

OSCILLOSCOPE TUBE with flat face, post deflection acceleration by means of a helical electrode, side contacts, high sensitivity and metal-backed screen

SCREEN

Type	Fluorescence	Phosphorescence	Persistence
D13-15BE	Blue	Blue	Medium short
D13-15GH	Green	Green	Medium short
D13-15GL	Yellowish green	Yellowish green	Medium short
D13-15GM	Purplish blue	Yellowish green	Long

Useful screen diameter min. 114 mm

Useful scan at $V_{g7}/V_{g4} = 2$ and $V_{g7}/V_{g2} = 2$
in the x direction min. 100 mm

in the y direction min. 60 mm

The useful scan may vertically be shifted max. 4 mm with respect to the geometric centre of the face plate

For further screen properties please refer to front of this section

HEATING

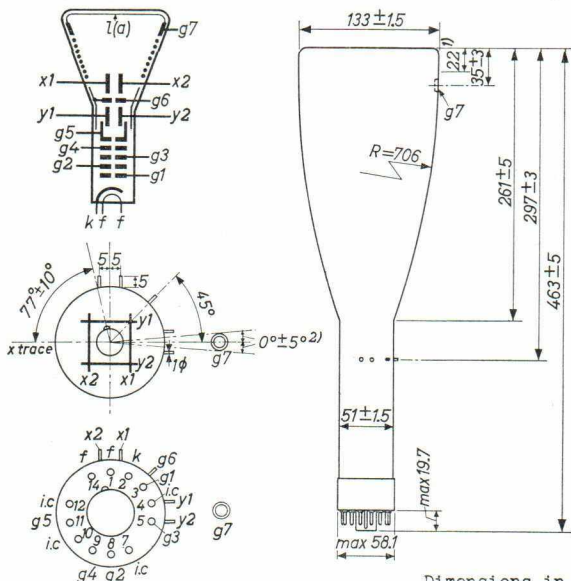
Indirect by A.C. or D.C.; parallel supply

Heater voltage $V_f = 6.3 \text{ V}$

Heater current $I_f = 0.3 \text{ A}$

CAPACITANCES

Grid No.1 to all other electrodes	C_{g1}	=	6.4 pF
Cathode to all other electrodes	C_k	=	3.9 pF
x_1 plate to all other electrodes except x_2 plate	C_{x1}	=	3.0 pF
x_2 plate to all other electrodes except x_1 plate	C_{x2}	=	3.0 pF
y_1 plate to all other electrodes except y_2 plate	C_{y1}	=	2.8 pF
y_2 plate to all other electrodes except y_1 plate	C_{y2}	=	2.8 pF
x_1 plate to x_2 plate	C_{x1-x2}	=	1.9 pF
y_1 plate to y_2 plate	C_{y1-y2}	=	1.5 pF

D13-15..**PHILIPS**

Dimensions in mm

g5 = deflection plate shield

Base: DIHEPTAL 12 p

g6 = isolation shield

The post-accelerator helix is connected between g7 and g6.

The resistance of the helix is min. 300 MΩ

MOUNTING POSITION: any

The tube should not be supported by the base alone

ACCESSORIES

Socket

5914/20

Connector for side contacts

55561

Mu-metal shield

55551

Post accelerator contact connector

55563

NET WEIGHT

910 g

1) Straight part of the bulb

2) Location of the recessed cavity button contact with respect to the x-trace

FOCUSING electrostatic

DEFLECTION double electrostatic

x plates symmetrical

y plates symmetrical

Angle between x and y traces $90^{\circ} \pm 1^{\circ}$

LINE WIDTH

Post accelerator voltage	$V_{g7} = 4000 \text{ V}$
Grid No.4 voltage	$V_{g4} = 2000 \text{ V}$
Grid No.2 voltage	$V_{g2} = 2000 \text{ V}$
Beam current	$I_b = 10 \text{ } \mu\text{A}$
Line width	$l.w. = 0.5 \text{ mm}$

The line width is measured with the shrinking raster method

OPERATING CHARACTERISTICS

Post accelerator voltage	$V_{g7} = 4000 \text{ V}$
Isolation shield voltage	$V_{g6} = 2000 \pm 200 \text{ V } ^1)$
Deflection plate shield voltage	$V_{g5} = 2000 \pm 100 \text{ V } ^1)$
Second accelerator voltage	$V_{g4} = 2000 \pm 100 \text{ V } ^1)$
Focusing electrode voltage	$V_{g3} = 220 \text{ to } 710 \text{ V}$
First accelerator voltage	$V_{g2} = 2000 \text{ V}$
Grid No.1 voltage	$V_{g1} = -60 \text{ to } -96 \text{ V } ^2)$
Deflection factor	
horizontal	$M_x = 21 \text{ to } 26 \text{ V/cm}$
vertical	$M_y = 5.1 \text{ to } 6.7 \text{ V/cm}$
Deviation of linearity of deflection	$= \text{max. } 2 \% ^1)^3)$
Pattern distortion	$= \text{max. } 1 \% ^1)^4)$
Undelected spot position	$R = 5 \text{ mm}^5)$

¹⁾²⁾³⁾⁴⁾⁵⁾ See page 4

- 1) In general the voltages on g_6 , g_5 , g_4 and the average potential of the deflection plates should be equal. Variation of the isolation shield voltage V_{g_6} (max. $\pm 10\%$ of V_{g_4}) serves to correct pincushion and barrel pattern distortion. Adjustment of the deflection plate shield voltage V_{g_5} (max. $\pm 5\%$ of V_{g_4}) provides improved linearity of vertical deflection. A small potential difference (max. $\pm 5\%$ of V_{g_4}) between the y plates and g_4 may be desirable for obtaining optimum sharpness.
- 2) For visual extinction of the focused spot
- 3) The sensitivity for a deflection of less than 75% of the useful scan will not differ more than 2 % from the sensitivity for a deflection of 25% of the useful scan
- 4) With a raster pattern the size of which is such that the widest points of the pattern just touch the sides of a rectangle of 100x60 mm, no points of the pattern sides will be within a concentric rectangle of 98x58.5 mm
- 5) With the tube shielded the spot will be within a circle of 5 mm radius, the circle being centered with respect to the tube face
- 6) If use is made of the full deflection capabilities of the tube, the deflection plates will intercept part of the electron beam near the edge of the scan; a low impedance deflection plate drive is therefore desirable
- 7) Values to be taken into account for the calculation of the V_{g_3} -potentiometer

LIMITING VALUES (Absolute limits)

Post accelerator voltage	V_{g7}	= max. 8800 V = min. 2500 V
Isolation shield voltage	V_{g6}	= max. 2200 V
Deflection plate shield voltage	V_{g5}	= max. 2200 V
Second accelerator voltage	V_{g4}	= max. 2200 V = min. 1000 V
Focusing electrode voltage	V_{g3}	= max. 1500 V
First accelerator voltage	V_{g2}	= max. 2200 V
Grid No.1 voltage		
negative	$-V_{g1}$	= max. 200 V
positive	$+V_{g1}$	= max. 0 V
peak positive	$+V_{g1\ p}$	= max. 2 V
Ratio V_{g2}/V_{g4}	V_{g2}/V_{g4}	= max. 1
Ratio V_{g7}/V_{g4}	V_{g7}/V_{g4}	= max. 4
Peak voltage between second accelerator and any deflection plate	$V_{g4-x\ p}$	= max. 500 V
	$V_{g4-y\ p}$	= max. 500 V
Voltage between cathode and heater		
cathode positive	$V_{kf}(k\ pos)$	= max. 200 V
cathode negative	$V_{kf}(k\ neg)$	= max. 125 V
First accelerator		
dissipation	W_{g2}	= max. 6 W
Screen dissipation	W_{ℓ}	= max. 3 mW/cm ²

CIRCUIT DESIGN VALUES

Focusing voltage	$V_{g3} = 110$ to $355\ V$	per kV of V_{g4}
Grid No.1 voltage ²⁾	$-V_{g1} = 30$ to $48\ V$	per kV of V_{g2}
Deflection factors at $V_{g7}/V_{g4} = 2$		
horizontal	$M_x = 10.5$ to $13\ V/cm$	per kV of V_{g4}
vertical	$M_y = 2.55$ to $3.35\ V/cm$	per kV of V_{g4}
Grid No.1 circuit resistance		$R_{g1} = \text{max. } 1.5\ M\Omega$
Deflection plate resistance		$R_x = R_y = \text{max. } 5\ M\Omega^{6)}$
Grid No.3 current		$I_{g3} = -15$ to $+10\ \mu A^{7)}$

²⁾⁶⁾⁷⁾ See page 4

