

SPECIAL QUALITY VOLTAGE REFERENCE TUBE

M8142

Special quality 85V gas-filled voltage reference tube with flying leads, for use in equipment where mechanical vibration and shocks are unavoidable.

PRELIMINARY DATA

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.

LIMITING VALUES¹ (absolute ratings)

*Minimum voltage necessary for ignition	115	V
Burning current		
Maximum	10	mA
Minimum	1.0	mA
Maximum negative anode voltage	75	V
Ambient temperature limits	-55 to +90	°C

*This value covers operation in daylight and complete darkness.

PREFERRED OPERATING CONDITION

Burning current	6.0	mA
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CHARACTERISTICS

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

Maintaining voltage (variation from tube to tube)	83 to 87	V
Incremental resistance		
Average	300	Ω
Maximum	450	Ω
Maximum increase in maintaining voltage as current is varied from 1 to 10mA	4.0	V
*Maximum percentage variation of maintaining voltage over first 1000 hours of life	0.5	%
Typical percentage drift of maintaining voltage per 1000 hours after 1300 hours	0.1	%

*After the initial warming-up period of 3 minutes

Discontinuities of the I_a/V_a characteristic

Typical voltage jumps over current range 4 to 10mA	5.0	mV
Maximum voltage jumps over current range 1 to 10mA	100	mV

SHORT-TERM STABILITY

Maximum short-term variation of maintaining voltage for any 8 hour period after the first 100 hours life will be better than 0.01% provided there is an initial warming-up period of 3 minutes.

Maximum short-term (100 hours max.) variation of maintaining voltage after the first 300 hours of life is 0.1%.

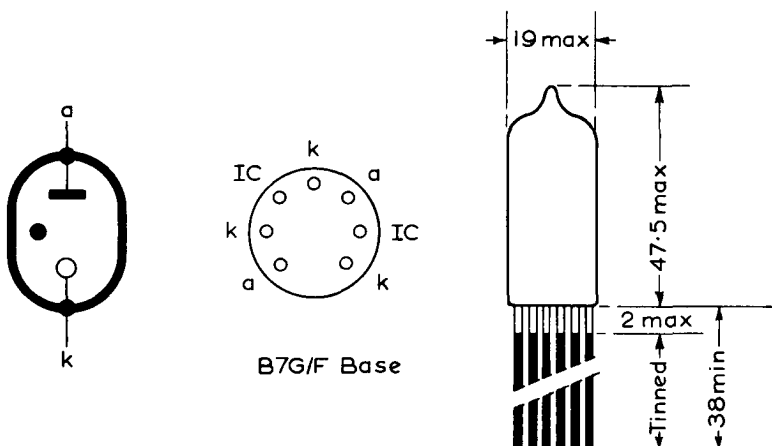
In order to avoid voltage variations due to temperature fluctuations it will in general be sufficient to draught shield the tube.

OPERATING NOTES

A steady maintaining voltage is reached within 3 minutes.

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

The noise generated by the tube over a frequency band of 30 to 10,000c/s is of the order of $60\mu\text{V}$, which is equivalent to the noise generated by a resistor of approximately $22\text{M}\Omega$ at a temperature of 300°K . The noise is evenly distributed over the frequency range.



5806

All dimensions in mm

The bulb dimensions of this tube are in accordance with BS448, Section B7G

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.

TEST CONDITIONS (unless otherwise specified)

R_{lim}
(k Ω)
5.0

$I_{burning}$
(mA)
6.0

After initial warming-up period of 3 minutes at burning current of 6mA.

TESTS

GROUP A

Ignition voltage. Illumination 5 to 50 ft. cd.	..	..	..	..	†	—	115	V
Maintaining voltage	..	..	..	..	..	83	87	V
Change in maintaining voltage for burning current change from 5.8 to 6.2mA	..	..	..	..	..	—	180	mV
Voltage jumps. Burning current varies from 1 to 10mA. $R_a = 500\Omega$	..	..	..	..	..	—	100	mV
Oscillation. Burning current varies from 1 to 10mA. $R_a = 500\Omega$	..	..	..	..	..	—	5	(pk-pk) mV
Microphonic noise. $R_a = 500\Omega$	..	..	..	..	..	—	15	(pk-pk) mV
Leakage current. Supply voltage = 55V, $R_a = 1M\Omega$	..	..	..	..	..	—	5	(pk-pk) μA

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

GROUP B

Ignition voltage in darkness, after 24 hours in darkness	..	..	..	..	..	—	115	V
Change in maintaining voltage for burning current change from 1 to 10mA	..	..	..	..	..	—	4.0	V

TESTS

GROUP C

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

Fatigue¹¹

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

Post fatigue tests

Change in maintaining voltage	..	..	..	..	2.5	—	± 0.7	V
Microphonic noise as in Group A	..	..	..	..	2.5	—	30	mV (pk-pk)
Sub-group quality level ⁷	..	..	..	..	4.0	—	—	—

Shock¹²

No applied voltage, 500g

Post shock tests

Change in maintaining voltage	..	..	..	..	2.5	—	± 0.7	V
Microphonic noise as in Group A	..	..	..	..	2.5	—	30	mV (pk-pk)
Sub-group quality level ⁷	..	..	..	..	4.0	—	—	—

GROUP D

Life test¹¹

Burning current = 6mA continuous

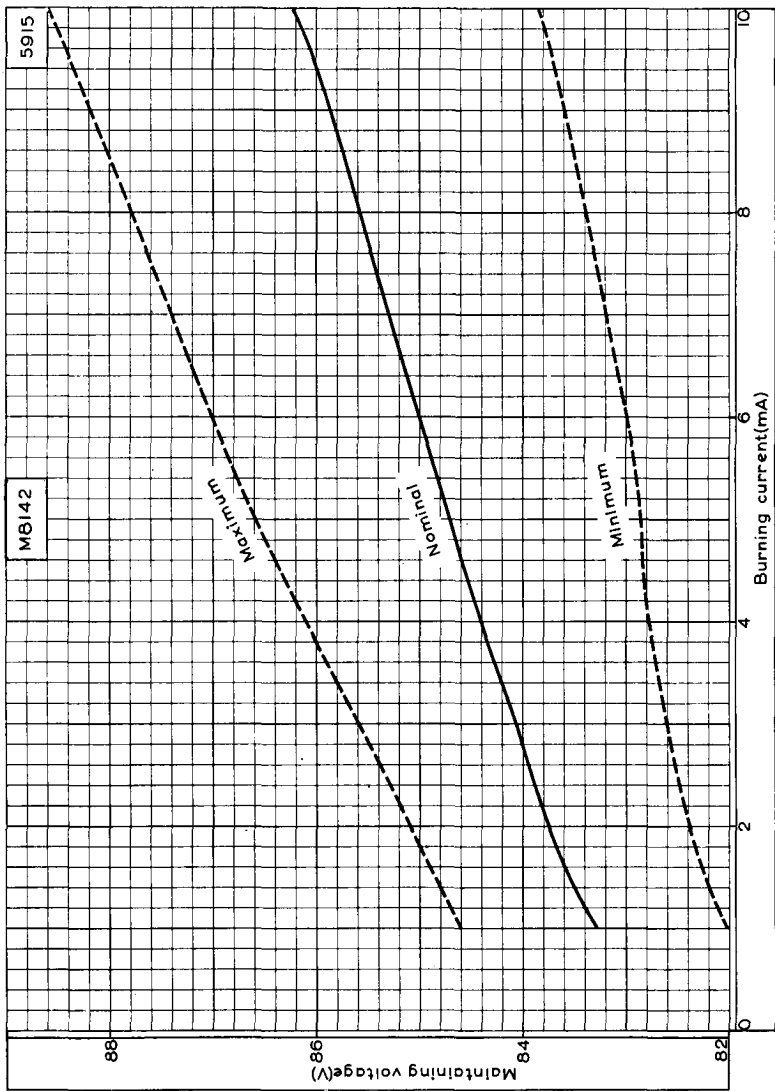
Life test end points, 1000 hours

Inoperatives ¹³	..	..	..	..	..	2.5	—	—
Ignition voltage	..	..	..	..	..	2.5	115	V
Change in maintaining voltage	..	..	..	..	..	2.5	±0.4	V
Change in maintaining voltage for burning current change from 5.8 to 6.2mA						2.5	180	mV

GROUP E

Tubes are held for 28 days and retested for

Inoperatives ¹³	..	..	..	..	..	0.5	—	—
Ignition voltage	..	..	..	..	..	0.5	115	V
Maintaining voltage	..	..	..	..	..	0.5	83	V
Change in maintaining voltage for burning current change from 5.8 to 6.2mA						0.5	180	mV



MAINTAINING VOLTAGE PLOTTED AGAINST BURNING CURRENT

