Understanding the Hazard

Idle Pallets

Understanding the Hazard
This series of publications is designed to help you understand the everyday hazards present at your company's facilities. For more information on how you can better understand the risks your business and operations face everyday, contact your FM Global engineer, whose card is attached on the back page. UTH topic categories:

- Construction
- Equipment Hazards
- Fire Protection
- Human Factors
- Process Hazards

Hazard or Risk?
Without property protection, storage of idle pallets in your facility can be a serious hazard. They present the risk of significant damage to your building and high-value contents while being of relatively low value themselves. Your FM Global engineer can help you better understand this risk.

The Hazard

Idle pallets present a unique fire-protection dilemma. They are found almost anywhere that bulk quantities of goods are stored or moved. Although they are made of common materials (wood and plastic), pallets also are built and frequently stored in a configuration that maximizes their fire hazard. Relatively inexpensive themselves, they expose much more valuable goods and equipment to severe fire damage.

Although this hazard is well-understood and there are a variety of methods for addressing it, your sprinkler system may not be adequate to provide the required protection.

Science of the Hazard

The three requirements that enable a fire to grow are fuel, oxygen to support combustion, and heat feedback to vaporize combustibles, allowing them to burn. This process is at work in campfires, wood stoves and fireplaces. If wood is stacked too closely, the air supply is insufficient for the wood to burn well. If the logs are too far apart, the fire can't support itself.

The configuration of a typical pallet (plenty of fuel) is virtually the same as that required for a healthy campfire. The spaces between the top and bottom of the pallet and between the slats allow for plenty of air access. These same spaces are near-enough together to allow for optimum heat feedback. If someone were purposely trying to maximize the heat-release rate from a wood-slat fire, the array would look very much like a stack of idle pallets.

Another determining factor for severity of a fire is the heat content of the material being burned. In the past, most pallets on the market were made of wood. Now, plastic pallets are becoming much more common. Plastic pallets essentially form the same configuration as wood pallets, but they add another dimension to the hazard. Whereas the heat content of wood typically is 7,000-8,000 BTU/lb. (16,300-18,600 kJ/kg), the heat content of plastic typically is 16,000-20,000 BTU/lb. (37,200-46,500 kJ/kg). It is easy to see that a fire in plastic pallets can be two- to three-times more severe than an equivalent fire in wood pallets.

What You Can Do in Your Facility

First, recognize that the degree of hazard presented by inadequately protected idle pallets is influenced by:

- Type of pallet (wood or plastic)
- Number of pallets
- Storage arrangement
- Proximity to other combustibles

If your sprinkler protection is inadequate for your current storage of idle pallets, you have several options. Your FM Global engineer can help you select the options best-suited to your facility. With that determination made, you can take the following steps:

Now:

- Minimize the storage of idle pallets within buildings, and separate them as much as possible from valuable goods and equipment.
- Reduce the height of idle-pallet storage.
- Where possible, store idle pallets outdoors or in low-value buildings, well separated from buildings.

Soon:

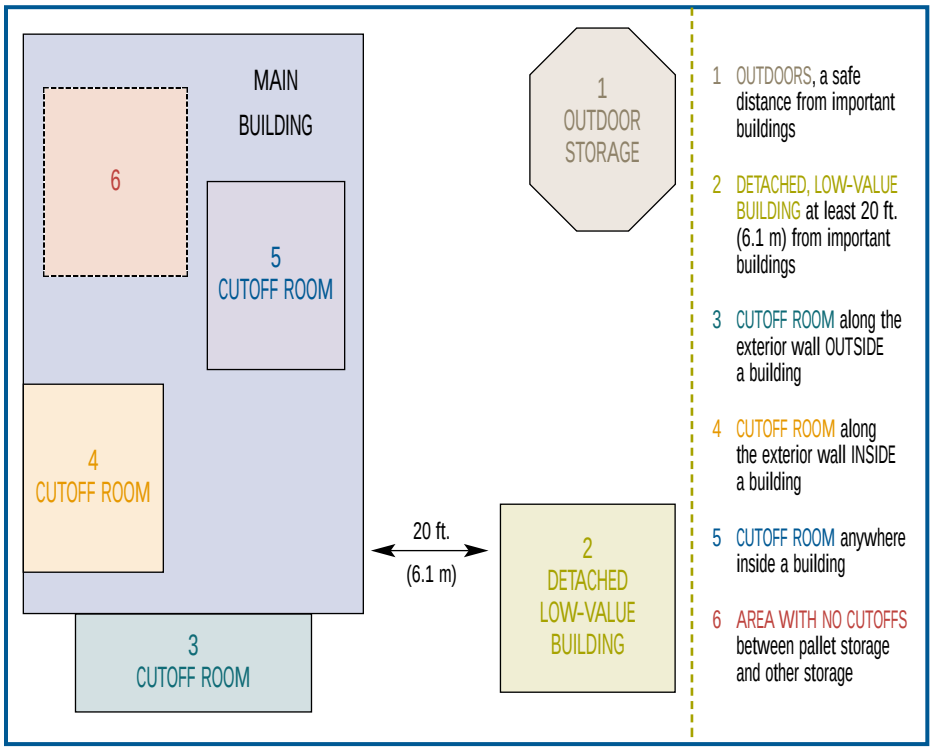
- If you are using unapproved plastic pallets, switch to FM Approved plastic pallets or wooden pallets, if feasible.
- Upgrade your sprinkler protection so you can store the type and quantity of pallets you need.

Sprinkler systems are designed to protect a specific level of fire hazard. Many systems are not designed to control a fire that releases as much heat as an idle-pallet fire. If the sprinkler system is inadequate for the hazard, an idle-pallet fire could spread uncontrolled and damage or destroy contents and equipment located far from the original idle-pallet storage area. The fire would have the potential to destroy the entire building.

Loss History

Fortunately, because the wood-pallet storage issue has been well-understood for some time, wood pallets are stored in areas equipped with proper sprinkler protection, in most facilities. As a result, severe fires in idle pallets located inside buildings have been relatively rare. With proper sprinkler protection, idle-pallet fires can be controlled easily. The same cannot be said for idle-pallet storage outdoors, where fixed automatic fire protection is not practical. A fire in idle pallets stored outdoors and near important buildings can be huge and capable of overpowering sprinkler protection within the building it exposes.

Recommended locations of idle pallet storage, in order of preference.



The storage recommendations for idle pallets are shown above. Idle pallets are not of great value. They burn easily and therefore should not be stored near items that are valuable. The heat emitted by a burning pallet will open sprinklers, producing thick smoke and damaging nearby contents.

But What About…

…storing pallets outside, away from my building? I can't do that, because my pallets must stay clean and dry.

The option of storing pallets outside your building can be an attractive alternative to expensive sprinkler system upgrades, but there certainly are cases where it is not a viable one. For situations in which pallets must be stored indoors, a detached, low-value building may be a better choice.

…cost justification? Sprinkler systems are expensive and the pallets aren't worth much.

If the only concern were the value of the pallets, then the cost of providing sprinkler protection for them would be hard to justify. That's why storing them outside or in an unsprinklered low-value building are recommended options. But, if the pallets must be stored inside your building, your building and its contents are exposed to damage or loss in the event of an uncontrolled fire in pallet storage.

…my facility's changing storage conditions? Why should we provide sprinkler protection for the worst idle-pallet storage situation when storage conditions vary daily, weekly or seasonally?

We wear seat belts every time we get into a car (or at least we should!), regardless of whether we're driving on country roads, in city traffic or on freeways. That's because we can never predict when an accident will occur. Similarly, a fire is just as possible when pallet storage is at its maximum level as it is at any other time.

…ease of ignition. How hard are pallets to ignite? I've never seen a fire in pallets.

Pallets are comparatively hard to ignite by themselves, but can easily be ignited by nearby fire in a small amount of paper or other ordinary combustible material. In warehouses, incendiarism and arson are among the more common causes of fires, and a stack of pallets is an ideal target.

…if we store idle pallets on top of racks so they will be close to sprinklers. Won't that be good enough?

It might be, if the fire starts at the top of the racks, in the pallets. The most likely spot for a fire to start, however, is near floor level. In that scenario, the fire in the lower levels of the rack will ignite the pallets, and sprinklers will be faced with a combined fire more severe than they were intended to protect.

…if we choose to use plastic pallets that have been tested and classified as self-extinguishing and approved by the United States Department of Transportation (DOT)?

The term "self extinguishing" is applied to products that have been subjected to small-scale tests with small ignition sources. They have no bearing on fire performance in a large-scale storage array. The DOT tests address issues of strength, load capacity, etc. They do not address fire performance. FM Approvals has fire-test protocols that specifically address the fire protection requirements for plastic pallets.

Additional Steps You Can Take

Plastic Pallets

Plastic pallets are becoming increasingly popular in the material-handling industry. They offer longer life, ease of cleaning and reduced likelihood of worker injury.

The change from wood to plastic pallets affects two areas. In idle-pallet storage areas, the fire challenge presented by unapproved plastic pallets is far greater than an equal quantity of wood pallets. In areas where commodities are stored on pallets (in racks or on the floor), the change from wood to plastic pallets increases the amount of protection needed for these areas.

As with most situations in life, benefits seldom come without cost. In most cases, the change from wood to plastic pallets in existing facilities calls for either upgraded sprinkler protection or Approved plastic pallets. For brand new facilities, it is relatively easy to accommodate the use of plastic pallets during design and constuction by taking advantage of one of the recently developed improved-performance sprinklers.

Need More Information?

Ask your FM Global engineer about the following:

- Photographs of a fire in a plant yard's idle-pallet storage area
- Video clip that compares the burning of wood and plastic pallets
- How to provide the most cost-effective protection for pallet storage in your facility

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A wide range of issues, problems and solutions are associated with pallet storage, and there is no single, one-size-fits-all answer. Your FM Global engineer will be able to work with you to analyze your specific situation and develop a customized solution.

Don't Let This Happen to You

Above are photographs of a fire that was set intentionally to demonstrate the hazard of fire in idle pallets. A total of roughly 2,500 pallets were used. The pile was 12-ft. (4-m) high and 100-ft. (30-m) wide. The second picture shows the fire approximately 15 minutes after ignition. Flames were estimated to be 100-ft. (30-m) high or more.

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