

Because of their very low capacitance, low on state impedance and fast response to voltage transients, gas discharge tubes (sealed spark gaps) frequently provide the best protection against destructive vacuum tube inter-grid breakdowns. They are frequently not used however, because tube bias voltages and source impedances prevent the protective gas discharge tube from extinguishing following the shunting of an inter-grid surge current. This application problem can usually be avoided by the use of two or more gas discharge tubes fabricated in series by Reynolds.

Gas discharge tubes have two distinct on states. The first is a high voltage, low current state known as the glow state. Typically, discharge tubes may be held in this state following breakdown if the supply voltage has sufficient source impedance to limit the tube current to the high milliampere range. This glow state may be maintained as long as the supply voltage is held above the inherent glow voltage of the tube (typically 180 volts) and the tube is supplied with sufficient current to maintain the glow, but not enough current to permit it to enter its second type of on state.

The second on stage is a low voltage, high current condition and is the state the tube enters when conducting large transient surge currents.

In high grid bias voltage problem applications, where a single gas discharge tube is installed, the protecting tube responds to an inter-grid discharge and diverts the surge in its low voltage, high current arc state. Following the passage of the surge the gas tube is unable to extinguish because the grid bias power source has sufficient voltage and supply current to hold the tube in its glow state. For many grid voltage ranges that are too high for the application of a single gas discharge tube, two or more protection tubes may be installed in series. In this arrangement, their glow voltages are additive, thus the series string will extinguish bias voltages two or more times the extinguishing voltage for a single discharge tube.

Reynolds provides a number of these in series combinations of ceramic to metal constructed, gas filled discharge tubes brazed together with customer specified lead or threaded stud terminals. These tubes are capable of extinguishing low current source bias voltages up to 450 volts D.C. and high frequency A.C. voltages of several thousand volts. Where specific applications require circuit testing to provide a solution to this extinguishing problem, Reynolds is always pleased to work with the user towards a solution. Below are examples of typical in series gas discharge tube specifications.

