Equipment for Use in Potentially Ignitable Atmospheres

Parr reactors are typically equipped with totally enclosed variable speed motors, electric heaters, and controllers intended for use in non-hazardous environments. These standard units can be used in most laboratories without undue hazard, but there will be situations where the installed equipment must be considered for use in ignitable atmospheres. Parr offers various optional stirrer drives and heating solutions to meet these strict requirements.

USA and Canadian Codes (HAZLOC – Hazardous Locations)

Designing electrical equipment to be operated in hazardous locations is a complex subject, which is governed by extensive national electrical codes and supplemented by local regulations. These codes require all electrical equipment that is installed in a governed location must be approved for use with the specific gas, vapor, or dust that can be present in the defined location. USA and Canadian electrical codes classify hazardous locations according to the nature and concentration of specific hazardous or flammable materials. These are divided into three classes:

- **Class I –** Flammable liquids, gases or vapors.
- **Class II –** Combustible or electrically conductive dusts.
- **Class III –** Easily ignitable fibers/flyings.

There are two divisions within each of these classes.

- **Division 1 –** Where the flammable material exists in the atmosphere under normal operating conditions.
- **Division 2 –** Where the hazardous material is confined within a closed system from which it may be released only under abnormal conditions, such as a gas leak in the system.

Class I locations are further subdivided into four groups, A, B, C and D which identify specific explosive gases and vapors. Explosive dusts and fibers in Class II are subdivided into Groups E, F and G. Most hazardous applications for Parr apparatus will occur in atmospheres identified by Class I, Group B for hydrogen and Groups C and D for most other combustible gases and vapors. Class II, Group F covers coal dust. Most other combustible dusts, such as flour and grain, are in Group G. Minimum ignition temperatures and energy levels are established for specific materials in each group.

The European Community has corresponding classifications for "Explosive Atmospheres" referred to as ATEX (ATmospheriques EXplosives). Parr will work with all users to provide equipment compatible with their own local codes.

The components in Parr reactor systems that may be considered hazardous and the steps that can be taken to reduce or eliminate the hazards they represent are described below.

Motors

Because of sparking from brush contacts, permanent magnet DC electric motors clearly represent the principal ignition source introduced by a stirred reactor. Electric motors approved for Class I (Divisions 1 & 2), Groups C and D, and Class II (Divisions 1 & 2), Groups F and G atmospheres are readily available in most sizes and voltages. These totally enclosed motors are suitable for many hazardous applications, and they are sometimes used with hydrogen, though they are not approved for Group B atmospheres. Currently, there are no Division 1 motors available for Group A or B atmospheres. A special air purging system can be used to reduce the classification inside the motor. The motor is pressurized by building up a positive pressure of air, or inert gas, within the motor to prevent explosive gases or vapors from entering the motor housing.

Model 4524 Reactor, 2000 mL, Fixed Head Style with Aluminum Block Heater