Superseded by Issue 3



VALVE ELECTRONIC

SERVICES VALVE TEST LABORATORY

# CV 5008

| SPECIFICATION AD/CV.5008 incorporating MIL-E-1/510B<br>ISSUE NO. 2 DATED 4.8.61.<br>To be read in conjunction with K.1006. | SECURITY | |
|---|---|---|
| | SPECN. | VALVE |
| | Unclassified | Unclassified |

TYPE OF VALVE: Reliable Double Triode

CATHODE: Indirectly heated

ENVELOPE: Glass

PROTOTYPE: 6080WA

**MARKING**

See K.1001/4

Additional marking 6080WA

**BASE**

Large wafer octal with metal sleeve

**RATINGS**

Absolute, unless otherwise stated

| | | | NOTE |
|---|---|---|---|
| Heater voltage, nominal | (V) | 6.3 | |
| Heater current, nominal | (A) | 2.5 | |
| Max. heater-cathode voltage | (V) | 300 | |
| Max. D.C. anode voltage | (V) | 250 | |
| Max. peak ~~inverse~~ forward anode voltage | (V) | 3000 | |
| Max. anode dissipation | (W) | 13 | A |
| Max. D.C. grid voltage | (V) | 0 | |
| Max. grid resistance | (Mohms) | 1.0 | A,B |
| Max. grid current | (mA) | 5.0 | A |
| Max. bulb temperature | (°C) | 230 | |
| Max. altitude | (ft) | 60,000 | |

**CONNECTIONS**

| Pin | Electrode |
|---|---|
| 1 | Grid 2 |
| 2 | Anode 2 |
| 3 | Cathode 2 |
| 4 | Grid 1 |
| 5 | Anode 1 |
| 6 | Cathode 1 |
| 7 | Heater |
| 8 | Heater |

**DIMENSIONS**

See drawing page 3

**MOUNTING POSITION**

Any

**NOTES**

A. Each section.

B. For cathode bias operation; where fixed bias or fixed and auto-bias is used, max. allowable grid resistance = 0.1 Mohms.

C. Notice to Designers

(a) The slope of one half of the valve is affected to some extent by the dissipation of the other half due to heat radiation

(b) This valve may show at full dissipation considerable reverse anode current due to anode emission

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MIL-E-1/510B
5 December 1955
SUPERSEDING
MIL-E-1/510A (NAVY)
14 February 1955

INDIVIDUAL MILITARY SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING, TWIN TRIODE

JAN-6080WA

This specification sheet forms a part of the latest issue of Military Specification MIL-E-1.

Description: Twin Triode, Low Mu

| Ratings: | Ef | Eb | Ec | Ehk | epy | Rk/k | Rg/g | Ic/g | Pp/p | T Envelope | Alt |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Absolute | V | Vdc | Vdc | v | V | ohms | Meg | mA | W | °C | ft |
| Maximum: | 6.6 | 250 | 0 | 300 | 3000 | --- | Note 21 | 5.0 | 13 | 230 | 60,000 Note 2 |
| Minimum: | 6.0 | --- | --- | -300 | --- | --- | --- | --- | --- | --- | --- |
| Test Cond.: | 6.3 | 135 | 0 | --- Note 1 | --- | 250 | --- | --- | --- | --- | --- |

Cathode: Coated Unipotential
Base: Large Wafer Octal, with metal sleeve, 8-Pin, B8-98

Diameter: 1-23/32 in. max.
Height: 4-1/16 in. max.

Envelope: T-12 (Per Outline)

| Pin No.: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Element: | 2g | 2p | 2k | 1g | 1p | 1k | h | h |

The following tests shall be performed:

For the purposes of inspection, use applicable reliable paragraphs of MIL-E-1 and Inspection Instructions for Electron Tubes.
For miscellaneous requirements, see Paragraph 3.3, Inspection Instructions for Electron Tubes.

| Ref. | Test | Conditions | AQL(%) | Insp. Level or Code | Sym. | LIMITS Min. | LAL | Bogie | UAL | Max. | AID | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Qualification Approval Tests | | | | | | | | | | | |
| 3.1 | Qualification Approval: | Required for JAN Marking | --- | --- | | | | | | | | |
| 4.9.20.3 | Vibration(1): | Ecl=-7Vdc; Rp=2000ohms; Note 15 | --- | --- | Ep: | --- | --- | --- | --- | 100 | --- | mVac |
| --- | Cathode: | Coated Unipotential | --- | --- | | | | | | | | |
| 3.4.3 | Base Connections: | | --- | --- | | | | | | | | |
| | Measurements Acceptance Tests, Part 1, Note 3 | | | | | | | | | | | |
| 4.10.8 | Heater Current: | | 0.65 | II | If: | 2.35 | --- | --- | --- | 2.65 | --- | A |
| 4.10.15 | Heater-Cathode Leakage: | Note 14<br>Ehk=+100Vdc<br>Ehk=-100Vdc | 0.65 | II | Ihk:<br>Ihk: | ---<br>--- | ---<br>--- | ---<br>--- | ---<br>--- | 25<br>25 | ---<br>--- | uAdc<br>uAdc |
| 4.10.6.1 | Grid Current: | Rg=1.0Meg; Rk=125ohms; Notes 7,15 | 0.65 | II | Ic: | 0 | --- | --- | --- | -2.0 | --- | uAdc |
| 4.10.4.1 | Plate Current(1): | Notes 14,17 | 0.65 | II | Ib: | 100 | --- | --- | --- | 150 | --- | mAdc |
| 4.10.4.1 | Plate Current(1): | Notes 4,14,17 | --- | --- | Ib: | --- | 115 | 125 | 135 | --- | 25 | mAdc |
| 4.10.9 | Transconductance(1): | Notes 14,17 | 0.65 | II | Sm: | 6000 | --- | --- | --- | 8200 | --- | umhos |
| 4.10.9 | Transconductance(1): | Notes 4,14,17 | --- | --- | Sm: | --- | 6600 | 7000 | 7400 | --- | 1000 | umhos |
| 4.7.5 | Continuity and Shorts: (Inoperatives) | | 0.4 | II | | --- | --- | --- | --- | --- | --- | |
| 4.9.1 | Mechanical: | Envelope: per outline | --- | --- | | --- | --- | --- | --- | --- | --- | |
| | Measurements Acceptance Tests, Part 2 | | | | | | | | | | | |
| 4.8 | Insulation of Electrodes: | Eg-all=-100Vdc<br>Ep-all=-300Vdc<br>Note 14 | 2.5 | IA | Ir:<br>Ir: | 200<br>200 | --- | --- | --- | --- | --- | Meg<br>Meg |
| 4.10.9 | Transconductance(2): | Ef=5.7V; Notes 14, 17 | 2.5 | I | $\Delta \frac{Sm}{Ef}$: | --- | --- | --- | --- | 10 | --- | % |
| --- | Low Pressure Voltage Breakdown: | Pressure=55±5mm Hg.; Voltage=500Vac; Notes 5,6 | 6.5 | Note 5 | --- | --- | --- | --- | --- | --- | --- | |
| 4.10.4.1 | Plate Current(1) Difference Between Sections: | | 2.5 | I | Ib: | --- | --- | --- | --- | 25 | --- | mAdc |

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| Ref. | Test | Conditions | AQL(%) | Insp. Level or Code | Sym. | LIMITS Min. | LAL | Bogie | UAL | Max. | ALD | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Measurements Acceptance Tests, Part 2(Contd) | | | | | | | | | | | |
| 4.10.11.1 | Amplification Factor: | Rk=250ohms;Notes 14, 17 | 6.5 | Code G | Mu: | 1.5 | --- | --- | --- | 2.5 | --- | |
| 4.9.20.4 | Vibration(2): | Rp=2000;Ec=-7Vdc; Note 15 | 6.5 | Code G | Ep: | --- | --- | --- | --- | 50 | --- | mVac |
| 4.10.4.1 | Plate Current(2): | Eb=250Vdc;Ec=-200Vdc; Notes 14,17 | 2.5 | I | Ib: | --- | --- | --- | --- | 10 | --- | mAdc |
| | Degradation Rate Acceptance Tests, Note 9 | | | | | | | | | | | |
| 4.9.20.5 | Shock: | Hammer angle=30°; Ehk=-100Vdc;Ec=-7Vdc; Rb=2000ohms;Rk=0; Note 15 | 20 | --- | | --- | --- | --- | --- | --- | --- | |
| 4.9.20.6 | Fatigue: | | 6.5 | Note 6 | | --- | --- | --- | --- | --- | --- | |
| --- | Post Shock and Fatigue End Points: | Vibration(2) | --- | --- | Ep: | --- | --- | --- | --- | 100 | --- | mVac |
| | | Heater-Cathode Leakage | | | | | | | | | | |
| | | Ehk=-100Vdc | --- | --- | Ihk: | --- | --- | --- | --- | 50 | --- | uAdc |
| | | Ehk=-100Vdc | --- | --- | Ihk: | --- | --- | --- | --- | 50 | --- | uAdc |
| | | Transconductance(1) | --- | --- | $\Delta_t^{Sm}$: | --- | --- | --- | --- | 10 | --- | % |
| | | Grid Current | --- | --- | Ic: | --- | --- | --- | --- | - 3 | --- | uAdc |

| Ref. | Test | Conditions | AQL(%) | Insp. Level or Code | Allowable Defectives per Characteristic 1st Sample | Combined Samples | Sym. | LIMITS Min. | Max. | Units |
|---|---|---|---|---|---|---|---|---|---|---|
| | Acceptance Life Tests Note 9 | | | | | | | | | |
| --- | Stability Life Test: | Notes 12,13,16 | | | | | | | | |
| 4.11.4 | Stability Life Test End Points: | Change in Transconductance(1) of individual tubes;Note 12 | 1.0 | Code I | | | $\Delta_t^{Sm}$: | --- | 10 | % |
| --- | Survival Rate Life Test: | Notes 13,16,19 | | | | | | | | |
| 4.11.4 | Survival Rate Life Test End Points: | Inoperatives | 0.65 | II | --- | --- | Sm: | 5800 | --- | umhos |
| | | Transconductance(1) | 1.0 | II | | | | | | |
| 4.11.7 | Heater Cycling Life Test: | Ef=7.5V;Ehk=300Vdc; Eb=Ec=0;Note 10 | | | | | | | | |
| 4.11.4 | Heater Cycling Life Test End Points: | Heater-Cathode Leakage | | | | | | | | |
| | | Ehk=-100Vdc | --- | --- | --- | --- | Ihk: | --- | 50 | uAdc |
| | | Ehk=-100Vdc | --- | --- | --- | --- | Ihk: | --- | 50 | uAdc |
| | | Note 10 | | | | | | | | |
| 4.11.5 | Intermittent Life Test: | Ek=125ohms;Rg=1.0meg; Ehk=300V;T Envelope= 230°C min.;Notes 11,18 | --- | --- | --- | --- | | --- | --- | |
| 4.11.5 | Intermittent Life Test End Points: | Notes 8, 18 | | | | | | | | |
| | | Inoperatives;Note 20 | --- | --- | 1 | 3 | | --- | --- | |
| | | Grid Current | --- | --- | 1 | 3 | Ic: | 0 | -10 | uAdc |
| | | Transconductance(2) | --- | --- | 1 | 3 | $\Delta_{Ef^2}^{Sm}$ | --- | 10 | % |
| | | Combined Total | | | 2 | 5 | | | | |
| | | Heater-Cathode Leakage | | | | | | | | |
| | | Ehk=-100Vdc | --- | --- | 1 | 3 | Ihk: | --- | 25 | uAdc |
| | | Ehk=-100Vdc | --- | --- | 1 | 3 | Ihk: | --- | 25 | uAdc |
| | | Heater Current | --- | --- | 1 | 3 | If: | 2.35 | 2.75 | A |
| | | Transconductance(1) | --- | --- | 1 | 3 | Sm: | 5500 | --- | umhos |
| | | Insulation of Electrodes | | | | | | | | |
| | | g-all | --- | --- | 1 | 3 | R: | 100 | --- | Meg |
| | | p-all | --- | --- | 1 | 3 | R: | 100 | --- | Meg |
| | | Combined Total | | | 3 | 6 | | | | |

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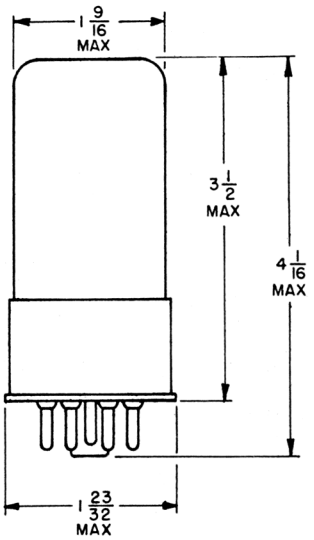
| Ref. | Test | Conditions | |
|---|---|---|---|
| | Packaging Requirements | | |
| 4.9.18.1.1 | Carton Drop: | (d) Package Group 1; Carton Size F | |



Note 1: The reference point for heater-cathode potentials shall be the positive terminal of the cathode resistor.

Note 2: If altitude rating is exceeded, reduction of instantaneous voltages (Ef, excluded) may be required.

Note 3: The AQL for the combined defectives for attributes in Measurements Acceptance Tests, Part 1, excluding Inoperatives and Mechanical shall be one (1) percent. A tube having one (1) or more defects shall be counted as one (1) defective. MIL-STD-105, Inspection Level II shall apply.

Note 4: Variables Sampling Procedure:

Test for Lot-Average Acceptance:

Select a 35 tube sample at random from the lot. Number these tubes consecutively.

Determine the numerical average value of the characteristic as specified on the specification sheet of the 35 tube sample. If this value is on or above the LAL and on or below the UAL, accept for Lot Average.

Test for Lot Dispersion Acceptance:

Divide the 35 tube sample into seven (7) consecutive sub-groups of five (5) tubes each. Determine the range, R, of each sub-group for the measured characteristic specified on the Specification Sheet.

Compute the numerical average of the R values which is equal to $\bar{R}$. If $\bar{R}$ is equal to or less than the ALD, accept for Lot Dispersion.

Note 5: Low pressure voltage breakdown.- Tubes shall be tested in a chamber under the pressure specified. The specified voltage shall be applied between the base pins (or leads) of elements carrying B+ voltage and their adjacent pins (or leads). The voltage shall be of sinusoidal waveform with F = 60 cycles. Tubes showing evidence of arcing or corona shall be considered as defectives.

Note 6: This test shall be conducted on the initial lot and thereafter on a lot approximately every 30 days. Once a lot has passed, the 30-day rule shall apply. In the event of lot failure, the lot shall be rejected and the succeeding lot shall be subjected to this test. MIL-STD-105, sample size code letter F shall apply.

Note 7: With both units operating, Ic is the sum of I1c and I2c.

Note 8: Order for Evaluation of Life Test Defects.- If a tube is defective for more than one attribute characteristic, the characteristic appearing first in the Life Test End Points shall constitute the failure.

Note 9: Destructive tests:

Tubes subjected to the following destructive tests are not to be accepted under this specification.

| | |
|---|---|
| 4.9.20.5 | Shock. |
| 4.9.20.6 | Fatigue. |
| 4.11.7 | Heater-Cycling Life Test. |
| 4.11.5 | Intermittent Life Test. |

Note 10: The no load to steady state full load regulation of the heater voltage shall be not more than 3.0 percent. This test shall be made on a lot by lot basis. A failure or defect shall consist of an open heater, open cathode circuit, heater-cathode short, or heater-cathode leakage current in excess of the specified heater cycling life test end point limit.

Note 11: Envelope Temperature is defined as the highest temperature indicated when using a thermocouple of #40 AS or smaller diameter elements welded to a ring of .025 inch diameter phosphor bronze placed in contact with the envelope. Envelope Temperature requirement will be satisfied if tube, having bogie Ib (±5%) under normal test conditions, is determined to operate at minimum specified temperature at any position on the life test rack.

Note 12: Stability Life Test:

a. Life test samples shall be selected from a lot at random in such a manner as to be representative of the lot. If such selection results in a sample containing tubes which are outside the initial specification sheet limits for the relevant life test end point characteristics, such tubes shall be replaced by randomly selected acceptable tubes.

b. Serially mark all tubes from the sample.

c. Record referenced characteristic measurements after a maximum operation of 15 minutes under specified voltage and current conditions on the entire sample.

d. Operate at life test conditions for one (1) hour (plus 30 minutes, minus 0 minutes). Life test shall be conducted as per paragraphs 4.11 and 4.11.5, MIL-E-1, except that the following shall be substituted for the third sentence of 4.11: The mean electrode potentials, except heater or filament, may be established at values differing by not more than 5% from the specified values provided the same average electrode dissipations are obtained that occur with the specified voltages. Fluctuations of all voltages including heater or filament voltage shall be as small as practical.

e. Record referenced characteristic measurements at the end of this test period. Referenced characteristic measurements shall be taken immediately following the test or tubes shall be preheated 15 minutes under specified test voltage and current conditions, and immediately measured. The 15 minutes preheat shall be considered as part of the test time.

f. A defective shall be defined as a tube having a change in referenced characteristic greater than that specified on the Specification Sheet.

g. A resubmitted lot must be subjected to all Measurements Acceptance Tests except Mechanical Inspection, Vibration, and Low Pressure Voltage Breakdown tests.

Note 13: Tubes shall be life tested at room temperature ambient.

Note 14: Test each unit separately.

Note 15: Tie 1k to 2k; 1g to 2g; and 1p to 2p.

Note 16: The equivalent of intermittent life test conditions shall be interpreted as having the same heater voltage (Ef), heater-cathode voltage (Ehk), and intermittent voltage cycling as the intermittent life test. The electrode voltages shall be such that the element dissipations are not less than 80 percent of their values at intermittent life test conditions. These voltages shall be maintained within the limits of, plus 100, minus 50 percent of the intermittent life test voltages.

Note 17: Both units shall be operating.

Note 18: Intermittent Life Tests:

a. The first 20 tubes of the Stability Life Test sample which meet the measurements acceptance limits for those characteristics specified as Intermittent Life Test End Points may be used for the Intermittent Life Test sample. In the event that a second Stability Life Test sample is used, the first 20 tubes from that sample which meet the above conditions shall be used.

b. In the event of failure of the first sample on Intermittent Life Test, take a completely fresh sample (MIL-STD-105 sample size code letter I) and stabilize it in accordance with the conditions of the Stability Life Test. Then select from it the first 40 tubes which meet the measurements acceptance test limits for those characteristics specified as the Intermittent Life Test End Points.

Subject these 40 tubes to the Intermittent Life Test. Acceptance shall then be based on combined results from the first and second samples.

c. As an alternate method, the manufacturer may select his life test samples as described in Note 12, paragraph (a).

d. Regular Life Test

1. Regular Life Test shall be conducted for 1000 hours.

2. Regular life test acceptance shall be on the basis of the 1000 hours requirements as indicated on the Specification Sheet.

3. Regular life test shall be in effect initially and shall continue in effect until the eligibility criteria for the Reduced Hours shipment have been met.

e. Reduced Hours Shipment:

1. The lot shall be eligible for acceptance at 500 hours providing:

(a) No lot failure shall have occurred in the preceding three (3) consecutive 1000 hour life tests.
(b) The life test sample meets the 1000 hour life requirements at 500 hours.

2. Loss of eligibility for reduced hours shipment: Two (2) or more life test lot failures occurring in the last three (3) 1000 hour life tests.

f. The life test sample shall be read at the following times:

0 hours
500 hours (plus 48 hours; minus 24 hours)
1000 hours (plus 48 hours; minus 24 hours)

Additional reading periods may be used at the discretion of the electron tube manufacturer.

g. Acceptance Criteria: The lot shall be considered satisfactory for acceptance provided that the specified allowable defects are not exceeded and the change of the average of any characteristic in the life test sample specified for life test control of averages is not exceeded. The average percentage change shall be ascertained from the determination of the individual changes for each tube in the life test sample from the zero (0) hour value for the referenced change, the absolute values of the individual changes for each tube in the life test sample shall be used. Any tube found inoperative during life testing shall not be considered in the calculation of this average.

h. A resubmitted lot must be subjected to all Measurements Acceptance Tests except Mechanical Inspection, Vibration, and Low Pressure Voltage Breakdown.

i. Not more than one (1) accidental breakage shall be allowed in the life test sample. If one (1) life test tube is accidentally broken, acceptability of the life test sample shall be based upon the remaining tubes in the sample provided that the broken tube was not known to be a defective.

Note 19: MEANS OF ASSURING SURVIVAL RATE - The procedure for assuring the maintenance of a desirable quality level in terms of early life survival consists of a series of normal, reduced, and tightened inspection plans for use at 100 hours. The sample size is dependent upon lot size, and the transfer between normal, reduced, and tightened inspection is dependent upon quality history.

The selection of inspection scheme and sampling plan shall be in accordance with Inspection Instructions for Electron Tubes paragraph 5.3.4.2 through 5.3.4.3.1.3 inclusive except that paragraph 5.3.4.2.2 shall be modified by deleting the last part of the first sentence which states". . . or if no lot in the last 20 lots inspected shall have been declared nonconforming for life test qualities." At the manufacturer's option, reduced inspection may be used if no lot in the last ten (10) lots inspected has been declared nonconforming.

INSPECTION PROCEDURE

a. Select sample in accordance with Note 12, Paragraph (a).

b. Tubes to be tested at 100 hours as provided in MIL-E-1(4.7.5). When any tap-short indication is obtained, the test shall be repeated. When any short indication is obtained the tube will be rejected as an inoperative.

Note 19: (Contd)

c. Determine the number of defective tubes at the 100 hour period.

d. If more than the allowable number of defectives occur, declare the lot non-conforming.

e. A resubmitted lot must be subjected to all Measurements Acceptance Tests except Mechanical Inspection, Vibration, and Low Pressure Voltage Breakdown tests.

Note 20: An inoperative as referenced in Life Test is defined as a tube having one (1) or more of the following defects: discontinuity (Ref. MIL-E-1, par. 4.7.1), shorts, (Ref. MIL-E-1, par. 4.7.2), air leaks.

Note 21: Maximum grid-circuit resistance:

(a) 1.0 megohm for Cathode-bias operation.
(b) 0.1 megohm for fixed-bias operation.
(c) 0.1 megohm for combined fixed and cathode-bias operation.

Note 22: Reference specification shall be of the issue in effect on the date of invitation for bid.

Superseded by Issue 3

ELECTRONIC VALVE SPECIFICATIONS

SPECIFICATION CV5008

ISSUE NO. 2 DATED 4.8.1961

AMENDMENT No. 1

Under RATINGS amend:

Max. Peak inverse voltage (V) to read:-
Max. Peak forward anode voltage (V) 3000.

Under NOTES add

Note C to read:-
Notice to Designers

(a) The slope of one half of the valve is affected to some extent by the dissipation of the other half due to heat radiation.
(b) This valve may show at full dissipation considerable reverse anode current due to anode emission.

May 1962
(2 2650)

Services Valve Test Laboratory

13/7/62