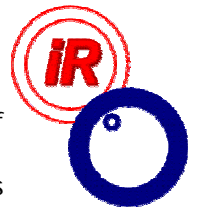


# Why Can IR Windows Never Carry a Generic Arc Rating?



Electrical Switchgear comes in infinite shapes and sizes and as such the surface areas and volumetric elements of the cabinets are different with each model, type and rating.

Each cabinet is subject to the testing that is laid down by the certification bodies such as UL, IEEE, etc... This test is completed on the cabinet assemblies and when the testing is completed the compliance is awarded to the assembly, and not the components that make up the assembly.

A simple way of viewing this is to calculate the force that would be experienced on the surface of an electrical cabinet whilst undergoing an arc flash explosion test. The pressure exerted on a surface by a given force is determined by using the area over which that force acts. The formula to be used is;

$$P = F/A$$

**Where:**

**P : Pressure in N/ m<sup>2</sup>**

**F : Force in Newton's**

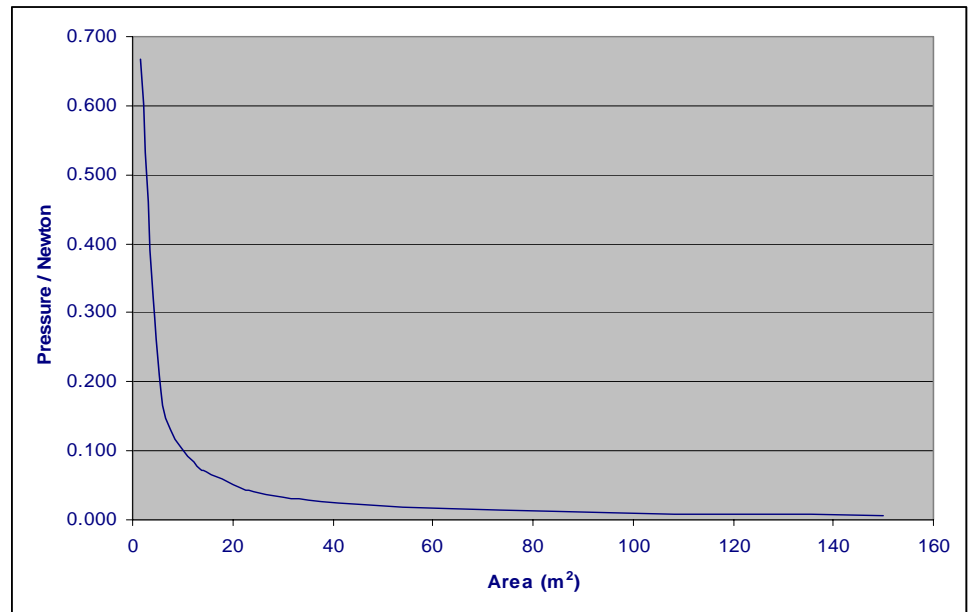
**A : Area in m<sup>2</sup>**

**Note:**

For the purposes of these calculations we are assuming that an Arc Flash explosion causes a uniform increase in pressure across the entire inside area of the chamber.

However you should note that pressure also increases with temperature and so in an explosion where temperature increases this would make these cases even more extreme, especially in the small chambers.

This is a generic chart that shows how the area is related to the pressure.



Therefore for a given force x the pressure is inversely proportional to the area and hence as the area over which the force acts decreases the pressure will increase, this relationship can be seen in graph above. This shows that if the force or explosion remains constant but the chamber and hence the area gets smaller the pressure on each part of the chamber goes up according to the relationship shown.

**Example:**

The following four electrical cabinets have the following dimensions:

- 1x1x1 = Internal Surface Area 6m<sup>2</sup>
- 3x1x1 = Internal Surface Area 14m<sup>2</sup>
- 3x2x1 = Internal Surface Area 22m<sup>2</sup>
- 3x3x1 = Internal Surface Area 30m<sup>2</sup>

This shows that the internal surface of the 1x1x1 cabinet is 5 times smaller than the 3x3x1 cabinet and would in the event of an arc incident of the same magnitude be subjected to 5 times more surface pressure than the 3x3x1 cabinet,. As stated cabinet dimensions are infinite and we therefore cannot use the data from one cabinet design to another design unless they are identical in every way. This is why components can never carry a generic arc rating and must be subjected to industry standard tests to confirm that they conform to the minimum required level of mechanical strength and properties for the electrical cabinets to which they are fitted.

