INCH-POUND

MIL-PRF-1/1569D
17 August 2004
SUPERSEDING
MIL-PRF-1/1569C
9 July 1999

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER
TYPE 8168 *

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: Tetrode.

See figure 1.

Mounting position: Any.

Weight: 27 ounces (840 grams) nominal.

ABSOLUTE RATINGS:

Parameter:	F	Ef	Eb	Ec1	Ec2	Ib	Pg1	Pg2
Unit:	MHz	V ac	V dc	V dc	V dc	mA dc	W	W
Maximum: AB1 or B1	110	6.0 ± 5 %	3,000	-250	400	1,000	0	12
Test conditions:	---	6.0	2,000	Adj	300	250	---	---

ABSOLUTE RATINGS:

Parameter:	Pp	T(seal)	T(anode core)	tk	Cooling
Unit:	W	°C	°C	sec (min)	1/
Maximum: AB1 or B1	1,000	250	250	180	---
Test conditions:	---	---	---	300	2/

See footnotes at end of table I.

GENERAL:

Qualification: Required.

---

* Formerly 8168/4CX1000A

TABLE I. Testing and inspection.

Inspection	Method MIL-STD-1311	Notes	Conditions	Acceptance Level 10/	Symbol	Limits Min	Limits Max	Unit
Conformance inspection, part 1								
Heater current	1301	---		0.65	If	8.1	9.9	A ac
Electrode voltage (grid)	1261	---		0.65	Ec1	-47	-60	V dc
Electrode current (screen)	1256	---		0.65	Ic2	---	-10	mA dc
Primary grid emission (control)	1266	---	Ec1/Pg1= 1 W; a = g2 = k = 0 V dc; E(avg) reverse = 25 V; t = 60	0.65	Isg1	---	-10	µA dc
Primary grid emission (screen)	1266	---	Ec2/Pg2 = 12 W; a = g1 = k = 0 V dc; E(avg) reverse = 50 V; t = 60	0.65	Isg2	---	-25	µA dc
Ion current	---	5/	Eb = -67.5 V dc; Ec2 = 300 V dc; Ec1/Ic2 = 20 mA dc	0.65	Iz	---	10	µA dc
Pulse emission (1) (sinusoid)	1231	9/	eb = ec2 = ec1 = 500 v; prr = 10 (min)	0.65	is	65	---	a

Pulse emission (2)	1231	9/	eb = ec2 = ec1 = etd;
			etd/is = 65a;
			prr = 10 (min)
				0.65	etd	---	500	v

Interelement leakage resistance, cold	1366	---	g1 to k; no other voltages	0.65	R	50	---	MegΩ
		6/	g1 to g2; no other voltages	0.65	R	50	---	MegΩ
Conformance inspection, part 2								
Amplification factor	1316	---	g1 to g2; Ec2 = 300 V dc; Ic2 = 40 mA dc; t = 30; anode floating	---	Mu	3.2	4.5	---
Direct-interelectrode capacitance	1331	---		---	Cgp	---	0.022	pF
					Cin	75.0	88.0	pF
					Cout	10.8	12.8	pF

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	
Conformance inspection, part 3								
Life test	---	---	Group C; Class AB amp; F = 1 to 32 MHz; Eb = 2,900 V dc; Ec2 = 350 V dc; Ec1/Ibo = 250 mA dc; Eg1/Ib = 800 mA dc; t = 500 hours	---	Po	1,200	---	W (useful)
Forced cooling	1143	3/ 7/	Ec1/Ib = 500 mA dc	---	T(anode core)	---	250	°C
Coolant-pressure drop versus coolant flow	1155	4/ 7/	No voltages	---	---	---	0.25	In.H_2O
Vibration, mechanical	1032	7/ 8/	Ef = 6.0 V, ac or dc; Ebb = 2,500 V dc; Ec2 = 400 V dc; Rp = 1,000 ohms; Ec1/Ib = 250 mA dc; accel = 10 G peak (min) or DA = 0.25 inch (min) below 28 Hz; F = 10 to 500 to 10 Hz	---	Ep	---	30	V ac
RF useful output power	2214	7/	Class AB1 amplifier; F = 1 MHz (min); Eb = 3,000 V dc; Ec2 = 350 V dc (max); Ec1/Ib = 250 mA dc with Pd = 0 W; Eg1/Ib = 1,000 mA dc (max); Ic1 = 0 mA dc; Ic2 = 30 mA dc (max); t = 15 minutes (min)	---	Po	1,500	---	W (useful)
Shock, specified pulse	1042	7/	Test condition A	---	---	---	---	---
Vibration, mechanical and shock, specified pulse end points:	---							
Electrode current (ion)	1256	7/		---	Iz	---	10	µA dc
Electrode voltage (grid)	1261	7/		---	Ec1	-47	-60	V dc

See footnotes at top of next page.

TABLE I. Testing and inspection - Continued.

1/ In all cases of operation, forced-air cooling shall be applied and the maximum seal and anode core temperature rating shall not be exceeded. An air-system socket and air director (chimney), such as the EIMAC SK-800 series sockets with SK-806 chimney, or equivalents, should be used. The cooling table is based on installation of the tube in the SK-800/SK-806 socket/chimney combination, with air at a maximum of 40°C. The static-pressure drop figures shown are for the tube/socket/ chimney combination, with airflowing in a base-to-anode direction. At very high frequency, increased airflow will be required. Cooling airflow shall be maintained during standby periods when only the heater voltage is applied to the tube. Airflow shall be applied before or simultaneously with the electrode voltages, and may be removed with them. Where long life and consistent performance are factors, cooling in excess of minimum requirements is normally beneficial.

Sea level			10,000 feet		
Anode diss.	Airflow (cfm)	Approx. press. drop ($In.H_2O$)	Anode diss.	Airflow (cfm)	Approx. press. drop ($In.H_2O$)
600 W	13	0.05	600 W	19	0.08
800	17.5	0.10	800	26	0.15
1,000	25	0.20	1,000	37	0.30

2/ In all electrical tests involving application of heater voltage, the use of air-system socket/chimney combination SK-800/SK-806 series, or equivalents, shall be allowable. Forced-air cooling is permitted at the rate of 25 cfm maximum for the base and anode of sea level, rising to a maximum of 37 cfm at 10,000 feet elevation. A separate source may be used for the base and anode but neither shall exceed the totals specified above. Cooling air shall not have a temperature less than 20°C.

3/ The cooling test shall be made as follows: An SK-800 series socket shall be mounted in an infinite baffle system, or equivalent. The tube under test (TUT) shall be mounted in the socket, with an SK-806 chimney mounted so that all air passing in a base-to-anode direction shall pass through the anode cooler of the tube. At an ambient temperature of not less than 20°C nor more than 40°C, both base and anode shall be cooled by applying an airflow of 25 cfm maximum at sea level. At the specified test conditions, the anode core temperature shall not exceed the specified limit. Temperature shall be measured by means of a thermocouple, located as follows: The thermocouple shall be embedded in the top of the anode core, adjacent to the cooler, by means of drilling a small hole, shallow enough so that the tube vacuum shall not be lost, placing the welded thermocouple junction therein, and then peening the edges of the hole so as to hold the thermocouple firmly in place. Good electrical continuity between the thermocouple and the metal of the anode core shall be demonstrated before the cooling test is performed.

4/ An infinite baffle system, or equivalent, with an airflow of 25 cfm at sea level shall be used. The static-pressure drop is measured across the tube/socket/chimney combination.

5/ This test shall be the first test performed after the holding period. The tube shall be connected as an ion gauge with the specified potentials applied, and the highest initial reading shall be taken as the test value. Ion current is read with a microammeter in series with the negative anode lead. Except for Ef, all voltages shall be applied simultaneously, with an automatic current regulator controlling Ic2 to the specified value.

6/ Test to be made with a potential of 50 ± 5 V dc applied between the test points. An instrument such as the General Radio Megohmeter (model 1862B), or equivalent, may be used.

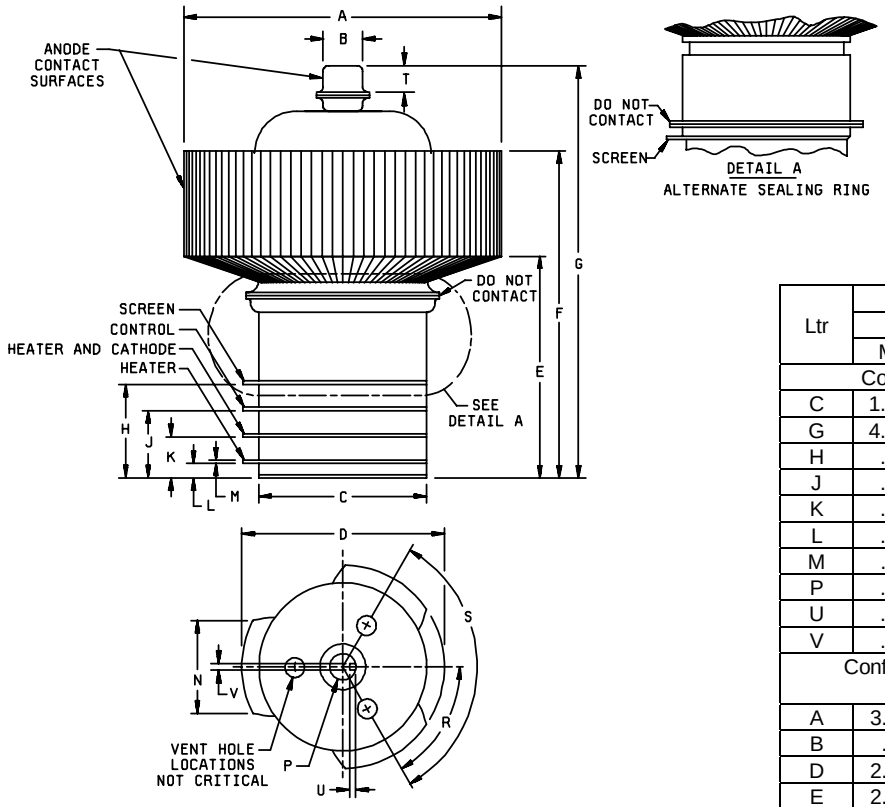
7/ This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. An accept on zero defect sampling plan shall be used, with sample of three tubes with an acceptance number of zero. In the event of failure, the test will be made as a part of conformance inspection, part 2, acceptance level 6.5 (see 10/). The "12-calendar month" sampling plan shall be reinstated after three consecutive samples have been accepted.

TABLE I. Testing and inspection - Continued.

8/ Each TUT shall be subjected to one sweep cycle in each of the three axes X, Y, and Z. One sweep cycle (10 to 500 and back to 10 Hz) shall be covered in 6 to 12 minutes. The specified voltages shall be applied during the test, using the basic test circuit shown, see figure 2. Tubes found to electrically oscillate for causes other than vibration shall not be tested nor rejected on this test. Each tube shall be vibrated for 60 seconds at the frequency which gives the maximum vibration (noise) output voltage in each of the three axes. If at the end of the 60 seconds the vibration output voltage is increasing, the vibration shall be continued until there is no further increase. The tubes shall not show noise voltage output in excess of the maximum limit specified, except one intermittent short per tube shall be allowable during this test. In addition to reading noise voltage on the specified VTVM, or equivalent, a permanent recording shall be made using a good quality recorder to produce a plot of noise voltage versus frequency. Noise voltage amplifiers used with the recorder shall have a $\pm$ 1 dB frequency response over the range to be measured and the overall recording equipment shall be capable of fast response in order to show sharp noise voltage spikes resulting from internal tube resonances or other phenomenon. Prominent noise peaks indicated on the recording shall be individually investigated by fixed-frequency operation, and the 60-second operation shall be made at the frequency of highest noise as so selected.

9/ MIL-STD-1311 method 1231, pulse emission (1) or pulse emission (2) tests may be performed alternately as specified herein. Only one of these tests shall be performed.

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
Conformance inspection, part 2				
C	1.870	1.900	47.50	48.26
G	4.600	4.800	116.84	121.92
H	.965	.988	24.51	25.10
J	.690	.710	17.53	18.03
K	.415	.435	10.54	11.05
L	.140	.165	3.56	4.19
M	.020	.030	0.51	0.76
P	.314	.326	7.98	8.28
U	.025	.048	0.64	1.22
V	.045	.070	1.14	1.78
Conformance inspection, part 3 7/				
A	3.335	3.365	84.71	85.47
B	.807	.817	20.50	20.75
D	2.250	2.300	57.15	58.42
E	2.195	2.380	55.75	60.45
F	3.410	3.550	86.61	90.17
N	.700	.800	17.78	20.32
R	55°		65°	
S	115°		125°	
T	.470	.530	11.94	13.46

NOTE: Dimensions H, J, K, L, and M shall be maintained within .100 inch (2.54 mm) from the outer peripheral edge of the contact tabs.

FIGURE 1. Outline drawing of electron tube type 8168.

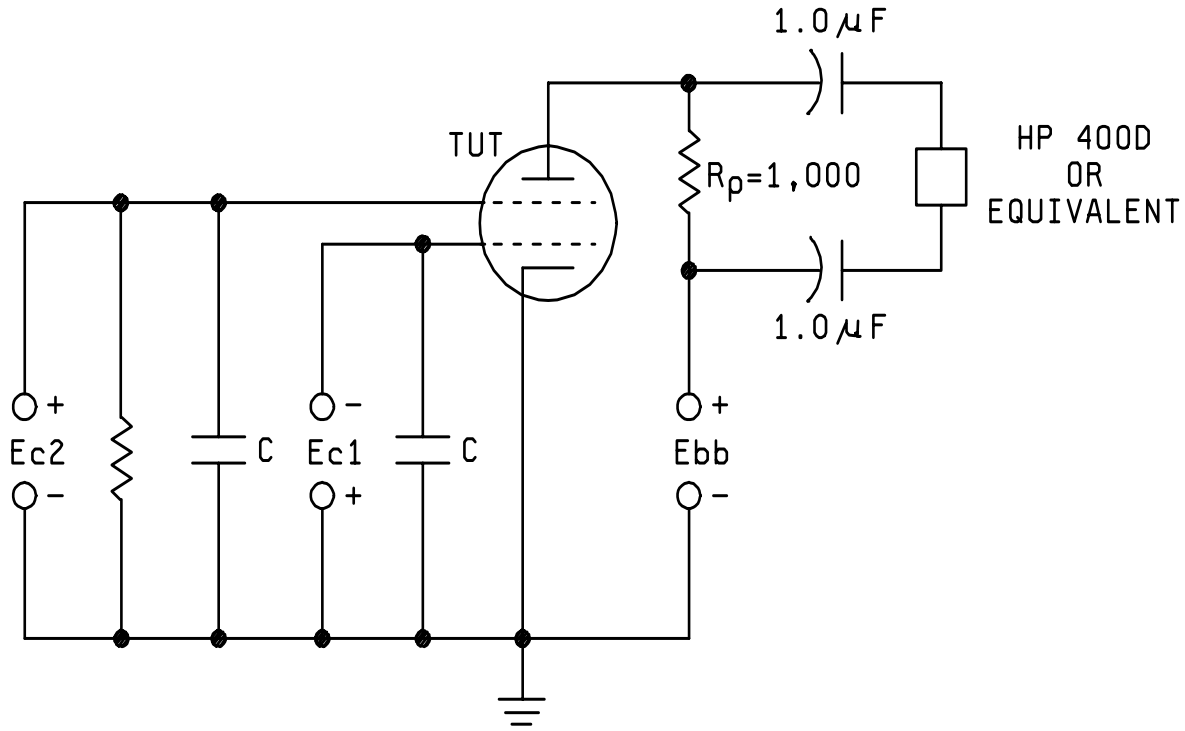


FIGURE 2. Basic circuit for vibration test (noise).

NOTES

Referenced documents. In addition to MIL-PRF-1, this specification sheet 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 5960-3746)

Review activities:
Army - AR, CE, MI, SM
Navy - AS, CG, MC, OS
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 www.dodssp.daps.mil.