



ELECTRONIC TUBE REFERENCE

1554

Rectifier - Full Wave electronic tube

CONSOLIDATED TECHNICAL DATA

2 SECTIONS

CONSTRUCTION

RECTIFIER-RECTIFIER

Directly heated Philips double-anode mercury-vapor/gas industrial rectifier with auxiliary ignition. Heavy-current capability and low arc voltage suit demanding industrial power-conversion systems.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	1.9 V / 70 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Common cathode	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION1 Rectifier	
PEAK INVERSE VOLTAGE	850 V
NOMINAL OUTPUT CURRENT	40 A
PEAK FORWARD CURRENT	135 A
FORWARD VOLTAGE DROP	15 V
WARM-UP TIME	120 s
Representative of two identical anode rectifier paths; published Ia max 20 A per anode.	

SECTION2 Rectifier	
PEAK INVERSE VOLTAGE	850 V
NOMINAL OUTPUT CURRENT	40 A
PEAK FORWARD CURRENT	135 A
FORWARD VOLTAGE DROP	15 V
WARM-UP TIME	120 s
<i>Physical rectifier section 2; electrical properties populated from the same published ratings applicable to the identical rectifier path.</i>	

1554 — Double-Anode Mercury-Vapor and Gas-Filled Rectifying Valve

The **1554** is a heavy-duty, double-anode, mercury-vapor and gas-filled rectifying valve designed primarily for industrial rectifier applications. It is capable of delivering up to 40 A per valve maximum and is suitable for charging or buffering up to 110 lead-acid (Pb) cells.

Filament and Pre-Heating Requirements

The 1554 features a directly heated, oxide-coated filament designed for operation with an alternating current (AC) supply. The electrical requirements for the filament are highly specific, demanding a low voltage and extremely high current:

Parameter	Value
Filament Voltage (V_f)	1.9 V
Filament Current (I_f)	70 A

Because of the mercury-vapor and gas filling, proper pre-heating of the filament is critical before anode voltage is applied. The recommended pre-heating time (T_w) is 2 minutes. In urgent situations, this pre-heating period may be decreased to a minimum of 1 minute. To ensure the correct delay is maintained, the use of a type [4152](#) time delay switch is recommended. Following transport or a prolonged interruption of service, the pre-heating time must be extended to at least 5 minutes to ensure proper distribution of the mercury.

Physical Specifications and Mounting

The 1554 is a physically large and heavy valve, requiring secure mounting and specific orientation to operate safely.

- **Mounting Position:** The valve must be mounted vertically with the base down.
- **Net Weight:** 1600 g

- **Shipping Weight:** 5250 g
- **Maximum Dimensions:**
 - Height: 355 mm
 - Width: 317 mm
 - Depth/Diameter: 124 mm

The electrical connections are made via specialized terminals and leads to accommodate the high currents:

- The anodes (a and a') utilize M8 threaded connections.
- The auxiliary ignition electrode (a_h) uses an M4 threaded connection.
- The filament (f) connections are made via heavy flexible leads, measuring 150 mm and 175 mm in length, terminating in 10 mm lugs.

Electrical Characteristics and Auxiliary Ignition

During normal operation, the valve exhibits a typical arc voltage (V_{arc}) of 15 V. The typical ignition voltage (V_{ign}) is 50 V.

To reliably establish the ignition voltage of 50 V, an auxiliary ignition system is required. An auxiliary DC supply unit capable of delivering approximately 100 V and 25 mA of power must be connected between the auxiliary ignition electrode a_h (connected to the positive terminal) and the cathode (connected to the negative terminal). This connection must be made through a current-limiting resistor to protect the ignition circuit. The Auxiliary Ignition Unit type E3 108 03 is recommended for this application.

Operating Limits and Maximum Ratings

To ensure reliable operation and prevent premature failure, the 1554 must be operated within its strictly defined limiting values:

Parameter	Minimum	Maximum
Transformer Voltage (V_{tr})	60 V_{eff}	275 V_{eff}
Peak Inverse Anode Voltage (V_{ainvp})	—	850 V
Continuous Anode Current (I_a)	—	20 A
Peak Anode Current (I_{ap})	—	135 A
Operating Temperature Range (t_{Hg})	30 °C	80 °C

The operating temperature (t_{Hg}) refers to the temperature of the condensed mercury, which must be maintained between 30 °C and 80 °C during operation. The minimum and maximum transformer voltage limits are specified under standard circuit conditions (Circuit a).

Technical Summary

The 1554 is a robust industrial double-anode rectifier utilizing a combination of mercury vapor and gas filling. With a directly heated 1.9 V, 70 A oxide-coated filament, it requires careful pre-heating management, especially after transport or long idle periods. It features a typical arc drop of 15 V and utilizes an auxiliary ignition electrode to facilitate reliable starting at 50 V. Designed for vertical mounting, the valve supports continuous anode currents up to 20 A and peak currents up to 135 A, making it highly suitable for high-power industrial battery charging and rectification systems.

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	275 V	—
Minimum RMS anode supply voltage	60 V	—
Maximum average anode current per anode	20 A	—
Permitted mercury/ambient temperature	30–80 degC	—
DC output current	40 A	—

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Ignition voltage	50 V	—

1999 PHILIPS 0-D

Section 2 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum RMS anode supply voltage	275 V	—
Maximum RMS anode supply voltage	275 V	—
Minimum RMS anode supply voltage	60 V	—
Minimum RMS anode supply voltage	60 V	—
Maximum average anode current per anode	20 A	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum average anode current per anode	20 A	—
Permitted mercury/ambient temperature	30–80 degC	—
Permitted mercury/ambient temperature	30–80 degC	—
DC output current	40 A	—

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Ignition voltage	50 V	—

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