



A guide to the correct application of fans with Explosion Proof Motors

In compliance with ATEX-100 Directive 94/9/EC

Installation and Maintenance Guide

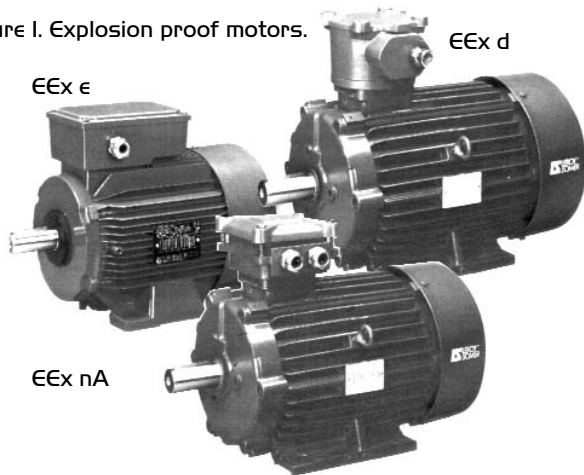


Overview

The ATEX directive refers to the design, application, installation and maintenance of motors for potentially explosive atmospheres. In this particular instance, the use of motors in fan products intended for use in such atmospheres.

The directive is mandatory as of 1st July 2003 and in order that full compliance is met specific requirements are required of the manufacturer, the installer and the end user.

Figure 1. Explosion proof motors.



Nuaire have taken all necessary due care to ensure compliance of products relevant. This document, when read in conjunction with the product standard Installation and Maintenance (I&M) document, provides the necessary information to enable both supplier and installer to meet their obligations under the ATEX-100 Directive 94/9/EC.

Products affected

The AXUS range of Axial flow fans.

Long Cased Axial	Data sheet 671054
Bifurcated Axial	Data sheet 671055
High temperature Axial	Data sheet 671156
Smoke extract - In duct	"
Smoke extract - in duct contra rotating	"
Smoke extract - In duct run & standby	"
Smoke extract - Roof mounted	Data sheet 671063

Before an enquiry or order is accepted for any product requiring compliance with ATEX-100 directive 94/9/EC, confirmation of the risk assessment of significant

environmental hazards having been completed is required. This confirmation is held in the project file, together with certificates of conformance relevant to bought in items e.g. motor.

Upon completion of manufacture the product will have been the subject of functionality and compliance testing and a test certificate produced, a copy of the test certificate is also held in the project file. Copies of all documentation will be supplied with the fan and it is the purchaser's responsibility to ensure they are presented to the end user.

Upon delivery and prior to commencing installation it is incumbent on the installer to ensure that the product complies with the specified environmental risk by comparing the groups and categories laid down for the area against that shown on the fan rating label.

Figure 2. Typical product identification and rating label.

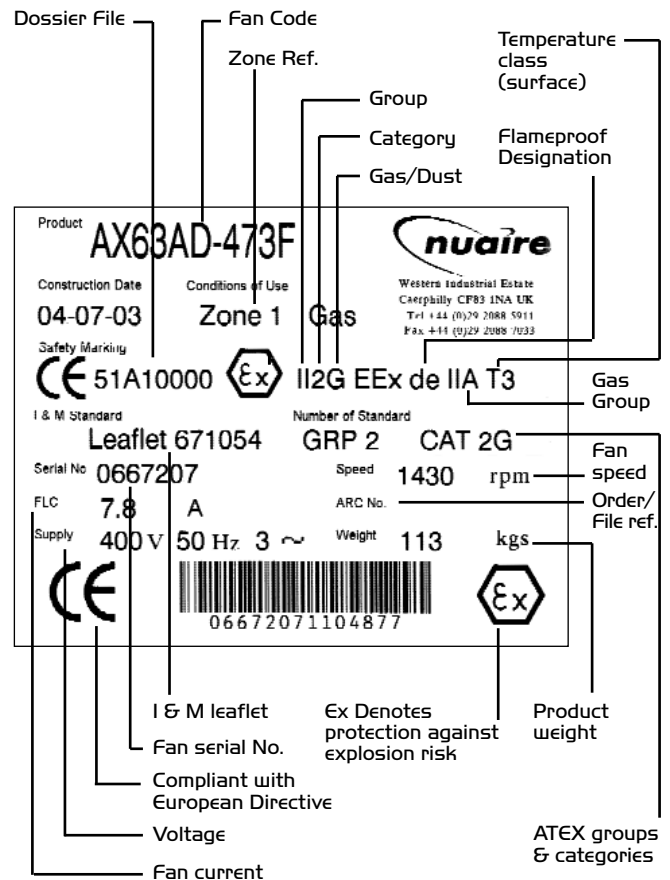


Figure 3.
Typical motor rating label and definition of symbols used.

Line 1.		Line 2.	
MOT	= 3 Phase A.C. motor	No.	= Batch No.
FLSD	= FLSD range	M*	= Production year/*L = 2002/*L = 2001, M = 2002
225	= Frame size regreasing	A • •	= Production month (January)**A = January,
M	= Housing symbol	A	= February
CE	= Compliant with European Directive	O22	= Serial No.
O080	= INERIS I.D. No.	kg	= weight

Line 3.		Line 4.	
IP55	= Protection index	V	= Supply voltage
I cl. F	= Insulation class F	Hz	= Supply frequency
40°C	= Max ambient operation temperature	min ⁻¹	= Revolutions per minute
SI.%	= Duty operating factor	kW	= Rated power output
...d/h	= NO. cycles per hour	cos φ	= Power factor
		A	= Rated current

Line 5/6.	
Ex symbol	= Denotes protection against explosion risk
EEEx	= Denotes switchgear designed for potential explosive atmospheres
d	= Protection type
II	= Explosion group
B	= Gas sub-division
T4	= Temperature class
INERIS	= Notified body
OIATEX000IX	= EC-type examination certificate No.

Bearings	
DE	= Drive end bearings
NDE	= Non drive end bearings
23cm ³	= Amount of grease at each regreasing (in cms ³)
8300 h	= Regreasing interval
UNIVEX N3	= Type of grease

△ / Λ = Connection symbol

A duplicate motor rating label is affixed to the outside of the fan product adjacent to the product rating label.

Installation

Installation must be completed by competent and suitably qualified persons, in accordance with good industry practice and should conform to all governing and statutory bodies i.e. IEE, HVCA, CIBSE, COSHE, ATEX, BSI & EN standards etc.

Installation procedure will be generally as detailed in the standard I&M document with the following additional requirements, necessary to conform with the ATEX directive.

Mechanical

Prior to installation and as part of the regular routine maintenance programme, referring to the rating label and test certificate, complete the following checks:

Mechanical pre installation checks ✓

Overall structural integrity	<input type="checkbox"/>	Impeller rotational freedom	<input type="checkbox"/>
Impeller tip clearance	<input type="checkbox"/>	Impeller balance weights	<input type="checkbox"/>
Torque settings of blade bolts	<input type="checkbox"/>	Torque settings of motor feet bolts	<input type="checkbox"/>
Torque settings and impeller security	<input type="checkbox"/>	Torque set of motor support brackets	<input type="checkbox"/>
Security of anti spark ring	<input type="checkbox"/>	Security of inlet/outlet guards	<input type="checkbox"/>

Any damages or deviations should be immediately reported to NUAIRE Ltd quoting the order and product details from the identification/rating plate.

Ensure that any ancillary equipment used during installation e.g. flexible duct connections, silencers, shutters, isolator etc. are also compliant and are the subject of similar checks.

Electrical

The hazard group identified from the customer/specifier environmental risk assessment carried out at pre order stage dictates the motor type, and therefore its mode of electrical connection. Prior to installation and as part of the regular routine maintenance programme, referring to the rating labels and test certificate, complete the following checks:

Electrical pre installation checks ✓

Structural integrity of pre installed motor wires	<input type="checkbox"/>	Structural integrity of termination/glanding box	<input type="checkbox"/>
Insulation and continuity of pre installed wires	<input type="checkbox"/>	Motor insulation and winding resistance	<input type="checkbox"/>
Ensure conductor cross section is appropriate to fan loading	<input type="checkbox"/>	Ascertain motor winding configuration e.g. STAR, DELTA, 2 Speed etc.	<input type="checkbox"/>
Correct thermal protection if appropriate	<input type="checkbox"/>	Selection of correct cable glands	<input type="checkbox"/>

Fans with explosion proof motors are not supplied with external termination boxes, it is the installers responsibility to connect directly to the motor termination box with the correct cable and gland and giving due consideration to accessibility when the fan is being sited.

It is essential, in order that the level of protection is maintained and the flameproof properties of the motor are not compromised, that the correct cable glands, type and size are used.

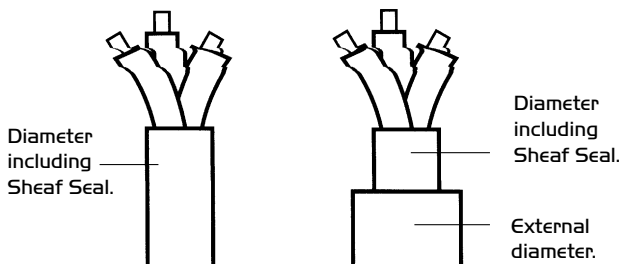
Cable glanding specifications

EXD motor	ADE IF non armoured cable
	ADE 3P for armoured cable

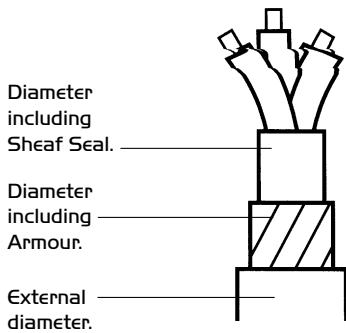
Typical glanding arrangements

The sheath seal diameter of the cable must correspond to a permissible diameter of the gland, the sheath diameter is compressed by the gland ring thus creating the flameproof seal.

Figure 4. Typical glanding arrangements.
Non Armoured Cable (Gland Type ADE I F).



Armoured Cable (Gland Type ADE 3 F).



- **Ensure selection of cable and glands is appropriate to the standard**
- **Ensure local isolator is appropriate to the standard**
- **When the connection is complete and before switching on, ensure no solid object can be drawn to the fan, turn power on and complete the following**

Mechanical & electrical load checks ✓

Correct rotational direction (on both speeds of a two speed motor)	<input type="checkbox"/>	Monitor noise and vibration	<input type="checkbox"/>
Check and record supply voltage	<input type="checkbox"/>	Check and record full load current	<input type="checkbox"/>
Check and record starting current	<input type="checkbox"/>		

Air-balance and commission the system to an industry standard.

Speed control

Explosion proof motors are only speed controllable by way of a matched inverter variable speed drive. If intending to use such a drive it is critical to state this at design stage so that the motor can be manufactured with the appropriate thermistors fitted. The thermistors must be connected to a matching trip relay device in order to afford the required motor protection and isolation before the external surface temperature reaches its T class.

Figure 5. EEx d Type explosion proof motor.



Maintenance

Only appropriately qualified personnel, familiar not only with the electrical aspect of the work but trained and authorised in the dangers and hazards of the zone, must carry out maintenance of electrical equipment in explosion risk zones.

Induction motors, by their very nature require minimal maintenance. However a regular regime of inspection is recommended to ensure that minor problems do not escalate into critical breakdowns.

Typical maintenance intervals would be one thousand operating hours or three months from commissioning whichever is the sooner and six monthly thereafter, unless site conditions dictate otherwise.

The maintenance programme must conform to 'good custom and practice' and to the published recommendations of associations such as the HVCA, CIBSE, ECA and BRECSU. The HVCA's publication 'Standard Maintenance Specification for Mechanical Services in Buildings' Volume 2 Ventilating and Air Conditioning is a recommended reference.

Reference to the product rating plates, data sheet and the original test certificate is also recommended.

The advice given in the product I&Ms must be observed but in addition, and to conform with the ATEX directive, consider the following maintenance record/check list on page 4 as typical of the items to be covered.

Maintenance record/check list

Product Code: _____ Product Serial No: _____

Mechanical Item	Check/record	Check/record	Electrical/operational item
Structural integrity of case, flange fixing bolts, mounting feet, Avs etc.	<input type="checkbox"/>	Tension of impeller hub ring bolts.	<input type="checkbox"/>
Structural integrity of motor, wiring terminations and glanding box.	<input type="checkbox"/>	Impeller tip clearance.	<input type="checkbox"/>
Tension of motor fixing bolts.	<input type="checkbox"/>	Security of anti spark ring.	<input type="checkbox"/>
Structural integrity of motor support bracketry.	<input type="checkbox"/>	Inspect impeller for impact damage.	<input type="checkbox"/>
Tension of motor bracket bolts.	<input type="checkbox"/>	Minimum 5mm clearance between impeller and fixed component.	<input type="checkbox"/>
Blade/case tip clearance.	<input type="checkbox"/>	General cleanliness – remove excess dirt and debris.	<input type="checkbox"/>
Impeller to shaft security.	<input type="checkbox"/>	Security and integrity of inlet/outlet guards.	<input type="checkbox"/>
Security of impeller balance weights.	<input type="checkbox"/>	*Greasing.	<input type="checkbox"/>
			Structured integrity of installed wiring, local isolator etc.
			Insulation and continuity of installed field wiring.
			Check and record motor winding resistance.
			Check and record motor winding insulation.
			Check and record starting current.
			Check and record full load current.
			Check and record supply voltage.
			Monitor noise and vibration.

*Lubrication

Not all motors are provided with re greasing facilities, the rating plate will advise greasing frequency, type and quantity of grease to use.

Repairs

In order to maintain the level of protection, only authorised repair agents are allowed to dismantle and repair motors designed for use in explosion risk zones, any repair or replacement must result in the reinstatement of an identical device.

Table of torque settings

Bolt size	Torque Nm	Bolt size	Torque Nm
M4	3.0	M10	49.0
M5	5.9	M12	85.0
M6	10.0	M16	210.0
M8	25.0	M20	300.0

Other useful references

EN50014 & BS5501 part 1	The general rules on the selection and use of flameproof motors.
EN50018 & BS5501 part 5	The rules for flameproof motor type 'd' (EEEx d motors).
EN50019 & BS5501 part 6	The rules for increased safety motor type 'e' (EEEx e motors).
EN660079-10	Definition of Zones where explosive atmospheres may appear.
EN60079-14	Selection of equipment by Zone.
NFC23.514 & EN50014	Standards relevant to Zone I equipment.
BS5000 part 16 & IEC79.15	Standards relevant to Zone 2 equipment.

CERTIFICATE OF CONFORMANCE with ATEX DIRECTIVE 94/9/EC

WE declare that the following fan product has been manufactured for use in a hazardous atmosphere installation of the type fully described by the customer/end user in his 'Hazardous Area Risk Assessment'. And is in conformance with the dossier ref ATEX T429 held at SIRA for Zone I products and dossier ref QA ATEX held at Nuair for Zone 2 products.

We further declare that the material used in manufacture is fully compliant with ATEX Directive 94/9/EC to meet the conditions previously described. All supportive documentation is attached for issue to our customer and onward issue to the end user.



Supportive Documentation:

- Customer's hazardous risk assessment
- Certificates of conformance relative to procured items used
- Product/ATEX Guide 671213
- Product range installation and maintenance instructions
- Vital check list/test certificate

Designation of machinery:

Product Code: _____ Serial Number: _____

Signature of manufacturer representative:

Name		Position
Date		
C J Biggs 1st August 2003		Technical Director
W Glover 1st August 2003		Manufacturing Director

This certificate is in addition to 'Declaration of Incorporation' and 'CE Declaration of Conformity' and applies to products for use in potentially hazardous atmospheres only.

