



ELECTRONIC TUBE REFERENCE

19H4

Rectifier - Half Wave electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

RECTIFIER

High-voltage industrial half-wave rectifier for demanding power-supply service. Its multi-kilovolt inverse-voltage capability and modest current output suit specialized professional DC systems.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	2.5 V / 1.7 A	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Rectifier	
MAXIMUM CATHODE CURRENT	30 mA
PEAK INVERSE VOLTAGE	23000 V
NOMINAL OUTPUT CURRENT	30 mA
PEAK FORWARD CURRENT	180 mA
WARM-UP TIME	10 s
<i>REDO promoted-field audit</i>	

19H4 High Vacuum Diode

The **19H4** (also designated as the **19.H.4**) is a high-vacuum diode designed specifically for high-voltage power rectification. Manufactured by companies such as Associated Electrical Industries Limited (AEI) / Ediswan and Mazda, this device is engineered to handle extremely high peak inverse voltages, making it suitable for specialized power supply and rectification roles.

Physical Construction and Base Configuration

The 19H4 is constructed with a clear glass envelope and features an American Miniature Type top cap, which serves as the connection point for the anode. The tube utilizes an International Octal (IO8) base. It is designed for unrestricted mounting, allowing it to be installed in any physical orientation.

Physical Dimensions and Weight

The physical envelope of the 19H4 is characterized by the following maximum dimensions:

- **Maximum Overall Length:** 129 mm
- **Maximum Seated Height:** 116 mm
- **Maximum Diameter:** 40 mm

The weight of the device varies slightly depending on the manufacturing specification:

- **Net Weight:** Approximately 2.5 oz (2½ oz) to 2.75 oz (2¾ oz)
- **Packed Weight:** Approximately 3.5 oz to 3.75 oz (3¾ oz)

Pin Connections and Wiring Requirements

The base connections, viewed from the free end of the pins, are assigned as follows:

- **Pin 1:** No connection
- **Pin 2:** Heater (h)
- **Pin 3:** No connection
- **Pin 4:** No connection
- **Pin 5:** No connection
- **Pin 6:** No connection
- **Pin 7:** Heater/Cathode (h/k) or Heater (h)
- **Pin 8:** No connection
- **Top Cap:** Anode (a)

A critical wiring requirement is specified for the socket holder: all pins with the exception of Pin 2 must be connected directly to Pin 7 on the holder, and Pin 7 must then be connected to the reservoir condenser.

Heater and Cathode Characteristics

The 19H4 operates with a nominal heater voltage of 2.5 V. However, the documentation reflects differing specifications regarding the heating method and current requirements depending on the manufacturer:

- In some specifications, the tube is described as an **indirectly heated** device with a heater current rating of **1.7 A**. Under these specifications, Pin 7 serves as a combined heater/cathode (h/k) connection.
- In other specifications, the tube is described as a **directly heated** device with a heater current rating of **3.3 A**. Under these specifications, Pin 7 is designated simply as a heater (h) connection.

Regardless of the heating configuration, a pre-heating period is required under delayed switching conditions, where the heater must be energized for at least 10 seconds before the anode voltage is applied.

Electrical Characteristics and Operating Curves

The average operating characteristics of the 19H4 describe the relationship between anode voltage and anode current. The tube exhibits a typical diode exponential start at lower voltages, transitioning into a highly linear region as voltage increases.

Specifically, the curve starts at 0 V and 0 mA, showing a non-linear upward trend up to approximately 100 V to 120 V. From 120 V up to the upper measurement limits of 340 V to 360 V, the relationship becomes highly linear. Typical operating points extracted from the characteristic curves include:

- **At 100 V:** Anode current is approximately 28 mA to 30 mA.
- **At 120 V:** Anode current is approximately 40 mA.
- **At 200 V:** Anode current is approximately 90 mA to 92 mA.
- **At 280 V:** Anode current is approximately 145 mA.
- **At 300 V:** Anode current is approximately 160 mA to 162 mA.
- **At 340 V to 355 V:** Anode current reaches approximately 200 mA.

Absolute Maximum Ratings and Circuit Parameters

The maximum ratings for the 19H4 are defined as absolute values rather than design centers. These limits depend heavily on whether the circuit employs delayed switching or simultaneous switching.

Delayed Switching Conditions

When the heater is allowed to warm up for at least 10 seconds before anode voltage is applied, the tube can be operated at its full power capability:

- **Maximum Mean Anode Current:** 25.0 mA to 30.0 mA
- **Maximum Peak Anode Current:** 150 mA to 180 mA
- **Maximum Peak Inverse Voltage (No Load):** 23.0 kV
- **Maximum Peak Inverse Voltage (On Load):** 20.0 kV

Simultaneous Switching Conditions

If the heater and anode voltages are applied simultaneously, the maximum ratings are significantly reduced to protect the tube:

- **Maximum Mean Anode Current:** 5.0 mA
- **Maximum Peak Inverse Voltage (No Load or On Load):** 18.0 kV

Circuit Protection and Filter Limits

To prevent damage from inrush currents and excessive loading, specific circuit parameters must be maintained:

- **Minimum Surge Limiting Resistance:** 18,000 ohms to 23,000 ohms
- **Maximum Reservoir Condenser (at 50 c/s):** 0.5 μF
- **Maximum Reservoir Condenser (at 1,600 c/s):** 0.01 μF

Technical Summary

The **19H4** is a high-vacuum diode designed for high-voltage power rectification. It features an International Octal base, a clear glass envelope, and an American Miniature top cap for the anode. Operating with a 2.5 V heater, its current draw is specified as either 1.7 A or 3.3 A depending on whether it is configured as an indirectly or directly heated device. The tube is capable of handling peak inverse voltages up to 23.0 kV under no-load conditions and mean anode currents up to 30.0 mA when a 10-second delayed switching sequence is observed. Proper circuit design requires a minimum surge limiting resistance of 18,000 to 23,000 ohms and strict adherence to reservoir capacitor limits to ensure reliable operation.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1960 Mazda

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

1960 MAZDA

Section 1 · Rectifier

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
No-load peak inverse voltage	23 kV	—
Minimum surge-limiting resistance	23000 Ohm	—
Warmup time	10 s	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 AEI Industrial Valves

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

1961 AEI INDUSTRIAL VALVES

Section 1 · Rectifier

CHARACTERISTICS

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
No-load peak inverse voltage	23 kV	—
Delayed-switching mean anode current	5 mA	—



1961 Associated Electrical Industries

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

1961 ASSOCIATED ELECTRICAL INDUSTRIES

Section 1 · Rectifier

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
No-load peak inverse voltage	23 kV	—
Delayed-switching mean anode current	5 mA	—