

Corrosion Prevention Compliance for Defense Acquisition Requirements

Course No. 324

FOR WHOM INTENDED Government acquisition personnel, project managers, program managers, engineers, scientists, aides and technicians.

OBJECTIVES This course is designed to lead to a better understanding of US Government initiatives to prevent corrosion in Department of Defense equipment and infrastructure. The course's secondary goal is to provide basic understanding of the mechanisms of corrosion, and measures that can be used to control corrosion.

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.

In December 2003, the US Department of Defense produced a report to Congress entitled, "Long-Term Strategy to Reduce Corrosion and the Effects of Corrosion on the Military Equipment and Infrastructure." This report called upon Congress to mandate and fund corrosion-prevention measures, in order to reduce the costs of dealing with corrosion after it occurs, and improve the defense readiness of the United States. This course will first focus on the impact of corrosion-related laws and policies. US DoD plans, guidebooks and directives will be discussed as they relate to corrosion prevention and control planning, also to maintenance requirements and procedures.

Next, the course will review basic corrosion theory, including corrosion mechanisms and forms, before touching on design solutions based on corrosion type, fabrication method or environment. The science of characterizing corrosion is covered next, followed by material selection and testing. The instructor takes a detailed look at anti-corrosion coatings and finishes, and concludes with a summary of newer non-metallic, composite and other advanced materials.

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

PREREQUISITES There are no definite prerequisites. No prior technical expertise is assumed.

RELATED COURSES See [TTi Course 320, Corrosion Control Techniques](#).

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: Impact of Corrosion, Laws, Policies and Guidance.

Potential Impact Of Corrosion:

Cost • Readiness • Manpower • Safety • Quality Of Life

Congressional Mandate For Corrosion Control

DOD Corrosion Guidance: Corrosion Prevention And Mitigation

Strategic Plan • Corrosion Prevention And Control Guidebook •

Defense Acquisition Guidebook • DOD Directive and Instruction

5200.1 • Additional Guidance

Corrosion Prevention And Control Organization: Corrosion Control

Planning In The Defense Acquisition Process • Integration of

Corrosion Control • Corrosion Prevention And Control Planning

Maintenance Practices and Procedures: Defining Required

Maintenance During Design, Acquisition • Documenting and

Validating Maintenance Requirements, Procedures

Service Testing • Simulated Service Testing • Accelerated

Testing • Balancing Initial Costs and Maintenance Costs

Basic Corrosion Theory: Definition • Driving Force For Corrosion of

Metals • The Electrochemical Cell

Forms of Corrosion: Immunity • General • Galvanic • Pitting

Concentration Cell • Dealloying • Intergranular • Stress Assisted

Cracking • Hydrogen Embrittlement • Corrosion Fatigue

Flow-Assisted • Fretting • Stray Current

Corrosion Control Methods: Materials Selection Methodologies

Protective Coatings • Change of Environment

Design Solutions Based on: Corrosion Type

Fabrication Techniques; Impact on Corrosion of:

Welding • Heat Treatment • Cold Work • Surface Finish

Environment: Temperature • Free Drainage • Atmosphere

Fresh or Salt Water Immersion • Splash and Spray Exposure

Critical Corrosion Design and Materials Tradeoffs

Corrosion Testing and Characterization of Materials

Analysis and Correction of Corrosion Problems

Identification • Visual • NDT • Destructive Evaluations

Problem Correction • Modify Design, Materials or Environment

Coatings, Sealants, Adhesives, Finishes, Inhibitors

Coatings: Purpose • Coatings • Improper Use of Coatings

Sealants and Adhesives: Purpose • Corrosion Types Mitigated by

Sealants and Adhesives • Improper Use

Finishes: Effect of Finish on Corrosion • Finish Selection

Corrosion Inhibitors: Types • Anodic and Cathodic Film Formers

Surface Film Formers • Application of Corrosion Inhibitors

Non-Metallic and Composite Materials: Types

Deterioration Mechanisms: Absorption and Swelling

Oxidation • Ultraviolet Light • Continued Polymerization

Bulk versus Surface Effects

Composite Materials: Effects on Matrix, on Reinforcement

New Materials Technology: Advances in Metallic Materials

Advances in Non-Metallic Materials and Composites

Advantages And Disadvantages of Advanced Materials

Summary and Conclusions. Corrosion Control:

Is Natural, But Controllable • Is Cost Effective • Affects Readiness,

Safety and Other Vital Issues • Technology is Well Developed

Consideration is a Requirement in Acquisition Process

Final Review • Award of Certificates



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