

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
RECTIFIER

1749A

Rectifier - Half Wave electronic tube

Philips directly heated mercury-vapor/gas high-current half-wave rectifier for cinema and related industrial supplies, providing substantial DC and peak-current capability.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	1.925 V / 29 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Common cathode	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Rectifier	
PEAK INVERSE VOLTAGE	300 V
NOMINAL OUTPUT CURRENT	12.5 A
PEAK FORWARD CURRENT	75 A
FORWARD VOLTAGE DROP	10 V
WARM-UP TIME	120 s
Published ratings and characteristics promoted from the approved TESLA source.	

1749A — Gas-Filled and Mercury Vapor Double-Anode Rectifier

The **1749A** (also designated as **1749 A** or **TESLA 1749 A**) is a heavy-duty, gas-filled and mercury vapor full-wave rectifying discharge valve. Designed for robust industrial and cinema applications, this double-anode tube combines a directly heated oxide-coated cathode with a mercury vapor and gas filling to achieve high current-carrying capacity with low internal voltage drop.

Mechanical Construction and Physical Dimensions

The 1749A features a robust physical design housed in a special glass bulb. It is engineered to operate exclusively in a vertical position with the base facing down.

The physical dimensions and mechanical specifications of the tube are as follows:

- **Maximum Height:** 290 mm
- **Maximum Bulb Diameter:** 101 mm to 102 mm
- **Width (including mounting brackets):** 145 mm
- **Mounting Hole Spacing:** 125 mm
- **Net Weight:** 600 g
- **Shipping Weight:** 2000 g

Terminals and Connections

Electrical connections are distributed across the envelope to ensure high-voltage isolation and secure mechanical mounting:

- **Anodes (a_1 , a_2 or a , a'):** Two top caps with a diameter of 25 mm, spaced 25 mm apart, featuring M6 screw terminals.
- **Filament (f , f):** Connected via heavy-duty ribbon leads (páskové přívody) that also serve to mechanically secure the tube within the equipment.
- **Auxiliary Ignition Electrode (S_{pom} or s):** A screen terminal located lower on the bulb, utilizing an M4 screw thread or a smaller screw terminal. This electrode is connected by the manufacturer to one of the filament terminals via an integrated 10 k Ω series resistor.

Filament and Heating Requirements

The 1749A utilizes a directly heated, oxide-coated cathode designed for AC operation. Due to the mercury vapor filling, strict heating schedules must be observed to prevent damage to the cathode emissive layer.

Parameter	Value
Filament Voltage (V_f)	1.9 V to 1.95 V (A.C.)
Filament Current (I_f)	25 A (nominal) to approx. 29 A (at mean filament voltage)
Recommended Pre-heating Time (T_w)	2 minutes
Minimum Pre-heating Time (Urgent)	1 minute (utilizing a type 4152 time delay switch)
Pre-heating After Transport / Long Interruption	5 minutes

Commissioning and Burn-in Procedure

Before placing a new tube into service, or after a long period of inactivity, a specific burn-in procedure is required. The tube must be operated by sequentially connecting each of the two anodes for 15 minutes. This process ensures that any dispersed mercury within the envelope is completely vaporized and condensed back into the lower part of the bulb, eliminating the risk of inter-anode breakdown or arc-back during normal operation.

Electrical Characteristics and Operating Limits

The gas and mercury vapor filling provides a low internal resistance, resulting in a low and relatively constant arc voltage drop during conduction.

Typical Discharge Characteristics

- **Typical Ignition Voltage (V_{ign}):** 22 V (with a maximum limit of 30 V)
- **Typical Arc Voltage (V_{arc}):** 10 V (with a maximum limit of 12.5 V)
- **Rectified Current (I_{ss}):** 25 A

Limiting Values (Absolute Maxima)

To ensure reliable operation and prevent backfire or cathode destruction, the circuit must be designed within the following limits:

- **Transformer AC Voltage per Anode (V_{tr} / E_a):** Maximum 95 V_{eff} , Minimum 30 V_{eff} (applicable to standard full-wave rectifier configurations)
- **Peak Inverse Anode Voltage ($V_{ainvp} / E_{inv\ max}$):** 270 V to 300 V maximum
- **Anode Current (I_a):** Maximum 12.5 A per anode
- **Peak Anode Current ($I_{ap} / I_{ss\ max}$):** Maximum 75 A
- **Surge Limiting Resistance ($R_t / R_{o\ min}$):** Minimum $0.1\ \Omega$ (required at maximum anode voltage to limit fault currents)
- **Operating Mercury Temperature (t_{Hg}):** 30 to 80 °C

Intended Applications

The high current capability and robust construction of the 1749A make it suitable for several heavy-duty industrial and commercial power applications:

- **Cinema Rectifiers:** Delivering up to 25 A per valve, typically used to power projection arc lamps and charge associated accumulator banks (up to 36 lead-acid / Pb cells).
- **Industrial Power Supplies:** Powering electromagnets for magnetic chucks and clamping plates.
- **Motor Control and Arc Lamps:** Providing rectified DC for industrial motors and high-intensity carbon arc lighting.
- **Battery Charging:** Charging large accumulator installations, supporting up to 36 lead-acid cells or up to 54 alkaline cells.

- **Electrochemical Processes:** Supplying low-voltage, high-current DC for electroplating and other electrolysis applications.

Equivalents and Replacement Configurations

The 1749A can be used in place of several older or alternative rectifier designations, sometimes requiring minor mechanical or electrical adaptations:

- **Direct Equivalents:** The types **1049** and **1053** are direct equivalents, though they may require mechanical or electrical modifications depending on the specific equipment socketing and terminal layout.
- **Multi-Tube Replacements:** A pair of 1749A tubes can be configured to replace larger single-envelope rectifiers such as the **1054**, **1059**, or **1759**.
- **Conditional Equivalents:** The 1749A can replace the **1849** rectifier, provided that the AC supply voltage of the host equipment is limited to a maximum of $2 \times 95 \text{ V}_{\text{eff}}$.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X Tesla

Published test conditions and operating points. Values on this page are preserved as reported by this source.

195X TESLA

Section 1 · Rectifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
RectifiedCurrent	25 A	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak Inverse Voltage	270 V	—
PeakRectifiedCurrent	75 A	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1963 Philips Electron Tubes Handbook V3

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1963 PHILIPS ELECTRON TUBES HANDBOOK V3

Section 1 · Rectifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Arc voltage drop	10 V	GasFilled

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum peak inverse anode voltage	300 V	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum average anode current	12.5 A	—
Maximum peak anode current	75 A	—
Application	cinema rectifier service up to 36 lead-acid cells	—
Heater voltage	1.9 V	DirectAC
Heater current	25 A	DirectAC



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1999 Philips 0-D

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1999 PHILIPS 0-D

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum RMS anode supply voltage	95 V	—
Minimum RMS anode supply voltage	30 V	—
Maximum average anode current per anode	12.5 A	—
Minimum series resistance	0.1 ohm	—
Permitted mercury/ambient temperature	30–80 degC	—
DC output current	25 A	—

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Ignition voltage	22 V	—

TUBE TINKER

An independent reference for electronic tubes, vacuum tubes, and their source documents.

