

# Hazardous electrics

Hazardous areas demand properly certified equipment – and that applies to maintenance kit, too. But cost and efficiency are also key. Gordon Low examines the issues



As process plants become more complex, health and safety regulations more stringent, and business more competitive, plant engineers and technicians need to step up a level. They need to become more efficient, in terms of inspection, maintenance and servicing of plant equipment, in order to minimise production downtime and guarantee safe operation of plant, machinery and other electrical equipment, but at lower cost.

However, when it comes to repair, replacement or maintenance of electrical equipment in hazardous areas, the tasks facing plant engineers are generally time-consuming and costly – the more so, if they are not provided with appropriate tools or equipment has not been installed with maintenance in mind. Why? Because in hazardous gas or dust environments, before any electrical apparatus – and

that includes electric motors, variable speed drives, valve actuators and sensors – can be changed, repaired or maintained, there are strict procedures to follow.

In particular, electrical apparatus must be isolated from its power supplies, because explosion-protection is rendered ineffective once its enclosure is opened. Equally, all appropriate fire protection and safety fencing must also be carried out. And all of the above is subject to the preparation of a 'hot work' permit, which itself can take 24 hours to issue. Bear in mind that, even if the permit arrives in a couple of hours, if production is already down then serious costs are already being incurred.

So stepping back a little, when engineers are selecting electrical equipment for hazardous areas, one point well worth considering is its total lifespan cost, in terms of plant operations and maintenance. That includes installation costs, maintenance life costs, scrap costs (due to failures of pumps, valves and instrumentation) and consequent plant downtime. Aspects to consider include the likely maintenance effort required, how easy the equipment will be to use, and any maintenance and diagnostic support options.

However, they also need to think about more basic practical points, such as the flexibility of electrical connections and lighting. And these apply right down to portable lamps, cord reels, plug distributors and repair sockets. Selecting the right kit throughout will have a positive impact on efficiency of maintenance and hence plant operations as a whole.

## Risk assessments

None of which in any way diminishes the importance of ensuring that all existing and new electrical equipment complies with the relevant European safety and quality standards. Nor, for that matter, the requirement for proper risk assessments on equipment, in accordance with health and safety

## The X factor

When it comes to sourcing electrical equipment for hazardous areas, users and contractors need to understand the significance of the European and international health and safety standards that allow electrical equipment to be marked 'X' at the end of the certificate number.

EN 60079-0 describes the symbol as denoting that equipment is subject to 'specific conditions for safe use', specified in the schedule to the certificate. Engineers need to know the hidden meaning of their 'X' marked equipment, and note that kit from different manufacturers carrying the same ATEX and 'X' classification may impose different conditions of use.

Take explosion-protected control stations or overhead fluorescent lighting. The 'X' could denote that equipment can only be installed where there is a low risk of mechanical damage. This may mean that a unit cannot be installed in certain production areas, or handling and lifting bays, because the 'X' denotes that the housing is rated below the 7Nm impact test.

Another example could be a limitation in ambient temperature. Instead of the standard range, -20°C up to +40°C, the equipment may be limited to 0°C and +40°C – meaning indoor use only. On the other hand, 'X' could also refer to an increased temperature range.

'X' may also entail other conditions – for example, special installation instructions and maintenance procedures. Maybe self-tapping screws are supplied with the lighting to lock the diffuser clamps. If so, these must be fitted to maintain the certification. But, if the user is installing hundreds of lights through a plant, the additional time and cost of installation can be significant.



photoLibrary.com

regulations and, where hazardous areas are concerned, also European ATEX Directives (ATEX 137 or ATEX 118a, 1999/92/EC).

Note also the minimum requirements stipulated in ATEX 137, which states that 'all necessary measures shall be taken to ensure that the workplace, the work equipment and the associated connection devices...are maintained and operated in such a way as to minimise the risks of an explosion'.

But the point is, that's not all. While standard, off-the-shelf, explosion-protected electrical equipment is now available to help engineers minimise service and maintenance costs, it is worth noting that some can also be customised to ease maintenance on a particular plant or offshore oil platform.

### Shining a light

On lighting, for example, some portable Ex-lamps and torches, including LED versions, can now be activated using one hand. Spotlights can be provided with displays showing the user how much operational time is remaining. Single- and double-lamp machine lights can be provided, with pipe made from polycarbonate and protected to IP68.

Similarly, for high power lighting in Zone 0 hazardous areas, Ex tank inspection lights are now available to check, for example, oil or gas storage tanks, quickly and safely. These lights can also be integrated with custom-designed transport trolleys, if required. And other hazardous area lighting products include emergency lights, pendant light fittings, floodlights, and lamps for outbuildings and mast bases.

Much the same applies to power supplies. In hazardous areas, maintenance technicians will benefit from portable Ex socket distributors and cable drums, compatible with zones 1, 2, 21 and 22. Again, their purpose is to minimise the time and effort required, while guaranteeing the safety of



plant and personnel. Cooper Crouse-Hinds' eXLink plug connections, for instance, can be used to enable electrical equipment – including actuators, motors, submerged pumps, liquid level sensors, floating switches etc – to be connected and disconnected quickly and safely, without the use of tools, without engineers having to isolate the apparatus or disconnect terminals, and without compromising the safety or integrity of the installation. 

*Gordon Low is marketing segment manager with Cooper Crouse-Hinds*



## IS OR XP: that is the question

**Marcus Halliday, general manager of CorDEX Instruments, writes:** Think of equipment for hazardous area operation, and the terms 'intrinsically safe' (IS) and 'explosion proof' (XP) spring to mind. But which is the most appropriate for your application?

Intrinsically safe is protection based around limiting the available electrical energy, so that ignition sources cannot occur from a short circuit or failure. With an IS system, the entire power of a device is controlled. This includes, but is not limited to, the batteries. Hence, inductive and capacitive loads are also assessed, to the extent that they cannot cause a spark in an explosive atmosphere.

However, these constraints would preclude the use of many electrical instruments in hazardous areas, because they require a higher power range. So, if the instrument you are considering falls into this category, your focus needs to be on explosion-proof XP protection. Quite simply, if power is an issue, think XP.

The CorDEX Centurion XP Dual digital camera (pictured above) provides a good example. It is the only ATEX certified explosion proof digital camera available for hazardous environments. By using XP, relatively high power devices, such as a camera flash, can be used in explosive areas. In this digital camera's case, that works, because it is designed to contain an internal explosion: it channels expanding gases towards the outside world via flame paths that provide cooling to prevent external ignition.

IS and XP also differ in terms of ATEX classification, with IS equipment available as EX ia and EX ib, while explosion-proof equipment is classified Ex d, which covers the majority of applications for portable instruments. Instruments holding this certification are deemed ideal for use in open areas where explosive gas may prevail under certain circumstances.

However, that is not the end of the story: for ATEX certified equipment, a separate quality assurance notification is also required to allow its legal sale. This is different from a standard ISO9001:2000 quality management system and far more stringent, with respect to inspection, testing and acceptance.