

EQUIPMENT: GENERAL SPECIFICATION FOR ENVIRONMENTAL TEST OF

A. APPLICABLE SPECIFICATIONS

A-1. The current issue of the following specifications, in effect on date of issuance of proposals, forms a part of this specification:

Army Air Forces	40984	Test, Resistance of Equipment to Mildew.
Army Navy		
Aeronautical	AN-QQ-8-91	Salt-Spray-Corrosion-Test, Process For.

B. Type

B-1. This specification covers methods for testing equipment under simulated environmental conditions.

C. MATERIAL AND WORKMANSHIP.

C-1. Not Applicable.

D. GENERAL REQUIREMENTS.

D-1. See Section E

E. DETAIL REQUIREMENTS.

E-1. The detail requirements shall be as specified in the detail specification.

F. Method of Inspection and Tests.

F-1. Test Reports shall be furnished in accordance with the detail specification.

F-2. Samples shall be selected in accordance with the detail specification.

F-3. Group 10 – High Temperature Tests:

Method 11.

1. Apparatus. The apparatus shall consist of a test chamber capable of maintaining an internal temperature of 71 plus or minus 2 degrees C. (160 plus or minus 3 degrees F.) and an internal relative humidity of not more than 2 percent. The source of heat for the chamber shall have a surface temperature of not more than 538 degrees C. (1000 degrees F.) and shall be arranged in such a manner that radiant heat will not fall upon the test specimen.

2. Procedure. The equipment shall be placed within the chamber and heated to the temperature specified above. The total volume occupied by a single item of equipment or by several identical items shall be not more than 50 percent of the internal volume of the test chamber. The total volume occupied by dissimilar items of equipment shall be not more than 10 percent of the internal volume of

the test chamber. The equipment shall be maintained at the specified temperature for a period 15 hours. The equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

Method 12.

1. Status. The apparatus shall consist of a test chamber capable of maintaining an internal temperature of 71 plus or minus 2 degrees C. (160 plus or minus 3 degrees F.) and an internal relative humidity of not more than 2 percent. The source of heat for the chamber shall have surface temperature of not more than 538 degrees C. (1000 degrees F.) and shall be arranged in such manner that radiant heat will not fall upon the test specimen.

2. Procedure. The equipment shall be placed within the chamber and heated to the temperature specified above. The total volume occupied by a single item of equipment or by several identical items shall be not more than 50 percent of the internal volume of the test chamber. The equipment shall be maintained at the specified temperature for a period of 15 hours, allowed to cool to & temperature of 49 degrees C. (120 degrees F.) and then shall be examined, tested or operated in accordance with the requirements of the detail specification.

F-4. Group 20 - Low Temperature Tests:

Method 21.

1. Apparatus. The apparatus shall consist of a test chamber capable of maintaining internal temperatures of minus 65 plus or minus 2 degrees C. (minus 85 plus or minus 3 degrees F.) and minus 54 plus or minus 2 degrees C. (minus 65 plus or minus 3 degrees F.)

2. Procedure. The equipment shall be placed within the chamber and cooled to and maintained at a temperature of minus 65 plus or minus 2 degrees C. (minus 85 plus or minus 3 degrees F.) for a period of 48 hours. At the end of the 48 hour period the temperature shall be changed to minus 54 plus or minus 2 degrees C. (minus 65 plus or minus 3 degrees F.) which shall be maintained for an additional period of 24 hours. At the end of the 24 hour period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

Method 22.

1. Apparatus. The apparatus shall consist of a test chamber capable of maintaining internal temperatures of minus 65 plus or minus 2 degrees C. (minus 85 plus or minus 3 degrees F.) and minus 34 plus or minus 2 degrees C. (minus 30 plus or minus 3 degrees F.)

2. Procedure The equipment shall be placed within the chamber and cooled to and maintained at a temperature of minus 65 plus or minus 2 degrees C. (minus 85 plus or minus 3 degrees F.) for a period of 48 hours. At the end of the 48 hour period the temperature shall be changed to minus 34 plus or minus 2 degrees C. (minus 30 plus or minus 3 degrees F.) which shall be maintained for an additional period of 24 hours. At the end of the 24 hour period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

Method 23.

1. Apparatus. The apparatus shall consist of a test chamber capable of maintaining internal temperatures of minus 54 plus or minus 2 degrees C. (minus 65 plus or minus 3 degrees F.)

2. Procedure The equipment shall be placed within the chamber and cooled to and maintained at a temperature of minus 54 plus or minus 2 degrees C. (minus 65 plus or minus 3 degrees F.) for a period of 48 hours. At the end of the 48 hour period the temperature shall be changed to plus 4 degrees C. (plus 40 degrees F.). At the end of an additional 2 hour period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

F-5. Group 30 - Humidity Tests:

Method 31.

1. Apparatus. The apparatus shall consist of a test chamber capable of maintaining an internal temperature of 71 plus or minus 2 degrees C. (160 plus or minus 3 degrees F.) and an internal relative humidity of 95 plus or minus 5 percent. The test chamber shall be capable of being sealed so as to retain the total moisture content in the test space. The heat loss from the chamber shall be sufficient to reduce the internal temperature from the above specified operating temperature to not more than 38 degrees C. (100 degrees F.) within a period of 18 hours from the time of removal of the source of heat.

2. Procedure. The equipment shall be placed in the test chamber and the temperature and relative humidity raised to the specified values. At the end of an additional 18 hour period the chamber shall be unsealed and the heat again applied. This cycle shall be repeated a sufficient number of times to extend the total time of the test to 120 hours. At the end of the 120 hour period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

F-6. Group 40 – High Altitude Tests:

Method 41.

1. Apparatus. The apparatus shall consist of a test chamber capable of maintaining an internal absolute pressure corresponding to an altitude of 50,000 above sea level plus or minus 1000 feet.

2. Procedure. The equipment shall be placed in the chamber and tested as described in the detail specification.

Method 42.

1. Apparatus. The apparatus shall consist of a test chamber capable of maintaining an internal absolute pressure corresponding to an altitude of 20,000 feet above sea level plus or minus 1000 feet.

2. Procedure. The equipment shall be placed in the chamber and the pressure reduced to and maintained at the specified value for a period of 10

hours. At the end of the 10 hour period the equipment shall be re\_\_ed and examined, tested or operated in accordance with the requirements of the data specification.

F-7. Group 50 – Salt Spray Tests:

Method 51. - The equipment shall be subjected to a salt spray in accordance with Specification AN-QQ-S-91. The time of exposure shall be as specified in the detail specification.

F-8. Group 60 – Vibration Tests:

Method 61.

1. Apparatus. The apparatus shall consist of a suitable device for mounting and vibrating items of equipment through the following ranges:

- 0.036 inch total travel at 10 to 75 cycles per second.
- 10 “g’s” linear acceleration at 76 to 300 cycles per second.
- 15 “g’s” linear acceleration at 301 to 1000 cycles per second.

2. Procedure. Unless otherwise specified in the detail specification, the equipment shall be mounted on the apparatus in a position dynamically similar to the most severe mounting used in service. Natural frequencies of the equipment within the specified test range shall be determined by moving through the range at low acceleration. If natural frequencies are encountered, the equipment shall then be vibrated for four hours in each of three perpendicular planes or for 6 hours in a circular motion in a horizontal plane plus 6 hours in a circular motion in a vertical plane at each resonant condition at the travel or acceleration specified above. Whenever clearly defined natural frequencies are not encountered within the specified range, equipment shall be vibrated for 12 hours in each of three perpendicular planes or for 18 hours in a circular motion in a horizontal plane plus 18 hours in a circular motion in a vertical plane at a total travel of 0.036 inch and a frequency of 50 cycles per second. At the end of the test period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

Method 62.

1. Apparatus. The apparatus shall consist of a suitable device for mounting and vibrating items of equipment through the following ranges:

- 0.042 inch total travel at 10 to 75 cycles per second.
- 15 “g’s” linear acceleration at 76 to 100 cycles per second.
- 20 “g’s” linear acceleration at 101 to 500 cycles per second.
- 35 “g’s” linear acceleration at 501 to 1000 cycles per second.
- 50 “g’s” linear acceleration at 1001 to 2500 cycles per second.

2. Procedure. Unless otherwise specified in the detail specification, the equipment shall be mounted on the apparatus in a position dynamically similar to the most severe mounting used in service. Natural frequencies of the equipment within the specified test range shall be determined by moving through

the range at low acceleration. If natural frequencies are encountered, the equipment shall then be vibrated for four hours in each of three perpendicular planes or for 6 hours in a circular motion in a horizontal plane plus 6 hours in a circular motion in a vertical plane at each resonant condition at the travel or acceleration specified above. Whenever clearly defined natural frequencies are not encountered within the specified range, equipment shall be vibrated for 12 hours in each of three perpendicular planes or for 18 hours in a circular motion in a horizontal plane plus 18 hours in a circular motion in a vertical plane at a total travel of 0.018 inch and a frequency of 150 cycles per second. At the end of the test period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

Method 63.

1. Apparatus. The apparatus shall consist of a suitable device for mounting and vibrating items of equipment through the following the range of 10 to 55 cycles per second at 1.5 "g's" linear acceleration.

2. Procedure. Unless otherwise specified in the detail specification, the equipment shall be mounted on the apparatus in a position dynamically similar to the most severe mounting used in service. Natural frequencies of the equipment within the specified test range shall be determined by moving through the range at low acceleration. If natural frequencies are encountered, the equipment shall then be vibrated for four hours in each of three perpendicular planes or for 6 hours in a circular motion in a horizontal plane plus 6 hours in a circular motion in a vertical plane at each resonant condition at the travel or acceleration specified above. Whenever clearly defined natural frequencies are not encountered within the specified range, equipment shall be vibrated for 12 hours in each of three perpendicular planes or for 18 hours in a circular motion in a horizontal plane plus 18 hours in a circular motion in a vertical plane at a total travel of 0.020 inch and a frequency of 35 cycles per second. At the end of the test period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

Method 64.

1. Apparatus. The apparatus shall consist of a suitable device for mounting and vibrating items of equipment with tortional motion through a total travel of 4 degrees at rates varying from 15 to 40 cycles per second.

2. Procedure. Unless otherwise specified in the detail specification, the equipment shall be mounted on the apparatus in a position dynamically similar to the most severe mounting used in service. The equipment shall be tested as described in the detail specification.

F-9. Group 70 – Mildew Resistance Tests:

Method 71.

1. Apparatus. The equipment shall be subjected to the action of fungi in accordance with Specification No. 40984 except that the test period shall be 28 days. At the end of the test period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

F-10. Group 80 – Sunshine Tests:

Method 81.

1. Apparatus. The apparatus shall consist of a suitable device capable of applying radiant energy at the rate of 100 to 110 watts per square foot. The apparatus shall be capable of furnishing 45 to 55 percent of the total energy in wave lengths above 8000 Angstrom units and 8 to 12 percent of the total energy in wave lengths below 4000 Angstrom units.

2. Procedure. – The equipment shall be mounted and tested in accordance with the requirements of the detail specification.

F.11. Group 90 – Rain Tests:

Method 91.

1. Apparatus. The apparatus shall consist of a test chamber containing suitable spray nozzles capable of producing a simulated rainfall of 4 plus or minus one inch per hour within the test area.

2. Procedure. – The equipment shall be mounted in the test area in the manner specified in the detail specification. The temperature within the test chamber shall be adjusted to 20 plus or minus 5 degrees C. (68 plus or minus 10 degrees F.) at the start of the test. Water shall then be sprayed into the test chamber for a period of 2 hours. The temperature of the water shall be maintained at 16 plus or minus 5 degrees C. (60 plus or minus 109 degrees F.). At the end of the 2 hour period the equipment shall be examined, tested or operated in accordance with the requirements of the detail specification.

F.12. Group 100 – Sand and Dust Tests:

Method 101.

1. Apparatus. The apparatus shall consist of a test chamber capable of maintaining internal temperatures of minus 21 plus or minus 2 degrees C. (minus 70 plus or minus 3 degrees F.) and 71 plus or minus 2 degrees C. (160 plus or minus 3 degrees F.) and a relative humidity of not more than 70 percent. The chamber shall also be capable of maintaining air velocities of 2300 plus or minus 50 feet per minute and 100 plus or minus 10 feet per minute and a sand and dust density of 0.30 plus or minus 0.03 grains per cubic foot within the test space. The sand and dust particles shall be of angular structure. All sand and dust particles shall pass through a 170 mesh screen and not more than 50 percent by weight shall pass through a 200 mesh screen.

2. Procedure. The equipment shall be placed in the test chamber and the sand and dust density raised and maintained at the value specified above. The internal temperature of the test chamber shall be maintained at 21 plus or minus 2 degrees C. (70 plus or minus 3 degrees F.) for a period of six hours with an air velocity through the test area of 2300 plus or minus 50 feet per minute and 6 hours with an air velocity through the test area of 100 plus or minus 10 feet per minute. The temperature shall then be raised to, and maintained at 71 degrees plus or minus 2 degrees C. (160 plus or minus 3 degrees F.) for a period of 6 hours with an air velocity through the test area of 2300 plus or

minus 50 per minute and 6 hours with an air velocity through the test area of 100 plus or minus 10 feet per minute. At the end of the 24 hour test period the equipment shall be allowed to cool and shall be examined, tested or operated in accordance with the requirements of the detail specification.

#### G. PACKAGING, PACKING AND MARKING FOR SHIPMENT.

G-1. Not Applicable.

#### H. NOTES.

H-1. NOTICE: When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder, or any other person or corporation or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

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(Copies of this specification may be obtained from the Commanding General, Air Technical Service Command, Wright Field, Dayton, Ohio.)

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