THE RISK BASED INSPECTION FOR EXPLOSION-PROTECTED EQUIPMENT

Since some time, the scientific and technical community is talking about the Risk Based Inspection, a process of analysis to define optimized plant plan maintenance, overcoming the classical approach of preventive maintenance at a fixed date.

This methodology, which begins to have great applications in petrochemical sector, optimizes:

- the frequency of inspection;
- the methods of inspection;
- the extent of inspections depending on a risk.

This method was born from the need to ensure the safety and reliability of systems based on pressure equipment, performing on factors affecting the operation of the equipment and ensuring the integrity of the components, so as to avoid the risk of accidents. It can be effectively applied for periodic testing of electrical equipment used in areas with danger of explosion.

The Risk Based Inspection analysis evaluates the process variability, the characteristics of the materials used, the aggressiveness of the environment and so on in order to identify any kind of damage that can cause a failure and, consequently, increase or decrease the frequency of inspections implementing convenient methods of inspection. This method was developed by referring to documents produced by the American Petroleum Institute (API-580 and API-581) and is proposed for the management of plants inspections.

This control method is designed to fill the gaps that presents the scheduling of inspections and controls based on fixed timings which, for example, do not consider past experience, not allowing you to vary the frequency of tests carried out on equipment and lines.

**Inspection and maintenance of electrical systems**

The electrical system in a danger zone has different characteristics depending on the variables needed to make it secure, against the probability of ignition of the explosive atmosphere. These variables are:

- type of explosive atmosphere;
- classified area;
- required level of security required by the system;
- type of protection methods;
- construction features and equipment specifications of installation.
Although we know that the equipment is built, tested and certified to ensure safe operation even in the event of failure, however, we must ensure that the characteristics of the type of protection are maintained over time. For example, an Ex "tb" construction is suitable for installation in Zone 21. This equipment provides protection against the ingress of dust thanks to a gasket that allows to obtain a protection at least equal to IP6X. The tests performed to certify the equipment, ensure that the gasket has been subjected to artificial aging, in order to verify it over time. The real operating conditions, however, may affect over time the elastic quality of the gasket and adversely influence the degree of protection IP6X, on which depends the safety of the system. The periodic checking of the enclosure, therefore, assumes vital importance for the safety of the equipment and, consequently, of the plant.

From this example we can understand how necessary is to ensure, for the whole life of electrical installations in hazardous areas, the integrity of electrical equipment and plants features which are critical for the safe operation of the equipment and for safety.

In accordance with EN 60079-17 standard are required both an initial inspection and regular periodic checks, or ongoing supervision by trained personnel.

In this sense, the Risk Based Inspection methodology can be useful to keep low the inspection and maintenance costs, keeping and sometimes increasing, the degree of safety of facilities and equipment. The methodology is based on the assessment of the probability that a failure may affect the safety protection systems.

Each industrial plant has, at a specified moment, a level of risk, which is called residual risk, relevant to the probability of damage and the consequence in the case of damage. An optimized inspection and control, allows to photograph this risk and, therefore, to mitigate within acceptable values.

An optimized inspection plan must be developed by answering the following questions:

- What kind of damage am I looking for?
- Where do I look for?
- How do I look for?
- When should I look for?

The answer to these questions can be facilitated by systematic procedures to gather data recording results of previous inspections. The API 580 and API 581 can be used, for example, for the preparation of appropriate plans.

This methodology has been developed in particular for the control of pressure equipment, but can be validly applied to the management of inspection plans for electrical equipment installed in area with danger of explosion, all to the good of safety and economy.