

## Breakdown Voltage vs. Pressure Paschen's Law and "The Paschen Curve"

In 1889, F. Paschen published a paper (*Wied. Ann.*, **37**, 69) which set out what has become known as Paschen's Law. The law essentially states that, at higher pressures (above a few torr) the breakdown characteristics of a gap are a function (generally not linear) of the product of the gas pressure and the gap length, usually written as  $V = f(pd)$ , where  $p$  is the pressure and  $d$  is the gap distance.

Extensive additional experiments for different materials, lower pressures, different gases and a variety of electrode shapes have expanded the data set involved. Below is shown the "Paschen Curve" for air, two flat parallel copper electrodes for pressures between  $3 \times 10^{-2}$  torr and 760 torr..

As the pressure is reduced below a few torr (as shown in the diagram below) the curve of breakdown voltage versus pressure reaches a minimum, and then, as pressure is further reduced, rises steeply again.

