



**Your
global
compliance
partner**

www.dlsemc.com

Introduction to D.L.S.

Welcome to D.L.S. Electronic Systems, Inc., one of the largest independent, commercial EMC/EMI (Electromagnetic Compatibility/Interference), Environmental, Wireless and Product Safety compliance testing facilities in North America. Centrally located less than twenty minutes from O'Hare International Airport in suburban Chicago, IL for over 35 years, our engineering staff has been helping numerous manufacturers and marketers of electronic and electrical equipment meet global regulatory and industry compliance needs in a prompt and economical manner. From FCC to CE, to MIL-STD, to RTCA, to SAE, and FDA, we offer a unique global compliance package second to none.

We offer one of the most modern compliance testing laboratories in North America, fully accredited under the ANAB/ANSI National Accreditation Board Program to ISO 17025, by

the American National Standards Institute (ANSI). We have 16 EMC testing chambers, plus two fully enclosed and temperature controlled Open Area Test Sites, a state of the art environmental testing facility, and a full-time Product Safety testing laboratory, operating in three campus, at Wheeling, IL and Genoa City, WI. locations. We offer one of the largest staff of iNARTE engineers in our industry.

D.L.S. supports MIL-STD and Aviation/Avionics testing under MIL-STD-461, RTCA/ DO-160, MIL-STD- 810, MIL-STD-202, MIL-STD-704, MIL-STD-1399, MIL-STD-1275 and several other compliance categories including EMC/EMI, Lightning, Environmental, HIRF, and Power Quality. We maintain status as an iNARTE Certified Organization, as well as meeting ANAB/ANSI, ITAR, ILAC,



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and other certification programs. DER/DAR services are also available.

We specialize in global compliance, including the CE Mark for EMC, R&TTE/RED, Low Voltage, Machinery, Medical MDR and RoHS Directives, and we participate in the CB Scheme program. We offer multiple product safety compliance programs, including CE, CB, CCC, utilizing in-house testing, reducing time to market. Through our global partner lab reciprocity arrangements, we provide a global compliance program that is seamless. We are one of the few organizations that offer both EMC and Product Safety compliance testing within one organization on a global market access basis.

D.L.S. offers hands-on trouble shooting and design assistance as well. We regularly test products for compliance in a number of categories, such as laboratory and test equipment, medical devices, machinery, wireless devices, telecom equipment, commercial avionics and military equipment and devices, to name a few.

We have pioneered a detailed Early Design Evaluation program: a consultation with experienced EMC,

Product Safety, Wireless and Environmental engineers, providing a comprehensive design review of your product, prior to scheduled testing. The review can identify subtle flaws in design, ones that can cause costly engineering time if found during testing.

D.L.S. tests to the EMC Directive and to the Radio Equipment Directive (RED) for telecom and radio transceiver testing requirements for Europe. We also provide additional telecom and wireless testing services, including the CTIA requirements for wireless products and antennas.

We provide comprehensive test reports, designed and compiled by engineers for engineers, available in digital format. The easy-to-read reports provide a certification path that meets compliance requirements on a worldwide basis.

Experience counts when choosing a compliance partner. No other organization, world-wide, can provide the level of expertise in global compliance testing, coupled with the economics of multiple agency approvals, and value added engineering assistance, all at the same time. Make the D.L.S. advantage your advantage today. At D.L.S. we do it all for you.

MIL-STD Testing Services



MIL-STD Testing Services

- MIL-STD-461 – EMI/EMC
- MIL-STD 464 – EMI/EMC – Systems
- MIL-STD-810 – Environmental Testing
- MIL-STD DTL 83528 – Shielding Effectiveness
- MIL-STD-704 – Power Quality for Aircraft
- MIL-STD-1275 – Power Quality for Vehicles
- MIL-STD-1399 – Power Quality for Ships
- MIL-STD-1399 Section 070 – Degaussing
- MIL-STD-202 – Environmental Testing
- Component Parts
- MIL-DTL-16377 – Lighting
- MIL-PRF-28800 – Test Equipment
- DEF STAN 59-411 – EMI/EMC

D.L.S. offers one-stop testing capabilities on military applications for EMI/EMC, Environmental, Power Quality, and other applicable testing services. The list of accredited standards includes: MIL STD 461, MIL STD 810, MIL STD 202, MIL DTL 83528, MIL STD 704, MIL STD 1275, and MIL STD 1399, and others.

These standards are specific to electrical, electronic, electromechanical equipment, materials, and sub systems for aircraft, shipboard, above and below deck, submarines, communications equipment, vehicles and support equipment, electronic enclosures, electric power inputs, equipment racks, waste systems, galley equipment, and other armed services applications.

D.L.S. offers specially equipped larger testing chambers to support complex systems and equipment and can provide support equipment such as shielded load rooms, self-contained ethylene glycol and cooling fluids, air conditioning to support unique temperature extremes, ability to control vehicle and related engine exhaust.

D.L.S. supports testing services with one of the largest iNARTE certified engineering staffs in the industry, experienced in all aspects of testing support, mitigation, troubleshooting, as well as test plan and procedure preparation.



Avionics RTCA/DO-160 C-G Testing Services



RTCA/DO-160 C-G

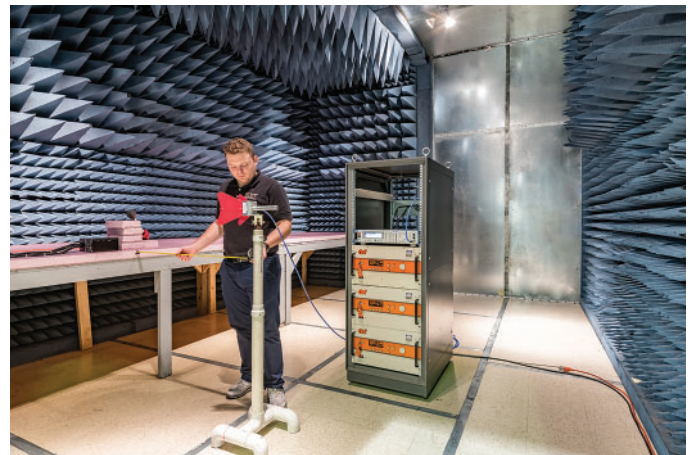
- Section 4 - Temperature & Altitude
- Section 5 - Temperature Variation
- Section 6 - Humidity
- Section 7 - Mechanical Shock
- Section 8 - Vibration
- Section 9 - Explosive Atmosphere
- Section 10 - Waterproofness
- Section 11 - Fluid Susceptibility
- Section 12 - Sand and Dust
- Section 13 - Fungus Resistance
- Section 14 - Salt Spray
- Section 15 - Magnetic Effect
- Section 16 - Power Input
- Section 17 - Voltage Spike
- Section 18 - Audio Conducted Susceptibility
- Section 19 - Induced Signal Susceptibility
- Section 20.4 - Conducted Susceptibility
- Section 20.5 - Radiated Susceptibility - HIRF
- Section 21 - Radiated Emissions
- Section 22 - Lightning Induced Transients
- Section 23 - Direct Lightning Effects
- Section 24 - Icing
- Section 25 - ESD
- Section 26 - Fire and Flammability

D.L.S. offers compliance testing on Aviation and Avionics platform applications for EMI/EMC, Environmental, Power Quality, and other applicable services. The list of accredited standards includes RTCA/DO-160 for Electromagnetic Compatibility, Lightning, HIRF and Environmental requirements. RTCA/DO-160 defines a series of minimum test conditions (categories) and applicable test procedures for commercial airborne equipment.

D.L.S. has experience testing communications equipment, lighting, passenger entertainment, cockpit equipment and displays, aircraft control and safety equipment, electric power inputs, equipment racks, waste systems, galley equipment, seating systems, aviation related materials and sub components.

D.L.S. offers specially equipped larger testing chambers to support complex systems and equipment, and can provide support equipment such as shielded load rooms, self-contained ethylene glycol and cooling fluids, air conditioning to support unique temperature extremes, ability to control vehicle and related engine exhaust.

D.L.S. supports testing services with one of the largest iNARTE certified engineering staffs in the industry, experienced in all aspects of testing support, mitigation, and troubleshooting, as well as test plan and procedure preparation. D.L.S. supports STC and other replacement product requirements as well.



Environmental Testing Services

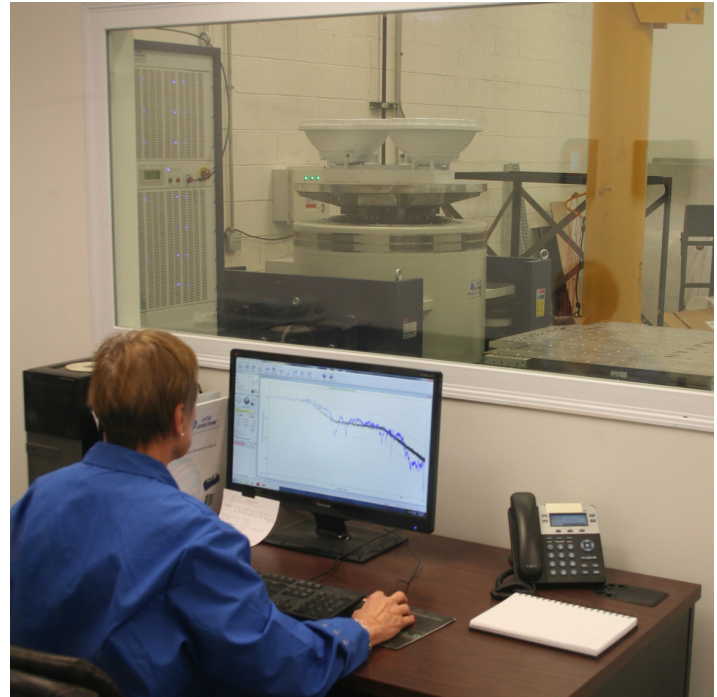
D.L.S. offers a series of comprehensive environmental and mechanical tests under the accredited ANSI/ANAB ISO 17025 program, an ILAC signatory. This globally accepted accreditation covers environmental and mechanical testing that include vibration and shock, temperature extremes, sand and dust, fluid and chemical resistance, altitude, humidity, salt spray, ingress protection, icing, flammability and other related testing services.

Standards that are included are RTCA/DO-160, MIL-STD-810, MIL-STD-202, and several ASTM, ANSI, IEC, ISO, ISTA, NEMA, UL, and SAE standards as well.

The recently expanded environmental testing facility is part of the Wheeling, IL corporate location, and located in the east campus. Equipped with state-of-the-art equipment, and with the 37 plus years of compliance testing experience, D.L.S. is a logical choice when attention to detail is required.

The D.L.S. group offers a comprehensive environmental testing service, including mechanical, climatic, weather, HASS, and other reliability tests, including:

- Mechanical Shock
- Temperature Extremes
- Chemical Exposure and Fluid Testing - Fungus



Salt Spray/Fog
IP Testing-Water Exposure Wind and Rain
Flammability
Sand and Dust
Humidity
Explosive Atmosphere
Solar Radiation
Package Handling
HASS/HALT

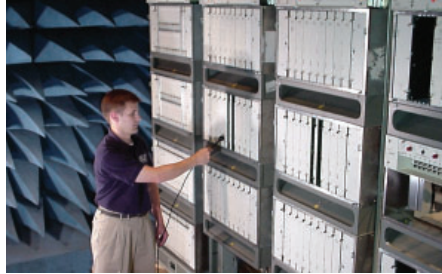


Problem Solving Engineering Staff

D.L.S. offers one of the largest iNARTE certified engineering staffs in the compliance industry, trained not only in performing tests, but also providing mitigation and troubleshooting, compliant to Navy Air Command requirements for iNARTE engineers. We perform this work in our state of the art testing facilities, accredited under the ANAB/ANSI National Accreditation Board program, by the American National Standards Institute (ANSI).

As part of our testing process, D.L.S. offers real time troubleshooting and design assistance during the testing process. No need to take your product back to rework it. We regularly test products for compliance in a number of categories, such as laboratory and test equipment, ITE multimedia equipment, construction equipment, medical devices, machinery, telecom equipment, wireless/radio, commercial avionics and

military avionics, to name a few. Since 1983, this testing experience has exposed our engineering staff to most EMC economically sensitive design solutions.



D.L.S. also provides a substantial inventory of EMC solutions, including capacitors, RF chokes, filters, surface mount shields, EMC gaskets, cable shielding, AC line filters, conductive paints, shielded

windows, and ferrite beads and sleeves. In the hands of an experienced engineer, your testing problems can be easily identified, fixed, and found compliant in the fastest possible time, streamlining your compliance testing.

When problems occur there's no better place to go than to D.L.S. where the engineering staff is experienced in solving design problems with both economy and manufactureability in mind.



Consulting Services

D.L.S. offers a comprehensive consulting service, providing an extension to your engineering department. With unparalleled expertise in EMI/EMC, Environmental and Product Safety (if applicable) compliance designs, we have a number of consulting avenues that you can utilize.

D.L.S. offers an EDE, Early Design Evaluation Program. This program incorporates an early stage design review and evaluation, addressing EMI/EMC, Environmental and Product Safety requirements of electronic and electrical devices, including but not limited to MIL-STD, SAE, NEMA, ASTM, IEC/EN, RTCA and other government and regulatory agencies and requirements. This process greatly reduces the time to market by eliminating design flaws and identifying applicable standards for end products.



D.L.S. EDE[®] Program

1. Initial Review

- Identifies the product being evaluated
- Briefly describes intended use
- An EDE project leader, EMI/EMC Specialist and Environmental Specialist are assigned

2. EMI/EMC/Environmental/Product Safety Compliance Review

- Product/device is reviewed for applicable EMI/EMC, Environmental and Product Safety (if applicable) standards and for intended use and location
- Testing methodology is determined

3. EMI/EMC Design Evaluation

The EDE EMI/EMC Specialist:

- Issues a written, detailed analysis of the product/device for EMI
- Reviews EMI design issues and suggests solutions related to boards, components, cables, enclosures and systems

4. Environmental Design Evaluation

The EDE Environmental Specialist:

- Issues a written, detailed analysis of the product/device for Environmental issues
- Reviews Environmental design issues and suggests solutions related to boards, components, cables, enclosures and systems

5. Product Safety Design Evaluation

The EDE Environmental Specialist:

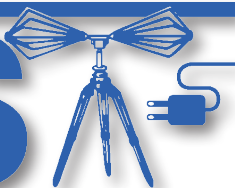
- Issues a written, detailed analysis of the product/device for Product Safety
- Reviews Product Safety design and documentation issues and suggests solutions related to boards, components, cables, enclosures and systems and documentation.

Conclusion

EDE Project Leaders will issue a final report, with the findings of the EDE project. Specifically detailed are the areas reviewed and recommendations are given.



DLS



CONFORMITY ASSESSMENT, INC.

Environmental Testing & Consulting



www.dlsemc.com

RTCA

SAE



Introduction

D.L.S. Conformity Assessment performs a series of comprehensive environmental and mechanical tests under the accredited ANSI/ANAB ISO 17025 program. This globally- accepted accreditation covers environmental and mechanical testing that includes vibration and shock, temperature extremes, sand and dust, fluid and chemical resistance, altitude, humidity, salt spray, ingress protection, icing, flammability and other related testing services.

Standards include: RTCA DO-160, MIL-STD 810 and 202, and several ASTM, ANSI, IEC, ISO, ISTA, NEMA, UL, and SAE standards as well.



Also:

- Temperature Extremes
- Vibration
- Altitude-Decompression
- Mechanical Shock
- Chemical and Fluid Testing-Fungus
- Salt Spray/Fog
- IP Testing-Water Exposure Wind & Rain
- Flammability
- Sand and Dust
- Humidity
- Explosive Atmosphere
- Solar Radiation
- Package Handling

MIL-STD 810

Currently, D.L.S. performs the entire environmental suite of tests up to the current revision level of H. These tests are often performed in addition to EMI related tests.

- Method 500 Low Pressure (Altitude)
- Method 501 High Temperature
- Method 502 Low Temperature
- Method 503 Temperature Shock
- Method 504 Fluid Contamination
- Method 505 Solar Radiation
- Method 506 Rain
- Method 507 Humidity
- Method 509 Salt Fog
- Method 510 Sand and Dust
- Method 511 Explosive Atmosphere
- Method 512 Immersion Testing
- Method 513 Acceleration
- Method 514 Vibration
- Method 515 Acoustic noise
- Method 516 Shock
- Method 517 Pyroshock
- Method 518 Acid Atmosphere
- Method 519 Gunfire Shock
- Method 520 Temperature, Humidity, Vibration, & Altitude
- Method 521 Icing/Freezing Rain
- Method 522 Ballistic Shock
- Method 523 Vibro-Acoustic/Temperature
- Method 524 Freeze / Thaw
- Method 525 Time Waveform Replication
- Method 526 Rail Impact
- Method 527 Multi-Exciter
- Method 528 Mechanical Vibrations of Shipboard Equipment



Cage Code
#OKP98

RTCA DO-160

Currently, D.L.S. performs the entire environmental suite of tests up to the current revision level of G. These tests are often performed in addition to EMI related tests.

- Section 4 Temperature and Altitude
- Section 5 Temperature Variation
- Section 6 Humidity
- Section 7 Mechanical Shock
- Section 8 Vibration
- Section 9 Explosive Atmosphere
- Section 10 Waterproofness
- Section 11 Fluid Susceptibility
- Section 12 Sand and Dust
- Section 13 Fungus
- Section 14 Salt Spray
- Section 26 Fire and Flammability



Additional standards

- SAE
- ASTM/ANSI
- IEC

Additional Services

D.L.S. offers a series of support related value-added services. These include program management, engineering development assistance, including product evaluations and test plan preparation from our experienced technical staff.

D.L.S. can offer a one stop shop for projects that involve EMC, Product and Electrical Safety, and Environmental testing under a single project, with a valued added engineering support staff, and experienced program coordinators.

Make D.L.S. your choice for global compliance for your environmental testing needs.



www.dlsemc.com

DLS
EMC • Product Safety
Environmental Testing
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D.L.S. Electronic Systems, Inc.



*Military Standard
&
Commercial Avionics
Testing Services*



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Overview

D.L.S. Electronic Systems, Inc. offers a complete RTCA DO-160, MIL-STD-461, MIL-STD-810, MIL-STD-704, MIL-STD-1275, MIL-STD-1399 and MIL-STD 464 testing package, including EMI/EMC testing, Power Quality, and Environmental requirements. D.L.S.'s main facilities are located in Wheeling, IL, a Chicago suburb conveniently located 30 minutes from O'Hare making it a few hours from just about everywhere. We offer one of the largest, independent testing laboratory under one roof, with 16 testing chambers and one of the largest staff of Certified iNARTE Engineers of any testing facility.



Our testing chambers include several that are 36'x 26'x 20' and are complete with auxiliary equipment for air and exhaust handling, temperature control, special chillers, and drive stands to meet a variety of testing requirements. No project is too large for our engineering staff.

D.L.S. has established strong relationships with government agencies that provide witness and verification of compliance. Through these relationships, D.L.S. has been able to facilitate most testing requirements, even under the most time sensitive schedules. This includes DCAS, DER, and FAA requirements. D.L.S. can provide and coordinate DAR/DER activities as well.

D.L.S. tests to industry standards including Boeing, Airbus, FAA, and SAE requirements. D.L.S. offers testing levels to 200 V/m, with new HIRF capabilities, up to 40 GHz, 3000 VPM.

D.L.S. truly provides the best value for your compliance testing dollars: unparalleled facility capacity, state-of-the-art equipment, and seasoned engineers that provide not only testing expertise, but design and mitigation experience as well. From the initial design review, through set-up, calibration, testing program, and final reports, D.L.S. offers a professional program, second to none.



RTCA Testing Services

RTCA DO-160 C-G

(EMI, Environmental, & HIRF)

- Section 4 - Temperature & Altitude
- Section 5 - Temperature Variation
- Section 6 - Humidity
- Section 7 - Mechanical Shock
- Section 8 - Vibration
- Section 9 - Explosive Atmosphere
- Section 10 - Waterproofness
- Section 11 - Fluid Susceptibility
- Section 12 - Sand and Dust
- Section 13 - Fungus Resistance
- Section 14 - Salt Spray
- Section 15 - Magnetic Effect
- Section 16 - Power Input
- Section 17 - Voltage Spike
- Section 18 - Audio Conducted Susceptibility
- Section 19 - Induced Signal Susceptibility
- Section 20.4 - Conducted Susceptibility
- Section 20.5 - Radiated Susceptibility
- Section 21 - Radiated Emissions
- Section 22 - Lightning Induced Transient Susceptibility
- Section 23 - Direct Lightning Effects
- Section 24 - Icing
- Section 25 - ESD
- Section 26 - Fire and Flammability



DER/DAR Services

iNARTE Engineers

Mitigation Services

Design Seminars

Senior Level

Consultants on Staff

Military Testing Services

MIL STD 461 A-G - EMI

- | | |
|--|--|
| CE101 - Power Leads | RE101 - Magnetic Field |
| CE102 - Power Leads | RE102 - Electric Field |
| CE106 - Antenna Terminal | RE103 - Antenna Spurious
& Harmonic Outputs |
| CS101 - Power Leads | RS101 - Magnetic Field |
| CS103 - Intermodulation | RS103 - Electric Field |
| CS104 - Rejection Unwanted | RS105 - Transient EM Field |
| CS105 - Cross Modulation | |
| CS106 - Transients - Power Leads | |
| CS109 - Spike | |
| CS114 - Bulk Cable Injection | |
| CS115 - Bulk Cable Injection; Impulse Excitation | |
| CS116 - Damped Sinusoidal Transients | |
| CS117 - Lightning Induced Transients | |
| CS118 - Electrostatic Discharge | |

MIL STD 810 - ENVIRONMENTAL

- Method 500 - Low Pressure (Altitude)
- Method 501 - High Temperature
- Method 502 - Low Temperature
- Method 503 - Temperature Shock
- Method 504 - Fluid Contamination
- Method 505 - Solar Radiation
- Method 506 - Rain
- Method 507 - Humidity
- Method 509 - Salt Fog
- Method 510 - Sand and Dust
- Method 511 - Explosive Atmosphere
- Method 512 - Immersion Testing
- Method 513 - Acceleration
- Method 514 - Vibration Testing
- Method 515 - Acoustic Noise
- Method 516 - Shock
- Method 517 - Pyroshock
- Method 518 - Acid Atmosphere
- Method 519 - Gunfire Shock
- Method 520 - Temperature, Humidity, Vibration, & Altitude
- Method 521 - Icing/Freezing Rain
- Method 522 - Ballistic Shock
- Method 523 - Vibro-Acoustic/Temperature
- Method 524 - Freeze/Thaw
- Method 525 - Time Waveform Replication
- Method 526 - Rail Impact
- Method 527 - Multi-Exciter
- Method 528 - Mechanical Vibrations of Shipboard Equipment



Additional Services:

MIL-STD-704, 1275, 1399 Power Quality

MIL-STD-464

Materials Testing

Shielding Effectiveness

Radome Transitivity

HASS Testing

Wireless Transmitters

Test Plan and Procedure Preparation

Harness/Cable Testing

Consulting

Cage Code #OKP98



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Environmental • Wireless

Testing & Consulting

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