Explosion Proof Units

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Explosion Proof Units



ICE Western *AH Series Explosion Proof Units* are fully tested for operational performance & compliance to ensure customers satisfaction. Available in both Division 1 & 2 codes, these units are designed to provide cooling and or heating for industrial severe duty applications. Our quality of engineering & manufacturing will ensure many years of reliable & safe service.

ICE Western explosion proof equipment are all ETL certified. Our products are designed to offer a safe solution at a competitive price while maintaining the highest level of quality in both our systems and service.

Our quality control department provides testing on all systems to ensure the units fully comply with engineering specifications issued for manufacturing.

All units are built to client specifications. Please contact our sales and engineering department to assist you in a properly design system for your specifications.

EXPLOSION-PROOF UNITS AT A GLANCE

UNIT MODEL NOMINAL NOMINAL OV NO. CFM FPM			CEM		HEATING/COOLING COILS				
		RANGE		LARGE FACE AREA COIL					
				NO.	LOW 2"	MED. 5"	8"	SQ. FT.	H" X W"
					DIA.	DIA.	DIA.		
AH-20-BI	2000	1290	1550-4650	1	BI	BI	BI	5.6	25X32
							12		
AH-60-BI	6000	2575	4100-9780	1			15	13.3	40X48
AH-80-BI	8000	2319	5520-14490	1			18	20.0	48X60
AH-120-BI	12000	2899	7500-17300	1			20	24.0	48X72
AH-150-BI	15000	2930	9000-21500	1			22	30.0	60X72
AH-180-BI	18000	2387	13000-31500	1			27	36.0	72X72
AH-210-BI	21000	2256	16000-35000	1			30	42.0	72X84
AH-240-BI	24000	2130	18000-43000	1			33	48.0	72X96
AH-320-BI	32000	2321	20000-55000	1			36	72.0	96X108
AH-400-BI	40000	2385	30000-65000	1			40	88.0	96X132
AH-480-BI	48000	2343	36000-85000	1			44	104.0	96X156
AH-600-BI	60000	2414	45000-104000	1			49	130.0	120X156
AH-700-BI	70000	2298	55000-120000	1			54	138.3	120X166

		MINAL OV FPM RANGE		HEATING CC	/COOLING)ILS				
NO. CFM FPM			OV FPM		MAX. PRE	LARGE FACE AREA COIL			
				NO.	LOW 2"	MED. 5"	MED. 6"	SQ. FT.	H" X W"
					DIA.	DIA.	DIA.		
AH-20-FC	2000	1429	1600-3400	1	FC	FC	FC	5.6	25X32
					12				
AH-60-FC	6000	2691	4000-10000	1		15		13.3	40X48
AH-80-FC	8000	2667	6000-13000	1			18	20.0	48X60
AH-120-FC	12000	2804	8000-20000	1			21	24.0	48X72
AH-150-FC	15000	2727	9000-25000	1			24	30.0	60X72
AH-180-FC	18000	2590	14000-30000	1			27	36.0	72X72
AH-210-FC	21000	2471	16000-34000	1			30	42.0	72X84
AH-240-FC	24000	2299	18000-40000	1			33	48.0	72X96
AH-320-FC	32000	2522	24000-52000	1			36	72.0	96X108
AH-400-FC	40000	2633	30000-60000	1			39	88.0	96X132
AH-480-FC	48000	2622	36000-72000	1			42	104.0	96X156
AH-600-FC	60000	2673	48000-104000	1			48	130.0	120X156
AH-700-FC	70000	Consult factory.							

EXPLOSION-PROOF UNITS AT A GLANCE

		CEM		STAN SIZE	HEATING/COOLING COILS			
NO. CFM		RANGE		Max. Pr	RESSURE	LARGE FACE AREA COIL		
			NO.	LOW 2"	MED. 5"	8"-9"	SQ. FT.	H" X W"
				DIA.	DIA.	DIA.		
AH-20-DD	2000	1600-4600	1	DD	DD	DD	5.6	25X32
						14		
AH-60-DD	6000	4000-8200	1			18	13.3	40X48
AH-80-DD	8000	5000-14600	1			24	20.0	48X60
AH-120-DD	12000	8000-25000	1			30	24.0	48X72
AH-150-DD	15000	9000-27000	1			33	30.0	60X72
AH-180-DD	18000	14000-33200	1			36	36.0	72X72
AH-210-DD	21000	16000-40000	1			40	42.0	72X84
AH-240-DD	24000	17400-49800	1			44	48.0	72X96
AH-320-DD	32000	20000-60000	1			49	72.0	96X108
AH-400-DD	40000	30000-65000	1			54	88.0	96X132
AH-480-DD	48000	37000-91000	1			60	104.0	96X156
AH-600-DD	60000	45000-109000	1			66	130.0	120X156
AH-700-DD	70000	55000-130000	1			73	138.3	120X166

	NOMINAL	OFM		STAN SIZE	HEATING/COOLING COILS			
NO. CFM		RANGE		MAX. PR	ESSURE	LARGE FACE AREA COIL		
			NO.	LOW 2"	MED. 5"	8"-9"	SQ. FT.	H" X W"
				DIA.	DIA.	DIA.		
AH-20-PF	2000	1600-4600	1	PF	PF	PF	5.6	25X32
						14		
AH-60-PF	6000	4000-8200	1			18	13.3	40X48
AH-80-PF	8000	5000-14600	1			24	20.0	48X60
AH-120-PF	12000	8000-25000	1			30	24.0	48X72
AH-150-PF	15000	9000-27000	1			33	30.0	60X72
AH-180-PF	18000	14000-33200	1			36	36.0	72X72
AH-210-PF	21000	16000-40000	1			40	42.0	72X84
AH-240-PF	24000	17400-49800	1			44	48.0	72X96
AH-320-PF	32000	20000-60000	1			49	72.0	96X108
AH-400-PF	40000	30000-65000	1			54	88.0	96X132
AH-480-PF	48000	37000-91000	1			60	104.0	96X156
AH-600-PF	60000	45000-109000	1			66	130.0	120X156
AH-700-PF	70000	55000-130000	1			73	138.3	120X166

Explosion-Proof Duct Heaters Option

ULTRA-SAFE

• FM and CSA Approved for virtually all Class I and Class II, Division 1 and 2 hazardous gas or dusty atmospheres

- Ignition temperatures as low as 320°F (160°C)
- Six standard sizes to fit a wide range of ducts with twenty four available sizes
- Ratings up to 240 kW, 600 volts



Series EP2 Explosion Proof Duct Heaters

• FM and CSA Approved for Class I, Division 2 locations where a hazardous gas is occasionally present

- Ignition temperatures as low as 392°F (200°C)
- For ducts up to 240" (610 cm) wide by 120" (305 cm) high
- Ratings up to 1000 kW, 600 volts



Custom Explosion-Proof Duct Heaters

- Wider range of sizes than available in the other two designs
- Vertical airflow
- Ratings up to 750 kW, 600 volts



Explosion-Proof Duct Heaters Comparison Chart

	KW and Control Dange	Class and Division	NEC Ignition	Special Canaidarations
Heater Type	KW and Control Range	Class and Division	Temperature Code	Special Considerations
ULTRA-SAFE For hazardous gas or dust atmospheres. Fits ducts from 12"W x 12"H to 75"W x 35"H.	Up to 240 KW Single stage or SCR Control	Class I, Division 1 and 2, Groups B, C and D Class II, Division 1 and 2, Groups E, F and G	T3C 320⁰F (160ºC)	 Fastest delivery of the three design Available for outdoor or wet location Corrosion resistant construction available Horizontal airflow only Not approved for shipboard use
Series EP2 For Division 2 hazardous gases (hazard exists only occasionally).	Up to 1000 KW Multi-stage or SCR Control	Class I, Division 2 and 2, Groups C and D	T3 392ºF (200ºC)	 Available for outdoor or wet location May be less expensive than ULTRA-SAFE for larger KW Horizontal airflow only Approved for shipboard use
Custom Designed for each project. Not FM or CSA approved.	Up to 750 KW Multi-stage or SCR Control	Class I, Division 1 and 2, Groups C and D Class II, Division 1 and 2, Groups E, F and G	T1 842ºF (450ºC) through T3B 329ºF (165ºC)	 Horizontal or vertical airflow Slip-in or flanged mounting For ducts smaller than 12" x 12" Available for outdoor or wet location

Hazardous locations definitions

The definition of hazardous locations is based on three criteria: The possible presence of an explosive atmosphere such as flammable gases, vapors, or liquids (Class I), combustible dusts (Class II) or ignitable fibers & flyings (Class III); the likelihood that the explosive atmosphere is present when equipment is operating; or the ignition-related properties of the explosive atmosphere that is present.

An area may also be considered "hazardous" for other reasons, such as the use of electrical equipment in the vicinity of water, the risk of personal injury from moving or falling parts, or even the presence of biological hazards.

This approach to classifying hazardous locations is used by the United States (National Electrical Code), Canada (Canadian Electrical Code), Europe (CENELEC EN60079-10) and throughout the world (IEC 60079-10). The hazardous locations information provided on these pages is intended to answer questions associated with U.S., Canadian, IEC and European classified hazardous locations.

While hazards are associated with all of these conditions, areas are only considered hazardous (classified) locations under conditions defined by the NEC, CEC, IEC 60079-10, or CENELEC EN 60079-10, as applicable.

Class I, Division 1 Location

A location (1) in which ignitable concentrations of flammable gases or vapors can exist under normal operating conditions; (2) in which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or (3) in which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors and might also cause simultaneous failure of electrical equipment that could act as a source of ignition.

Class I, Division 2 Location

A location (1) in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; (2) in which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation and might become hazardous through failure or abnormal operation of the ventilating equipment; or (3) that is adjacent to a Class I, Division 1 location and to which ignitable concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air and effective safeguards against ventilation failure are provided. Electrical conduits and their associated enclosures separated from process fluids by a single seal or barrier are classified as a Class I, Division 2 location if the outside of the conduit and enclosures is a nonhazardous (unclassified) location.

Class II location

A location that is hazardous because of the presence of combustible dust.

Class II, Division 1 Location

A location (1) in which combustible dust is in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures; (2) in which mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced and might also provide a source of ignition through simultaneous (the word "simultaneous" is not included in the Canadian definition) failure of electric equipment, operation of protection devices, or from other causes; or (3) in which combustible dusts of an electrically conductive nature may be present in hazardous quantities.

Class II, Division 2 Location (United States)

A location in which combustible dust is not normally in the air in quantities sufficient to produce explosive or ignitable mixtures and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus, but combustible dust may be in suspension in the air as a result of infrequent malfunctioning of handling or processing equipment and where combustible dust accumulations on, in, or in the vicinity of the electrical or may be ignitable by abnormal operation or failure of electrical equipment.

Class II, Division 2 location (Canada)

A location in which combustible dusts are not normally in suspension in air likely to be thrown into suspension by the normal or abnormal operation or the failure of equipment or apparatus in quantities sufficient to produce explosive or ignitable mixtures, but in which:

a) deposits or accumulations of dust may be sufficient to interfere with the safe dissipation of heat from electrical equipment or apparatus; or

b) deposits or accumulations of dust on, in, or near electrical equipment may be ignited by arcs, sparks, or burning material from the electrical equipment.

Group

A classification of flammable materials of similar hazard. Consists of Groups A, B, C, D, E, F, and G to NEC and CEC standards and Groups I, IIA, IIB, and IIC to IEC standards.

Group A

Acetylene Atmospheres

Group B

Atmospheres containing Butadiene, ethylene oxide, propylene oxide, acrolein, or hydrogen (or gases or vapors of equivalent hazard to hydrogen, such as manufactured gas.)

Group C

Atmospheres containing Cyclopropane, ethyl ether, ethylene, hydrogen sulfide, or gases or vapors of equivalent hazard.

Group D

Atmospheres such as acetone, alcohol, ammonia, benzine, benzol, butane, gasoline, hexane, lacquer solvent vapors, methane, naphtha, natural gas, propane, or gases or vapors of equivalent hazard.

Group E

Atmospheres containing combustible metal dusts regardless of resistivity or other combustible dusts of similarly hazardous characteristics having resistivity of less than 102 ohm-centimeter (magnesium, aluminum, bronze powder, etc.)

Group F

Atmospheres containing carbon black, charcoal, coal, coke dusts that have more than 8% total volatile material (coal and coke dusts per ASTM 3175-82) or atmospheres containing these dusts sensitized by other materials so that they present an explosion hazard and having resistivity greater than 102 ohm-centimeter but equal to or less than 108 ohm-centimeter.

Group G

Atmospheres containing combustible dusts (flour, starch, pulverized sugar and cocoa, dairy powders, dried hay, etc.) having resistivity of less than 108 ohm-centimeter or greater.

Zone

The international method of specifying the probability that a location is made hazardous by the presence, or potential presence, of flammable concentrations of gases and vapors. The term Division is used in the United States and Canada.

Zone 0

An area in which an explosive gas-air mixture is continuously present or present for long periods. Equal to a Division 1 hazardous location in the United States and Canadian classifications.

Zone 1

An area in which an explosive gas-air mixture is likely to occur in normal operation. Equal to a Division 1 hazardous location in the United States and Canadian classifications.

Zone 2

An area in which an explosive gas-air mixture is not likely to occur and if it does occur, will only exist for a short time. Equal to a Division 2 hazardous location in the United States and Canadian classifications.

THE EXPLOSION-PROOF FAN

At some point during an engineer's career, he may be confronted with an application which involves an air stream containing one or more potentially explosive components. Now, since we know that there are electrical enclosures which are rated as explosion-proof, and there are motors which are rated as explosion-proof, it is natural to think that it logically follows that there are also fans which are rated as explosion-proof. But **THERE IS NO SUCH THING AS AN EXPLOSION-PROOF FAN**. There are several reasons for this.

A potentially explosive airstream is always in contact with both the interior of the fan housing (or fan guard), and with the fan impeller. An explosion-proof motor is designed such that the interior of the motor is isolated, usually by shaft seals, from contact with the airstream outside.

Since the potentially explosive airstream cannot be isolated from contact with fan components, other methods are necessary to minimize if not eliminate the possibility of igniting the airstream.

AMCA Standard 99-0401 *Classifications of Spark Resistant Construction* was developed to address the question of spark resistant construction, and to give fan purchasers and fan manufacturers a number of options to choose from in the construction of such fans.

Consider the ways in which such ignition might occur as the airstream flows through the fan. Generally, the source of ignition for a contained, potentially explosive airstream is a spark. Sparks may originate in one of two ways.

A static discharge can cause ignition. All that is required is a high enough potential. AMCA 99-0401 provides recommendations for the prevention and possible elimination of the likelihood of such discharge through the use of devices which collect static build-up and drain it to ground, rendering it harmless.

A friction spark can cause ignition. In a fan, the source of the friction spark would be the contact of two components which are capable of producing a friction spark. Principally, this might be contact between the rotating impeller and some fixed component of the fan.

There are many ways of reducing the possibility of a friction spark between fan components. We say "reducing" the possibility of contact because the fan impeller rotates during operation, and there are several ways in which a fixed component of the fan might come into contact with the rotating impeller. If the impeller has a close running clearance, a severe out of balance condition might result in metal-to-metal contact. Likewise, a fan housing is generally designed to withstand internal pressure generated by the fan impeller, but the housing is not usually designed to withstand serious external forces resulting from accidental impact, such as might result from a dropped crate or a fork lift accident. It should be noted that such construction is possible, should the application warrant the additional cost.

Quite often, a high degree of spark resistance can be obtained through the careful selection of materials used for constructing the fan impeller and housing components. Since the generation of a spark requires that at least one material contain iron, one approach is to use a material containing no iron. Such a material might be used for construction of the fixed components of a fan, such as the housing and inlet. The impeller, however, requires a strong material for structural integrity at high speed. The use of a material which contains little or no iron might require that the impeller operate at a lower speed than is needed to generate the required pressure, so sometimes a low or no-iron material is not a good choice for the impeller. Some copper alloys are quite suitable for housing construction and may be "teamed" with a material having the strength suitable for the impeller's mechanical requirements.

In addition to the trade-off of strength for spark resistance, there are a few surprises: Some non-ferrous alloys oxidize in service and become capable of generating a spark by friction. Other non-ferrous materials are prone to build-up and discharge of dangerous static electricity. The choice of materials is one which should always be made with very great care.

AMCA 99-0401 addresses the choice of materials only in terms of ferrous or non-ferrous. It is generally accepted practice that ferrous materials are those whose iron content is 5% or greater. The standard further addresses spark resistance in terms of assembly of fan components. The result is three types of spark resistant construction:

Type A: Offers the highest degree of spark resistance, requiring that the fan components be constructed of 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.

Type B: Offers a medium level of spark resistance, requiring that the impeller be constructed of nonferrous material, and that the fan components be assembled in a manner such as to reduce the possibility of contact between any stationary and rotating component.

Type C: Offers the "entry level" degree of spark resistance construction, requiring that the fan components be assembled in a manner such as to reduce the possibility of contact between any stationary and rotating component.

These classifications were developed in response to equipment users' need for a way to achieve spark resistance for varying degrees of ignition hazard. The specific level of resistance necessary is one which only the purchaser can evaluate. The choice of any level of spark resistance should be determined in consultation with the fan manufacturer. A fan can then be engineered and constructed to meet the required service level.













