

## **SAFELY HANDLING FLAMMABLE MATERIAL IN THE CHEMICAL SUPPLY CHAIN**

**With potentially explosive atmospheres present throughout the chemical supply chain, Mark Nailer, Industry Manager for Hyster Europe, discusses the 360-degree Hyster® solutions that support compliant and efficient handling.**

“It can only take one spark or hot surface to cause an ignition in the potentially explosive atmospheres found across the chemical supply chain,” says Mark. “Heat and spark control are therefore primary considerations for businesses involved in the production, storage and transport of flammable chemicals.”

### **Raw materials**

The production and delivery of raw materials to a manufacturer is the first stage of the chemical supply chain. These potentially flammable raw materials are likely to be delivered, pumped and stored in large tanks. Drums and IBCs (intermediate bulk containers) may be found indoors or outdoors, in areas where Hyster® ICE diesel or electric forklifts will commonly be working, or passing through.

This may be a Zone 2\* hazardous area, classified by ATEX\*\* as where a mixture of air and flammable substances in the form of gas, vapour or mist is possible, but not likely to occur in normal operation. To prevent the risk of ignition, it is vital that only explosion protected and rated lift trucks enter this area.

Hyster Europe works with specialist partners, such as Pyroban, who conduct explosion protection conversions to help materials handling equipment comply with local legislation. In Zone 2 applications, the Pyroban conversion of a Hyster® truck combines gas detection with various explosion protection methods such as restricted breathing enclosures and surface temperature cooling.

“It’s important for drivers to be aware of the presence of a flammable atmosphere in a Zone 2 area, so Hyster® trucks operating in Zone 2 areas can be converted with ‘active’ gas detection systems,” explains Mark. “This means if certain levels of gas or vapour in air are detected, the driver receives an audible and visual warning, and if that level elevates further, full equipment shutdown may occur.”

In addition to systems that alert the driver, those using Hyster® lift trucks in Zone 2 may also need to specify particular tyres, seats, batteries or other ancillary products, to reduce the risk of static causing ignition. A wide range of options is available via local Hyster® distribution partners.

Though more commonly found in Zone 1 operations, some applications may choose to use a ‘passive’ gas detection system in these areas. Instead of initiating a system shutdown when hazardous levels of gas or vapour are detected, these lift trucks are converted to work in these conditions.

### **Chemical manufacturing**

During the next stage in the supply chain, raw materials are mixed or processed to manufacture specific chemicals with a whole range of uses, from pharmaceuticals and cosmetics, through to the food, paints or coatings industry.

Here, Hyster® lift trucks are commonly used to transport and feed chemicals in to the production line. Those operations mixing ingredients may benefit from mobile weighing systems fitted to trucks as these allow dosing to be done straight from the drum or container. Using weight information, the truck can accurately deliver ingredient quantities.

While some manufacturing operations are Zone 2 areas, others may be classified as Zone 1<sup>\*\*\*</sup>, where an explosive atmosphere is likely to occur in normal operation.

“Unlike Zone 2 equipment which shuts down in the presence of a flammable atmosphere, explosion protected trucks for Zone 1 must be specially converted to allow them to work through the atmosphere,” says Mark. “This ‘passive’ protection features explosion proof enclosures and many other technologies which are essential for maintaining productivity in these Zone 1 operations.”

As well as the risks from explosive gases or vapours, chemicals in the form of combustible powders or dusts also pose a risk of ignition. To reduce risk, explosion protection modifications are available for diesel and electric Hyster® materials handling equipment operating in these so-called Zone 21<sup>\*\*\*\*</sup> or Zone 22<sup>\*\*\*\*\*</sup> areas.

“If dusty atmospheres are a problem, an in cab independent air filtration system can also be fitted to certain trucks to aid operator comfort,” says Mark. “And to help reduce non-explosive powder build up around the lift truck engine, some Hyster® lift trucks can be provided with a reversible hydraulic fan that operates on an automatic timer to clear out residue deposits, as well as a heavy-duty air filter which can help reduce the intake of unwanted particles.”

### **Chemical warehousing and logistics**

Following manufacturing, finished chemical products are usually stored in IBCs and sealed drums in an indoor or outdoor warehouse area. Here, diesel Hyster® forklifts, such as the Fortens™ range, or the Hyster® J-series of electric lift trucks are commonly used to transport and lift loads.

Sometimes chemical applications may work with particularly tall drums or gas bottles which can be challenging to handle. To cater to these operations, a high cab option is available on selected Hyster® lift truck models to provide visibility for the operator, as well as swivel or rotating seat options to assist drivers that may frequently need to reverse.

“Explosion protection conversions can be applied to most Hyster® diesel and electric trucks, including warehouse equipment,” says Mark. “This allows applications to select a solution such as a Reach Truck or VNA which delivers on efficiency and suits their infrastructure, even if the equipment will be operating in a potentially explosive atmosphere.”

Ultimately, finished chemical products are often transported onwards from the warehouse by a third-party logistics (3PL) company who will also need to be aware of the risks, and legislations, surrounding flammable chemical handling.

“Hyster® equipment is popular with logistics companies thanks to its reliability and low cost of ownership over multi-shift operations,” Mark says. “Those 3PLs taking on chemical contracts will need to ensure that the Hyster® trucks in their warehouses and portside stores are updated accordingly with the correct level of explosion protection.”

## **Managing chemical waste**

Another common Zone 2 area encountered in the supply chain is chemical waste storage at the end of the manufacturing process, usually outdoors in sealed drums. Typically, these are handled by explosion protected forklifts, though some operations may look to use pallet trucks to transport smaller loads.

“Some operations do not realise that even hand pallet trucks can still generate enough friction to be a source of ignition,” explains Mark. “However, by working with expert suppliers, Hyster® pallet trucks can be modified to comply with the relevant European explosion protection standards.”

Chemical waste can include contaminated water, batteries, aerosols, glue, paint, acid and liquid chemicals, and is generally collected by specialist companies which treat and recycle the waste into new raw materials. Many of these operations depend on tough Hyster® lift trucks that can endure the difficult, dirty conditions often found on a chemical waste management site.

## **Fully compliant solutions**

“In addition to specifying the correct explosion protected equipment, those in the chemical supply chain also need to be aware of their responsibilities when it comes to ongoing compliance,” Mark says.

“For instance, maintenance and repairs must only be conducted by specially trained engineers in order not to compromise the finely tuned explosion protection systems, and specialist replacement parts may be required,” he continues.

Likewise, when it comes to maintenance, Ex-Annual Safety Audits (Ex-ASAs)<sup>\*\*\*\*\*</sup> are required alongside regular Thorough Examinations<sup>\*\*\*\*\*</sup> to ensure that equipment is looked after with due regard for safety.

To avoid downtime, the global network of local Hyster® dealers supports chemical industry applications in planning and managing the particular maintenance requirements of explosion protected Hyster® equipment.

For more information on efficient and cost-effective materials handling in chemical applications, speak to your local Hyster® distribution partner or visit [www.hyster.eu](http://www.hyster.eu).

\*Zone 2 - a hazardous area classified as an atmosphere where a mixture of air and flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation, but if it does occur, will persist for a short period only. Zone 2 hazardous areas are typically storage areas but can also be process areas.

\*\*ATEX - The legal framework for controlling explosive atmospheres and standards of equipment and protective systems used in them

\*\*\*Zone 1 - A Zone 1 area is classified as a place in which an explosive atmosphere consisting of a mixture with air or flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally. These are typically process areas where gases are more likely to be present.

\*\*\*\*Zone 21 - A Zone 21 area is classified as a place in which an explosive atmosphere consisting of a mixture with air or flammable substances in the form of powder or dust is likely to occur in normal operation occasionally. These are typically process areas where dusts and powders are more likely to

be present.

\*\*\*\*\*Zone 22 - A Zone 22 area is classified as an atmosphere where a mixture of air and flammable substances in the form of powder or dust is not likely to occur in normal operation, but if it does occur, will persist for a short period only. These are typically storage areas but can also be process areas.

\*\*\*\*\*Ex-ASA - The Pyroban Annual Safety Audit is a thorough inspection of all safety critical components and systems. An Ex-ASA is a solution which provides a means of compliance to the ATEX Directives if carried out annually. An Ex-ASA can also prove beneficial when purchasing a used piece of equipment or following refurbishment or modification.

\*\*\*\*\*Thorough Examinations - A thorough examination is a systematic and detailed examination of lifting equipment by a competent person to detect any defects that are, or might become, dangerous.

## **NOTES**

Hyster® is one of the leading global brands of materials handling equipment and Hyster Europe, a trading name of Hyster-Yale UK Limited, a subsidiary of Hyster-Yale Group, Inc. ([www.hyster.com](http://www.hyster.com)), is a leading worldwide lift truck designer and manufacturer, offering more than 140 models of counterbalance trucks, warehouse and container handling equipment. The company invests heavily in research and development to ensure Hyster® products are at the forefront of the materials handling industry providing maximum dependability and low costs of ownership for demanding operations everywhere.

Hyster-Yale Group, Inc. is a wholly owned subsidiary of Hyster-Yale Materials Handling, Inc. (NYSE:HY). Hyster-Yale Materials Handling, Inc. and its subsidiaries, headquartered in Cleveland, Ohio, employ approximately 7,900 people worldwide.

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