110° TELEVISION PICTURE TUBE
WITH INTEGRAL PROTECTION

Direct viewing television picture tube with metal backed screen, electrostatic focusing, 110° magnetic deflection and with an integral protection against dangerous mechanical tube failures, so that no separate safety panel is required. The tube is provided with four metal mounting lugs to facilitate mounting into the cabinet.

HEATING: Indirect by A.C. or D.C.; series or parallel supply

Heater voltage \( V_f = 6.3 \) V

Heater current \( I_f = 0.3 \) A

If the tube is used in a series heater chain the surge heater voltage should not exceed 9.5 V (R.M.S.) when the supply is switched on. If necessary, a current limiting device must be used to ensure that this value is not exceeded.

CAPACITANCES

Grid No.1 to all other electrodes

\[ C_{g1} = 6 \text{ pF} \]

Cathode to all other electrodes

\[ C_k = 4 \text{ pF} \]

External conductive coating to final accelerating electrode

\[ C_{m-a,g3,g5} > 1700 \text{ pF} \]

\[ C_{m'-a,g3,g5} < 2500 \text{ pF} \]

Metal band to final accelerating electrode

\[ C_{m'-a,g3,g5} = 350 \text{ pF} \]

SCREEN

Metal backed

Luminescence white

Light transmission 53%

Useful diagonal min. 566 mm

Useful width min. 489 mm

Useful height min. 385 mm

For curves of the screen properties please refer to front of this section.

7Z2 2271
Dimensions in mm

Tentative data

max 578
min 566 (phosphor screen)
max 503
max 400

R = 12
max 3

opening of
rim band

Detail A

max 2.4

max 528.5
min 505

R = 700 / 6

51.4
93°

max 86

min 50

410

max 427
min 402

265

R = 620

R = 502

82°

48.6

referece line

min 130

722

222

Philips
Dimensions in mm

Base: Small-button neoghtar

Mounting position: any

Net weight 11 kg

The socket for the base should not be rigidly mounted; it should have flexible leads and be allowed to move freely.

The bottom circumference of the base wafer will lie within a circle concentric with the bulb axis and having a diameter of 40 mm.

1) ... 13) See page 7.
MAXIMUM CONE CONTOUR DRAWING (dimensions in mm)
See also page 5.
MAXIMUM CONE CONTOUR DRAWING (continued)

All dimensions (in mm) are maximum values, unless otherwise specified.

| Section | Nom. height | Long axis | 0° | 10° | 20° | 30° | Dia- | 40° | 50° | 60° | 70° | 80° | 90° |
|---------|-------------|-----------|----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|
| ref. line | above | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 | 82.5 |
| 1       | 18.3        | 107.3     | 107.2 | 106.7 | 105.5 | 105.0 | 104.6 | 104.0 | 103.6 | 102.8 | 102.3 | 102.3 | 102.5 |
| 2       | 25.3        | 135.0     | 135.3 | 135.2 | 132.9 | 131.3 | 129.6 | 127.2 | 124.9 | 123.9 | 123.9 | 123.9 | 123.9 |
| 3       | 35.3        | 158.0     | 158.4 | 158.8 | 155.1 | 152.1 | 149.8 | 144.6 | 141.1 | 139.5 | 139.3 | 139.3 | 139.3 |
| 4       | 45.3        | 178.4     | 179.0 | 179.1 | 175.6 | 171.6 | 168.4 | 161.4 | 156.6 | 153.8 | 152.5 | 152.2 | 152.2 |
| 5       | 55.3        | 196.0     | 197.0 | 197.3 | 194.6 | 190.0 | 186.0 | 177.7 | 171.1 | 166.3 | 164.0 | 163.1 | 163.1 |
| 6       | 65.3        | 210.8     | 212.0 | 213.4 | 211.6 | 206.7 | 202.2 | 192.6 | 183.7 | 177.4 | 174.0 | 172.4 | 172.4 |
| 7       | 75.3        | 223.3     | 225.1 | 228.1 | 227.2 | 222.8 | 217.9 | 206.1 | 194.4 | 187.0 | 182.3 | 180.4 | 180.4 |
| 8       | 85.3        | 233.2     | 235.2 | 240.1 | 240.7 | 238.0 | 232.7 | 217.8 | 203.9 | 194.4 | 189.3 | 187.1 | 187.1 |
| 9       | 95.3        | 240.8     | 243.3 | 249.4 | 253.2 | 252.5 | 246.8 | 228.6 | 212.4 | 200.9 | 195.1 | 192.8 | 192.8 |
| 10      | 105.3       | 247.2     | 249.7 | 257.0 | 264.9 | 266.2 | 259.9 | 238.3 | 219.9 | 206.7 | 200.2 | 197.7 | 197.7 |
| 11      | 115.3       | 253.1     | 255.8 | 264.0 | 275.5 | 278.8 | 272.3 | 247.4 | 226.5 | 212.4 | 205.2 | 202.7 | 202.7 |
| 12      | 125.3       | 258.4     | 261.4 | 270.4 | 285.4 | 290.2 | 283.5 | 255.7 | 232.9 | 217.8 | 209.9 | 207.5 | 207.5 |
| 13      | 135.3       | 263.2     | 266.3 | 276.0 | 293.4 | 299.5 | 293.3 | 263.2 | 238.6 | 222.9 | 214.6 | 211.9 | 211.9 |
| 14      | 145.3       | 267.06    | 270.3 | 280.3 | 297.8 | 303.7 | 299.3 | 268.9 | 243.7 | 227.6 | 218.9 | 216.1 | 216.1 |
| 15      | 155.3       | 267.75    | 270.97| 280.92| 298.64| 304.5 | 300.24| 270.22| 244.91| 228.8 | 219.87| 217.0 | 217.0 |
| 16      | 160.5       | 183.4     | 183.4 | 183.4 | 183.4 | 183.4 | 183.4 | 183.4 | 183.4 | 183.4 | 183.4 | 183.4 | 183.4 | 183.4 |
REFERENCE LINE GAUGE

Dimensions in mm

If $x$ and $y$ are expressed in inches, the parabolic formula for the inner contour reads $y = 0.58x^2 + 0.576$

The reference line is determined by the plane of the upper edge of the flange of the reference line gauge when the gauge is resting on the cone.

FOCUSING electrostatic

DEFLECTION magnetic

- Diagonal deflection angle $110^\circ$
- Horizontal deflection angle $99^\circ$
- Vertical deflection angle $82^\circ$

PICTURE CENTRING MAGNET

Field intensity perpendicular to the axis for centring of the picture should be adjustable from 0 to 10 Oersteds.

Distance between centre of the field of the magnet and the reference line max. 57 mm.

The centring magnet should be mounted as close to the deflection coils as possible. -7Z2 2142
Notes from pages 2 and 3

1) Opening of metal rim band (see detail A). Eccentricity with respect to centre of screen max. 1.5 mm.

2) The position of the mounting screw in the cabinet will be within a circle of 9.5 mm diameter.

3) Opening of coating at end of free zone.

4) Meniscus of resin filler on screen.

5) Small cavity contact.

6) End of free zone. The maximum contour from reference line towards screen is given by the reference line gauge (18.13 mm).

7) The mounting lug is situated within this distance.

8) The screen radius of 700 mm applies to the major axis and the diagonal.

9) The screen radius of 1012 mm applies to the centre area of the screen.

10) This area must be kept clean.

11) The deviation of any lug with respect to the plane through the other three lugs is max. 2 mm.

12) 8 tags for earthing the rim band. The metal rim band must be earthed by means of these tags. No electrical contact between the band and the mounting lugs can be guaranteed.

13) The configuration of the external conductive coating is optional but contains the contact area shown in the drawing. The external conductive coating must be earthed.

7Z2 2284
GRID DRIVE SERVICE

Voltages are specified with respect to the cathode.

OPERATING CHARACTERISTICS

Final accelerator voltage \[ V_{a, g_3, g_5} = 18 \quad 18 \text{ kV} \]
Grid No.2 voltage \[ V_{g_2} = 400 \quad 500 \text{ V} \]
Grid No.4 voltage \[ V_{g_4} = 0 \text{ to } 400 \quad 0 \text{ to } 400 \text{ V} \]

Negative grid No.1 voltage
for visual extinction of focused raster: \[ -V_{g_1} = 40 \text{ to } 77 \quad 50 \text{ to } 93 \text{ V} \]

LIMITING VALUES (Design centre limits)

Final accelerator voltage at \[ I_{a, g_3, g_5} = 0 \mu \text{A} \]
\[ V_{a, g_3, g_5} = \text{max. } 18 \text{ kV} \]
Final accelerator voltage
\[ V_{a, g_3, g_5} = \text{min. } 11 \text{ kV} \]

Grid No.4 voltage
positive value \[ V_{g_4} = \text{max. } 1000 \text{ V} \]
negative value \[ -V_{g_4} = \text{max. } 500 \text{ V} \]
peak positive value \[ V_{g_4} \text{ p} = \text{max. } 2500 \text{ V} \]

Grid No.2 voltage \[ V_{g_2} = \text{max. } 550 \text{ V} \]

Grid No.1 voltage
negative value \[ -V_{g_1} = \text{max. } 150 \text{ V} \]
positive value \[ +V_{g_1} = \text{max. } 0 \text{ V} \]
peak negative value \[ -V_{g_1} \text{ p} = \text{max. } 400 \text{ V} \]
peak positive value \[ +V_{g_1} \text{ p} = \text{max. } 2 \text{ V} \]

1) Voltage range necessary for optimum overall focus at 100 \( \mu \text{A} \) beam current.
2) Absolute limit.
3) Maximum pulse duration = 22\% of a cycle, but maximum 1.5 msec.

7Z2 2055

Tentative data
LIMITING VALUES (Design centre limits) (continued)

Cathode to heater voltage

<table>
<thead>
<tr>
<th>Condition</th>
<th>Voltage</th>
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<tbody>
<tr>
<td>cathode positive</td>
<td>$V_{kf}$ (k pos) = max. 250 V</td>
</tr>
<tr>
<td>cathode negative</td>
<td>$V_{kf}$ (k neg) = max. 135 V</td>
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<tr>
<td>peak value, cathode positive</td>
<td>$V_{kfp}$ (k pos) = max. 300 V</td>
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<tr>
<td>peak value, cathode negative</td>
<td>$V_{kfp}$ (k neg) = max. 180 V</td>
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CATHODE DRIVE SERVICE

Unless otherwise stated, voltages are with respect to grid No.1.

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Voltage</th>
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<tr>
<td>Final accelerator voltage</td>
<td>$V_{a,g_3,g_5} = 18$ 18 kV</td>
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<tr>
<td>Grid No.2 voltage</td>
<td>$V_{g2} = 400$ 500 V</td>
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<tr>
<td>Grid No.4 voltage</td>
<td>$V_{g4} = 0$ to 400 $0$ to 400 V 1)</td>
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<tr>
<td>Cathode voltage for visual</td>
<td>$V_k = 36$ to 66 $45$ to 79 V</td>
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<td>extinction of focused raster</td>
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1) Voltage range necessary for optimum overall focus at $100\mu$A beam current.

5) In order to avoid excessive hum the A.C. component of the heater to chassis voltage should be as low as possible and must not exceed 20 V (R.M.S.).

6) During an equipment warm-up period not exceeding 15 sec $V_{kf}$ is allowed to rise to 410 V. Between 15 and 45 seconds after switching on a decrease in $V_{kf}$ proportional with time from 410 V to 250 V is permissible.

722 2056
Cathode Drive Service (continued)

Unless otherwise stated, voltages are with respect to grid No. 1.

Limiting Values (Design Centre Limits)

Final accelerator voltage at
\[ I_{a, g_3, g_5} = 0 \, \mu A \]
\[ V_{a, g_3, g_5} = \text{max. } 18 \, kV \]

Final accelerator voltage
\[ V_{a, g_3, g_5} = \text{min. } 11 \, kV \]

Grid No. 4 voltage

positive value \[ V_{g_4} = \text{max. } 1000 \, V \]
negative value \[ -V_{g_4} = \text{max. } 500 \, V \]
peak positive value \[ V_{g_4, p} = \text{max. } 2500 \, V \]

Grid No. 2 voltage
\[ V_{g_2} = \text{max. } 700 \, V \]

Grid No. 2 to cathode voltage
\[ V_{g_2-k} = \text{min. } 550 \, V \]

Cathode voltage

positive value \[ V_k = \text{max. } 150 \, V \]
negative value \[ -V_k = \text{max. } 0 \, V \]
peak positive value \[ V_{k, p} = \text{max. } 400 \, V \]
peak negative value \[ -V_{k, p} = \text{max. } 2 \, V \]

Cathode to heater voltage

\[ V_{kf} \text{ (k pos)} = \text{max. } 250 \, V \]
\[ V_{kf} \text{ (k neg)} = \text{max. } 135 \, V \]
\[ V_{kf, p} \text{ (k pos)} = \text{max. } 300 \, V \]
\[ V_{kf, p} \text{ (k neg)} = \text{max. } 180 \, V \]

2) Absolute limit.
3) Maximum pulse duration = 22% of a cycle, but maximum 1.5 msec.
4) At max. beam current \( V_{k-g_1} = 0 \, V \)
5)\) See page 7.
CIRCUIT DESIGN VALUES for both grid drive service and cathode drive service

Positive grid No.4 current \( I_{g4} \) = max. 25 \( \mu \)A
Negative grid No.4 current \( -I_{g4} \) = max. 25 \( \mu \)A
Positive grid No.2 current \( I_{g2} \) = max. 5 \( \mu \)A
Negative grid No.2 current \( -I_{g2} \) = max. 5 \( \mu \)A

MAX. CIRCUIT VALUES for both grid drive service and cathode drive service

Grid No.1 circuit resistance \( R_{g1} \) = max. 1.5 M\( \Omega \)
Grid No.1 circuit impedance \( Z_{g1} (f = 50 \text{ c/s}) \) = max. 0.5 M\( \Omega \)
Resistance between cathode and heater \( R_{kf} \) = max. 1 M\( \Omega \)
Impedance between cathode and heater \( Z_{kf} (f = 50 \text{ c/s}) \) = max. 0.1 M\( \Omega \)
Grid drive
$V_{a,g3g5} = 11-18kV$

$V_{g2}=500V$

$V_{g2}=200V$

$I_{o+g3+g5}$ (μA)
Cathode drive
Voltages with respect to $g_1$
$V_{a,g3,g5} = \text{11-18}\,kV$
$V_{a,g3,g5} = 11-18 \text{kV}$

grid – drive

 upper limit

 lower limit
$V_{a,g3,g5} = 11 - 18 \text{kV}$

cathode - drive

upper limit

tower limit
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