CHEMETRON™
Fire Systems

FM-200

Application Bulletin

FM-200 Fire Suppression —

Textile Plants

In Scouting you are taught how to make a campfire "by flint and steel." You make a mat of a loose cellulose material, then, striking a piece of flint rock against a piece of steel, you create a spark that you catch in the mat. You immediately pick up the mat and blow on the small ember to turn it into a blazing mass that is used to ignite the camp fire.

Unfortunately, the processing of cotton and other fibers in a textile mill creates a situation where the process does essentially the same thing as our scout. Typically, fiber is plucked from the bale by the teeth of an automatic bale opener in the machine head. Loose fibers are sucked through the opener, associated transport channel and duct. They are then blown to a blender/mixer, through a cleaner, a particle separator, another blender and cleaner, and finally to the carding equipment. Foreign material being transported with the cotton fibers can cause sparks when it strikes machine parts or ducts. The air used to convey the fiber is the "scout blowing on the ember," and a fiber accumulation at any point down the line is the mass to be ignited.

If not quickly detected and controlled, serious fires can result.

Detection involves the installation of spark detectors in the ducts leading to the equipment requiring fire protection — equipment where fiber accumulates. Upon near instantaneous detection of a fire ember, a fire suppressant is discharged into the equipment. To maintain the continuity of plant production, it is important that this suppressant be clean and dry. In the past halons have been used, but these were found to be ozone depleters and production was banned by the Environmental Protection Agency (EPA) effective 12/31/93. For this protection Chemetron now recommends FM-200™, or in some cases, carbon dioxide (CO_2). With properly designed systems, both of these gaseous agents will control the fires produced and are fully acceptable to the EPA.

The systems illustrated and described herein utilize FM-200, which is readily available and provided in approved system equipment.

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A World of Protection

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Tests have shown that quickly flooding an enclosure with FM-200 will control incipient fires. The secret to catching the fire in its incipiency is fast detection.

The spark detectors used, with response times measured in milliseconds, provide the detection needed. They are mounted on the air inlets to the equipment protected.

Release of FM-200 into each compartment of the protected equipment ensures proper agent distribution. Shutting down the fans upon detection ensures that the air flow will not purge the fire extinguishant too quickly. Where provided, fire dampers shall also be tripped to close. However, it is important that the fire suppressant be carried through the equipment item protected to ensure agent distribution within that unit.

The system illustrated for the automatic bale opener incorporates another feature. Upon spark detection, not only is the internal cotton movement path flooded with agent, but gas is also locally applied to the surface of the bale area just plucked. Thus, in case burning embers drop out of the machine arm (head) back onto the bale, they can be suppressed before there is an opportunity to ignite the opened bale.

The FM-200 Systems are frequently most efficiently installed when strapped to the side of the machine. Therefore, for the larger units with multiple internal enclosures, more than one system may be used. For proper agent distribution it is important that piping to discharge nozzles be as balanced as possible. Obviously, all systems on a unit are discharged simultaneously.

It is important that each internal compartment where fiber can accumulate be flooded with gas. If the fiber processing equipment is not available for examination when the fire protection system is being designed, the processing equipment manufacturer should be consulted. To prevent interference with equipment operation and maintenance, consultation on nozzle locations with the owner and/or equipment supplier is important.

Similarly to Halon systems, FM-200 Systems, when compared to other extinguishing agents, require little storage space and weight is minimal. A drawback, however, is the cost of the gas itself.

Obviously the whole purpose of this protection scheme is to achieve fast suppression of small fires. Depending on the quality of the fiber processed, this could mean fairly frequent fires. If tramp material content is high, frequent sparks are created. The resultant discharges necessitate frequently refilling the cylinders. If this scenario is anticipated, then possibly CO_2 should be considered as an alternate.

Carbon dioxide requires a much higher concentration (65% by volume) and necessitates storage in heavy, spun steel high pressure cylinders. Therefore, floor mounting is necessary if CO_2 is used.

As a comparison, a typical blender (10' x 6' x 13.2') of 800 cu. ft. requires 68 lbs. of FM-200 at 15% concentration or CO_2 at 65% concentration. Each system is one (1) cylinder, but the CO_2 cylinder with gas weighs about twice as much as the FM-200 cylinder. What makes CO_2 attractive is the agent recharge gas cost is minimal when compared to FM-200. Most systems are small capacity, so the lighter weight, ease of handling feature of FM-200 helps outweigh the higher gas cost.

Chemetron Fire Systems Engineering is available for help with any analysis of alternates being considered.

Building sprinklers and dry chemical systems in waste and dust enclosures are another important part of a total fire suppression plan. Factory Mutual Loss Prevention Data Sheet 7-1 (June, 1991) is an excellent reference for this application.

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Textile Mill Fire Suppression Arrangement

Typical Cotton Processing Line