

## DESCRIPTION AND RATING

### TEMPERATURE-CONTROLLED IGNITRON GL-6512

The GL-6512 ignitron is a sealed, steel-jacketed, water-cooled, mercury-pool tube designed for rectifier service in the 125-, 250-, 600-, and 900-volt d-c power fields. It is suitable for use in rectifiers rated up to 200 kilowatts output, depending on the number of ignitrons used, the output voltage, and the circuit. It has a continuous average current rating of 100 amperes per tube for this service. The tube is also designed for 2400-volt a-c control service where it has a rating of 1200 kilovolt-amperes.

This tube is identical in ratings and characteristics to the GL-5554/FG-259-B. Mechanically, it has the additional feature of an integral temperature-control device with protective features. The control includes a switch which operates a solenoid valve in the water-supply line to the tube in response to increasing and decreasing tube temperature, thus maintaining the amount of cooling water to the minimum required by the operating conditions. It also includes an over-temperature switch which may be used to remove power from the ignitron when its temperature exceeds a safe value.

This new construction prevents excessive condensation over the external parts of the tube under conditions of high humidity. Another advantage is the appreciable saving in maintenance costs over tubes of the old design since this control feature, in addition to greatly reducing the amount of water required, eliminates the necessity for such safety devices as water-flow relays, water over-temperature relays, and water-pressure interlocks required with the older design tubes. In applications where the cooling water flows through two or three tubes in series, this tube can be used with the GL-5554/FG-259-B since the GL-6512 in the position nearer the water drain where it receives the warmer water, can control the flow to all under normal conditions.

Like its prototype, the GL-6512 has an auxiliary anode and two ignitors. Excitation of the auxiliary anode permits stabilizing the cathode spot for very small anode currents. The two ignitors assure long life since only one is used at a time. Phase control of the ignitor impulses permits voltage control of the rectified output. In common with other ignitors arc losses in the GL-6512 are low, and design and construction features inherent in the steel-jacketed construction assure ease of installation, economical use of space, and reliability of operation.

## TECHNICAL INFORMATION

### GENERAL

#### Electrical

Cathode Excitation - Cyclic  
Cathode Spot Starting - Ignitor  
Number of Electrodes  
Main Anodes  
Main Cathodes  
Auxiliary Anodes  
Ignitors

1  
1  
1  
2

GENERAL ELECTRIC COMPANY

from JETEC release #1378, Dec. 6, 1954

# Electrical (Cont'd)

|                                              |                |              |
|----------------------------------------------|----------------|--------------|
| Arc Drop at 100 Peak Amperes                 | 12.6 $\pm$ 0.5 | Volts        |
| Arc Drop at 300 Peak Amperes                 | 14.4 $\pm$ 0.5 | Volts        |
| Arc Drop at 600 Peak Amperes                 | 17.3 $\pm$ 0.5 | Volts        |
| Cathode Excitation Requirements              |                |              |
| Ignitor Voltage Required to Fire             | 450            | Volts        |
| Ignitor Current Required to Fire             | 45             | Amperes      |
| Starting Time at Required Voltage or Current | 100            | Microseconds |

# Mechanical

|                                     |      |        |
|-------------------------------------|------|--------|
| Envelope Material - Stainless Steel |      |        |
| Net Weight                          | 13.5 | Pounds |

# Thermal

## Type of Cooling - Water

|                                                         |     |                        |
|---------------------------------------------------------|-----|------------------------|
| Inlet Water Temperature, minimum                        | 0   | C                      |
| Inlet Water Temperature*, maximum                       |     |                        |
| Power-Rectifier Service                                 |     |                        |
| Peak Inverse Anode Voltage = 900 Volts                  | 50  | C                      |
| Peak Inverse Anode Voltage = 2100 Volts                 | 35  | C                      |
| AC Control Service                                      |     |                        |
| Voltage = 2400 Volts RMS                                | 30  | C                      |
| Water Flow, minimum                                     |     |                        |
| At Continuous Rated Average Current                     | 1.5 | Gallons per Minute     |
| Characteristics for Water Cooling at Rated Minimum Flow |     |                        |
| Water Temperature Rise, maximum                         | 6   | C                      |
| Pressure Drop at 3 Gallons per Minute, maximum          | 5   | Pounds per Square Inch |

# MAXIMUM RATINGS AND TYPICAL OPERATION

Power-Rectifier Service, Continuous Duty  
Ratings are for Zero-Phase-Control

|                                                    |       |       |                   |
|----------------------------------------------------|-------|-------|-------------------|
| Maximum Peak Anode Voltage                         |       |       |                   |
| Inverse                                            | 900   | 2100  | Volts             |
| Forward                                            | 900   | 2100  | Volts             |
| Maximum Anode Current                              |       |       |                   |
| Peak                                               | 900   | 600   | Amperes           |
| Average                                            |       |       |                   |
| Continuous                                         | 100   | 75    | Amperes           |
| Two-Hours - Averaged Over Any Two-Minute Interval  | 150   | 112.5 | Amperes           |
| One-Minute - Averaged Over Any One-Minute Interval | 200   | 150   | Amperes           |
| Fault                                              | 6000  | 4500  | Amperes           |
| Maximum Duration of Fault Current                  | 0.15  | 0.15  | Seconds           |
| Frequency Range                                    | 25-60 | 25-60 | Cycles per Second |

# AC Control Service $\neq$

Two Tubes in Inverse Parallel, Ratings per Tube

|                                          |       |                   |
|------------------------------------------|-------|-------------------|
| Voltage                                  | 2400  | Volts RMS         |
| Maximum Demand                           | 1200  | Kilovolt-Amperes  |
| Average Current at Maximum Demand        | 75    | Amperes           |
| Maximum Average Current                  | 113   | Amperes           |
| Demand at Maximum Average Current        | 600   | Kilovolt-Amperes  |
| Maximum Averaging Time at 2400 Volts RMS | 1.50  | Seconds           |
| Maximum Peak Fault Current               | 1500  | Amperes           |
| Frequency Range                          | 25-60 | Cycles per Second |

## Ignitor

|                                                              |     |         |
|--------------------------------------------------------------|-----|---------|
| Maximum Voltage                                              |     |         |
| Positive - Anode Voltage                                     |     |         |
| Negative                                                     | 5   | Volts   |
| Maximum Current                                              |     |         |
| Peak                                                         | 100 | Amperes |
| Root Mean Square                                             | 15  | Amperes |
| Average                                                      | 2   | Amperes |
| Maximum Averaging Time                                       | 10  | Seconds |
| Typical Resistance Added to Ignitor Circuit for Anode Firing |     |         |
| At Anode Voltage of 600 Volts or Less                        | 4   | Ohms    |
| At Anode Voltage of 601 Volts to 1000 Volts                  | 10  | Ohms    |
| At Anode Voltage of 1001 Volts to 1500 Volts                 | 20  | Ohms    |
| At Anode Voltage of 1501 Volts to 2000 Volts                 | 35  | Ohms    |
| At Anode Voltage of 2001 Volts to 2400 Volts                 | 50  | Ohms    |

## Auxiliary-Anode

|                              |     |         |
|------------------------------|-----|---------|
| Maximum Peak Forward Voltage | 160 | Volts   |
| Maximum Peak Inverse Voltage |     |         |
| Main Anode Conducting        | 25  | Volts   |
| Main Anode Not Conducting    | 160 | Volts   |
| Maximum Current              |     |         |
| Peak                         | 30  | Amperes |
| Average                      | 9   | Amperes |
| Maximum Averaging Time       | 10  | Seconds |
| Root Mean Square             | 15  | Amperes |

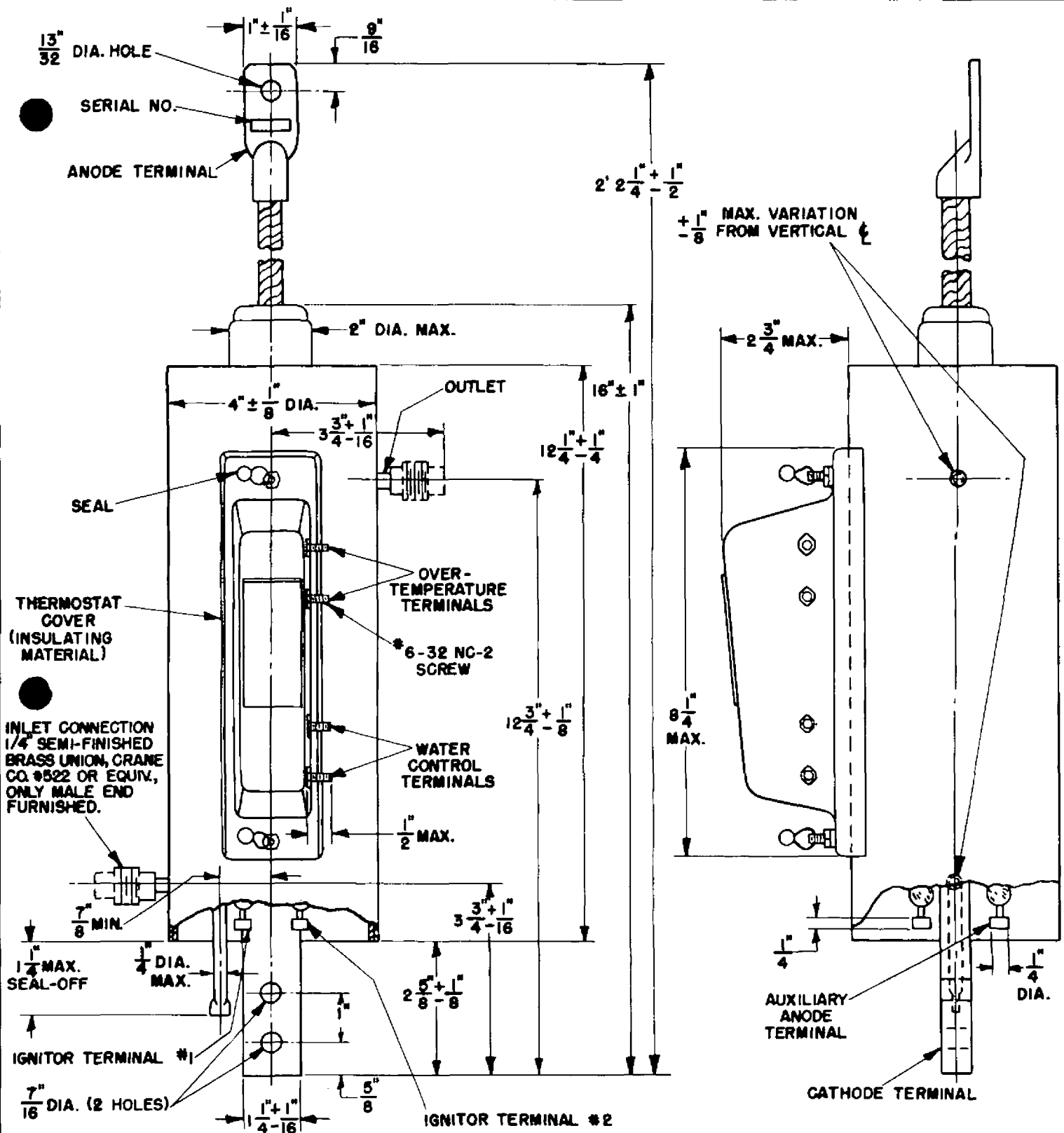
## Temperature-Control-Switch Ratings $\neq$

|                                                                               |      |         |
|-------------------------------------------------------------------------------|------|---------|
| Maximum Voltage                                                               | 575  | Volts   |
| Maximum Current                                                               |      |         |
| Over-Temperature Switch                                                       | 6    | Amperes |
| Water-Control Switch                                                          | 1.5  | Amperes |
| Maximum Peak Potential of Tube Water Cylinder Above Ground                    | 1500 | Volts   |
| Switch Contact Arrangement                                                    |      |         |
| Over-Temperature Switch - Normally Closed (Contacts Open on Temperature Rise) |      |         |
| Water-Control Switch - Normally Open (Contacts Close on Temperature Rise)     |      |         |

- \* No more than three tubes should be connected in series for water flow. When the series connection is used the temperature of the incoming water must be within the rated limit for the warmest tubes in the series.
- / RMS demand voltage, current, and kilovolt-ampere demand are all on the basis of full-cycle conduction (no phase delay) regardless of whether or not phase control is used.
- # Suitable fuses should be provided in the switch circuits to prevent a power arc should a ground occur in the switch or wiring.

November 11, 1954

TUBE DEPARTMENT  
GENERAL ELECTRIC COMPANY  
SCHENECTADY 5, NEW YORK



OUTLINE  
GL-6512

|                           |
|---------------------------|
| 057-1954                  |
| 1. <i>Patley</i> 11-18-88 |
| <b>REVISIONS</b>          |

MADE BY *E. J. SWILORZAL, Oct. 13-1957*

**GENERAL ELECTRIC**

ELECTRONICS DIVISION

**TUBE DEPARTMENT**

RE-INSPECTED BY *Oct. 19, 57* *JA-18976*

**N22022AZ**

SHEET No. CONT. ON SHEET

PRINTS  
TO