

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

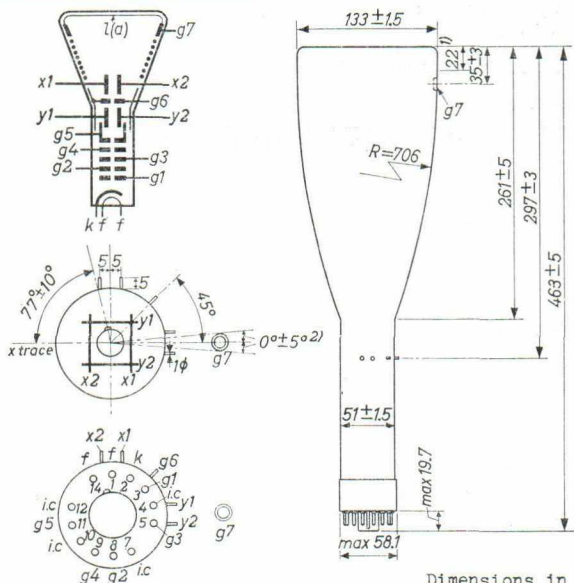
Indirect by A.C. or D.C.; parallel supply

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

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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. 200 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 Shipping weight 2300 g

1) Straight part of the bulb

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

<u>FOCUSING</u>	electrostatic
<u>DEFLECTION</u>	double electrostatic
x plates	symmetrical
y plates	symmetrical
Angle between x and y traces $90^\circ \pm 1^\circ$	
<u>LINE WIDTH</u> 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	$l.w. = 0.4 \text{ mm}$

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)

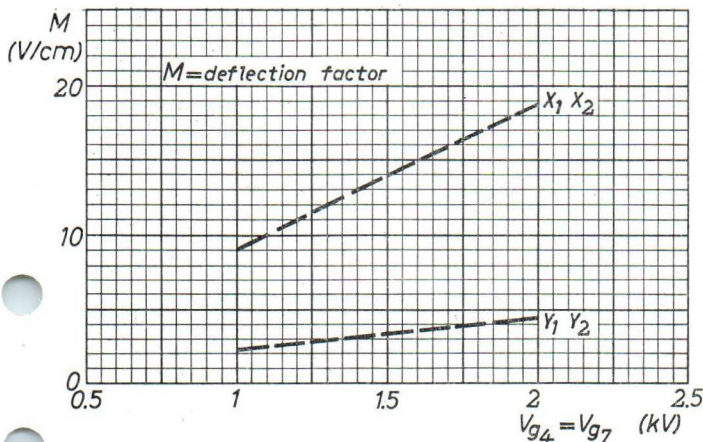
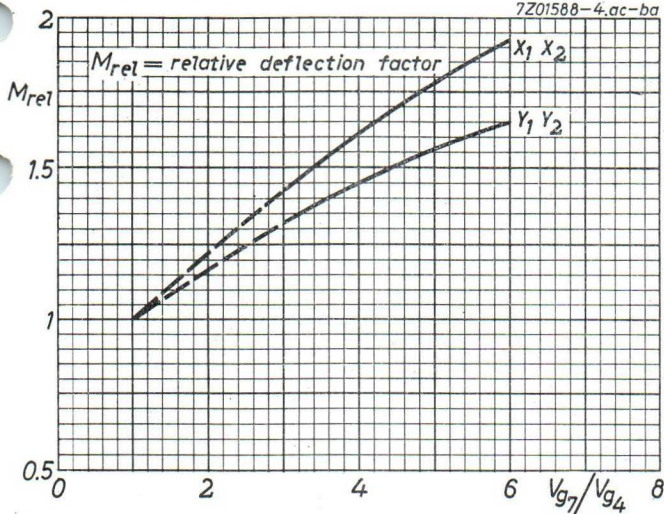
Post accelerator voltage	V_{g7}	= max. 12 kV = min. 6 kV
Isolation shield voltage	V_{g6}	= max. 2200 V
Deflection plate shield voltage	V_{g5}	= max. 2100 V
Second accelerator voltage	V_{g4}	= max. 2100 V = min. 1000 V
Focusing electrode voltage	V_{g3}	= max. 1500 V
First accelerator voltage	V_{g2}	= 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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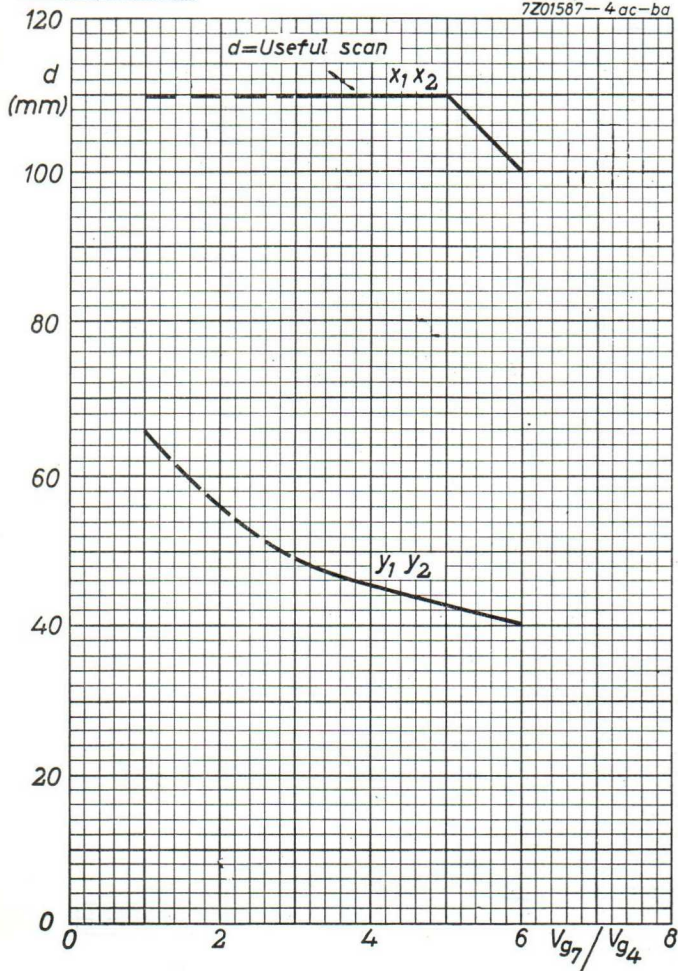
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PHILIPS

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