Explosion protected switchgear in Lithium-Alanate production

Some products are rare and expensive. Lithium-alanate belongs to this group – it is one of the most important basic materials for pharmaceutical production worldwide.

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Figure 1: The new Chemetall Lithium-alanate production plant at Langelsheim/Harz is mainly classified as Zone 1 hazardous areas

The development and production of active substances and drugs offer many companies opportunities for growth. This applies not only to bio-technology companies, but also to companies in speciality chemicals such as Chemetall GmbH. The company, which is based in Frankfurt/Main, is the world's largest manufacturer of Lithium-aluminium-hydride, a highly effective reducing agent, used in the chemical synthesis of pharmaceutical substances. This substance is also produced as a white powder called Lithium-alanate in Langelsheim/Harz. The Chemetall factory goes back to Hans-Heinrich-Hütte founded there in 1913. In 1920, the former Metallgesellschaft (today mg technologies AG) took over the site. Production of lithium-aluminium-hydride commenced here as early as 1924. Due to rising demand, production capacity needed to be increased. In September 2000, the enlarged alanate plant – complying with the latest production and safety standards – was commissioned, with a production capacity approximately 1.5 times larger than its predecessor.

Figure 2: SAE-STAHL displays as a local panel. These enable in-field intervention in specific production stages

Figure 3: Switch cabinet in the control room with supply and signal isolating cards in 19' sub-rack. These cards enable intrinsically safe control of the local panels

The complete plant (Figure 1) is classified as Zone 1 due to the substances processed, primarily the highly reactive lithium hydride and its compounds. All electrical equipment used – including switches, light fittings and many other parts of the production plant – therefore had to be explosion protected design. The new plant was engineered by the internationally- experienced plant contractor Lurgi of Frankfurt, which like Chemetall and Dynamit Nobel belongs to mg technologies AG.

‚The production process in the plant, which covers approximately 20 x 20 x 20 m, runs semi-automatically', says Production Manager, Dipl.Ing. Bernd Debbeler, ‚our plant operators must however intervene at different points in the production process by means of keyboards and displays'. Both the explosion protected displays and all light fittings, switches, distribution boxes, control elements that are also explosion protected were supplied by R. STAHL Schaltgeräte GmbH from their Waldenburg or Weimar factory. R. STAHL is a trusted supplier to Chemetall of many years standing and hence the new plant was completely equipped with products from these two factories. The whole of the field electrics is explosion protected – also the SAE-STAHL displays which take on the function of the local panels already referred to (Figure 2). They enable communication and response from production to control room. All control commands are generated on the two PCs in the control room. Siemens S7 PLCs are connected to the PCs (Figure 3) Most of the mixers, valves, pumps and other equipment used in the production plant are connected with these controls via interfaces to the intrinsically safe field circuits. All field devices are connected via Series 8146 EExe or EExi terminal boxes made of impactproof, glass-fibre-reinforced polyester resin. The robust design of these enclosures means there is no problem with installing them outdoors. Series 8537 safety switches serve as back-up for the mixer and pump motors. During cleaning and repair work, mandatory isolation of the electrical power supply is ensured by operating these lockable switches. Thus the preparation work normally necessary, such as unscrewing back-up fuses or removing the terminals from motors – work that only qualified electricians can do – is avoided.

Series 9752 PLC graphics terminals for monitoring and controlling the individual processes are installed directly in the field at the plant operating positions. They have explosion protection mark EEx ib IIC T4 and are fitted into Series 8146 enclosures. As can be seen in Figure 2, additional components such as push-buttons, indicating lamps and switches are also fitted there.

Figure 4: Approximately 120 light fittings from the R. STAHL works in Weimar ensure good and safe working conditions in both internal and external production areas. The fittings shown are EXLUX 6000 and 6008

Series EXLUX 6000 light fittings, with their high light quality and operational safety, are used to light the plant both indoors and outdoors. They are characterized – not only by the well-proven materials of which they are made – but also by the high level of resistance to corrosive media and other harsh environmental influences. To guarantee the safety of personnel should the general lighting fail, Series EXLUX 6008 individually supplied emergency light fittings are installed throughout the plant (Figure 4).

Because the new lithium-alanate plant has an estimated life of a good 20 years, it was particularly important to the user Chemetall when selecting suppliers that availability of spare parts for repairs and possible future changes could be guaranteed over this period.