

ATEX AND ABRASIVE BLASTING EQUIPMENT

WHAT IS ATEX, AND WHY IS IT REQUIRED?

The ATEX directive is a European law that covers equipment and Protective systems intended for use in potentially explosive atmospheres. Customers classify their work area and need to use equipment that is appropriately rated for that location.

WITH WHAT ATEX STANDARDS DOES THE EQUIPMENT COMPLY?

The equipment is in conformity with the relevant EU harmonization legislation 2014/34/EU and complies with the following harmonized standards:

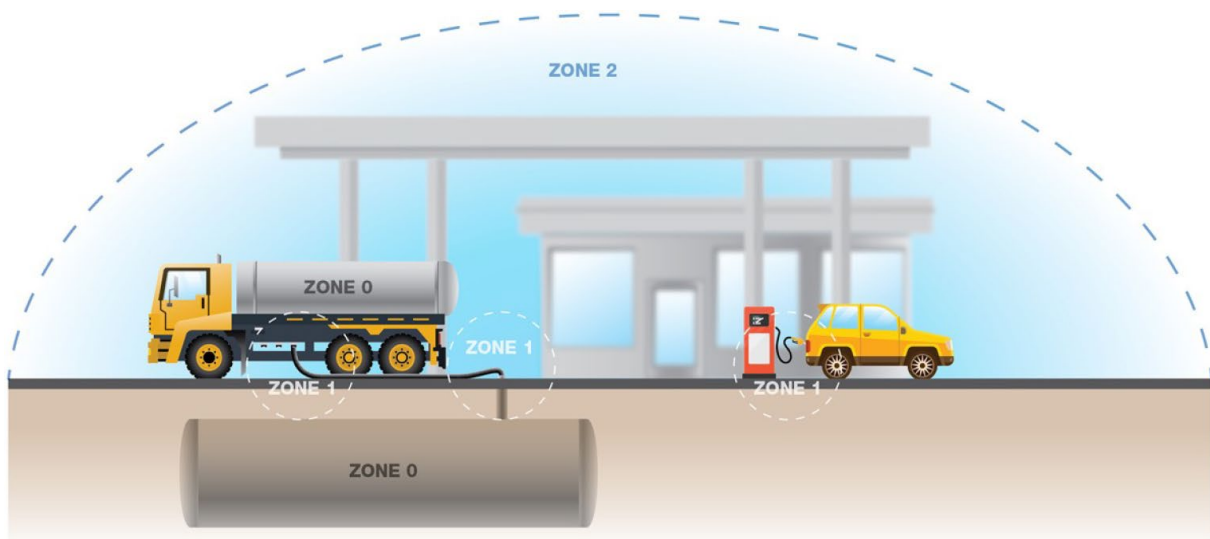
- EN ISO 80079-36:2016
- EN ISO 80079-37:2016
- EN 1127-1:2019

The technical documentation of the ATEX equipment is filed at DNV Product Assurance AS with Notified Body no. 2460.

WHERE IS THE GRITCO ATEX EQUIPMENT APPROVED FOR USE?

The equipment has been approved for use in the gas atmosphere classification Zone 1 and Zone 2 and in the dust atmosphere classification Zone 21 and Zone 22 (according to directive 1999/92/EC). This means the equipment is approved to be used in an area where an explosive atmosphere may occasionally be present during normal operation. This means that flammable substances such as gases, vapours, mists, or dust can sometimes accumulate in sufficient concentrations in the air to cause an explosion if there is an ignition source.


The below figure gives an understanding of the differences between the area classifications.




Area classification example

WHAT DO THE ATEX MARKINGS MEAN ON THE EQUIPMENT?

There are two markings on the Gritco ATEX equipment that refer to use in a **G**as atmosphere (Zone 1 and Zone 2) and in a **D**ust atmosphere (Zone 21 and Zone 22).

	II	2 G	Ex h	IIA	T3
EU mark for products used in potentially explosive areas	Device group II: Industry	Device category: 2 Atmosphere: Gas can be used in ATEX Zone 1 or Zone 2	Protection method h = mechanically protected (read manual)	Gas group: IIA Gases with a minimum ignition energy of 200µJ Examples: propane, butane, ethane, petrol	Device temperature class: T3 Surface temperature 200°C

	II	2 D	Ex h	IIIC	T135°C
EU mark for products used in potentially explosive areas	Device group II: Industry	Device category: 2 Atmosphere: Dust can be used in ATEX Zone 21 or Zone 22	Protection method h = mechanically protected (read manual)	Dust group: IIIC Conductive solids < 0.5mm	Surface temperature: 135°C

DOES THE WHOLE SYSTEM HAVE ATEX APPROVAL OR JUST THE COMPONENTS?

The Gritco ATEX equipment as a whole has ATEX approval. This means the blast machine complete with the supplied blast hose package and nozzle. Another type of hose package or nozzle can make the approval void.

DOES THE EQUIPMENT REALLY REACH THE MENTIONED SURFACE TEMPERATURES?

The equipment will not reach these temperatures during normal operation. The highest temperature can be achieved in a runaway condition with the water pump running dry. The maximum temperature the optional pump unit will reach is 135°C (275°F).

WHAT IS DIFFERENT ABOUT THE GRITCO ATEX MACHINES COMPARED TO THE STANDARD ONES?

The equipment was assessed according to a risk inventory and evaluation described in NEN-EN 15198 and based on NEN-EN-ISO 80079-36/37. This assumed the probability of hot surfaces, discharge of static electricity and mechanically reprocessed ignition sources as well as adiabatic compression. Design changes have been made to the ATEX blast machine and accompanying hose package and nozzle. Together with extra (grounding) measures as described in the manual, this will avoid the potential ignition sources.

HOW TO GROUND THE EQUIPMENT AND AVOID STATIC ELECTRICITY RISKS?

A significant potential ignition hazard during abrasive blasting is the generation and accumulation of enough static electricity to produce an incendiary spark. The static electricity is generated by abrasive flowing through the machine, hose and nozzle and striking the substrate.

The Gritco ATEX equipment is already constructed with a conductive nozzle, nozzle holder, blast hose and couplings to ensure proper electrical bonding to the blast machine. The machine itself needs to be connected to an earth point as described in the manual's grounding instructions. Also, the object should be connected to the same earth point.

IS THE GRITCO ATEX EQUIPMENT NON-SPARKING IN USE?

The Gritco ATEX equipment has been approved for use in area classifications Zone 1 & Zone 2 and Zone 21 and Zone 22. Gritco does not claim the use of the equipment is non-sparking. In some cases, the abrasive striking against the substrate can cause sparks. It is important to realize that not all kinetic energy of the abrasive particle will be converted into the energy of a spark. The material type & hardness of the abrasive plays a role in this. The initial kinetic energy will be divided between: *energy transferred into the target, energy transferred into the particle, particle energy after impact and remaining energy*. Only the small part of *remaining energy* will be able to convert into *spark energy*.

Many tests have been conducted to determine if these sparks are considered an ignition source. The general outcome is they are not, for the following reasons:

- The air released from the blasting process causes a large amount of air to be released at the nozzle. A possible present on-site explosive atmosphere will be highly diluted and dispersed from where the abrasive will strike the substrate.
- Any spark caused by the release of kinetic energy on the substrate is quickly cooled and dissipated by the expanding compressed air from the nozzle (Joule-Thomson effect) so that no hot surfaces are created. The optional adding of water to the blasting process can further improve this.

This is supported by the American Petroleum Institute (API) which states in their *Recommended Practice 2027*: “Sparks generated by abrasive blasting are typically not considered to be ignition sources as they are relatively low in heat energy and are cooled by the stream of blasting air or water. The blast stream also tends to disperse and dilute any flammable vapours present in the area where sparks occur, further reducing the potential ignition hazard”.

What supports this even further, are the extensive tests carried out by Shell Research Ltd (report TRCP.2039, revised). For this study, a test chamber was constructed that enclosed a blast nozzle, steel plate, spark plug, and gas inlets. Coarse and fine copper slag and steel shot were used as an abrasive. Blasting with a pressure of 100 psi (6.9 bar) on the rusty steel plate created visible sparks. Propane gas was used to determine whether blasting could ignite the gas in question when continuously present in the test chamber under ideal conditions (in other words, blasting operations in a zone 0!). Throughout the various tests the spark plug was used to ignite the atmosphere to ensure a flammable mixture of air, abrasive and gas was present.

The tests and their validation showed that the ignition energy of the sparks visibly produced during blasting in none of the cases could ignite a combustible gas/air mixture. The report states “The sparks produced by the grit streams were numerous but dull and they could only be observed in darkness. On no occasion did they ignite the flammable gas mixture present in the test chamber.” and “All these tests support the view that sparks produced during abrasive blasting operations using air as the propellant are incapable of causing explosions in flammable atmospheres”.

CAN I USE ALL ABRASIVES IN AN ATEX ZONE?

The dry blasting tests conducted by Shell Research Ltd were done with fine and coarse copper slag abrasive and steel shot S170. These did produce sparks but did not ignite the explosive atmosphere. Since then, various experiments have been conducted with other abrasives such as garnet, crushed glass and sodium bicarbonate (soda). Also, different blasting pressures and substrates have been tested. In most cases sparks do not even occur, and if they do, the outcome is always the same: they do not to ignite the explosive atmosphere.

Prior to commencing any blasting activities, it is crucial to consult with the site owner or safety manager to address the appropriate work permit. In some cases, wet/vapour blasting or vacuum blasting might be the preferred option over open dry blasting. Ultimately, it is their responsibility to determine which blasting method is permissible. However, when using Gritco ATEX equipment, you can be confident that these machines are certified as safe for use!

REFERENCES

- Dr.-Ing. Andrea Momber - “Blast Cleaning Technology” ISBN: 978-3-540-73644-8 (2008)
- API Publication 2027 - “Ignition Hazards and Safe Work Practices for Abrasive Blasting of Atmospheric Storage Tanks in Hydrocarbon Service” (2007)
- Singleton, D. W., Shell Research Ltd. - “Blast Cleaning in Inflammable Atmospheres” TRCP.2039 (1976)