As consequence of last month’s newsletter, we received some requests regarding the Ex p type of protection and we are happy to satisfy our readers expectations.
The internal overpressure protection mode is based on the concept of segregation. Basically, it prevents the penetration of the explosive atmosphere in enclosures containing sparkling equipment through the injection of clean air, which creates an excess an overpressure, preventing gas from coming into contact with the trigger factor.

2. REFERENCE STANDARD
Currently, the reference standard is the IEC 60079-2 that is the EN 60079-2 at European level.

3. MAIN FEATURES
The main feature of this way of protection is that, theoretically, there is no size constraint to its application. Practically, any electrical equipment of all types and sizes, can be housed in an enclosure of appropriate dimensions, in which is generated, by an air compression system, a pressure higher than the outside one, so that it’s actually prevented the entrance of any type of hazardous gas.

The enclosure can have the size of a room and the equipment contained can be of any electrical size. The internal overpressure is applied especially to medium and low voltage distribution systems complete with all the control equipment.

In particular, the most common applications are addressed to:
- measurement, control and monitoring systems;
- large size electric motors;
- medium and low voltage transformers.

Thanks to experiments conducted by companies that produce equipment with this type of protection, we can say that you can still certify enclosures with volumes up to 10 m3 containing equipment with voltage up to 24 kV and currents of 5000 A.

The minimum overpressure allowed by the rules is of 0.5 mbar (50 Pa), and this can be maintained with a continuous flow of inert gas or air.

Based on the latter consideration, Ex p equipment can be divided in three categories:
- of static overpressure;
- of overpressure with compensation for losses;
- of overpressure with continuous circulation of protective gas.

4. DESIGN FEATURES
We have seen so far the possible applications and the dimensional potential of the internal overpressure enclosures.
The enclosure will necessarily have design features which allow it to contain the overpressure with any deformations that can cause large losses of the protection gas.

Here it’s necessary to make a clarification. Weather-proof box for electrical equipment, although designed to have a high protection against the penetration of solids or liquids such as a IP55 or IP67 protection, are not suitable for this purpose, because designed to prevent the penetration and not, as in the case of a Ex p panel, to prevent the release of protective gas.
The impulse that causes the compressed gas, even if the pressure is of weak entities, is notable and it’s therefore necessary to choose construction designed for this purpose.

Just think that on a door of 1 m², with an internal pressure of only 10 mbar, acts a force of 100 kg. Therefore it’s understandable that the enclosures must be constructed only by specialized companies.

If the overpressure fall below the minimum limit, automatic de-energizing systems of electrical equipment must be provided in order to report the failure in environments that are constantly manned. For this reason, usually inside the Ex p enclosure, there’s a series of devices, generally contained in an Ex d enclosure to ensure the de-energizing of the equipment and the switch on of the alarms. In case of failure, the alarm devices do not become a source of ignition of the explosion, but are individually protected in case of lack of shielding gas.

It’s clear that a pressurized housing must be equipped with an automatic control system of the protective gas circulation, which will consist of electro-pneumatic devices that check pressure, flow, washing time, the alarm sequences and anything else necessary to ensure compliance with the equipment security features.

CONCLUSIONS

The type of protection of internal overpressure is applied especially in those areas and in those conditions where, for dimensional reasons, can not use other modes of protection. The construction complexity and the high costs have, however, relegated it as a co-head mode of protection addressed to hazardous areas, but it is a totally secure system, if built and used correctly, though very critical from the control point of view.