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IEEE Standard Test Specifications for Gas Tube Surge-Protective Devices

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IEEE Standard Test Specifications for Gas Tube Surge-Protective Devices

Sponsor

**Surge Protective Devices Committee of the
IEEE Power Engineering Society**

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Foreword

(This foreword is not part of IEEE Std 465.1-1977, IEEE Standard Test Specifications for Gas Tube Surge-Protective Devices.)

The gas tube surge protective device is a gap-type overvoltage limiting for use on power, communications, or signal circuits. It has been used in one form or another for several decades.

With the trend to highly sophisticated, electrically vulnerable, electronic devices which are exposed to surges from the environment, interest in gas tube arresters has grown. Initially there were no standard terms to define these devices or standard tests to compare them. In an effort to correct this situation, the IEEE Surge Protective Devices Committee formed its Low Voltage Surge Protective Devices Working Group in 1970.

Experts were drawn from many fields ranging from communications and power utilities, through electronics manufacturers, to producers of the tubes themselves. The diverse requirements, experiences and vocabularies of these representatives were melded over a period of years to produce this document which should be of service to all potential users of gas tube surge protective devices.

At the time the standard was approved, the Low Voltage Surge Protective Devices Working Group has the following membership:

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IEEE Standard Test Specifications for Gas Tube Surge-Protective Devices

1. Scope

This standard applies to surge-protective devices for application on systems with voltages equal to or less than 600 V rms. These protective devices are designed to limit voltage surges on balanced or unbalanced communication circuits and dc to 420 Hz power circuits. This standard contains a series of standard test criteria for determining the electrical characteristics of these gas tube devices.

The tests in this standard are intended as design tests as defined under “design tests” in IEEE Std 100-1972, IEEE Standard Dictionary of Electrical and Electronics Terms, and provide a means of comparison among various gas tube surge-protective devices.¹

Gas tube devices are used to provide over-voltage protection in electrical circuits. When the gas tube’s breakdown voltage is exceeded, the tube’s normal high impedance state changes to a low impedance state to allow the gas tube to conduct the surge discharge current. After the tube conducts the surge discharge current, it interrupts the flow of power follow current and returns to its high impedance state.

This standard’s test criteria and definitions provide a common engineering language beneficial to user and manufacturer of gas tube surge-protective devices.

Due to the voltage and energy levels employed in the majority of tests contained herein, all measurements should be considered dangerous and appropriate caution should be taken in their performance.

¹ In this standard, the term “arresters” is used when the definition of gas tube surge arrester (see Section 2) is intended and the term “protectors” is used when the definition of surge protector (see Section 2) is intended. When a test can apply to both protectors and arresters, the term “device” or “gas tube device” is used alone. For the purpose of this document, all connections to a device are by means of the terminals.

2. Definitions

The following definitions apply specifically to gas tube surge-protective devices and do not necessarily cover other applications.

arc current. The current that flows after breakdown when the circuit impedance allows a current that exceeds the glow to-arc transition current. Sometimes called arc mode current.

arc voltage. The voltage drop across the arrester during arc current flow. Sometimes called arc mode voltage.

breakdown (sparkover). The abrupt transition of the gap resistance from a practically infinite value to a relatively low value in the case of a gap. This is sometimes referred to as sparkover (see the definition included in this section) or ignition.

breakdown voltage ac. The minimum rms value of sinusoidal voltage at frequencies between 15 Hz and 62 Hz that results in arrester sparkover.

breakdown voltage, dc. The minimum slowly rising dc voltage that will cause breakdown or sparkover when applied across the terminals of an arrester.

current turnoff time. The time required for the arrester to restore itself to a nonconducting state following a period of conduction. This definition applies only to a condition where the arrester is exposed to a continuous specified dc potential under a specified circuit condition.

dc holdover voltage. The maximum dc voltage across the terminals of an arrester under which it may be expected to clear and to return to the high impedance state after the passage of a surge, under specified circuit conditions.