

SERVICES VALVE TEST LABORATORY

CV 3629

Specification AD/CV.3629 incorporating MIL-E-1/111B Issue No. 2 dated 4.8.61. To be read in conjunction with K1006.	<table> <tr> <th colspan="2">SECURITY</th></tr> <tr> <th>SPECN.</th><th>VALVE</th></tr> <tr> <td>Unclassified</td><td>Unclassified</td></tr> </table>	SECURITY		SPECN.	VALVE	Unclassified	Unclassified
SECURITY							
SPECN.	VALVE						
Unclassified	Unclassified						

<u>TYPE OF VALVE</u>		Hydrogen thyatron modulator		<u>MARKING</u>	
<u>CATHODE</u>		Unipotential		See K1001/4	
<u>ENVELOPE</u>		Glass		Additional marking 6130.	
<u>PROTOTYPE</u>		6130		<u>BASE</u>	
				See K1001/AIV/D48/A4-9	
				Medium 4 pin low loss phenolic	
<u>RATINGS</u>				<u>CONNECTIONS</u>	
				<u>Pin</u> <u>Electrode</u>	
Heater voltage nominal		(V)	6.3	1	Heater
Heater current nominal		(A)	2.25	2	Cathode
Max. peak anode voltage		(kV)	3	3	Grid
Max. peak inverse anode voltage		(kV)	3	4	Heater + Cathode
Max. peak inverse grid voltage		(V)	200	T.C.	Anode
Min. trigger voltage		(V)	175	<u>TOP CAP</u>	
Max. peak anode current		(A)	35	See K1001/A1/D5.1	
Max. mean anode current		(mA)	45	BSS.448 ref. CT2. with skirt	
Max. rate of rise anode current		(A/ $\mu$ S)	750	<u>DIMENSIONS (ins)</u>	
Max. value of product (peak anode volts) x (peak anode current) x prf		(V.A. pps)	0.3 x 10 <sup>9</sup>	Height	Min. $4 \frac{13}{16}$ Max. $5 \frac{3}{16}$
Min. cathode heating time		(min)	2	Diameter	- 1 $\frac{9}{16}$
Max. ambient temperature		(°C)	90	<u>MOUNTING POSITION</u>	
Max. Altitude		(ft)	50,000	Any	

NOTES

A. For further details see Notes 1, 2 and 3 of MIL-E-1/111B.

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MIL-E-1/111B  
14 May 1956  
SUPERSEDED  
MIL-E-1/111A  
20 May 1953  
MIL-E-1/138  
30 March 1953

## INDIVIDUAL MILITARY SPECIFICATION SHEET

### ELECTRON TUBE, THYRATRON, HYDROGEN

JAN-3C45, 6130

This specification sheet forms a part of the latest issue of Military Specification MIL-E-1.

Ratings:	Test Code:	Ef	epy	epx	Ebb	Ec	egx	egy	lb	lb	tk	$\frac{dik}{dt}$	Pb	TA	Cooling	prp	Alt
Absolute:	both:	Vac	kv	kv	Vdc	Vdc	v	v	a	mAdc	sec(min)	a/us	---	°C	---	pps	ft
Maximum:	(a):	6.3/ 5%	3.0	3.0	---	---	200	---	35	45	---	750	0.3x10 <sup>9</sup>	/90	Note 4	---	10,000
	(b):	6.3/ 5%	3.0	3.0	---	---	200	Note 3	35	45	---	750	0.3x10 <sup>9</sup>	/90	Note 4	---	50,000
		-10%	Note 1	Note 2	---	---	---	Note 3	---	---	---	---	---	---	---	---	---
Minimum:	both:	---	---	5%epy	800	---	---	---	---	---	120	---	---	-50	---	---	---
Test Cond:	both:	6.3	3.0	---	---	0	---	130	---	---	120	---	---	---	---	2800	---

\*\*Cathode: (a) Coated Unipotential  
(b) Coated Unipotential

\*Height: 4-1/2 in. min., 5-3/16 in. max.  
4-13/16 in. min., 5-3/16 in. max.

\*\*Base: both: Medium 4-Pin Low-Loss Phenolic A4-9  
Clamping: both: Note 5

\*Diameter: 1-9/16 in. maximum  
\*\*Cap: Small Metal C1-1

\*\*Pin No.: both: 1 2 3 4 Cap  
Element: both: h k g h p  
k

Mounting Position: Any  
\*\*Envelope: T-12

The following tests shall be performed:

For miscellaneous requirements, see Paragraph 3.3, Inspection Instructions for Electron Tubes.

For miscellaneous requirements, see Paragraph 3.3, Inspection Instructions for Electron Tubes.

Ref.	Test	Test Code	Conditions	AQL(%)	Insp. Level or Code	Sym.	LIMITS						Units
							Min.	LAL	Bogie	UAL	Max.	ALD	
	<u>Qualification Approval Tests</u>												
3.1	Qualification Approval:	both:	Required for JAN Marking	---	---								
---	Cathode:	both:	Coated Unipotential	---	---								
3.4.3	Base Connections:												
4.9.19.1	Vibration (1):	both:	No Voltages; F=12 to 50 cps; Notes 6 and 7										
4.9.19.2	Vibration (2):	both:	t = 30 (min); Note 7										
---	Operation (2):	both:	t=5.0 hours;TA=90°C;Note 8			egy:	---	---	---	---	130	---	v
---	Operation (4):	(b):	t=5.0 hours; Notes 8 and 9			egy:	---	---	---	---	130	---	v
	<u>Measurements Acceptance Tests, Part 1: Note 10</u>												
4.5	Holding Period:	both:	t=96 hours										
4.10.8	Heater Current:	both:		0.65	II	If:	2.0	---	---	---	2.5	---	Aac
---	†Instantaneous Starting:	both:	epy=3000v(min); Notes 8 and 11	0.65	II	---	---	---	---	---	---	---	
4.10.17.2	DC Anode Voltage:	both:	Notes 8 and 12	0.65	II	Ebb:	---	---	---	---	300	---	Vdc
---	†Operation (1):	both:	epy=4.0kv(min); Notes 8 and 13	0.65	II	egy:	---	---	---	---	130	---	v
---	Emission:	both:	Ik=35a(min);prp=60pps ±10%;tp=5.0us±10%;tr=0.5us max; Note 14	0.65	II	egk:	---	---	---	---	150	---	v
4.9.1	Mechanical:	both:											

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Ref.	Test	Test Code	Conditions	AQL(%)	Insp. Level or Code	Sym.	LIMITS						Units
							Min.	LAL	Bogie	UAL	Max.	ALD	
<u>Measurements Acceptance Tests, Part 2</u>													
4.9.19.3	Bump:	both:	Angle = 20°; Note 7	6.5	IA								
---	Anode Delay Time:	both:	epy=4.0kv(min);Notes 8,13;t=120; Note 15	6.5	IA	tad:	---	---	---	---	0.6	---	us
---	Anode Delay Time Drift:	both:	Anode Delay Time; Note 16	6.5	IA	Δtad:	---	---	---	---	0.15	---	us
---	Time Jitter:	both:	epy=1.5kv max; Notes 8 & 17	6.5	IA	tj:	---	---	---	---	0.02	---	us
---	Operation (3):	(b):	t=5.0minutes;Notes 8 & 9	6.5	IA	egy:	---	---	---	---	130	---	v
Ref.	Test	Test Code	Conditions	AQL(%)	Insp. Level or Code	Allowable Defectives per Characteristic			Sym.	Limits		Units	
						1st Sample	Combined Samples	Min.		Max.			
<u>Acceptance Life Tests</u>													
4.11	Life Test:	both:	Group B; Notes 8 and 18						t:	500	---	hours	
4.11.4	Life Test End Points:	both:	Operation (1) DC Anode Voltage Time Jitter						egy: Ebb: tj:	--- --- ---	140 750 0.04	v Vdc us	
<u>Packaging Requirements</u>													
4.9.18.1.6	Container Drop:	both:	(d) Package Group 1; Container Size J										

Note 1: For instantaneous starting applications where plate voltage is applied instantaneously, the power supply filter design shall be such that the maximum permissible epy is 3000v and shall not be attained in less than 0.04 seconds.

Note 2: In pulsed operation, the peak inverse voltage, exclusive of a spike of .05us max. duration, shall not exceed 1500 volts during the first 25 us after the pulse.

Note 3: Driver pulse, measured at tube socket with thyatron grid disconnected: egy=175v(min), time of rise=0.5us(max), grid pulse duration=2.0us(min). Impedance of drive circuits=1500 ohms (max.)

Note 4: Cooling of the anode lead is permissible, but there shall be no air blast directly on the bulb.

Note 5: Clamping is permissible by the base and/or bulb in the area up to 2 in. above the top of the base only.

Note 6: There shall be no pronounced resonance in the specified range.

Note 7: There shall be no evidence of shorts of any kind resulting from this test.

Note 8: The tube shall be tested in the test circuit shown in the attached drawing. Tests performed at repetition rates less than the resonant repetition rate shall be made with a hold-off diode in the charging circuit. The circuit constants shall be chosen so that at epy=3.0kv under resonant charging conditions, dik/dt=750a/us(min), ib=35a, tp=0.5us±10%, prr=3000 pps.

Warning: These conditions are specified only for the purpose of determining circuit constants. The actual operating voltage and repetition rates for each test is specified in the conventional manner under the particular conditions or under the general test conditions, as the case may be.

The grid pulse characteristics shall be tp=2.0us(max), tr=0.5us(min), Driver impedance=1500 ohms(min).

Note 9: The tube shall operate satisfactorily in an evacuated chamber in which the pressure does not exceed 70 mm Hg absolute.

Note 10: The AQL for the combined defectives for attributes in Measurements Acceptance Tests, Part 1, excluding Mechanical, shall be one percent. A tube having one or more defects shall be counted as one defective. MIL-STD-106, Inspection Level II, shall apply.

Note 11: This shall be the first test after the holding period. The tube shall operate satisfactorily on push button starting within 3 attempts when the anode voltage epy is applied to the tube under test in such a manner as to rise from 0 to 3000v within 0.03 sec. (the filter in the rectifier shall be designed so that epy reaches at least 1500v within 0.015 sec).

The intervals between successive attempts to instantaneously start the tube shall not be less than 10 seconds nor more than 30 seconds. The tube failing to start within 3 attempts will be considered a failure.

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- Note 12: This test shall be conducted within 60 seconds after the Operation (1) test.
- Note 13: The tube shall operate continuously, for five minutes without evidence of arc-back or anode heating.
- Note 14: The positive pulse shall be applied to the grid of the tube. Measure the voltage between grid and cathode 2.5us(max) after the beginning of the current pulse. The average voltage shall not rise during the last four microseconds. Plate floating.
- Note 15: Anode Delay Time ( $t_{ad}$ ) - a time interval between the point on the rising portion of the grid pulse which is 26% of the maximum unloaded pulse amplitude and the point where anode conduction takes place.
- Note 16: During the interval between 2 minutes and 7 minutes of the Anode Delay Time Test, the change in anode delay time ( $\Delta t_{ad}$ ) relative to the  $t_{ad}$  value observed on the Anode Delay Time test shall not exceed the specified value.
- Note 17: The variation in firing time ( $t_f$ ) shall be measured at 50% of pulse amplitude and shall not be greater than the amount specified.
- Note 18: Life test shall be operated with the tube in a horizontal position and shall be shut down every ninety-six (96) hours for a sixty (60) minute interval.
- Note 19: Reference specification shall be of the issue in effect on the date of invitation for bid.

