

INCH POUND

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SUPERSEDING
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PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, THYRATRON
TYPE 5C22

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 specification sheet and MIL-PRF-1.

DESCRIPTION: Triode, hydrogen
See figure 1
Mounting position: Any
Weight: 12-ounces nominal

ABSOLUTE RATINGS:

| | | | | | | | | | |
|------------------|-----|------|------------------------|-------|------|-----|--------------|-----|-------|
| Parameter: | Ef | epy | epx | Ebb | Ecc | egx | egy | ib | lb |
| Unit: | V | kv | kv | V dc | V dc | v | v | a | mA dc |
| Maximum: | 6.8 | 16.0 | 16.0 | --- | --- | 200 | --- | 325 | 200 |
| Minimum: | 5.8 | --- | 5% epy (see note 2) | 4,500 | --- | --- | (see note 3) | --- | --- |
| Test Conditions: | --- | 16.0 | --- | --- | 0 | --- | 150 | --- | --- |

ABSOLUTE RATINGS:

| | | | | | |
|------------------|-----|--------|-------------------|-----|-------|
| Parameter: | tk | dik/dt | Pb | TA | pr |
| Unit: | sec | a/μs | --- | °C | --- |
| Maximum: | --- | 1,500 | 3.2×10^9 | 90 | --- |
| Minimum: | 300 | --- | --- | -50 | --- |
| Test Conditions: | --- | --- | --- | --- | 1,000 |

GENERAL:

Qualification – Not Required

Table 1. Testing and Inspection.

| Inspection | Method MIL-STD- 1311 | Conditions | Acceptance Level <u>13/</u> | Symbol | Limits Min | Limits Max | Units |
|---------------------------------------|----------------------------|---|--------------------------------|--------|---------------|---------------|-------|
| <u>Conformance inspection, part 1</u> | | | | | | | |
| Heater current | 3241 | Ef = 6.3 V ac | 0.65 | If | 9.6 | 11.6 | Aac |
| Instantaneous starting | 3267 | Ef = 6.8 V ac; epy = 13.5 kv (min); tk = 300 See notes 6 and 8 | 0.65 | --- | --- | --- | --- |
| Operation (1) | 3246 | Ef = 5.8 V ac; epy = 18.0 kv (min); prr = 800; t = 300 See notes 6 and 7 | 0.65 | egy | --- | 150 | v |
| DC anode voltage for conduction | 3247 | See note 6 | 0.65 | Ebb | --- | 2,500 | V dc |
| Pulse emission | 3251 | Ef = 6.3 V ac; ik = 325 a (min); prr = 60 ± 10 % tp = 5 μs ± 10 % starting time of current pulse = 2.5 μs (max); specified time interval = 4.0 μs tr = 0.5 μs (max) | 0.65 | egk | --- | 175 | v |
| <u>Conformance inspection, part 2</u> | | | | | | | |
| Dimensions | Appendix D, 30(b) | See figure 1 | --- | --- | --- | --- | --- |
| High frequency vibration | 1031 | No voltages applied | --- | --- | --- | --- | --- |
| Operation (1A) | 3246 | Operation (1); Ef = 6.8 V ac | --- | egy | --- | 150 | V |
| Anode delay time | 3256 | Operation (1); t = 120; egy = 150 v | --- | tad | --- | 0.65 | μs |
| Anode delay time drift | 3256 | Anode delay time See note 9 | --- | Δtad | --- | 0.10 | μs |
| Time jitter | 3261 | Ef = 6.3 V ac; epy = 5.0 kv (max) See note 6 | --- | tj | --- | 0.005 | μs |

See notes at end of Table I.

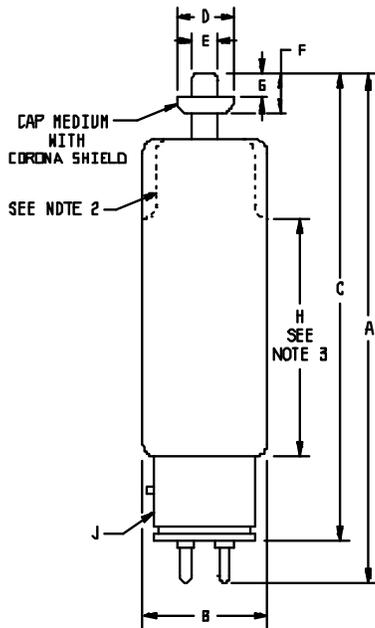
Table 1. Testing and Inspection -Continued.

| Inspection | Method MIL-STD- 1311 | Conditions | Symbol | Limits Min | Limits Max | Unit |
|---------------------------------------|----------------------------|---|--------|---------------|---------------|------|
| <u>Conformance inspection, part 3</u> | | | | | | |
| Life-test | --- | Group C; Ef = 6.3 V ac; t = 500 hrs; 96 hrs "on" and 1hr "off"; tube mounted in horizontal position See note 6 | --- | --- | --- | --- |
| Life-test end points: | | | | | | |
| Operation (1) and (1A) | 3246 | See note 10 | egy | --- | 160 | v |
| DC anode voltage for conduction | 3247 | egy = 160 v | Ebb | --- | 4,000 | V dc |
| Time jitter | 3261 | egy = 160 v | tj | --- | 0.01 | μs |
| Anode delay time | 3256 | egy = 160 v | tad | --- | 0.7 | μs |
| Anode delay time drift | 3256 | egy = 160 v | Δtad | --- | 0.1 | μs |
| Dimensions | Appendix D, 30(b) | See figure 1 and note 11 | --- | --- | --- | --- |
| Variable-frequency vibration | 1031 | No voltages applied See notes 4 and 11 | --- | --- | --- | --- |
| Operation (2) | 3246 | TA = 90°C; t = 5.0 hours; Ef = 6.3 ± 0.5 V ac; See notes 6, 7 and 11 | egy | --- | 150 | v |
| Shock | 1041 | Angle = 13° See notes 5 and 11 | --- | --- | --- | --- |
| Shock end points: | --- | | | | | |
| Operation (1) | 3246 | | egy | --- | 150 | v |
| DC anode voltage for conduction | 3247 | | Ebb | --- | 2,500 | V dc |
| Time jitter | 3261 | | tj | --- | 0.005 | μs |

See notes at end of Table I.

NOTES:

1. For instantaneous starting applications where anode voltage is applied instantaneously the maximum permissible epy is 13.5 kv and shall not be attained in less than 0.04 second.
2. In pulsed operation, the peak inverse voltage, exclusive of a spike of 0.05 μ s maximum duration, shall not exceed 5.0 kv during the first 25 μ s after the pulse.
3. Driver pulse measured at tube socket with thyratron grid disconnected shall be epy = 200 v minimum; time of rise = 0.5 μ s maximum; grid pulse duration = 2 μ s minimum; impedance of driver circuit = 500 ohms maximum.
4. There shall be no pronounced resonance in the specified frequency range.
5. Use clamp as specified on Drawing 243-JAN.
6. The anode circuit constants shall be chosen so that at epy = 16.0 under resonant charging conditions:
 - dik/dt = 1,500 a/ μ s minimum; $i_b = 175$ a; $t_p = 1.0 \mu s \pm 10$ percent; $prr = 1,000$.
 - The grid pulse characteristic shall be $t_p = 2.0 \mu s$ maximum; $t_r = 0.5 \mu s$ minimum.
 - Internal impedance of driver = 500 ohms minimum.
7. The tube shall operate continuously without evidence of arc-back.
8. Push-button starting shall be attempted up to three times, with intervals of from 10 to 30 seconds between successive attempts. Any tube failing to operate satisfactorily when the anode voltage (epy) applied rises from 0 to 13.5 kv within 0.03 second (the filter in the rectifier shall be designed so that the epy reaches at least 7 kv within 0.015 second) will be considered a failure.
9. During the interval between 2 minutes and 7 minutes of the anode delay time test, the change in anode delay time (Δt_{ad}) relative to the t_{ad} value observed on the anode delay time test shall not exceed the specified value.
10. Anode heating shall not be cause for rejection on operation (1) and operation (1A) performed during life-test end point test.
11. This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. A regular double sampling plan shall be used, with the first sample of three tubes with an acceptance number of zero, and a second sample of three tubes with a combined acceptance number of one. In the event of failure, the test will be made as a part of conformance inspection, part 2, code level D, with an acceptance level of 6.5. The regular "12-calendar month" double sampling plan shall be reinstated after three consecutive samples have been accepted.
12. Reclaimed materials shall be utilized to the maximum extent possible.
13. This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III. █



| Pin No. | Element |
|---------|---------|
| 1 | g |
| 2 | h, k |
| 3 | h |
| 4 | k |
| CAP | a |

| Dimensions in inches with metric equivalents (mm) in parentheses (see note 1) | | |
|---|----------------|----------------|
| Ltr | Minimum | Maximum |
| Conformance inspection, part 2 | | |
| A | 8.250 (209.55) | 8.750 (222.25) |
| B | 2.313 (58.75) | 2.563 (65.10) |
| C | 7.531 (191.29) | 8.031 (203.99) |
| Conformance inspection, part 3 (See note 4) | | |
| D | 0.994 (25.25) | 1.170 (29.72) |
| E | 0.559 (14.20) | 0.573 (14.55) |
| F | 0.609 (15.47) | 0.641 (16.28) |
| G | 0.375 (9.53) | |
| H | 4.250 (107.95) | |
| J | BASE : A4 - 18 | |

NOTES:

1. Metric equivalents (to the nearest 0.01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.
2. Alternate seal configuration.
3. Clamping shall be confined to the base and the area designated by dimension H.
4. See Note 11, Table I.

FIGURE 1. Outline drawing of electron tube type 5C22

Referenced documents. In addition to MIL-PRF-1, this document references the following:
 MIL-STD-1311
 JETEC DWG 243-JAN

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Custodians:
 Army - CR
 Navy - EC
 Air Force - 85
 DLA - CC

Preparing activity:
 DLA - CC
 (Project No. 5960-2009-001)

Review activities:
 Army - AR, CR4
 Navy - AS, CG, MC, OS, SH
 Air Force - 99

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