

SAFETY IN EVERY ZONE

Explosion Protected Trucks from
Linde Material Handling





Safety in ATEX Zones

DANGER RECOGNIZED, DANGER AVERTED

Whether pharmaceutical production, the chemicals industry, food and beverage production, or the logistics of hazardous substances: whenever dusts, gases, or vapors mix with oxygen in the air, this creates highly flammable atmospheres in which every ignition source can lead to disaster.

Forklift trucks and warehouse trucks can be the source of sparks, electric arcs, or hot surfaces that trigger explosions in contact with flammable gas and dust mixtures. To eliminate these dangers, the European Union developed two ATEX directives: the manufacturer directive together with a product safety standard defines the equipment categories and specific safety requirements for explosion-proof industrial trucks. The workplace directive requires operating companies to, among other things, define appropriate safety zones on the company premises.

These ATEX zones consider two parameters for hazard classification: firstly, the type of dangerous substances (gas or dust). Secondly, the frequency and duration of potential explosive atmospheres in the respective work environment.

HAZARD ZONES DEFINED IN THE ATEX DIRECTIVE

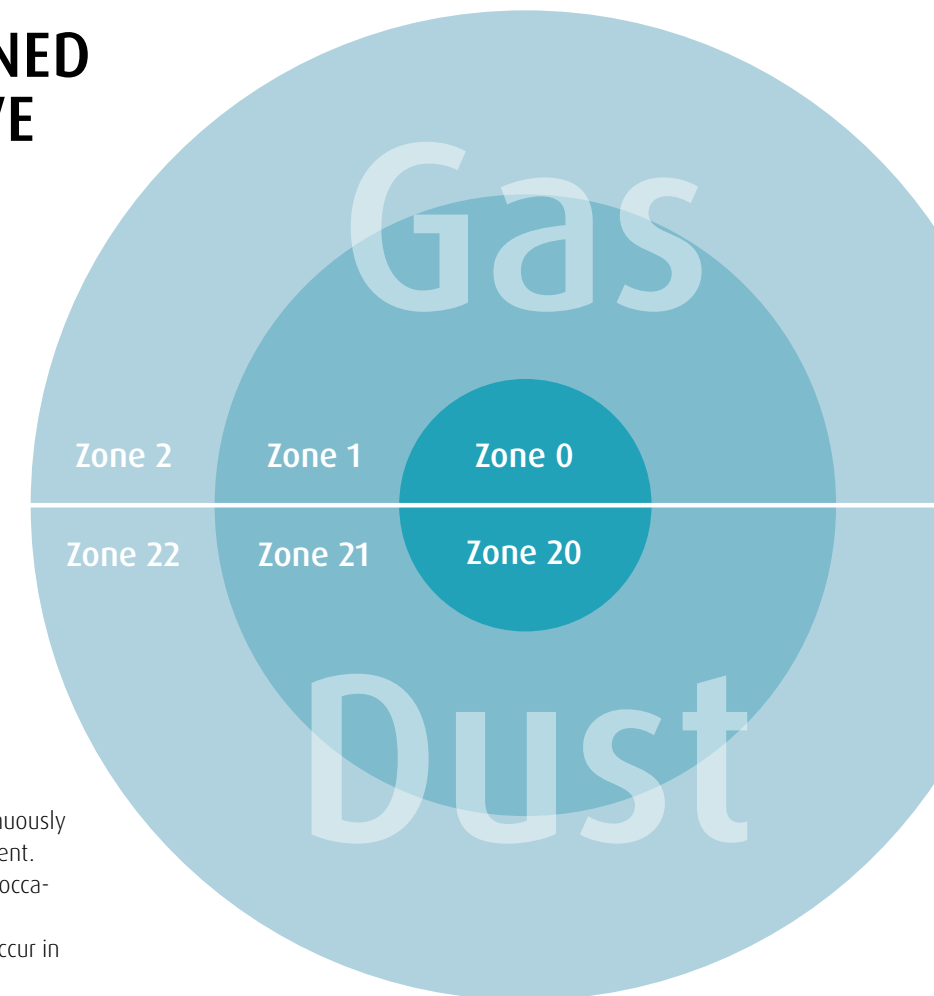
Gas Zones

Explosive gaseous atmospheres arise when flammable gases, vapors, or mists in adequate quantity and concentration mix with the ambient air.

Dust Zones

Explosive dust atmospheres arise when the ambient air contains ignitable clouds of combustible dust.

- **Zone 0/20:** An explosive atmosphere is present continuously or for long periods or frequently in the work environment.
- **Zone 1/21:** An explosive atmosphere is likely to occur occasionally in normal operation.
- **Zone 2/22:** An explosive atmosphere is not likely to occur in normal operation or for a short period only.



Industries

Logistics

Hazardous substances are often transported and stored in modern logistics operations. Critical situations can occur along the entire process chain.

Pharmaceuticals and Chemicals

Production often takes place in hazard zone 1/21, where liquids and solids are decanted, mixed, and processed.

Food and Beverages

Explosive atmospheres can arise, for instance, when producing and processing alcohol, concentrates, and additives.

Oil and Gas

Large volumes of highly flammable liquids need to be transported in refineries and petrochemical facilities. Explosion protection is particularly critical in these operations.

Recycling

Hazardous substances are repeatedly decanted, drums are emptied, and containers are transported during disposal and recycling.

Military

Industrial trucks for military applications are usually used to transport explosives or for disposal of ammunition.

Explosion Protection for Every Application

THE LINDE EDGE

When there is a danger of explosion there can be no room for compromise. Industrial trucks for these hazard zones must provide comprehensive protection while remaining as efficient and ergonomic as they are in all other areas.

That's why Linde Material Handling supplies a range of explosion-proof trucks for ATEX zone 1/2 (gases, vapors, and mists) and ATEX zone 21/22 (dusts). The ATEX Product Directive defines the specific requirements that a truck needs to satisfy. It takes account of the zone type, explosion group, temperature class, and surface temperature. The Linde explosion-proof trucks offer all the benefits of a series-produced truck, supplemented with perfectly tailored ignition protection measures for the specific application. The appearance and performance of the trucks remain the same.

All Linde explosion-proof trucks meet the current ATEX directives and EU provisions. Linde is the only manufacturer that independently develops and manufactures explosion-proof trucks for all hazard zones.

As an experienced explosion protection partner, Linde carries out all the necessary certifications and conducts extensive quality checks. For zone 1/21, usually only the explosion protection of the specific individual components needs to be tested by external notified bodies. Linde goes a step further and has also the entire truck certified.



Benefits at a Glance

- Wide Range:** From counterbalanced forklift trucks and reach trucks through to very narrow aisle trucks, pallet stackers, and pallet trucks, Linde offers a comprehensive portfolio of standard models that are retrofitted for the ATEX zones in various industries.
- Specialized Solutions:** Special-purpose trucks are available for special tasks in ATEX areas. For example, a pallet stacker with manual or remote-controlled drum tipper to safely handle drums in hazard zone 1/21.

Added Safety: Explosion protection goes beyond the truck itself. That's why Linde supplies innovative assistance systems, safety features, and special equipment available from the standard truck range. They provide added safety in ATEX areas.

Complete Documentation: Only ATEX-certified trucks can be used in potentially explosive areas. Every explosion protection retrofit therefore needs to be precisely documented. Linde provides comprehensive documentation, including operating manual, spare parts catalog, and EU declaration of conformity, for all ATEX trucks.

Optimal Service: As always, the Linde service network is at your service for explosion protection as well. Specially qualified service technicians ensure the permanent availability of all trucks. Just like for standard trucks, 24/7 availability of spare parts is ensured.



All-Round Safety

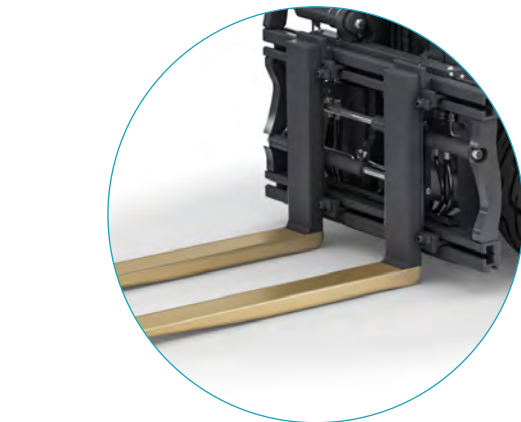
Explosion Protection in Detail

For all explosion-proof trucks, Linde protects electrical components such as the engine, control system, sensors, switches, headlights, displays, and electrical connection with different types of ignition protection.

And the mechanical components are also optimized for explosion protection. Spark formation is consistently avoided on forks, attachments, brakes, and hydraulics. The conductive design of plastics, such as for covers, floor mats, and tires, prevents the build-up of electrostatic charge. Temperature monitoring ensures that the relevant components do not exceed their permitted maximum values, even under full load. Below are a selection of the key explosion protection measures based on the example of a Linde E30 EX* for use in ATEX zone 1/21:



Electrical Accessories:
LED headlights, warning lights, windscreen wipers, battery connector, and plug connections in explosion-proof design.



Forks and Attachments:
Depending on the intended use, the forks are coated to prevent sparking. Here you can see the example of a brass coating for zone 1/21. The side shifter also has a conductive design.



Electric Control Elements:
Components such as the display, horn, and the reader for access control are housed in a flame-proof enclosure.



Anti-Static Material:
Conductive textiles, plastic surfaces, and tires prevent sparking caused by a build-up of electrostatic charge.



Temperature Monitoring:
The truck monitors the temperatures of the lifting and drive motor, the electronic control, the hydraulic valves, and the hydraulic oil.

*The displayed explosion-proof truck is an E30 EX – II 2G IIB T4/II 2D IIIC T135°C:

E	30	EX	- II	2G	II	B	T4	/ II	2D	III	C	T135°C
Truck type	Load capacity	Explosion protection	Equipment group	Equipment category	Explosion group	Explosion sub-group	Temperature class	Equipment group	Equipment category	Explosion group	Explosion sub-group	Maximum temperature
Gases, vapors, mists							Dusts					

The Right Choice

FIND YOUR PERFECT LINDE TRUCK



Counterbalanced Forklift Trucks

Power and Maneuverability in the ATEX Zone: Linde equips electric counterbalanced forklift trucks in payload classes between 1.4 and 5.0 tons for use in potentially explosive areas. The Linde explosion-proof trucks offer the same amount of comfort and safety as the standard models, from the cabin heating through to the warning devices and assistance systems. Even attachments are available in a special explosion-proof design.



Pallet Trucks

The need to transport goods quickly and precisely over short distances also extends to ATEX zones. To make sure that safety does not suffer, Linde supplies explosion-proof pallet trucks in all necessary payload classes. The trucks are available in a pedestrian design or can be equipped with a driver platform.



Reach Trucks

Fast, maneuverable, and maximum performance, even in narrow aisles: When things get tight and tricky in the ATEX zone, Linde has just what you need with a huge selection of explosion-proof electric reach trucks. For ATEX zone 2/22, the trucks can be fitted with camera systems and special light solutions, such as Linde VertiLight, for added safety even when visibility is poor.



Very Narrow Aisle Trucks

Potentially explosive atmospheres can occur when storing hazardous substances in high rack warehouses. As a result, Linde can equip its very narrow aisle trucks with all the necessary explosion protection measures as required. In this case, explosion-proof versions of standard components can be modularly installed in the truck. For example, the swivel reach or telescopic forks are coated in stainless steel for spark protection. Anti-static guide rollers prevent electrostatic build-up near the floor.



Pallet Stackers

Linde offers several pallet stackers across various payload classes in pedestrian and platform design for use in ATEX zones. Pallet stackers are also available as special-purpose trucks with a manual or remote controlled drum tipper. Both versions enable safe handling of hazardous substances in hazard zone 1/21.



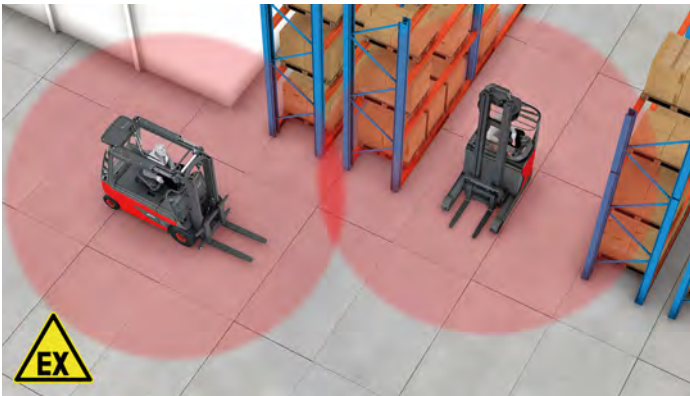
Linde Explosion Protection
A Quick Check of your Benefits

- Always the right truck for every environment
- Certification in line with the ATEX directives and EU standards
- Series-standard operation, ergonomics, visibility, and efficiency
- Fully certified trucks for hazard zone 1/21
- Numerous safety features and assistance systems for explosion protection
- Highly-qualified service technicians always nearby
- 24/7 supply of spare parts worldwide
- Ex-Monitoring app for optimum truck availability
- Complete explosion protection documentation for every truck

Added Safety

LINDE FEATURES FOR ATEX AREAS

Accidents and collisions are a constant risk in intralogistics. These collisions can be particularly disastrous in ATEX zones. The Linde safety features, assistance systems, and software solutions help to minimize these dangers.



In the Safety Zone: Linde Safety Guard

The Linde Safety Guard assistance system surrounds trucks with intelligent safety zones. It is suitable for a whole range of applications in ATEX zone 2/22. If two trucks get too close, the system reduces the driving speeds to prevent collisions. What's more, ATEX zones can be converted into low-speed areas. Where a general access restriction is in place with the Safety Guard, the system notifies non-ATEX trucks of danger zones via creep speed and a warning signal.



Be Seen: Linde BlueSpot and Red Warning Lines

The specially encapsulated Linde BlueSpot™ LED light projects a blue warning spot onto the floor that warns pedestrians and other trucks of an approaching truck to prevent collisions. The emitter maximizes safety in lanes and at intersections with poor visibility. An optimal addition to the BlueSpot™ are the Linde Red Warning Lines: LED headlights project warning lines onto the floor to the left and right of the truck to keep pedestrians at a safe distance and warn everyone near the truck of potential dangers.



See the Complete Picture: Linde connect

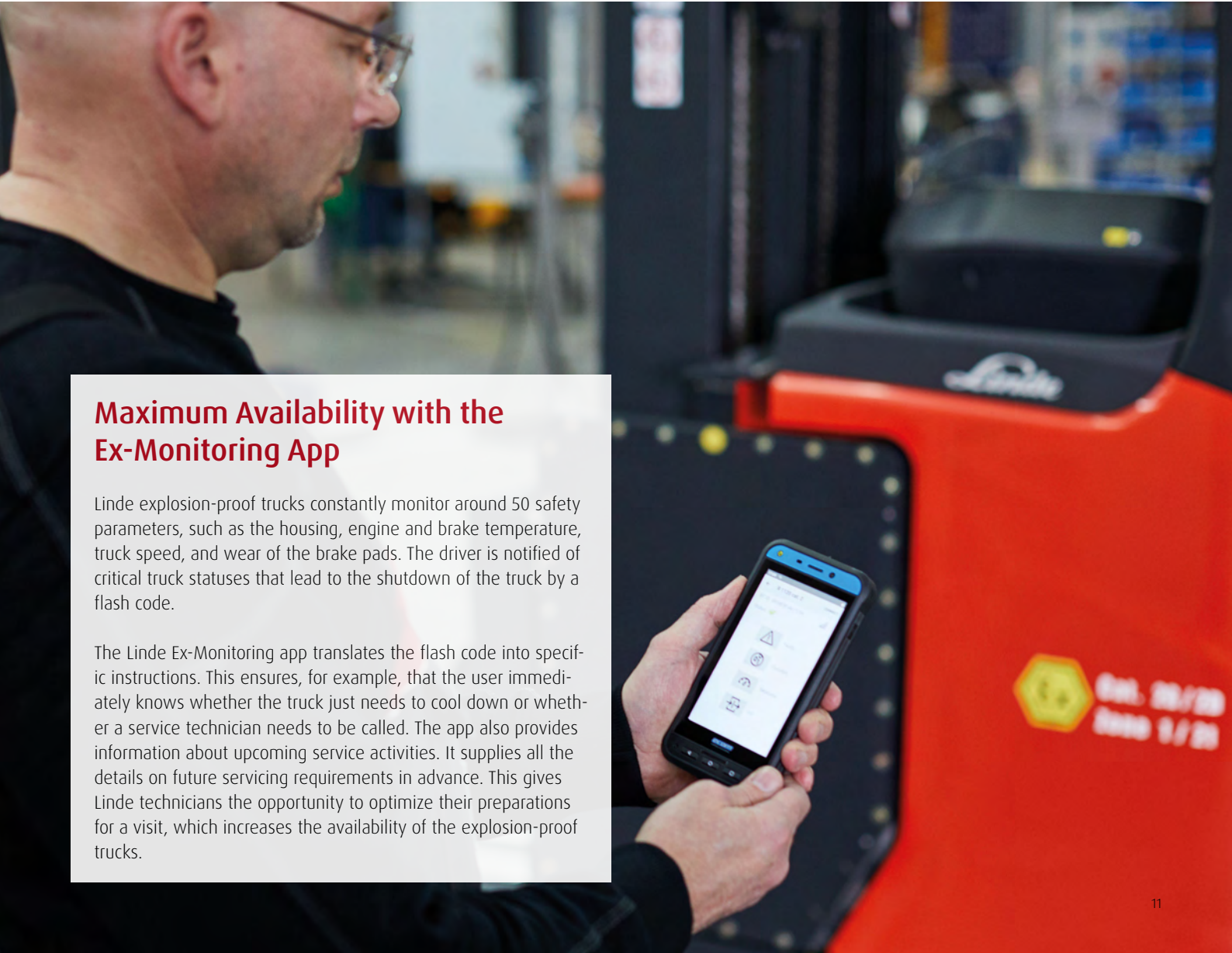
The Linde connect fleet management software provides a range of opportunities for monitoring explosion-proof trucks and improving safety in ATEX zones. The connect:ac access control enables activation by PIN or RFID and ensures that only authorized personnel operate explosion-proof equipment. The connect:dt crash detection function helps identify danger zones or floor damage and exposes intentional misuse. The connect:an usage analysis provides details on the use of the trucks and enables conclusions to be drawn about the behavior of individual drivers.

Always Nearby

LINDE EXPLOSION PROTECTION SERVICE

Linde's extensive service network ensures that explosion-proof trucks are always perfectly serviced and ready for operation at all times. Service technicians qualified in line with the international explosion-protection provisions are available worldwide and have the necessary documentation and special tools required to repair and service an explosion-proof truck.

Linde service technicians are intimately familiar with the maintenance requirements and applicable legal provisions for explosion protection and provide seamless service documentation. Just like for normal standard trucks, spare parts for explosion-proof trucks are also available 24/7 worldwide.



Maximum Availability with the Ex-Monitoring App

Linde explosion-proof trucks constantly monitor around 50 safety parameters, such as the housing, engine and brake temperature, truck speed, and wear of the brake pads. The driver is notified of critical truck statuses that lead to the shutdown of the truck by a flash code.

The Linde Ex-Monitoring app translates the flash code into specific instructions. This ensures, for example, that the user immediately knows whether the truck just needs to cool down or whether a service technician needs to be called. The app also provides information about upcoming service activities. It supplies all the details on future servicing requirements in advance. This gives Linde technicians the opportunity to optimize their preparations for a visit, which increases the availability of the explosion-proof trucks.

Linde Material Handling GmbH

Linde Material Handling, a KION Group company, is a leading global manufacturer of forklift trucks and warehouse trucks, and a solutions and service provider for intra-logistics. With a sales and service network that spans more than 100 countries, we are close to customers in all major regions around the world.

With over 100 years of experience in providing material handling solutions to companies in virtually every industry, we help our customers optimise their entire material handling process. Our experts analyse all workflows from goods receiving to shipping and work with the customer to develop solutions that fully meet their individual requirements. In the process, Linde Material Handling guarantees smooth implementation, reliable commissioning and responsive service.

For further information, please visit: www.linde-mh.com



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