

MILITARY SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING

TYPE 5651WA

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: Diode, miniature, voltage reference

Outline --- 5-2 (EIA)
 Base --- E7-1
 Envelope --- T5-1/2
 Cathode --- Glow discharge

Base connections:

Pin No.	---	1	2	3	4	5	6	7
Element	---	a	k	Note 1	k	a	Note 1	k

ABSOLUTE-MAXIMUM RATINGS:

Parameter:	Total darkness ionization voltage	Ambient light ionization voltage	Operating voltage	Operating current	TE °C	TA °C	(D) Alt ft
Unit:	Vdc	Vdc	Vdc	mAdc			
Maximum:	---	---	90 (approx)	3.5	+155	+150	Note 2
Minimum:	115	115	82	1.5	---	-55	---
<u>TEST CONDITIONS:</u>	---	---	---	---	---	25±5	---

GENERAL:

Qualification - Required

Reliable tube

(D) denotes changes

MET-CD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
							MIN	MAX	
	<u>Quality conformance inspection, part 1</u>								
3347	Ionization voltage (1)	-	Ebb/Ib = 1.5 to 3.5 mAdc; illumination = 5 to 50 ft candles	0.4	II	Ez	---	110	Vdc
3337	Voltage drop (1)	-	Ebb/Ib = 3.5 mAdc	0.4	II	Etd	82.0	88.0	Vdc
3337	Voltage drop (2)	-	Ebb/Ib = 1.5 mAdc	0.4	II	Etd	82.0	88.0	Vdc
3337	Voltage drop (3)	-	Ebb/Ib = 2.5 mAdc	0.4	II	Etd	83.5	86.5	Vdc
3335	Regulation	-	Etd (1) minus Etd (2)	0.4	II	Reg	---	±2.0	Vdc
3345	Voltage jump	3		0.4	II	Jump	---	5.0	mVdc
1201	Short and discontinuity detection	-		0.4	II	---	---	---	---
	<u>Quality conformance inspection, part 2</u>								
3278	Noise	-	Ebb/Ib = 3.5 mAdc	1.0	II	Eb	---	5.0	mVac
3347	Ionization voltage (2)	4		6.5	Code G	Ez	---	115	Vdc
3305	Leakage current	-	Eb = 50 Vdc; Rp = 3,000 ohms	6.5	Code G	L/Ib	---	5	μAdc
---	Voltage repeatability	5	Ebb/Ib = 2.5 mAdc	6.5	Code E	Etd	---	100	mVdc
1031	Low-frequency vibration	-	F = 40 Hz; 15 G; Rp = 10,000 ohms. Ebb/Ib = 2.5 mAdc	6.5	Code G	Ep	---	5.0	mVac
1041	Shock	-	450 G	---	---	---	---	---	---
1031	Vibration fatigue	6	2.5 G; fixed frequency; F = 25 Hz (min), 60 Hz (max)	6.5	---	---	---	---	---
---	Post-shock and vibration-fatigue test end points:								
3347	Ionization voltage (1)	-		---	---	Ez	---	115	Vdc
3337	Voltage drop (1)	-		---	---	Etd	82	90	Vdc
3337	Voltage drop (2)	-		---	---	Etd	82	90	Vdc
3335	Regulation	-		---	---	Reg	---	±3.0	Vdc
1121	Base strain	-		---	---	---	---	---	---
2126	Glass strain	-		2.5	I	---	---	---	---
1105	Permanence of marking	-		---	---	---	---	---	---

METHOD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL PERCENT DEFECTIVE	INSP LEVEL OR CODE	ALLOWABLE DEFECTIVES PER CHARACTERISTIC		SYMBOL	LIMITS		UNIT
						1ST SAMPLE	COMBINED SAMPLES		MIN	MAX	
	<u>Quality conformance inspection, part 3</u>										
1516	Stability life	-	Ebb/fb = 2.5 mAdc. TA = room	---	---	---	---	---	---	---	---
---	Stability life-test end point:	-									
---	Change in voltage drop (3) of individual tubes	-		2.5	Code H	---	---	ΔE_{td}	---	200	mVdc
1521	Survival-rate life	-	Stability life-test conditions	---	---	---	---	---	---	---	---
---	Survival-rate life-test end points (100 hours):	-									
---	Inoperatives	-		---	---	---	---	---	---	---	---
---	Change in voltage drop (3) of individual tubes	-		2.5	Code H	---	---	ΔE_{td}	---	500	mVdc
1501	Intermittent life	7	Stability life-test conditions, or equivalent. TA = 150°C (min)	---	---	---	---	---	---	---	---
---	Intermittent life-test end points (500 hours):	-									
---	Inoperatives	-		---	---	1	3	---	---	---	---
3335	Regulation	-		---	---	1	3	Reg	---	±3.0	Vdc
3337	Voltage drop (1)	-		---	---	1	3	E _{td}	82	90	Vdc
3337	Voltage drop (2)	-		---	---	1	3	E _{td}	82	87.5	Vdc
3337	Voltage drop (3)	-		---	---	1	3	E _{td}	82	88.5	Vdc
3347	Ionization voltage (1)	-		---	---	1	3	E _z	---	115	Vdc
---	Change in voltage drop (3) of individual tubes	-		---	---	1	3	ΔE_{td}	---	1.5	Vdc
---	Total defectives	-		---	---	3	6	---	---	---	---
---	Intermittent life-test end points (1,000 hours):	-									
---	Inoperatives	-		---	---	2	5	---	---	---	---
3335	Regulation	-		---	---	2	5	Reg	---	±3.2	Vdc
3337	Voltage drop (1)	-		---	---	2	5	E _{td}	82	91	Vdc
3337	Voltage drop (2)	-		---	---	2	5	E _{td}	82	88	Vdc
3337	Voltage drop (3)	-		---	---	2	5	E _{td}	82	90	Vdc
3347	Ionization voltage (1)	-		---	---	2	5	E _z	---	115	Vdc
---	Total defectives	-		---	---	5	10	---	---	---	---

NOTES:

1. Internal connections, do not use.
2. See "Reduced pressure (altitude) rating", and altitude, maximum peak voltage in the basic document.
3. Cycle (or vary) the tube current between 1.5 and 3.5 mA.
4. Conditions for this test shall be those of ionization voltage (1), except testing shall be done in total darkness, and the tube shall not have conducted or have been exposed to light for least 24 hours prior to testing.
5. Repeatability shall be defined as the maximum shift in tube voltage drop between successive firings of the tube. The tube shall be tested in the following manner:
 - (a) The voltage drop shall be read at, 2.5 mAdc drain.
 - (b) The tube shall be turned off for 1 minute.
 - (c) The tube shall be restarted and operated at the same current.
 - (d) The voltage drop shall be read after 1 minute of operation.
 - (e) The "on-off" cycle shall be repeated a minimum of five times. The maximum difference in tube voltage drop shall be taken as the measure of repeatability.
- ① 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 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.
- ① 7. Envelope temperature (TE) requirements, when measured in accordance with the temperature by conduction-band measurement (method 1226), will be satisfied if a tube having box tube drop (Etd = ± 3 percent) under normal test conditions, is determined to operate at minimum specified temperature at any position in the life-test rack.

Custodians:

Army - EL
 Navy - EC
 Air Force - 80

Preparing activity: Navy - EC

Agent: DSA - ES

(Project 5960-2597)

Review activities:

Army - MI
 Air Force - 11, 17
 DSA - ES

User activities:

Army - MU, WC
 Navy - AS, OS, MC, CG, SH