



ELECTRONIC TUBE REFERENCE

1173

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

RECTIFIER

Directly heated Philips mercury-vapour or gas-filled industrial rectifier for large battery-charging installations up to about 110 lead-acid cells. Rated for approximately 850 V peak inverse voltage and 4 A output.

GENERAL CHARACTERISTICS

BASE DESIGNATION	SPECIAL 3P	BASE PINS	—
NOMINAL HEATER	1.9 V / 13 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Rectifier	
PEAK INVERSE VOLTAGE	850 V
NOMINAL OUTPUT CURRENT	4 A
PEAK FORWARD CURRENT	20 A
FORWARD VOLTAGE DROP	12 V
WARM-UP TIME	60 s
Directly heated gas-filled rectifier with mercury-vapour/gas filling for industrial rectifier service up to 110 lead-acid cells.	

1173 — Single-Anode Mercury-Vapour and Gas-Filled Rectifying Valve

An industrial-grade, single-anode rectifying valve designed for high-current power conversion, battery charging, and industrial power supplies.

Overview

The **1173** is a directly heated, single-anode, mercury-vapour and gas-filled rectifying valve. It is specifically designed for industrial rectifier applications, where it can deliver up to 4 A of average current per valve. A typical application includes charging or buffering lead-acid battery banks up to a maximum of 110 Pb-cells. To ensure reliable starting and stable operation under varying load conditions, the valve incorporates an auxiliary ignition electrode.

Construction and Physical Specifications

The 1173 is built with a heavy-duty glass envelope designed to withstand the thermal and mechanical demands of industrial environments.

- **Anode Connection:** The anode is terminated at the top of the bulb via a robust M6 screw connector (labeled 'a').
- **Base and Socket:** The tube features a special 3-pin base (Spec. 3p) with three pins of 4 mm diameter. It is designed to be installed in a type 1287 socket.
- **Mounting Position:** The valve must be mounted vertically with the base down to ensure proper distribution of the liquid mercury.
- **Physical Dimensions:** The maximum overall height of the tube is 189 mm, and the maximum bulb diameter is 62 mm.
- **Weight:** The net weight of the valve is 165 g, while the shipping weight is 390 g.

Filament and Pre-Heating Requirements

The 1173 utilizes a directly heated, oxide-coated filament. Because it is a mercury-vapour tube, strict pre-heating protocols must be followed to vaporize the mercury before applying anode voltage, preventing damage to the cathode coating.

- **Filament Voltage (V_f):** 1.9 V
- **Filament Current (I_f):** 13 A
- **Calculated Filament Power:** $1.9\text{ V} \times 13\text{ A} = 24.7\text{ W}$ (calculated from the nominal filament voltage and current)
- **Heating Supply:** Direct by A.C.
- **Pre-heating Time (T_w):**
 - The standard recommended pre-heating time is **1 minute**.
 - Under urgent circumstances, this pre-heating time may be reduced to a minimum of **45 seconds**. A type [4152](#) time-delay switch can be used to automate this delay.
 - Following transport or after a long interruption of service, the pre-heating time (T_w) must be extended to **5 minutes** to ensure complete redistribution of the mercury.

Ignition and Auxiliary Electrode Operation

The 1173 exhibits a typical arc voltage (V_{arc}) of 12 V and a typical ignition voltage (V_{ign}) of 22 V.

To reliably achieve the low ignition voltage of 22 V, an auxiliary D.C. supply unit delivering a minimum of 40 V and a current of at least 10 mA must be connected. This auxiliary supply is connected via a current-limiting resistor between the auxiliary ignition electrode *ah* (positive potential, +) and the cathode (negative potential, -). The use of a Philips Auxiliary Ignition Unit type 1289 is recommended for this purpose.

Operating Characteristics

The 1173 can be operated in several rectifier circuit configurations. The operating characteristics for these configurations (designated a through g) are detailed below, specifying the transformer secondary voltage (V_{tr} in V_{eff}), the direct output voltage (V_o), and the direct output current (I_o):

Circuit Configuration	Transformer Voltage V_{tr} (V_{eff})	Direct Output Voltage V_o (V)	Direct Output Current I_o (A)
a	275 V	230 V	8 A
b	540 V	440 V	8 A
c	220 V	240 V	12 A
d	210 V	440 V	12 A
e	205 V	240 V	16 A
f	200 V	240 V	24 A
g	220 V	240 V	24 A

Limiting Values and Absolute Maxima

The valve's absolute maximum ratings are divided into two distinct operating regimes, depending on the maximum peak inverse voltage and the thermal environment:

Parameter	Regime 1	Regime 2
Max. Peak Inverse Anode Voltage (V_{ainvp})	685 V	850 V
Max. Average Anode Current (I_a , $T_{av} = \text{max. } 5 \text{ s}$)	4 A	4 A
Max. Peak Anode Current (I_{ap})	24 A	20 A
Max. Surge Anode Current (I_{surge} , $T = \text{max. } 0.1 \text{ s}$)	240 A	200 A

Parameter	Regime 1	Regime 2
Min. Surge-Limiting Resistance (R_t)	0.75 Ω	0.75 Ω
Mercury Temperature Range (t_{Hg})	30 to 80 °C	30 to 75 °C
Ambient Temperature Range (t_{amb})	10 to 50 °C	10 to 45 °C

To protect the tube from damage during transient overcurrent conditions, a minimum surge-limiting resistance (R_t) of 0.75 Ω must be maintained in the anode circuit.

Technical Summary

The **1173** is a specialized, single-anode, mercury-vapour and gas-filled rectifying valve designed for demanding industrial power applications. Featuring a high-current 1.9 V, 13 A directly heated filament, the tube is capable of delivering up to 4 A of average anode current and charging battery systems up to 110 Pb-cells. It utilizes a top-cap M6 anode terminal, a special 3-pin base, and must be operated in a vertical, base-down position. By employing an auxiliary ignition electrode connected to a suitable D.C. supply, the valve achieves a low ignition voltage of 22 V and a stable arc voltage of 12 V. Depending on the thermal conditions and circuit configuration, the 1173 supports peak inverse voltages up to 850 V, providing a robust solution for industrial rectification.



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	12 V	GasFilled

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum peak inverse anode voltage	850 V	—
Maximum average anode current	4 A	—
Maximum peak anode current	20 A	—
Maximum surge current	200 A	ShortDuration
Application	industrial rectifier service up to 110 lead-acid cells	—
Heater voltage	1.9 V	DirectAC
Heater current	13 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	Mercury vapour and gas	—

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Arc voltage	12 V	—
Ignition voltage	22 V	—

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak inverse voltage	850 V	—
Maximum peak current	24 A	—
Auxiliary ignition supply minimum	40 V	—
Auxiliary ignition current	10 mA	—

TUBE TINKER

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