

AIRE Bulletin

Safe Storage of Wood Pallets



Wood pallets have been used for years in warehouses, manufacturing, and distribution operations. The main purpose of a pallet is to aid storage practices by allowing products to be moved easily by forklift trucks and to provide stability.

However, once pallets have achieved their purpose, they are often stacked inside buildings in out of the way corners, near loading docks, or in outdoor storage yards. They present significant fire hazards when stored indoors in bulk, due to their high heat release rate and ease of ignition. Even where stored in areas protected by automatic sprinklers, idle pallet fires can cause extensive damage.

Why Wooden Pallets Are a Fire Hazard

The construction, combustibility, and shielding effects of wooden pallets contribute to rapid fire growth and severe property loss. Stockpiling idle pallets indoors or outdoors presents a very severe fire hazard. Piles of empty wooden pallets are an ideal configuration for rapid development of a fire. The pile is essentially multiple layers of combustible fuel each separated by a layer of air. The built-in flues provide a means for fire to spread throughout the pile and for air to carry oxygen to the layers of burning fuel. Their large surface area to mass ratio also makes the pallets easy to ignite.

High Combustibility and Heat Release

Wooden pallets tend to dry out over time, so their edges become frayed and splintered. As they age, their ignition potential increases, and once ignited, their high heat release rate leads to rapid fire development. The slatted design of pallets also creates natural air channels that accelerate flame spread throughout the stack.

Shielding Effect and Suppression Challenges

Stacked pallets create significant obstructions for sprinkler systems. The undersides of pallet slats are shielded from water discharge, preventing adequate penetration to the burning surfaces. This shielding effect makes fire control extremely difficult and often requires water volumes far higher than what standard sprinkler systems can deliver.

Rapid Vertical Fire Growth

Because pallets are typically stacked in tall, dense piles, they form continuous vertical fuel packages. Once ignited, flames can rapidly extend upward, reaching ceiling level sprinklers and reducing system effectiveness. This rapid vertical heat development increases the chances of the fire overwhelming suppression efforts and impacting the larger facility.

Recommended Risk Control Measures for Pallet Storage

Idle pallet fire hazards can be significantly reduced by controlling how and where pallets are stored. The most effective approach is to keep idle pallets outside and positioned safely away from buildings. Where outdoor storage is not feasible, pallets may be stored in a detached structure, or—only as a last resort—inside a building provided they are arranged and protected in accordance with applicable fire-protection requirements. Wood pallets shall be permitted to be stored in the following arrangements:

1. Stored outside
2. Stored in a detached structure
3. Stored indoors, where arranged and protected.

Outdoor storage of pallets is preferred. Outside in stable piles with adequate space separation away from critical/primary buildings or structures, and other combustible yard storage. Guidelines on stack heights, aisle width, and clearance from buildings can be found in NFPA and FM. Refer to FM-8-24 Idle Pallet Storage

- Table 1. Separation Distances for Outdoor Storage of Idle Pallets
- Table 2. Safe Separation Distances for Adjacent Piles of Pallets Stored Outdoors.

NFPA provides guidance for the recommended distance between outside pallet storage and buildings. Here are relevant NFPA references:

1. NFPA 1 (Fire Code), Chapter 34, Section 34.11.4.7:
 - States that unless permitted otherwise, stacks of pallets shall not be stored within 0.75 times the stack height of any important building on the site.
2. NFPA 13, Annex A (A.20.17.1.1):
 - Provides tables with recommended clearances between outside idle wood pallet storage and buildings, considering anticipated radiated heat for materials like plastic.
3. NFPA 1, Chapter 34, Section 34.11.3.2:
 - Specifies that idle pallets stored outdoors must comply with Table 34.11.3.2, detailing required clearance between outside pallet storage and buildings.

Stored in Detached Structure

Idle pallets may be stored inside detached, low-value buildings or under canopies that are physically separated from primary or critical structures. When pallets must be stored indoors, they should only be kept in areas protected by automatic sprinkler systems specifically designed in accordance with NFPA 13 for pallet hazards. Storage must never occur in non-sprinklered spaces or in areas where the sprinkler design does not meet the required criteria. Because pallet fires grow rapidly and release significant heat, under-designed sprinkler systems are incapable of achieving effective control, increasing the risk of severe fire loss.

Sprinkler Protection

Idle pallet fires inside buildings can escalate rapidly and can easily lead to a total building loss if the automatic sprinkler system is not specifically designed, installed, tested, and fully operational in accordance with NFPA 13. Effective suppression of pallet fires typically requires heavy prewetting of wood to slow fire growth, which demands a substantial discharge volume. When plastic pallets are involved, fire control becomes even more difficult because plastic does not absorb water, making prewetting impossible. Additionally, as pallet stack height increases, so does the fire's intensity, the difficulty of achieving control, and the amount of water required for suppression

Pallets, where stored indoors, shall be protected by sprinklers in accordance with the Section 20.17- Protection for Idle pallets, NFPA 13, 2025 or FMDS-8-24.

Wood pallets stored up to 6 ft (1.8 m) high may be protected by CMDA sprinklers in accordance with OH2 design. Each pile of no more than four stacks shall be separated from other pallet piles by at least 8 ft (1.4 m) of clear space or 25 ft (7.6 m) of commodity.

Same protection for plastic pallets, except storage height is limited to 4 ft (1.2 m) and each pile is limited to two stacks.

Consider the following recommendations to minimize risk

Control of Ignition Sources

Strictly control hot work, enforce no-smoking rules, and prevent temporary accumulation.

Housekeeping and Inventory Management

Compliance with allowable pallet stack heights, pile sizes, and required separation distances must be verified regularly, and facilities should maintain clear aisles, and ensure pallets are never stored near heat producing equipment to prevent unnecessary fire exposure.

Security Controls

Pallets stored in exterior yards can be vulnerable to arson or other malicious activity, so facilities should secure the perimeter by installing fencing, maintaining adequate lighting, and using surveillance systems to deter intruders and reduce the risk of intentional ignition

Conclusion

Consider the fire hazards of accumulated empty wood pallets stored inside your facility. To mitigate the danger, instruct workers to remove empty pallets to an outdoor storage yard. If your business reuses wood pallets and maintains these inside the building, be sure they are stored in an area protected by an adequate fire suppression system. Pallets stored in yards or detached sheds must be arranged so they do not pose a hazard to buildings and other structures. Remove any unused pallets from your facility as soon as possible to reduce the fire hazard.

Additional Resources

- [NFPA 1 – Fire Code](#)
- [NFPA 13 – Standard for the Installation of Sprinkler Systems](#)
- [Fire Protection Handbook](#)
- [NFPA 1 and Idle Pallet Storage](#)
- [Idle Pallet Storage and NFPA 13](#)
- [Bing Videos](#)
- [Bing Videos](#)
- [Large stack of pallets catches fire in Dallas – NBC 5 Dallas-Fort Worth](#)
- [Owners of West Town pallet firm assess damage after massive fire: 'Looked like a war scene' - Chicago Sun-Times](#)
- [Idle Pallet Fire Exposure - Risk Logic](#)

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