

SECTION 5. ACCEPTANCE TESTS FOR ALL VALVES
(With certain exceptions stated in
Sections 5A to 5F)

5.1. General Inspection. A general inspection of the physical features of the valve shall be made and if it does not conform to the requirements of this specification and of the Valve Test Specification it shall be rejected.

5.2. Insulation Tests. The interelectrode insulation of valves of less than 750V anode rating shall be tested by one of the three methods described in paragraphs 5.2.1, 5.2.2 and 5.2.3. In these tests any metal soleplate or skirt or metal coating connected to a pin shall be regarded as an electrode; the heater shall be connected to the cathode.

5.2.1. Insulation Tests, Method 1

5.2.1.1. The following tests shall be applied with the cathode cold.

5.2.1.2. The insulation resistance between any two electrodes (excluding that between cathode and the adjacent grid in multi-electrode valves) shall exceed 100 megohms when measured at the maximum rated voltage of the valve or 500 volts whichever is the lower.

5.2.1.3. The insulation resistance between cathode and the adjacent grid shall be not less than 60 megohms when measured at not less than 20 volts.

5.2.2. Insulation Tests, Method 2

In this test the cathode (or filament) may be cold or heated at the rated voltage. The electrodes shall be strapped in two groups arranged in so many ways that the leakage path between any pair of electrodes may be tested by the application of a suitable voltage. The test voltage shall be applied through 10 megohms and shall be not less than 250 volts for indirectly heated valves and not less than 100 volts for battery valves.

If the valves are tested hot the leakage current shall not exceed 8 microamperes for indirectly heated valves and 2.5 microamperes for battery valves.

If the valves are tested cold the corresponding limits shall be 5 and 2 microamperes respectively.

5.2.3. Insulation Tests, Method 3

In this test the cathode shall not be heated and the insulation shall be measured between each individual electrode and all the other electrodes connected together. The insulation resistances C-all and G1-all shall each exceed 50 megohms when measured at not less than 200 volts.

5.2.4. Insulation Test Under Vibration

In some cases an insulation test under stated vibration conditions will be given in the Test Specification. This will normally be a Qualification Approval Test.

5.3. Heater-Cathode Leakage. The heater-cathode leakage current in indirectly heated valves wherein the heater is not internally connected to the cathode shall be measured with the rated heater voltage or current applied and with the heater both at negative and positive potentials with respect to the cathode, all other electrodes being unconnected. Notwithstanding the inclusion of any protective resistances the applied voltage shall be adjusted so that a potential of not less than 100 volts is maintained between the cathode and heater of the valve during this test. When the maximum permissible leakage current is not given in the Test specification it shall be 25 microamperes.

5.4. Tests of Characteristics

5.4.1. The valve characteristic tests given in the Test Specification need not be performed in the tabulated order unless required. Valves shall be preheated to obtain steady conditions of readings. The applied voltages shall be measured as follows:-

Cathode	Heating Supply	Voltage measured with respect to:
Indirectly heated	AC or DC	Cathode
Directly heated	DC	Negative filament terminal
	AC	Filament transformer secondary centre tap

5.5. Element and Electrode Connections. When the Test Specification requires that internal parts such as shields, beam plates, suppressor grids etc. be each connected to one or more base pins tests shall be made to ensure that they are properly connected.

5.6. Cancelled.

5.7. External Parts

5.7.1. Contact Potential. Where external metal parts such as sole plates, cans and shells are in contact the potential difference shall not exceed 0.25 volts (See DEF 5000, Part VII, Section 10).

5.7.2. Resistance. The resistance between any part of a sprayed metal coating and the base pin to which it is connected shall not exceed 1 ohm.

5.7.3. Clearance. The clearance between a cap and a sprayed metal coating shall be not less than 4 mm.

5.8. Noise. For the purposes of this specification the term noise shall include:-

- (a) Noise Factor
- (b) Hum
- (c) Hiss
- (d) Microphonic Noise
- (e) Vibration Noise

When required by the Test Specification, test methods as stated in the following paragraphs, shall be used.

5.8.1. Noise Factor

The Noise Factor of a linear system at a selected input frequency is the ratio of (1) the total noise power per unit bandwidth (at a corresponding output frequency) available at the output terminals to (2) the portion thereof engendered at the input frequency by the input termination, whose noise temperature is standard (290°K) at all frequencies. The Noise Factor shall be measured under the conditions given in the Test Specification using the equipment described in Appendix XIII.

Note 1. The Noise Temperature at a pair of terminals, and at a specific frequency is the temperature of a passive system having an available noise power per unit bandwidth equal to that of the actual terminals.

Note 2. For heterodyne systems there will be, in principle, more than one output frequency corresponding to a single input frequency, and vice versa; for each pair of corresponding frequencies a noise factor is defined.

Note 3. The phrase "available at the output terminals" may be replaced by "delivered by the system into an output termination" without changing the sense of the definition.

5.8.2. Hum. Hum is defined as the mains frequency voltage introduced from the heater system in terms of an equivalent grid voltage. It shall be measured under the conditions given in the Test Specification using the equipment described in Appendix XII.

5.8.3. Hiss. Hiss is defined as all noise within a spectrum approximately 25 c/s to 10,000 c/s in the output referred back to the grid when the valve is operated with a D.C. voltage applied to the heater and the valve is not subjected to mechanical vibration and shock.

5.8.4. Microphonic Noise. Microphonic noise is defined as that noise developed when the valve is subjected to mechanical shock excitation, in terms of an equivalent grid voltage. It shall be measured under the conditions given in the Test Specification using the equipment described in Appendix XII. The valve shall be mounted and excited using the equipment described in Appendix X.

5.8.5. Vibration Noise. Vibration noise is defined as that noise which is generated when the valve is subjected to continuous mechanical vibration, expressed in terms of a r.m.s. noise output voltage. It shall be measured under the conditions given in the Test Specification. Suitable test equipment is described in Appendices X and XII.

5.9. Inter-electrode Capacitance. See Appendix III.

5.10. Emission. See Appendix V.

5.11. Operational Tests. Operational tests may be carried out as a Qualification Approval feature by the Service to which the valves are supplied to ensure that they are satisfactory for use in the equipment for which they are required. Contract documents may require the manufacturer to do similar tests, if so, will state the apparatus or information to be supplied by the Approving Authority.

5.12. Lead Fragility Test. The following test shall be applied to subminiature valves and semiconductor devices with flexible leads. It shall also be applied to other valves with flexible leads when stated in the Test Specification. Unless otherwise stated the sampling procedure shall be as given in DEF.131 for an ACL of 6.5% and an Inspection Level 1A. Valves which are mechanically sound but failures on electrical tests may be used for this test.

The valve held vertically shall have a weight of not less than 1 lb. (or 8 ozs for semiconductor devices) freely suspended from each lead in turn. It shall then be inclined slowly so as to bend the lead through 45°, brought back and bent to 45° in the opposite direction and returned to the vertical, all bending being in the same vertical plane. Any damage which may permit the ingress of air or moisture or fracture or breakage of a lead, shall constitute a failure.

Valves subjected to the above test are not to be included in deliveries.

5.13. Test of Perpendicularity of B7G and B9A Valves. The major axis of the bulb of B7G and B9A valves shall not depart from the perpendicular to the sole by more than 3½°. The method of test shall be subject to the approval of the Inspecting Authority.

5.14. Inoperatives. Valves or semiconductor devices which have one or more of the following defects are termed "Inoperatives":

- (a) Discontinuity
- (b) Short circuit
- (c) Air leak
- (d) Broken pin or lead
- (e) Loose base or cap

5.15. Destructive Tests. The following tests are destructive, and valves used for these tests will not be accepted for delivery:-

- (a) Lead Fragility
- (b) Glass Base Strain
- (c) Life (other than Stability)
- (d) Shock
- (e) Vibration Fatigue
- (f) Capacitance Tests and other tests on Flying Lead Valves which require the leads to be cut for the measurements.

5.16. Heater Supplies. Valves shall be designed to operate at discrete frequencies within the range 50-2500 c/s in addition to operation at 50 c/s or at D.C.

Usually their performances over this range will be checked as a Qualification Approval procedure. Unless otherwise specified the heater supply for acceptance tests shall be A.C. at 50 c/s.

Where additional or alternative supply frequencies are specified they shall be taken from the following list:-

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| (a) D.C. | (c) 400 c/s | (e) 1600 c/s |
| (b) 60 c/s | (d) 500 c/s | (f) 2400 c/s |

All supply frequencies shall be within 5% of the nominal value. These conditions will also apply to valves having additional elements connected to the heater supply.

5.17. Cathode Interface Resistance. Measurement of Cathode Interface Resistance shall be carried out under the conditions specified in the Test Specification. Suitable test equipment is described in Appendix XVIII.