GREENHECK
Fan Application
FA/116-02
PRODUCT APPLICATION GUIDE
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 their equipment to ensure continuous and safe system operation. This article will help develop an understanding of SRC along with how and when these types of products should be applied.

Where is SRC Used?

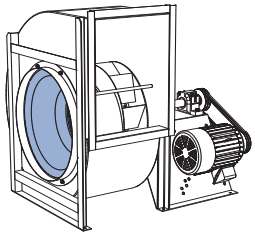
Although the term "explosion proof" is commonly used when referring to some enclosures for electric motors and disconnect switches, there is no such thing as an explosion-proof fan. When referring to fan construction, "spark resistant" is used. SRC is commonly used in systems where a spark in the airstream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

How is SRC Defined?

The Air Movement and Control Association International (AMCA) has developed recommendations and guidelines for the selection and construction of air handling equipment which is used for potentially explosive airstreams. This guide, known as AMCA Standard 99-0401 Classifications of Spark Resistant Construction, defines three levels for spark resistant construction: Spark A, B, and C. The ultimate goal is to avoid physical contact between two ferrous materials.

Type C Spark

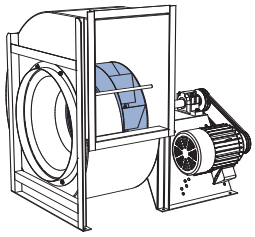
Type C offers a minimal level of spark resistance and only requires that possible contact between stationary and rotating components be reduced. Typically, this construction includes the use of an aluminum inlet cone and an aluminum rub ring. The aluminum inlet cone will be the first point of fan wheel 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 of the steel fan shaft and steel fan housing.



Type: C Cost: Low
Protection: Minimal

Type B Spark

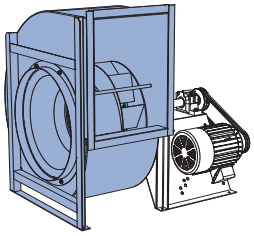
Type B requires that the impeller be constructed of non-ferrous materials, and that the fan components in the airstream be assembled in a manner that reduces the possibility of contact between any stationary and rotating component. Typically, this is satisfied with the use of an aluminum wheel and an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



Type: B Cost: Moderate
Protection: Better

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



Type: A Cost: High
Protection: Best

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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. In addition, an aluminum sheath is required to cover the steel fan shaft, or the shaft is to be constructed from monel.

As noted in the descriptions of spark A, B, and C construction, aluminum is the preferred nonferrous material. Alternative materials that are used for spark resistant construction include plastics, fiberglass, and Monel.

The Intent of Spark Resistant Construction

Although SRC, as defined by AMCA, was originally set up to be used with housed centrifugal blowers, many manufacturers currently market other types of fans with the same SRC designations. Scroll type centrifugal fans typically offer higher levels of protection when compared to inline fans primarily because the bearings are located outside of the housing. The protection of internally mounted bearings on inline fans presents special problems.

For tube axial fans, meeting AMCA spark requirements is aided by the location of the impeller. Typically, tube axial fans are constructed with the impeller at the discharge of the fan, which keeps the bearing enclosure under negative pressure. This means that during fan operation ambient air is drawn through the bearing compartment and exhausted into the airstream.

For tubular centrifugals, the impeller is located at the inlet of the fan housing. This creates a situation where the bearing enclosure is under pressure. It is imperative that the bearing chamber be sealed tightly to prevent flammable fumes from escaping the fan.

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.

When comparing SRC fans to standard steel construction, a higher degree of protection also comes at a higher price.

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 paint booth that is handling a normally hazardous airstream when the booth is in use. For the majority of paint booth applications, Spark B is required.

Equally important to the fan selection is the choice of electrical components such as the motor and disconnect switch, if required. The selection of this equipment is generally based on the environment surrounding the fan system and caution should be exercised here as well. For additional information on the selection of these components, refer to Product Application Guides FA/107-00 (Explosion Resistant Disconnect Switches) or FA/113-01 (Motors for Ventilation Products).

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 is 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 customer, ultimately it is up to the system designer to specify appropriate levels. If needed, Greenheck's engineers are also available to provide additional assistance.