DESCRIPTION AND RATING

TEMPERATURE-CONTROLLED IGNITRON GL-6513

The GL-6513 igniton is a sealed, stainless-steel-jacketed, water-cooled, mercury-pool tube designed for rectifier service in the 125-, 250-, 500-, and 900-volt d-c power fields. It is suitable for use in rectifiers rated up to 1000 kilowatts output, depending on the number of ignitrons used, the output voltage, and the circuit. Continuous average current rating is 200 amperes per tube in such service. The tube is also designed for 2400-volt a-c control service where it has a rating of 2400 kilovolt-amperes.

This tube is identical in ratings and characteristics to the GL-5555/FG-238-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 igniton 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-5555/FG-238-B since the GL-6513 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-6513 has an auxiliary anode and two igniters. Excitation of the auxiliary anode permits stabilizing the cathode spot for very small anode currents. The two igniters 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 ignitron arc losses in the GL-6513 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 | 1 |
| Main Cathodes | 1 |
| Auxiliary Anodes | 1 |
| Igniters | 2 |

GENERAL ELECTRIC COMPANY

from JETEC release #1378, Dec. 6, 1954
Electrical (Cont'd)

Arc Drop at 600 Peak Amperes 16.2 ± 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 25 Pounds

Thermal

Type of Cooling - Water

- Inlet Water Temperature, minimum 5°C
- Inlet Water Temperature*, maximum 0°C
- 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 25°C

Water Flow, minimum
- At Continuous Rated Average Current 3 Gallons per Minute

Characteristics for Water Cooling at Rated Minimum Flow
- Water Temperature Rise, maximum 7°C
- Pressure Drop at 3 Gallons per Minute, maximum 6 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 1800 1200 Amperes
- Average
  - Continuous 200 150 Amperes
  - Two-Hours - Averaged Over Any Two-Minute Interval 300 225 Amperes
  - One-Minute - Averaged Over Any One-Minute Interval 400 300 Amperes
- Fault 12,000 9000 Amperes
- Maximum Duration of Fault Current 0.15 0.15 Seconds

Frequency Range 25-60 25-60 Cycles per Second
<table>
<thead>
<tr>
<th>AC Control Service</th>
<th>Two Tubes in Inverse Parallel, Ratings per Tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>2400 Volts RMS</td>
</tr>
<tr>
<td>Maximum Demand</td>
<td>2400 Kilovolt-Amperes</td>
</tr>
<tr>
<td>Average Current at Maximum Demand</td>
<td>135 Ampere</td>
</tr>
<tr>
<td>Maximum Average Current</td>
<td>207 Ampere</td>
</tr>
<tr>
<td>Demand at Maximum Average Current</td>
<td>1105 Kilovolt-Amperes</td>
</tr>
<tr>
<td>Maximum Averaging Time at 2400 Volts RMS</td>
<td>1.66 Seconds</td>
</tr>
<tr>
<td>Maximum Peak Fault Current</td>
<td>6000 -3000 Ampere</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>25-60 Cycles per Second</td>
</tr>
</tbody>
</table>

Ignitor

<table>
<thead>
<tr>
<th>Maximum Voltage</th>
<th>Positive - Anode Voltage</th>
<th>5 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peak</td>
<td>100 Ampere</td>
<td></td>
</tr>
<tr>
<td>Root Mean Square</td>
<td>15 Ampere</td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>2 Ampere</td>
<td></td>
</tr>
<tr>
<td>Maximum Averaging Time</td>
<td>10 Seconds</td>
<td></td>
</tr>
</tbody>
</table>

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 Ampere |
| Average                      | 9 Ampere  |
| Maximum Averaging Time       | 10 Seconds|
| Root Mean Square             | 15 Ampere |

Temperature-Control-Switch Ratings

| Maximum Voltage | 575 Volts |
| Maximum Current |           |
| Over-Temperature Switch | 6 Ampere |
| Water-Control Switch   | 1.5 Ampere  |
| 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 16, 1954

TUBE DEPARTMENT

GENERAL ELECTRIC COMPANY

SCHENECTADY 5, NEW YORK
WATER OUTLET CONNECTION
1/4" SEMI-FINISHED BRASS
UNION, CRANE CO. #522
OR EQUIV., ONLY MALE PART
FURNISHED.

OVER-Temperature
TERMINALS

WATER-CONTROL
TERMINALS

THERMOSTAT
COVER
(INSULATING
MATERIAL)

SEAL

INLET

IGNITOR TERMINAL #1
9" DIA. HOLES

CATHODE TERMINAL

IGNITOR TERMINAL #2
NOTE: ONE IGNITOR
USED AT A TIME.

OUTLINE
GL-6513

MAX.

VARIATION
± 3°
FROM
CENTERLINE

AUXILIARY
ANODE
TERMINAL

N 2 2 0 2 3 A Z
SHEET NO......CONT. ON SHEET......

REVISIONS

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PRINTED IN U.S.A.