



The step-by-step guide to storing, handling and installing flameproof motors

There are some important considerations when it comes to deploying flameproof motors in potentially explosive atmospheres, and a number of these criteria are set out in the IEC 60079 series of standards. For instance, IEC 60079 not only specifies the appropriate design and definition of flameproof motor components, but explains the correct installation, maintenance and inspection processes required to retain certification.

In this article, Marek Lukaszczyk from WEG outlines a number of steps to ensure the safe storage, handling and installation of flameproof motors and how failure to heed this advice could have serious consequences.

The correct installation and operation of flameproof motors is vital to maximise the working life of any machinery that is expected to function in hazardous environments, resulting in less downtime and remedial work which would otherwise

impact on end-user processes. Moreover, respect for the manufacturer's storage instructions and start-up inspection procedures can significantly improve motor reliability throughout its operational life.

It is worth pointing out that flameproof electric motors, particularly high-power models, are valuable assets which can significantly impact project budgets. With this in mind, correct storage is critical. For example, when motors arrive and are not immediately unpacked, they should be

stored in places protected against humidity, sudden heat changes and vibration, as these factors can potentially damage motor components and reduce service life considerably.

Avoid humidity

Motors supplied with space heaters should be stored with them switched on to avoid the accumulation of internal condensation. Here, maintaining the inner temperature of stored motors at around 2 to 3°C above ambient will have the desired effect. Always store flameproof motors in well-ventilated areas, ensuring a minimum clearance of approximately one-quarter of the frame size around the motor to promote normal air flow. Notably, space heaters also maintain the winding insulation resistance within acceptable levels, thus prolonging motor life.

Staying with the theme of insulation resistance, after prolonged storage this needs to be measured before operating the motor. Moreover, if the ambient atmosphere exhibits high levels of humidity, measuring tasks should be conducted regularly. Limit values defined by IEEE-43 must be checked. If the test is performed at a temperature other than 40°C, it will be necessary to adjust the value in line with IEEE-43 correction curves.

When checking for winding insulation resistance, the terminal boxes should also be observed to see if the interior is dry and free of any dust accumulation; whether the contact elements are free of corrosion; if the flameproof joint is free of rust and any kind of damage or scratches; and whether the cable inlets are correctly sealed with certified cable glands (or certified plugs if not in use).

Ensure corrosion-free joints and surfaces

Flameproof joints need to be free of corrosion. Prior to assembly following prolonged storage, the enclosure's flameproof joint surfaces must be protected with grease, thus avoiding any potential for the propagation of rust. Similarly, with motor bearings, any extended storage periods make it necessary to remove the shaft locking device and rotate the shaft manually every two months. After rotation, the end position of the shaft should be

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45° from its initial position. If in storage for longer than six months, the bearings will require greasing before start-up.

For storage purposes, any motors with sleeve bearings need to be filled with the correct quantity of oil, as they are usually supplied dry. After every two months of storage, the shaft should be rotated at about 30 rpm for oil circulation. If it is not possible to rotate the shaft, further instructions for maintaining corrosion-free contact surfaces must be consulted in the motor's manual. Starting the motor after a long storage period without correct care of the bearing system can lead to failure and destruction of the sleeve bearings.

Regularly inspect motor condition

In all cases, periodic motor inspections should be conducted for any signs of physical damage, contamination, or the presence of water condensation or other aggressive agents. Checking ambient and winding temperatures and relative humidity and recording any vibration during storage are vital to correctly evaluate a motor's status before start-up.

Following long-term storage, the motor should be cleaned and dried before commencing operations. Always check that the motor is completely sealed with regard to areas such as the terminal box and drain holes prior to cleaning. Dry cleaning, by vacuuming for example, is often preferable to wet cleaning. Also, take care that cleaning the motor does not lead to the build-up of static.

In terms of the cleaning process itself, remove the fan cover and ensure that all air inlet holes are completely free of dirt or contamination. Additionally, any dust, dirt and obstructions should be removed from behind the fan and along any frame ribs. It is important to prevent dust from





accumulating on the exterior of the motor, as it could impair cooling.

The corrosion inhibitor of exposed machined surfaces such as the shaft end must be removed using a cloth soaked in a suitable petroleum-based solvent. It must also be guaranteed that any enclosure entry is fitted with a certified plug, drain or cable gland depending on its function, and that every flameproof joint which was exposed during storage is free of corrosion, dirt, scratches or visible damage, and protected against rust occurring in the future.

When motors are dispatched with plastic plugs fitted into the cable entry holes, these plugs must be taken out before commissioning and a suitably certified gland inserted. Furthermore, it is essential that cable entries are not left open, which means that if any holes are unused or redundant, they should be mated with suitably certified and correctly inserted plugs, preferably ones that can only be removed with the aid of a tool.

Bearings must be lubricated with the type of grease listed on the nameplate. On flameproof motors with re-lubrication facilities, take care to avoid overfilling the bearing housings as this can present a far greater hazard to trouble-free service than under-greasing, so careful attention is required. Any bearings without re-lubrication facilities will ultimately require replacement at the prescribed interval.

Correct motor handling is critical, not only to avert damage, but to guarantee personal safety. Only use the eyebolts supplied (or integral lifting holes) to gently lift and lower the motor. To avoid any tilting of the motor during handling, appropriate tools must be used to adjust the lifting point to the motor's centre of mass. Failure to do so can cause the fan cover to hit the ground before the motor feet, damaging the exterior fan.

Follow installation instructions

Electric motors must be installed in locations with easy access for inspection and maintenance. Under no

circumstances should motors be installed in boxes or covered with materials that may impede or reduce free air circulation for cooling purposes.

The requirements for machine foundations can be found, for example, in DIN 4042-1, where defined limits are specified for natural foundation frequency when relating to the motor's speed frequency, double-speed frequency and line frequency. Poor foundation dimensioning can promote vibration in the motor, which may be amplified by its own natural frequencies. When designing the motor base, it is also important to understand that the motor can occasionally be subjected to torques higher than the rated torque.

Ultimately, the motor must be mounted on a base which is rigid enough to prevent distortion and vibration. A good tip is to seek out motors with frames that offer flat areas for the placement of accelerometers – in both vertical and horizontal planes – thus permitting easier monitoring of vibration levels.

Align with other components

To ensure optimised operation, besides a stable foundation, motors must be properly aligned, while components assembled at the shaft end need to be balanced correctly.

Always turn the shaft by hand before coupling to detect any possible fault due to incorrect handling. The coupling of a motor with a drive can be made by means of direct coupling, gearbox, or belt and pulley. Appropriate care should be taken according to the coupling type. For example, it is mandatory that belts operating in hazardous atmospheres are not affected electrostatically. In addition, the mounting and dismounting of couplings must be conducted using the proper tools to avoid shaft-end damage.

Clearly, power supply quality is essential to maintain motor life expectancy and the health of windings. Supply cables should be able to withstand motor voltage and current as stated on the nameplate and

documentation, as poorly selected cables may overheat and ignite the hazardous atmosphere. For motors fitted with an 'Ex e' terminal box, special care must be taken to avoid any looseness of cables in motor terminals by means of cable clamps, washers or any other methods specified by the manufacturer.

Last but far from least, any thermal protection devices (such as thermistors and thermostats) fitted to the motors must be correctly connected and monitored via a suitable control circuit. Aside from the safety implications, any failure in this regard would result in the loss of potentially useful data collection that would otherwise underpin timely preventive action with regard to maintenance and repairs. As a final point, always follow manufacturer recommendations when it comes to setting alarm and trip temperatures. ■

About the author



Marek Lukaszczyk is WEG Marketing Manager for the Europe and Middle East region, a position he has held for over a decade. Responsible for developing and managing marketing initiatives to drive the company's revenue growth, Marek leads marketing strategy development and execution of marketing plans with partners and country directors across the European and MENA sales territory. Before this role, Marek held the post of Export Marketing Manager at WEG's headquarters in Brazil running the export marketing department, supporting branches, distributors and supporting the rollout of the company's new corporate identity.