

MILITARY SPECIFICATION SHEET  
 ELECTRON TUBE, RECEIVING  
 TYPE 7587

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

The complete requirements for procuring the electron tube described herein shall consist of this document and the latest issue of Specification MIL-E-1.

DESCRIPTION: Tetrode, miniature, amplifier, metal shell, sharp cutoff

Outline --- See figure 1

Cathode --- Coated unipotential

Base connections:

Pin No.	---	1	2	3	4	5	6	7	8	9	10	12	Cap
Element	---	int con	g2	int con	g1	int con	int con	int con	k	int con	h	h	a

ABSOLUTE-MAXIMUM RATINGS:

Parameter:	Ef	Ebb	Eb	Ecc2	Ec2	Ec1	Ehk	Rk
Unit:	V	Vdc	Vdc	Vdc	Vdc	Vdc	v	Ohms
Maximum:	6.9	330	250	330	110	+2, -55	100	---
Minimum:	5.7	---	---	---	---	---	---	---

TEST CONDITIONS: 6.3 --- 125 50 --- 0 --- 68

ABSOLUTE-MAXIMUM RATINGS:

Parameter:	Rg1	Ik	Ic1	Pp	Pg2	TE(shell)	Alt
Unit:	Meg	mAdc	mAdc	W	W	°C	ft
Maximum:	Note 1	20	2.0	2.2	0.2	150	100,000
Minimum:	---	---	---	---	---	---	---

TEST CONDITIONS: --- --- --- --- --- --- ---

GENERAL:

Qualification - Required

7587

METHOD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
							MIN	MAX	
<u>Quality conformance inspection, part 1</u>									
1301	Heater current	--		0.4	II	I <sub>f</sub>	140	160	mA
1336	Heater-cathode leakage	--		0.4	II	I <sub>hk</sub>	---	3	μAdc
1266	Total grid current	2	E <sub>b</sub> = 200 Vdc; E <sub>c2</sub> = 70 Vdc; R <sub>g1</sub> = 0.5 Meg; E <sub>c1</sub> = -1.6 Vdc; R <sub>k</sub> = 0	0.4	II	I <sub>c1</sub>	---	-0.1	μAdc
1256	Electrode current (1) (anode)	2		0.4	II	I <sub>b</sub>	8.5	11.5	mAdc
1256	Electrode current (2) (anode)	--	E <sub>c1</sub> = -6.0 Vdc; R <sub>k</sub> = 0	0.4	II	I <sub>b</sub>	---	50	μAdc
1256	Electrode current (screen)	--		0.4	II	I <sub>c2</sub>	---	3.6	mAdc
1306	Transconductance (1)	--		0.4	II	S <sub>m</sub>	9,000	12,200	μmhos
1201	Short and discontinuity detection	3		0.4	II	---	---	---	---
<u>Quality conformance inspection, part 2</u>									
1211	Insulation of electrodes	--	E(g1-a11) = -100 Vdc E(g2-a11) = -100 Vdc E(a-a11) = -300 Vdc	2.5	II	R R R	5,000 5,000 10,000	---	Meg Meg Meg
2201	Noise and microphonics	4	R <sub>n2</sub> = 5,000 ohms; R <sub>k</sub> = 70 ohms; anode disconnected; E <sub>c1</sub> = 0.6 V (rms)	2.5	II	EB	---	17	VU
1306	Transconductance (2)	--	E <sub>f</sub> = 5.7 V	2.5	II	ΔS <sub>m</sub> E <sub>f</sub>	---	20	%
1231	Emission at reduced filament voltage	5	E <sub>f</sub> = 5.5 V; E <sub>bb</sub> = E <sub>cc2</sub> = 45 Vdc; e <sub>c1</sub> = 2.8 Vac; R <sub>k</sub> = 0	---	---	I <sub>s</sub>	10	---	mA
1331	Direct-interelectrode capacitance	--		6.5	Code E	C <sub>g1-a</sub> C <sub>in</sub> C <sub>out</sub> Chk	---	0.018 6.0 1.2 1.1	pF pF pF pF
1002	Barometric pressure, reduced	--	Pressure = 8.0 ± 0.5 mmHg; voltage = 250 Vac	6.5	Note 6	---	---	---	---
1031	Sweep-frequency vibration (1)	7	R <sub>p</sub> = 2,000 ohms; 1G F = 3 to 6 kHz F = 6 to 15 kHz	6.5 6.5	Code E Code E	ep ep	---	50 700	mv mv
1031	Sweep-frequency vibration (2)	8	R <sub>p</sub> = 2,000 ohms; 1G; F = 50 to 3,000 Hz	6.5	Note 6	Ep	---	35	mVac
1041	Shock	9	E <sub>hk</sub> = +100 Vdc; 1,000G	---	---	---	---	---	---
1031	Vibration-fatigue	10	No voltages	6.5	Note 6	---	---	---	---

METHOD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
							MIN	MAX	
	<u>Quality conformance inspection, part 2</u> -Continued								
---	Shock and vibration-fatigue test end points:								
1306	Transconductance (1)	--		---	---	$\Delta S_m$ t	---	10	%
1266	Total grid current	--		---	---	Ic1	---	-0.2	$\mu$ Adc
1336	Heater-cathode leakage	---		---	---	Ihk	---	5	$\mu$ Adc
1031	Sweep-frequency vibration (1)	--	F = 3 to 6 kHz. F = 6 to 15 kHz	---	---	ep	---	100	mv
				---	---	ep	---	1,000	mv
1105	Permanence of marking	---		---	---	---	---	---	---
	<u>Quality conformance inspection, part 3</u>								
1506	Heater-cycling life	--	Ef = 8.5 V; Ehk = -100 Vdc; Eb = 0; Rk = 0; 1 min "on", 2 min "off"	---	---	---	---	---	---
---	Heater-cycling life-test end point:								
1336	Heater-cathode leakage	--		---	---	Ihk	---	5	$\mu$ Adc
1516	Stability life	--	Ebb = 250 Vdc; Ecc2 = 125 Vdc; Ecc1 = -3.3 Vdc; Ehk = +100 Vdc; Rq1 = 0.5 Meg; Rg2 = 15,000 ohms	---	---	---	---	---	---
---	Stability life-test end points:								
1306	Change in trans-conductance (1) of individual tubes	--		---	---	$\Delta S_m$ t	---	10	%
1501	Intermittent life	11,12	Ebb = 180 Vdc; Ecc2 = 180 Vdc; Rq1 = 0.5 Meg; Rg2 = 39,000 ohms; Ehk = +100 Vdc; Ec1 = -1.0 Vdc; Rk = 0; TE(shell) = 50°C (min)	---	---	---	---	---	---
---	Intermittent life-test end points (500 hours):	13							
1266	Total grid current	--		---	---	Ic1	---	-0.2	$\mu$ Adc
1301	Heater current	--		---	---	If	140	163	mA
1306	Change in trans-conductance (1) of individual tubes	---		---	---	$\Delta S_m$ t	---	15	%
1306	Transconductance (2)	--		---	---	$\Delta S_m$ Ef	---	22	%
1266	Heater-cathode leakage	--		---	---	Ihk	---	5	$\mu$ Adc
1211	Insulation of electrodes	--	E(g1-a11) = -100 Vdc E(q2-a11) = -100 Vdc E(a-a11) = -300 Vdc	---	---	R	1,000	---	Meg
1306	Transconductance (1), average change	--		---	---	Avg $\Delta S_m$ t	---	10	%

METHOD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
							MIN	MAX	
	<u>Quality conformance inspection, part 3</u> -Continued								
---	Intermittent life-test end points (1,000 hours):	13							
1266	Total grid current	--		---	---	Ic1	---	-0.2	μAdc
1301	Heater current	--		---	---	If	140	166	mA
1306	Change in trans-conductance (1) of individual tubes	--		---	---	ΔSm t	---	22	%
1306	Transconductance (2)	--		---	---	ΔSm Ef Ihk	---	20	%
1336	Heater-cathode leakage	--		---	---		---	5	μAdc
1211	Insulation of electrodes	--	E(g1-a11) = -100 Vdc E(g2-a11) = -100 Vdc E(a-a11) = -300 Vdc	---	---	R	1,000	---	Meg
1511	Cathode interface life	12	Ef = 6.9 V; other electrodes disconnected	---	---	Ri	---	25	Ohms

## NOTES:

- Maximum grid-circuit resistance for operation at metal-shell temperatures up to 150°C.  
For fixed-bias operation: 0.5 Meg  
For cathode-bias operation: 1.0 Meg
- This test shall be performed at the conclusion of the holding period.
- This test shall use a hand taper consisting of a Bakelite rod 1/8-inch in diameter and 7-inches in length with a rubber tip 1-inch long. The rubber tip consists of gum tubing 1/8-inch ID and 3/32-inch wall thickness with an average Durometer rating of 35 ±5 Shore A, or equivalent.
- The "tapper" shall consist of a brass gear, 3/8-inch OD x 1/2-inch in length, having 11 teeth, and mounted on the end of a 1/4-inch fiber rod 5-inches long. Roll taper against top corner of the tube. Hold tube in test socket with light thumb pressure.
- The dc resistance in the grid circuit shall not exceed 2.0 ohms. Measure emission as the dc component of current in the anode-screen circuit.
- This test shall be conducted on the initial lot and thereafter on a lot approximately every 12 months. When one lot has passed, the 12-month rule shall apply. In the event of lot failure, the lot shall be rejected and the succeeding lots shall be subjected to this test until a lot passes. MIL-STD-105, sample size code letter E, shall apply.
- The TUT shall be vibrated in the X plane through a frequency range of 3,000 to 15,000 Hz. Sweep time shall be approximately 7.0 seconds, and the rate of change of frequency shall be approximately linear. Each tube shall be rotated to find the direction of vibration in the X plane which gives the highest output reading. For holding fixtures, see Drawing 184-JAN.
- The TUT shall be vibrated in the X plane through a frequency range of 50 to 3,000 Hz. Sweep time shall be 30 seconds per octave.
- A grid resistor of 0.5 megohm shall be added; however, this resistor shall not be used when a thyratron-type short indicator is used. For holding fixtures, see Drawing 184-JAN.

NOTES: Continued

10. The TUT shall be vibrated in the X plane at 60 Hz for 48 hours.
11. Shell temperature (TE) requirements, when measured in accordance with the temperature by conduction-band measurement (method 1226), or thermocouple elements welded to shell, will be satisfied if a tube having bogey Ib (+5 percent) under normal test conditions, is determined to operate at or above minimum specified temperature at any position in the life-test rack.
12. The life-test sample shall consist of 20 tubes per lot and not more than 1-tube failure shall be permitted. In the event of rejection of the first sample due to failure of more than 1 tube, a second sample of 40 tubes shall be selected from the lot. Acceptance shall be based on the combined first and second samples. The total tube failures from the combined first and second samples shall not exceed three.
13. The allowable defectives per characteristic shall be one for the first sample and three for combined samples. Total defectives shall be two and four respectively.
14. Revision letters are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - ER  
Navy - EC  
Air Force - 85

Review activities:

Air Force - 99  
DLA - ES

User activities:

Navy - AS, CG, OS, MC  
Air Force - 11

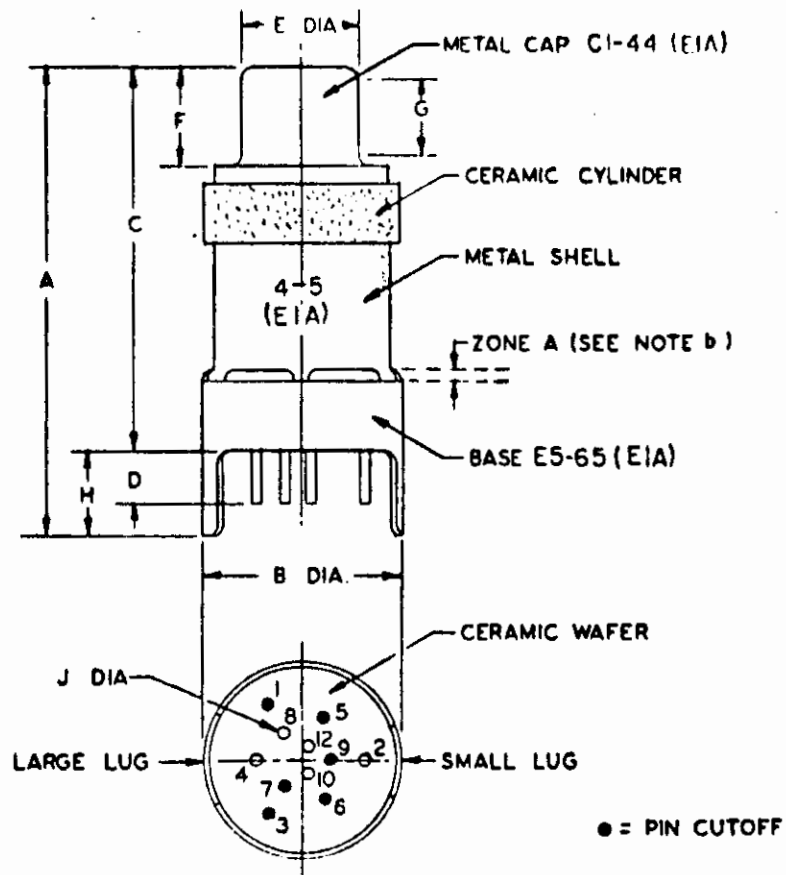
Preparing activity:

Army - ER

Agent:

DLA - ES

(Project 5960-3255)



Ltr	Dimensions in inches with metric equivalents (mm) in parentheses		NOTES
	Minimum	Maximum	
Qualification inspection			
A		1.050(26.67)	
B		.435(11.05)	a
C		.840(21.34)	
D	.100(2.54)	.130 (3.30)	
E	.245(6.22)	.255 (6.48)	
F	.220(5.59)		
G	.175(4.45)		
H	.175(4.45)	.210 (5.33)	
J	.015 (.38)	.017 (.43)	

Notes:

- a. Maximum OD of .440 (11.18) is permitted along .190 (4.83) lug length.
- b. Shell temperature should be measured in zone A between broken lines.

FIGURE 1. Outline drawing of electron tube type 7587.