Denver Fire Department
Idle Pallet Storage Guidelines
Per NFPA 13_Chpt 12

Idle wood and plastic pallets introduce a severe fire condition.
Stacking idle pallets in piles is the best arrangement of combustibles to promote rapid spread of fire, heat release, and complete combustion. Improperly stored or improperly protected pallets add a significant fuel load to any occupancy and can lead to a catastrophic loss in the event of a fire. The extremely high heat release associated with a fire in a stack of pallets creates a high-velocity plume of fire gases.

Sprinkler systems designed for ordinary hazards may be inadequate in combating pallet fires because the rising gases in the plume carry much of the sprinkler water away from the fire, and the high temperatures generated in the intensely burning array evaporate much of the water that does penetrate the plume. With little water reaching the seat of the fire to cool and extinguish the burning material, the fire continues to grow, releasing greater quantities of heat and causing more and more sprinklers to open, until eventually the sprinkler system is overpowered.

In most industries, wood pallets are much more frequently encountered than plastic pallets. This familiarity combined with the perception that wood is generally less “flammable” than plastic, can potentially lead people to view plastic pallets as the real hazard and wood pallets as simply a low-value, somewhat innocuous, necessity for moving goods. While viewing plastic pallets as a high hazard is certainly accurate, the fire challenge posed by wood pallets should not be underestimated.

Wood pallets often become dry and frayed during use allowing them to be easily ignited. Once ignited, the large amount of surface area and the open nature of their design create a near perfect geometry for a fast developing fire with very high heat release. A wood pallet fire can have heat release rates more consistent with a plastics or flammable liquids fire than a typical fire involving paper or wood.

In the case of a plastic pallet, this near perfect fire geometry combined with the higher flammability and heat release of a plastic commodity creates an extremely challenging fire to control.

Regardless of the material from which they are constructed, it is critical that we recognize the hazard idle pallets pose and properly arrange any areas where they are stored.

If idle pallet storage is a necessity in your facility, it is essential that you address the storage location, arrangement and required sprinkler protection as described on the following pages if the pallets are to be stored safely.

The storage of empty wood pallets should not be permitted in an unsprinklered warehouse containing other storage.

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STORAGE LOCATION

Figure 1 shows the order of preference for storage of idle pallets is as follows:

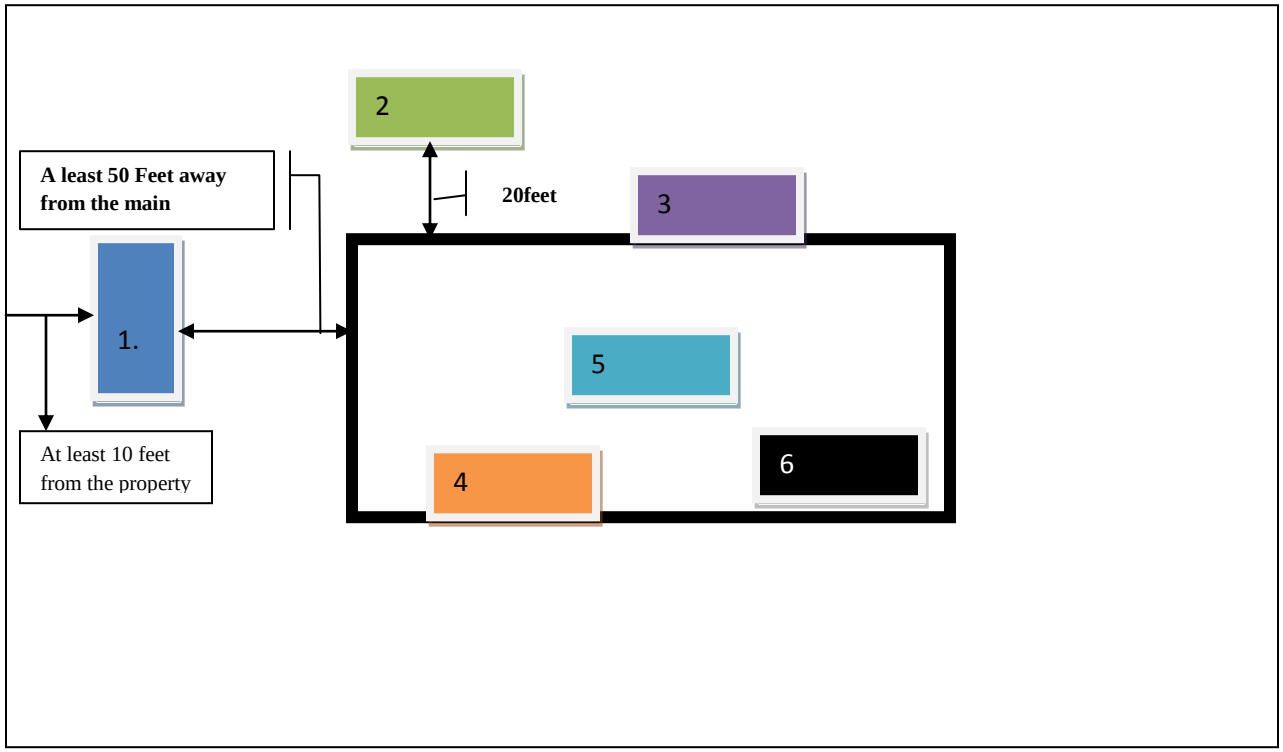

Table A.12.12.1.1. Recommended Clearance Between Outside Idle Wood Pallets Storage

Recommended Clearance Between Outside Idle Wood Pallets Storage		Minimum Pallet Distance from Exterior Wall		
Wall Construction		Under 50 Pallets	50 to 200 Pallets	Over 200 Pallets
Wall Type	Openings	Feet	Feet	Feet
Masonry	None	0	0	0
Masonry- Wire glass outside sprinklers with 1 hour doors.		0	10	20
Masonry- Wire or plain glass with outside sprinklers and ¾-hour doors.		10	20	30
Wood or metal with outside sprinklers		10	20	30
Wood, metal, or other		20	30	50

1. Outside Storage of wood pallets. Table A.12.12.1.1.

Although this is the safest way to store idle pallets, it is not without hazards. Large stacks of pallets can be a serious fire exposure to nearby buildings. Remember, a stack of burning pallets liberates a tremendous amount of heat. Ample separation is essential. A separation of 50 feet is usually adequate for wood pallets, but the more separation that can be provided the greater the margin of safety. Additional separation is needed if the building is constructed of combustible materials or there are openings in the wall in the location of the storage.

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2. Detached Building. Another acceptable storage location is a detached, low-value building or trailer used exclusively for pallet storage and separated from all other buildings by at ***least*** **20 feet**.

3. Attached Building. Another alternative is to store pallets in an attached building that shares a common wall with the main building. The common wall should be constructed of on combustible materials with no unprotected openings.

4. Cut-off Room. Pallets are sometimes stored in a cut-off room, located within the main building but having at least one outside wall. The cut-off room should be constructed of noncombustible materials and should be protected by automatic sprinklers as specified for wooden or plastic pallets.

5. Inside Room. If pallets must be kept in a storage room inside the main building, the room should be constructed of noncombustible materials and protected by automatic sprinklers as specified below for wooden or plastic pallet storage.

6. Open Storage Within Main Building. The least desirable location for idle pallets is in an open storage area within a main building. This storage method should be avoided. If this method cannot be avoided, it is essential that the pallets are arranged and protected as outlined in **National Fire Protection Association (2010 NFPA) 13**, ***Standard for the Installation of Sprinkler Systems***, Section 12.12- Protection of Idle Pallets.

7. Miscellaneous Combustible (Outside storage). Outside storage of combustible materials shall not be located within **10 feet (3048 mm) of a property line**.

Exceptions:

1. The separation distance is allowed to be reduced to **3 feet** (914 mm) **for storage not exceeding 6 feet (1829 mm) in height**.

INDOOR STORAGE OF IDLE WOOD PALLETS GUIDELINES

If you must provide inside storage of wooden pallets, follow the guidelines provided in **NFPA 13, *Standard for the Installation of Sprinkler Systems,* Section 12.1.9- Protection of Idle Pallets**, specifically, **sub-section 12.1.9.1- Wood Pallets**. Some of the recommendations and guidelines are summarized below.

• Protect steel columns to provide one hour fire resistance, or provide a side wall sprinkler located 15 feet above the floor and directed toward one side of the column. (This is not a requirement of NFPA 13, but is a sound loss prevention practice.)

• If a cut-off is provided, it should be constructed of noncombustible materials having a fire resistance of not less than two hours.

All openings should be protected by at least 11/ 2 hour listed fire doors.

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Sprinkler protection for idle wood pallets should meet the minimum requirements outlined in:

Tables 1. - Control mode density/area sprinkler protection of Wood Pallets
Tables 2. - CMSA sprinkler protection of Wood Pallets
Tables 3. - ESFR sprinkler protection of Wood Pallets
Tables 4- ESFR sprinkler protection of Plastic Pallets

CONTROL MODE DENSITY/AREA SPRINKLER PROTECTION
TABLE 1: TABLE 12.12.1.2(a)

TYPE OF SPRINKLER	LOCATION OF STORAGE	NOMINAL K-FACTOR	MAXIMUM STORAGE HEIGHT	MAXIMUM CEILING/ROOF HEIGHT	SPRINKLER DENSITY	AREAS OF OPERATION		WATER SUPPLY DURATION (HOURS)
						HIGH TEMP	LOW TEMP	
			FEET	FEET	GPM/FEET	FEET	FEET	
Control Mode Density/Area	On Floor	8 or larger	Up to 6	20	.20	2000	3000	1 1/2
	On Floor	11.2 or larger	Up to 8	30	.45	2500	4000	
	On Floor or racks without solid shelves	11.2 or larger	8 to 12	30	.60	3500	6000	
			12 to 20	30	.60	4500	-	
	On Floor	16.8 or larger	Up to 20	30	.60	-	2000	

Control mode density/area sprinkler protection provided for the general occupancy shall be considered adequate and no additional protection shall be required for idle wood pallet storage that meets *all* of the following three conditions:

1. Pallets stored no higher than **6 feet** and

2. Each pallet pile contains no more than **four stacks** (50 square feet) and

3. Each pallet pile is separated from other pallet piles by at least **8 feet of clear space** or **25 feet of commodity.**

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CMSA SPRINKLER PROTECTION
TABLE 2: TABLE 12.12.1.2(b)

STORAGE ARRANGEMENT	COMMODITY CLASS	MAXIMUM STORAGE HEIGHT FEET	MAXIMUM CEILING/ROOF HEIGHT FEET	K-FACTOR /ORIENTATION	TYPE OF SYSTEM	NUMBER OF DESIGNED SPRINKLERS	MINIMUM OPERATING PRESSURE	WATER SUPPLY DURATION (HOURS)
ON FLOOR	IDLE WOOD PALLETS	20	30	11.2 UPRIGHT	WET	15	25 PSI	1 1/2
					DRY	25	25 PSI	2
				16.8 UPRIGHT	WET	15	15 PSI	1 1/2
					DRY	25	15 PSI	2
				19.6 PENDENT	WET	15	16 PSI	1 1/2
			35	19.6 PENDENT	WET	15	25 PSI	1 1/2
			40	19.6 PENDENT	WET	15	30 PSI	1 1/2

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ESFR SPRINKLER PROTECTION
TABLE 3: TABLE 12.12.1.2(c)

TYPE OF SPRINKLER (ORIENTATION)	LOCATION OF STORAGE	NOMINAL K-FACTOR	MAXIMUM STORAGE HEIGHT	MAXIMUM CEILING/ROOF HEIGHT	MINIMUM OPERATING PRESSURE	WATER SUPPLY DURATION (HOURS)
			FEET	FEET	PSI	
ESFR (PENDENT)	ON FLOOR OR RACK WITHOUT SOLID SHELVES	14.O	25	30	50	1
			25	32	60	
			35	40	75	
		16.8	25	30	35	
			25	32	42	
			35	40	52	
		22.4	25	30	25	
			30	35	35	
			35	40	40	
		25.2	25	30	15	
			30	35	20	
			35	40	25	
ESFR (UPRIGHT)	ON FLOOR	14.0	20	30	50	
			20	35	75	
		16.8	20	30	35	
			20	35	52	

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INSIDE STORAGE: PLASTIC PALLETS

Inside storage of plastic pallets (other than those listed for having a demonstrated fire hazard equal to or less than idle wood pallets — generally unreinforced polypropylene or high density polyethylene) is not recommended. However, if storage in an attached building, or cut-off room is necessary, follow the guidelines provided in **NFPA 13, *Standard for the Installation of Sprinkler Systems*, Section 12.12- Protection of Idle Pallets, specifically, sub-section 12.12.2- Plastic Pallets.** Some of the recommendations and guidelines are summarized below.

*****Open storage within the main building should be avoided*****

Indoor storage of plastic pallets shall be permitted to be protected in accordance with the following arrangement if you do not have EFSR sprinkler protection:

(a) **Maximum** storage height of **10ft**.
(b) **Maximum** ceiling height of **30ft**.
(c) **Sprinkler density 0.6 gpm/ft over 2000 ft**.
(d) **Minimum** sprinkler **K-factor of 16.8**.

Where stored in cutoff rooms, the following shall apply:

a. Construct the storage location in an area that has at **least one exterior wall**.

b. The interior walls should be constructed of noncombustible material having a fire resistance rating of **at least three hours**.

c. Stack pallets on the floor, never on racks (unless protected by an ESFR as outlined in Table 4).

d. Stack plastic pallets **no higher than 12 feet**.

e. Ceiling height should **not be greater than 30 feet**.

f. Design sprinkler protection to deliver a density of **0.60 gallons per minute per square foot** over the entire area of the room.

g. Protect steel columns to provide one-hour fire resistance, or provide **a side wall sprinkler located 15 feet above the floor and directed toward one side of the column**.

Where stored without cutoff rooms, the following shall apply:

- Stack pallets no higher than **four feet**.
- Limit storage piles to a **maximum of two stacks**.
- Keep each pile **separated by eight feet of clear space or 25 feet of stored commodity**.
- Use only **286° F rated** high- temperature rated sprinklers.

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TABLE 4:
ESFR Protection For Idle Plastic Pallets

Type of Sprinkler	Location of Storage	Nominal K-factor	Max. Storage Height (feet)	Max. Ceiling Height (feet)	Min. Operating Pressure (psi)
ESFR (pendant)	On floor or rack without solid shelves	14.0	25	30	50
			25	32	60
			35	40	75
		16.8	25	30	35
			25	32	42
			35	40	52

Idle Pallets Stored on Racks, on Shelves and Above Doors. NFPA 13_12.12.3

12.12.3.1 **Idle wood pallets** shall be stored on racks or shelves, except where permitted in 12.12.1.3, 12.12.2.3 and 12.12.3.2.

12.12.3.2 **Idle wood pallets** shall be permitted to be stored on the lowest level of storage only where no storage or shelves are located above the stored pallets and the applicable protection criteria referenced in 12.12 are applied.

12.12.3.3 Where idle pallet storage is above a door, the idle pallet storage height shall be calculated from the base of storage above the door using the applicable protection criteria referenced in Section 12.12.-

These are general guidelines based on the requirements of ***NFPA 13 chapter 12.12**** and don't represent every protection configuration or storage option. Some plastic pallets have flammability more consistent with wood pallets and therefore have different protection requirements.

Fact Sheet on **iGPS** Plastic Pallets- http://www.igps.net/pallet_specs.php or

PDF form- http://www.igps.net/pdf/pallet_specs.pdf