



API RP 571 (Edition 2020) : Damage Mechanisms
Affecting Fixed Equipment in the Refining Industry

Course Overview

This training course is conducted for all professionals who are interested in understanding deeply the different types of corrosion, cracking and other damage mechanisms that their equipment may suffer or face in service. The following assets and equipment may suffer from damage mechanisms derived thorough API 571:

- All of process piping designed according ASME B31.3 & inspected according API 570
- All of Pressure Vessels designed according ASME Sec VIII & inspected according API 510
- All of Tanks inspected designed according API 650 & inspected according API 653

This training course will demonstrate deeply all the 66 damage mechanisms contained in the recommended practices API 571. The damage mechanisms in this recommended practice cover situations encountered in the refining and petrochemical industry in pressure vessels, piping, and tankage. The damage mechanism descriptions are not intended to provide a definitive guideline for every possible situation that may be encountered, and the reader may need to consult with an engineer familiar with applicable degradation modes and failure mechanisms, particularly those that apply in special cases.

The Training Course will Highlight

- Basics of Corrosion
- Understanding deeply the whole Damage Mechanisms as per API 571
- How to determine which damage mechanism you may face with your plant assets
- The Best Methodology to study for the exam
- Real Exam Tricks & Simulation

Course Objectives

By the end of this training course, participants will learn to:

- Be very familiar and aware of all the 66 damage mechanisms stated in Recommended Practices API 571 as well as the different types of corrosion and cracking mechanisms
- Be able to distinguish and identify the type, extent and severity of the damage mechanism faced in the plant facilities
- Learn to anticipate which equipment may suffer specific damage mechanisms under which design and operating conditions
- Know how to inspect for the damage mechanisms and recommended types of inspection methods
- Know how to prevent the occurrence of the well-known damage mechanisms.

Get prepared for the next API 571 exam and have enough knowledge and skills to pass such exam to get the API 571 Inspector certificate

Course Methods

This training course will combine presentations with instructor-guided interactive discussions between participants relating to their individual interests. Practical exercises, video material and case studies aimed at stimulating these discussions and providing maximum benefit to the participants will support the formal presentation sessions. Above all, the course leader will make extensive use of case examples and case studies of issues in which he has been personally involved.

Target Audience

This training course is intended for all professionals who aim to register for API 571 exam, any inspector or professional who is responsible for inspection activities and aims to thoroughly understand different damage mechanisms faced in the oil and gas industry. The online training course is further recommended for those who wish to thoroughly understand the RP API 571 Damage Mechanisms.

This training course is suitable to a wide range of professionals but will greatly benefit:

- Asset Integrity Engineers
- NDT Engineers & Technicians
- Fresh Graduated Mechanical Engineers
- Corrosion Engineers
- Inspection Engineers
- In service inspectors
- Welding Engineers
- All professionals who aim to register for API 571 exam

Course Outline

Day One

- Introduction to material properties and metallurgy
- Basics of NDT & DT
- Corrosion theories.
- Terms and Definitions
- 885 °F (475 °C) Embrittlement
- Amine Corrosion
- Amine Stress Corrosion Cracking
- Ammonia Stress Corrosion Cracking
- Ammonium Bisulfide Corrosion (Alkaline Sour Water).
- Ammonium Chloride and Amine Hydrochloride Corrosion.
- Aqueous Organic Acid Corrosion.
- Atmospheric Corrosion.

Course Outline

Day Two

- Boiler Water and Steam Condensate Corrosion.
- Brine Corrosion.
- Brittle Fracture.
- Carbonate Stress Corrosion Cracking.
- Carburization.
- Caustic Corrosion.
- Caustic Stress Corrosion Cracking.
- Cavitation.
- Chloride Stress Corrosion Cracking.
- CO₂ Corrosion.
- Concentration Cell Corrosion.
- Cooling Water Corrosion.
- Corrosion Fatigue.

Course Outline

Day Three

- Corrosion Under Insulation.
- Creep and Stress Rupture.
- Dealloying.
- Decarburization
- Dissimilar Metal Weld Cracking.
- Erosion/Erosion-Corrosion.
- Ethanol Stress Corrosion Cracking.
- Flue Gas Dew Point Corrosion.
- Fuel Ash Corrosion.
- Galvanic Corrosion.
- Gaseous Oxygen-enhanced Ignition and Combustion.
- Graphitic Corrosion of Cast Irons.

Course Outline

Day Four

- Graphitization
- High-temperature H₂/H₂S Corrosion.
- High-temperature Hydrogen Attack.
- Hydrochloric Acid Corrosion.
- Hydrofluoric Acid Corrosion.
- Hydrofluoric Acid Stress Corrosion Cracking of Nickel Alloys.
- Hydrogen Embrittlement.
- Hydrogen Stress Cracking in Hydrofluoric Acid.
- Liquid Metal Embrittlement.
- Mechanical Fatigue (Including Vibration-induced Fatigue).
- Metal Dusting.
- Microbiologically Influenced Corrosion.
- Naphthenic Acid Corrosion.
- Nitriding.
- Oxidation.
- Oxygenated Process Water Corrosion

Course Outline

Day Five

- Phenol (Carbolic Acid) Corrosion
- Phosphoric Acid Corrosion
- Polythionic Acid Stress Corrosion Cracking
- Refractory Degradation
- Stress Relaxation Cracking (Reheat Cracking)
- Short-term Overheating-Stress Rupture (Including Steam Blanketing)
- Sigma Phase Embrittlement
- Soil Corrosion
- Sour Water Corrosion (Acidic).
- Spheroidization (Softening)
- Strain Aging.
- Sulfidation.
- Sulfuric Acid Corrosion.
- Temper Embrittlement.
- Thermal Fatigue.
- Thermal Shock.
- Titanium Hydriding.
- Wet H₂S Damage (Blistering/HIC/SOHIC/SSC).
- Tips for API 571 Exam
- Q&A for the whole course.