

TERMS OF REFERENCE
Special Committee (SC) 135
Environmental Testing
(Revision 06-17-2021)

ORIGINAL REQUESTOR:

| Organization | Person |
|------------------|--------|
| Established 1975 | |

SC LEADERSHIP:

| Position | Name | Affiliation | Telephone | email | Change |
|-----------|---------------|-------------|---------------|--|------------|
| Chair | Kyle McMullen | NIAR | 316- 978-8281 | kcmullen@niar.wichita.edu | |
| GAR | Rich Adler | FAA/AIR-6B1 | 202-267-9834 | richard.adler@faa.gov | Lee Nguyen |
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BACKGROUND:

Special Committee 135 (SC-135) published the first version of DO-160() in February 1975. It has been periodically updated, so that it is now at revision G. DO-160() defines minimum standard environmental test conditions and standardized procedures for airborne equipment environmental tests. These tests provide a means to determine the performance of airborne equipment in environmental conditions representative of those encountered when the equipment is installed and operated on aircraft.

DO-160() is referenced in a wide range of specifications and standards. RTCA references DO-160() in minimum operational performance standards (MOPS). Regulatory authorities throughout the world refer to DO-160() in standards such as FAA technical standard orders (TSOs), and advisory circulars (ACs). Aircraft, avionics, and equipment manufacturers refer to DO-160() in equipment specifications. Test laboratories rely on DO-160() for standard test procedures.

SC-135 has worked and will continue to work collaboratively with EUROCAE WG-14(), which has produced EUROCAE document ED-14(), which is technically identical to DO-160().

SC-135 maintains an active group of change coordinators that are experts in their sections and provide guidance on interpretation of the requirements and test procedures to the industry.

DELIVERABLES:

| Product | Description | FRAC Completion Due Date* | Change |
|---|--|----------------------------------|---------------|
| DO-357A: Supplement to DO-160H: User Guide for DO-160H | Update Revision of User Guide for DO-160H, Guidance Material for DO-160H | 12/2024 | |
| DO-160H: Environmental Conditions and Test Procedures For Airborne Equipment | Minimum Standard Environmental Test Conditions (categories) and Applicable Test Procedures for Airborne Equipment | 12/2024 | |
| DO-380A: Environmental Conditions and Test Procedures for Ground Equipment | Update to address change proposals received against DO-380 for all sections | 12/2025 | |

*Note: Final Review and Comment (FRAC) Completion Due Date refers to the date that the committee plenary approves the document after completing the FRAC Process. SCs should submit the final document at least 45 days before the PMC meeting where it will be considered for approval.

SCOPE and COORDINATION:

Special Committee 135 will work collaboratively with EUROCAE WG-14 for the following:

- a. Develop a new revision to DO-160G and produce an update to RTCA/DO-160G and EUROCAE/ED-14G. The new revision will include rationale, procedures, guidance and background information for the environmental test requirements, and the updated user guide.
- b. Maintain an active group of DO-160() Change Coordinators to propose recommendations for user guide material to RTCA/DO-160G and to collect change proposal's to RTCA/DO-160G.

- c. Continue coordination with EUROCAE Working Group 14 to develop new revisions to DO-160G and the User Guide for DO160G.
- d. Coordinate with RTCA SC-159, Global Positioning System (GPS), and the appropriate working groups to develop harmonized requirements for radio frequency emissions in the GPS related frequency bands.
- e. Coordinate with the FAA and Flammability Harmonization Working Group on potential new alternative flammability test methods and procedures including testing whole components instead of breaking down electronic devices into individual material samples as currently required.
- f. Chair a working group to work with industry representatives on requirements and testing of the continually changing aircraft power systems. This working group is to propose test conditions for 540 volt dc generators.
- g. Coordinate with the SAE AE-2, Lightning Committee, to address hybrid wire bundle testing.
- h. Coordinate with the SAE AE-4, Civil Aircraft Electromagnetic Compatibility (EMC) Working Group, on equipment EMC qualification.
- i. Coordinate with the Airline Passenger Experience Association (APEX) Technology Committee and EUROCAE WG-99 on investigating whether new requirements are needed for higher frequency test for RF Susceptibility, to address new WiGig and determine who should drive those requirements.
- j. Chair a working group to work with industry representatives on requirements for aligning Audio Susceptibility requirements to that of MIL STD-461 and to bridge the frequency gap between audio frequency susceptibility and RF frequency susceptibility
- k. Chair a working group to work with industry representatives on requirements for developing a proposal developing a method on a faster alternative to the current reverb chamber uniformity calibration.
- l. Chair a working group to work with industry representatives and EUROCAE WG-14 on considering requirements for volcanic ash qualification.
- m. Investigate specific aspect of carbon dust (due to its conductivity) which is now widely present in the aircraft industry.
- n. Address specific aspects of testing of Integrated Modular Avionics. As being a versatile platform for which the supplier may only provide for generic hardware and firmware, with the intent that the end user will implement its own hardware configuration and application software, the hardware and software configuration issues question the ability of the supplier to claim for a DO-160/ED-14 compliance.
- o. Investigate to replace 19.3.5 with a test procedure similar to MIL-STD-461 CS115.

Special Committee SC-135 has received a request from SC-228 to update DO-380 to include content in Section 9 for Earthquake and add content to Section 17 (currently reserved) to include Lightning Direct Effect updating DO-380 to Revision A. Currently, there is no expertise of active members of SC-135 to create these new sections. It is possible that SAE AE-2 will create content that would support a section for testing Lightning Direct Effect on the ground. However, since there has been no participation to add these sections from SC-228 or new members, the updates for Revision A on these sections will be delayed until after the publication of DO-160H and DO-357A.

SC-135 will monitor questions and change requests against DO-380 and will come back to the PMC if support is found to create the additional sections. Revision A will include any change proposals against DO-380. SC-135 will also monitor industry requests to address the two topics in DO-380.

ENVISIONED USE OF DELIVERABLE(S):

Ground based environmental qualification document will specify requirements and procedures for surface-based (not airborne) equipment in the Detect and Avoid and the Command and Control Link Equipment.

Revision H of DO-160 for environmental test conditions and test procedures will be used by equipment manufacturers, aircraft manufacturers, airlines, aircraft operators, aircraft modifiers, test laboratories, and aviation authorities for the design, approval and installation of aircraft equipment. The plan for the future revisions to the DO-160() environmental test conditions and test procedures will consider changes in:

- Aircraft and equipment manufacturers environmental test specifications.
- Industry Standards (RTCA MOPS, EUROCAE MOPS, SAE MPS)
- FAA Advisory Circulars
- FAA Technical Standard Orders (TSO's)

SPECIFIC GUIDANCE:

EUROCAE Coordination – SC135 will continue to coordinate with EUROCAE Working Group 14 so that documents are identical. Any plan for future revisions of DO-160() and ED-14() will be agreed upon between SC-135 and WG-14. Any plan for future revisions of DO-160() and ED-14() require approval by the RTCA Program Management Committee and the EUROCAE Council.

Additional Coordination

- FAA
 - Advisory Circular AC 21-16G
 - FAA Flammability AC and Handbook
- SC-159
 - RF emissions in GPS frequency bands
- SAE AE2
 - Lightning Test Procedures
- Department of Defense
 - US Army
 - US Navy
 - US Air Force
- NASA
 - SC-228

Initial Documentation

| Documents | Intended Use |
|--|--|
| Change 1 to DO-160G/ED-14G | Basis for Revision H development |
| DO-357/ED-234 User Guide for DO-160G/ED-14G | Basis for User Guide for DO-160 Revision H development |
| SAE ARP 5412 Lightning Environment and Test Waveforms | Sections 22 and 23 environmental conditions definition |
| FAA Flammability AC and Handbook | Section 26 test conditions and procedures |
| DO-160 – Bob Saffel’s Document: Applying RTCA DO-160() Environmental Conditions and Test Procedures for Airborne Equipment | Guidance for incorporating environmental test requirements in MOPS |
| DO-380 | Baseline for update to revision A |

TERMINATION:

When the scope of this Terms of Reference is complete, the committee will recommend to the PMC that the committee Sunset, go into Active Monitoring Mode, or spend a period of time in Hiatus. Any change/extension of a committee’s work program requires prior PMC approval.