SPECIAL QUALITY R.F. PENTODE

Special quality r.f. pentode for use in equipment where high ambient temperatures, mechanical vibration and shocks are unavoidable and where statistically controlled major electrical characteristics are required.

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

HEATER

\[
\begin{align*}
V_h & \quad 6.3 \quad V \\
I_h & \quad 150 \quad mA
\end{align*}
\]

MOUNTING POSITION

Any

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

CAPACITANCES\(^2\) (measured with external shield)

\[
\begin{align*}
C_{a-g1} & \quad <15 \quad mF \\
C_{1a} & \quad 4.2 \quad pF \\
C_{out} & \quad 3.4 \quad pF
\end{align*}
\]

CHARACTERISTICS\(^2\)

\[
\begin{align*}
V_a & \quad 100 \quad V \\
\*V_{g3} & \quad 0 \quad V \\
V_{g2} & \quad 100 \quad V \\
V_{g1} & \quad -1.5 \quad V \\
I_a & \quad 7.5 \quad mA \\
I_{g2} & \quad 2.4 \quad mA \\
\beta_m & \quad 5.0 \quad mA/V \\
r_a & \quad >175 \quad k\Omega \\
R_k & \quad 0 \quad \Omega \\
V_{g1} \ (I_a < 50\mu A) & \quad -9.0 \quad V
\end{align*}
\]

*The suppressor grid should not be used for control or gating purposes.

LIMITING VALUES\(^4\) (absolute ratings)

\[
\begin{align*}
V_a \ \text{max.} & \quad 6.6 \quad V \\
V_a \ \text{min.} & \quad 6.0 \quad V \\
V_{a(b)} \ \text{max.} & \quad 330 \quad V \\
V_a \ \text{max.} & \quad 165 \quad V \\
p_a \ \text{max.} & \quad 800 \quad mW \\
V_{g3} \ \text{max.} & \quad 22 \quad V < \\
V_{g2(b)} \ \text{max.} & \quad 310 \quad V \\
V_{g2} \ \text{max.} & \quad 155 \quad V \\
p_{g2} \ \text{max.} & \quad 350 \quad mW \\
V_{k1} \ \text{max.} & \quad 0 \quad V < \\
V_{g1} \ \text{max.} & \quad 55 \quad V \\
I_k \ \text{max.} & \quad 16.5 \quad mA \\
R_{g1-k} \ \text{max.} & \quad 1.1 \quad M\Omega \\
V_{b-k} \ \text{max.} & \quad 200 \quad V \\
\text{Maximum acceleration (continuous operation)} & \quad 2.5 \quad g \\
\text{Maximum shock (short duration)} & \quad 500 \quad g \\
T_{bulb} \ \text{max.} & \quad 220 \quad ^\circ\text{C}
\end{align*}
\]
<table>
<thead>
<tr>
<th>TESTS</th>
<th>A.Q.L.(^5)</th>
<th>Individuals(^6)</th>
<th>Lot average(^7)</th>
<th>Lot standard deviation(^8)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>((^\circ)%)</td>
<td>Bogey(^9) Min.</td>
<td>Max.</td>
<td>Min.</td>
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<tr>
<td>GROUP A</td>
<td></td>
<td></td>
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<tr>
<td>Heater current</td>
<td>0.65</td>
<td>150 140 160</td>
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</tr>
<tr>
<td>Heater-to-cathode leakage current</td>
<td>—</td>
<td>—</td>
<td>5.0</td>
<td>—</td>
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<tr>
<td>(V_{b-k} = \pm 100)V</td>
<td>0.65</td>
<td>—</td>
<td>0 0.3</td>
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<tr>
<td>Reverse grid current</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>6.7 8.3</td>
</tr>
<tr>
<td>(R_{g1} = 1.0)MΩ</td>
<td>0.65</td>
<td>—</td>
<td>7.5 5.5 9.5</td>
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<tr>
<td>Anode current</td>
<td>—</td>
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<tr>
<td>Anode current</td>
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</tr>
<tr>
<td>(V_{g1} = -9.0)V, (R_k = 0)Ω</td>
<td>0.65</td>
<td>—</td>
<td>1.5 3.3</td>
<td>—</td>
</tr>
<tr>
<td>Screen-grid current</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>5.0 4.2 5.8</td>
</tr>
<tr>
<td>Mutual conductance</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>4.7 5.3</td>
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<tr>
<td>Sub-group quality level(^{10})</td>
<td>—</td>
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<tr>
<td>Inoperatives(^{16})</td>
<td>—</td>
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</tbody>
</table>
GROUP B

Insulation

- a-crest, measured at -300V: 2.5
- g1-crest, measured at -100V: 100 MΩ

Change in mutual conductance

- $V_R = 5.7V$: 2.5
- $V_{g1} = 7.5V, V_R = -9.0V$: 100 %
- $R_{g1} = 1.0MΩ, R_k = 0Ω$. Measured after 5 minutes preheat under standard test conditions: 0.5 μA

Reverse grid current: $V_R = 7.5V, V_{g1} = 100kΩ$
- $V_{g2} = 19V, R_{g1} = 100kΩ$: 2.5
- $R_{g2} = 1.0kΩ, R_a = 200kΩ$: 70 mV

Anode impedance

- $R_{g2}$: 6.5 kΩ
- $R_a$: 175 kΩ

Capacitances (shielded) No applied voltages

- $C_{in}$: 6.5 pF
- $C_{out}$: 3.5 4.9
- $C_{a-g1}$: 2.9 3.9
- $C_{a-g2}$: 15 mpF

Low pressure voltage breakdown

- Pressure = 55±5mmHg
- Voltage = 300V r.m.s. No other applied voltages: 6.5

Microphonic noise at the anode at 50c/s, 15g
- min. peak acceleration, $R_a = 10kΩ$: 60 mV

†The valve is tapped with a specified hammer and the output observed on a meter of specified dynamic response.
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<td>Max.</td>
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<td><strong>GROUP C</strong></td>
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<tr>
<td>Lead fragility test(^{10,11}) 4 arcs</td>
<td>2.5</td>
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<tr>
<td><strong>Fatigue(^{14})</strong></td>
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<tr>
<td>(V_h = 6.3) V. No other voltages applied. 2.5g\</td>
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<tr>
<td>min. peak acceleration, fixed frequency</td>
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<td>(f = 25c/s) min. 60c/s max. for 32 hours in each</td>
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<td>of 3 mutually perpendicular planes</td>
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<tr>
<td><strong>Post fatigue tests</strong></td>
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<tr>
<td>Heater-to-cathode leakage current</td>
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<tr>
<td>(V_{h-k} = \pm 100V)</td>
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<tr>
<td>Change in mutual conductance</td>
<td>6.5</td>
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<tr>
<td>Microphonic noise as in group B</td>
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<tr>
<td><strong>Shock(^{16})</strong></td>
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<tr>
<td>(V_{h-k} = 100V) (cathode negative), (R_{k} = 100k\Omega), 500g</td>
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<tr>
<td><strong>Post shock tests</strong></td>
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<tr>
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<tr>
<td>Change in mutual conductance</td>
<td>20</td>
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<tr>
<td>Microphonic noise as in group B</td>
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<tr>
<td>Glass strain test(^{11,12}), No applied voltages</td>
<td>6.5</td>
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</tbody>
</table>
GROUP D

Heater cycling life test

$V_h = 7.0V$ 1 minute on, 4 minutes off,

2000 switchings. $V_{h-k} = 140V_{r.m.s.}$ (continuous)

No other applied voltages 2.5

Stability life

Running conditions: $R_{g1} = 1.0M\Omega$,

$V_{h-k} = 200V$ (cathode negative),

$T_{ambient} = $ Room temperature

Stability life end points

Change in mutual conductance after 1 hour 1.0

Survival rate life test

Running conditions $R_{g1} = 1.0M\Omega$,

$V_{h-k} = 200V$ (cathode negative),

$T_{ambient} = $ Room temperature

Survival rate life test end points (100 hours)

Inoperatives 0.65

Mutual conductance 1.0

Intermittent life test

Running conditions: $R_{g1} = 1.0M\Omega$,

$V_{h-k} = 200V$ (cathode negative), $T_{bulk/min} = 220^\circ C$

Intermittent life test end points (500 hours)

A.Q.L. (%) Min. Max.

Inoperatives $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$

Heater current $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$ $\ldots$

Heater-to-cathode leakage current $V_{h-k} = \pm 100V$

Reverse grid current $R_{g1} = 1.0M\Omega$

Change in mutual conductance (individuals)

Change in mutual conductance $V_h = 5.7V$

Insulation as in group B

Average change in mutual conductance

Sub-group quality level

mA/V

6205
The bulb and base dimensions of this valve are in accordance with BS448, section B8D/F.
ANODE AND SCREEN-GRID CURRENTS PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER
ANODE AND SCREEN-GRID CURRENTS, MUTUAL CONDUCTANCE AND ANODE IMPEDANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE