

WHITE PAPER

Demystifying Explosion-Proof Submersible Pumps

Introduction

When the discussion turns to requirements for “explosion-proof” pumps, many people rely on word of mouth, past practices or even old wives tales it seems. The requirements for “explosion-proof” pumps and systems are not really that difficult to understand, if you are willing to unlearn many of the myths most people take as truths.

The term “explosion-proof” may be one of the most common misnomers in the submersible wastewater pump industry. The appropriate term can be found in the National Fire Protection Association’s (NFPA) publication 70, commonly known as the National Electric Code (NEC). The NEC applies the technical term “Hazardous Locations” to what is commonly known as “explosion-proof “

Chapter 5 of the NEC is entitled “Special Occupancies”. Article 500 in chapter 5 covers general electrical requirements for Class I, II and III, Divisions 1 and 2 Hazardous (Classified) Locations. Article 501 covers Class I location requirements in detail.

Wastewater systems may be categorized in one or more of these classes and divisions. The most typical occurrence, when a system is classified as “explosion-proof” is a Class I, Division 1 location.

Paragraph 500.5(B) (1) describes in detail a Class I, Division 1 location.

Who can make the call as to whether or not a given installation is classified as hazardous? Paragraph 500.4(B) and FPN number 1 refers us to other publications. The most common reference is the NFPA 820, Standard for Fire Protection in Wastewater Treatment and Collection Facilities. This paragraph also makes reference to “...the authority having jurisdiction”. Just who is this “authority”? Some states and local jurisdictions have enacted statutes that define when a system must be classified as hazardous. Others have not. When there is no clear delineation of who has authority, the local electrical inspector is this authority, (NFPA 70, 90.4).

The NFPA 820 table 4.2 can help the authority having jurisdiction to make a determination whether or not a specific installation should be classified as hazardous.

Another misconception that many specifiers and owners have is that simply specifying or installing a pump labeled for hazardous locations will meet the requirements and intent of the NEC. The fact is that the NEC does not specifically mention pumps in reference to hazardous locations. Paragraph 500.8 of the NEC states, “Articles 500 through 504 require equipment construction and installation that ensure safe performance under conditions of proper use and maintenance”. This basically means that ALL equipment in the hazardous location must be suitable for use in a hazardous location. Other equipment in a submersible pump installation affected by this requirement may include: level controls, control panels, connection or wiring boxes, slide rail systems, etc.



Many specifiers believe that simply keeping the pump submersed is sufficient to meet the intent of the NEC when it comes to hazardous locations. This could not be further from the truth. Paragraph 500.8(A)(1) states, "Equipment shall be identified not only for the class of location but also for the explosive, combustible, or ignitable properties of the specific gas, vapor, dust, fiber, or filings that will be present". Paragraph 508(A) (1) sub paragraphs 1, 2 and 3 indicate the, "Suitability of identified equipment shall be by any of the following: equipment listing or labeling, evidence of equipment evaluation from a qualified testing laboratory, or evidence acceptable to the authority having jurisdiction. Paragraph 500.8 makes it clear that all equipment, (not just the pump), in a hazardous location must be approved for that use.

Requirements for submersible pumps in Hazardous Locations, ("explosion-proof") are not really all that complicated. The NEC requires ALL equipment in a designated Hazardous Location to be labeled by a third party, and be suitable for the particular Class, Group and Division of the hazard. If any question should arise regarding the requirement of a particular location, the "Authority Having Jurisdiction" has the last say so in the matter.

Hydromatic can provide pumps and systems to meet all the requirements of the NEC. When a motor is operated on a variable frequency drive, unexpected voltage can be induced on the rotor and shaft. A number of solutions have been employed in order to prevent early bearing failure in motors operated on drives.

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