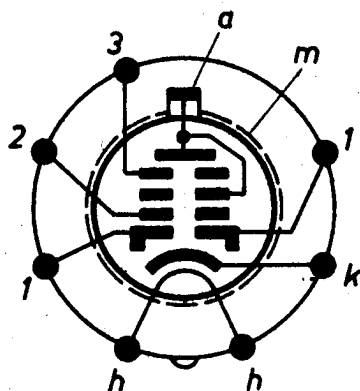


ITT

28 cm-Rectangular TV Picture Tube,
90° deflection angle, aluminized
screen, with tensionband for
battery-operated television-sets

A28-13W

- Preliminary -



Face

Electron gun
Bulb
Base

Focusing
Deflection
Angle of deflection

Neck diameter

Tetrode with Einzel-lens
All-glass
Special miniature
(7 pins)

Electrostatic
Magnetic
Diagonal 90°
Horizontal 80°
Vertical 63°

20 mm

Shape
Material

Spherical
Filter-glass (Light-
transmittance 62 % appr.)

Phosphor
Fluorescence colour
Colour temperature
Minimum useful dimensions

P 4-Aluminized
White
7500° K appr.
228 x 171 mm
Diagonal 262,5 mm
Max 245 ± 5 mm
2,0 kg appr.

Overall length incl. base
Weight

1. Heater Characteristics for Parallel Connection

Heater voltage	11 ¹⁾	volts
Heater current	68 appr.	ma
Oxide cathode, indirectly heated		

2. Typical Operating Conditions (Cathode drive service)²⁾

Anode voltage	11 000	volts
Screen grid voltage	200 to 350	250 volts
Focusing voltage ⁴⁾	0 to 350	volts
Cut-off voltage	45 appr. ³⁾	32 to 58 volts

The external conductive coating of the tube shall be grounded.

The tube can be used without safety glass.

1) At mains-connection ± 15 %.

At stabilized operation or when heating from the scanning-line-
transformer ± 10 %.

At battery operation look at the diagram on page 6.

2) Unless otherwise specified, all voltages are positive with respect to grid No. 1.**3) The cut-off voltage is defined by tact voltage, below which disappears the raster adjusted to give a sharp image.****4) The voltage to be set depends on the deflection system utilized and the operating conditions.**

3. Ratings

Anode voltage ($I_k = 0$)	12 000	volts
Minimum anode voltage	7 500 ¹⁾	volts
Maximum grid No. 3 voltage	450	volts
Maximum negative grid No. 3 voltage	-100	volts
Maximum screen grid voltage	450	volts
Minimum screen grid voltage	180	volts
Maximum cathode voltage	100	volts
Minimum cathode voltage	0	volt
Maximum cathode peak voltage	350 ²⁾	volts
Minimum negative cathode peak voltage	-2	volts
Specif. screen dissipation per sqcm	10	mw/cm ²
Grid leak resistance DC	1.5	megohms
Grid leak resistance AC (50 C/s)	0.5	megohm
External resistance between heater and cathode DC	1.0 ³⁾	megohm
External resistance between heater and cathode AC (50 C/s)	0.1 ⁴⁾	megohm
Maximum heater - cathode voltage	80 ⁵⁾	volts
Maximum heater - cathode peak voltage	130	volts

The power source generating the operating voltage shall be designed so, that the permanent current resulting from a short-circuit is less than 5 ma.

4. Capacitances

Control grid - all other electrodes	appr. 6	pF
Cathode - all other electrodes	appr. 3	pF
Anode - external conductive coating	700	pF
Anode - tensionband	125	pF

5. Particular Indications

- a) The maximum grid No. 3 current may be 24 μ a.
- b) The high field intensity present in the tube neck may lead to fluorescence on the glass; however, no conclusions can be drawn from this as to vacuum and life of tube.
- c) Excluding extraneous fields, the center of the undeflected focused spot will fall within a circle having 9.0 mm radius concentric with the center of the tube face.

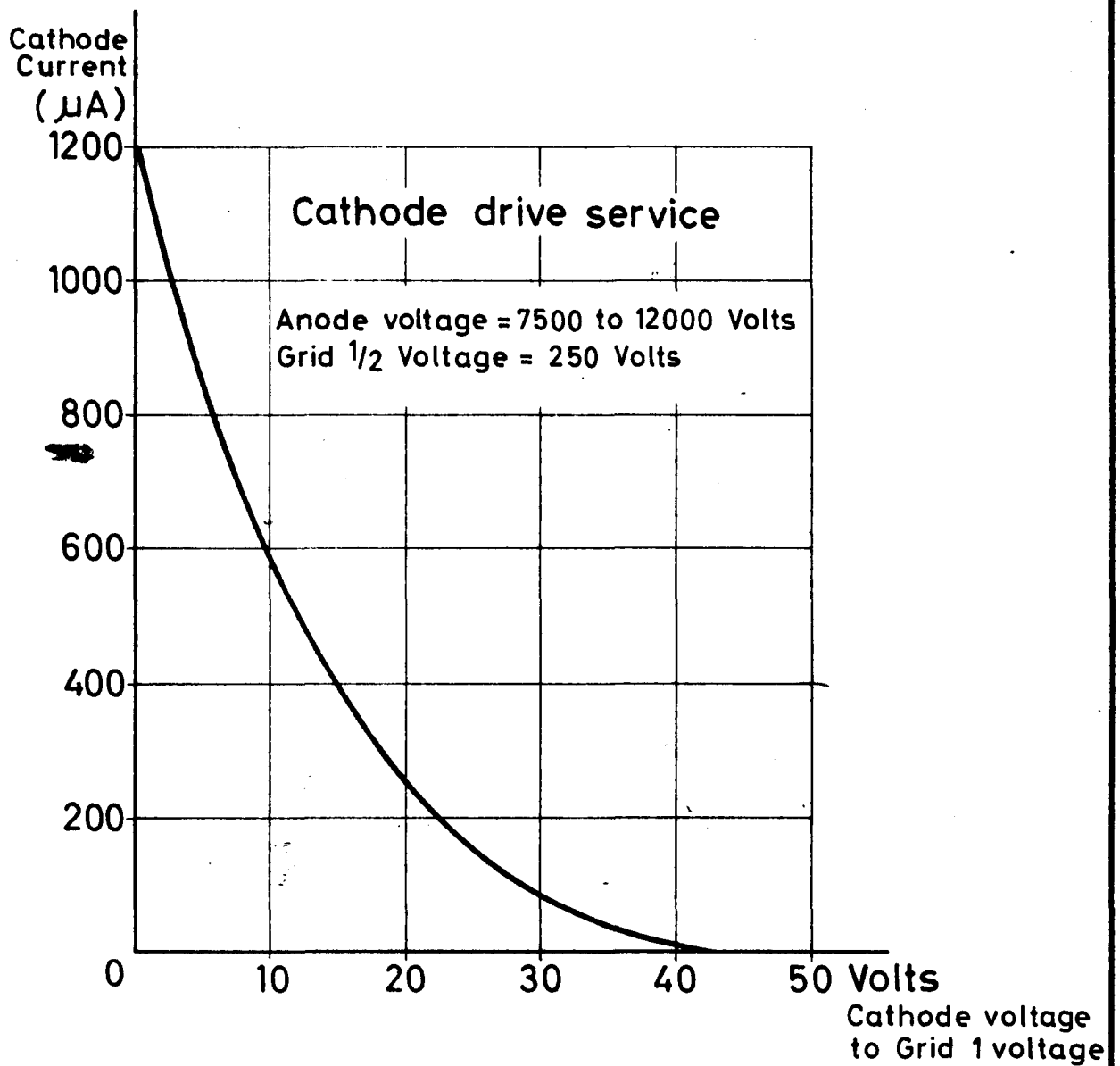
Notes for page 2

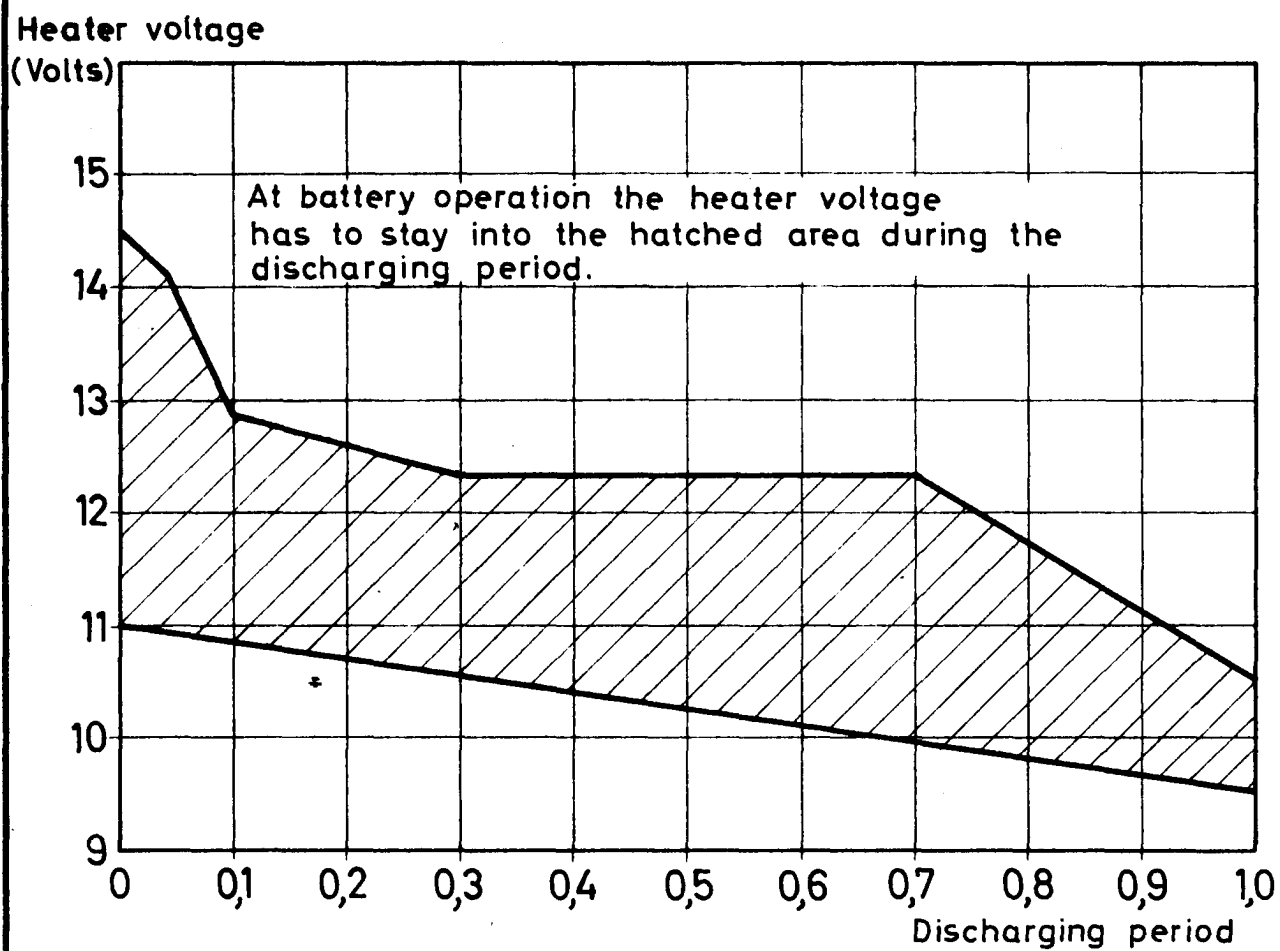
- 1) The anode voltage should not be below minimum rating. The picture sharpness decreases with decreasing anode voltage, and with an anode voltage below 7500 volts dark screen areas might appear due to the aluminization, as the velocity of the electrons will not be sufficiently high to penetrate the aluminium coating.
- 2) Line change impulse max 22 % of line sweep period.
Frame change impulse max 1.5 ms.
- 3) With separate transformer.
- 4) With series connection.
When fed by separate transformer, this external resistance may be 1 M Ω .

- 5) To avoid picture distortions, the interference proceeding from the heater must be kept as low as possible. Therefore, the AC-voltage between heater and cathode shall by no means exceed the value $V_{hkrms} = 20$ volts.
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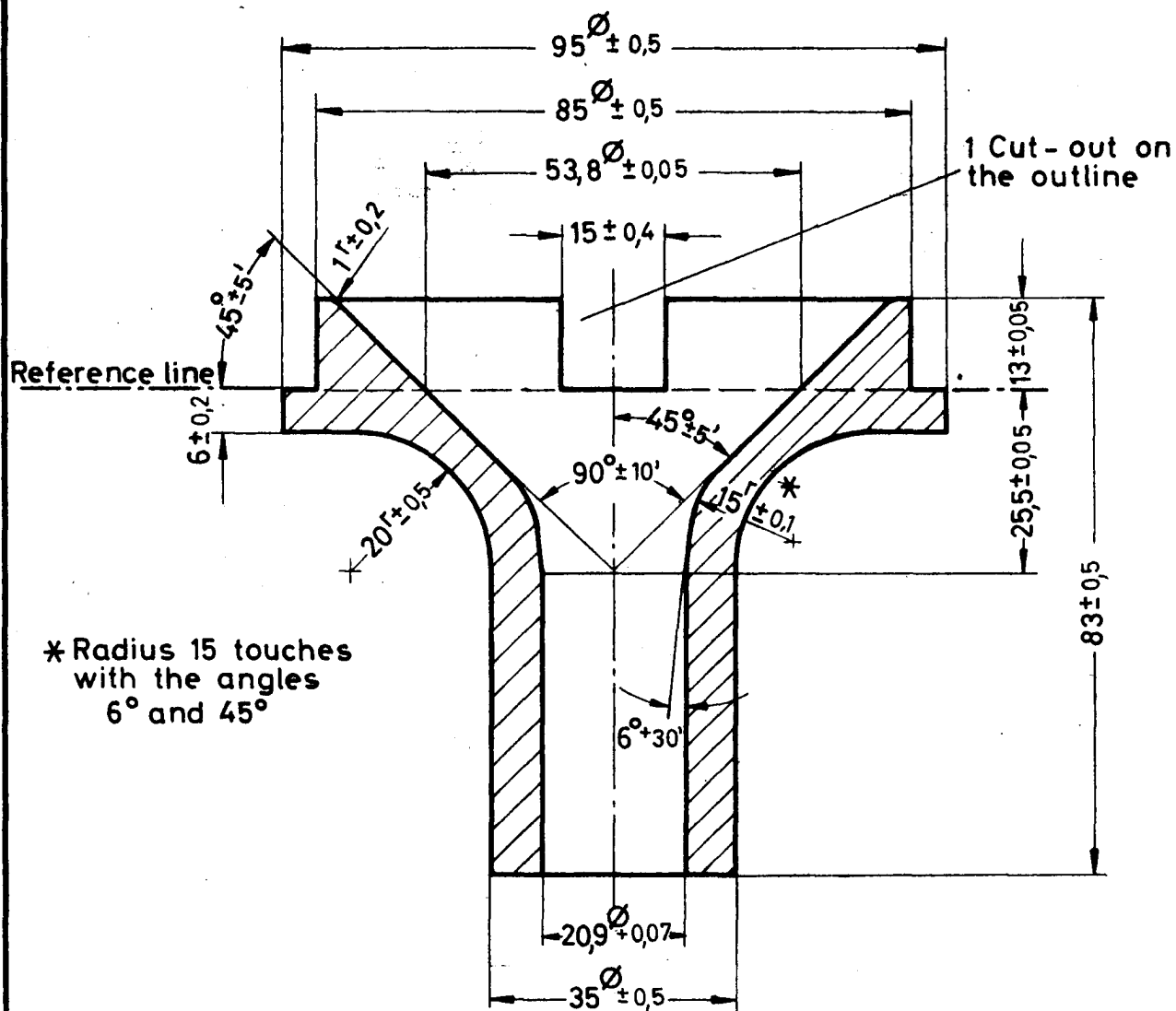
Notes for page 4 and 7

- 1) The reference line is defined by the marked plane of the reference line gauge if the letter rests against the cone of the bulb. The gauge must not be supported on the front.
- 2) Angular deviations between the anode cavity cap and the base pins No. 1 and 5.
- 3) This area is to be cleaned only with soft dry lintless cloth.
- 4) The point "Z" is a reference point to the position of the points "X" and "Y".
The dimensions for the points "X", "Y" and "Z" are identically to the minimum useful screen dimensions.
- 5) For the mounting bolts, a free passage of at least 5,7 mm diameter at nominal position is ensured.
- 6) The indicated dimensions rely on the bulb.
- 7) This stud is provided for putting-on a clip (e.g. type Faston).





Reference line gauge
for Picture tubes with 90° deflection angle
and 20mm neck diameter



All dimensions in millimeters!