

INCH-POUND

MIL-PRF-1/1100F
19 December 2002
SUPERSEDING
MIL-PRF-1/1100E
21 July 1997

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, THYRATRON
TYPES 5949A AND 5949A-1

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
See figures 1, and 2.
Mounting position: Any
Weight: 2.25 pounds (1.0 kg) nominal

RATINGS:

Parameter:	Ef	epy	epx	Ebb	lp	egy	egx	Ecc	ib
Units:	V ac	kv	kv	Kv dc	A ac	v	v	V dc	a
Maximum:	6.6	25.0 <u>1/</u>	25.0 <u>2/</u>	---	15	---	450	---	500
Minimum:	6.0	10.0	5% epy	5.0	---	<u>3/</u>	---	---	---
Test conditions:	6.3	25.0	---	---	---	450	---	0	---
Parameter:	lb	pr	tj	pb	tk	TA	dik/dt	Eres	Ires
Units:	A dc		μ s			$^{\circ}$ C	a/ μ s	V ac	A ac
Maximum:	0.5	---	0.005 <u>4/</u>	6.25×10^9	---	+75	2,500	5.5 <u>5/</u>	6.0
Minimum:	---	---	<u>3/</u>	---	300	-55	---	3.0	---
Test conditions:	---	500	---	---	300	---	---	<u>6/</u>	---

- 1/ Instantaneous starting is not recommended. When it is absolutely necessary, however, the maximum permissible epy is 18.0 kv and shall not be attained in less than 0.04 seconds.
- 2/ The peak inverse voltage, exclusive of a spike of 0.05 μ s maximum duration, shall not exceed 5 kv during the first 25 μ s following the anode pulse.
- 3/ The driver pulse, measured at the tube socket with thyatron grid disconnected, shall be: egy = 550 volts minimum, 1,000 volts maximum; tr = 0.25 μ s maximum; tp = 2.0 μ s minimum; impedance of driver circuit 50 to 200 ohms.
- 4/ Appreciably less jitter than 0.005 μ s can be realized if anode voltage of 18 kv or more, maximum rated grid drive voltage and a grid impedance near the lower limit are used.
- 5/ The optimum reservoir voltage for operation in accordance with operation (1) conditions is inscribed on the base of the tube and must be held to within ± 5 percent.
- 6/ Adjust reservoir voltage to value indicated on tube to within ± 5 percent.

GENERAL: Qualification - Required

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TABLE I. Group A inspection.

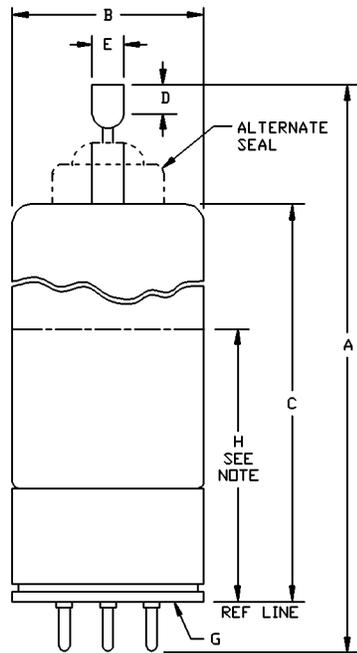
Inspection	Mil-Std-1311		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Conformance inspection, part 1</u>						
Heater current	3241		If	15.0	22.0	Aac
Heater current	3241	Eres = 4.5 Vac	Ires	2.0	6.0	Aac
DC anode voltage for conduction	3247	Eres = inscribed value -5 percent	Ebb	---	4000	Vdc
Instantaneous starting <u>1/ 4/</u>	3267	epy = 18.0 kv(min); Eres = inscribed value +5 percent	---	---	---	---
Operation (1) <u>1/</u>	3246	epy = 27.5 kv; prr = 450; Eres = inscribed value -5 percent; t = 30 minutes	egy	---	450	v
Operation (2) <u>5/ 6/</u>	3246	epy = 20 kv; prr = 1,200; Eres = 95 percent of optimum value (2)	egy	---	450	v
Operation of optimum reservoir voltage(1) (inscribed value)	3246	Operation (1)	Eres	3.0	5.5	Vac
Operation of <u>6/</u> optimum reservoir voltage (2)	3246	Operation (2)	Eres	3.0	5.5	Vac
Pulse emission	3251	ik = 500 a; tp = 5.0 μ s \pm 10 percent; prr = 60 \pm 10 percent; tr = 0.5 μ s (max); Eres = inscribed value; specified time interval = 2.5 μ s	egk	---	250	v
<u>Conformance inspection, part 2</u>						
Operation (3)	3246	Operation (1), except Eres = inscribed value +5 percent; tk = 900 sec; t = 1,200 sec	egy	----	450	V
Operation (4)	3246	Operation (2), except Eres = 105 percent optimum value(2)	egy	----	450	V
Anode delay time	3256	Operation (1); t = 120 sec	tad	----	1.0	μ s
Anode delay time drift <u>7/</u>	3256	Anode delay time	Δ tad	----	0.25	μ s
Time jitter <u>8/</u>	3261	Operation (1); except epy = 15.0 kv	tj	----	0.004	μ s

See footnotes at end of table.

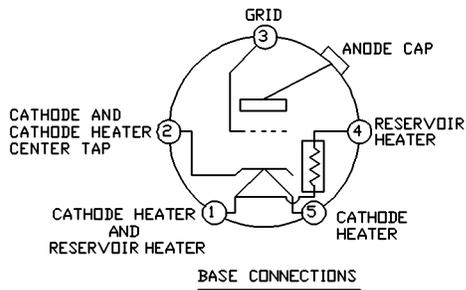
TABLE I. Group A Inspection - Continued.

Inspection	Mil-Std-1311		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Conformance inspection, part 3</u>						
Life test (1) <u>1/</u>	----	Group c; t = 96 hours "on" and 1 hour "off"; t = 500 hours	----	----	----	----
Life test (2) <u>6/</u>	----	Life test (1); operation (2); Zg = 250 ohms; t = 500 hours	----	----	----	----
Life test (3) <u>1/ 3/</u>	----	t = 500 hours	----	----	----	----
Life-test (1), (2), and (3) end points:	----					
Operation (1)	3246		egy	----	500	V
DC anode voltage for conduction	3247	egy = 500 V	Ebb	----	4,500	V dc
Time jitter	3261	egy = 500 V; Zg = 250 ohms	tj	----	0.005	μs
Operation at elevated ambient temperature	3246	TA = 75°C; t = 5 hours	----	----	----	----

- 1/ The circuit constants shall be chosen so that at epy = 25.0 kv under charging conditions: dik/dt = 2,500 a/μs minimum; ib = 500 a minimum; tp = 2.0 ± 0.2 μs; prr = 500 minimum. The grid pulse characteristics shall be: tp = 2.0 μs maximum; tr = 0.25 μs minimum; internal impedance of driver = 250 ohms minimum.
- 2/ This test shall be conducted for a total of 5 consecutive hours with no more than three kickouts and with no evidence of anode heating. The tube shall be started at Eres = 105 percent of the inscribed value and operate at this value for 4 hours. At the start of the fifth hour and while the tube is still operating, the reservoir voltage shall be lowered to 95 percent of the inscribed value and remain there for the final 1 hour of operation.
- 3/ The life test shall be intermittent, with the tube operating approximately half the total elapsed time, and held without reservoir voltage or cathode-heater voltage approximately half the total time. The tube shall make a minimum of four starts during each 24-hour period. The life-test duration is measured in operating hours. Failure of the tube to operate following the minimum allowable cathode and reservoir heater warmup time constitutes failure of the test.
- 4/ The tube shall operate satisfactorily on push-button starting within three attempts when the anode voltage (epy) is applied to the tube under test in such a manner as to rise from 0 to 18 kv within 0.03 second. (The filter in the rectifier shall be designed so that the epy reaches at least 9 kv within 0.015 second.) Any tube failing to start within three attempts will be considered a failure.
- 5/ The anode circuit constants shall be so chosen that at resonant charging conditions; epy = 20 kv; ib = 200 a minimum; dik/dt = 2,500 a/μs minimum. Output pulse; tp = 1.0 μs ± 10 percent; prr = 1,200 minimum; epx = 5.0 kv. Grid pulse the same as note 1. Adjust reservoir voltage to optimum value for these test conditions. The tube shall operate continuously for 20 minutes without continuous conduction.
- 6/ The optimum reservoir voltage for operation in accordance with operation (2) conditions shall be so determined that the tube shall operate at 95 to 105 percent of the established reservoir voltage for these conditions.
- 7/ This test shall be performed simultaneously with the operation (1) test. An anode delay time measurement shall be made at the end of 2 minutes, 4 minutes, and 30 minutes of the operation (1) test. The Δtad measurement is the numerical difference between the 2-minute and 4-minute, or 2-minute and 30-minute anode delay time readings, whichever is greater.
- 8/ The tj shall be not greater than the amount specified after 120 seconds of anode operation.

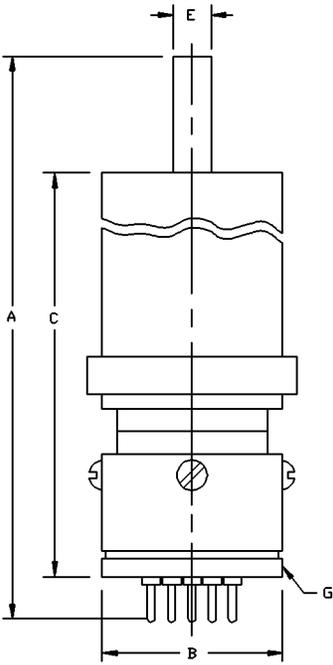


Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	11.500	12.500	292.10	317.50
B	-----	3.313	-----	84.15
C	8.000	9.000	203.20	228.60
H	-----	5.000	-----	127.00
Conformance inspection, part 3				
E	0.559	0.573	14.20	14.55
G	Base: A5-98 (EIA)			
Reference dimensions				
D	0.500		12.70	



NOTES: Dimension H locates the center line of the clamping area. Clamping shall be confined to 1.5 inches above and below this line.

FIGURE 1. Outline drawing of electron tube type 5949A (glass).



Ltr	Dimensions			
	Inches		Millimeters	
Conformance inspection, part 2				
	Min	Max	Min	Max
A	11.500	12.500	292.10	317.50
B	-----	3.313	-----	84.15
C	-----	7.000	-----	177.80
E	0.559	0.573	14.20	14.55
G	Base: A5-98 (modified)			

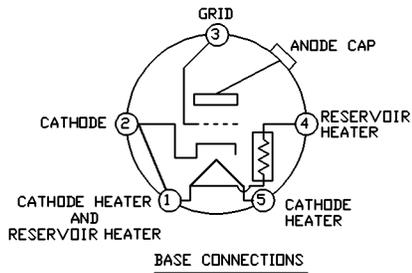
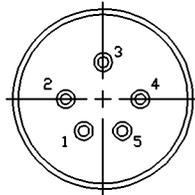


FIGURE 2. Outline drawing of electron tube type 5948A-1 (ceramic).

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Custodians:

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

Preparing activity:

DLA - CC

(Project 5960-3593)

Review activities:

Army - AR
Navy - AS, CG, MC, OS, SH