

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

SCREEN

Type	Fluorescence	Phosphorescence	Persistence
D13-21BE (DB13-79)	Blue	Blue	Medium short
D13-21GH (DH13-79)	Green	Green	Medium short
D13-21GL (DN13-79)	Yellowish green	Yellowish green	Medium short
D13-21GM (DP13-79)	Purplish blue	Yellowish green	Long

Useful screen diameter min. 108 mm

Useful scan at $V_{g7}/V_{g4} = 6$
in the x direction 100 mm
in the y direction 40 mm

The useful scan may vertically be shifted max. 3 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 $\frac{V_f}{I_f} = 6.3 \text{ V}$

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

PHILIPS



Base: DIHEPTAL 12 p

The post-accelerator helix is connected between g7 and g6.
The resistance of the helix is min. 200 MΩ

The tube should not be supported by the base alone

ACCESSORIES

NET WEIGHT 910 g Shipping

NET WEIGHT 910 g Shipping weight 2300 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 measured on a circle of 30 mm diameter

Post accelerator voltage $V_{g7} = 10 \text{ kV}$

Grid No.4 voltage $V_{g4} = 1670 \text{ V}$

Grid No.2 voltage $V_{g2} = 1670 \text{ V}$

Beam current $I_l = 0.5 \text{ }\mu\text{A}$

Line width l.w. = 0.4 mm

OPERATING CHARACTERISTICS

Post accelerator voltage $V_{g7} = 10 \text{ kV}$

Isolation shield voltage $V_{g6} = 1670 \text{ V } ^1)$

Deflection plate shield voltage $V_{g5} = 1670 \text{ V } ^1)$

Second accelerator voltage $V_{g4} = 1670 \text{ V } ^1)$

Focusing electrode voltage $V_{g3} = 180 \text{ to } 590 \text{ V}$

First accelerator voltage $V_{g2} = 1670 \text{ V}$

Grid No.1 voltage $V_{g1} = -50 \text{ to } -80 \text{ V } ^2)$

Deflection factor

horizontal $M_x = 27-33 \text{ V/cm}$

vertical $M_y = 5.7-7.1 \text{ V/cm}$

Deviation of linearity of deflection $^1)^3)$

horizontal max. 1.5 %

vertical max. 1 %

Pattern distortion $^1)^4)$

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_{g6} (max. +10 % or -5 % of V_{g4}) serves to correct pincushion and barrel pattern distortion
Adjustment of the deflection plate shield voltage V_{g5} (max. ± 5 % of V_{g4}) provides improved linearity of vertical deflection
A small potential difference (max. ± 5 % of V_{g4} , obtained by varying V_{g4}) 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 from the sensitivity for a deflection of 25 % of the useful scan by more than the indicated values
- 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 100x40 mm, no points of the pattern sides will be within a concentric rectangle of 98x38.8 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_{g3} -potentiometer

LIMITING VALUES (Design centre limits)

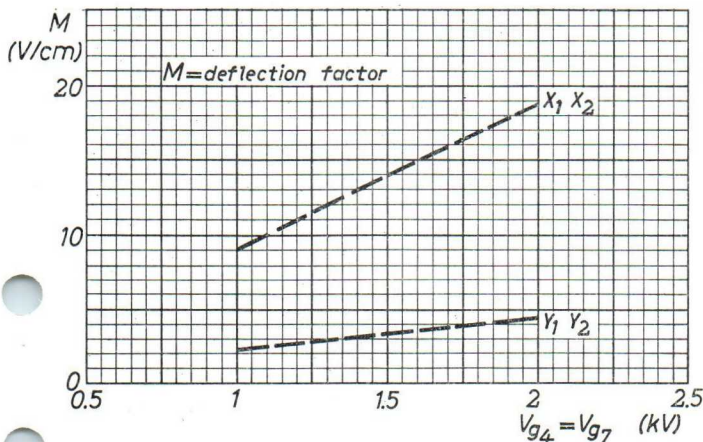
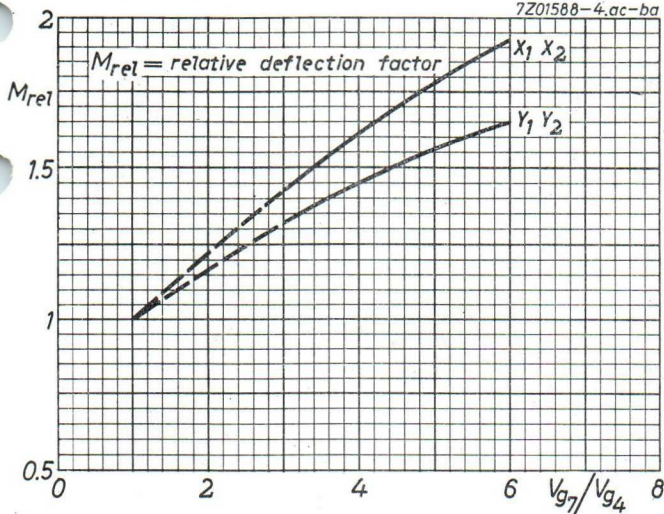
Post accelerator voltage	V_{g7}	= max. 12 kV = min. 6 kV
Isolation shield voltage	V_{g6}	= max. 2200 V
Deflection plate shield voltage	V_{g5}	= max. 2100 V
Second accelerator voltage	V_{g4}	= max. 2100 V = min. 1000 V
Focusing electrode voltage	V_{g3}	= max. 1500 V
First accelerator voltage	V_{g2}	= max. 2100 V = min. 1000 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_{g7}/V_{g4}	V_{g7}/V_{g4}	= max. 6
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	$V_{kf}(k \text{ pos})$	= max. 200 V
cathode negative	$V_{kf}(k \text{ neg})$	= 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 $V_{g7}/V_{g4} = 6$			
horizontal	$M_x =$	16.2 to 19.8 V/cm	per kV of V_{g4}
vertical	$M_y =$	3.4 to 4.25 V/cm	per kV of V_{g4}
Grid No.1 circuit resistance		$R_{g1} =$	max. 1.5 M Ω
Deflection plate resistance		$R_x = R_y =$	max. 1 M Ω ⁶⁾
Grid No.3 current		$I_{g3} =$	-15 to +10 μA ⁷⁾

^{2) 6) 7)} See page 4

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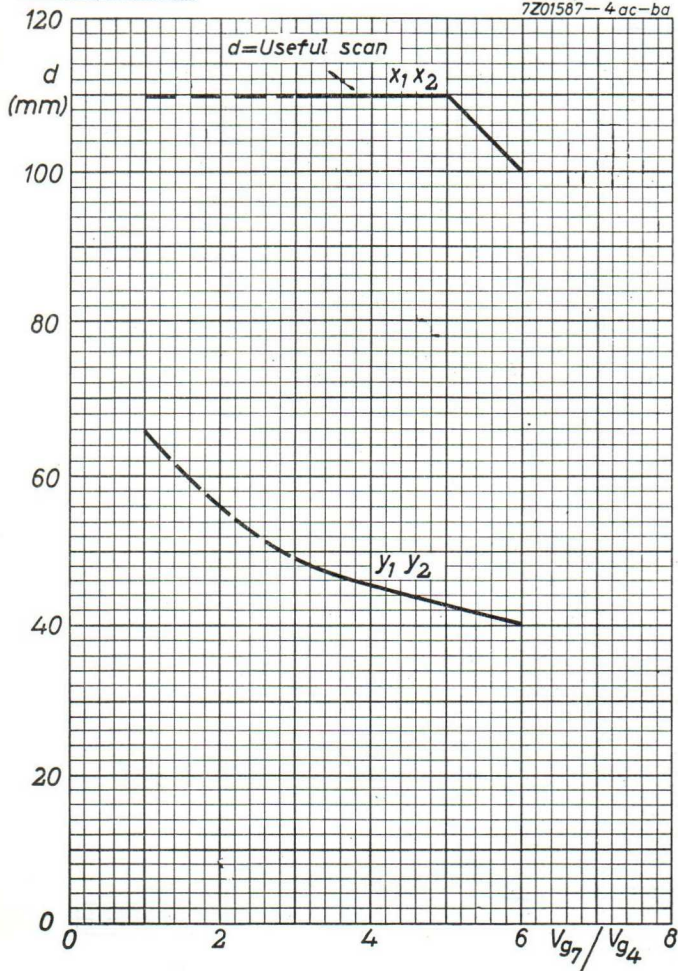
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PHILIPS

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