

MINISTRY OF SUPPLY - D.L.R.D.(A)/R.A.E.

Specification MOS(A)/CV4058 Issue 1 Dated 20.1.56 To be read in conjunction with BS.448, BS.1409 and K.1001	<u>SECURITY</u> Specification UNCLASSIFIED Valve UNCLASSIFIED
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TYPE OF VALVE - Reliable Miniature R.F. Power Triode				<u>MARKING</u> K1001/4 Additional Marking:- 6100/6C4WA			
CATHODE - Indirectly heated				<u>BASE</u> BS.448/B7G			
ENVELOPE - Glass							
PROTOTYPE - CV133				<u>CONNECTIONS</u>			
R.E.T.M.A. - 6100/6C4WA							
<u>RATING</u>			Note	Pin	Electrode		
Heater Voltage (V)			6.3	1	a		
Heater Current (A)			0.15	2	IC		
Max. Heater Cathode Voltage (V)			±150	3	h		
Max. Operating Anode Voltage (V)			330	4	h		
Max. Anode Voltage (Ia = 0) (V)			550	5	a		
Max. Anode Dissipation (W)			3.8	6	g		
Max. Mean Cathode Current (mA)			21	7	k		
Max. Bulb Temperature (°C)			170	<u>DIMENSIONS</u> See BS.448/B7G/2.1 Size Ref. No. 2			
Max. Shock (short duration) (g)			500				
Max. Acceleration (continuous operation) (g)			2.5				
Max. Operating Frequency (Mc/s)			150				
Amplification Factor			17				
Mutual Conductance (mA/V)			2.2	Dimensions (mm)		Min.	Max.
Anode Impedance (kΩ)			7.7	A seated height		-	47.5
				Ø diameter		16.0	19.0
				D overall length		-	54.5
<u>CAPACITANCES</u> (pF)				<u>MOUNTING POSITION</u> Any			
C in (nom.)			1.8				
C out (nom.)			1.3				
Ca, g (nom.)			1.6				
<u>NOTES</u>							
A. Absolute value.							
B. Measured at Va = 250V; Vg = -8.5 (Ia = 10.5 mA).							
C. <u>Caution to Electronic Equipment Design Engineers:</u> Special attention should be given to the temperature of valves to be operated in aircraft. Reliability will be seriously impaired if the maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life tests are imposed on the valve and will be reduced appreciably if absolute maximum ratings are exceeded. Both reliability and performance will be jeopardised if heater voltage ratings are exceeded; life and reliability performance are directly related to the degree that regulation of the heater voltage is maintained at its centre-rated value.							
D. Measured with valve unscreened.							

To be performed in addition to those applicable in K1001

To be performed in the specified order unless otherwise agreed with the Inspecting Authority

Test Conditions - unless otherwise specified												
Vh(V)		Va(V)	Vg(V)	Vhk(V)								
6.3		250	-8.5	0								
K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym. bol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
14.1	Vibration	No Voltages		100%								
7.1	Glass Strain	No Voltages	6.5	I								
	<u>GROUP A</u>											
	Electrode Insulation	Vh = 6.3V. Note 1. Vg-all = -100V Va-all = -300V		100% 100%	R R	100 100	- -	- -	- -	- -	- -	MΩ MΩ
	Reverse Grid Current			100%	Ig	-	-	-	-	0.5	-	μA
5.3	<u>GROUP B</u>											
	Heater Current	Combined AQL	1.0	II	Ih	138	-	150	-	162	-	mA
	hk Leakage Current	Vhk = ±100V. Note 3 Vhk = -100V Cathode Positive	0.65	II V2	Ihk Ihk	- -	- -	- -	- 3	10 -	- -	μA μA
	Anode Current		0.65	II V2	Ia Ia	6.5 -	- 9.0	- 10.5	- 12.0	14.5 -	- 3.5	mA mA
	Mutual Conductance		0.65	II V2	gm gm	1.75 -	- 2.0	- 2.2	- 2.4	2.65 -	- 0.45	mA/V mA/V
11.1	<u>GROUP C</u>											
	Anode Current	Combined AQL	6.5	II	Ia	-	-	-	-	50	-	μA
	Reverse Grid Current	Vg1 = -30V Vh = 6.9V. Note 7.	2.5 2.5	I I	Ig Ig	- -	- -	- -	- -	1.0 -	- -	μA
	Vibration Noise	Va(b) = 250V; RL = 2 kΩ. Notes 5 and 6.	2.5	I	Va AC	-	-	-	-	7.0	-	mV
7.2	<u>GROUP D</u>											
7.2	Base Strain	No Voltages.	6.5	IA								
5.9	Capacitances	Measured on 1 Mc/s bridge with valve mounted in a fully shielded holder. No valve screen or holder skirt. Pin 2 link to pin 7.	6.5	IC	C in C out Ca, g	1.35 0.98 1.2	- - -	1.8 1.3 1.6	- - -	2.25 1.62 2.0	- - -	pF pF pF

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym. bol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
	Amplification Factor		6.5	IA	μ	15.5	-	-	-	18.5	-	
				V1	μ	-	16.15	17.0	17.85	-	1.9	
	Mutual Conductance	$V_a = 100V; V_g = 0$	6.5	IA	gm	2.5	-	-	-	4.0	-	mA/V
				V1	gm	-	2.82	3.25	3.68	-	0.95	mA/V
	Change of Mutual Conductance	$V_a = 100V; V_g = 0$ $V_h = 5.7V$. Note 2	6.5	IA	Δ gm	-	-	-	-	15	-	%
	Power Oscillation	$V_a(b) = 300V$ $R_g = 8.5 k\Omega$ $f = 150 Mc/s$. Note 8	4.0	IA	PO	1.8	-	-	-	-	-	W
11.2	<u>GROUP E</u> Resonance Search	$V_a(b) = 250V$ $R_L = 2k \Omega$ Frequency:- (1) 25-200 c/s (2) 200-500 c/s (3) 500-2500 c/s	2.5	IC	-	-	-	-	-	7	-	mV rms
					-	-	-	-	-	35	-	mV rms
					-	-	-	-	-	150	-	mV rms
11.3	Fatigue	Note 4. $V_h = 6.9V$.		IA								
	<u>Post Fatigue Tests</u>											
	hk Leakage Current	$V_{hk} = \pm 100V$ Note 3	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	1.6	-	-	-	2.65	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		V_a AC	-	-	-	-	15	-	mV rms
11.4	Shock	Hammer Angle = 30° No voltages.		IA								
	<u>Post Shock Tests</u>											
5.3	hk Leakage Current	$V_{hk} = \pm 100V$ Note 3	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig	-	-	-	-	1.0	-	μA
	Mutual Conductance		2.5		gm	1.6	-	-	-	2.65	-	mA/V
11.1	Vibration Noise	As in Group C	2.5		V_a AC	-	-	-	-	15	-	mV rms
A VI/5	<u>GROUP F</u> Life	$V_{hk} = 150V$ D.C. Heater positive Note 9.										
A VI/5.1	<u>Stability Life (1 hour)</u>											
	Change in Mutual Conductance		1.0	I	Δ gm	-	-	-	-	10	-	%
A VI/5.2	<u>Survival Rate Life (100 hours)</u>											
5.6	Inoperatives		0.65	II								

K1001 Ref.	Test	Test Conditions	AQL %	Insp. Level	Sym- bol	Limits						Units
						Min.	LAL	Bogey	UAL	Max.	ALD	
	<u>Intermittent Life</u>											
A VI/5.6	<u>Test Point 500 hrs.</u>	Combined AQL	6.5	1A								
	Inoperatives		2.5									
	Heater Current		2.5		Ih	138	-	-	-	162	-	mA
5.3	hk Leakage Current	Vhk = $\pm 100V$. NOTE 3	2.5		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		2.5		Ig	-	-	-	-	0.5	-	μA
	Mutual Conductance		2.5		gm	1.6	-	-	-	2.65	-	mA/V
	Average Change in Mutual Conductance				Δgm	-	-	-	-	15	-	%
	Anode Current		4.0		Ia	5.5	-	-	-	14.5	-	mA
	Electrode	Vh = 6.3V. Note 1.	4.0									
	Insulation	Vg -all = -100V	4.0		R	50	-	-	-	-	-	M Ω
		Va -all = -300V	4.0		R	50	-	-	-	-	-	M Ω
	<u>Test Point 1000 hrs.</u>	Combined AQL	10									
A VI/5.6	Inoperatives		4.0									
	Heater Current		4.0		Ih	138	-	150	-	162	-	mA
5.3	hk Leakage Current	Vhk = $\pm 100V$. Note 3	4.0		Ihk	-	-	-	-	20	-	μA
	Reverse Grid Current		4.0		Ig	-	-	-	-	0.5	-	μA
	Mutual Conductance		4.0		gm	1.5	-	-	-	2.65	-	mA/V
	Anode Current		6.5		Ia	5.0	-	-	-	14.5	-	mA
	Electrode	Vh = 6.3V. Note 1	6.5									
	Insulation	Vg -all = -100V			R	30	-	-	-	-	-	M Ω
	<u>GROUP G</u>	Va -all = -300V			R	30	-	-	-	-	-	M Ω
A IX/2.5	Electrical Re-test after 28 days holding period			100%								
A VI/5.6	Inoperatives		0.5									
	Reverse Grid Current		0.5		Ig	-	-	-	-	0.5	-	μA

NOTES

1. Heater and cathode strapped and considered as a single electrode.
2. Change of mutual conductance is expressed:

$$\frac{(\text{gm at } 6.3\text{V}) - (\text{gm at } 5.7\text{V})}{(\text{gm at } 6.3\text{V})} \times 100\%$$

3. Heater positive and negative successively.
4. Valves shall be vibrated in each of the three required planes for not less than 30 hours and not less than 100 hours total. Heater switched 1 minute on 3 minutes off. No other voltages. Minimum peak acceleration = 5g; frequency = 170 $\pm$ 5 c/s. 30 + 30 + 39 hrs
5. The valve shall be mounted so that the direction of vibration is parallel to the minor axis of the mounting structure.
Vibration frequency = any fixed frequency in the range 25-100 c/s.
Minimum peak acceleration = 2g.
The test shall be of sufficient duration to obtain a steady reading of noise output.
6. Alternatively $V_a(b) = 250\text{V}$; $R_L = 2\text{k}\Omega$; $V_g = 0$; $R_k = 810\Omega$; $C_k = 1000\mu\text{F}$.
7. Prior to this test the valve shall be pre-heated for 5 minutes under the test conditions. I_g shall not be rising or out of limit after 10 minutes.
Alternative test conditions: $V_a(b) = 250\text{V}$; $V_g = 0$; $R_k = 810\Omega$ may be used for this test.
8. An average valve shall be set to give $I_a = 25\text{mA}$ by adjusting the load/tank circuit coupling while the load is simultaneously tuned to give maximum power output.
9. Life test conditions. $V_a = 250\text{V}$; V_g adjust so that the anode dissipation is 3.45 watts $\pm$ 10%.
Cathode Bias may be used.

Supplement for 15mm 1A

ELECTRONIC VALVE SPECIFICATION

SPECIFICATION CV.4058

ISSUE 1 - DATED 20th JANUARY, 1956.

AMENDMENT NO.2.

GROUP F.

Intermittent Life Test Point (500 hrs)

Electrode Insulation

Delete existing Electrode Insulation (at the end of the Group) and substitute the following:-

K1001 Ref.	Test	Test Conditions	AQL %	INSP LEVEL	SYMBOL	LIMITS						
						MIN	LAL	BOGEY	UAL	MAX	AID	UNITS
	ELECTRODE	Vh = 6.3V Note 1	4.0									
	INSULATION	Vg -all = -100V Va -all = -300V		- -	R R	50 50	- -	- -	- -	- -	- -	- -

MΩ
MΩ

Test Point (1000 hrs.)

Delete all reference to Heater Current Test.

Add at the end of this Group (after amode Current) the following:-

K100 Ref.	Test	Test Conditions	AQL %	INSP. LEVEL	SYMBOL	LIMITS						
						MIN	LAL	BOGEY	UAL	MAX	AID	UNITS
	ELECTRODE	Vh = 6.3V Note 1	6.5									
	INSULATION	Vg -all = -100V Va -all = -300V			R R	30 30	- -	- -	- -	- -	- -	MΩ MΩ

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T.V.C.

✓ PMS

Supplement to Issue 1A