

BAROMETRIC PRESSURE, REDUCED (ALTITUDE OPERATION)

1. PURPOSE. The barometric-pressure test is performed under conditions simulating the low atmospheric pressure encountered in the nonpressurized portions of aircraft and other vehicles in high-altitude flight. This test is intended primarily to determine the ability of component parts and materials to avoid voltage breakdown failures due to the reduced dielectric strength of air and other insulating materials at reduced pressures. Even when low pressures do not produce complete electrical breakdown, corona and its undesirable effects, including losses and ionization are intensified. The simulated high-altitude conditions of this test can also be employed to investigate the influence on components' operating characteristics, of other effects of reduced pressure, including changes in dielectric constants of materials, and decreased ability of thinner air to transfer heat away from heat-producing components.

2. APPARATUS. The apparatus used for the barometric-pressure test shall consist of a vacuum pump and a suitable sealed chamber having means for visual observation of the specimen under test when necessary, a suitable pressure indicator to measure the simulated altitude in feet in the sealed chamber, and a microammeter or oscilloscope capable of detecting current over the range from dc to 30 megahertz.

3. PROCEDURE. The specimens shall be mounted in the test chamber as specified and the pressure reduced to the value indicated in one of the following test conditions, as specified. While the specimens are maintained at the specified pressure, the specimens shall be subjected to the specified tests. During this test and for a period of 20 minutes before, the test temperature shall be $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$. The device shall have the specified voltage applied and shall be monitored over the range from atmospheric pressure to the specified minimum pressure and return for any device malfunctions. A device which exhibits arc-overs, harmful coronas, or any other defect or deterioration which may interfere with the operation of the device shall be considered a failure.

Test condition	Pressure, maximum		Altitude	
	Inches of mercury	mm of mercury	Feet	Meters
A	17.3	439.00	15,000	4,572
B	8.88	226.00	30,000	9,144
C	3.44	87.00	50,000	15,240
D	1.31	33.00	70,000	21,336
E	0.315	8.00	100,000	30,480
F	0.043	1.09	150,000	45,720
G	9.436×10^{-8}	2.40×10^{-6}	656,000	200,000

3.1 Measurement. The device shall be connected for measurement and have the specified voltages applied during the entire pump-down cycle. The terminals to which the maximum voltage (see 4c.) is applied shall be monitored with a microammeter or oscilloscope for corona currents in the range from dc to 30 megahertz. Provision shall be made for calibrating the current flow in the test circuit minus the device under the applicable test condition to insure that test readings are characteristic of the device under test.

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4. SUMMARY. The following details must be specified in the applicable acquisition document:

- a. Method of mounting (see 3).
- b. Test condition letter (see 3). Unless otherwise specified, condition E shall be used.
- c. Tests during subjection to reduced pressure (see 3). Unless otherwise specified, the device shall be subjected to the maximum voltage it would be subjected to under rated operating conditions.
- d. Tests after subjection to reduced pressure, if applicable (see 3). Unless otherwise specified, the device shall be subjected to full electrical tests of specified device characteristics or parameters.
- e. Exposure time prior to measurement, if applicable (see 3)