PRODUCT APPLICATION

A technical bulletin for engineers, contractors and students in the air movement and control industry

Spark Resistant Construction (SRC)

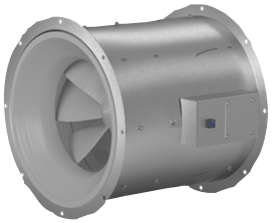
One of the critical uses for ventilation equipment is the movement of potentially explosive gases. Engineers and designers who specify these systems must exercise caution when selecting equipment to ensure continuous and safe system operation. This article will help develop an understanding of spark-resistant construction (SRC) and review the types of products available for these applications.

Where is SRC Used?

Although the term “explosion-proof” is commonly used when referring to some enclosures for electric motors and disconnect switches, there is no such thing as an explosion-proof fan. When referring to a fan ventilating potentially explosive gases, the phrase “spark-resistant construction” is used. SRC is commonly used in systems where a spark in the airstream could cause fumes or contaminants in the airstream to ignite. Common applications include paint booths, chemical storage areas, and lab fume exhaust systems.

Vektor® Laboratory Exhaust

Tube Axial/Vane Axial



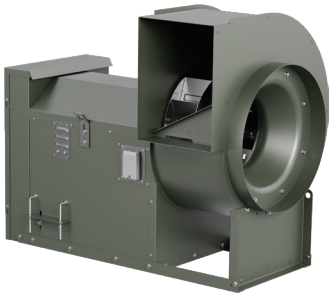
Inline Centrifugal /Mixed Flow

How is SRC Defined?

The Air Movement and Control Association International Inc. (AMCA) has developed a standard for the selection and construction of air-handling equipment used for potentially explosive airstreams. ANSI/AMCA Standard 99 includes a section that defines three levels for spark-resistant construction: Spark A, B, and C. Each category provides a unique means to prevent physical contact between two ferrous materials that while rotating could generate a spark resulting in the ignition of gases or particulates in an airstream. Aluminum is the preferred nonferrous material in AMCA Type A, B, and C construction. Alternative materials that are used for spark-resistant construction include plastics, fiberglass, and monel.

AMCA Type A Spark

Type A provides the highest degree of spark resistance, requiring that all fan components in the airstream be constructed of a non-ferrous material and that they be assembled in a manner such as to reduce the possibility of contact between any stationary and rotating component. The most common practice to meet Spark A requirement is to construct all of the fan’s airstream components from aluminum. This includes the housing, wheel, inlet cone, and any fasteners used in the airstream. Installing aluminum rubbing plates around the shaft entry points can prevent metal-on-metal contact between rotating and stationary parts. In addition, the fan shaft needs to have a sheath to cover the steel shaft or the shaft must be fabricated from monel.



Utility Set/ Centrifugal Blower

In applications of moving air that has both corrosive and flammable components, the application of a Fiberglass Reinforced Plastic (FRP) blower may be required. In order to achieve AMCA Type A "spark resistant" construction on an FRP blower, a layer of graphite fibers within the FRP laminate is used to ensure static electricity dissipation via grounding.

Adequate grounding of an SRC blower is required to dissipate static electricity.

Of the three spark-resistant options, Spark A is typically the most expensive.

AMCA Type B Spark

Type B requires that the impeller be constructed of non-ferrous materials and that the fan components in the airstream be assembled in a manner that reduces the possibility of contact between any stationary and rotating component. Typically, this is satisfied with the use of an aluminum wheel and aluminum rub rings around the steel shaft. If there is a mechanical failure of the fan, the aluminum wheel will contact a steel inlet cone. The aluminum rub ring will protect against contact between the steel fan shaft and the steel fan housing. Spark B falls between Spark A and Spark C with regard to cost.

AMCA Type C Spark

Type C offers a minimal level of spark resistance and only requires that possible contact between stationary and rotating components be reduced. Typically, this construction includes the use of an aluminum inlet cone and steel shaft aluminum rub rings. The aluminum inlet cone will be the first point of fan wheel contact if there is a mechanical failure. The aluminum rub ring placed at the opening of the housing where the shaft passes protects against contact between the steel fan shaft and steel fan housing. Spark C is the least expensive alternative.

Other considerations

Electrical motors, disconnect switches, bearings, and drive components may require some consideration depending on the type of fan.

ANSI/AMCA Standard 99 does not require that an explosion-resistant motor and disconnect be used to attain spark-resistant construction as long as these components are located out of the airstream. ANSI/AMCA Standard 99 states that the motor or any electrical device should not be placed in the flammable airstream. If mounting these devices in the airstream is required, then a suitable explosion-resistant construction or enclosure is required to prevent igniting the airstream. For additional information on the selection of these components, refer to Application Guide FA/107-24 Explosion-Resistant Disconnect Switches or FA/113-24 Motors for Ventilation Products.

Spark Resistant Fan Types

Spark-resistant construction is available on many types of commercial and industrial blowers. Along with scroll-type centrifugal fans, most reputable manufacturers offer power roof ventilators and inline fans that are designed to meet ANSI/AMCA Standard 99. These alternative construction options provide more flexibility to meet the unique needs of each ventilation application.

Which type should I use?

The main criteria to keep in mind are whether the airstream will be normally hazardous or not normally hazardous. A normally hazardous airstream may require Type A or B. A fan handling gases that are not normally hazardous might be of construction Type B or C.

An example of a system that is not normally hazardous would be a high school chemistry lab. Although a spark-resistant construction is warranted for this application, the degree of spark resistance would lessen as ambient classroom air dilutes the flammable materials. When the level of construction is in question, go with the higher degree of protection. One example might be a gasoline storage facility. Based on the high level of fumes, this would constitute a normally hazardous airstream. For this application, Spark A or B should be considered.

Keep in mind that having a safe SRC fan system does not end with the fan selection, purchase, and installation. Proper maintenance and regular inspection of SRC fans are important. The US Bureau of Mines along with others has shown that aluminum impellers rubbing on steel which has been allowed to rust may result in high-intensity sparking.

Summary

Although factory representatives can help suggest what might best serve their customers, ultimately it is up to the system designer to specify the appropriate blower SRC required for an application. For more information, we recommend referencing the latest version of ANSI/AMCA Standard 99. If needed, Greenheck's application engineers are also available to provide additional assistance.

AMCA Certified Ratings

A manufacturer that participates in AMCA's Certified Ratings Program (CRP) assures the industry that the products and equipment will perform as stated by the manufacturer. The program stipulates the various rules and regulations for presenting cataloging data: AMCA 211 for aerodynamic performance and AMCA 311 for acoustic performance.

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