Workplace Safety

Flammability Limits: How to Reduce Fire Hazard Risks in Your Facility

Matt Morgan | Aug 20, 2020

Manufacturing facilities that use flammable liquids and gases—we're looking at you—must comply with regulations to keep fire risks low. Do you know where your company stands? Here's a primer for protecting your business.

Fire! The word is enough to make anyone's hairs stand on end. And in manufacturing, the threat of combustion is real. Due to the nature of the business—where solvents, compressed gases and other flammable chemicals are used all day, every day—the explosive potential of fire literally hangs in the air.

For a fire to occur, three elements must be present: fuel, such as a flammable liquid; oxygen, from the air; and an ignition source, such as an arc, spark or flame. These elements coexist in virtually every manufacturing business.

Ignition of flammable or combustible liquids causes an average of 930 manufacturing facility structure fires annually, costing $99 million in direct property damage and resulting in 46 injuries each year, according to a 2014 report by the National Fire Protection Association.

> **"Between the NFPA 30 and the IFC codes, you pretty much have it covered how you're supposed to be doing stuff with flammable liquids."**
> Andy Brousseau
> Justrite

To minimize the risk of fire and avoid becoming a statistic, manufacturing companies should safely store and handle flammable liquids and gases.

3 Fire Safety Precautions for Manufacturing Facilities

Lowering your workplace's risk of fire from flammable and combustible liquids starts with these three steps from Andy Brousseau, director of industrial safety and compliance at Justrite.

1. Train and educate your employees. Anyone whose job involves storing or handling flammable liquids should understand how to safely perform those tasks.

2. Develop standard operating procedures. "You should have well-developed, documented, written processes on how you're going to transfer fluid, how you're going to add fluid to a machine," Brousseau says. "And people should be adhering to those processes."

3. Manage and audit the process. "Somebody who knows what they're doing has to take a look and say, 'Is this training the correct training for what our folks are doing?'" he says. Periodically check to see that workers are completing the required paperwork and taking any necessary corrective actions.

Flammability Basics

To protect your facility against fire risks from flammable liquids and gases, you must understand each product's flammability properties—and for that, you must start with the SDS, or safety data sheet.

"The SDS will give you what you need to get started. It won't give you any sound answers—you've got to do some investigation," says Andy Brousseau, who is director of industrial safety and compliance at Justrite Safety Group and a retired firefighter and paramedic of 22 years. Justrite manufactures a wide range of ***industrial safety products***.

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"It all depends on what the SDS is telling you," he adds. The SDS contains information about a product's physical and chemical properties that is used to determine the maximum allowable quantity of that product at the facility.

Key characteristics of flammables and combustibles include:

Lower flammability limit—also called lower explosive limit, or LEL—is the lowest percentage of a product's vapor or gas in the air that's capable of igniting when exposed to an ignition source, such as an arc, spark, heat or flame. Below the lower limit, the vapor in the air is considered too "lean" to ignite.

Upper flammability limit—also called upper explosive limit, or UEL—is the highest percentage of a product's vapor or gas in the air that's capable of catching fire. Above the upper limit, the vapor in the air is considered too "rich" to ignite, but conditions can become dangerous quickly: Adding air to a room, for example, can quickly bring the percentage of the product's vapor down to within its flammability range, with potentially explosive consequences.

Flashpoint is the lowest temperature at which a chemical will release enough vapors to catch fire with

an ignition source. The lower a chemical's flashpoint, the more volatile it is and the tighter the restrictions are for storage.

Boiling point is the temperature at which a liquid changes to a gas or vapor under normal atmospheric pressure.

Once you know your product's flammability properties and the many specific circumstances of your facility—down to building construction type, sprinkler system and occupancy rate—you can check your company's compliance with the authoritative agencies.

Regulations for Flammable Liquids and Gases

The primary source for regulation of flammable liquids in the United States is the National Fire Protection Association's ***Flammable and Combustible Liquids Code (NFPA 30)***. "Their document is the bible for flammables and combustibles," Brousseau says.

Many companies that have international facilities follow the ***International Fire Code***, whose regulations are similar. "Between the NFPA 30 and the IFC codes, you pretty much have it covered how you're supposed to be doing stuff with flammable liquids," he says.

When you've determined which guide to follow, "I recommend buying a copy and becoming familiar with it," he adds. "For any questions you have, contact your local jurisdiction having authority."

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Your local jurisdiction having authority is most likely your local fire department, which will have the final say in how your facility complies with flammable liquids regulations.

"As a former firefighter," Brousseau says, "I can tell you that their mindset is to help people, not to just issue citations. They will be glad to tell you, 'This is what you've got to do to be compliant.'"

The Occupational Safety and Health Administration does not design rules and regulations for flammable liquids, Brousseau notes. Rather, it bases its ***standards*** on authoritative agencies such as the NFPA.

Beyond the authoritative agencies, it's a good idea to consult your insurance provider for any requirements it may have that are different from the NFPA, the IFC or the fire department. Failure to comply with your insurance company's regulations could affect your insurability.

Different Types of Fire Safety Products for Flammable Chemicals

Given the looming danger of fire risk in manufacturing, safety products for storing, transferring and using flammable liquids are designed to meet exacting standards. Here are a few you might need at your facility:

Flammable liquid storage cabinets are required for any facility storing more than 25 gallons of flammable chemicals, such as solvents. These specially designed cabinets are certified by Underwriters Laboratories (UL) or Factory Mutual (FM), or both. "Almost all facilities will have a need for at least one flammable liquid storage cabinet," Brousseau says. "They can't just be metal cabinets that they used to keep their copy paper in."

Compressed gas cages are needed for facilities that use compressed gases, such as acetylene. Not to be

confused with ***flammable liquids storage lockers***, which have a sump for liquids at the bottom, cages are well-ventilated to let the gas safely dissipate.

Safety dispensing cans are good for transferring flammables from a large container (such as a drum) to smaller ones for use around the facility. "They burp and vent off gas when pressure builds up, which is what you want," Brousseau explains. "They have very tight-sealing lids. They're a certain thickness."

Grounding and bonding equipment is required to minimize static electricity sparks that could ignite a flammable liquid while it's being transferred from one container to another.

Plunger cans are useful for cleaning parts while keeping solvents contained. "You can't just be dipping your rag in an open container," Brousseau says. "You have to have the proper designed can, where you plunge down the rag and it gives you just enough solvent to do your job without releasing a lot of fumes."

Drum faucets have an auto-shutoff feature that prevents liquid from continuing to pour if a worker suddenly isn't able to stop the flow. "We've seen people have strokes or heart attacks, or pass out or trip," he says, "and by the time it takes to get that person on his feet, you have literally gallons of flammables pouring out all over."

What questions do you have for managing flammable liquids and gases at your facility? Let us know in the comments.