

INCH-POUND
MIL-PRF-1/1516C
22 August 2014
SUPERSEDING
MIL-PRF-1/1516B
22 May 2007

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING

TYPE 5963

Inactive for new design
after 30 April1997.

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: Twin triode, miniature.

Outline --- 6-2 (EIA).

Base --- E9-1.

Envelope --- T6-1/2.

Cathode --- Coated unipotential.

Base connections:

Pin No.	---	1	2	3	4	5	6	7	8	9
Element	---	2a	2g	2k	h	h	1a	1g	1k	hct

ABSOLUTE-RATINGS:

Parameter:	Ef	Eb	Ec	Ehk	Ik/k	Rb/b	Rg/g	Pp/a	Pg/g	TE	Alt
Unit:	V	V dc	V dc	v	mA dc	MegΩ	MegΩ	W	W	°C	ft
Maximum:	13.9	250	0	90	20	---	0.5	2.5	0.5	120	(Note 2)
	6.9	---	---	---	---	---	(Note 1)	---	---	---	---
Minimum:	11.3	---	-100	---	---	---	---	---	---	---	---
	5.7	---	---	---	---	---	---	---	---	---	---
		Ebb	Ecc								
		V dc	V dc								
Test conditions:	12.6	150	0	---	---	0.02	0.047	---	---	---	---

GENERAL:

Qualification: Not required.

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

MIL-PRF-1/1516C

TABLE I. Requirements and tests.

Requirement or test	MIL-STD-1311 method	Conditions	Symbol	Limits		Unit	
				Min	Max		
<u>Conformance inspection, part 1</u>							
Total grid current	1266	Eb = 250 V dc; Ecc = -9 V dc; Rg = 0.5 MegΩ; Rb = 0 (See note 4)	Ic	---	-1.5	μA dc	
Transconductance (1)	1306	Eb = 67.5 V dc; Rb/b = 0; Rg/g = 0	Sm	2,600	3,800	μmhos	
Short and discontinuity detection	1201		---	---	---	---	
Heater current	1301		If	138	162	mA	
Heater-cathode leakage	1336	See note 3	Ihk	---	10	μA dc	
Electrode current (1) (anode)	1256	See note 3	Ib	4.6	5.4	mA dc	
Electrode current (2) (anode)	1256	Ecc = -15 V dc (see note 3)	Ib	---	50	μA dc	
<u>Conformance inspection, part 2</u>							
Insulation of electrodes	1211		R	100	---	MegΩ	
Transconductance (2)	1306	Ef = 11.4 V; Eb = 67.5 V dc; Rg/g = 0; Rb/b = 0 (see note 3)	$\frac{\Delta S_m}{E_f}$	---	15	%	
Amplification factor	1316	Eb = 67.5 V dc; Rb/b = 0; Rg/g = 0 (see note 3)	Mu	18	24	---	
Direct-interelectrode capacitance	1331	No shield (note 3)	$\left\{ \begin{array}{l} C_{gp} \\ C_{in} \\ C_{out} \\ C_{out} \\ C_{g1-g2} \end{array} \right.$	Cgp	1.20	1.80	pF
		Cin		1.60	2.20	pF	
		Cout		0.35	0.65	pF	
		Cout		0.24	0.46	pF	
		Cg1-g2		---	0.010	pF	
Low-frequency vibration	1031	Ebb = 250 V dc; Ec = - 8.5 V dc; Rb = 2,000 ohms; Rg = 0; 10 G; F = 40 Hz (see note 5)	Ep	---	150	mV ac	
Base strain	1121		---	---	---	---	
Glass strain	2126		---	---	---	---	
Permanence of marking	1105		---	---	---	---	

See footnotes at end of table.

MIL-PRF-1/1516C

TABLE I. Requirements and tests - Continued.

Requirement or test	MIL-STD-1311 method	Conditions	Symbol	Limits		Unit
				Min	Max	
<u>Conformance inspection, part 3</u>						
Heater-cycling life	1506	Ef = 7.5 V; heater in parallel; Ehk = +135 V dc; Ec = Eb = 0; cycle 1 minute "on" 4 minutes "off"	---	---	---	---
Heater-cycling life-test end point	---					
Heater-cathode leakage	1336		Ihk	---	20	μA dc
Survival-rate life	1521	Eb = 250 V dc; Ec = - 9 V dc; Ehk = +135 V dc; Rg/g = 0.5 MegΩ; Rb/b = 0	---	---	---	---
Survival-rate life-test end point						
Short and discontinuity detection	1201		---	---	---	---
Cathode-interface life	1511	Heaters in parallel (see note 6)	---	---	---	---
Cathode-interface life-test end point	---	See note 7	Ri	---	25	Ohms
Intermittent life	1501	Eb = 250 V dc; Ec = - 9 V dc; Ehk = +135 V dc; Rg/g = 0.5 MegΩ; Rb/b = 0; TE = 120°C (min)	---	---	---	---
Intermittent life-test end points (500 hours)						
Inoperatives	---		---	---	---	---
Total grid current	1266		Ic	---	- 2.0	μA dc
Heater current	1301		If	138	164	mA
Change in anode current (1) of individual tubes.			$\frac{\Delta I_b}{t}$	---	1.0	mA dc
Change in transconductance (1) of individual tubes			$\frac{\Delta S_m}{t}$	---	20	%
Transconductance (2)	1306		$\frac{\Delta S_m}{E_f}$	---	15	%
Heater-cathode leakage	1336		Ihk	---	20	μA dc
Insulation of electrodes	1211		R	50	---	MegΩ
Average change in transconductance (1)			Avg. $\frac{\Delta S_m}{t}$	---	15	%
Total defectives			---	---	---	---

See footnotes at end of table.

MIL-PRF-1/1516C

TABLE I. Requirements and tests - Continued.

Requirement or test	MIL-STD-1311 method	Conditions	Symbol	Limits		Unit
				Min	Max	
<u>Conformance inspection, part 3</u> - Continued						
Intermittent life-test end points (1,000 hours)						
Inoperatives	---		---	---	---	---
Total grid current	1266		I _c	---	- 2.0	μA dc
Heater current	1301		I _f	138	166	mA dc
Change in anode current (1) of individual tubes.			$\frac{\Delta I_b}{t}$	---	1.0	mA dc
Change in transconductance (1) of individual tubes			$\frac{\Delta S_m}{t}$	---	25	%
Transconductance (2)	1306		$\frac{\Delta S_m}{E_f}$	---	15	%
Heater-cathode leakage	1336		I _{hk}	---	20	μA dc
Insulation of electrodes	1211		R	25	---	MegΩ
Total defectives			---	---	---	---

NOTES:

1. This value is for operation under fixed-bias conditions; with cathode bias, R_{g/g} may be 1.0 MegΩ, maximum.
2. Altitude test not required as operating voltage is less than 280 volts. Requirements covering altitude versus voltage breakdown relationship are specified in the basic document.
3. Test each unit separately.
4. This test to be performed at the conclusion of the holding period.
5. Tie 1k to 2k; 1g to 2g; and 1a to 2a.
6. The life-test sample shall consist of 20 tubes, and no tube failure shall be permitted. In the event of rejection of the first sample due to failure of 1 tube, a second sample of 20 tubes shall be selected from the lot. Acceptance shall be based upon zero defects. A life-test defect is defined as a failure to meet the life-test end-point limits as specified on the tube specification sheet. The life-test sample shall be read at 500 (+48, - 24) hours.
7. E_f = 5.7 V (heaters in parallel), E_b = 100 V dc, adjust E_c to obtain an anode current of 1.5 milliamperes.

MIL-PRF-1/1516C

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

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 last previous issue.

Custodians:

Army - CR
Navy - EC
Air Force - 85
DLA - CC

Preparing activity:

DLA - CC

(Project 5960-2014-016)

Review activities:

Army - AR MI
Navy - AS, CG, MC, OS, SH
Air Force - 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 <https://assist.dla.mil/>.