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EIA STANDARD

TP-03B

Altitude Immersion Test Procedure For Electrical Connectors

EIA-364-03B

(Revision of EIA-364-03A)

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ELECTRONIC INDUSTRIES ALLIANCE

**Electronic Components, Assemblies, Equipment & Supplies
Association**



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EIA-364-03B

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(From Standards Proposal No. 4304, formulated under the cognizance of the CE-2.0 National Connector Standards Committee.)

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TEST PROCEDURE No. 03B

ALTITUDE IMMERSION TEST PROCEDURE
FOR
ELECTRICAL CONNECTORS

(From EIA Standards Proposal No. 4304, formulated under the cognizance EIA CE-2.0 Committee on National Connector Standards, and previously published in EIA-364-03A.)

1 Introduction

1.1 Scope

This standard establishes a test method to determine the ability of the connector-to-wire and interface area seals of a mated connector assembly to perform satisfactorily during and subsequent to simulated rapid descents from high altitude with attendant moisture condensation.

2 Test resources

2.1 Equipment

2.1.1 Altitude chamber

Altitude immersion test chamber shall consist of a suitable sealed chamber having a means of visual observation of connector assembly under test with necessary vacuum pump equipment to maintain a reduced pressure of 25.4 mm (1 inch) of mercury (3.4 kPa) or lower if required by the referencing document. The chamber shall have provisions for electrical connections.

2.1.2 Test container

The test container for positioning connector assembly shall have dimensions that are a minimum of 50.8 mm (2 in) wide, 228.6 mm (9 in) long and 76.2 mm (3 in) deep.

A salt solution shall be placed in the container to a depth that will completely cover the connector at all times during the altitude immersion test. The salt solution shall be prepared by dissolving 5 ± 1 parts by weight of sodium chloride (e.g. non-iodized commercial table salt) in 95 parts by weight of distilled water. No material shall be added to, and no contaminant shall be present in the container or solution that would tend to prevent wetting of the test specimen by the solution.

3 Test specimen

3.1 Description

The test specimen shall consist of one fully assembled, mated electrical connector with the specified number of contacts, proper wire type size and end preparation and sealing plugs and other hardware as required by the referencing document.

3.2 Preparation

Care shall be taken to ascertain that the wires are free of pin holes that would permit leakage of the solution into the connector or breathing with the chamber pressure changes. It shall be verified that wires provided for connection to the connector shells are actually electrically connected to the preceding shell. Maximum resistance from the wire end to the furthest point on the connector shell shall not exceed 1 ohm. It shall be verified that the connector halves are fully coupled. No material shall be added to, and no contaminant shall be present on the test specimen that would tend to prevent wetting of the test specimen by the solution.

4 Test procedure

4.1 Mounting

The test specimen shall be placed in the container in the chamber in such a manner that the connector assembly will be entirely immersed in the salt solution. The uppermost point of the connector shall be 25.4 mm (1 in) maximum below the surface of the solution. The wires of the test specimen shall be bent at approximately 90° on 63.5 mm (2.5 in) bend radius, and brought out of the solution within 76.2 mm (3 inches) from each end of the connector assembly. Unless otherwise specified, termination of the wires of the test specimen shall be unsealed and within the sealed chamber as specified. The wires shall be arranged so as to prevent any voltage breakdown or low insulation resistance that might incorrectly indicate connector failure.

4.2 Altitude immersion cycling

The chamber shall be sealed. The chamber pressure shall be reduced from room ambient to 25.4 mm +0.0 mm, - 5 mm (1 in +0.0 in, -0.2 in) of mercury, 3.4 kPa, +0.0 kPa, -0.6 kPa (equivalent to 75,000 feet of altitude), within 5 minutes and shall be maintained at this level for 30 minutes minimum. The chamber pressure shall be increased to room ambient within one minute, and shall be maintained at room ambient pressure for 30 minutes minimum. The foregoing shall constitute one cycle. Two additional cycles shall be performed (three cycles total). The connector shall remain fully immersed in the salt solution during the three cycles and for the subsequent measurements specified herein.

4.3 Final measurements

4.3.1 Insulation resistance test

After the third cycle and while still in the salt solution, the insulation resistance test shall be performed, in accordance with EIA-364-21.

4.3.2 Dielectric withstanding voltage test

After the insulation resistance test and while the connector is still in the salt solution, a dielectric withstanding voltage test shall be performed, in accordance with EIA-364-20. The test voltage shall be applied for 5 seconds minimum unless otherwise specified.

4.3.3 Connector examination

After the altitude immersion test, the test specimen shall be removed from the chamber and washed in distilled or tap water. The test specimen shall then be patted or wiped with suitable towels and dried by being exposed to room ambient conditions for 20 to 24 hours, or by placing in a circulating air oven, at $48.9\text{ }^{\circ}\text{C} \pm 2.8\text{ }^{\circ}\text{C}$ ($120\text{ }^{\circ}\text{F} \pm 5\text{ }^{\circ}\text{F}$) for 2 to 3 hours. The connector shall then be uncoupled and both halves shall be examined using the unaided eye for evidence of the following:

4.3.3.1 Evidence of foreign deposits on the interface or contacts.

4.3.3.2 Deterioration of moisture seal.

4.3.3.3 Evidence of dielectric breakdown across interface of connector.

4.3.3.4 Evidence of moisture on the interface or contacts.

5 Details to be specified

The following details shall be specified in the referencing document:

5.1 Wire type and size

5.2 Number of contacts and sealing plugs

5.3 Connector accessories, support hardware to be installed on connector specimen during test

5.4 Connector specimen preparation

5.5 Insulation resistance minimum allowable limit

5.6 Dielectric withstanding voltage including maximum leakage current and test voltage application time if other than 5 seconds

5.7 Number of specimens to be tested

6 Documentation

Documentation shall contain the details specified in clause 5, with any exceptions, and the following:

6.1 Title of test

6.2 Specimen description including fixturing, if applicable

6.3 Test equipment used, and date of last and next calibration

6.4 Test procedure

6.5 Values and observations

6.5.1 Chamber pressure, temperature and duration of each cycle

6.5.2 Insulation resistance values

6.5.3 Identity of each contact pair in test specimen

6.5.4 Dielectric withstanding test results

6.5.5 Identity of each pair in test specimen

6.5.6 Connector visual examination

6.6 Name of operator and date of test

EIA Document Improvement Proposal

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