

SPECIAL QUALITY SUBMINIATURE VOLTAGE REFERENCE TUBE

M8190

Special quality 85V subminiature gas-filled voltage reference tube for use in equipment where mechanical vibration and shocks are unavoidable and where statistically controlled major electrical characteristics are required.

This data should be read in conjunction with the GENERAL NOTES—
SPECIAL QUALITY VOLTAGE STABILISER & REFERENCE TUBES
which precede this section of the handbook, and the index numbers are
used to indicate where reference should be made to a specific note.

ABSOLUTE MAXIMUM RATINGS¹

*Minimum voltage necessary for ignition	125	V
Cathode current		
Maximum	3.5	mA
Minimum	0.5	mA
Maximum negative anode voltage	75	V
Minimum ambient temperature	-55	°C
Maximum bulb temperature	+90	°C

*This value covers operation in daylight and complete darkness.

PREFERRED OPERATING CONDITION

Cathode current	2.0	mA
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CHARACTERISTICS

Measured at preferred operating condition and $T_{amb} = 25^{\circ}\text{C}$

Maintaining voltage (variation from tube to tube)	84 to 88	V
Maximum maintaining voltage difference over current range 0.5 to 3.5mA	3.0	V
Maximum incremental resistance	1.0	k Ω
Variation of maintaining voltage during the first 1000 hours of life		
Maximum	± 1.0	%
Typical	± 0.5	%

OPERATING NOTES

A steady maintaining voltage is reached within 3 min.

The greatest constancy of maintaining voltage is obtained if the tube is
operated at the preferred current.

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TEST CONDITIONS (unless otherwise specified)

$R_{lim.}$ (k Ω)	$I_{burning}$ (mA)
30	2.0

TESTS

After initial warming-up period of 3 minutes at burning current of 2.0mA

GROUP A

	+	-	125 V
Ignition voltage	..	..	..
Maintaining voltage	..	..	..
Change in maintaining voltage for burning current change from 1.9 to 2.1 mA	..	..	..
Voltage jumps. Burning current varies from 1.2 to 3.5 mA	..	..	..
Oscillation. Burning current varies from 1.2 to 3.5 mA	..	..	..
Microphonic noise	..	..	..

†This test is carried out on a 100% basis.

GROUP B

	V	μA	V	V
Ignition voltage in darkness after 24 hours in darkness	2.5	..	..	—
Leakage current. Supply voltage = 50V $R_b = 1M\Omega$	2.5	..	..	—
Change in maintaining voltage for burning current change from 0.5 to 3.5mA	2.5	..	..	—
Maintaining voltage at burning current of 3.5mA	2.5	..	..	—
Group quality level ¹	6.5	..	..	—
	125	..	..	—
	15	..	..	—
	3.0	..	..	—
	89	..	..	—

GROUP C

	65	65
Glass strain test ^{8A} , No applied voltage	..	..
Lead fragility test ^{10A} , No applied voltage	..	..

Resonance search

Vibrated at 2g over frequency range specified.

	25 to 500c/s	..	..	..	..	2.5	5.0 mV (r.m.s.)
500 to 2500c/s	..	..	..	..	..	2.5	15 mV (r.m.s.)

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Fatigue¹¹

No applied voltage, 5g min. peak acceleration, $f = 170 \pm 5$ c/s for 33 hours in each of 3 mutually perpendicular planes

Post fatigue tests

Change in maintaining voltage	..	..	..	..	..	2.5	±0.8	V
Microphonic noise	..	..	..	..	..	2.5	50	mV
Sub-group quality level ¹⁷	..	..	..	..	..	4.0	—	(pk-pk)

Shock¹²

No applied voltage, 750g

Post shock tests

Change in maintaining voltage	..	..	..	..	..	2.5	±0.8	V
Microphonic noise	..	..	..	..	..	2.5	50	mV
Sub-group quality level ¹⁷	..	..	..	..	..	4.0	—	(pk-pk)

GROUP D

Life test¹¹

Burning current = 2mA continuous

Life test end points. 1000 hours

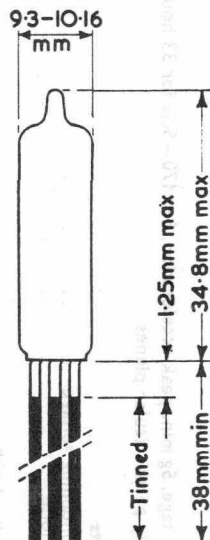
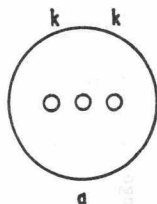
Ignition voltage	..	..	..	..	..	2.5	125	V
Change in maintaining voltage from 0 to 300 hours	..	..	..	..	..	2.5	±0.4	V
Change in maintaining voltage from 0 to 1000 hours	..	..	..	..	..	2.5	±0.8	V
Change in maintaining voltage for burning current change from 1.9 to 2.1mA	..	..	..	..	..	2.5	+0.2	V
Group quality level ¹⁷	..	..	..	..	..	6.5	—	



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5807



The bulb dimensions of this tube are in accordance with BS448, Section B8D.

Note.—Direct soldered connections to the leads of the tube must be at least 5mm from the seal and any bending of the leads must be at least 1.5mm from the seal.

