



A Powerful Combination: Explosion Protected Motor with Extra Protection

In potentially explosive atmospheres, special safety requirements apply to electrically operated components – spark formation due to malfunctions, overheating or other similar incidents must be avoided at all costs. Strict standards and certification requirements apply in these hazardous areas, primarily to ensure the safety of people who are present and working in them. Electric motors require a flameproof enclosure to prevent any sparks from escaping from inside and causing an explosion. They therefore need to be intrinsically safe and sufficiently isolated to ensure they don't spark. BEN Buchele, a specialist in electric motors based in Nuremberg, has developed and obtained certification for a new type of flameproof motor designed for high power output and featuring a special protective function.

Explosive atmospheres are classified according to various hazard zones, each of which is subject to specific requirements: The least hazardous zone is Zone 2, in which an explosive atmosphere occurs rarely and only for short periods, whereas an explosive atmosphere is occasionally present in Zone 1. By contrast, Zone 0 is the most dangerous as it has a permanently explosive atmosphere. For critical Zones 0 and 1, a flameproof motor is essential.

Explosion protected Motor can be used Without Restriction for IIC/T4

The explosion protected motor with the type designation dKD280 was designed for the highest explosion group, IIC. Class A is not highly explosive and includes gases such as propane, for example, in relatively low concentrations. Class B includes, for example, ethylene, which is more explosive. The highest class, Class C, includes hydrogen, which is a highly explosive and highly flammable gas with colossal destructive power.

Temperature class is another relevant factor when it comes to operation of the electric motor; in other words, at what motor surface temperature does the gas found there become flammable. BEN Buchele's explosion protected motor is suitable for temperature class T4. Some gases ignite at just 200 degrees Celsius on the surface, while others only ignite at 300 or 400 degrees Celsius. In the T4 class, the motor must not exceed a maximum temperature of 135 degrees Celsius on the surface of the casing or any external components in order to prevent hydrogen or other gases, such as ethyl ether, from igniting. The actual ignition temperature may still be much higher, but a certain safety buffer is nevertheless crucial. Needless to say, the testing requirements are particularly stringent.



Image 1) The explosion protected motor with the type designation dKD280 (at the front of the picture) offers a unique combination of output (up to 200 kW), protection levels (up to IP68), explosion group (IIC), temperature class (T4) and integrated braking function. The yellow explosion protected motor at the rear is a version with an external fan. Image: ©BEN Buchele Elektromotorenwerke GmbH

Robust, Durable, Powerful

This innovative explosion protected motor is a three-phase asynchronous motor which is extremely robust, low-maintenance and also highly durable. Its sturdy grey cast iron design withstands the harshest environmental conditions such as salt water, salty air or extreme temperatures from minus 35 degrees Celsius to plus 50 degrees Celsius. Depending on the requirements, the motor can be designed without a fan / with an integral fan / with an external fan for the operating modes S1 (continuous operation), S2 or S3 (both short-time duty) and can thus be used for outputs from 50 to 200 kW.

Integrated Brake Function

Another special feature is the integrated electromagnetic spring-operated brake with 3,300 Nm of braking force, which is of interest e.g. for anchor and mooring winches on large ships and in ports. These applications require a powerful electric motor that also has a reliable braking function to hold the anchor in place. In the case of the mooring winch, the motor uses its braking function to hold the ropes with which the ship is secured to the quay wall. The braking function is also a supportive safety tool for crane systems or conveyor belts in potentially explosive areas. Further possible uses for the explosion protected motor include pumps that convey explosive media directly.

A Unique Combination and Expert Advice

The unique combination of its properties gives the size-280 explosion protected motor an unrivalled position on the market: The explosion protected motor complies with protection levels ranging from IP56 to IP68, is flameproof and features an integrated brake function. There is no other motor on the market that offers this combination of power, protection level, explosion protected rating, temperature class and integrated braking function. In addition to the 280 frame size, which already covers a wide range of output ratings, BEN Buchele will be offering further sizes and output classes in the near future.

In all applications, the available features always depend on the specific design. BEN Buchele attaches great importance to providing comprehensive advice from the outset. Particularly in the case of explosion protected motors, which are always subject to strict safety standards, the experts at BEN Buchele assess all relevant parameters, as Head of Design Stefan Kunzmann explains: "When designing a motor, it is important to know where it will be used, what the hazard zone is, what temperatures it will be operating in, what the temperature differences are between day and night, what protection levels are required, what power output is needed, whether it will be used for continuous or intermittent operation, and consequently whether a fan is required or not, whether maintenance intervals need to be as long as possible, and so on. Customers are often surprised by the level of detail in our preliminary discussions, but this is the only way we can design the motor to fit the specific application perfectly." At BEN Buchele, the philosophy of craftsmanship prevails: Every single motor is configured individually.

Optional Extras as Required

Explosion protected motors feature additional functions that BEN Buchele also offers in its standard motors. For instance, an incremental encoder can be installed to monitor the speed more effectively. A non-return device, which acts as a safety device, prevents the motor from running in reverse. In addition, the relubrication of the ball bearings can be facilitated along with bearing control or shock pulse transducers to monitor vibrations. An anti-condensation heater can also be useful to prevent condensation build-up. Above a certain power rating, use of current insulated bearings is likewise possible. If the motor is operated with a frequency converter, the bearing currents between the ball and running surface can cause damage. However, electrical insulation can prevent this from happening.

One of the practical benefits is the direct substitution option made possible by BEN Buchele's bespoke manufacturing. If existing standard electric motors need to be replaced – as country-specific regulations regarding explosion protected areas have changed, for example – BEN Buchele can manufacture a flameproof motor as an equivalent to the existing one, based on the specifications of the existing motor. Existing connections, pipework and hydraulic systems can continue to be used as a result.

Applications for Explosion protected Motors

Although it was designed for a very specific application – anchor and mooring winches in potentially explosive atmospheres – there are many other potential applications where flameproof motors are essential. Electric motors with safety level IIC/T4 are in high demand in the chemical and petrochemical industries, as well as for applications like the cooling of gas pipelines, where a high protection level and temperature resistance are also essential. The explosion protected motor can also be used in offshore applications, on oil rigs, or for axial and radial fans in air-conditioning and ventilation systems. At BEN Buchele, we are driven by the guiding principle of tailoring each motor individually to the specific application.



Image 2) Explosion protected motors are used in a wide range of scenarios. On offshore drilling platforms with hazardous areas, legs to be lowered can be fitted with explosion protected motors. Image source: iStock | pichistocke