

INCH-POUND

MIL-PRF-1/1593D  
17 August 2004  
SUPERSEDING  
MIL-PRF-1/1593C  
19 July 1999

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING  
TYPE 8233

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:** Pentode, sharp cutoff.

Outline: See figure 1.

Base: E9-23.

Envelope: T9.

Cathode: Coated unipotential

Base connections:

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

**ABSOLUTE MAXIMUM RATINGS:**

Parameter:	Ef	Ebb	Eb	Ecc2	Ec2	Ec3	Ecc1	Ec1	egk
Unit:	V	V dc	v						
Maximum:	6.6	400	200	350	175	---	---	0, -55	0
Minimum:	6.0	---	---	---	---	---	---	---	-110
Test conditions:	6.3	136	---	136	---	0	+8	---	---

**ABSOLUTE MAXIMUM RATINGS:**

Parameter:	Ehk	Rk	Rg1	lk	Pg2	Pp	TE	Alt
Unit:	v	Ohms	Meg	mA dc	W	W	°C	ft
Maximum:	200	---	0.125	75	1.5	10	180	60,000
Minimum:	---	---	---	---	---	---	---	---
Test conditions:	0	200	---	---	---	---	---	---

See footnotes at end of table I.

**GENERAL:**

Qualification: Not required.

TABLE I. Testing and inspection.

Inspection	Method MIL-STD-1311	Notes	Conditions	Acceptance Level <u>10/</u>	Symbol	Limits		Unit
						Min	Max	
<u>Conformance inspection, part 1</u>								
Heater current	1301	---		0.65	If	540	660	mA dc
Heater-cathode leakage	1336	---		0.65	lhk	---	15	$\mu$ A dc
Total grid current	1266	---		0.65	lc1	0	-1.0	$\mu$ A dc
Electrode voltage (grid 1)	1261	<u>1/</u>		0.65	Ec1	2.3	3.7	V dc
Electrode current (screen)	1256	---		0.65	lc2	---	7.0	mA dc
Transconductance (1)	1306	---		0.65	Sm	38,000	52,000	$\mu$ mhos
Electrode current (anode)	1256	---	Ec1 = -6 V dc; Eb = 125 V dc; Ec2 = 125 V dc	0.65	lb	---	1.0	mA dc
Short and discontinuity detection	1201	---	egk = 110 v (max)	0.4	---	---	---	---
<u>Conformance inspection, part 2</u>								
Insulation of electrodes	1211	---	E (g1 to all) = -50 V dc E (a to all) = -200 V dc	2.5	---	---	---	---
Transconductance (2)	1306	---	Ef = 5.7 V	2.5	$\Delta$ Sm Ef	---	10	%
Amplification factor	1316	<u>2/</u>		6.5	Mu	26	34	---
Grid emission	1266	<u>3/</u>	Ef = 7.5 V; Ecc1 = -10 V dc; Rg1 = 0.1 Meg $\Omega$	2.5	lc1	0	-2.0	$\mu$ A dc
Direct-interelectrode capacitance	1331	---	No shield	6.5	{ Cin Cout Cgp	15 3.6 ---	21 4.4 0.15	pF pF pF
Barometric pressure, reduced	1002	---	Pressure = 55 $\pm$ 5 mmHg; voltage = 300 V ac	6.5	---	---	---	---
High-frequency vibration	1031	---	Rp = 2,000 ohms; Rk = 56 ohms, unbypassed; Rg = 20,000 ohms; Cg2 = 25 $\mu$ F; Ebb = Ecc2 = 225 V dc; Ec1 = 0 F = 50 Hz	2.5	Ep	---	50	mV ac

See footnotes at end of table.

MIL-PRF-1/1593D

TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD- 1311	Notes	Conditions	Acceptance Level <u>10/</u>	Inspection level or code	Symbol	Limits		Unit
							Min	Max	
<u>Conformance inspection, part 2 - Continued</u>									
Shock	1041	---	450 G; no voltages applied	6.5	<u>4/</u>	---	---	---	---
Vibration-fatigue	1031	---		6.5	<u>4/</u>	---	---	---	---
Shock and vibration-fatigue-test end points:	---								
High-frequency vibration	1031	---	Rp = 2,000 ohms; Rk = 56 ohms, unbypassed; Rg2 = 20,000 ohms, Cg2 = 25 μF; Ebb = Ecc2 = 225 V dc; Ec1 = 0; F = 50 Hz	---	---	Ep	---	100	mV ac
Heater-cathode leakage	1336	---		---	---	l <sub>hk</sub>	---	25	μA dc
Total grid current	1266	---		---	---	l <sub>c1</sub>	0	-2.0	μA dc
Change in transconductance (1) of individual tubes	1306	---		---	---	ΔS <sub>m</sub> t	---	20	%
Envelope strain	2126	---		2.5	l	---	---	---	---
Permanence of marking	1105	---		---	---	---	---	---	---
<u>Conformance inspection, part 3</u>									
Heater-cycling life	1506	<u>5/</u>	Ef = 7.5 V; Ehk = 140 V ac; Ec1 = Ec2 = Eb = 0	---	---	---	---	---	---
Heater-cycling life-test end point:	---								
Heater-cathode leakage	1336	---		---	---	l <sub>hk</sub>	---	25	μA dc
Stability life	1516	<u>5/</u>	Ehk = -200 V dc; Rg1 = 0.1 MegΩ; TA = room	---	---	---	---	---	---

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method MIL-STD-1311	Notes	Conditions	Acceptance Level 10/	Symbol	Limits		Unit
						Min	Max	
<u>Conformance inspection, part 3</u> - Continued								
Stability life-test end point:	---							
Change in transconductance (1) of individual tubes	1306	---		---	$\Delta S_m$ t	---	10	%
Intermittent life	1501	6/	Ehk = -200 V dc; Rg1 = 0.1 Meg $\Omega$	---	---	---	---	---
Intermittent life-test end points (500 hours)	---	7/						
Total grid current	1266	---		---	Ic1	0	-2.0	$\mu$ A dc
Heater current	1301	---		---	If	530	670	mA
Change in transconductance (1) of individual tubes	1306	---		---	$\Delta S_m$ t	---	20	%
Transconductance (2)	1306	---	Ef = 5.7 V	---	$\Delta S_m$ Ef	---	15	%
Heater-cathode leakage	1336	---		---	lhk	---	30	$\mu$ A dc
Insulation of electrodes	1211	---	E (g1 to all) = -50 V dc } E (a to all) = -200 V dc }	---	---	---	---	---
Transconductance (1), average change	1306	---		---	Avg $\Delta S_m$ t	---	15	%
Intermittent life-test end points (1,000 hours)	---	8/						
Total grid current	1266	---		---	Ic1	0	-2.0	$\mu$ A dc
Change of transconductance (1) of individual tubes	1306	---		---	$\Delta S_m$ t	---	25	%
Heater-cathode leakage	1336	---		---	lhk	---	30	$\mu$ A dc
Insulation of electrodes	1211	---	E (g1 to all) = -50 V dc } E (a to all) = -200 V dc }	---	---	---	---	---

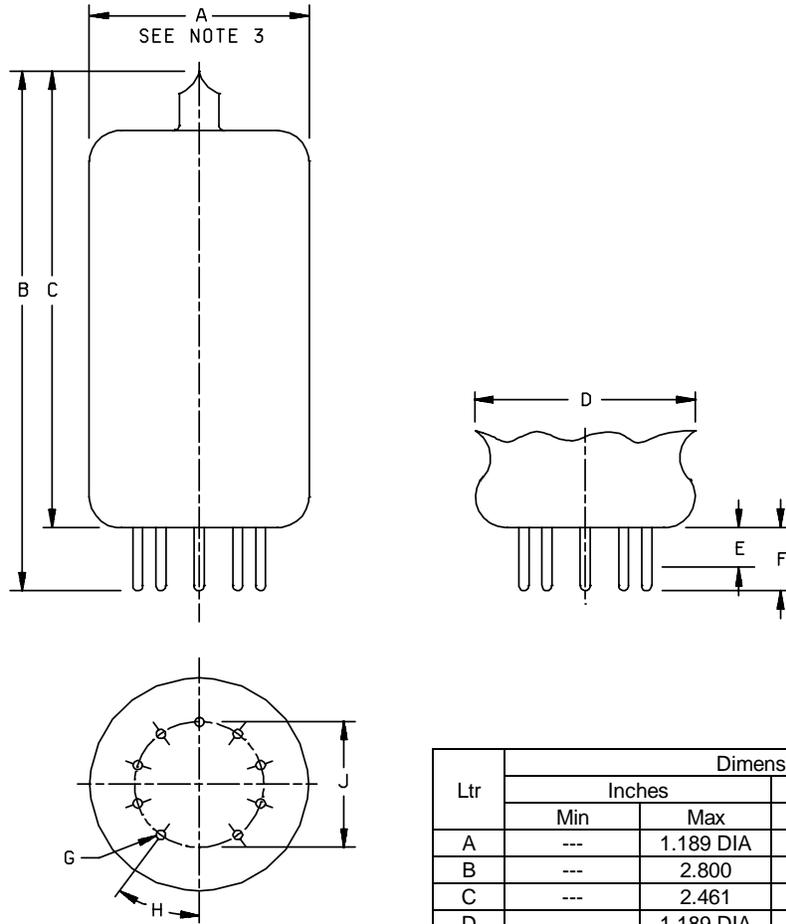
See footnotes at top of next page.

TABLE I. Testing and inspection - Continued.

- 1/ This voltage shall be read with a high-impedance voltmeter connected between grid and cathode.
- 2/ The screen grid shall be utilized as the anode (output is in screen grid circuit). Anode voltage = 136 V dc.
- 3/ Prior to this test, tubes shall be preheated 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 grid emission test.

Ef	Ebb	Ecc2	Ecc1	Rg1	Rk
V	V dc	V dc	V dc	MegΩ	Ohms
7.5	136	136	+8	0.125	200

- 4/ 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 (see 10/).
- 5/ The acceptance level shall be 1.0, in accordance with MIL-PRF-1, table III.
- 6/ The life-test sample shall consist of 20 tubes per lot and no tube failures shall be permitted. In the event of rejection of the first sample, a second sample of 40 tubes shall be selected from the lot. Acceptance shall then be based on the combined first and second samples and shall not exceed a total of two tube failures.
- 7/ No defectives per characteristic shall be allowed for the first sample. Total defectives shall be not greater than 1 for combined samples.
- 8/ No defectives per characteristic shall be allowed for the first sample. Total defectives shall be not greater than 2 for combined samples.
- 9/ Marginal notations are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.
- 10/ This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	---	1.189 DIA	---	30.20 DIA
B	---	2.800	---	71.12
C	---	2.461	---	62.51
D	---	1.189 DIA	---	30.20 DIA
E	.250	---	6.35	---
F	---	.375	---	9.53
G	.0485 DIA	.0530 DIA	1.232 DIA	1.346 DIA
H	36° TYP		36° TYP	
J	.682 DIA	.692 DIA	17.32 DIA	17.58 DIA

NOTES:

1. Dimensions are in inches.
2. Metric equivalents are given for general information only and are based on 1 inch = 25.4 mm.
3. The minimum measurement should be made in the area included between .375 inch (9.53 mm) from the bottom of bulb to the top of bulb body.

FIGURE 1. Outline drawing of electron tube type 8233.

NOTES

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

Changes from 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 on the entire content irrespective of the marginal notations and relationship to the previous issue.

Custodian:

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

Preparing activity:

DLA - CC  
  
(Project 5960-3749)

Review activities:

Army - CR4  
Navy - AS, CG, MC, OS, SH  
Air Force - 19, 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](http://www.dodssp.daps.mil).