

Corrosion Control Techniques

Course No. 320

FOR WHOM INTENDED Engineers, scientists, aides and technicians. Previous knowledge of corrosion or materials engineering is not required.

OBJECTIVES To provide basic understanding of the mechanisms of corrosion, and measures that can be used to control corrosion. The course also includes a brief overview of the properties of commonly used engineering materials and their resistance to deterioration.

BRIEF COURSE DESCRIPTION Corrosion is responsible for the failure of many systems and structures. Unchecked corrosion can result in excessive maintenance and repair as well as system downtime and product contamination.

This course will focus on the cause of corrosion of metals, the results of corrosive action and the measures that can be used to control corrosion.

The course will describe the basic electrochemical processes responsible for the corrosion of metals, the mechanisms of corrosion and the resulting effects of the various types of corrosion on the ability of the metals to perform their intended function. Particular emphasis will be placed on the identification and solution of practical corrosion problems in real engineering situations.

The performance of engineering materials, including both metals and non-metals in real service environments will be discussed including the application of basic materials science to the selection and application of materials.

DIPLOMA PROGRAMS This course may be used as an optional course for any [TTi Diploma Program](#).

PREREQUISITES There are no definite prerequisites. Supervisors are invited to telephone or e-mail TTi on prospective attendees' backgrounds and needs.

RELATED COURSES See [TTi Course 324, Corrosion Prevention Compliance for Defense Acquisition Requirements](#).

TEXT Each student will receive 180 days access to the on-line electronic course workbook. Renewals and printed textbooks are available for an additional fee.

COURSE HOURS, CERTIFICATE AND CEUs Class hours/ days for on-site courses can vary from 14–35 hours over 2–5 days as requested by our clients. Upon successful course completion, each participant receives a certificate of completion and one Continuing Education Unit (CEU) for every ten class hours.

Course Outline

Introduction

Why is corrosion important?

Why do you need to know about corrosion?

What can you do to control corrosion?

Definition and Mechanisms of Corrosion

Definition of corrosion

Mechanism of corrosion

The electrochemical cell

Components

Reactions • Reaction Rates

Forms and mechanisms of corrosion

Immunity • Uniform attack • Galvanic corrosion

Pitting • Concentration Cell Corrosion

De-alloying • Inter granular corrosion

Stress corrosion cracking

Hydrogen embrittlement • Corrosion Fatigue

Erosion corrosion • Cavitation corrosion

Fretting corrosion • Stray current corrosion

Methods for Corrosion Control

Materials selection

Methodologies

Information resources

Checklist

Corrosion tolerance • Protective coatings

Cathodic protection

Change of environment

Change in service

Identification and Analysis of Corrosion Problems

Visual observation • Non-destructive inspection

Destructive evaluations

Distinction between causes and mechanisms of corrosion

Identification and validation of solutions to corrosion problems

Identification of potential solutions

Evaluation of alternative solutions

Accelerated corrosion testing

Field corrosion testing

Properties and performance of metallic materials

Carbon and alloy steels

Cast irons • Aluminum alloys

Stainless Steels • Nickel alloys

Titanium alloys • Copper alloys

Properties and performance of non-metallic materials

Plastics • Elastomers

Composite materials

Summary and final Review

Award of certificates for successful completion



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