VALVE ELECTRONIC

SERVICES VALVE TEST LABORATORY

CV 3987

SPECIFICATION AD/CV.3987 incorporating MIL-E-1/181B ISSUE NO. 2 DATED 4.8.61. To be read in conjunction with K.1006.	SECURITY	
	SPECN.	VALVE
	Unclassified	Unclassified

TYPE OF VALVE	Reliable Gas-filled voltage Stabiliser with flexible leads.
CATHODE	Cold
ENVELOPE	Glass
PROTOTYPE	5644

Superseded

RATINGS

Absolute, unless otherwise stated

			NOTE
Min. Striking Voltage			
in light	(V)	125	
in total darkness	(V)	175	
Nominal stabilising voltage	(V)	95	
Max. Anode current	(mA)	25	
Min. anode current	(mA)	5	
Voltage regulation over current range	(V)	5	
Max. bulb temperature	(°C)	220	
Min. ambient temperature	(°C)	-55	
Max. altitude	(ft)	60,000	

MARKING

See K.1001/4

Additional marking 5644

BASE

B8D/F

CONNECTIONS

Lead	Electrode
1	Anode
2	Cathode
3	Internal connection.
4	Cathode
5) 6) 7)	Internal connection.
8	Cathode

DIMENSIONS (ins.)

	Min.	Max.
Height	-	2.0
Diameter	-	0.4

MOUNTING POSITION

Any

CV 3987

MIL-E-1/181B
28 June 1956
SUPERSEDING
MIL-E-1/181A
9 July 1953

INDIVIDUAL MILITARY SPECIFICATION SHEET

ELECTRON TUBE, RELIABLE, SUBMINIATURE VOLTAGE REGULATOR, RECEIVING

JAN-5644

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

Description: Voltage Regulator Tube

Ratings:	Total Darkness Ionization Voltage	Ambient Light Ionization Voltage	Operating Voltage	Operating Current	Ambient Temperature	T Envelope	Alt	
Absolute Maximum:	Vdc ---	Vdc ---	Vdc 108	mAdc 25	°C ---	°C 220	ft 60,000	←
Minimum:	175	125	82	5	-55	---	---	←
Test Cond.:	---	---	---	---	---	---	---	←

Cathode: Glow Discharge
Base: Subminiature - 8-Pin with long leads

Height: 2.00 in. max
Diameter: 0.400 in. max

Envelope: T-3

Pin No.:	1	2	3	4	5	6	7	8
Element:	p	k	Note 1	k	Note 1	Note 1	Note 1	k

The following tests shall be performed:

For the purposes of inspection, use applicable reliable paragraphs of MIL-E-1 and Inspection Instructions for Electron Tubes.
For miscellaneous requirements, see Paragraph 3.3, Inspection Instructions for Electron Tubes.

Ref.	Test	Conditions	AQL(%)	Insp. Level or Code	Sym.	Min.				Max.		Units
	Qualification Approval Tests											
3.1	Qualification Approval:	Required for JAN Marking	---	---								
---	Cathode:	Glow Discharge	---	---								
3.4.3	Base Connections:		---	---								
	Measurements Acceptance Tests Part 1 Note 2											
4.13.1	Ionization Voltage(1):	Ebb/Ib=5 - 25mAdc; Illumination=5 - 50 ft. candles	0.65	II	Ex:	---	---	---	---	120	---	Vdc
4.13.2	Tube Voltage Drop(1):	Ebb/Ib=25mAdc	0.65	II	Etd:	85	---	---	---	105	---	Vdc
4.13.2	Tube Voltage Drop(2):	Ebb/Ib=5mAdc	0.65	II	Etd:	85	---	---	---	105	---	Vdc
4.13.2.1	Regulation:	(1)Etd - (2)Etd	0.65	II	Reg:	---	---	---	---	5.0	---	Vdc
4.7.5	Continuity and Shorts: (Inoperatives)		0.4	II		---	---	---	---	---	---	
4.9.1	Mechanical:	Envelope Outline No. 8-5				---	---	---	---	---	---	
	Measurements Acceptance Tests Part 2											
4.13.4.3	Noise:	Ebb/Ib=25mAdc	2.5	I	Eb:	---	---	---	---	15	---	mVac
4.13.4.2	Oscillation:	Esig=15mVac; Ebb/Ib= 5 - 25mAdc	2.5	I		---	---	---	---	---	---	
4.13.1	Ionization Voltage(2):	Ebb/Ib=5 - 25mAdc; Note 3	6.5	Code F	Ex:	---	---	---	---	175	---	Vdc
4.13.3	Leakage:	Eb=50Vdc	6.5	Code F	LIb:	---	---	---	---	10	---	uAdc
4.9.20.3	Vibration(1):	No Voltages	10.0	Notes 4,8		---	---	---	---	---	---	
	Degradation Rate Acceptance Tests Note 5											
4.9.5.3	Subminiature Lead Fatigue:	Note 6	2.5	Code G		4	---	---	---	---	---	arcs

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Ref.	Test	Conditions	AQL(%)	Insp. Level or Code	Sym.	Min.				Max.		Units
	Degradation Rate Acceptance Tests Note 5(Contd)											
4.9.20.5	Shock:	Hammer Angle=30°; Note 7	---	---		---	---	---	---	---	---	
4.9.20.6	Fatigue:	G=2.5; Fixed Frequency; F=25 min., 60 max.	6.5	Note 8		---	---	---	---	---	---	
---	Post Shock and Fatigue Test End Points:	Ionization Voltage(1)	---	---	Ez:	---	---	---	---	130	---	Vdc
		Regulation	---	---	Reg:	---	---	---	---	5.0	---	Vdc
		Tube Voltage Drop(1)	---	---	Etd:	82	---	---	---	108	---	Vdc
		Tube Voltage Drop(2)	---	---	Etd:	82	---	---	---	108	---	Vdc
---	Glass Strain:	Note 9	2.5	I		---	---	---	---	---	---	

Ref.	Test	Conditions	AQL(%)	Insp. Level or Code	Allowable Defectives per Characteristic		Sym.	LIMITS		Units
					1st Sample	Combined Samples		Min.	Max.	
	Acceptance Life Tests Note 5									
---	Survival Rate Life Test:	Intermittent Life Test Conditions or equivalent; TA=Room; Note 10	---	II	---	---		---	---	
4.11.4	Survival Rate Life Test End Points:	Continuity and Shorts (Inoperatives)	0.65	---	---	---		---	---	
4.11.5	Intermittent Life Test:	Ebb/Ib=25mAdc; T Envelope=+220°C min.; Notes 11,12	---	---	---	---		---	---	
4.11.4	Intermittent Life Test End Points: (500 hours)	Note 13								
		Inoperatives; Note 14	---	---	1	3		---	---	
		Regulation	---	---	1	3	Reg:	---	5.0	Vdc
		Tube Voltage Drop(1)	---	---	1	3	Etd:	82	108	Vdc
		Tube Voltage Drop(2)	---	---	1	3	Etd:	82	108	Vdc
		Ionization Voltage(1)	---	---	1	3	Ez:	---	125	Vdc
		Total Defectives	---	---	4	8		---	---	
4.11.5	Information Life Test:	Intermittent Life Test Conditions; Notes 12,15	---	---	---	---		---	---	
4.11.4	Information Life Test End Points: (1000 hours)	Note 15	---	---	---	---		---	---	
	Packaging Requirements									
4.9.18.1.4	Carton Drop:	(d) Package Group 1; Carton Size D								

Note 1: Internal connections. DO NOT USE.

Note 2: The AQL for the combined defectives for attributes in Measurements Acceptance Tests, part 1, excluding Inoperatives and Mechanical shall be one (1) percent. A tube having one (1) or more defects shall be counted as one (1) defective. MIL-STD-105, Inspection Level II shall apply.

Note 3: 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 at least 24 hours prior to testing.

Note 4: Post Shock and Fatigue Test End Points shall apply.

Note 5: Destructive tests:

Tubes subjected to the following destructive tests are not to be accepted under this specification.

4.9.5.3 Subminiature Lead Fatigue
4.9.20.5 Shock
4.9.20.6 Fatigue
4.11.5 Intermittent Life Test

Note 6: When a manufacturer submits tubes for Qualification Approval, five (5) extra tubes shall be submitted for lead fatigue testing. These may be electrical rejects.

Note 7: Leads may be clipped for application of voltages during impact.

Note 8: This test shall be conducted on the initial lot and thereafter on a lot approximately every 30 days. Once a lot has passed, the 30-day rule shall apply. In the event of lot 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 F shall apply.

Note 9: Glass strain procedures - All tubes subjected to this test shall have been sealed a minimum of 48 hours prior to conducting this test. All tubes shall be at room temperature. The entire tube shall be immersed in water at not less than 97°C for 15 seconds and immediately thereafter immersed in water at not more than 5°C for 5 seconds. The volume of water shall be large enough that the water temperature will not be appreciably affected by the test. The holder shall be in accordance with Drawing #245-JAN, and the tubes shall be immersed quickly. The tubes shall be so placed in the water that no contact is made with the containing vessel, nor shall the tubes contact each other. After the 5-second submersion period, the tubes shall be removed and allowed to return to room temperature on a wooden surface. After drying at room temperature for a period of 48 hours, the tubes shall be inspected and rejected for evidence of air leaks(Ref. MIL-E-1, par. 3.2.4.3). Electrical rejects, other than inoperatives, may be used in the performance of this test.

Note 10: SURVIVAL RATE LIFE TEST: The sampling and testing procedure for this test shall be as defined in paragraphs 5.3.4.2 to 5.3.4.2.4, inclusive, of the Inspection Instructions for Electron Tubes.

Note 11: Intermittent Life Tests: Sampling and acceptance procedures for these tests shall be as defined in paragraphs 5.3.4.3(a) to 5.3.4.3(i), inclusive, of the Inspection Instructions for Electron Tubes, except that the following subparagraph shall be added to 5.3.4.3(e):(4) The life test sample from the first lot accepted each month shall continue on life test for an additional 500 hours(1000 hours total life test time). Failure of this sample to meet the 1000-hour life test end points shall result in loss of eligibility for reduced hours testing.

Note 12: Envelope Temperature is defined as the highest temperature indicated when using a thermocouple of #40 BS or smaller diameter elements welded to a ring of 0.025 inch diameter phosphor bronze in contact with the envelope.

Note 13: Order for Evaluation of Life Test Defects: See Paragraph 5.3.4.4 of the Inspection Instructions for Electron Tubes.

Note 14: An inoperative as referenced in Life Test is defined as a tube having one (1) or more of the following defects: discontinuity(Ref. MIL-E-1, par. 4.7.1), shorts(Ref. MIL-E-1, par. 4.7.2), air leaks(Ref. MIL-E-1, par. 3.2.4.3).

Note 15: Information life test shall be conducted on a minimum of one sample of ten tubes each month of production. This sample shall be selected as the first ten serially marked, noninoperative tubes from a completed Intermittent Life Test sample. This life test shall be classified as a destructive test. Read at 1000 hours. On Information Life Tests, read same characteristics as Intermittent Life Test. Limits do not apply. This test shall not be a basis for lot acceptance. Six copies of these data shall be forwarded to the Armed Services Electron Tube Committee.

Note 16: Reference specification shall be of the issue in effect on the date of invitation for bid.