



energy **API**

Exploitation des codes et Normes (ASME et API)

Réf : API_CODES



Support de formation
en français

10 Days

- Acquérir les connaissances permettant de naviguer dans les sections du code pour en comprendre la philosophie particulière et pour identifier les parties applicables à une fabrication ou construction donnée et en définir avec exactitude les critères applicables.

Objectifs

À l'issue de la formation, les stagiaires seront capables de :

- Comprendre le processus réglementaire aux USA et au Canada ;
- Comprendre la structure et l'organisation administrative et technique du B&PV Code de l'ASME ;
- Connaître les normes ASME et API et de naviguer dans les sections du code
- Comparer les exigences clés relatives à la fabrication, aux contrôles et essais d'équipements construits suivant ASME VIII et d'autres Codes B31.1,3,4, 8..
- Identifier les différences critiques entre quelques codes en termes de fabrication, contrôles et essais.
- Vérifier la conformité aux sections du code
- Maîtriser l'exploitation des critères d'acceptabilité des codes

Public

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- Comprendre la structure et l'organisation administrative et technique du B&PV Code de l'ASME ;
- Connaître les normes ASME et API et de naviguer dans les sections du code
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- Identifier les différences critiques entre quelques codes en termes de fabrication, contrôles et essais.
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Exploitation des codes et Normes (ASME et API)

Programme

PARTIE - I : CODE ASME

- Chapitre I : Organisation historique & General Requirements
- Chapitre II : Codes et Standards pour Tuyauterie ASME B31.1, B31.2, B31.3, B31.4, B31.8
- Chapitre II : ASME Section VIII DIV.1 Div.2 et Div.3

Étude et construction des appareils à pression (en aciers soudés)

- Chapitre III : ASME Section IX

Qualifications de soudage dans le cadre de la section VIII DIV. 1

- Chapitre IV : ASME Section V

Essais non destructifs dans le cadre de la section VIII DIV. 1 ou 2

PARTIE - II : CODE API

1. Liste et définition des normes API
2. Codes et section
3. Exemple de présentation de code/normes API relative au pipeline et à la tuyauterie
4. Certifications API

API – 510 Pressure Vessel Inspector

Réf : API_510



English training
ressources

5 Days

- The course prepares the professional for the API 510 exam. The course is an intensive Five days course with a heavy emphasis on the use of the codes and mathematical calculations.
- API Authorized Pressure Vessel Inspectors must have a broad knowledge base relating to maintenance, inspection, repair, and alteration of pressure vessels. The API 510 Certification Preparation is designed to equip the professional with such information and understand the exam format.

Learning Objectives

The course provides participants with the knowledge necessary to:

- Successfully pass the API 510 pressure vessel inspector certification exam
- Effectively use major codes: ASME B&PV Sections V, VIII, & IX
- Perform all basic vessel calculations needed for the API exam (e.g. t_{min} , test pressure, MAWP, static head, MDMT, corrosion rates, remaining life, etc.)
- Use API's requirements during inspection, repairs, and alterations of pressure vessels
- Review welding procedures (WPS/PQR) and welder performance qualifications (WPQ)

Audience

This course will specifically benefit Engineers, Supervisors, and Managers from the following disciplines:

- Mechanical Engineering
- Inspection
- Maintenance & Operations
- Technical & Engineering
- QAQC

and technical personnel with 2-3 years of experience in the management and planning of inspection and maintenance activities of pressure vessel system at upstream oil & gas facilities, refineries, process plants and petrochemical facilities.

API – 510 Pressure Vessel Inspector

Program

Module - 1 Welcome and Introduction
 Overview of API 510 Course

Module - 2 Joint Effeciencies

Module - 3 Thickness Calculations

Module - 4 Static Head

Module - 5 External Preasure
 Impact Testing

DAY 2

Module - 1 Pressure Testing

Module - 2 Weld Size For Attachment Welds at Openings

Module - 3 Nozzle Reinforcement

Module - 4 Scope of API 510
 References

Module - 5 Definitions
 Owner/user inspection organization

DAY 3

Module - 1 Inspection, Examination and Pressure Testing Practices

Module - 2 General Types Of Inspection And Surveillance
 Condition Monitoring Locations
 Condition Monitoring Methods

Module - 3 Pressure Testing
 Material Verification And Traceability
 Inspection Of In-service Welds And Joints
 Inspection Of Flanged Joints

DAY 4

Module - 4 Interval/frequency and extent of inspection

Module - 5 Inspection data evaluation, analysis, and recording

Module - 6 Fitness For Service Analysis Of Corroded Regions

DAY 5

Module - 1 Repairs, alterations, and rerating of pressure vessels .

Module - 2 Heat Treating Requirements

Module - 3 Introduction to ASME Sec. IX

Module - 4 API RP 576, Inspection of Pressure-Relieving Devices

Module - 5 Article 1, General Requirements - Article 2, Radiographic Examination

Module - 6 Article 6, Liquid Penetrant Examination -
 Article 7, Magnetic Particle Examination (Yoke and Prod techniques only)
 Article 23, Ultrasonic Standards, Section SE-797

Module - 7 API RP 576, Inspection of Pressure-Relieving Devices

Module - 8 Discussion

API 572- Inspection of pressure vessels

Réf : API_572



English training
ressources

5 Days

API RP 572, Inspection of Pressure Vessels, is a recommended practice developed and published by the American Petroleum Institute (API) that covers the inspection of pressure vessels, including those with a design pressure under 15 psig, and the standards for their construction and maintenance. In addition, RP 572 also discusses, with relation to pressure vessels, the reasons for inspection, causes of deterioration, the frequency and methods of inspection, methods of repair, and preparation of records and reports. This recommended practice covers a large variety of topics related to the inspection of pressure vessels including safety precautions, thickness measurements, both internal and external inspections, and special methods of detecting mechanical damage.

Learning Objectives

This recommended practice (RP) supplements API 510 by providing pressure vessel inspectors with information that can improve skills and increase basic knowledge of inspection practices. This RP describes inspection practices for the various types of pressure vessels (e.g. drums, heat exchangers, columns, reactors, air coolers, spheres) used in petroleum refineries and chemical plants. This RP addresses vessel components, inspection planning processes, inspection intervals, methods of inspection and assessment, methods of repair, records and reports. API 510 has requirements and expectations for inspection of pressure vessels.

Audience

Personnel involved in Pressure Vessels, interacting with Inspectors, Quality Managers, Plant Engineer, Supervisors and other interested persons. Individuals responsible for evaluating the mechanical integrity of in-service pressure vessels in process plant applications and Managers responsible for implementing a pressure vessel maintenance program and desire an understanding of applicable evaluation procedures. This class is also designed for pressure equipment inspectors and engineers working in refineries, chemical & industrial plants, gas plants, pipeline terminals, and oil fields.

API 572- Inspection Practice for Piping System components

Program

- Introduction and overview of the applied codes and standards
- Types of pressure vessels: columns, towers, drums, heat exchangers, condensers
- Materials and methods of construction; carbon steel, low-alloy steel, austenitic steels and nitrogen-based alloys
- Reasons for periodic inspection: safety, continuity, efficiency and reliability
- Causes of degradation and deterioration in the materials of pressure vessels: corrosion, erosion, metallurgical changes, thermal stresses, mechanical stresses, faulty material or fabrication techniques
- External inspection of pressure vessels: supports and bolts, insulation and coatings, metallic parts, evidence of corrosion, etc.
- Internal inspection: visual inspection, metallic lining and non-metallic lining
- Special methods for inspection: thickness measurements, in-situ metal analysis, hammer testing, pressure and leak tests & Reports and Records.

API 574- Inspection Practice for Piping System components

Réf : API_574



English training
ressources

5 Days

Process piping system is one of the critical production assets in process industry. Organizations recognize the need to maintain authorized inspection agency and technically assess qualified piping engineers and inspectors to ensure facilities are at top performance. This two-day course is designed for petroleum industry personnel, suppliers, or subcontractors responsible for the design, inspection, maintenance, regulatory compliance, or operation of API Inspection of Piping system.

Learning Objectives

This recommended practice (RP) supplements API 570 by providing piping inspectors with information that can improve skill and increase basic knowledge of inspection practices. This RP describes inspection practices for piping, tubing, valves (other than control valves), and fittings used in petroleum refineries and chemical plants. Common piping components, valve types, pipe joining methods, inspection planning processes, inspection intervals and techniques, and types of records are described to aid the inspectors in fulfilling their role implementing API 570. This publication does not cover inspection of specialty items, including instrumentation, furnace tubular, and control valves.

Audience

This course will specifically benefit Engineers, Supervisors, and Managers from the following disciplines:

- Mechanical Engineering
- Inspection
- Maintenance & Operations
- Technical & Engineering
- QAQC

and technical personnel with 2-3 years of experience in the management and planning of inspection and maintenance activities of Piping system at upstream oil & gas facilities, refineries, process plants and petrochemical facilities.

API 574- Inspection Practice for Piping System components

Program

- Scope
- Normative References
- Terms, Definitions, Acronyms, and Abbreviations
- Piping Components & Pipe-joining Methods
- Reasons for Inspection & Inspection Plans
- Frequency and Extent of Inspection
- Safety Precautions and Preparatory Work
- Inspection Procedures and Practices
- Pressure Tests
- Determination of Minimum Required Thickness & Records

API 579 - Fitness for Service (FFS)

Réf : API_579



English training
ressources

5 Days

Fitness-For-Service (FFS) assessments are quantitative engineering evaluations that are performed to demonstrate the structural integrity of an in-service component that may contain a flaw or damage. This training course is designed to give a detailed discussion of the subject of Fitness for Service concepts (FFS) with emphasis on the basic degradation mechanism and its consequences aspect.

Learning Objectives

- To familiarize participants with the main concepts and technical terms of degradation mechanisms.
- To introduce participants to the concepts of FFS.
- To explain to participants the basic concepts of degradation and FFS.
- To provide participants with the basic technical and scientific knowledge for carrying out in depth inspection and engineering calculations.
- To train participants to choose between '3 R's i.e. Re-rate, Repair and Replace.
- To introduce participants to different ways of evaluations and decision making as regards the repairs alterations and re-ratings Assessment of future remaining life.

Audience

Designers, Inspection Engineers, Maintenance Engineers, Plant Inspectors, Mechanical Engineers, and Process Engineers interested in Fitness-for-Service assessments.

Program

- Introduction
- Fitness-for-service engineering assessment procedure
- Assessment of existing equipment for brittle fracture
- Assessment of general metal loss
- Assessment of local metal loss
- Assessment of pitting corrosion
- Assessment of hydrogen blisters and hydrogen damage associated with hic and sohic
- Assessment of weld misalignment and shell distortions
- Assessment of crack-like flaws
- Assessment of components operating in the creep range
- Assessment of fire damage
- Assessment of dents, gouges, and dent-gouge combinations
- Assessment of laminations

API – 580 Risk Based Inspection

Réf : API_580



English training
ressources

5 Days

The course is based on API RP 580 Risk-Based Inspection and API Publication 581, Base Resource Document. The course first explains feasible means and alternatives for achieving a successful RBI program without undue complications. This course deals with RBI framework and methodology in a simple straight forward manner to establish and implement a risk-based inspection program best suited for the company objectives. Its utility is based on the premise that a few vital equipments in a process plant contribute a majority of the risk. Consequently, if these few equipments can be identified, then testing and inspection can be focused on them rather than several low-risk items.

RBI helps to prioritize their equipment for inspection, optimize inspection methods and frequencies, and develop effective inspection plan commensurate with the risk contribution and equipment condition. The course is focused on methodology of actual implementation of RBI in Oil and Gas industry.

Learning Objectives

The course is based on API RP 580 Risk Based In-spection and API Publication 581, Base Resource Document. The course first explains feasible means and alternatives for achieving a successful RBI program without undue complications. This course deals with RBI framework and method-ology in a simple straight forward manner to establish and implement a risk based inspection program best suited for the company objectives. Its utility is based on the premise that a few vital equipments in a process plant contribute a majority of the risk.

Audience

- Refining and petrochemical engineers and inspectors.
- Plant personnel from the pulp and paper, oil and natural gas, and chemical industries may also find the course beneficial.

Program

- Overview of Risk-Based Inspection Principles
- Introduction to API RP 580
- Introduction to the 2nd Edition of API RP 581
- Risk Determination & Inspection Planning
- Assessing Damage Mechanisms & Probability of Failure
- Assessing Consequences of Failure
- Assessing Various Risk Determinations
- Identifying, Understanding and Managing Risk Drivers
- Risk-Based Inspection Planning
- Financial Risk & Cost Benefit Analysis
- Reassessment & Updating
- Understanding Sensitivities of the Risk Models

API– 653 Above Ground Storage Inspector

Réf : API_653



English training
ressources

5 Days

This course is designed to give a detailed discussion on the required engineering knowledge for In-service Storage tanks with emphasis on syllabus published by API (Body of Knowledge) for the said examination. It includes all the code sections referred by API 653 committee to the extent required from examination point of view This preparatory course will clarify basic intentions of all code prescribed for study, how to interpret code rulings and at the end, built-up the confidence among the participants for taking decisions. The course is divided into six main areas: Basic Storage tank design engineering i.e. API 650, In-service inspection techniques (API 653/ RP 575/ RP 577), In-service degradation mechanisms (API 571), Cathodic protection (API RP 651) and lining of tank bottom (API RP 652), calculations of retirement thickness and other skills required for delivery of quality job & safe operation. The participants will receive comprehensive course notes, illustrated with practical examples, Mock-examinations, main punch-points of the course and extensive question banks to give the participants the confidence for getting certified successfully.

Learning Objectives

The course provides participants with the knowledge necessary to:

- To familiarize participants with the main concepts and technical content of API 653 Code and the other reference codes prescribed for Certification Examination.
- To introduce participants to the concept of metal degradation.
- To explain to participants the design fundamentals of storage tank (API 650).
- To introduce participants to evaluation of tank integrity of shell, bottom and roof .Thickness calculations for intended design conditions or revised design conditions.
- To clarify the need of Cathodic Protection and lining of tank bottom.
- To Evaluate and decide remedial action for Tank settlement.
- To explain to participants how to estimate remaining life of tank and decide inspection intervals. Be able to choose the appropriate inspection tools and inspection intervals.
- To carry out re-rating, remaining life and retirement thickness calculations.
- To Score very well in API 653 examination.

Audience

Tank inspection engineers, Managers, Inspection personnel, Plant operations engineers and others, who wish to appear for API 653 examination. All Maintenance engineers, Inspectors, Corrosion engineers and Design persons involved in integrity assessment of in-service tanks, Repairs and Replacement of old tanks, and preventive maintenance of storage tanks will find the course immensely beneficial.

API– 653 Above Ground Storage Inspector

Program

- Fundamentals of Storage Tank Design & construction (API 650)
- Understanding of Storage Tank Inspection Code (API 653)
- Understanding of Storage Tank Inspection Code (API 653)...Contd
- Storage tank Inspection (studyof other codes and standards)
- Discussions on Corrosion Protection & Quality of Welding

ASME Plant Inspector - Level I

Réf : API_ASME1



English training
ressources

5 Days

ASME Plant inspector Level 1 is a five day, entry-level course for those wishing to consolidate their experience before moving on to ASME Level II or API inspection qualifications. It is also the main route for inspectors and technicians planning a move into plant inspection from other disciplines. Rather than focusing solely on ASME codes, our ASME Level 1 references a broad selection of multi-national inspection codes, resulting in a course that covers a wide range of international inspection practices used for various equipment items. Delegates gain extensive technical knowledge of inspection principles, frequencies and equipment damage mechanisms and, knowledge of the types and techniques of inspection. By the end of the course, delegates are able to carry out practical inspections and write narrative technical descriptions.

Learning Objectives

- Equip professionals with the necessary plant inspection skills, thus ensuring that they are able to assess the integrity and safety of plants and equipment being used
- To recognize plant inspectors and certify that they are competent to carry out plant inspection responsibilities
- To provide professional development to people wishing to start a career in plant inspection or provide further training for plant operators and inspectors.

Audience

The ASME Course for plant inspection is designed for plant operators, plant engineers, material engineers, and plant inspectors who are tasked with ensuring the integrity and safety of process equipment such as pipelines, storage tanks, machinery, boilers and others. The course is suitable for various professionals such as:

- Plant inspectors involved in manufacturing processes
- Professionals working for inspection organizations
- Plant safety regulators
- Plant operators
- Insurance companies' employees
- Equipment owners

The course can also be undertaken by people wishing to start a career that involves plant inspection, or other professionals wishing to move into plant inspection from another discipline of plant operations.

ASME Plant Inspector - Level I

Program

- The Pressure Systems Safety Regulations (PSSR)
- Written Schemes of Examination
- Inspection of vessels, pipework and heat exchangers
- Basic stress and corrosion calculations
- Basic application of API inspection codes
- Corrosion severity & Inspection reporting

ASME Plant Inspector - Level II

Réf : API_ASME2



English training
ressources

5 Days

An intensive four day examined course covering advanced aspects of in-service inspection of pressure equipment and related plant in the oil/gas/petroleum/petrochemical industries. The course is suitable for candidates with an existing plant inspector qualification who wish to demonstrate a higher level of technical knowledge relating to plant inspection in these industries. The course content is heavily based around the requirement for technically accurate narrative descriptions of inspection findings. Some basic code calculations are required.

Audience

The ASME Course for plant inspection is designed for plant operators, plant engineers, material engineers, and plant inspectors who are tasked with ensuring the integrity and safety of process equipment such as pipelines, storage tanks, machinery, boilers and others. The course is suitable for various professionals such as:

- Plant inspectors involved in manufacturing processes
- Professionals working for inspection organizations
- Plant safety regulators
- Plant operators
- Insurance companies' employees
- Equipment owners

The course can also be undertaken by people wishing to start a career that involves plant inspection, or other professionals wishing to move into plant inspection from another discipline of plant operations.

Program

- Material properties in relation to design code practice including proof stress
- Design code reassessments including the use of reassessment calculations
- How to compile a Working Scheme of Examination (WSE) and the importance of having one that is technically strong
- An overview of common damage mechanisms
- Remaining life and inspection frequencies including the creep-rupture lifetime of high temperature components
- Non-Intrusive Inspection (NII) principles including Non Destructive Examination (NDE) techniques for NII
- NII justification and decision records
- Pressure equipment repairs including post-repair issues.

Exploitation du code API RP 1110

Réf : API_RP1110



Support de formation
en français

3 Days

Acquérir les connaissances permettant de naviguer dans les sections du code pour en comprendre et pour identifier les parties applicables aux essais et en définir avec exactitude les critères applicables.

À l'issue de la formation, les stagiaires seront capables de :

- Connaître et comprendre la structure et l'organisation technique du API RP 1110;
- Naviguer dans les sections du code API RP 1110 ;
- Identifier et Maitriser l'exploitation des critères d'acceptabilité du code
- Vérifier la conformité des travaux conformément aux sections du code
- Etablir des procédures et spécifications conformément au Code/Pratique Recommandée API RP 1110

Public

- Responsables essais Hydrostatiques, ingénieur et techniciens des essais hydro
- Responsable soudage, Responsable CND,
- Ingénieur et techniciens....

Programme

PARTIE-I: PRESENTATION DES DIFFERENTES PARTIES DE LA NORME OU PRATIQUES RECOMMANDEES API RP 1110

- 1- Domaine d'application
- 2- Références normatives
- 3- Termes, définitions et abréviations
- 4- Processus de planification des tests de pression
- 5- Mise en œuvre du test de pression.
- 6- Enregistrements et diagramme de test de pression.

PARTIE-II: GUIDE DE VERIFICATION DE LA TUYAUTERIE ET DU TEST D'ETANCHEITE - B31.8 Pipelines

1. Introduction : Domaine d'application
2. Exigences générales
3. Portée de l'examen/vérification
4. Base de sélection de l'examen.
5. Base de sélection de l'essai
6. Méthodes d'essai /test
7. Pression d'essai /de test
8. Procédures de pré-test.

[... Suite page suivante](#)

Exploitation du code API RP 1110

Suite du Programme

PARTIE-III: TEST HYDROSTATIQUE EN TANT QU'OUTIL DE GESTION DE L'INTEGRITE

1. Utilisations des tests hydrostatiques - Comprendre les avantages
2. Eléments d'un programme de test - Définitions
3. Conception d'un programme de test
4. Effets néfastes potentiels des essais hydrostatiques

PARTIE-IV: CAS PRATIQUE D'UN TEST HYDROSTATIQUE

Etablissement d'une procédure de test hydrostatique

Matériels pédagogiques :

Méthode pédagogique alternant

théorie et pratique au travers d'études de cas et/ou de travaux dirigés.

Vidéo-projection

Support de cours et Documents techniques remis lors de la formation

Modalités d'évaluations

Attestation de fin de formation.

- Exercices individuels, en binôme, en groupe
- Études de cas (selon le temps de formation demandé)

Tuyauterie

Réf : API_TUYAU



Support de formation
en français

15 Days

A l'issue de cette formation, le stagiaire va acquérir les connaissances nécessaires lui permettant d'être en mesure ou capable de :

- Reconnaître les différents types d'accessoires et leur utilisation (bride, joint, coude, té, boulonnerie...);
- Interpréter des plans isométriques et repérer les éléments et accessoires d'une ligne de tuyauterie ;
- Identifier et repérer des éléments sur un isométrique, plan, PID (Piping and Instrumentation Diagram) ;
- Réaliser une représentation simple d'une ligne de tuyauterie selon les différents modes de projections à partir de relevés de côtes sur site
- Interpréter les plans isométriques et déterminer, en autonomie, les matières nécessaires à la fabrication ;
- Effectuer des relevés sur site et réaliser la représentation des lignes de tuyauterie sur plan – Bien appréhender les prises de cotes ;
- Réaliser par pointage et/ou assemblage mécanique la fabrication d'éléments de tuyauteries (diamètres de ¼ à 6 pouces environ...) destinées aux raccords d'équipements industriels avec les alimentations en fluide.
- Assembler avec des procédés TIG ou EE les éléments de tuyauterie.
- Comprendre le contenu des principales spécifications et normes liées à la tuyauterie.
- Maîtriser la réalisation d'ouvrage de tuyauterie complexe;
- Maîtriser la réalisation des piquages pour traçage ;
- Maîtriser l'assemblage d'un ouvrage de tuyauterie ;
- Maîtriser le calcul des côtes et des encombrements.

Public

- Tuyauteurs, Meuleur, et clampseur (Niveau terminal techniques ou sciences est un minimum exigé)
- Techniciens tuyauteurs, Techniciens d'études et agents des méthodes, personnel de maintenance, chaudronniers, tuyauteurs et chauffagistes...
- Tous opérateurs affectés pour travailler dans le métier de tuyauterie, Techniciens ou agents de maîtrise confrontés aux problèmes liés à la mise en oeuvre ou souhaitant acquérir des connaissances en tuyauterie.

Prérequis

- Niveau terminal options techniques, sciences ou équivalent

Tuyauterie

Programme

- DÉFINITIONS ET DOMAINES D'APPLICATIONS
- LES ACCESSOIRES : (Les tubes, Les brides, raccords, vannes, boulonnerie ...)
- LES OUTILS DU TUYAUTEUR (de découpes, de traçage, de positionnements...)
- LECTURE DE PLANS EN TUYAUTERIE / PLANS ISOMETRIQUES
- PRÉPARATION EN TUYAUTERIE, PRISE EN COMPTE DES OPÉRATIONS DE SOUDAGE
- LA MISE EN OEUVRE ET LE DIMENSIONNEL
- ASSEMBLER UNE LIGNE DE TUYAUTERIE SIMPLE
- FABRIQUER UN TRONCON DE TUYAUTERIE COMPLEXE
- RÉGLEMENTATION, CONTRÔLE ET INSPECTION DE LA TUYAUTERIE

Modalités d'évaluations

Attestation de fin de formation.

- Exercices individuels, en binôme, en groupe
- Études de cas (selon le temps de formation demandé)

Matériels pédagogiques :

- Méthode pédagogique alternant théorie et pratique au travers d'études de cas et/ou de travaux dirigés.
- Démonstrations et commentaires de chaque théorie
- Exercices divers de lecture de plan et d'application pratique
- Vidéo-projection
- Support de cours et divers
- Documents techniques seront remis lors de la formation