INCH-POUND

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9 July 1998
SUPERSEDING
MIL-E-1/1635A(ER)
6 February 1980

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, CATHODE RAY
TYPE 10ALP19

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: Electrostatic deflection and focus, special deflection structure for minimum deflection defocusing, aluminized screen.

Dimensions and pin connections: See figure 1.

ABSOLUTE RATINGS:

Parameter:	Ef	Ec1	Eb1	Eb2	ed	Rg	Zd
Unit:	V	V dc	V dc	V dc	v	Meg	Meg 1/
Maximum:	6.9	0	4,000	10,000	1,200	1.5	5.0
Minimum:	5.7	-300	---	5,000	---	----	----
Test conditions: 2/	6.3	Adjust	Focus	8,000	---	----	----

See footnotes at end of table I.

GENERAL:

Qualification: Required 3/

TABLE I. Testing and inspection.

Inspection	Method	Notes	Conditions	Symbol	Limits Min	Limits Max	Unit
Preproduction sample approval inspection		6/					
Pressure (implosion)	1141	---		---	---	---	---
Direct-interelectrode capacitance	1331	---	Grid 1 to all	Cg1	---	12.5	pF
			D1 to D2	C1D2	---	7.0	pF
			D3 to D4	C3D4	---	3.0	pF
			D1 to all	CD1	---	14.5	pF
			D2 to all	CD2	---	14.5	pF
			D3 to all	CD3	---	8.0	pF
			D4 to all	CD4	---	8.0	pF
Cathode illumination	5216	---		---	---	---	---
Deflection - factor uniformity	5248	---		---	---	1.5	%
Vibration	5111	---		---	---	1	mm
Shock	5115	11/		---	---	---	---
Base material insulating quality	1216	---		---	---	---	---
Conformance inspection part 1							
Angle between traces	5101	---		---	89	91	Degrees
Bulb, screen, and faceplate quality	5106	---		---	---	---	---
Voltage breakdown	5201	---		---	---	---	---
Voltage breakdown (electrostatic types)	5201	---		---	---	---	---
Gas “cross” (electrostatic deflection)	5206	7/	Beam current = 2.5 μA dc	---	---	---	---
Stray light emission (conventional types)	5216	---	Eb = 10,000 V dc	---	---	---	---
Modulation	5223	7/	Beam current = 2.5 μA dc	ΔEc1	---	20	V dc
Spot position (electrostatic deflection)	5231	---		---	---	20	mm
Grid-cutoff voltage	5241	---		Ec1	-155	-205	V dc
Focusing voltage at cutoff	5246	---		Eb1	2,250	3,100	V dc
Spot displacement (leakage)	5231	---		---	---	10	mm
Grid No. 1 leakage current	5251	---		---	---	---	---

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
Conformance inspection part 1 - Continued							
Spot examination	---	8/		---	---	---	---
Minimum useful scan	---	7/	Focused trace; beam current = 2.5 μA dc	---			
1D2		---		---	9	---	Inches
3D4		---		---	9	---	Inches
Screen charging	---	9/		---	---	---	---
Deflection defocusing	---	10/		---	---	1:3	Ratio
Pattern distortion	5103	---		---	---	2	%
Secureness of base, cap, or insert	1101	---		---	---	---	---
Base pin solder depth	1111	---		---	---	---	---
Permanence of marking	1105	4/ 5/		---	---	---	---
Conformance inspection part 2							
Neck and base alignment (electrostatic types)	5101	---		---	---	1.5	Degrees
Heater current	1301	---		If	540	660	mA
Base alignment (electrostatic types)	5101	---	+1D2, index pin	---	---	---	---
Electrode current (anode No. 1)	5201	---		Ib1	-15	+10	μA dc
Screens	5221	7/		---	---	---	---
Line width A (electrostatic deflection)	5226	7/	Beam current = 2.5 μA dc	---	---	0.30	mm
Line width B (electrostatic deflection)	5226	7/	Beam current = 2.5 μA dc	---	---	0.42	mm
Anode No. 1 leakage current	5251	---		---	---	---	---
Anode No. 2 leakage current	5251	---		---	---	---	---
Deflection factor	5248	---	1D2	---	155	189	V dc/inch
Deflection factor	5248	---	3D4	---	151	185	V dc/inch

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
Conformance inspection part 3							
Life test	---	7/ 11/	Group C; beam current = 2.5 μA dc; Eb2 = 10,000 V dc; t = 500 hours (min)	---	---	---	---
Life-test end points:	---	---					
Modulation	5223	---		ΔEc1	---	20	V dc
Line width A	5226	---		---	---	0.30	mm
Line width B	5226	---		---	---	0.42	mm
Grid No. 1 leakage current	5251	---		---	---	---	---
Anode No. 1 leakage current	5251	---		---	---	---	---
Anode No. 2 leakage current	5251	---		---	---	---	---
Stray light emission (conventional types)	5216	---		---	---	---	---

1/ It is recommended that the deflection electrode circuit resistances be approximately equal.

2/ The P19 screen may be permanently damaged if the current density is permitted to rise too high. To prevent burning, minimum beam current densities should be employed.

3/ The preproduction sample approval requirements in U.S. Army Electronics Command Drawing SC-A-46600B hereby replace any qualification requirements referable to the product covered herein. However, the requirements of 3.1.2.1, 3.1.2.2, 3.1.3, and 4.4 in Drawing SC-A-46600B shall be considered not applicable to the product covered herein.

(Copies of U.S. Army Electronics Command Drawing SC-A-46600B, 19 March 1965, “Preproduction Sample Approval In Lieu of Qualification Requirements In Specifications for Semiconductor Devices And Electron Tubes” may be obtained from the acquiring activity or as directed by the contracting officer.)

4/ Marking shall be in accordance with MIL-PRF-1. If any specification requirements waiver has been granted, the product-identification marking shall consist of the tube type-number only. (See figure 1 herein.)

5/ The following additional marking requirement shall apply: A line, of adequately contrasting color to the base-material color, shall be drawn on the tube base parallel to the tube axis; this line shall be aligned with and on the same side as the index pin.

6/ Although all tests covered herein are required to be performed during preproduction sample approval inspection, the seven tests listed under this caption are performed, normally, during preproduction sample approval only.

7/ Beam current shall be measured by applying a sufficient voltage to either D1 or D2 to deflect a 1 by 1-inch (25.4 by 25.4 mm) raster until the raster cannot be seen on the screen. Grid No. 1 bias voltage shall be adjusted so that either D1 or D2 will collect 2.5 microamperes.

8/ With the focused spot just above visual cutoff, examine the spot for any abnormalities. The spot shall be of uniform brightness and shall not show any indication of a dual spot. This may be noted as an astigmatic spot of nonuniform brightness, or a spot the extremities of which give the appearance of bright cores, with the center of the spot appearing dark.

TABLE I. Testing and inspection - Continued.

9/ If used, visually check the internal aluminum coating in the area between the edge of the faceplate and internal aquadag; it shall appear uniform and nearly opaque. If not, perform the following test: With a 1.5 by 1.5-inch (38.1 by 38.1 mm) slightly defocused raster, in accordance with method 5221, in the center of the screen, and with Eb2 = 10,000 volts, and with a beam current of 15 microamperes, there shall be no evidence of any doubling of the raster lines (venetian-blind effect), or a sawtooth effect at the edges of the raster. (Any doubling of the raster lines shall be intermittent only, giving the appearance of being pulsed.) Repeat on the edges of the screen in the following positions:

a. 45° clockwise from the plane of pin No. 1.

b. 135° clockwise from the plane of pin No. 1.

c. 225° clockwise from the plane of pin No. 1.

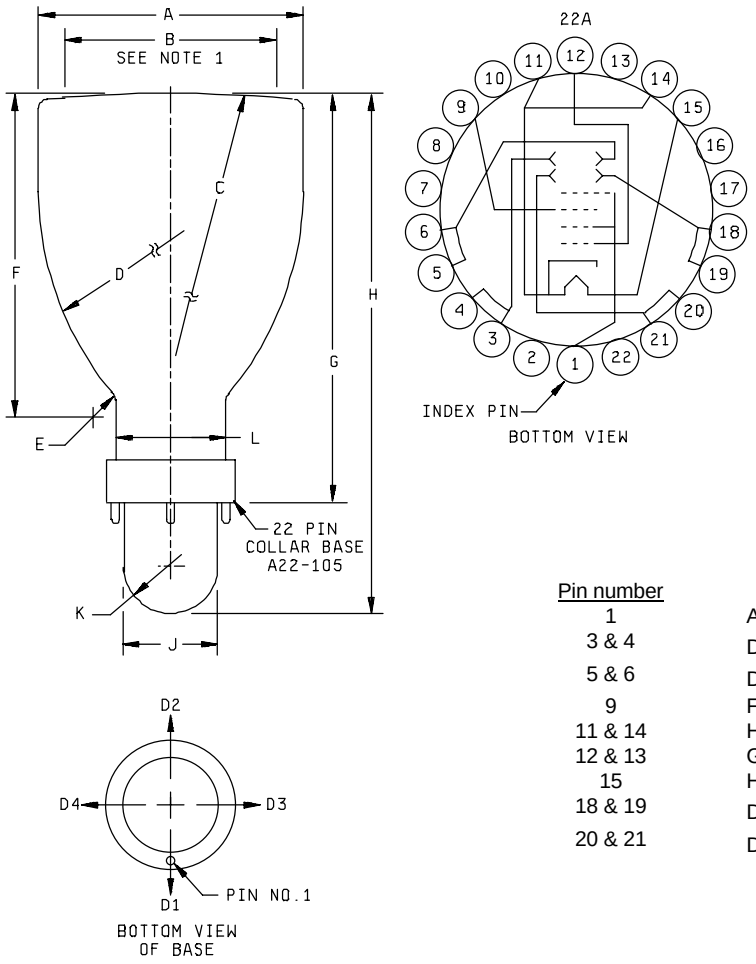
d. 315° clockwise from the plane of pin No. 1.

These tests shall be made quickly to prevent burning of the screen; apply the grid drive momentarily.

10/ The ratio of the line width of a 2-inch (50.8 mm) long trace, adjusted for best center focus, to the line width measured on the faceplate axis when the trace is deflected perpendicularly plus or minus 4 inches (101.6 mm) from the face center by a balanced dc voltage, shall not be greater than the value specified herein.

11/ Unless otherwise specified, tubes subjected to the following destructive tests are not to be delivered on the contract: Shock; life test.

12/ Revision letters are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.



Pin number	Element
1	Accelerator
3 & 4	Deflecting electrode D_1
5 & 6	Deflecting electrode D_2
9	Focusing electrode
11 & 14	Heater & cathode
12 & 13	Grid number 1
15	Heater
18 & 19	Deflecting electrode D_3
20 & 21	Deflecting electrode D_4

NOTES:
1. Minimum useful screen diameter.
2. Metric equivalents are given for general information only and are based upon 1.00 inch = 25.4 mm.
3. Reference dimensions are for information only and are not required for inspection purposes.

FIGURE 1. Outline drawing of electron tube type 10ALP19.

Ltr	Dimensions (see note 2)			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	10.375 DIA	10.625 DIA	263.53 DIA	269.88 DIA
B	9.000 DIA	---	228.60 DIA	---
F	11.375	11.875	288.93	301.63
G	15.500	16.000	393.70	406.40
H	19.750	20.250	501.65	514.35
J	3.469	3.656	88.11	92.86
K	1.594 RAD	1.969 RAD	40.49 RAD	50.01 RAD
L	4.312 DIA	4.500 DIA	109.52 DIA	114.30 DIA
Reference dimensions (see note 3)				
C	42.000 RAD		1066.80 RAD	
D	11.750 RAD		298.45 RAD	
E	1.000 RAD		25.40 RAD	

FIGURE 1. Outline drawing of electron tube type 10ALP19 - Continued.

Custodians:
Army - CR

Review activities:
Army - AV, CR4

Preparing activity:
DLA - CC

(Project 5960-A244)