



# SAFETY COMPLIANCE IN HAZARDOUS ENVIRONMENTS

ATEX WEIGHING GUIDE



# Introduction

*A buyers guide to weighing in hazardous environments*

**Avery Weigh-Tronix**

**For manufacturing and processing companies operating in hazardous environments, the risk of major incidents resulting in loss of property or life pose a very real threat. Negligence, purposeful or otherwise, can result in fines or even imprisonment if something goes wrong.**

These risks can be mitigated with a better awareness of the dangers associated within hazardous environments, as well as choosing the right equipment.

Having accurate weighing equipment is a critical part of many processes. But choosing the right weighing solution to meet specific process requirements as well as the regulations for working in hazardous areas can be a challenging task.

Rules and regulations are continually changing and standards are becoming tougher, with production areas once considered non-hazardous becoming reclassified and making older weighing equipment obsolete.

Read this guide to discover:

- › The dangers involved in operating in hazardous environments and how easy it can be to create an explosion from dust or gas
- › An overview of the standards and regulations in place to ensure safety in hazardous environments
- › Hazardous area classifications and zones
- › Guidance on creating a compliant working environment
- › A guide to choosing safe, ATEX approved weighing equipment for your business

# ATEX and Weighing

*A buyers guide to weighing in hazardous environments*

## The dangers of operating in hazardous environments

An **explosive atmosphere** is created when a mixture of the following three components combine:

- Combustible material
- Ignition source
- Oxygen

### **Combustible material**

Most manufacturing and processing industries will create potentially explosive atmospheres by using flammable or explosive substances including flammable gases or vapours, flammable liquids, combustible dusts or ignitable fibres.

### **Ignition source**

An ignition source doesn't need to be a spark. Ignition sources could include hot surfaces (resulting from an equipment fault), mechanically generated sparks or static electricity, all commonly found within manufacturing and processing environments.

### **Oxygen**

Without the presence of oxygen, combustion is not possible.





To eliminate the risk of explosion, one of the three elements of the combustion triangle must be removed.

*Explosions are not exclusive to oil refineries and chemical plants. Most microfine dust particles can become statically charged in the air, then ignite from a spark generated in the normal workings of electronic equipment including weighing scales, measuring or filling equipment.*

## Standards and regulations

Safety is crucial for businesses that operate in potentially explosive environments. Standards and regulations play an important role in these hazardous manufacturing environments by specifying the framework of conditions that guide both equipment manufacturers and operators to ensure safety in production.

Both manufacturers and users have a responsibility when it comes to equipment in explosive environments. The ATEX Directive is a mandatory legal directive which has set out a level of safety across countries within the European Community (EC). Since 2006, ALL equipment for use within potentially explosive atmospheres has had to meet ATEX standards unless the user could prove safety, documented by risk assessment and sign to take responsibility.

The ATEX Directive describes the equipment and the work environment acceptable within an explosive atmosphere and is split into two parts:

- › **Use Directive – ATEX 1999/92/EC**

Places a legal obligation on businesses to ensure the safety of all employees working in or near potentially explosive areas.

- › **Equipment and protective systems Directive – ATEX 2014/34/EU**

Equipment manufacturers have to produce their equipment in line with the requirements of this directive and the applicable construction standards.

The legislation applies to any hazardous area below ground, on the surface and on offshore fixed facilities. This could include a filling line in a chemical plant, a formulation system in a pharmaceutical factory or a designated area for volatile liquids, solvents and paints.



## The ATEX Use Directive 1999/92/EC

The ATEX Use Directive 1999/92/EC applies to employers and sets out the minimum requirement for improving the safety and health protection of workers potentially at risk from explosive atmospheres.

As a minimum requirement, employers must;

- › Work with the guidelines to prevent and protect their employees against explosions
- › Carry out a risk assessment of explosion risks present within the workplace
- › Ensure safe working conditions for employees, including providing employees with instructions, training, supervision and appropriate equipment
- › Classify areas where explosive atmospheres may occur into 'Zones'

## The ATEX equipment and protective systems Directive 2014/34/EU

The ATEX equipment and protective systems Directive applies to the manufacture and distribution of equipment for use in potentially explosive atmospheres. It came into force on the 20th April 2016, immediately replacing the previous version 94/9/EC.

Adhering to the directive when manufacturing equipment should eliminate or minimise the risks resulting from using the specified equipment in potentially explosive atmospheres.

It is the equipment manufacturer's responsibility to ensure the equipment produced and certified for use in potentially explosive atmospheres complies with the scope of the directive.

***ATEX stands for 'atmosphere explosibles', which is the French term for 'potentially explosive atmosphere'***



***Processing industries, including petrochemical, chemical, food and pharmaceutical are typical industries which might include both gas and dust laden atmospheres.***

# Know your zones

## *Hazardous area classification zones*

All businesses must undertake a full risk assessment to ensure that work in potentially explosive areas is carried out safely.

This must be documented and regularly updated to demonstrate that the equipment and working environment and practices are designed, operated and maintained correctly.

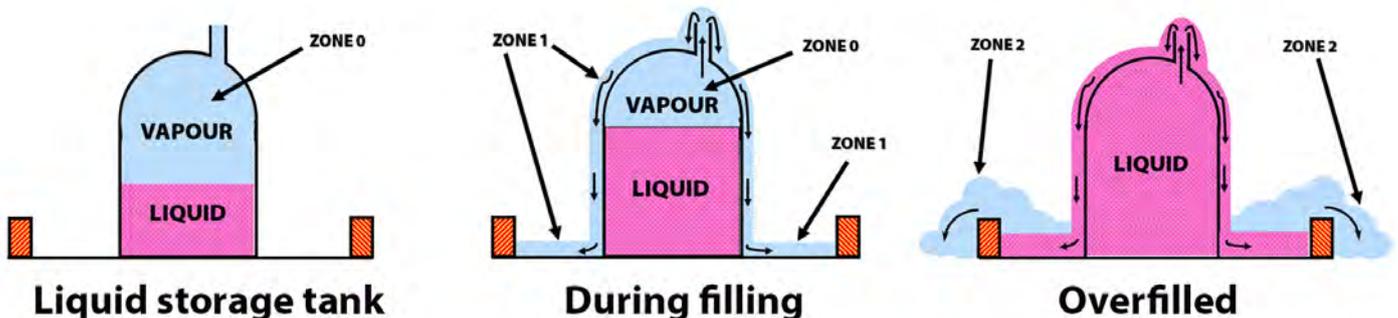
Part of the risk assessment includes classifying the areas where explosive atmospheres may occur into Zones.

This classification is extremely important as it will determine the selection of the electrical equipment used so as to minimise risk.

Area classification is a serious and complicated issue and should only be carried out by a competent body.



### **Zone classification example**



## Know your Zones

Hazardous zone classifications are split between gas and dust;

### Gas

Gas groups fall under three hazard categories for surface industries with different eases of ignition:

- › Group IIA – e.g. propane and ammonia (least easily ignited)
- › Group IIB – e.g. ethylene and propanol
- › Group IIC – e.g. hydrogen and acetylene (most easily ignited)

Group IIA gases require a relatively large ignition energy and are flammable over a narrow gas/air concentration, whereas IIC gases only require a small amount of ignition energy and remain flammable over a large range of gas/air concentration.

### Dust

Dust was formally added to the ATEX guidelines in 2003. When solid objects are processed in industrial environments, small particles present in the environment can form dust or dust clouds. Approximately 70-75% of dusts are explosive, and they differ from gases as dust clouds last longer.

Bulk powder handling, milling or sanding processes can generate fine dust like wood chips or sintered metal particles. While within food and pharmaceutical production, dust from dry ingredients can generate a substantial potential hazard. Other industries where combustible dust is present include the manufacture of textiles, plastics, resins and bio-solids.

	Zone classification	Probability of hazard being present	ATEX category	EPL
Gas	Zone 0	Continuous	1G	Ga
	Zone 1	Primary emissions (10-1,000 hours p/a)	2G	Gb
	Zone 2	Secondary emissions (<10 hours p/a)	3G	Gc
Dust	Zone 20	Continuous	1D	Da
	Zone 21	Primary emissions (10-1,000 hours p/a)	2D	Db
	Zone 22	Secondary emissions (<10 hours p/a)	3D	Dc

**All equipment must be correctly selected and suitable for the zone it is to be operated in.**

# Weighing in hazardous environments

## Weigh up your options

Whether you're filling, dosing or batching, weighing plays an important part in many manufacturing processes and it requires special attention when conducted in hazardous areas. It is crucial the weighing equipment used in processes has an appropriate level of safety for the environment its being used in.

To prevent any ignition and provide safe operation of electrical weighing systems in hazardous areas, one possibility is limiting energy outputs to safe levels. To achieve low energy and prevent ignition, the main components of weighing systems, such as load cells, junction boxes and weighing terminals are designed for intrinsic safety.

Intrinsically safe technology prevents explosions by ensuring that the energy in intrinsically safe circuits is well below the energy required to ignite a flammable mixture.

## Avery Weigh-Tronix weighing solutions for hazardous environments

Harsh, potentially explosive environments require safe and compliant weighing equipment. Intrinsically safe weighing equipment is the safest method of weighing in hazardous environments as, by design, it eliminates heat and sparks from the weighing equipment in the production area.

When purchasing ATEX approved weighing equipment, ask your supplier to produce the appropriate certification to prove that it meets the series of stringent assessment criteria. This includes the equipment design and specification, documentation of the manufacturing process and supply chain traceability.

Any equipment purchased should not simply be manufactured to ATEX standards, but also should interface with other products and systems used in the hazardous area, to guarantee the entire installation is safe.

Avery Weigh-Tronix offers a range of highly accurate, intrinsically safe weighing equipment with full ATEX approval for operating in Zones 1/21 and 2/22, including;

- › High precision bench scales
- › Mobile and static floor scales
- › Accessories including portable battery packs and safe area battery chargers

## Trust the experts

Due to the hazardous nature of working in ATEX environments, weighing equipment should be installed and serviced by experts. Avery Weigh-Tronix service technicians hold accreditations for working in hazardous and potentially explosive environments and receive specialist ATEX training at regular intervals.

Site dedicated ATEX technicians get to know your operation and equipment, which minimises the need for site inductions, and ensures installations, calibrations and preventative maintenance visits are carried out with optimum safety.

## 7 steps to effective risk management in hazardous environments

If you're operating in hazardous environments, following these 7 steps can help you limit the risk factors;

1. Have you prevented the formation of a potentially explosive atmosphere by eliminating ignition sources where possible?
2. Have you checked your equipment is certified for use in potentially explosive atmospheres and complies with the scope of the UK standards and regulations?
3. Have you analysed and classified your environment into the correct zones to aid the proper selection of electrical equipment and to limit the risk associated with the installation?
4. Have you got the correct ignition protection methods in place to ensure the energy transferred to a hazardous area is below the energy required to ignite hazardous gas/dust?
5. Do your weighing system components have intrinsically safe technology to prevent explosion?
6. Has your weighing system been installed and calibrated by an accredited technician who knows the dangers of working in hazardous and potentially explosive environments?
7. Have you limited the negative effects of equipment downtime (such as stopping production, interrupting process flow or holding onto hazardous materials) by choosing an all-inclusive support contract that guarantees uptime from a specialised ATEX supplier?

*View our range of ATEX approved weighing equipment at [averyweigh-tronix.com/atex-uk](https://averyweigh-tronix.com/atex-uk)*





# Avery Weigh-Tronix

[www.averyweigh-tronix.com](http://www.averyweigh-tronix.com)

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