TECHNICAL NEWS

CORTEM GROUP
To be sure to be safe.

September 2015

Comparison between discharge and LED lighting fixtures:

the hot restrike systems and the instant restrike of LED

Discharge lamps have been considered for a long time, the best solution for lighting large areas, such as petrochemical plants or other buildings for industrial production. This is from the point of view of the relationship between the light output and the cost.

The luminous efficiency of discharge lamps reaches and, in certain cases, exceeds 100 Lumen/ Watt, that is, with the same energy consumption, about 5-6 times the output of quartz-iodine lamps.

Currently, with the technological improvement and the development of power components, LED lighting systems are gradually spreading into different environments, replacing the lighting fixtures with discharge lamps.

1. Types and characteristics of discharge lamps

Historically, discharge lamps represented, in the nineteenth century, the first forms of electric lighting, even before the invention of the incandescent lamps.

The discharge was obtained by combining two metal or graphite rods in atmospheric air. This system was used to get a large luminous flux, but had the disadvantage of a rapid consumption of electrodes.

In time, with the replacement of the movable electrodes, were created modern lamps in which the discharge takes place through a pressure gas inside a glass bulb.

The main types of discharge lamps are:

- Low Pressure Sodium
- High-pressure sodium
- Metal halide
- High or low pressure mercury vapour
- A mixed light

Today, with the EU directive 2002/95/EC, the mercury vapour lamps have been banned for ecological safety. Subsequently, the Directive 2009/125/EC and the EC Regulation 245/2009, defined the requirements for the environmentally friendly design of high-intensity discharge lamps, ballasts and lighting equipment able to operate such lamps. Therefore, today we can consider that the discharge lamps, which can be used in environments at risk of explosion, are sodium (SOX - SON - SDW) and the metal halide (HMI).

The three main characteristics of these types of lamps and what differs one lamp from another:

- Emission spectrum
- Light output
- Lifespan

Without going specifically in the analysis of the differences, we can say that the emission spectrum depends on the type of gas present in the bulb, which leads to emissions of various colour temperatures. The range goes from the yellow light (2000 - 2200° K) of the high pressure sodium vapour lamps to the colour output of metal halide (4000- 5600° K), which makes them particularly suitable for lighting of places such as sports stadiums, in which the colour rendering is very important. The luminous efficiency is generally very high and the average life of these lamps is around 15,000 hours.

Despite these characteristics, the use of discharge lamps, in some places, is difficult by the inability to turn them on and turn them off as needed as incandescent or LED lamps.

After switching off, discharge lamps take several minutes to turn on. Furthermore, it's necessary to wait for it cool down so that the lighter will be able to trigger it again. This drawback is very annoying in case of momentary interruptions of the electricity or voltage dips caused by line noise or momentary strong electrical absorptions.

This phenomenon, which can only be annoying in certain conditions, becomes absolutely dangerous in others, for example, in the event of the lack of lighting for several minutes in an industrial warehouse in which production processes take place with high levels of risk.

For this reason, in recent years, systems of instant restrike have been developed using particular electronic equipment.

2. Hot restrike systems

As we said, in recent years they have been put on the market electronic systems that allow turning on the discharge lamp in few seconds, without having to wait for the complete cooling of the gas.

These systems, called Hot Restrike, are of various types.

The main ones are:

• Symmetrical hot restrike

• Asymmetric hot restrike

• High Frequency power supply

All these devices obviously need special attention during implant system. Normally, they have to be wired with special cables and they must be installed in the absolute proximity of the lamp.

Despite the improvements of this equipment, as compared with conventional ferromagnetic ballasts, the restarting times, to return to a luminous efficiency of 100%, always hovering around 100 seconds after turning off the lamp. Moreover, discharge lamps are subject to a rapid and premature deterioration that involves high maintenance costs.

3. The instant restrike as an intrinsic feature of LED lighting fixtures

The new lighting fixtures which use power LED have a light spectrum much better than that of discharge lamps, they can therefore be used in any environment that requires even colour temperatures next to the solar spectrum and they have a high luminous efficiency (the White LEDs can reach an efficiency of 300 lumens / watt).

The useful life of the LEDs, also, is of up to 50,000 hours, with a very slow decay.

But what should make them preferable to discharge lamps is their instant restrike, that is the immediate re-ignition without any latency.

The knowledge of LED technology for lighting large areas is still very limited in users. Very often, users require, at the time of the request of quotation, LED products with systems of hot restrike. These systems are absolutely useless for the LED lighting fixtures because, as an intrinsic feature of this technology, are able to re-ignite immediately, without waiting times and with the maximum brightness, after a power failure.

The lighting fixtures with this type of light source are, therefore, to be preferred especially in those areas in which the temporary absence of illumination may cause a severe drawback for the safety of the people working in those environments.