

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 document and the latest issue of MIL-PRF-1.

DESCRIPTION: Triode, hydrogen.
Outline drawing: 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	4,500	---	---	(see note 3)	---	---
		(see note 1)	(see note 2)						
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

Qualification - Not required

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Table I. Testing and Inspection.

Inspection	Method	Conditions	Acceptance Level (see note 13)	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); pr = 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); pr = 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.

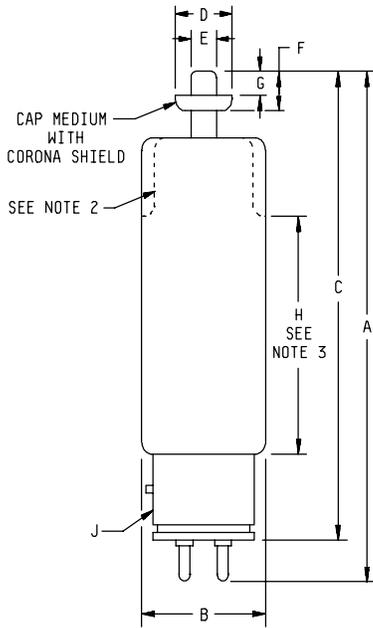
Table I. Testing and Inspection - Continued.

Inspection	Method	Conditions	Symbol	Limits Min	Limits Max	Unit
<u>Conformance inspection, part 3</u>						
Life-test (Optional)	---	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 (contact preparing activity if assistance locating drawing is needed).
6. The anode circuit constants shall be chosen so that at epy = 16.0 under resonant charging conditions:
 $dik/dt = 1,500 \text{ a}/\mu\text{s}$ minimum; $i_b = 175 \text{ a}$; $t_p = 1.0 \mu\text{s} \pm 10 \text{ percent}$; $prr = 1,000$.
The grid pulse characteristic shall be $t_p = 2.0 \mu\text{s}$ maximum; $t_r = 0.5 \mu\text{s}$ 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. An accept on zero defects sampling plan shall be used, with a 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 an acceptance level of 6.5 (see note 13). The regular "12-calendar month" 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 plan 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

NOTES

Referenced documents. In addition to MIL-PRF-1, this document references the drawing 243-JAN.

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.

Custodians:
 Army - CR
 Navy - EC
 Air Force - 11
 DLA - CC

Preparing activity:
 DLA - CC
 (Project No. 5960-3701)

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

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at www.dodssp.daps.mil.