

INCH-POUND

MIL-PRF-1/1509H  
 20 January 2015  
 SUPERSEDING  
 MIL-PRF-1/1509G  
 18 December 2008

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER  
 TYPES 6696A, 6697A, and 6697AW

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: Triode, metal-ceramic.

See figures 1 and 2.

Mounting positions: 6696A - vertically, anode down, in water jacket.

6697A and 6697AW - vertically, anode down, in air distributor.

Weight: 6696A - 17 pounds (7.7 kilograms) nominal.

6697A and 6697AW - 43 pounds (19.5 kilograms) nominal.

ABSOLUTE RATINGS: (Maximum):

Parameter:	TYPE	F1	Ef	Eb	Ec	Ib	Ic	Pg	Pi	Pp	Seal and env temp	Cooling
Unit:		MHz	V	kV dc	kV dc	A dc	A dc	W	kW	kW	°C	---
C Teleg:	6696A	30	13.0 ± 5 %	16.0	-3.2	11.0	2.0	1,000	176	60	200	<u>1/</u>
	6697A 6697AW	30	13.0 ± 5 %	16.0	-3.2	11.0	2.0	1,000	120	35	200	<u>2/</u>
C Teleg:	6696A	30	13.0 ± 5 %	10.0	-3.2	8.5	2.0	1,000	85	40	200	<u>1/</u>
	6697A 6697AW	30	13.0 ± 5 %	10.0	-3.2	8.5	2.0	1,000	81	23	200	<u>2/</u>
B/AB Audio:	6696A	---	13.0 ± 5 %	16.0	---	11.0	---	1,000	95	60	200	<u>1/</u>
	6697A 6697AW	---	13.0 ± 5 %	16.0	---	11.0	---	1,000	55	35	200	<u>2/</u>
B Teleg:	6696A	30	13.0 ± 5 %	16.0	---	9.0	---	1,000	144	60	200	<u>1/</u>
	6697A 6697AW	30	13.0 ± 5 %	16.0	---	9.0	---	1,000	85	35	200	<u>2/</u>
AB rf Amp:	6696A	30	13.0 ± 5 %	16.0	---	11.0	---	1,000	150	60	200	<u>1/</u>
	6697A 6697AW	30	13.0 ± 5 %	16.0	---	11.0	---	1,000	90	35	200	<u>2/</u>
Test conditions:	6696A	---	13.0	---	---	---	---	---	---	---	---	<u>3/</u>
	6697A 6697AW	---	13.0	---	---	---	---	---	---	---	---	<u>4/ 5/</u>

See footnotes at end of table I.

GENERAL:

Qualification: Not Required.

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

AMSC N/A

FSC 5960



## MIL-PRF-1/1509H

TABLE I. Testing and inspection.

Inspection	Method MIL-STD-1311	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 1</u>							
Total grid current	1266	<u>5/ 8/</u>	Eb = 10.0 kV dc; Ec/lb = 3.0 A dc; Pin = 30 kW; t = 300 seconds	Ic	---	-300	μA dc
Electrode voltage (1) (anode)	1261	---	Ec = -200 V dc; Eb/lb = 3.0 A dc	Eb(1)	5.6	7.2	kV dc
Electrode voltage (2) (anode)	1261	---	Ec = 0; Eb/lb = 3.0 A dc	Eb(2)	1.9	2.9	kV dc
Power oscillation	1236	---	Eb = 20.0 kV dc; Ib = 6.0 A dc; Ic = 1.0 A dc (max); Rg = 3,000 ohms (max); Ec = -3,000 V dc (max); F = 13.6 MHz (min); t = 600 seconds (min)	Po	75	---	kW (useful)
Peak emission	1231	---	eb = ec = 2,000 V	is	120	---	a
Electrode voltage (grid)	1261	---	Eb = 15.0 kV dc; Ec/lb = 0.020 A dc	Eco	-800	-1,000	V dc
Primary grid emission	1266	---	Anode grounded; Eg/Pg = 1,000 W; t = 20 seconds	Isg	---	-5.0	mA dc
Cold grid emission	---	<u>9/</u>	Ef = 0; Anode floating; Ec = -15.0 kV dc	Ic	---	15	μA dc
<u>Conformance inspection, part 2</u>							
Filament current	1301	---		If	190	210	A
Direct-interelectrode capacitance	1331	---	No shield	Cgp	47.0	57.0	pF
			No shield	Cgk	65.0	85.0	pF
			No shield	Cpk	2.0	3.2	pF
<u>Conformance inspection, part 3</u>							
Life test	---	<u>6/</u>	Group D; filament cycling; Ef = 13.0 V; "on" time = 3.5 ± 20% hours; "off" time = 15 ± 20% minutes; t = 500 hours	---	---	---	---
Life-test end points:	---						
Total grid current	1266	---		Ic	---	-330	μA dc
Electrode voltage (grid)	1261	---		Ec	-800	-1,000	V dc
Peak emission	1231	---		is	120	---	a
Mechanical resonance (type 6697AW only)	---	<u>7/ 11/</u>	No voltages applied	---	---	---	---

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

- 1/ Forced-air cooling of the base and seals may be required, depending on ambient conditions and operating frequency. Airflow rate and direction should be determined to limit seal and envelope temperatures to 200°C maximum and to maintain uniform temperature distribution around the seals. Minimum cooling requirements for the anode are shown, based on use of the Machlett Laboratories Inc. F-17393 water jacket, the EIMAC SK-1620 water jacket, or equivalent.

Anode diss. (kW)	Water flow rate (gpm)	Approx. press. drop (psi)
20	5.7	1.3
30	8.0	2.1
40	11.2	3.3
50	14.5	5.0
60	18.0	7.2

- 2/ Forced-air cooling of the base and seals may be required, depending on the ambient conditions and the operating frequency. Airflow rate and direction should be determined to limit seal and envelope temperatures to 200°C maximum and to maintain uniform temperature distribution around the seals. Minimum cooling requirements for the anode are shown, based on a maximum incoming air temperature of 50°C at sea level, and the use of the air distributor shown on figure 3, Machlett Laboratories Inc. F-17759 air distributor, EIMAC SK-1606A air distributor, or equivalent.

Anode diss. (kW)	Airflow (cfm)	Approx. press. drop (inches of water)
10	240	0.2
20	700	1.5
30	1,350	5.0
35	1,700	8.0

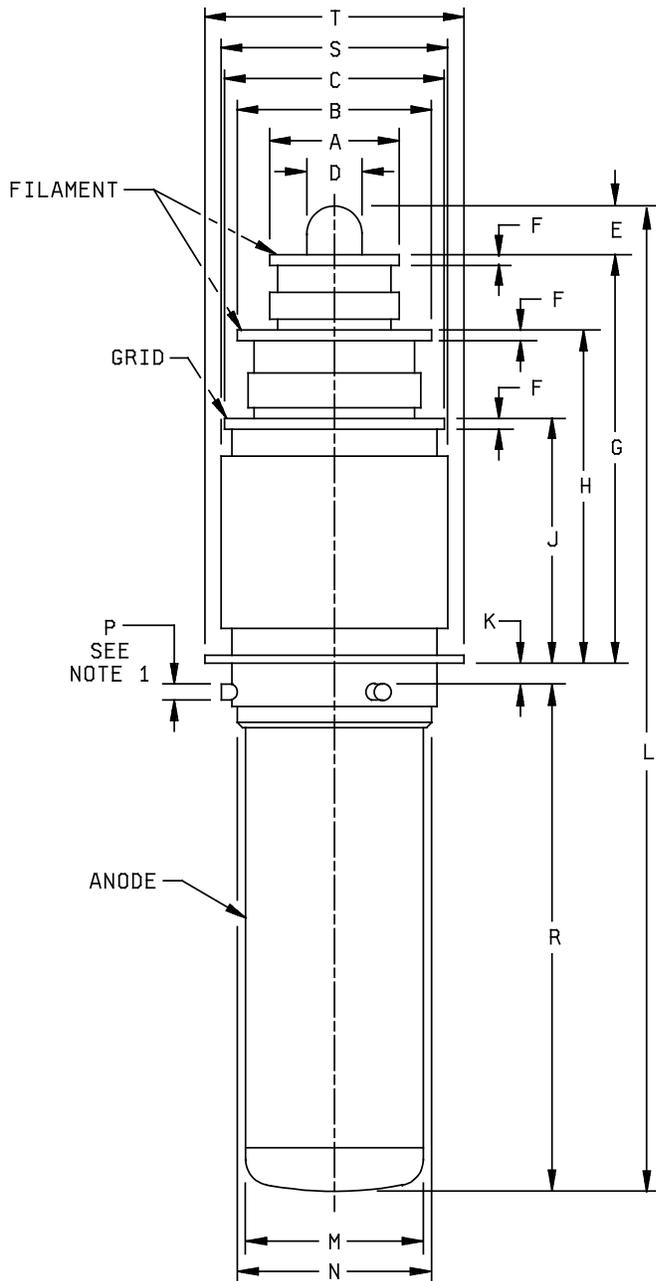
In cases where long life and consistent performance are factors, cooling in excess of minimum requirements is normally beneficial.

- 3/ During test, it shall be permissible to use forced-air cooling of the envelope and base and water cooling of the anode, in accordance with the provisions of 1/.
- 4/ During test, it shall be permissible to use forced-air cooling of the envelope, base, and anode, in accordance with the provisions of 2/.
- 5/ At the option of the manufacturer, type 6697A and 6697AW tubes may be tested according to this document as water-cooled tubes before assembly with the anode cooler (radiator) in which case only the total grid-current test (method 1266) need be made on the assembled tube. A holding period of 72 hours minimum (after attaching cooler) should elapse before making the total grid-current test.
- 6/ The operating time, t, is the total "on" time. Demonstration of satisfactory compliance to the life-test requirements listed by any of the three types shall satisfy the requirements for all three types.
- 7/ This test shall be performed on the grid-cathode structure, with the anode and envelope removed. The structure shall be supported by the grid terminal and mounted with its axis perpendicular to the direction of vibration. With a constant total displacement of approximately .002 inch (0.05 mm), the frequency shall be varied from 10 to 50 to 10 Hz. When viewed under light from a stroboscope, no resonance below 30 Hz shall be indicated.
- 8/ This test is to be the first test performed at the conclusion of the holding period.

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TABLE I. Testing and inspection - Continued.

- 9/ The cold grid-current test shall be performed using the circuit shown on figure 4, or equivalent. The  $E_c$  voltage shall be raised to the specified value but at no time shall the resultant  $I_c$  exceed  $100 \mu\text{A}$  dc. When the specified value of  $E_c$  is reached, the tube shall be held under this condition until the  $I_c$  requirement is met. Residual equipment leakage current may be subtracted from the indicated  $I_c$  reading.
- 10/ Compatibility testing will be required in addition to the requirements stated herein. A sample of eight each tube types 6696A and 6697A shall be subjected to compatibility testing. The 6696A shall be subjected to compatibility testing in the AN/FRT-67. The 6697A shall be subjected to compatibility testing in the AN/FRT-31. Compatibility testing shall be considered satisfactorily completed when the samples have accumulated a total of 3,200 operating hours without a failure. Each tube must operate at least 400 hours. In the event of a failure, the remaining tubes must accumulate a total of 3,600 operating hours. If more than one failure occurs, the sample shall be rejected. Compatibility testing will be conducted at each installation on a noninterference basis. Only manufacturers which have passed compatibility testing will be considered qualified.
- 11/ This test shall be performed yearly. 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. The yearly sampling plan may be reinstated after three consecutive samples have been accepted.

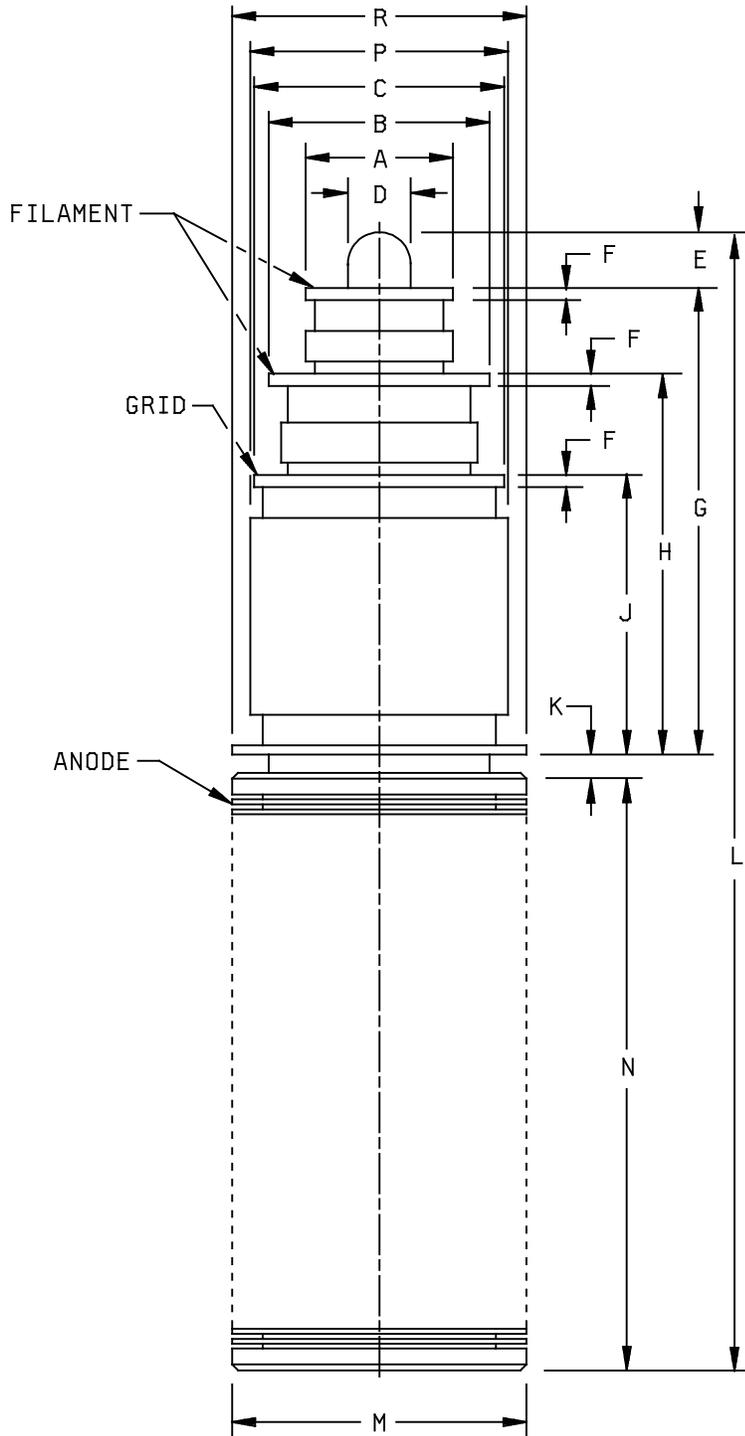


Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
G	7.750	8.000	196.85	203.20
K	.406	.469	10.31	11.91
L	---	19.375	---	492.13
M	3.485	3.515	88.52	89.28
N	3.990	4.000	101.35	101.60
P	.300	.320	7.62	8.13
R	9.750	10.000	247.65	254.00
Conformance inspection, part 3 (see note 2)				
A	2.469	2.531	62.71	64.29
B	3.469	3.531	88.11	89.69
C	4.619	4.681	117.32	118.90
D	---	1.187	---	30.15
E	---	1.000	---	25.40
F	.125	---	3.18	---
H	6.500	6.750	165.10	171.45
J	4.812	4.937	122.22	125.40
S	---	4.720	---	119.89
T	---	5.280	---	134.11

NOTES:

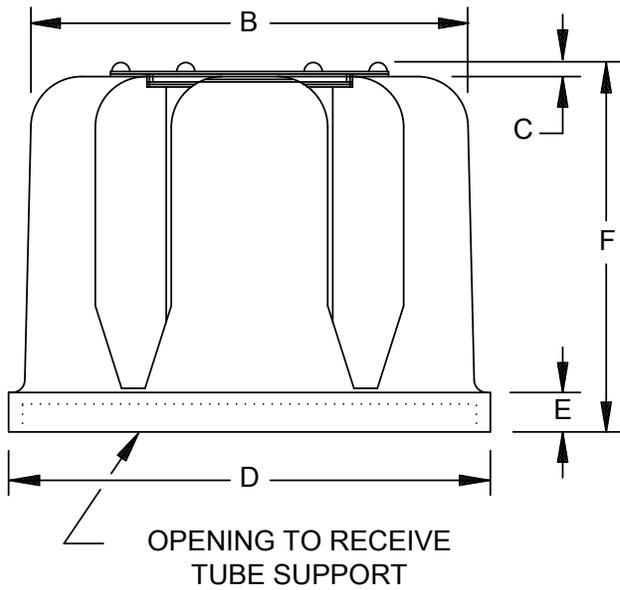
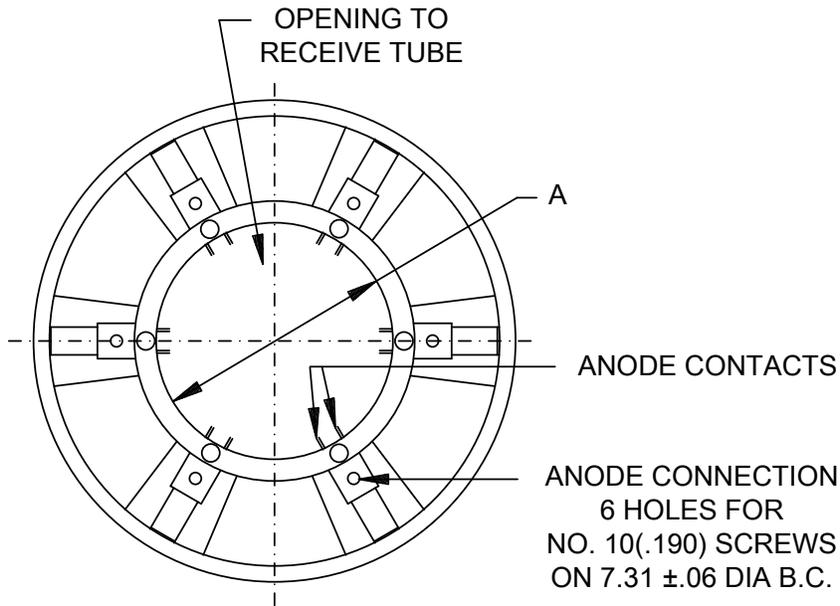
1. Three bayonet pins, dimension P diameter; length: Min .292 (7.42 mm), max .354 (8.99 mm), nominally 120° apart.
2. Dimensions shall be checked during the initial production and annually thereafter. An accept on zero defect sampling plan shall be used, with sample of three tubes with an acceptance number of zero. In the event of failure, the test will be made as a part of conformance inspection, part 2. Annual sampling plan may be reinstated after three consecutive samples have been accepted.

FIGURE 1. Outline drawing of electron tube type 6696A.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
L	---	19.875	---	504.83
M	5.219	5.281	132.56	134.14
N	10.000	10.250	254.00	260.35
Conformance inspection, part 3 (See note 2, figure 1)				
A	2.469	2.531	62.71	64.29
B	3.469	3.531	88.11	89.69
C	4.619	4.681	117.32	118.90
D	---	1.187	---	30.15
E	---	1.000	---	25.40
F	.125	---	3.18	---
G	7.750	8.000	196.85	203.20
H	6.500	6.750	165.10	171.45
J	4.812	4.937	122.22	125.40
K	.312	---	7.92	---
P	---	4.720	---	119.89
R	---	5.280	---	134.11

FIGURE 2. Outline drawing of electron tube types 6697A and 6697AW.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	5.28	5.31	134.11	134.87
B	10.38	10.62	263.65	269.75
C	---	.063	---	1.60
D	10.88	11.12	276.35	282.45
E	---	1.000	---	25.40
F	---	11.375	---	288.93

NOTE: Metric equivalents (to the nearest 0.01 mm) are given for general information only.

FIGURE 3. Air distributor for tube type 6697A.

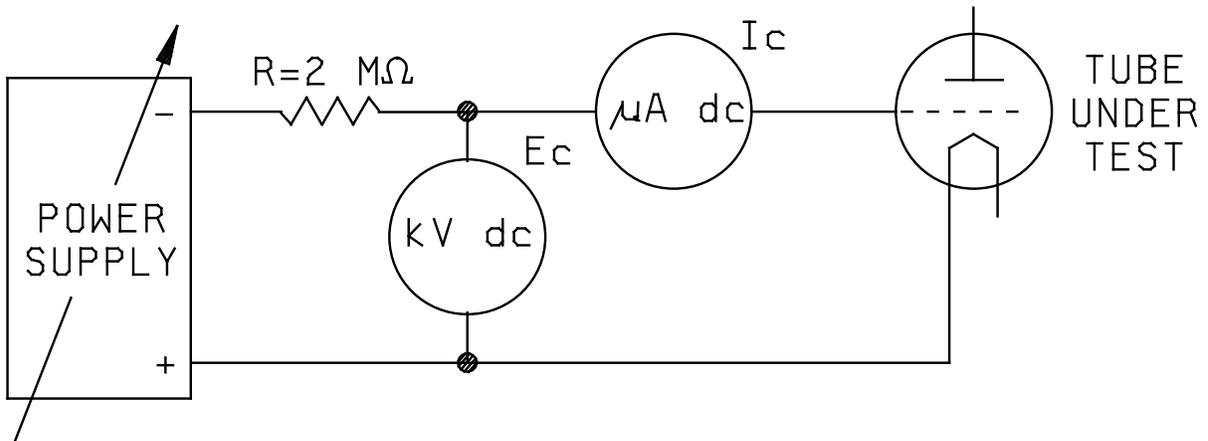


FIGURE 4. Test circuit for cold grid-current test.

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

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Custodian:

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Review activities:

Army - CR4  
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