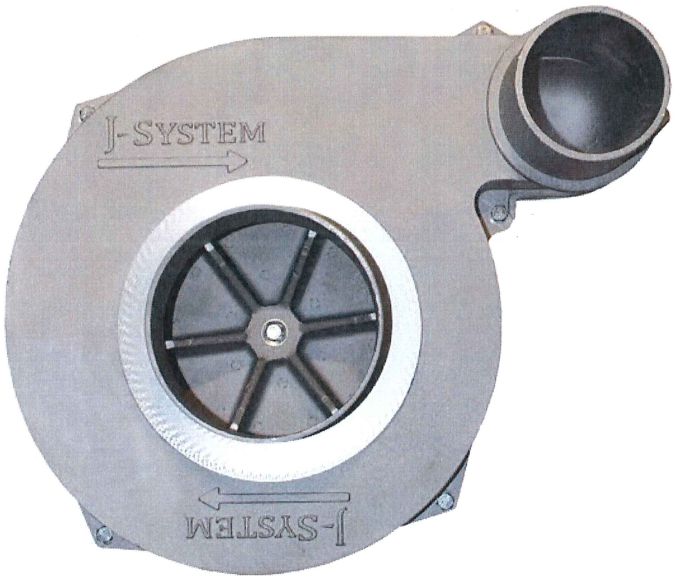
J-System Recirculation, LLC
153 Triangle Drive
Weyers Cave, VA 24486
(540) 234-9036
www.jsystemllc.com

Installation, Operating and Maintenance Manual



ATEX-compliant B9 Blower

To be used only for dispersing phosphine, methyl bromide or sulfuryl fluoride gas as defined by the J-System® Low Air Flow Fumigation Method. All other uses are prohibited.

P/N 569909
Revised 1/2017

TABLE OF CONTENTS

Section A.
INTRODUCTION

1. ATEX and its Directives

The ATEX directive consists of two separate European Union (EU) directives that outline what working environment and type of special equipment are allowed within an environment that contains a potentially explosive atmosphere.

ATEX is an abbreviation that originated from the French title of the title of the EU 94/9/EC directive: Appareils Destinés à être Utilisés en ATmosphères EXplosibles.

J-System Recirculation LLC manufactures the B9 Blower fan in accordance with the ATEX directive. This means: in accordance with the EU workplace Directive 94/9/EC.

EU Directive 94/9/CE, sometimes called ATEX 95, applies to all manufacturers of equipment (and protective systems) intended for use in potentially explosive atmospheres.

In addition, a workplace Directive 1999/92/EC (also known as ATEX 137) applies to all companies where people work in a potentially explosive atmosphere. This directive spells out the minimum requirements for safeguarding the health and safety of workers at risk from explosive atmospheres.

The directive numbers (95 and 137) are the same as the sections of the Treaty establishing the European Community.

In work environments where explosive atmospheres can occur, all hazards must be evaluated and fully documented in accordance with Directive 1999/92/EC. Responsible parties within such companies must create an "Explosion protection document" which contains, among other things, a plan showing the different zones.

When equipment (and protective systems) must be placed within explosive atmosphere zones (Zones 0, 1, 2, 20, 21 and 22), these will need to be built in accordance with Directive 94/9/EC.

Notes:

- Directives must be adhered to by all member states within the European Union.
- Manufacturers may use European standards to prove conformity with the essential requirements of a directive.
- Therefore: Fan manufacturers are not obliged to use the standard EN 14986:2007 "Design of fans working in potentially explosive atmospheres", but by using it within its limits, a presumption of conformity can be made.

2. ATEX Zones, Groups and Categories

Table A

Zone 0	A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapor or mist is present continuously or for long periods or frequently
Zone 1	A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapor or mist is likely to occur in normal operation occasionally.
Zone 2	A place in which an explosive atmosphere consisting of a mixture with air of dangerous substances in the form of gas, vapor or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
Zone 20	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.
Zone 21	A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally
Zone 22	A place in which an explosive atmosphere in the form or a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

In EC Directive 94/9/EG, equipment is divided into differing groups and categories depending on the working environment they will be used in.

J-System Recirculation LLC manufactures the B9 Blower fan, which is intended for use in Group II, Category 2, Zone 1.

Table B

		GROUPI		GROUP II	
	Category M1	Category M2	Category 1	Category 2	Category 3
Protection Level	Very High	High	Very High	High	Normal
Danger from combustible dust particles and/or firedamp	Danger is present	Danger is likely			
Danger from gas, mist, vapor, or air/dust mix					
Required protection	Two independent means or assurance for two faults occurring independently	Also in the case of more severe operating conditions	Two independent means or assurance for two faults occurring independently	Even in the event of frequently occurring faults	Only during normal operating conditions
Use	Surface operations	Surface operations	Dust: Zones 20, 21 & 22	Dust: Zones 21 & 22	Dust: Zone 22

2. ATEX Zones, Groups and Categories (continued)

2a. GROUP I

Fans covered under Group I requirements are designed for use in both subsurface mining and surface installations of such mines. These areas present danger from explosive gases and/or combustible dust. Fans covered under Group I requirements are subdivided into 2 categories, M1 and M2.
Emco Wheaton Retail Corporation does not build or sell fans designed for these categories.

2b. GROUP II

Fans covered under Group II requirements are designed for use in potentially explosive atmospheres excluding those present in those detailed in Group I above.

2c. GROUP II, CATEGORY 1

Fans covered under Category 1 are intended for use in areas in which explosive atmospheres caused by mixtures of air or gases, vapors or mists or by air/dust mixtures are present either continuously, for long periods or frequently.
Emco Wheaton Retail Corporation does not build or sell fans designed for this category.

2d. GROUP II, CATEGORY 2

Fans covered under Category 2 are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists or air/dust mixtures are likely to occur.
Category 2 covers equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and of ensuring a high level of protection.
The means of protection related to equipment of Category 2 ensures the requisite level of protection, even in the event of frequently occurring disturbances or equipment faults which normally have to be taken into account.
Fans covered under Category 2 are suitable for use in Zones 1 and 21 (also Zones 2 and 22).

2e. GROUP II, CATEGORY 3

Fans covered under Category 3 are intended for use in areas in which explosive atmospheres caused by gases, vapors, mists or air/dust mixtures are unlikely to occur, or, if they do occur, are likely to do so infrequently and for a short period only.
Category 3 comprises equipment designed to be capable of functioning in conformity with the operational parameters established by the manufacturer and of ensuring a normal level of protection.
Equipment of category 3 ensures the requisite level of protection during normal operation.
Fans covered under Category 3 are suitable for use in zone 2 and 22.

Section B.
IMPORTANT DATA

1. Flash point

This is the minimum temperature at which, under specified test conditions, a liquid gives off sufficient combustible gas or vapors to ignite momentarily on application of an effective ignition source.

2. Auto-ignition temperature

This is the minimum temperature required to ignite a gas or vapor (air or dust cloud) without a spark or flame (ignition source) being present.

Some examples are shown in the table underneath:

Table C

TYPE OF GAS	Flash Point	Auto-ignition Temperature	LEL (Lower Explosive Limit)	UEL (Upper Explosive Limit)
Acetone	-18 °C (-0.4 °F)	465 °C (869 °F)	2.6%	12.8%
Gasoline	< -40 °C (-40 °F)	246 °C (475 °F)	1.4%	7.6%
Methane	-188 °C (-306 °F)	537 °C (999 °F)	5.0%	15.0%
TYPE OF DUST			**Ignition Temp of Dust Layer (5mm)**	
	Ignition Temp of Dust Cloud		**Glow Temperature**	
Flour	490 °C (914 °F)		340 °C (644 °F)	
Synthetic rubber	450 °C (842 °F)		240 °C (464 °F)	
Zinc	570 °C (1058 °F)		440 °C (824 °F)	

Note: The table above is an example. Certain substances such as flour can become variable according to the specific type.

For dust, two different ignition temperatures need to be controlled: the ignition temperature of a dust cloud and of a dust layer (5mm).

3. Lower and upper explosion limit (LEL & UEL)

These are the limits (expressed in volume % of vapor or gas or grams of dust per m^3) of the "explosion range". This is the range of the concentration of a flammable substance in the air in which an explosion can occur.

If the value is lower than the LEL, the mixture is too poor. If the value is higher than the UEL, the mixture is too rich (in other words: there is not enough O2 present).

4. Temperature Class

The temperature class refers to the maximum surface temperature of the ATEX-compliant equipment.

Table D

Temperature Class	Maximum Surface Temperature
T1	450 °C (842 °F)
T2	300 °C (572 °F)
T3	200 °C (392 °F)
T4	135 °C (275 °F)
T5	100 °C (212 °F)
T6	85 °C (185 °F)

The choice of the temperature class of max surface temperature must be defined so that:

For gas:

- the chosen temperature class must be chosen in relation to the ignition temperature of the gas or vapor.

- in fans of category 2, the temperature class may not exceed 80 % of the ignition temperature. For category 3 fans, this is not the case.

For dust:

- the maximum surface temperature shall be equal or lower than the lowest value of:
  - 2/3 of the ignition temperature of a dust cloud
  - Ignition temperature of dust layer: – 75 °C (-103 °F)

- for dust, one uses the maximum surface temperature as an absolute figure (not temperature class)

5. Explosion Group

Group II, as defined in Chapter 3 above, is divided into explosion groups.

A, B and C are subdivisions according to the Maximum Experimental Safe Gap (MESG), which shows the maximum dimension of an opening so that it still draws enough energy from a flame of the concerned gas or vapor to put it out.

There is a direct relationship with the ignition energy.

Example: The minimum ignition energy (lowest possible value over the explosion range)

H2: 0.01 mJ

CH4:: 0.28 mJ

Section C.
EQUIPMENT INFORMATION

1. Intended usage of the equipment:

The equipment is a blower fan intended for use in dispersing pesticides in the ship holds, barges, corrugated steel tanks, steel welded or bolted tanks, concrete silos, flat storages and bunker storages. The atmosphere within this hold is filled with potentially explosive grain dust and therefore the blower must be manufactured to meet the requirements of EN 14986:2007 Group 2, Category 2 equipment. It is therefore necessary to produce an ignition risk assessment document for inclusion in the technical file. In accordance with the requirements for Category 2 equipment, the assessment has to consider all possible ignition sources that can occur in normal operation of the blower and additionally, those that can become effective as a result of malfunctions expected to occur in service. As the blower fan is not intended to meet the requirements of Category 1, potential ignition sources arising from rare malfunctions can be neglected.

2. Description of the equipment:

The blower fan assembly consists of a two-piece aluminum housing containing an aluminum impeller fan. The fan housing is held together by the following zinc plated steel hardware: (5) 1/4"-20 x 1" bolts, (5) ¼"-20 hex nuts, and (5) ¼" lock washers. The impeller fan is driven by an ATEX, UL and CE-approved ½ horsepower explosion-proof electric motor. The stepped shaft of the motor positively locates the impeller fan via a 1/8" x ¾" steel key, a 1/4"-20 x 0.75" stainless steel bolt [item 7] and a 5/16" stainless steel washer, and Loctite® 242 thread sealant. The electric motor is securely attached to the fan housing via (4) 3/8"-16 x 1" socket head, stainless steel screws. Both halves of the fan assembly are sealed with clear RTV high-temperature silicone sealant.

3. Shipping Instructions

Ship upright in original packaging as sent from J-System Recirculation LLC. Do not stack above three (3) units high.

4. Storage Instructions

Unit must be stored in a cool, dry place.

5. Fan Erection and Commissioning

a. General installation notes and information:
Mount fan securely in desired location, then connect motor wiring to wiring on site. Re-check mounting and wiring prior to operation.

b. Grounding: Insure the fan housing is grounded properly to the ground area.

c. Pre-commissioning checks:
Double-check fan assembly for bolt tightness, correct wiring and proper rotation.

6. Operation and maintenance

a. Health and safety: Only authorized personnel, using appropriate personal protective equipment, should perform fan mounting and electrical wiring.

b. No maintenance is required for this fan assembly.

c. No user-serviceable components are inside this assembly. When blower malfunctions, it must be removed from service, discarded, and a new fan assembly installed in its place.

d. Sub-suppliers of this blower assembly are as follows:

    Motor: Shenyang Daming Motor Co., Ltd.
    Blower: J-System Recirculation, LLC

e. Fan application category according to ISO 14694 is BV-3.

f. Fan housing is substantially leak-proof after final assembly.

g. Required clearance for material pairings: This fan assembly is designed with a specified minimum internal clearance of 2 mm, and is a fully sealed unit.

h. Care must be taken that small rocks, debris, iron dust, particles of rust scale etc. are not allowed into the fan housing.

i. Routine inspections, service and cleaning:
Perform inspection of fan housing and motor every six (6) months. Closely observe operation of fan. Unexpected noise, temperatures and vibrations should especially be taken into account. If there are noticeable problems, the fan shall be taken out of service and replaced.

j. Spare parts: No spare parts are offered by the motor manufacturer or the fan manufacturer.

7. B9 Blower performance data

B9 Blower Performance Data	August 16, 2010	
	ID	Area (sq. in.)
Discharge	3.46	9.40
Inlet	5.46	23.41
Static Pressure (inches of H2O)	CFM (60Hz)	CFM (50Hz)
0	522	435
0.7	522	435
1	520	433
1.5	505	421
2	480	400
2.5	446	371
3	408	340
3.5	372	310
4	340	283