



PUMPS & SYSTEMS

# BARNES®

# SH Series

# TECH NOTES

# #2

## Explosion-Proof Solids Handling Pumps

### 1. What does it mean for a submersible pump to be “Explosion-Proof?”

- It can withstand an internal explosion of a specified atmosphere.
- It can prevent the ignition of gases or dusts in the specified atmosphere surrounding the pump due to sparks, flashes or internal explosions.
- It will operate at temperatures which will not ignite the surrounding specified atmosphere.

To be certified as explosion proof, a submersible pump must be designed to specific mechanical criteria to meet the above requirements and then confirm the design with substantial testing. During explosion testing the motor housing is fitted with a spark plug, the housing filled with gas and repetitive explosions test the components and joints.

There is a standardized rating code that describes the explosion risk.

- Hazardous gases or hazardous dust
- Which gases or dusts could be present
- Level of risk of explosion
- Maximum skin temperatures allowed for those specific hazardous agents

### 2. What does the rating nomenclature mean?

The ratings are described by a Code that is seen frequently on motors and other electrical devices, broken down into Class, Group, Division and Temperature Code. The breakdown is as follows:

#### Class

- Class I Hazardous Gases
- Class II Hazardous Dusts

#### Group

- Group A Acetylene and other gases with higher flash points
- Group B Hydrogen and other gases with higher flash points
- Group C Ethylene and other gases with higher flash points
- Group D Propane and other gases with higher flash points
- Groups E, F and G are Dust groupings

#### Division

- Division 1 The hazard could be present in everyday operations or during frequent maintenance and repair activity.
- Division 2 The hazard is expected to be confined within closed containers or closed systems and will present a risk only through accidental rupture, breakage or unusual faulty operation.

Temperature Code (Based on Equipment Tests)					
T2A	* 280C	T3	200C	T4	135C
T2B	260C	T3A	180C	T4A	120C
T2C	230C	T3B	165C	T5	100C
T2D	215C	T3C	160C	T6	85C

\* Maximum Skin Temperature

Lower skin temperatures increase the range of environments in which the equipment can operate.

Barnes X-Pruf® XSH pumps are rated for **Class I, Groups C&D, Division 1, and Code T4**. This means the pumps are rated for operation in a Division I hazardous atmosphere for gases with a flash temperature equal to or greater than ethylene, and the pump will have a maximum surface temperature of 135C.

### 3. When are explosion-proof sewage pumps required?

Theoretically, all new pumping stations for sanitary and combined flow sewers in the US and Canada must utilize explosion-proof pumps. In the US, NFPA (National Fire Protection Association) 820 defines the environment as Class I, Group D, Division 1 unless air is ventilated at 12 changes per hour; and the NEC (National Electric Code) requires the use of explosion proof devices in this environment. Indeed, the ten States Standard (Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Wisconsin and the Province of Ontario) calls for Class I, Group D, Division 1 equipment. Most pump stations do not rely on ventilation as an alternative to Division 1 classification.

Canada and some states, such as California, strictly enforce the requirements. In some areas, existing stations are “grandfathered” and do not require explosion-proof as they were in existence prior to the implementation of mandating standards. In other areas, pumps that are fully submerged are accepted as exempt from the requirement. Other areas simply ignore the requirements. As states push to increase enforcement, as currently underway in Ohio, for example, the requirement for explosion proof pumps will increase.

### 4. What does explosion-proof mean mechanically for the XSH?

The XSH, mechanically identical to the SH, was designed to meet all of the requirements of Class I, Groups C&D, Division 1. This means that all of the mating fits between external motor housing components are designed to meet the standards with longer lengths and tighter clearances, the number of bolts have been increased over normal requirements and certain cast components have been upgraded to ductile iron.

The SH and XSH have deliberately been kept mechanically identical so that the same three week lead time easily applies to both.

**5. What is the difference between FM, UL and CSA certification?** FM (Factory Mutual) and UL (Underwriters Laboratories) certify the equipment to the US standard, the NEC. CSA (Canadian Standards Agency) certifies to both the NEC and the Canadian Electrical Code. The NEC and the CEC are essentially equivalent, but FM and UL are better accepted in the US and CSA is, of course, better accepted in Canada.