

INCH-POUND

MIL-E-1/83H
 17 January 2014
 SUPERSEDING
 MIL-E-1/83G
 26 March 2003

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, THYRATRON
 TYPE 5727

Inactive for new design
 after 7 March 1997.

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 MIL-PRF-1.

DESCRIPTION: Tetrode, xenon gas.
 Outline --- 5-2 (EIA)
 Cathode --- Coated uni-potential
 Mounting position --- Any
 Weight --- 0.3 ounce (8.5 grams) nominal
 Base connections:
 Pin no. --- 1 2 3 4 5 6 7
 Element --- g1 k h h g2 a g2

RATINGS:

Parameter:	Ef	epp	epy	epx	Conduction		Non-conduction		ehk	Rg1	Rg2	ik
					Ec2	Ec1	ec2	ec1				
Unit:	V	v	v	v	V	V	v	v	v	MegΩ	Ohms	a
Relay, G controlled rectifier:												
Maximum:	6.9	---	650	1,300	---	---	---	---	25	10	---	0.5
Minimum:	5.7	---	---	---	-10	-10	-100	-100	-100	---	---	---
Pulse modulator:												
Maximum:	6.9	500 1/	500	100	---	---	---	---	0	0.5	25K	10
Minimum:	6.0	---	---	---	-10	-10	-50	-100	0	---	2K	---
Test conditions:	6.3	---	---	---	0	---	---	---	---	---	---	---

Parameter:	Averaged 2/			Ic2	ic1	tp	dik/dt	pr	Du	TA	tk
	ik	Ig2	Ig1								
Unit:	mA	mA	mA	ma	ma	μs	a/μs	---	---	°C	sec
Relay, G controlled rectifier:											
Maximum:	100	10	10	---	---	---	---	---	---	90	---
Minimum:	---	---	---	---	---	---	---	---	---	-75	20
Pulse modulator:											
Maximum:	10	---	---	20	20	5	100	500	0.001	90	---
Minimum:	---	---	---	---	---	---	---	---	---	-75	20
Test conditions:	---	---	---	---	---	---	---	---	---	---	20 (min)

See footnotes at end of table I.

GENERAL:

Qualification: Not required.

This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

Reliable tube.

Holding period in accordance with MIL-STD-1311: $t = 24$ hours.

TABLE I. Testing and inspection.

Requirement or test	Method MIL-STD-1311	Conditions	Symbol	Limits		Units
				Min	Max	
<u>Conformance inspection,</u> <u>part 1</u>						
Short and discontinuity detection	1201		---	---	---	---
Heater current	3241		If	550	650	mA
Heater-cathode leakage	1336	Ehk = +25 V dc	Ihk	---	15	μ A dc
		Ehk = -100 V dc	Ihk	---	15	μ A dc
Critical grid voltage for conduction (1)	3201	Epp = 460 V ac; Rg1 = 0.1 Meg Ω ; Rp = 3,000 ohms <u>3/ 5/ 6/</u>	Ecc1	-2.9	-4.5	V dc
Critical grid voltage for conduction (2)	3201	Epp = 460 V ac; Rg1 = 10 Meg Ω ; Rp = 3,000 ohms <u>5/ 6/</u>	Ecc1	---	-5.2	V dc
Critical anode voltage for conduction (1)	3201	Ecc1 = 0; Rg1 = 0.1 Meg Ω ; Rp = 1,000 ohms <u>5/</u>	Ebb	---	38	V dc
Critical anode voltage for conduction (2)	3201	Ef = 0; Ecc1 = -100 V dc; Rg1 = 0; Rp = 10,000 ohms <u>5/ 7/</u>	Ebb	650	---	V dc
Pulse emission	1231	e = 180 ± 9 v; t = 3 sec (max); Rp = 10 ohms; Ra = 15 ohms; Zm = 7.5 ohms; pr = 100 ± 5 ; calibrating resistor = 5 ohms	etd	---	76	v

See footnotes at end of table.

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TABLE I. Testing and inspection - Continued.

Requirement or test	Method MIL-STD-1311	Conditions	Symbol	Limits		Units
				Min	Max	
<u>Conformance inspection, part 1</u> - Continued Operation	---	Ebb = 500 V dc (approx); egy = 100 v; epy = 1,000 v; Ecc1 = -50 V dc; Ecc2 = 0; pr = 500; Zo = 25 ±5 percent; Rl = 20 ±5 percent <u>8/</u>	ib	16	---	a
<u>Conformance inspection, part 2</u> Insulation of electrodes	1211	Ef = 6.3 V; Eg2-p = ±380 V dc <u>9/</u>	R	760	---	MegΩ
Base strain	1121		---	---	---	---
Envelope strain	2126	<u>3/</u>	---	---	---	---
High-frequency vibration	1031	No voltages applied; fixed amplitude = 0.0625 ± 0.0025	---	---	---	---
Shock	1041	720 G	---	---	---	---
Shock-test end points:	---					
Heater-cathode leakage	1336	Ehk = +25 V dc Ehk = -100 V dc	lhk lhk	---	40 40	μA dc μA dc
Critical anode voltage for conduction (1)	3201		Ebb	---	50	V dc
Pulse emission	1231		Etd	---	76	v
Critical anode voltage for conduction (1)	3201		Ecc1	-2.9	-4.5	V dc
Critical grid voltage for conduction (3)	3201	Ef = 7.0 V; Epp = 460 V ac; Rg1 = 10 MegΩ; Rp = 3,000 ohms <u>5/ 6/ 10/</u>	Ecc1	---	-6.4	V dc
Critical grid voltage for conduction (3)	3201	Ef = 5.7 V; Ecc1 = 0; Rg1 = 0.1 MegΩ; Rp = 1,000 ohms <u>5/ 11/</u>	Ebb	---	50	V dc
Electrode voltage (grid no. 2)	1261	Epp = 150 V ac; Egg1 = 16 V ac; Rp = 1,000 ohms; Rg1 = 2,500 ohms <u>12/ 13/</u>	Egg2	1.9	3.3	V ac

See footnotes at end of table.

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TABLE I. Testing and inspection - Continued.

Requirement or test	Method MIL-STD-1311	Conditions	Symbol	Limits		Units
				Min	Max	
<u>Conformance inspection, part 3</u>						
Heater-cycling life	1506	Ef = 7.5 V; Ehk = -100 V dc; Ec1 = Ec2 = Eb = 0 <u>14/</u>	---	---	---	---
Heater-cycling life-test end point:	---					
Heater-cathode leakage	1336	Ehk = +25 V dc Ehk = -100 V dc	lhk lhk	---	20	μ A dc μ A dc
Stability life	1516	Epp = 460 V ac; Rp/lb = 80 mA dc (min); Rg1 = 50,000 ohms; Rp/ib = 500 ma (min); Ta = room; tk = 20 +0, -1 <u>5/ 15/</u>	---	---	---	---
Stability life-test end points (2 and 20 hours)	---					
Critical grid voltage for conduction (1)	3201		Ecc1	-2.8	-4.6	V dc
Change in grid voltage (1) of individual tubes	---		Δ Ecc1	---	15	%
Intermittent life	1501	Epp = 460 V ac; Rp/lb = 80 mA dc (min); Rg1 = 50,000 ohms; Rp/ib = 500 mA (min); tk = 20 +0, -1; Ehk = -100 V dc; TE = 150°C (min) <u>5/ 15/ 16/</u>	---	---	---	---
Intermittent life-test end points (500 hours)	---					
Heater current	3241		If	550	660	mA
Critical grid voltage for conduction (1)	3201		Ecc1	-2.0	-4.8	V dc
Critical anode voltage for conduction (1)	3201		Ebb	---	50	V dc
Pulse emission	1231		etd	---	100	v
Heater-cathode leakage	1336	Ehk = +25 V dc Ehk = -100 V dc	lhk lhk	---	20	μ A dc μ A dc
Insulation of electrodes	1211	g2 = p	R	380	---	Meg Ω

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Requirement or test	Method MIL-STD-1311	Conditions	Symbol	Limits		Units
				Min	Max	
<u>Conformance inspection, part 3</u> - Continued						
Intermittent life-test end points: (1,000 hours)	---					
Heater current	3241		If	550	666	MA
Critical anode voltage for conduction (1)	3201		Ecc1	-1.6	-4.8	V dc
Critical grid voltage for conduction (1)	3201		Ebb	---	120	V dc
Heater-cathode leakage	1336	Ehk = +25 V dc; Ehk = -100 V dc	lhk	---	50	μ A dc
			lhk	---	50	μ A dc
Insulation of electrodes	1211	g2 = p	R	300	---	Meg Ω
Life test (continuous)	---	Group A; epy = 500 v (approx); egy = 100 v (max); Ecc1 = -50 V dc; Ecc2 = 0; Zo = 12.5 \pm 5 percent; R ℓ = 7.5 \pm 5 percent <u>18/</u>	---	---	---	---
Life-test end points; (200 hours) (continuous)	---					
Pulse emission	1231		etd	---	100	v
Operation under continuous life-test conditions	---	<u>4/</u>	ib	16	---	a
Vibration-fatigue	1031		---	---	---	---
Vibration-fatigue test end points:	---					
Heater-cathode leakage	1336	Ehk = +25 V dc; Ehk = -100 V dc	lhk	---	40	μ A dc
			lhk	---	40	μ A dc
Critical anode voltage for conduction (1)	3201		Ebb	---	50	V dc
Pulse emission	1231		etd	---	76	v
Critical anode voltage for conduction (1)	3201		Ecc1	-2.9	-4.5	V dc

1/ After completion of a pulse, a 20 μ s delay is required before positive voltage of more than 10 v is applied to tube.

2/ Averaged over any interval of 30 seconds maximum.

3/ This test shall be performed at the conclusion of the holding period.

TABLE I. Testing and inspection - Continued.

- 4/ Thirty seconds shall be the maximum time under test conditions before reading i_b . There shall be no evidence of amplitude jitter.
- 5/ Connect pins No. 5 and No. 7 to pin No. 2.
- 6/ Use miniature steatite socket with grounded shield base. Shield the anode power supply. Use short shielded anode and grid leads. Anode and grid resistors shall be non-inductive. Connect the grid resistor directly at socket.
- 7/ No voltages shall be applied to the tube for 20 minutes minimum preceding this test.
- 8/ Thirty seconds maximum in the operation test socket is permitted before reading. There shall be no evidence of amplitude jitter. The tube shall be tested in the circuit shown on figure 1. The circuit constants shall be so chosen that: at $e_{py} = 1,000$ v under resonant charging conditions, $dik/dt = 100$ a/ μ s minimum, $t_p = 2.0 \mu s \pm 10$ percent, $prr = 500$. The grid pulse characteristic at $e_{gy} = 100$ v shall be: $t_p = 2.0 \mu s$ maximum, $t_r = 0.5 \mu s$ minimum, driver impedance = 500 ohms minimum.
- 9/ Read electrode insulation between g_2 and anode with all other elements floating.
- 10/ Preheat for 15 minutes under the following conditions: $E_f = 7.0$ V; $E_{pp} = 220$ V ac; $E_{cc1} = E_{cc2} = 0$; $R_{g1} = 10$ Meg Ω ; $I_b = 100$ mA dc. Two seconds shall be the maximum time between preheat and test.
- 11/ Preheat using $E_f = 5.7$ V.
- 12/ E_{g1} supply shall be in phase with E_{pp} supply and E_{g2} supply 180 degrees out of phase with E_{pp} supply.
- 13/ Vary E_{g2} supply and read E_{g2} at which conduction occurs.
- 14/ The no-load to steady-state full-load regulation of the heater-voltage supply shall not be more than 3.0 percent. This test shall be made on a lot-by-lot basis.
- 15/ Phase of grid voltage adjusted to provide start of conduction at peak applied anode voltage.
- 16/ Envelope temperature (TE) is defined as the highest temperature indicated when using a thermocouple of No. 30 B and S or smaller diameter elements welded to a ring of .025-inch diameter phosphor bronze in contact with the envelope. The envelope temperature requirement will be satisfied if a tube, which draws 80 mA dc (± 5 percent) anode current and 500 ma (± 5 percent) peak anode current under the life-test conditions, is determined to operate at, or above, the minimum specified temperature at any position on the life-test rack.
- 17/ Adjust e_{py} for $i_b = 20a$ initially, and maintain this e_{py} value throughout the life test. The tube shall be tested in the circuit shown on figure 1. The circuit constants shall be so chosen that: at $e_{py} = 500$ v under resonant charging conditions, $dik/dt = 100$ a/ μ s minimum, $t_p = 2.0 \mu s \pm 10$ percent, $prr = 1,000$. The grid pulse characteristic at $e_{gy} = 100$ v shall be: $t_p = 2.0 \mu s$ maximum, $t_r = 0.5 \mu s$ minimum, and driver impedance = 500 ohms minimum.

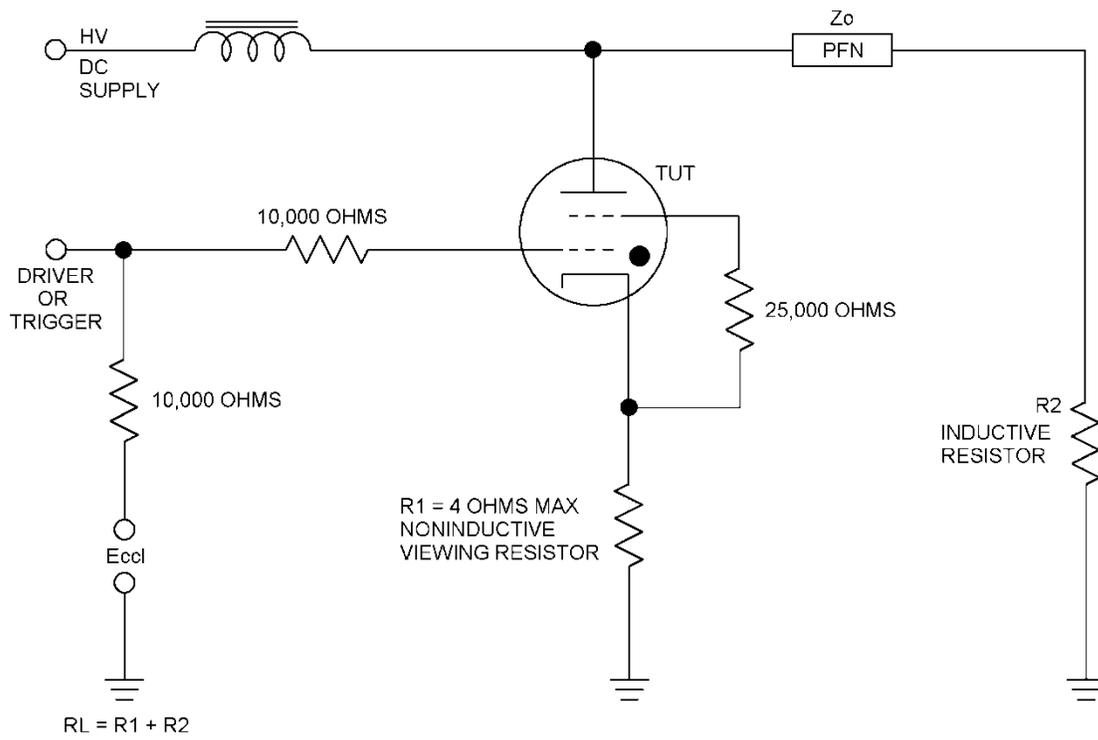


FIGURE 1. Test circuit.

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

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