

Specification AD/CV4051 Issue No. 3 dated 20.7.62. To be read in conjunction with K1001 BS.448 and BS.1409	<u>SECURITY</u>	
	<u>Specification</u> Unclassified	<u>Valve</u> Unclassified

→ Indicates a change

<u>TYPE OF VALVE:-</u> Reliable D.C. Stable) Double Triode with flexible leads) Note A <u>CATHODE:-</u> Indirectly heated. <u>ENVELOPE:-</u> Glass <u>PROTOTYPE:-</u> VX7115	<u>MARKING</u> K1001/4																																																																																					
	<u>BASE</u> B9A/F BS.448																																																																																					
<u>RATINGS</u> (All limiting values are absolute)	<u>CONNECTIONS</u>																																																																																					
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<p>A. This valve is specifically intended for D.C. amplifier operation in a cathode coupled circuit. The limit stability performance is as in test in Group F. Some improvement on this figure will generally be obtained particularly after a period of life. This assumes a heater voltage stability of at least 0.5%. The stability against changes of heater voltage is about 1 mV for a heater change of 1.5% over a period of 10 hours.</p> <p>B. Operated with heaters connected in parallel.</p> <p>C. Operated with heaters connected in series.</p> <p>D. The rated stability is the drift between grids over a 10 hour period. Vibration and shock have an adverse effect on stability and should be avoided as far as possible. Shelf life may have an adverse effect on stability but the valve should become stable in a few hours, running under rated conditions.</p> <p>E. For rated stability (max. variation) tolerance on heater voltage should be 0.5%.</p> <p>F. Measured at Va = 150V, Vg1 = -3.75V.</p> <p>G. Measured in a 1.0 Mc/s bridge in a fully shielded socket with an external screen</p>																																																																																						

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TESTS

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To be performed in addition to those applicable in K1001.

Tests are to be performed in the specified order unless otherwise agreed with the Inspecting Authority.

Test conditions - unless otherwise stated:-

Vh (V)	Va (V)	Vg (V)	Rk (ohms)	Ck (μ F)	Vhk (V)	Note 1
12.6	150	0	2700	2000	0	

K1001	TEST	TEST CONDITIONS	AQL %	Insp. Level	Sym-bol	LIMITS						UNITS		
						Min.	LAL	Bog	UAL	MAX	AJD			
7.1	<u>Group A</u> Glass Strain. Insulation.	No voltages	6.5	I										
		Vg-all = -100V											100%	R
		Va-all = -300V											Meg-ohms	
	<u>Group B</u>	Combined AQL Note 2	1.0											
		Heater Current	0.65	II	Ih	0.275	-	0.300	-	0.325	-	A	←	
		Heater/Cathode Leakage Current	Note 3 Vhk = +100V	0.65	II	Ihk	-	-	-	-	10	-	μ A	
		Anode Current	0.65	II	Ia	1.1	-	1.4	-	1.7	-	mA	←	
		Grid Current	Rg=500 k-ohms	0.65	II	Ia V2	-	1.29	-	1.51	-	0.25	mA	←
		Mutual Conductance	0.65	II	Ig1	-	-	-	-	0.05	-	μ A		
		Mutual Conductance	0.65	II	gm	1.0	-	1.25	-	1.5	-	mA/V		
				V2	gm	To be added later						mA/V		
11.1	<u>Group C</u>	Combined AQL	6.5											
		Change in Mutual Conductance	Note 4 Vh=11.4V	2.5	I	Δ gm	-	-	-	-	15	-	%	
		Cut-off	Vg1 = -10V	2.5	I	Ia	-	-	-	-	20	-	μ A	
		Vibration Noise	Va(b) = 250V RL = 50 k-ohms	2.5		VaAc	-	-	-	-	7	-	mV r.m.s.	
		Difference in Anode Current between triodes	Notes 3 and 5	2.5	I	Δ Ia	-	-	-	-	0.25	-	mA	←

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K1001	TEST	TEST CONDITIONS	AQL %	Insp. Level	Sym-bol	LIMITS						UNITS
						Min.	LAL	Bog.	UAL	MAX	ALD	
	<u>Group D</u>											
	Capacitances	Measured on a 1 Mc/s bridge in a fully screened socket with external shield connected to cathode of section under test	6.5	IA	Cd-a" Ca-g Cin Cout	- 1.4 1.7 1.5	- - - -	0.46 1.9 2.2 2.5	- - - -	1.0 2.4 2.7 3.0	- - - -	pF pF pF pF
	Amplification Factor		6.5	IA	-	26	-	31	-	36		
11.2	<u>Group E</u> Resonance Search	Va(b) = 250V RL=50 kΩ Frequency= 25-1000 c/s	2.5	IC	VaAC	-	-	-	-	25	-	mV
11.3	Fatigue	Frequency= 170 c/s Min. Peak Acceleration = 5g Duration= 3x23 hrs. Vh=12.6V Switched 1 min. on 3 mins. off Va = 0		IA								
	<u>POST FATIGUE TESTS</u>											
	Vibration Noise	Va(b) = 250V RL=50 kΩ Notes 3 & 5			VaAC	-	-	-	-	20	-	mV r.m.s. ←
	Heater-Cathode Leakage Current	Note 3 Vhk = ±100V			Ihk	-	-	-	-	15	-	μA
	Grid Current	Rg1 = 500 kΩ	2.5		Ig1	-	-	-	-	0.07	-	μA
11.4	Shock	Hammer Angle = 30° No voltages		IA								

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K1001	TEST	TEST CONDITIONS	AQL %	Insp. Level	Symbol	LIMITS						UNITS
						MIN	LAL	Bog	UAL	MAX	ALD	
AV1/5	<u>POST SHOCK TESTS</u>											
	Vibration Noise	Va(b)=250V RL = 50 kΩ Notes 3 & 5	2.5		VaAC	-	-	-	-	20	-	r.m.s.
	Heater-Cathode Leakage Current	Note 3 Vhk = ±100V	2.5		Ihk	-	-	-	-	15	-	μA
	Grid Current	Rg1 = 500 kΩ			Ig1	-	-	-	-	0.07	-	μA
	<u>Group F Life</u>	Va = 150V Rg1 = 1.5MΩ Rk = 2.7 kΩ Vhk = Heater connected to cathode through 4.7 kΩ										
	<u>Stability Test</u>					MIN	LAL	Median	Semi-decile	MAX	ALD	
	0-10 hrs.	Notes 6, 7, 9, 10 and 11		V2	ΔVg	-	-	-	20	-	-	mV
	9-10 hrs	Notes 6, 8, 9, 10 and 11		V2	ΔVg	-	-	-	4	-	-	mV
	0-1000 hrs			Q/A on 6 samples	ΔVg				Record			
	<u>Intermittent Life Test 500 hrs.</u>					MIN	LAL	Bog	UAL	MAX	ALD	
<u>Life Test End Points</u>	Combined AQL	10.0	IA									
Inoperatives Heater Current		2.5			Ih	0.275	-	-	-	0.325	-	A
Reverse Grid Current	Rg1 = 500 kΩ	2.5			Ig1	-	-	-	-	0.1	-	μA
Average Change in Mutual Conductance					Δgm	-	-	-	-	15	-	%
Change in Mutual Conductance					Δgm				Record			%
Difference in Δgm between triodes		6.5			Δgm	-	-	-	-	7.5	-	%

K1001	TEST	TEST CONDITIONS	AQL %	Insp. Level	Sym-bol	LIMITS						UNITS
						MIN	LAL	Bog	UAL	MAX	ALD	
AIX/ 2.5	Insulation	Va-all = -300V	2.5		R	50	-	-	-	-	-	MΩ
		Vg-all = -100V	2.5		R	50	-	-	-	-	-	MΩ
	<u>Life Test End Points 1000 hrs.</u>	Combined AQL	10.0									
	Insulation	Va-all = -300V	6.5		R	50	-	-	-	-	-	MΩ
		Vg-all = -100V	6.5		R	50	-	-	-	-	-	MΩ
	Change in Mutual Conductance		6.5		Δg_m			Record			-	% ←
	Difference in Δg_m between triodes		6.5		$\frac{\Delta g_m'}{\Delta g_m''}$	-	-	-	-	-	10	% ←
	Difference in Anode Current between Anodes		6.5		ΔI_a	-	-	-	-	0.5	-	mA ←
	<u>Group G</u> Electrical re-test after 28 days				100%							
	Inoperatives		0.5									
Grid Current	Rg = 500 kΩ	0.5			I_{g_1}	-	-	-	-	0.5	μA ←	

NOTES

- Test each section separately with the elements of the opposite section connected to the cathode of the section under test.
- At least one test in this group shall be carried out with the heaters connected in parallel to a 6.3 volt supply.
- Connect the two sections in parallel.
- The change in the mutual conductance shall be: $\frac{g_m \text{ at } 12.6 \text{ Vh} - g_m \text{ at } 11.4 \text{ Vh}}{g_m \text{ at } 12.6 \text{ Vh}} \times 100\%$
- Connect cathodes together and connect to earth through $R_k = 680$ ohms, $C_k = 1000$ μF. Connect grids to earth. Parasitic suppressors of 50 ohms maximum permissible.
- The stability of a valve is defined as the change in the difference between the grid voltages required to maintain equal anode currents in each triode over a period of time.
- This test shall be carried out in the specified circuit detailed on Page 6, and the drift measured over 10 hours. The valve shall be operated in the specified circuit for a minimum of 30 minutes and a maximum of 60 minutes before the test period commences.
- This test shall be carried out in the circuit referred to in Note 7 and the drift measured over the last hour of the 10 hour stability test period.
- For all stability tests the stability of heater supply must be better than $\pm 0.5\%$
- The figures refer to the total excursion between extremes of drift.
- Any valves from the sample tested on the 10 hour stability tests which fail to meet the specified semi-definite limits may, at the discretion of the manufacturer and the Inspecting Officer, be subjected to a further 10 hour stability test period. The stability figures so obtained may be substituted for the initial results in assessing the overall test result. No further aging is permitted before this second test period.

STABILITY TEST CIRCUIT.

