Training - Inspector

INSP-EN-P

Face-to-face only

40 days

This training aims to increase skills on inspection of static equipment. This course will provide an IFP Training Certificate according to the IFP Training procedures

IFP Training Certificate

Graduate Certificate

Level

Knowledge

Public

Inspection, maintenance and HSE Engineers, supervisors and staff involved in integrity and inspection of equipment

Objectives

Attendees will be able to implement the following skills:

- List the main material used in the oil and gas or petrochemical plants
- Select the main standards and codes used for pressure vessels and piping
- Describe the components of pressure vessel, piping and accessories
- List the origin of steels and alloys equipment degradations in the Oil & Gas and chemical industries
- Select appropriate NDT and alternative prevention tools to monitor corrosion effectively
- Review repair welding processes used in Oil & Gas industry
- Supervise and control efficiently contracted painting jobs and other protection devices
- Learn RBI strategy for a petrochemical or chemical unit

Pedagogical & technical resources

- Active teaching methods are used to promote individuals experience
- Learning process including case studies
- Visits of construction or repair workshops
- Each participant can present its daily work and analysis: regulations and local guidelines used, repair methods and code, welding specifications, NDT, qualification of controllers
- Mini-projects team works according to detailed program
- Practices in workshops if possible
- Individual project to finalize the program
- Practical internal inspection of pressure vessel during shutdown and external inspection of piping

Assessment of achievements

- Trainees are assessed throughout the training through practical application phases and interactions with the trainer
- A final on-the-spot evaluation may also be carried out at the end of the course and/or at the end of each module using tests designed to verify the learners' understanding and assimilation of the knowledge linked to the training objectives

Prerequisites

No prerequisites are necessary to follow this course

Responsable

IFP Training instructors, with expertise in the field and trained in modern teaching methods adapted to the specific needs of learners from the professional world

Program

MODULE 1: MATERIAL & STATIC EQUIPMENT — 5 days

Metallurgy of ferrous and non-ferrous material used in process industries, structure of steels and alloys. Mill certificate review.
Piping and flanges, different types of piping equipment: pipes, flanges and gaskets, valves, steam traps, bellows, safety valves, rupture discs; piping codes and standards, piping classes, pressure resistance (ISO-PN, series).
Pipe supports. Insulation and tracing.
Vessels: technology of separator drums; technology and internals of distillation columns and reactors; storage tanks - different types (atmospheric, pressurized, cryogenic...); design, technology; main safety and operating equipment; reliability criteria.
Thermal equipment: TEMA standard heat exchangers; thermal performance (fluid flow distribution, characteristics & technology).
Different types of furnaces and their characteristics. Boiler technology.

MODULE 2: REGULATIONS - RELIEF VALVES & RUPTURE DICS — 5 days

Local rules and international regulations applicable for pressure equipment. Pressure equipment directive requirements. International construction codes: ASME VIII, EN 13445. Thickness calculation for shell, bottom, pressure and vacuum, reinforcements of nozzles, pressure test. Existing equipment: study local and international practices: API 510, ASME B16.5 & B31.3, API 570 and 571.
Pressure relief valves and rupture discs technology and installation. Available technologies and selection criteria for liquid and gas: API 521 & API 520 part 1, international codes, norms, material, spring, orifice size, bellows. Field installation (API 520 part 2): connections, pressure drop, supports, noise, plugging risks. Periodic inspection and maintenance API 527, pop test, kellog test. Study cases.

MODULE 3: CORROSION & CORROSION PREVENTION — 5 days

Different types of industrial corrosion: thinning (corrosion under isolation, corrosion-erosion, galvanic, high temperature sulfur corrosion, oxidation...), cracking (hydrogen induced cracking, high temperature hydrogen attack, intergranular, stress corrosion, amine cracking...), pitting (passivation...), metallurgical deterioration (brittle fracture, creep, fatigue).
Corrosion prevention: material selection, detailed engineering design; corrosion control by means of sampling, use of corrosion coupons and probes; inhibitors.

MODULE 4: INSPECTION, NON-DESTRUCTIVE TESTING & REPAIR WELDINGS — 5 days

Basic and advanced NDT techniques: visual inspection, liquid Penetrant Test (PT), Magnetic field Test (MT), Radiographic Test (RT), Ultrasonic Testing (UT, TOFD, phase array), Leak and pressure Testing (LT), Electromagnetic Testing (ET), Positive Material Identification (PMI), Infrared Thermography (IR), Acoustic Emission (AE). Practical use.
Welding: cutting processes, forming, welding used on vessels and pipework (SMAW, GTAW, GMAW, SAW...). Welding parameters and weldability of main materials (CS, SS, LAS...). Welding Procedure Qualification Record (WPQR) - Welding Procedure Specification (WPS) - Welder Performance Qualification (WPQ). Post weld heat treatment. Welding safety and health issues.

MODULE 5: INDIVIDUAL PROJECT: REPAIR WORKS ON PRESSURE VESSEL OR PIPING — 5 days

Case study - Project: subject submitted by the lecturer: study of pressure equipment degradations and consequences.
Evaluate the damage and its potential kinetics of evolution (remaining life for thinning or risk of cracks propagation). Advise repair or modification, non-destructive testing and inspection in accordance with the applicable specifications and standards. Turnaround scheduling, including definition and selection of milestones. Check possibility for on line temporary repair or hot work during plant shutdown. Individual project oral presentation.

MODULE 6: PAINTINGS, COATINGS & CATHODIC PROTECTION — 5 days

Characteristics and properties of paintings and coatings. Paint components. Binders and plastifiers, pigments, fillers, colorants, additives, solvents. Physical characteristics. Paint manufacture and recent developments.
Different types of industrial paint and for special environment. Composition of a paint system (role of coats and compatibility). Inspection, control and commissioning.
Cathodic protection - Principles and applications. Wet corrosion mechanisms and prevention. Principles of cathodic protection.
Impressed current and sacrificial anodes. Design and selection of cathodic protection systems. Performance monitoring. Field potential measurement. Monitoring in sea water and in soil. Norms and standards (EN 15257).

MODULE 7: RISK BASED INSPECTION (RBI) — 5 days

Identification of the degradation mechanism for a corrosion loop based on API 571. Description of API 580 RBI methodology for a petrochemical or chemical plant. Probability and consequence of a failure using API 581 workflow and simplified alternative tools. Identification and ranking of piping and pressure vessels in a risk matrix. Extend inspection periodicity or set up an efficient inspection strategy (mitigation by means of more efficient NDT, design improvement or Process safety management enhancement).
Mini projects application to study cases as teamworks.

MODULE 8: FINAL PROJECT - PRACTICAL INSPECTION — 5 days

Practical external and internal inspection of a pressure vessel during a plant shutdown and an external on line piping inspection.
Preparation: identify the design conditions, the inspection history and detail the inspection strategy.
On site: plan the NDT; perform vessel and piping inspection according to the specifications; identify any corrosion.
Write an inspection report based on the actual tests, update the RBI and propose an updated inspection strategy.
Individual oral presentation and evaluations related to the IFP Training Certification.

To French entities : IFP Training is referenced to DataDock ; you may contact your OPCO about potential funding.
Please contact our disabled persons referent to check the accessibility of this training program : referent.handicap@ifptraining.com