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LOGISTICS

What You Need to Know About Chemical Warehousing

And what to look for in a chemical logistics partner

Chemical warehousing, including the storage of hazardous materials, is a highly regulated undertaking with a substantial investment in both the physical storage environment and rigorous adherence to associated protocols, practices and paperwork required to ensure safety and compliance. If you are responsible for the storage and distribution of commercial chemicals, this eBook serves as a primer on key safety and compliance basics.

Additionally, many companies decide that this type of warehousing is better left to experts like third-party logistics (3PL) providers that specialize in chemical and hazmat operations. If this is the case for your operation, this eBook will help you understand what to look for in a prospective partner.

CHEMICALS AND HAZARDOUS MATERIALS: THE BASICS

Under the Hazard Communication Standard (HCS) of the U.S. Occupational Health and Safety Administration (OSHA), any chemical that presents a physical hazard or a health hazard is considered a hazardous material. The HCS definitions of physical and health hazards are:

Physical hazard – there is scientifically valid evidence that the chemical is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Health hazard – there is statistically significant evidence that acute or chronic health effects may occur in people exposed to the chemical. This includes many chemical types, including carcinogens, irritants, corrosives, and agents which damage the lungs, skin, eyes, or mucous membranes.

There are 9 different classes of hazardous materials that are further broken down into divisions based on the type of hazard present.

CHEMICAL WAREHOUSING REQUIREMENTS

Each chemical class is like an industry unto itself, with specific rules and regulations for safe storage and handling. The chart below displays just a few examples:

CHEMICAL CLASS	REQUIREMENTS
Explosives	Heat, shock, friction or even static electricity can initiate explosions of these chemicals. All rooms in the distribution center should be “no spark”’ environments to eliminate the potential for sparks or equipment backfires. That means using non-spark forklift trucks and EE- and EEE-rated machinery.
Flammable liquids and solids	All flammable products are required to be stored in one classified room, away from any potential ignition sources. Flammable liquids and gases require rack stack storage and a rack firehouse pump system (sprinklers). Regular preventative maintenance is required to ensure that all systems are well maintained and up to code.
Gases	Great care must be taken in storing and handling compressed gases since dropping or knocking over a cylinder can cause the energy in the cylinder to be rapidly released, even propelling the cylinder like a rocket. Specific storage requirements will depend on the type of gas. If the gas is flammable, it is stored in a classified flammable room. Some gases could be a mix of toxics and corrosives so they might go into toxic room.
Oxidizers	Oxidizers require their own room and are not to be mixed with other product, especially flammable or combustible materials. Oxidizers should be kept in a cool, dry place, well ventilated and away from sunlight. Oxidizer rooms have no windows to keep out sunlight and are ventilated to reduce smell and allow airflow.
Poisons	Poisons require their own classified room. This room needs to have ventilation and be segregated from combustibles. Typically, air vents suck out the odor and the air travels to charcoal bins above the warehouse. Poisons should be labeled, processed and palletized in a poison-coded room. Poisonous products should never see any other part of the warehouse except their specified room.
Corrosives	Corrosives require their own room and are to be handled with great precaution. As with other chemicals, workers should use goggles, gloves and closed-toe shoes while handling corrosives. The classified corrosive room does not contain rack water systems. Pallets that enter the warehouse are taken to the secluded room with air vents that suck out the odor. The product should be labeled, processed and palletized in the classified corrosive room.

CHEMICAL WAREHOUSING REQUIREMENTS

Within each class, each specific chemical also has its own requirements. OSHA's Hazard Communication Standard requires chemical manufacturers and importers to prepare labels and Safety Data Sheets (SDS) to "convey the hazard information to their downstream customers."

These SDS sheets contain information on the specific hazard so workers handling these products can be informed and take the relevant precautions. In general, best practices related to a given chemical can be maintained by following the guidelines outlined in the SDS sheet for handling, storage and transportation.

OSHA has also set permissible exposure limits (PELs) for chemicals and other materials in order to protect employees in the workplace from exposure. Workers are not to be exposed to levels of chemical greater than these PELs. Importantly, states like California have their own exposure limits that are more stringent than the federal ones.

Other requirements will relate to the warehouse itself. For example, areas for corrosive chemical storage have strict specifications as to their construction. Areas must meet minimum requirements as follows.

- Mechanical ventilation
- Concrete ramp at entrance and inside the area
- Concrete dike on the perimeter at a height of 12 inches
- Automatic sprinkler system
- Air inlet and fireproof door

PREVENTING CROSS CONTACT

Several of the requirements specific to a given chemical or chemical class have to do with other chemicals – preventing them from coming into contact with one another.

For example, if an oxidizer is exposed to a flammable solvent, a fire can occur. Likewise, an acid that encounters metal dust can create hydrogen gas.

Because of this volatility, chemical classes must be stored independently of one another in clearly marked areas. These areas must be separated by approved non-combustible partitions and/or by a distance of 20 feet or greater.

Such chemical separation requirements are sometimes necessary for materials within the same chemical class. Examples of this include nitric and perchloric acids, which must be kept separate from organic acids like acetic acid.

Additionally, chemicals can belong to more than one chemical class. For example – according to the University of California, Berkeley's Office of Environment, Health, and Safety – "acetic acid is both a corrosive acid and a combustible liquid. It must be stored away from corrosive bases, such as sodium hydroxide, and also from oxidizing acids, such as nitric acid."

A facility that handles more than one hazardous chemical not only must meet the requirements of each independent chemical class but must fully understand the relationships between all stored chemicals and classes. Appropriate steps must then be taken to prevent cross contact at all times. As shown above, this includes the potentially hazardous relationships between chemicals within the same class.

CHEMICAL WAREHOUSING FAQs

Can any Warehousing Operation Handle Hazardous Material Storage?

No. A warehouse – such as that operated by a third-party logistics provider – must be certified to perform hazmat chemical storage. The certification process is rigorous and can involve many different government agencies, along with local fire departments, air quality boards and other agencies. Each individual process may require lengthy applications, followed by phone and in-person meetings.

Can Different Hazardous Materials be Stored Together?

Yes. Different chemical classes can be stored in the same warehouse but must be stored independently of one another in clearly marked, segregated areas. These areas must be separated by approved, non-combustible partitions and/or by a distance of 20 feet or greater.

Can Hazardous Materials be Stored with Non-Hazardous Materials?

Yes. As with storing different types of chemicals in the same warehouse, hazmat materials can be stored in the same facility as non-hazmat materials – provided that any relevant SDS is fully adhered to and separation requirements are met.

What is CFATS?

Managed by the U.S. Cybersecurity and Infrastructure Security Agency (CISA), the set of Chemical Facility Anti-Terrorism Standards (CFATS) is the first regulatory program in the U.S. that is focused on the security of chemical facilities. CISA works with such facilities to reduce security risks associated with hazmat products and their potential weaponization by terrorists.

Facilities that store – or plan to store – any of the 300 Chemicals of Interest (COI) identified by CISA must comply with CFATS requirements. This first involves the completion of a 'Top Screen Questionnaire' to determine facility risk level.

Based on the three criteria listed below and other factors, a facility that stores volatile chemicals will be designated as a tier 1, 2, 3, or 4 facility and have tier-based chemical warehousing requirements. Tier 1 denotes the highest level of risk.

- **Consequence** – the consequence of a successful attack on a chemical facility.
- **Vulnerability** – the odds that an attack on a chemical facility will meet with success.
- **Threat** – the intent and means of an adversary (terrorist) with respect to attacking a facility.

Which agencies audit a hazmat warehouse?

Most chemical and hazmat warehouses will undergo regular audits from local fire departments, air quality departments and public health departments. Many chemical 3PLs will go a step further and seek to be designated a "responsible distributor" by the National Association of Chemical Distributors (NACD). This designation by the NACD is considered to be the gold standard of safety within the chemical industry.

WHAT TO LOOK FOR IN A CHEMICAL WAREHOUSING 3PL

As you can see, there is a lot that goes into the performance of chemical warehousing services. As such, many companies entrust their products to 3PLs that have the infrastructure and expertise to handle chemicals safely and efficiently.

All chemical 3PLs aren't created equal, however. Choose the wrong provider and you jeopardize the safety of people and products. The wrong provider can also negatively impact your finances and business continuity as audit violations can result in hefty fines and penalties that disrupt operations.

The following are things to look for in a quality chemical warehousing 3PL.

Ask for the facility's licenses, permits and certification. A good way to ensure your 3PL is up to snuff is to play the role of auditor yourself during the vetting process. For starters, you can ask to see business licenses, fire department operating permits, and other applicable registrations.

Look for experience handling the class of chemicals you market. 3PLs that handle one class of chemicals are not necessarily qualified to handle others. For instance, non-regulated chemicals do not require the same stringent chemical warehousing procedures as flammables, oxidizers, explosives, corrosives, and other hazmat substances.

Check the provider's reputation with objective sources. Don't rely on the 3PL's marketing claims to gauge capabilities. Check those claims against the opinions of outside companies and agencies familiar with the provider. For instance, local fire departments with jurisdiction over the provider's warehouses will be aware of the company's ability to manage health, safety, security and environmental requirements for hazmat storage.

Ask about audit history. If the facility has undergone recent audits, you'll want to know when they occurred and what the results were. Information related to NACD audits – and the facility's responsible distributor designation (if applicable) – are particularly helpful in separating the pros from the pretenders.

WHAT TO LOOK FOR IN A CHEMICAL WAREHOUSING 3PL

Ask about employee training. It's not enough for your facility to be capable of storing your products. You need the men and women who handle your items to be knowledgeable and have appropriate hazmat training. You can ask to see records related to hazmat training and certification of the facility's associates.

Ask about CSR experience. Just as it is important to have experienced personnel handling your chemical and hazmat products, it can be equally important to have knowledgeable customer service representatives working on your account. CSRs with chemical experience help ensure that operations have the appropriate documentation each step of the way.

Ask about Inventory tracking and visibility. Depending on the types of products you'll store with your 3PL, its warehouse management system (WMS) capabilities related to inventory and segregation can be very important. For instance, in chemical warehousing it's often essential that your provider's WMS can segregate among chemical classes.

Choose a partner for present AND future needs. Too many Requests for Proposals ask only about a 3PL's ability to address current needs. Instead, you should anticipate your needs well into the future and look for a partner that can satisfy these requirements to avoid the cost and risk involved in switching providers. For instance, your need today might be for simple pallet in/ pallet out storage and distribution. But what if future requirements involve, for instance, repackaging 50-gallon drums into ten 5-gallon pails? Can the provider handle the job? Does the provider even want to do this kind of work?

Find out how active the provider is in industry groups. Environmental and safety regulations are constantly changing in the chemical industry. Providers need to remain active in industry groups to stay abreast of these changes. If they are not, it's fair to question their commitment to serving chemical industry customers.

The Chemical Council of the International Warehouse Logistics Association, the National Association of Chemical Distributors, and the Warehousing Education and Research Council are just a few of the organizations that provide education on chemical storage and transportation practices.

Look for a provider of integrated logistics services. You'll find many candidates for chemical warehouse services and many for last-mile transportation. But the pool of chemical logistics providers that can integrate these services with seamless visibility to product at rest and in motion is much smaller. The advantages of integrating logistics services with one provider include:

- Maintenance of product integrity throughout the distribution cycle, including adherence to temperature control requirements.
- Creation of a closed-loop supply chain by bringing reusable containers back to the warehouse after deliveries.
- Easing of the administrative burden by having a single point of contact.

GETTING STARTED

The vetting process should also include tours of your prospective partners' facilities. During such tours, be sure to interview key personnel to gauge their chemical operations expertise. Importantly, this includes the associates actually handling the products as well as the management team.

Once you've found the right 3PL provider, it will likely have different chemical warehousing options to choose from. These include shared warehousing in which your products are stored along with the products of other companies, as well as dedicated warehousing, in which an entire warehouse is dedicated solely to your operations.

No matter what your specific supply chain needs may be, there are 3PL providers that can help you accomplish them. Remember, however, that all the bells and whistles in the world remain secondary to the safety and regulatory compliance of your chemical products and your operations. Be sure to check those boxes first before taking any chemical warehousing partnership further.

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