CORE CONCEPT

EMC and Environmental Qualification Testing Course: MIL-STD-461, MIL-STD-810, DO-160 and IEC 61000

2 – 6 November 2026
London - Central London four-star

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Introduction:

EMC and environmental qualification testing to MIL-STD-461, MIL-STD-810, DO-160 and IEC 61000 is a 1-week course for electronics hardware, EMC, test laboratory and qualification roles that ends with an EMC and Environmental Qualification Test Plan for a case electronic unit. Manufacturers localising defence, aerospace and industrial electronics lose months when enclosures, cables and filters fail emissions, immunity, vibration or humidity tests late, and evidence packs are rejected. Nominees already design, test or release electronic equipment, and the course works through case studies on test data and failure records. CoreConcept Training Center delivers this EMC and environmental qualification testing course.

Course Objectives:

- Identify interference sources, victims and conductive, capacitive, inductive and radiative coupling paths in an electronic unit and its cable harness
- Specify shielding, grounding, bonding, cable screening and power-line filtering measures that bring a design within emission and immunity limits
- Select and tailor conducted and radiated emission and susceptibility tests from MIL-STD-461, IEC 61000-4 and DO-160 for a defined installation
- Derive a life cycle environmental profile and tailor MIL-STD-810 and DO-160 climatic and mechanical tests for vibration, shock, temperature, humidity, altitude, salt fog and sand and dust
- Diagnose emission, immunity and environmental test failures with pre-compliance scans, near-field probing and fixture checks, and verify corrective actions
- Compile a qualification test plan, test procedures and an evidence pack that a customer or design authority can accept

Target Audience:

- Electronics hardware design staff responsible for circuit boards, enclosures, cable harnesses and power-supply interfaces
- EMC engineering staff responsible for emission and immunity budgets, mitigation design and pre-compliance measurements
- Test laboratory staff responsible for chambers, shakers, receivers, antennas, fixtures and test records
- Qualification and certification staff responsible for test plans, tailoring rationales and evidence packs
- Supplier and localisation quality staff responsible for qualifying sub-assemblies built under technology transfer

Course Outline:

Day 1: Electromagnetic Interference Fundamentals and Qualification Landscape

- Emission, Susceptibility and Immunity Definitions for Electronic Equipment
- Conductive, Capacitive, Inductive and Radiative Coupling Path Analysis
- MIL-STD-461, DO-160 and IEC 61000 Scope Comparison by Platform
- Qualification, Acceptance and Pre-Compliance Test Stages Mapped
- Current-State Review of a Unit's Failed Test History

Day 2: Shielding, Grounding, Filtering and EMC Test Methods

- Enclosure Shielding Effectiveness, Seams, Apertures and RF Gaskets
- Ground Plane, Star Earthing and Bonding Strap Design Choices
- Line Filters, RF Chokes and Decoupling at Cable Entries
- MIL-STD-461 CE, CS, RE and RS Requirement Families Explained
- IEC 61000-4 ESD, EFT Burst and Surge Immunity Set-Ups

Day 3: Environmental Test Tailoring and Laboratory Execution

- MIL-STD-810 Life Cycle Environmental Profile and Tailoring Rationale
- Random Vibration, Mechanical Shock and Acceleration Fixture Design
- High and Low Temperature, Thermal Shock and Altitude Chamber Profiles
- Humidity, Salt Fog, Fungus and Sand and Dust Exposure Sequencing
- DO-160 Power Input, Voltage Spike and Lightning Induced Transient Sections

Day 4: Test Failure Diagnosis, Chamber Choice and Corrective Action

- LISN, Current Clamp and Biconical Antenna Pre-Compliance Scans
- Near-Field Probe Localisation of Radiated Emission Hotspots
- Anechoic, Reverberation and GTEM Chamber Selection and Limitations
- Fixture Resonance, Over-Test and Under-Test Root Cause Review
- Corrective Action Verification and Regression Test Selection Rules

Day 5: Case Study: EMC and Environmental Qualification Test Plan

- Case Unit Brief for a Ruggedised Control Electronics Module
- Case Coupling Path Review and Mitigation Selection
- Case Tailored Test Matrix Across EMC and Environmental Sections
- Case Test Sequence, Sample Allocation and Laboratory Booking Logic
- EMC and Environmental Qualification Test Plan Completion and Peer Review

Skills You Will Gain:

- Coupling Path Analysis
- Shielding and Bonding Design
- Power-Line Filter Selection
- Emission and Immunity Test Set-Up
- Environmental Test Tailoring
- Vibration Fixture Assessment
- EMI Failure Localisation
- Qualification Evidence Management

Why Attend This Course:

- Deliver an EMC and Environmental Qualification Test Plan for a case electronic unit to the engineering manager and the customer's design authority
- Decide which emission, immunity and environmental tests to run, tailor or omit, using installation data and a documented rationale
- Avoid repeated chamber bookings, late enclosure redesigns and rejected evidence packs that delay delivery of localised equipment
- Share coupling checklists, tailoring worksheets and failure diagnosis records with design, laboratory and supplier colleagues

Conclusion:

Back at work, the participant gives the EMC and Environmental Qualification Test Plan to the engineering manager, the test laboratory lead and the customer's design authority. They use it to agree which tests apply, how each is tailored, which samples and fixtures are needed and what evidence closes each requirement before laboratory time is booked. After the first qualification campaign, the unit should compare failures, retests and margins against the plan and update its mitigation checklist and tailoring rationale.

Frequently Asked Questions FAQ:

What should participants know before an EMC and environmental qualification testing course?

Participants should already design, test or release electronic equipment and read schematics, test reports or specifications. Basic knowledge of frequency, decibels and signal measurement helps. Bringing an anonymised test report or failure record lets the case studies reflect real units.

How does EMC and environmental qualification testing differ from a reliability and accelerated life testing course?

EMC and environmental qualification testing proves that equipment meets defined emission, immunity and environmental requirements for its installation. Reliability and accelerated life testing courses estimate product life and failure rates from stress testing and statistical life data instead.

Why does EMC and environmental qualification testing start with tailoring?

Tailoring links each test to the environments the equipment will actually meet across its life cycle. MIL-STD-810 does not impose fixed tests, so a documented life cycle environmental profile prevents over-testing, under-testing and wasted chamber time.

What do participants take back from the EMC and environmental qualification testing course?

Participants take back an EMC and Environmental Qualification Test Plan for a case electronic unit, with a coupling path review, a tailored test matrix, a test sequence and sample allocation, and a failure diagnosis checklist for their own laboratory.