

Application Note:

Criteria for the Verification of a Simple Intrinsically Safe Circuit

Intrinsic Safety (IS) is a low-energy signalling technique that prevents explosions from occurring by ensuring that the energy transferred to a hazardous area is well below the energy required to initiate an explosion.

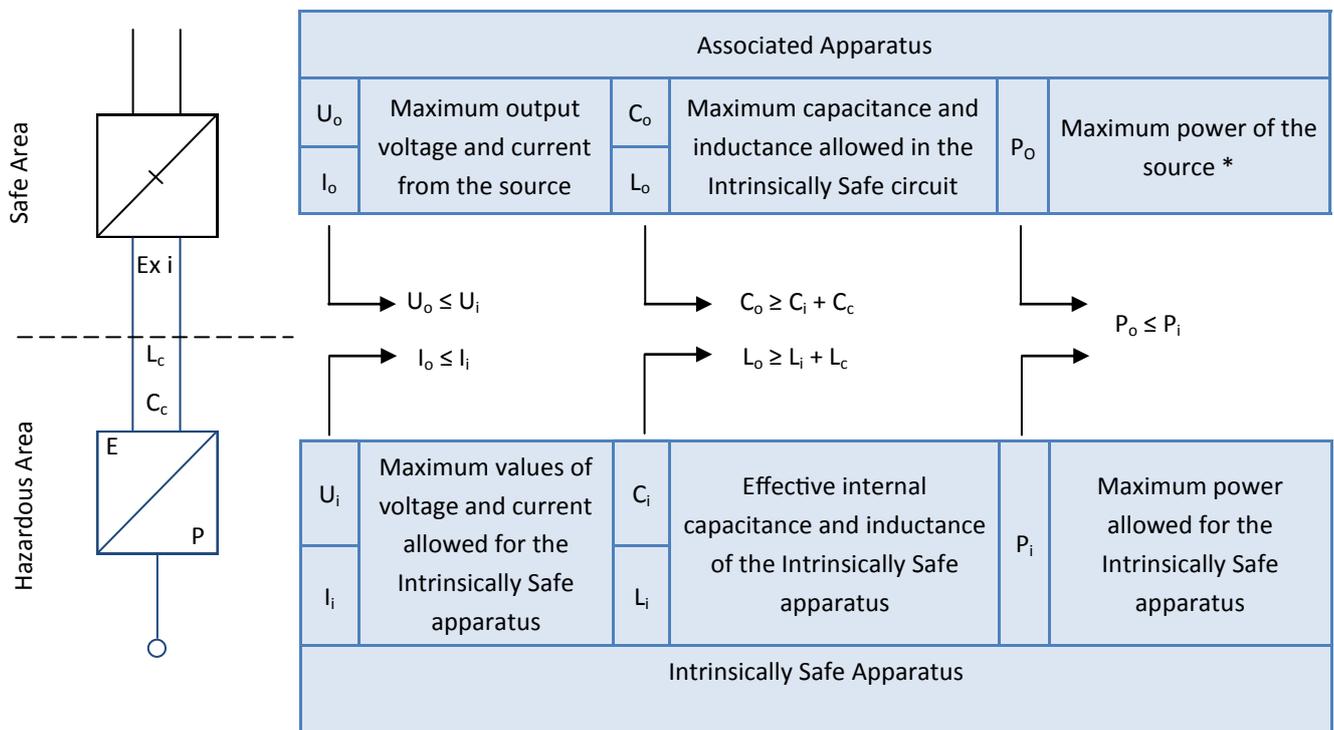
The Intrinsic Safety of an electrical circuit is essentially dependant on the safe limitation of current and voltage, and consequently of the power supplied, so that in neither normal operation nor under specified fault conditions ignition capable sparks can be produced by making or breaking circuits, or when there is a short-circuit earth.

To avoid spark ignition the energy stored in the circuit has to be limited. Even small amounts of additional energy can be sufficient to impair Intrinsic Safety.

Besides spark ignition also thermal ignition must be avoided. Therefore it has to be ensured that the maximum current, voltage and power available within the Intrinsically Safe circuit will not lead to unacceptably high surface temperatures at apparatus, components and cables located in the hazardous area.

For compliance with these criteria not only the individual device, but also the complete interconnection and interoperation of all apparatus in the Intrinsically Safe circuit, including the connecting cables, must be considered.

For simple Intrinsically Safe circuits with only one source supplying current, voltage and power to the circuit, verification of Intrinsic Safety can easily be made by comparison of the safety values as shown in the figure below:



* with resistive current limitation for **ia** output

$$P_o = 1/4 U_o \times I_o$$

OR

* with electronic current limitation for **ib** output

$$P_o = U_o \times I_o$$