

INCH POUND

MIL-PRF-1/302P
27 February 2004
SUPERSEDING
MIL-PRF-1/302N
10 July 1998

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER
TYPE 8172

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and the latest issue of MIL-PRF-1.

DESCRIPTION: Tetrode, metal-glass and ceramic
Outline drawing: See figure 1
Mounting position: Any
Weight: 6 ounces nominal

ABSOLUTE RATINGS: F1 (CW) = 500 MHz, F1 (pulsed) = 1,500 MHz

| Parameter: | Ef | eb | Eb | ec1 | Ec1 | ec2 | Ec2 | Ib | ik | cooling |
|-----------------------------|----------|-----|-------|------|------|-----|------|-------|-----|---------|
| Unit: | Vac | kv | V dc | v | V dc | kv | V dc | mA dc | a | note 1 |
| Maximum: (notes 1 and 2) | | | | | | | | | | |
| Class C Telep: | 2.5 ± 5% | --- | 1,000 | --- | -250 | --- | 300 | 200 | --- | --- |
| Class C Teleg: | 2.5 ± 5% | --- | 1,250 | --- | -250 | --- | 300 | 250 | --- | --- |
| Class C Pulsed: | 2.5 ± 5% | 7.0 | --- | -500 | --- | 1.5 | --- | --- | 7 | --- |
| Test conditions: | 2.5 | --- | 1,000 | --- | Adj | --- | 300 | 150 | --- | note 3 |

ABSOLUTE RATINGS: F1 (CW) = 500 MHz, F1 (pulsed) = 1,500 MHz

| Parameter: | tp | Pg1 | Pg2 | Pp | Pi | tk | T (ceramic seals and anode core) | T (glass seal) |
|-----------------------------|--------------|-----|-----|-----|-----|--------------|----------------------------------|----------------|
| Unit: | μs note 4 | W | W | W | W | sec (min) | °C | °C |
| Maximum: (notes 1 and 2) | | | | | | | | |
| Class C Telep: | --- | 2 | 12 | 165 | 200 | 30 | 250 | 150 |
| Class C Teleg: | --- | 2 | 12 | 250 | 312 | 30 | 250 | 150 |
| Class C Pulsed: | 5 | 2 | 12 | 250 | 312 | 30 | 250 | 150 |
| Test conditions: | --- | --- | --- | --- | --- | 120 | --- | --- |

Qualification - Required.

TABLE I. Testing and Inspection. *

| Inspection | MIL-STD-1311 method | Conditions | Acceptance level (see note 10) | Symbol | Limits Min | Limits Max | Units |
|---|---------------------|--|--------------------------------|--------|------------|------------|----------|
| <u>Conformance inspection, part 1</u> | | | | | | | |
| Pulse emission (1) | 2212 | Eb = Ec2 = 250 V dc; Ec1 = -100 V dc; egk/ik = 1.5 a; pr = 11.0 ± 1.0; tp = 4,500 μs (min); Ef = 2.25 V ac | 0.65 | Δik | --- | 200 | ma |
| Current division (long pulse, Method A) | 1372 | Eb = Ec2 = 250 V dc; Ec1 = -100 V dc; egk/ib = 1.0 a; pr = 11.0 ± 1.0; tp = 4,500 μs (min) | 0.65 | egk | 8 | 18 | v |
| | | | | ic1 | --- | 200 | ma |
| | | | | ic2 | --- | 260 | ma |
| Electrode current (screen) | 1256 | | 0.65 | lc2 | -5.0 | +3.0 | mA dc |
| Electrode voltage (grid) | 1261 | | 0.65 | Ec1 | -32 | -45 | V dc |
| Total grid current | 1266 | Eb = 2,000 V dc; lb = 125 mA dc | 0.65 | lc1 | --- | -15 | μA dc |
| Primary grid emission (control) | 1266 | lc1 = 70 mA dc; t = 15; anode and screen grid floating | 0.65 | lsg1 | --- | -25 | μA dc |
| Primary grid emission (screen) | 1266 | Ec1 = 0; lc2 = 100 mA dc; t = 15; anode floating | 0.65 | lsg2 | --- | -250 | μA dc |
| Heater current | 1301 | | 0.65 | If | 6.20 | 7.30 | Aac |
| <u>Conformance inspection, part 2</u> | | | | | | | |
| Low-frequency vibration | 1031 | No voltages applied | --- | --- | --- | --- | --- |
| Bump | 1036 | Angle = 20° | --- | --- | --- | --- | --- |
| RF useful output power | 2214 | Class C amplifier; F = 460 to 490 MHz; Eb = 1,250 V dc; Ec1 = -90 V dc; Ec2 = 250 to 300 V dc; lc1 = 20 mA dc (max); Eg1/1b = 250 mA dc; Ef = 2.30 V ac (see note 5) | --- | Po | 145 | --- | W useful |
| Direct-interelectrode capacitance | 1331 | Grounded grid | --- | Cpk | --- | 0.010 | pF |
| | | | | Cin | 14.5 | 19.00 | pF |
| | | | | Cout | 4.0 | 4.90 | pF |

See notes at end of table I.

TABLE I. Testing and Inspection - Continued.

| Inspection | MIL-STD-1311 method | Conditions | Symbol | Limits Min | Limits Max | Units |
|--|---------------------|---|-----------------------|---------------------|-----------------------|-------------------|
| <u>Conformance inspection, part 2</u> <u>Continued.</u> | | | | | | |
| Direct-interelectrode capacitance | 1331 | Grounded cathode | Cgp Cin Cout | --- 25.0 4.00 | 0.050 29.0 4.90 | pF pF pF |
| Pulse emission (2) | 2212 | Eb = Ec2 = 250 V dc; Ec1 = -100 V dc; egk/ik = 1.5 a; pr = 11.0 ± 1.0; tp = 4,500 μs (min); Ef = 2.50 V ac | Δik | --- | 100 | ma |
| <u>Conformance inspection, part 3</u> | | | | | | |
| Pulse emission (2) | 2212 | | Δik | --- | 100 | ma |
| Primary grid emission (control) | 1266 | | Isg1 | --- | -100 | μA dc |
| Primary grid emission (screen) | 1266 | | Isg2 | --- | -250 | μA dc |
| Life-test (2) provisions | --- | Group C; Ec1 = Ec2 = Eb = 0; Ef = 2.75 V ac; t = 500 hours | --- | --- | --- | --- |
| Life-test (2) end points: | --- | | | | | |
| Interelement leakage resistance | 1366 | supply voltage = 500 V dc; Rs = 2.5 Meg; anode positive (see note 6) | Rg1g2 Rg2k Rg1k | 10 10 10 | --- --- --- | Meg Meg Meg |
| Humidity | 1011 | (see note 7) | --- | --- | --- | --- |
| Post-humidity end point: | --- | | | | | |
| Total grid current | 1266 | | Ic1 | --- | -20 | μA dc |
| Pulse-power output | --- | Eb = 7 kv; ib = 6a; ec2 = 1.2 kv; tp = 5 μs; pr = 1,000; F = 1,200 ± 50 MHz (see note 7) | po | 17 | --- | kw |

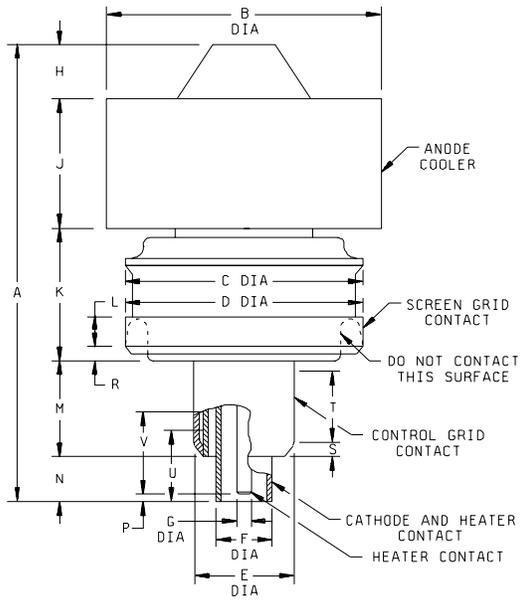
See notes at end of table I.

NOTES:

1. Forced-air cooling shall be provided for the base and anode. The maximum seal and anode core temperature ratings shall not be exceeded. At an anode dissipation of 250 watts and an incoming air temperature of 25°C maximum, a minimum airflow of 5.6 cfm at sea level shall pass through the anode cooler. With no voltages applied to the tube, the static pressure drop across the anode cooler with airflow of 5.6 cfm, at 25°C sea level, is 0.32 inch of water maximum. The pressure drop varies with the amount of escaping air and with the shape and construction of air director. This airflow requirement applies at bias voltages less than 100 volts and at frequencies less than 500 MHz (CW) and 1,500 MHz (pulsed). Air cooling on the tube shall be increased with increased negative grid bias, increased incoming air temperature, or increased frequency of operation. The stem shall be cooled either by a portion of the anode air or by a separate air supply. The airflow shall be applied before or simultaneously with them.
2. The transit-time heating effect of the cathode shall be compensated by a reduction in heater voltage after dynamic operation of the tube has started. The back heating is a function of frequency, grid current, grid bias, and duty cycle. For satisfactory life the heater voltage shall be adjusted to the value indicated below. The rated variation of ± 5 percent E_f shall apply to the value selected from this table. Conditions of operation are limited to those which indicate a heater voltage of 2.3 volts or more.

| <u>FREQUENCY (MHz)</u> | <u>E_f (V ac)</u> |
|------------------------|--------------------------------|
| Up to 400 | 2.5 |
| 401 to 1,000 | 2.2 |
| 1,000 to 1,500 | 2.0 |

3. In all electrical tests involving application of heater voltage, forced-air cooling of the tube shall be allowable at the rate of 6.0 cfm, maximum for the base and anode. A separate source shall be used for the base and anode but neither shall exceed 6.0 cfm. The cooling air shall not have a temperature less than 20°C, nor an absolute pressure greater than 32 in. Hg.
4. With a prr of 1,000 or less and a tp of 5 μ s or less, ib shall be limited to 6.0 amperes. For pulses of longer duration or higher repetition rates, ib shall be reduced in accordance with the data contained on figure 2.
5. Use cavity and circuit as shown on Drawing 224-JAN.
6. This test shall be made 30 minutes after E_f is turned off. Rated airflow shall be maintained during the 30-minute interval. Measurement to be made with General Radio Megometer No. 1862C, or equivalent. Unused elements are to be left floating.
7. This test shall be performed yearly. An accept on zero defect sampling plan shall be used, with sample of three tubes with an acceptance number of zero defects. In the event of failure, the test will be made as a part of conformance inspection, part 2 with acceptance level 6.5 (see note 10). The regular yearly sampling plan may be reinstated after three consecutive samples have been accepted.
8. Reclaimed materials shall be utilized to the maximum extent possible.
9. The tube manufacturer warrants the tube for one year from the date of shipment, or 750 hours of heater on time, whichever first elapses. This warranty applies only when the tube is operated within the maximum ratings (see "Absolute Ratings" of MIL-PRF-1). A defective tube shall either be replaced, or at the option of the manufacturer, a credit shall be made in the amount of the original purchase price pro-rated on the basis of 750 hours of heater on-time.
10. This specification sheet uses accept on zero defect sampling plan, in accordance with MIL-PRF-1, table III.

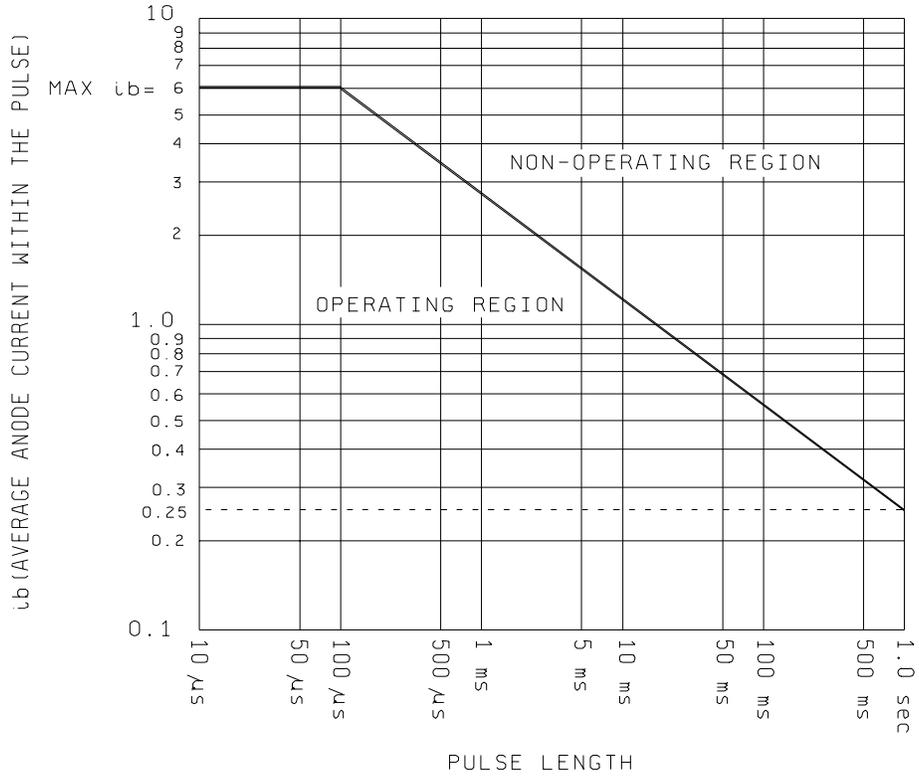


| Dimensions in inches with metric equivalents (mm) in parentheses | | | |
|--|---------------|---------------|-------|
| Ltr | Minimum | Maximum | Notes |
| Conformance inspection, part 2 | | | |
| A | | 2.750 (69.85) | |
| B | 1.615 (41.02) | 1.635 (41.53) | |
| D | 1.417 (35.99) | 1.433 (36.40) | |
| E | 0.587 (14.91) | 0.597 (15.16) | |
| F | 0.317 (8.05) | 0.327 (8.31) | |
| G | 0.088 (2.24) | 0.098 (2.49) | |
| Conformance inspection, part 3 (See note 4) | | | |
| C | | 1.406 (35.71) | |
| H | | 0.313 (7.95) | |
| J | 0.719 (18.26) | 0.781 (19.84) | 2 |
| K | 0.750 (19.05) | 0.813 (20.65) | |
| L | 0.188 (4.78) | | 2 |
| M | 0.500 (12.70) | 0.578 (14.68) | |
| N | 0.234 (5.94) | 0.266 (6.76) | |
| P | 0.031 (0.79) | 0.063 (1.60) | |
| T | 0.344 (8.74) | | 2 |
| U | 0.406 (10.31) | | 2 |
| V | 0.469 (11.91) | | 2 |
| Reference dimensions | | | 1 |
| R | 0.094 (2.39) | | |
| S | 0.125 (3.18) | | |

NOTES:

1. Reference dimensions are for information only and are not required for inspection purposes.
2. Available contact length.
3. Dome contour shall be such that it will be contained within crosshatch area of template shown on figure 3. Optical comparator techniques are normally used for this purpose.
4. See note 7 of table I.

FIGURE I. Outline drawing of electron tube type 8172.



Pulse anode current (i_b) capability is dependent on pulse length (t_p) and duty factor (D_u). Maximum i_b for a given t_p is shown; maximum D_u may then be derived from the relationship: $0.25 = i_b \sqrt{D_u}$

PULSE DERATING CHART

FIGURE 2. Pulse anode current versus pulse length.

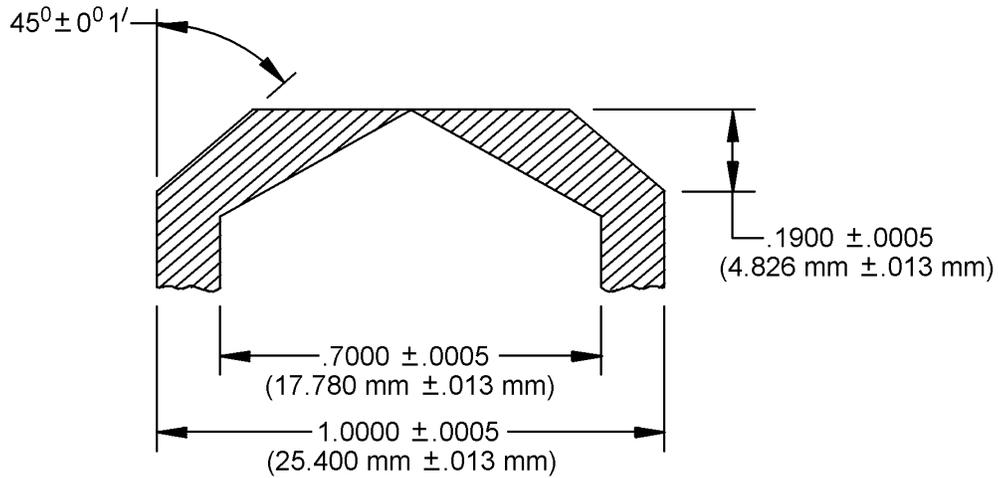


FIGURE 3. Contour template of dome shape.

Referenced documents. In addition to MIL-PRF-1, this specification sheet references MIL-STD-1311.

Changes from the previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based upon the entire content irrespective of the marginal notations and relationship to the last previous issue.

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