

Transient Voltage Suppressor Types and Applications

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Advantages, disadvantages and characteristics of popular TVS devices are explained.

Transient suppressors are installed to protect sensitive electronic equipment from electrical overstress (EOS). The most common forms of EOS detrimental to solid state equipment are voltage spikes originating from lightning, inductive load switching and electrostatic discharge (ESD).

Direct hits from lightning, fault clearing and switching of large industrial loads produce worst-case transient EOS on a power line, as described in the standard ANSI/IEEE C62.41-1980. The maximum currents and voltages produced in this environment range from 200A to 3,000A and are related to the location in the system, as shown in *Table 1*.

Category A levels of 200A short-circuit current and 6,000V open-circuit voltage

TVS devices fit into two categories: clamps and crowbars.

occur on long branch circuits. Category B levels of 3,000A short-circuit current and 6,000V open-circuit voltage are found at major feeders and short branch circuits.

ESD is characterized by extremely fast rise-times, in the nanosecond range, which are more lethal to microcircuits than the
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Location Category	Waveform	Open Circuit Voltage	Short Circuit Current
A	0.5 μ sec-100kHz Ring	6000V	200A
B	0.5 μ sec-100kHz Ring	6000V	500A
	1.2 \times 50 μ sec Impulse	6000V	—
	8 \times 20 μ sec Impulse	—	3000A

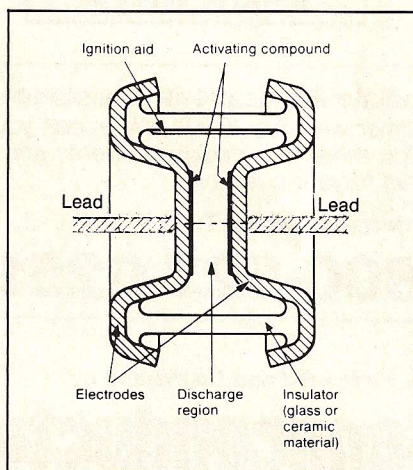


Figure 1. Gas Surge Arrester Cross Section.

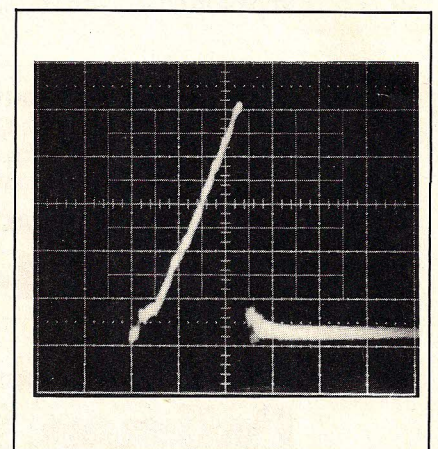


Figure 2. Gas Surge Arrester Pulse Output When Wavefront $dv/dt=400V/\mu$ sec. (Horiz: 500nsec/div, Vert: 100V/div)

