge, capabilities and skills of the targeted Engineers to be able to tackle the new integrity challenges.

The course will cover methods available to assess the significance of defects detected in all pipelines and connected equipments and auxiliaries. It will introduce simple analytical methods used to assess internal and external corrosion, dents and gouges, cracks (e.g. SCC), weld defects, and fatigue. The course is unique as it is a holistic approach to defect assessment, and it ensures the student appreciates all aspects of the subject, including repair and risk management.

All these topics are explained with case studies and photographs

Detailed explanations of all the information covered in the API 570 'Body of Knowledge' including: ASME welding requirements for pressure piping section IX and B31.3 VIII; ASME non-destructive testing principles and application of Section V; pressure piping design review ASME B31.3, weld sizes, pipe branch reinforcement, brittle fracture, weld efficiency factors, post weld heat treatment; pressure piping inspection practices;

### **WHO SHOULD ATTEND?**

This course is designed for Engineers with long field experience with the following disciplines: Pipeline Operations, Pipeline Inspection, Integrity Engineering.

The following personnel will also benefit from this course: Engineering Consultants, Maintenance Personnel, Inspectors, Inspection personnel, and Trainee Engineers.

### **TRAINING METHODOLOGY:**

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

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Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work & Practical Exercises
- 20% Videos & General Discussions

### **TRAINING OUTCOME**

By the end of the training course, the participants should be able to:

Detailed explanations of all the information covered in the API 570 'Body of Knowledge' including: ASME welding requirements for pressure piping section IX and B31.3 VIII; ASME non-destructive testing principles and application of Section V; pressure piping design review ASME B31.3, weld sizes, pipe branch reinforcement, brittle fracture, weld efficiency factors, post weld heat treatment; pressure piping inspection practices

### **COURSE DAILY PROGRAM**

#### **Day 1**

##### **Registration**

##### **Introduction to Basic Pipeline Engineering Principles**

- Importance of pipeline
- Basic pipeline design principles
- Stresses in pipelines
- Routing of pipelines
- Basic pipeline operating parameters
- Operating & Design Pressure

##### **Introduction to Pipeline Defects - Why Pipelines Fail**

- How safe are pipelines?
- How often do they fail?
- What causes pipelines to fail?
- Pipeline risks
- History of pipeline defect assessment

##### **Integrity for Sustained and Occasional loads**

- Layout
- Support
- Temperature Effects
- Vibration Effects
- Pressure Effects

#### **Day 2**

##### **Codes and Standards**

- ASME Codes and Standards
- API Standards
- Other standards: NACE, etc..

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### **Pipeline / System Defect or Failure Relationships**

- Why pipelines and systems fail? Material, manufacture, fabricational, operational, environmental factors
- Identifying cause assessing the damage/failure
- Fundamental failure relationships

### **Principles and Practice of Data Collection and Management**

- pipeline information database structures
- manufacturing defects
- construction defects
- environmentally induced failures (SCC)
- failure case studies analysis of causes of failures
- failure modes and how pipelines fail (ductile/brittle fracture)
- introduction to external and internal corrosion (including microbiological induced corrosion)
- case studies of pump components, pipes, etc

### **Day 3**

#### **Piping system other auxiliaries and equipments and causes of failures**

##### **Importance of standards for old and new lines**

- Inspection and testing practices – sec.5
- Selection of piping and fittings-flanges, elbows, joints
- Piping codes and standards – B 31
- Designing of piping system
- Material of construction – physical properties
- Pipe thickness calculations
- Engineering of piping – B 31.3
- Pressure drop
- Valves
- Pumps
- Compressors
- Heat exchangers
- heaters
- Expansion joints, orifice, strainers
- Pipe supports
- Routing: Above ground, below and in trenches
- Welding of CS and alloy steel
- Welding of austenite steels
- Conversion table
- Pressure testing
- Field velocities

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### **Case studies and analysis of failures with photographs**

- Repair, re-rate, alteration of in-service piping

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**Day 4**

**Defect Assessment**

**This module will review the assessment methods which are applicable to pipelines and systems**

- corrosion assessment methods (ASME B31.G)
- methods to assess manufacturing metal loss defects
- methods to assess dents
- methods to assess gouges and dent/gouge combinations
- methods to assess cracks (BS 7910, API 579, In-sec)
- methods to assess laminations (API 579)
- using inspection data to carry out integrity assessments
- on line measurements-coupons

**Repair and Remediation**

The objective of this module is to describe the Preparation Procedures for Repairs and restoration. The applicability of each of the techniques for the repair of defects will be discussed.

The following techniques will be include

- grind repairs
- local weld repairs
- sleeving, lining and cladding
- cold weld repair using epoxy products

materials handled

metallics

nonmetallics like concrete fiber glass rubber

**Setting offshore Pipeline Intelligent Pig Inspection Levels**

- Pigs - where they came from and what they can do.
- Basic theory
- Magnetic, ultrasonic pigs - their accuracy and limitations.
- What pigs can detect
- What operators want to detect
- Setting intelligent pig inspection levels

**Day 5**

**Risk and Integrity Management and Analysis**

- What is risk and risk analysis?
- Risk Assessment & Risk Management
- Risk management methods - API and ASME
- Baseline and direct assessment - discussion item
- Integrity Management Programs
- Prioritization schemes

**NOTE:**

**Pre & Post Tests will be conducted**

**Case Studies, Group Exercises, Group Discussions, Last Day Review & Assessments will be carried out.**

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