

ELECTRONIC TUBE REFERENCE

1849

Rectifier - Full Wave electronic tube

CONSOLIDATED TECHNICAL DATA
2 SECTIONS
CONSTRUCTION
RECTIFIER-RECTIFIER

Philips directly heated double-anode mercury-vapor/gas full-wave cinema rectifier, providing very high current with the low conducting drop characteristic of gas-discharge rectification.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	1.9 V / 29 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Rectifier	
PEAK INVERSE VOLTAGE	360 V
NOMINAL OUTPUT CURRENT	12.5 A
PEAK FORWARD CURRENT	75 A
FORWARD VOLTAGE DROP	10 V
WARM-UP TIME	2 s
<i>Promoted only where the locked section schema has a direct semantic match; additional published device-specific ratings, operating points, capacitances, life-test, pulse, RF, and rectifier data are retained in TUBE_SECTION_PARAMETER.</i>	

SECTION2 Rectifier	
<i>No fixed ratings recorded.</i>	
<i>Second physical rectifier section added for documented double-anode construction.</i>	

1849 — Double-Anode Mercury Vapour and Gas-Filled Rectifying Valve

A heavy-duty, gas-filled and mercury vapour double-anode rectifying valve designed for high-current applications, specifically optimized for cinema rectifiers delivering up to 25 A per valve.

Overview

The **1849** is a specialized double-anode rectifying valve utilizing a combination of mercury vapour and gas filling. It features an oxide-coated, directly heated filament designed to withstand high current demands. The tube is primarily intended for cinema projection rectifier systems, where it is rated to deliver a nominal 25 A of rectified current per valve. Its robust physical and electrical design allows it to handle substantial peak and surge currents under controlled thermal conditions.

Mechanical Design and Installation

The physical construction of the 1849 is optimized for high-power dissipation and secure mounting. The valve must be operated strictly in a **vertical position with the base pointing downwards** to ensure proper distribution of the mercury vapour.

Physical Dimensions and Weight

- **Maximum Height:** 294 mm
- **Maximum Diameter (at top cap assembly):** 105 mm
- **Base Mounting Bracket Width:** 145 mm
- **Mounting Hole Spacing:** 125 mm
- **Mounting Hole Diameter:** 11 mm
- **Net Weight:** 600 g
- **Shipping Weight:** 2400 g

Electrical Connections and Terminals

The electrical connections are distributed to separate high-voltage and high-current paths:

- **Anodes (a, a'):** Two top terminals featuring M6 threads, spaced 32 mm apart to prevent flashover.
- **Auxiliary Ignition Electrode (a_h):** A terminal with an M4 thread located at the base.
- **Filament/Cathode (f, f):** Two flexible leads extending from the base to handle the high filament current.

Filament and Heating Requirements

The 1849 utilizes a directly heated, oxide-coated filament designed for alternating current (A.C.) operation. Due to the high current requirements, precise timing and heating protocols must be observed to prevent damage to the cathode emission layer.

Parameter	Value
Filament Voltage (V_f)	1.9 V
Filament Current (I_f)	29 A
Calculated Filament Power	55.1 W
Heating Method	Direct A.C.

Note: The calculated filament power of 55.1 W is derived directly from the nominal filament voltage of 1.9 V and the nominal filament current of 29 A ($1.9\text{ V} \times 29\text{ A} = 55.1\text{ W}$).

Pre-heating Protocols (T_w)

To ensure the mercury vapour reaches its proper operating state before anode voltage is applied, specific pre-heating times are required:

- **Standard Recommended Pre-heating:** 2 minutes.
- **Minimum Pre-heating (Urgent Cases):** 1 minute, which requires the use of a specialized time delay switch (such as type [4152](#)).
- **Extended Pre-heating:** 5 minutes, mandatory after transport or after a long period of service interruption to ensure any condensed mercury is completely cleared from the electrodes.

Electrical and Ignition Characteristics

The 1849 operates with a low internal voltage drop once conduction is established, which is characteristic of mercury vapour and gas-filled rectifiers.

- **Arc Voltage (V_{arc}):** 10 V (typical voltage drop across the valve during conduction).
- **Ignition Voltage (V_{ign}):** 22 V.

Auxiliary Ignition Requirements

To reliably initiate the arc and achieve the nominal 22 V ignition voltage, the valve requires an auxiliary ignition circuit. An auxiliary D.C. supply delivering a minimum of 40 V and 10 mA must be connected to the auxiliary ignition electrode (a_h , positive polarity) and the cathode (negative polarity) via a suitable current-limiting resistor. The use of a dedicated auxiliary ignition unit, such as the Philips Type 1289, is recommended to satisfy these parameters.

Operating Configurations

The 1849 can be integrated into various rectifier circuit topologies. The resulting output voltage and current depend on the transformer secondary voltage and the specific circuit configuration:

Configuration	Transformer Voltage (V_{tr})	Rectified Output Voltage (V_o)	Rectified Output Current (I_o)
Circuit a	115 V _{eff}	85 V	25 A
Circuit e	115 V _{eff}	120 V	50 A
Circuit f	105 V _{eff}	120 V	75 A
Circuit g	115 V _{eff}	110 V	75 A

Absolute Maximum Ratings

Operating the 1849 outside of its absolute limits can cause immediate failure or severely degrade the operating lifespan of the valve.

- **Peak Inverse Anode Voltage (V_{ainvp}):** Maximum 360 V.
- **Average Anode Current (I_a):** Maximum 12.5 A (calculated over a maximum averaging time T_{av} of 15 seconds).
- **Peak Anode Current (I_{ap}):** Maximum 75 A.
- **Surge Current (I_{surge}):** Maximum 625 A (for a maximum duration T of 0.1 seconds).
- **Minimum Commutating / Series Resistance (R_t):** Minimum 0.2 Ω per anode circuit to limit peak currents.
- **Operating Mercury Temperature (t_{Hg}):** 30 to 80 °C. The temperature of the mercury must be maintained within this window to ensure stable ionization and prevent backfiring or failure to ignite.

Technical Summary

The **1849** is a high-power, double-anode, mercury vapour and gas-filled rectifying valve designed for demanding industrial and cinema projection applications. Operating with a low arc drop of 10 V and requiring an auxiliary ignition supply to strike at 22 V, it provides efficient high-current rectification. With a filament rating of 1.9 V at 29 A and a maximum peak inverse voltage of 360 V, the valve can deliver up to 75 A of rectified current in multi-valve configurations. Proper installation in a vertical, base-down position and strict adherence to filament pre-heating times and mercury temperature limits (30 to 80 °C) are essential for reliable operation.

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
Filament heating time	2 s	IndustrialRectifier
Arc voltage drop	10 V	IndustrialRectifier
Ignition voltage	22 V	IndustrialRectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak inverse anode voltage maximum	360 V	IndustrialRectifier
Average anode current maximum	12.5 A	IndustrialRectifier
Peak anode current maximum	75 A	IndustrialRectifier
Surge current maximum	625 A	IndustrialRectifier
Recommended temperature range	30-80 °C	IndustrialRectifier
Transformer RMS voltage	115 V	CircuitA
DC output voltage	85 V	CircuitA
DC output current	25 A	CircuitA
Transformer RMS voltage	115 V	CircuitE
DC output voltage	120 V	CircuitE
DC output current	50 A	CircuitE
Transformer RMS voltage	105 V	CircuitF
DC output voltage	120 V	CircuitF
DC output current	75 A	CircuitF

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transformer RMS voltage	115 V	CircuitG
DC output voltage	110 V	CircuitG
DC output current	75 A	CircuitG



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
Heater voltage	1.9 V	Nominal
Heater current	29 A	Nominal

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