Comparing ATEX and Ex-Proof Classifications

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ATEX and ex-proof classifications help manufacturers select and install equipment for potentially explosive atmospheres. ATEX is used in Europe, whereas ex-proof is used in North America and Canada.

The process environment and properties of any materials that will be present need to be ascertained. This is so the ignition risk of any gas and dust atmospheres can be classified and the appropriate preventative steps taken.

ATEX

The ATEX directive uses zones to classify potentially explosive gas and dust atmospheres. Classifications range from an ignitable condition being an unlikely occurrence (Zones 2 and 22) to continuously present (Zones 0 and 20).

> Gas / Vapour / Mist: Zone 0, Zone 1, Zone 2
> Powder / Dust: Zone 20, Zone 21, Zone 22

Ex-Proof

Ex-proof uses classes (1 and 2) to distinguish between explosive gas and dust atmospheres. Subdivisions are then used to categorise the type of gas (A, B, C, D) and dust (E, F, G). For milling and grinding applications, the most common subdivision is G as this covers food / grain and general dusts.

To assess the likelihood of an ignitable concentration being present, the classes are allocated a division (1 or 2 – see below).

> Gas / Vapour / Mist: Class 1 (A, B, C, D)
> Powder / Dust: Class 2 (E, F, G)

> Ignitable Conditions present 10-1000 hrs per year: Division 1
> Ignitable Conditions present <10 hrs per year: Division 2

ATEX and Ex-Proof Compared

Gas	Dust	Zone Definition	Equipment Category	Protection Method
Zone 0	Zone 20	Explosive atmosphere is present continuously, for long periods or frequently (10-1000 hours per year).	1	Equipment m be safe under normal opera expected and malfunction.
Class 1 Division 1	Class 2 Division 1			
Zone 1	Zone 21	Explosive atmosphere is likely to occur occasionally under normal operation (10-1000 hours per year).	2	Equipment m be safe under normal opera expected malfunction.
Class 1 Division 1	Class 2 Division 1			
Zone 2	Zone 22	Explosive atmosphere may occur under abnormal operation and only persists for a short period (<10 hours per year).	3	Equipment m be safe under normal opera
Class 1 Division 2	Class 2 Division 2			

Ignition Sources

A flammable gas or dust atmosphere requires an ignition source to cause an explosion. Effective ignition sources include:

> Mechanically generated impact sparks
> Mechanically generated friction sparks
> Electric sparks
> High surface temperature (e.g. resulting from milling and grinding)
> Electrostatic discharge

NEMA and IP Ratings

Electrical enclosures in ATEX and ex-proof environments also need to be rated to a standard that makes them safe to use. National Electrical Manufacturers Association (NEMA) and Ingress Protection (IP) grades enclosures used in industrial applications.

An IP rating (used in Europe) considers only protection against ingress of solid foreign objects and ingress of water, while NEMA ratings (used in North America) consider these and other specifics such as corrosion and construction details. Therefore it is not possible to exactly compare the two ratings. The most common IP and NEMA ratings for milling and grinding applications are listed below.

> **NEMA 3S / IP54**: A degree of protection against dust and water sprayed from all directions.
> **NEMA 4X / IP66**: Total protection against ingress of dust and strong jets of water.
> **NEMA 7**: Designed to contain an internal explosion without causing a hazard. Intended for use in Class 1 Division 1 / Zone 0 / Zone 1.
> **NEMA 9**: Prevents dust from entering and possible heat generating devices from heating the enclosures surfaces to a level that may cause combustion of surrounding dust.

Purge System

Compressed air of inert gas is allowed into the enclosure to remove the conditions for a possible explosion. The enclosure is at positive pressure allowing the flow of purge air/gas into the enclosure, while ensuring the air/gas in the atmosphere cannot enter.

Typically, nitrogen is used as the purging gas but other options are available which include carbon dioxide (although not fully inert), argon and helium.