

MILITARY SPECIFICATION SHEET
 ELECTRON TUBE, RECEIVING
 TYPE 6688

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

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

DESCRIPTION: Pentode, miniature, RF, sharp cutoff

Outline --- 6-1 (EIA) (B)
 Base --- E9-1
 Envelope --- T6-1/2
 Cathode --- Coated unipotential

Base connections:

Pin No.	---	1	2	3	4	5	6	7	8	9
Element	---	k	g1	k	h	h	int	a	g3	g2
							con			

ABSOLUTE-MAXIMUM RATINGS:

Parameter:	Ef	Eb	Ec1	Ec2	Ec3	Ehk	ec1
Unit:	V	Vdc	Vdc	Vdc	Vdc	v	v
Maximum:	6.6	210	0	175	0	60	---
Minimum:	6.0	---	-50	---	---	---	-100

TEST CONDITIONS: 6.3 190 +9 160 0 0 ---

ABSOLUTE-MAXIMUM RATINGS:

Parameter:	Rk	Rg1	Ik	Pp	Pg2	TE	Alt
Unit:	Ohms	Meg	mAdc	W	W	°C	ft
Maximum:	---	0.1	25	2.7	0.6	+155	(see note 1)
Minimum:	---	---	---	---	---	---	---

TEST CONDITIONS: 630 --- --- --- --- --- ---

GENERAL:

Qualification - Required

Reliable tubes

(B) denotes changes

6688

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL PERCENT DEFECTIVE)	INSP LEVEL OR CODE	SYMBOL	LIMITS						UNIT
						MIN	LAL	BOGEY	UAL	MAX	ALD	
<u>Quality conformance inspection, part 1</u>												
1301	Heater current		0.4	II	If	285	---	---	---	315	---	mA
1336	Heater-cathode leakage		0.4	II	Ihk	---	---	---	---	15	---	μ Adc
1266	Total grid current	See note 2	0.4	II	Ic1	0	---	---	---	-0.5	---	μ Adc
1256	Anode current (1)	Ebb = 180 Vdc; Ecc1 = 0; Ecc2 = 150 Vdc; Ecc3 = 0; Rk = 78 ohms	---	---	Ib	---	11.0	13.0	15.0	---	5.0	mAdc
1256	Anode current (1)	See note 2	0.4	II	Ib	8.0	---	---	---	18.0	---	mAdc
1256	Anode current (2)	Ec1 = -6.0 Vdc; Ebb = 180 Vdc; Ecc2 = 150 Vdc; Ecc3 = 0; Rk = 78 ohms	0.4	II	Ib	---	---	---	---	100	---	μ Adc
1256	Screen-grid current		---	---	Ic2	---	3.1	3.3	3.5	---	0.4	mAdc
1256	Screen-grid current		0.4	II	Ic2	2.9	---	---	---	3.7	---	mAdc
1306	Transconductance (1)		---	---	Sm	---	15000	16500	18000	---	2500	μ mhos
1306	Transconductance (1)		0.4	II	Sm	14200	---	---	---	18800	---	μ mhos
1201	Short and discontinuity detection		0.4	II	---	---	---	---	---	---	---	---
<u>Quality conformance inspection, part 2</u>												
(B) 1211	Insulation of electrodes		2.5	I	R	20	---	---	---	---	---	Meg
1306	Transconductance (2)	Ef = 5.7 V	2.5	I	Δ Sm Ef	---	---	---	---	15	---	%
1266	Grid emission	Ef = 7.5 V; Ec1 = -6.0 Vdc; Rk = 0 (see note 3)	2.5	I	Ic1	0	---	---	---	-0.5	---	μ Adc
2201	Noise and microphonics	Ef = 6.3 V; Ehk = 0; Ebb = Ecc2 = 200 Vdc; Ec1 = 0; Ecal = 600 mVac; Rk = 1,000 ohms; Rp = 0.1 Meg; Rg2 = 0.5 Meg; Cg2 = 2 μ f (see note 4)	2.5	I	---	---	---	---	---	---	---	---

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL PERCENT DEFECTIVE)	INSP LEVEL OR CODE	SYMBOL	LIMITS						UNIT	
						MIN	LAL	BOGEY	UAL	MAX	ALD		
<u>Quality conformance inspection part 2</u> -Continued													
1331	Direct-interelectrode capacitance	Shield No. 315 (see note 5)	6.5	Code E	Cg1p	---	---	---	---	0.030	---	pF	
					Cin	6.7	---	---	---	---	8.5	---	pF
					Cout	2.50	---	---	---	---	3.50	---	pF
1031	Low-frequency vibration	Rp = 2,000 ohms	6.5	Code H	Ep	---	---	---	---	300	---	mVac	
1041	Shock	450 G; Ehk = +100 Vdc (see note 7)	---	---	---	---	---	---	---	---	---	---	
1031	Vibration fatigue	2.5 G; F = 25 min, 60 max; fixed frequency	6.5	See note 6	---	---	---	---	---	---	---	---	
---	Post-shock and vibration-fatigue end points	Low-frequency vibration	---	---	Ep	---	---	---	---	400	---	mVac	
---		Heater-cathode leakage	---	---	Ihk	---	---	---	---	30	---	μAdc	
---		Transconductance (1)	---	---	Sm	12500	---	---	---	---	---	μmhos	
---		Total grid current	---	---	Ic1	0	---	---	---	-1.0	---	μAdc	
1121	Base strain		---	---	---	---	---	---	---	---	---	---	
(B) 2126	Glass strain		6.5	I	---	---	---	---	---	---	---	---	
(B) 1105	Permanence of marking		---	---	---	---	---	---	---	---	---	---	

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL PERCENT DEFECTIVE)	INSP LEVEL OR CODE	ALLOWABLE DEFECTIVES PER CHARACTERISTIC		SYMBOL	LIMITS		UNIT
					1 ST SAMPLE	COMBINED SAMPLES		MIN	MAX	
<u>Quality conformance inspection, part 3</u>										
1506	Heater-cycling life	Ef = 7.5 V; Ehk = 60 Vdc; Eb = Ec1 = Ec2 = 0	---	---	---	---	---	---	---	---
---	Life-test end point (heater-cycling)	Heater-cathode leakage	---	---	---	---	Ihk	---	30	μAdc
1516	Stability life	Eb = 200 Vdc; Ec1 = +9 Vdc; Ec2 = 170 Vdc; Ec3 = 0; Rk = 680 ohms; Rg1 = 0.5 Meg; TA = room	1.0	Code H	---	---	---	---	---	---
---	Life-test end point (stability)	Change in transconductance (1) of individual tubes	---	---	---	---	ΔSm t	---	10	%
1521	Survival-rate life	Stability life test, or equivalent conditions	---	II	---	---	---	---	---	---

METHOD	REQUIREMENT OR TEST	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSP LEVEL OR CODE	ALLOWABLE DEFECTIVES PER CHARACTERISTIC		SYMBOL	LIMITS		UNIT
					1 ST SAMPLE	COMBINED SAMPLES		MIN	MAX	
	<u>Quality conformance inspection, part 3</u> -Continued									
---	Life-test end points (survival rate) (100 hours)	Short and discontinuity detection Transconductance (1)	0.65 1.0	---	---	---	---	---	---	---
1501	Intermittent life	Stability life-test conditions; TE = +155° C (min) (see note 8)	---	---	---	---	---	---	---	---
---	Life-test end points (intermittent) (500 hours)	Inoperatives Total grid current Heater current Change in transconductance (1) of individual tubes Transconductance (2) Heater-cathode leakage Insulation of electrodes Transconductance (1), average change Total defectives	---	---	1 1 1 1 2 1 2 ---	3 3 3 3 5 3 5 ---	Ic1 If ΔSm t ΔSm Ef Ihk R Avg ΔSm t	0 285 ---	-0.9 315 20 15 30 10 15	μAdc mA % % μAdc Meg % ---
---	Life-test end points (intermittent) (1,000 hours)	Inoperatives Total grid current Heater current Change in transconductance (1) of individual tubes Heater-cathode leakage Insulation of electrodes Total defectives	---	---	2 2 2 2 2 2 5	5 5 5 5 5 5 10	Ic1 If ΔSm t Ihk R	0 285 ---	-0.9 315 25 30 10	μAdc mA % μAdc Meg ---
(B)	<u>Periodic-check test</u>									
---	Sweep frequency vibration (1)	Ef = 6.3 Vdc; Eb = 180 Vdc; Ec2 = 150 Vdc; Rp = 2,000 ohms; RL/Ib = 13 mAdc (see note 9)	---	---	---	---	Ep	---	500	mVac

NOTES:

- (B) 1. See "Reduced pressure (altitude) rating," and altitude, maximum peak voltage.
- 2. This test to be performed at the conclusion of the holding period.
- 3. Prior to this test, tubes shall be preheated a minimum of 5 minutes at the conditions indicated below. The 3-minute test is not permitted. Test at specified conditions within 3 seconds after preheating. Grid emission shall be the last test performed on the sample selected for the grid-emission test.

Ef	Ec1	Ec2	Eb	Rk
Vdc	Vdc	Vdc	Vdc	Ohms
7.5	+9	160	190	630

NOTES: -Continued

4. The rejection level shall be set at the VU meter reading obtained during calibration
5. Pin 6 floating.
- ⓑ 6. This test shall be conducted on the initial lot and thereafter on a lot approximately every 6-months. When one lot has passed, the 6-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.
7. A grid resistor of 0.1 megohm shall be added; however, this resistor will not be used when a thyratron-type short indicator is employed.
8. Envelope temperature (TE) requirements, when measured in accordance with the temperature by conduction-band measurement (method 1226), 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.
- ⓑ 9. The tubes shall be fastened rigidly to the vibration platform and vibrated with simple harmonic motion over a frequency range of 50 to 500 Hz at an acceleration value of 2.5 G. The acceleration over the frequency range shall be within ± 20 percent of the reference acceleration at 100 Hz. The frequency shall increase from 50 to 500 Hz with approximate logarithmic progression and shall require 4 minutes minimum, 5 minutes maximum, to traverse the range. Each tube shall be vibrated in positions X and Y, except that if the cumulative result of test on 50 or more tubes of a construction show that more than 75 percent of the tubes have higher output voltages in one position, subsequent measurements need to be taken only in the position giving the higher readings. The tubes shall be tested with the specified voltages applied thereto during vibration. The value of Ebb shall be the same as the value of Eb under the test conditions and shall be applied to the tube through the specified resistor, Rp. The value of the alternating voltage, Ep, produced across the resistor Rp, as a result of vibration, shall be measured with a suitable device. This device shall have an appropriate voltage range; shall have the ability to measure, with an error of less than 10 percent, the rms value of a sine wave of voltage at all frequencies from 20 to 5,000 Hz; and shall have dynamic response characteristics equivalent to or faster than a VU meter (as described in Publication ASA Standard No. C16.5-1954). The value of Ep shall not exceed the limit specified at any point in the frequency range, nor shall this test result in open circuits, permanent shorts, or tap shorts as specified in method 1201.

Custodians:
 Army - EL
 Navy - EC
 Air Force - 11

Preparing activity:
 Navy - EC
 (Project 5960-2223-36)

Review activities:
 Army - MU, MI
 Navy - EC, SH
 Air Force - 11, 17, 85
 DSA - ES

User activities:
 Army - ME
 Navy - AS, OS, MC, CG
 Air Force - 19