



ELECTRONIC TUBE REFERENCE

1164

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

RECTIFIER

Directly heated Philips mercury-vapour or gas-filled industrial rectifier for battery charging and cinema rectifier service. Rated for approximately 225 V peak inverse voltage and 15 A nominal output.

GENERAL CHARACTERISTICS

BASE DESIGNATION	GOLIATH	BASE PINS	—
NOMINAL HEATER	2.5 V / 25 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Rectifier	
PEAK INVERSE VOLTAGE	225 V
NOMINAL OUTPUT CURRENT	15 A
PEAK FORWARD CURRENT	90 A
FORWARD VOLTAGE DROP	10 V
WARM-UP TIME	15 s
<i>Directly heated gas-filled rectifier with mercury-vapour/gas filling for battery charging and cinema rectifier service.</i>	

1164 — Gas-Filled Single-Anode Rectifying Valve

The **1164** is a heavy-duty, gas-filled, single-anode rectifying valve designed for high-current industrial applications. It is primarily utilized in battery chargers and cinema rectifiers, capable of delivering up to 15 A of average current per valve and supporting charging systems with up to 30 lead-acid (Pb) cells.

Construction, Filament, and Mechanical Specifications

The 1164 features a directly heated, thoriated tungsten filament designed to withstand high emission currents. Because of the high thermal mass and the gas-filled nature of the valve, a pre-heating or waiting time (T_w) of 15 seconds must be observed after applying filament power before anode voltage is applied.

The physical construction of the valve is characterized by a large glass envelope with a maximum bulb diameter of 98 mm and a maximum overall height of 220 mm. The anode connection is located at the top of the envelope via a metal cap (measuring 15 to 20 mm in height), while the filament connections are brought out through the base.

Physical and Thermal Parameter	Value
Filament Voltage (V_f)	2.5 V
Filament Current (I_f)	25 A
Calculated Filament Power (P_f)	62.5 W
Pre-heating / Waiting Time (T_w)	15 s
Base Type	Goliath
Recommended Socket	65909 BG/01
Mounting Position	Vertical, base down
Net Weight	150 g
Shipping Weight (Pack of 12)	4750 g

The calculated filament power of 62.5 W (derived from the nominal 2.5 V supply and 25 A current draw) reflects the substantial heating energy required to maintain the thoriated tungsten filament at its proper operating temperature for high-current thermionic emission. To ensure reliable operation and prevent damage to the internal structure, the valve must be mounted strictly in a vertical position with the base facing downwards.

Electrical Characteristics and Typical Operation

As a gas-filled rectifier, the 1164 exhibits electrical characteristics distinct from vacuum rectifiers. Once the gas inside the envelope is ionized, the valve maintains a low and relatively constant voltage drop across the anode-to-cathode path during conduction, which minimizes internal power dissipation and improves efficiency.

- **Arc Voltage Drop (V_{arc}):** 9 V
- **Ignition Voltage (V_{ign}):** 16 V

The ignition voltage represents the minimum potential required to initiate the gas discharge and begin conduction. Once conduction is established, the voltage drop across the valve falls to the typical arc voltage of 9 V, remaining nearly independent of the load current.

Absolute Maximum Ratings and Circuit Configurations

The operating limits of the 1164 are highly dependent on the specific rectifier circuit configuration in which the valve is deployed. The absolute maximum ratings are categorized into two distinct groups of circuit configurations:

1. **Circuits a, c, e, f, g**
2. **Circuits b, d**

These circuit designations correspond to standard industrial rectifier topologies. The specific limiting values for each group are detailed below:

Parameter	Circuits a, c, e, f, g	Circuits b, d
Max. Transformer Voltage (V_{tr})	80 V_{eff} (RMS)	60 V_{eff} (RMS)
Min. Transformer Voltage (V_{tr})	20 V_{eff} (RMS)	20 V_{eff} (RMS)
Max. Peak Inverse Anode Voltage (V_{ainvp})	225 V	165 V
Max. Average Anode Current (I_a)	15 A	15 A
Max. Peak Anode Current (I_{ap})	90 A	90 A
Min. Limiting Resistance (R_t)	0.3 Ω	0.3 Ω
Ambient Temperature Range (t_{amb})	-55 to +75 °C	-55 to +75 °C

The minimum limiting resistance (R_t) of 0.3 Ω is a critical system requirement. It represents the minimum total resistance (including transformer winding resistance and any external series resistors) that must be present in the anode circuit to limit the peak anode current (I_{ap}) to a safe maximum of 90 A during turn-on or transient conditions. Exceeding the peak current limit can cause severe sputtering of the cathode and shorten the operating life of the valve. The wide permissible ambient temperature range of -55 °C to +75 °C ensures reliable operation in diverse industrial and projection-booth environments.

Technical Summary

The **1164** is an industrial, gas-filled, single-anode rectifying valve featuring a directly heated thoriated tungsten filament. Operating at a low filament voltage of 2.5 V but requiring a high current of 25 A, it is designed for high-efficiency, high-current rectification. With a typical arc drop of only 9 V and an ignition voltage of 16 V, it provides excellent voltage regulation for battery charging and cinema projection applications. The valve requires a Goliath base, a vertical mounting position, and a mandatory 15-second pre-heating period before anode voltage is applied. Its maximum ratings are tailored to specific circuit configurations, supporting average currents up to 15 A and peak currents up to 90 A when protected by a minimum series resistance of 0.3 Ω .



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	225 V	—
Maximum average anode current	15 A	—
Maximum peak anode current	90 A	—
Application	battery charging and cinema rectifier service	—
Heater voltage	2.5 V	DirectAC
Heater current	25 A	DirectAC



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

CONSTRUCTION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filling	Gas	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak inverse voltage	225 V	—
Maximum average current	15 A	—
Maximum peak current	50 A	—
Minimum series resistance	0.3 ohm	—