

Environmental Test Specifications

Course No. 450

FOR WHOM INTENDED This course is intended for commercial and government personnel involved with developing, applying, or reviewing environmental design and test specifications, standards and requirements. The target audience includes:

- Environmental engineering specialists
- Environmental test laboratory personnel
- Reliability and product assurance engineers
- Product designers
- Integrated Product Development Team leaders
- Contract writers and administrators

BRIEF COURSE DESCRIPTION This course provides understanding and guidance about the contents and proper application of environmental design and test specifications, standards and requirements documents. For newcomers, this course will make environmental design and test less mysterious and formidable. Those with some experience will gain a better understanding, to recognize mistakes and repeat successes.

Product test and evaluation have undergone major changes in recent years. This course will show how these changes impact the function and responsibilities of the environmental engineering specialist. In addition, it will help the student successfully adapt to change by providing a perspective for using future environmental specifications and standards.

Environmental design and test standards are a combination of valuable lessons learned and repetitive dogma. The ability to recognize the conflicting statements in referenced documents and obtain clarification as to which statement needs to be followed in a particular case will prove valuable to participants. This course will be presented in an interactive lecture-discussion format; lectures will be interspersed with class project work sessions to reinforce the students' understanding of the course material. Students are encouraged to introduce problems and questions from their own work for group discussions.

DIPLOMA PROGRAMS This course is required for TTI's [Environmental Engineering Specialist \(EES\)](#), [Dynamic Test Specialist \(DTS\)](#) and [Climatic Test Specialist \(CTS\)](#) Diploma Programs and is recommended as the final course in the series. It may be used as an elective for any other [Specialist Diploma Program](#).

PREREQUISITES This course is intended for individuals who have completed all other formal training requirements for TTI's [Diploma Programs](#) and have some familiarity with environmental test specifications and standards. Others who are not participating in the TTI EES program should have a basic understanding of environmental test procedures and facilities.

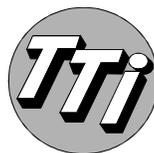
TEXT Each student will receive 180 days access to the on-line electronic course workbook. Renewals and printed textbooks are available for an additional fee.

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.

INTERNET COMPLETE COURSE 450 features over 11 hours of video as well as more in-depth reading material. All chapters of course 450 are also available as OnDemand Internet Short Topics. See the on-line course outline for details.

Course Outline

Introduction and Course Overview • Student Expectations and Goals
Class Project Intro: Project work sessions will be interspersed with lectures
The Role of Environmental Specifications and Standards
How Test & Evaluation are changing
Difference between Specifications and Standards • Applying a standard
Where standards come from and how they are maintained
Measurement Standard: Definition • Example • Classification • Traceability • Responsible Organizations for Measurement Standards
Military vs. Commercial Specifications • Modern environmental testing
Acquisition Reform: What prompted it? • What actions does it require?
Problems accompany Acquisition Reform • Are commercial standards better?
Environmental Testing: Objectives • A Value-Added Process
What Makes the "Same" Tests Different? • Testing a Hypothesis
Development Tests • Design Verification Tests • Qualification Tests
Development Tests: Accelerated Life Testing
Types of "Life" Tests: Short-Term "Life" Tests: Step-Stress Testing
Long-Term "Life" Tests: Fatigue & Durability Testing
Acceptance Testing • Contractual Compliance Testing • Production Tests/ESS
Test Tailoring
Problems with "sacred relics & magic numbers" in environmental testing
Examples of some sacred relics: 1-hour vibration test • Flat Vibration Test Profile • Simplistic g rms Syndrome • 6 g rms vibration spectrum • 71 °C Temperature test • Uniform Test Temperatures • Single-purpose Humidity Test • 10-day Humidity test • "Standard" Salt Fog test
15 g Avionics impact shock test • 20 g Automotive impact shock test
Environmental Test Standards—Are they Tailorable? • Tailoring strategies
Integrated Product or Process Teams (IPTs) • Documentation
Accelerated Testing: Reducing Test Time • Test Assumptions • What Does an Accelerated Test Accelerate? • Can Accelerated Testing Do What is Expected? • Environmental Forcing Functions • Different Environments, Different Effects • Different Rates of Test Acceleration • Critical Aspects of Accelerated Test Models
Risks • Miner's "Rule" Cautions • Principles of Test Time Compression • Two ways to accelerate: Higher Frequency of Occurrence or Exaggerated Load Levels • Cautions • Margins
Review of Current Environmental Standards: A confusing status quo
MIL-STD-810F/G • MIL-HDBK-310 (was MIL-STD-210C) • MIL-HDBK-2164A
MIL-HDBK-344A • IEC 60068 Series • SAE J1211
Bellcore Technical Reference TR-EOP-000063
Checklist for Applying Environmental Test Standards
Technical Honesty • Management Involvement • Sound Business Practice
Developing Life Cycle Environmental Profiles (LCEPs): Definition
Foundation for Test Tailoring • Integrating Engineering Information
LCEP in: Product Development, Accelerated Testing, Design Margins
Building LCEPs: Service Use Requirements • Applicable Platform Types
Product & Platform Characteristics • Logistics, Deployment & Distribution Modes • Characterize and Quantify Service Use Environments
ISO Quality Standards: ISO 9000 • Accreditation, Certification, Registration
ISO 9001 • Calibration, Measurement and Test Equipment • QS 9000—Quality System Requirements • ISO/IEC Standard 17025
Preparing and Reviewing Environmental Requirements: Elements of an Environmental Requirements Document • Expectations for a Test
Appropriate Environments • Test Levels, Duration • Product Operation During Tests • Interfaces and Boundary Conditions • Repeatable Procedures Don't Guarantee Repeatable Results! • Latent Defects vs. Infant Mortality
Levels of Assembly • Realism • Computer Assisted Tools: Cautions
Class Project Wrap-up • Final Quiz, Award of Certificates for Successful Completion



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