

MACHLETT
X-RAY TUBE SPECIALIST

EG-25-E

**Beryllium-Window
X-Ray Tube**

The Machlett Laboratories, Inc.
Stamford (Springdale),
Connecticut 06907

DESCRIPTION

The EG-25-E is a low-voltage, thin beryllium window x-ray tube. It is designed to provide long wave-length x-radiation. Its special design results in an unusually rugged, compact structure, and one readily adaptable to a simple self-contained type of radiation unit. The tube is especially suitable for Grenz ray therapy and industrial gauging applications.

The tube is usually mounted in an oil-filled enclosure which contains the high-voltage transformer. The x-ray window is located at the end of the tube and projects the x-ray beam along

the longitudinal axis of the tube. The cathode is intended to be operated at ground potential, so that the need for a highly-insulated filament transformer is eliminated. Cooling is accomplished by conduction and convection transfer of heat from the anode to the oil bath surrounding the tube.

Intensity of the x-ray beam is essentially uniform over a wide-angle (60°) cone of radiation. Quality of radiation is determined by voltage of operation over a range from 5 to 30KV, with minimum filtration of only 1.0 mm of beryllium.

STRUCTURAL DETAILS

DIMENSIONS: Per outline drawing (see Fig. 2).

ENVELOPE: Concentric metal filament-terminal rings, incorporating a beryllium window for x-ray exit, and pyrex glass section to support and insulate the anode and cathode.

ANODE: Vacuum-cast copper with tungsten target; external metal surface dull nickel plate.

TARGET ANGLE: 90° from central ray.

FOCAL SPOT SIZE: Approximately 6 mm in diameter.

CATHODE: Circular tungsten filament concentric with axis of anode and window.

INHERENT FILTRATION: 1.0 mm beryllium.

X-RAY COVERAGE: 30 degrees from central ray.

COOLING METHOD: Convection in surrounding insulating medium.

INSULATING MEDIUM: Oil.

WEIGHT: Approximately 1 pound.

RATINGS AND CHARACTERISTICS

RATINGS:

Maximum Voltage: 25 PKV useful or inverse (cathode grounded)

Maximum Energy: 10 MA at 25 PKV, pulsating potential, continuous; 7 MA at 25 KV, constant potential*, continuous.

* For constant potential operation, the circuit should contain at least one ohm of added resistance in series with the tube for each volt of maximum operating voltage.

For lower values of PKV or KV, the MA value may be increased proportionally, except as limited by the maximum allowable filament current specified below.

CHARACTERISTICS:

Filament: 2.0 to 3.2 volts, 7.5 to 8.8 amperes.

Maximum allowable filament current for continuous operation is 8.8 amperes.

APPLICATION NOTE

The EG-25-E should be installed in an oil-filled enclosure in a manner equivalent to that indicated by Fig. 1, which shows a suggested arrangement for mounting the tube in a self-contained unit including tube and transformer within the same enclosure.

The tube may be rigidly mounted and sealed in the unit by clamping the mounting flange (G) between a sealing gasket (H) and a suitable clamping ring (K). It is usually desirable to maintain the x-ray window at ground potential, as the possibility of shock or filament short circuit is thereby eliminated and the making of the filament connections simplified. To accomplish this, an insulating ring (J) is employed in conjunction with the sealing gasket (H) to isolate the mounting flange (G) from the shockproof enclosure (F). The

clamping ring may be fabricated with threads to receive treatment cones or filters, if desired.

Based on the assumption that the tube is to be operated with the x-ray window at ground potential, the electrical connections should be made in the following manner. The grounded filament ring (L), adjacent to the x-ray tube window (N), should be connected to the grounded shockproof enclosure (F) through a suitable contact member (M). The ungrounded filament terminal, adjacent to the glass envelope (C) and consisting of the mounting flange (G) and the adjoining collar (D), should be insulated from the enclosure and connected to the ungrounded filament transformer terminal through the insulated contact member (E). The anode terminal (B) should be connected to the ungrounded terminal of the high-voltage transformer.

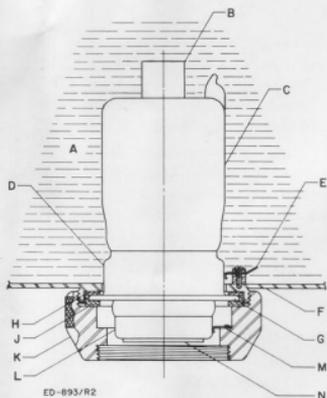


Fig. 1

- A—Insulating Oil
- B—Anode Terminal
- C—Glass Envelope
- D—Ungrounded Filament Terminal
- E—Insulated Filament Contact
- F—Shockproof Enclosure
- G—Mounting Flange
- H—Oil-sealing Gasket
- J—Insulating Ring
- K—Clamping Ring
- L—Grounded Filament Terminal
- M—Grounded Filament Contact
- N—X-Ray Window

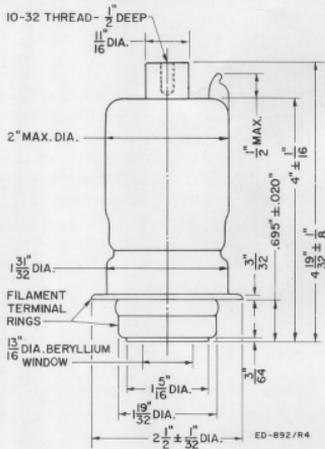


Fig. 2

CATALOG LISTING

Designation	Cat. No.
Type EG-25-E X-Ray Tube	E-230



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