City of Coalinga Fire Department

High-Piled Combustible Storage

FORM CPD-F-32

Coalinga Fire Department – 300 W Elm Ave., Coalinga – (559) 935-1652

High-Piled Combustible Storage

The intent of this guideline is to provide the requirements for the protection of high-piled storage (HPS) for a variety of commodities. HPS increases the potential fire hazard within a structure by increasing the vertical height of storage and by providing stability of storage (e.g., rack and automated storage) in a fire situation. The following requirements will ensure that the minimum measures required by code have been taken to provide for the public safety and that the required protection of these commodities has been designed in accordance with Chapter 32 of the 2019 California Fire Code (CFC), the 2016 California Building Code (CBC) and locally adopted ordinances enforced by Coalinga Fire Department (CFD).

This guideline provides the Fire Department's requirements for all HPS within the jurisdiction of the CFD. This does not address the structural design for stability of the storage required by the Building Safety Departments.

For the purposes of this guideline, certain terms are defined as follows:

Commodity
The combination of products, packing material, and container that determines commodity classification. NFPA 13 § 3.9.1.5

Free-Flowing Plastic Materials
Those plastics that fall out of their containers during a fire, fill flue spaces, and create a smothering effect on the fire. Examples include powder, pellets, flakes, or random-packed small objects [e.g., razor blade dispensers, 1 oz. to 2 oz. bottles]. NFPA 13 § 3.9.1.14

High-Piled Combustible Storage
The storage of combustible materials in closely packed piles, on pallets, in racks, or on shelves where the top of storage is greater than 12 feet in height. High-piled combustible storage also includes certain high-hazard commodities, such as rubber tires, Group A plastics, flammable and combustible liquids, idle pallets, and similar commodities where the top of storage is greater than 6 feet in height. CFC 3202

Note: To be considered non-high pile combustible storage for high hazard commodities ≤ 6 feet there cannot be any storage above it.

Max6’

High-Piled Storage Area
An area within a building that is designated, intended, proposed, or actually used for high-piled combustible storage. For purposes of selecting the applicable fire protection requirement row in Table 3206.2:

- This area shall include the "footprint" of the actual storage array (racks, shelves, fixtures, or pallets), inclusive of aisles within the storage area(s). When individual storage arrays are separated by less than 15-foot spaces, the spaces shall be considered aisles and shall be included in a single storage area footprint. When individual storage arrays are separated by more than 15-foot spaces, the individual arrays shall be considered separate storage areas with their own footprint calculation. CFC 3206.2
- Each storage area shall also include a 48-inch perimeter aisle calculated in the footprint. This additional perimeter aisle is not required for areas that abut to a wall. The aisle is the space between the racks not at the end of the rack.
- For multiple storage areas within a building, the aggregate of all high-piled storage areas shall be used for selecting the applicable row in Table 3206.2, unless such areas are separated from each other by a one-hour rated fire barrier wall constructed in accordance with Section 706 of the California Building Code (CBC). Openings in such walls shall be protected by fire assemblies having a one-hour fire-protection rating. CFC 3206.3.2.1

Listed-plastic pallets
Plastic pallets listed and labeled in accordance with UL2335 or FM 4996 shall be treated as wood for determining required sprinkler protection.

Rack Storage
A combination of vertical, horizontal, and diagonal members that support stored materials. Racks can be fixed or portable. NFPA13 Section 3.9.3.7

Open Rack
Racks without shelving or with shelving in racks that are fixed in place with shelves having a solid surface and shelf area equal or less than 20 ft^2 or with shelves having a wire mesh, slatted surface, or other material with openings representing at least 50 percent of the shelf area including the horizontal area of the rack members and where the flue spaces are maintained.

Shelf Storage
Storage on shelves less than 30 inches deep with the distance between shelves not exceeding three feet vertically. For larger shelves and other storage arrangements see *Rack Storage*. NFPA 13 Section 3.9.2.6

Solid Shelving
Shelving that is solid, slatted, mesh, or grated, or of other construction and less than 50% open located within racks that obstruct sprinkler water penetration through the racks. Within the codes that regulate HPS there are two different thresholds when the size of shelf is considered solid; the Fire Code specifies 32 ft^2 while NFPA 13 specifies 20 ft^2. In sprinklered buildings two factors are used to determine if the shelf is considered solid; the construction type of the shelf and the size of the product that will be stored on the shelf. If the item stored has a horizontal area that exceeds 20 ft^2 in size the shelf is considered

solid regardless of the construction of the shelf. As an example the HPS uses wire mesh shelves with an opening greater than 50%. The commodity being stored is on a non-standard pallet of 4' deep by 6' wide, total horizontal size = 24 ft^2. The shelving would be considered solid since the commodity exceeds 20 ft^2 irrespective that the shelf is wire mesh. NFPA 13 Section 3.9.3.8

1. General

   At the time of permit application, plans and specifications, including but not limited to the information listed below, shall be submitted for review and approval. For certain HPS reviews, the services of a design professional familiar with the requirements contained in CFC Chapter 32 may be of great assistance. All new plan submittals and revisions will consist of **2** plan hard copies and 1 electronic copy in pdf format. All electronic copies may be submitted on CD, DVD, or Memory Stick.

   To determine whether a High-Piled Storage plan is required to be submitted to CFD, please refer to Attachment 10. If a submittal is required, plans shall include the following information per CFC 3201.3 Items #1-14:

   1. A letter of intent containing a detailed description of the products to be stored and the description of all containers, pallets, and packaging materials. This letter must also include a detailed description of the storage methods (racks, shelves, and pallets), the total storage area in square feet, maximum storage height, aisle widths, and flue spaces. Within this letter, state that approved high piled storage plans will be maintained on site for the life of the HPS system(s). An authorized officer of the company or business must sign this letter. The letter shall be copied onto the plans.
   2. A scaled site plan that shows the entire building, including all fire access lanes, fire hydrants, fire department connection, and fire sprinkler risers. CFC 3206.6.
   3. A scaled floor plan of the building showing locations and dimensions of the HPS area, location of the racks, and access doors to the storage area.
   4. The maximum desired/proposed storage height for each designated storage area per array. This height is measured from the finished floor to the highest point of the commodity stored (not shelf level).
   5. The number of tiers within each rack.
   6. The commodity clearance between the top of storage and the sprinkler deflector for each storage arrangement.
   7. Aisle dimensions between each storage array. Aisles are measured from the actual edge of the commodity to commodity, not rack to rack.
   8. Maximum pile volume for each storage array for solid pile and shelf-storage.
   9. The location and classification of different commodity classes.
      In buildings with multi-tenant spaces, the plan shall show if the tenant spaces within the building are separated by a one-hour fire barrier, or that the adjacent tenant(s) does not have HPS. In the event that the adjacent tenant(s) has HPS and are not separated by a one-hour fire barrier per CBC Section 707, the aggregate of all areas of HPS within the building shall be used for the

application of Table 3206.2. Additionally, the provisions of CFC 3206.3.2.1 for multiclass high-piled storage areas shall apply.

10. The location of commodities that are banded or encapsulated.
11. The dimension and location of the transverse and longitudinal flue spaces.
12. The sprinkler design requirements based on commodity type, aisle width, and sprinkler temperature rating as outlined in NFPA 13, Chapter 12-18 (e.g., .45/3000 with 286-degree heads). A complete sprinkler design shall be submitted under a separate Service Request number by a C16 licensed contractor.
13. The location of all steel columns in relationship to the racks. All steel columns located within a rack flue space or immediately adjacent to a rack in an aisle may require protection. See NFPA 13, Section 16.1.4, 17.1.4, or 18.2.1.
14. The location, make, model, type, and automatic link temperature of the automatic/manual release smoke vents. In sprinklered buildings, the fusible links for smoke and heat vents shall operate at a temperature no less than 100 degrees above the sprinkler rating. In non-sprinklered buildings, the fusible links shall operate between 100 and 220 degrees above the ambient temperature. Gravity-operated drop-out vents shall operate at 500 degrees.

Note: New construction shall only use approved/labeled smoke vents as specified by CFC 910.3.1. Required smoke vents in existing structures (constructed under the 1998 or previous codes) shall be inspected for proper operation (manual & automatic) and proper link temperature by an independent qualified contractor. Non-required existing vents shall be either treated as a required vent or shall have the automatic and manual mechanism deactivated including the removal of the release handles.

An inspection report by the inspecting contractor shall be provided to CFD **prior to plan approval**. The report, at a minimum, shall identify the year the building was constructed, a roof plan showing the location of each vent inspected, the fusible link temperature rating, the presence of a manual release mechanism, and the operational status of each vent. Prior to submitting the report to CFD, all identified deficiencies must be corrected and included within the report.

If the smoke vents do not contain manual release devices, and CFD determines that the manual release devices were not specifically required at the time of construction or during any previously approved high piled storage use, then manual release devices will not be required. CFD staff will evaluate all other conditions on a case-by-case basis during the review process. If this requirement is placed, CFD staff will indicate the requirement adjacent to the CFD approval stamp on the final approved plans from the proposed operation. The vent inspection report shall be copied onto the plans prior to CFD plan approval.

Establishing HPS in an existing building where the building owner can demonstrate that the smoke & heat vents have been maintained and inspected per NFPA 204 a new inspection report will not be required. If required, the design (construction), location, and depth of the curtain board assembly, if applicable.

P. The occupancy group as defined by CBC Chapter 3.
Q. Pallet/commodity stop details for maintaining the required flue space (see Attachments 2-5, 7 & 8).
R. CFD requires that the High Pile Storage Minimum Information Form (Attachment 9) be completed and copied onto the first sheet of the HPS plan.

2. California Fire Code Permits—CFC 3201.2
Plans and specifications shall be submitted to the CFD Planning and Development Services Section as indicated elsewhere in this document. All permits will be issued following plan approval and completion of corresponding inspections of the HPS installation. A CFC permit is required when a building or portion thereof is used for high-piled storage exceeding 500 square feet in area (see the definition of high-piled storage area under "Scope"). CFC permit fees are invoiced annually.

3. Commodity Classification—CFC 3203
Commodities shall be classified as Class I, II, III, IV, or High Hazard, in accordance with CFC Chapter 32 and referenced standards.

Plastics shall be classified as Group A, B, or C in accordance with CFC Chapter 32. To determine the proper commodity classification of products with limited quantities of Group A plastics in mixed commodities, use CFC Figure 3203.7.4. This figure identifies the quantity of Group A plastics allowed to be stored in a package, carton, or on a pallet without increasing the hazard and commodity classification to "high hazard".

The designation and protection feature of a high-piled combustible storage area intended for storage of different commodity classes shall be based on the highest hazard commodity stored, except as otherwise provided for by engineering analysis in CFC 3204.2.

Note: Flammable liquids, flammable solids, flammable gasses, aerosols, explosives, oxidizers, and reactive materials, etc. fall under the category of hazardous materials and have additional codes that apply. Storage of hazardous materials often shall require submittal and approval of additional plans prior to further review of the high-piled storage plan.

4. General Fire-Protection Provisions—CFC 3206
Fire-protection features for high-piled storage areas shall be in accordance with CFC Chapter 32 and other nationally recognized standards approved by the CFD. Fire-detection systems, smoke and heat removal, curtain boards, and fire sprinkler design densities shall extend to 15 feet beyond the high-piled storage area or to a permanent partition, whichever is least. CFC 3206.2 The aggregate of all high-piled storage areas within a building shall be used to design the fire protection features found in CFC Table 3206.2 (attached), unless such areas are separated from each other by a one-hour fire barrier wall constructed in accordance with CBC 706. Distinct occupancy groups shall be separated according to CBC 508.

5. Fire Sprinkler Systems—CFC 3206.4
When fire sprinklers are required by CFC Table 3206.2 or the CBC (or if otherwise provided), the sprinkler system shall be installed in accordance with NFPA 13 or other applicable NFPA codes. A full description of the tables, figures, and curves in NFPA 13, Section 12 through 18 (Storage), shall be used to determine the design criteria required.

6. Fire Detection Systems—CFC 3206.5
When fire detection is required by CFC Table 3206.2, an approved automatic fire detection system shall be installed in accordance with NFPA 72 standard throughout the high-piled storage area. This system shall be installed and monitored as required by CFC 907.

7. Fire Department Access—CFC 3206.6
When building access is required by CFC Table 3206.2, access roadways shall be provided to within 150 feet of all portions of the exterior walls of the building used for high-piled storage. When access doors are required by CFC Table 3206.2, they shall be provided in each 100 lineal feet or faction thereof, of the exterior wall that faces the required access roadway. The required access doors shall be distributed such that the lineal distance between adjacent doors does not exceed 100 feet. Access doors shall be accessible without the use of a ladder. Roll-up doors shall not be used unless approved. Only approved locking devices shall be used.

8. Smoke and Heat Removal— as required per CFC 3206.8 and installed per CFC 910
When smoke and heat removal is required by CFC Table 3206.2, heat and smoke vents (installed in accordance with CFC 910.3) or a mechanical smoke removal system (installed in accordance with section 910.4) shall be of an approved type and shall operate automatically by a heat response device and contain a manual release roof handle. Vent size shall be in accordance with CFC 910.3.3 and equations 9-4 or 9-5. The fusible link temperature shall be rated as specified in Section 1-N.

Smoke and heat vents are ***not*** required per this chapter, when storage areas have an exit access travel distance of 250 feet or less and are protected by early suppression fast response (ESFR) sprinkler systems installed in accordance with NFPA 13. Smoke vents shall be inspected and maintained in accordance with NFPA 204

9. Draft Curtains
Where ESFR sprinkler systems are installed adjacent to sprinkler systems with standard-response sprinklers, a draft curtain of noncombustible construction and at least 2 ft. in depth shall be required to separate the two areas. NFPA 13

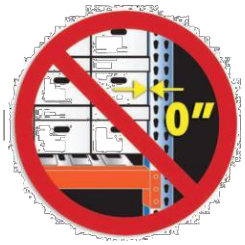
10. Rack Flue Spaces—CFC 3208.3
Requirements for flue spaces within the rack storage are provided in CFC Table 3208.3 (attached). Single and double row racks shall be equipped with a transverse flue space. A mechanical means shall be provided to maintain the transverse flue

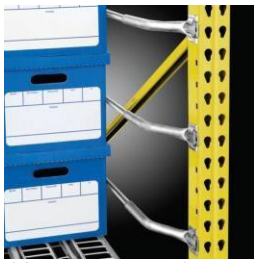
space at the uprights (Attachment 7, Method 1). The device and its installation method shall be identified on the plan. Transverse flue spaces between uprights shall be marked with a 3 or 6 inch yellow strip on the load beam with words in red that read, “Keep Clear,” as indicated below. Durable vinyl tape, paint, or other methods as approved by CFD may be used.

Double-row racks shall be equipped with a pallet/commodity stop along the longitudinal flue space at each level. The stop along the longitudinal flue space shall be steel or other ferrous material ¼” thick and, in the mounted position, shall extend a minimum of 4 inches above the shelf or cross member, or other method (i.e., 9 gauge chain link) approved by the fire code official (CFC 3208.3; see Attachments 1-5 & 8). The device and its installation method shall be identified on the plan. In double row racks, where products are hand-stacked, chain link shall be securely attached to the rear of both racks. The chain link shall be a minimum of 12 gauge. Attachment method shall be in compliance with Figure 3208.3 (Attachment 6) or other methods as approved by the fire code official**.**

NOTE: Regardless of the design of the pallet stop, the flue space shall be measured from the back of the pallet stop to the back of the pallet stop (see Attachment 8).

Transverse flue space is measured as the distance between the loads, not the distance between the racks. A flue space's net width is a measure of its gross width minus any horizontal obstructions, such as rack uprights, located within the flue space. In other words, a rack upright (typically 3 in. wide) is not considered a flue space, due to the cross bracing used.





ACCEPTABLE METHOD

11. Solid Piled and Shelf Storage
    Shelf storage, storage in solid piles, solid piles on pallets, and storage in bin boxes not exceeding five feet in any dimension shall be in accordance with CFC 3206 and 3207.

12. Rack Storage
    Rack storage in a non-sprinklered building shall be in accordance with CFC 3206 and 3208. Rack storage in a sprinklered building shall be in accordance with CFC 3206 and 3208; however the sprinkled protection for solid shelves shall be based on NFPA 13 definition for solid shelves.

    Where sprinklers are required for reasons other than those in Chapter 32, the portion of the sprinkler system protecting the high piled storage area shall be designed and installed in accordance with Sections 3207 and 3208.

13. Column Protection
    Where fireproofing of building columns is not provided and storage heights are in excess of 15 ft., protection of building columns located wholly or partially within the rack footprint inclusive of flue spaces or within 12 in. of the footprint shall be protected in accordance with one of the options in NFPA 13 Section 16.4.1.

14. In-Rack Sprinklers
    In-rack sprinklers shall be located at an intersection of transverse and longitudinal flues spaces not exceeding the maximum spacing rules NFPA 13 Section 16.1.8.4

15. Automated Storage
    Automated storage similar to carousel storage shall be in accordance with CFC 3209.

16. Specialty Storage—CFC 3210
    Record storage facilities used for rack or shelf storage of combustible paper records greater than 12 feet in height shall be in accordance with CFC 3206, 3208, and NFPA 13. Palletized storage of records shall be in accordance with CFC 3207.

CFC Chapter 9

All fire and life safety equipment and systems required by the CFC shall be maintained operable at all times. Equipment, devices, and systems shall be regularly tested in accordance with nationally recognized standards, manufacturers' recommendations, and adopted regulations.

The responsibility for inspections, maintenance of the HPS areas as approved, and all fire and life safety equipment and systems required by the CFC shall be the ultimate responsibility of the building owner provided that this responsibility has not been transferred in written form to a management company or other party via a lease agreement or other legal document.

DO NOT STORE ABOVE THE YELLOW LINE

Note: As required by the fire code official, a visual method of indicating the maximum allowable storage height shall be provided. CFC 3205.6

CFC Chapter 3201.3
A copy of the approved HPS plans shall be signed by the CFD Fire Inspector upon issuance of the permit. This copy of the plans shall be maintained on site for the life of the HPS system. CFD shall be consulted prior to any changes in the approved/existing/permitted HPS system(s).

Due to the complexity of the designs specified within the CFC and adopted standards, it may be necessary to obtain the service of a fire protection design professional to assist with developing a protection scheme that meets the requirements of the CFC and other applicable regulations.

TABLE 3206.2: GENERAL FIRE-PROTECTION AND LIFE-SAFETY REQUIREMENTS

Commodity Class	Size of High-Piled Storage Area [a] (square feet) (See Sections 3206.2 and 3206.4)	ALL STORAGE AREAS (See Sections 3206, 3207 and 3208) [b]				SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (See Section 3207.3)		
		Automatic Fire-extinguishing System (See Section 3206.4)	Fire-detection System (See Section 3206.5)	Building Access (See Section 3206.6)	Smoke and Heat Removal (See Section 3206.7)	Maximum Pile Dimension c	Maximum Permissible Storage Height d (feet)	Maximum Pile Volume (cubic feet)
I-IV	0-500	NR [a]	NR	NR [e]	NR	NR	NR	NR
	501-2,500	NR [a]	Yes [i]	NR [e]	NR	100	40	100,000
	2,501-12,000 Public Accessible	Yes	NR	NR [e]	NR	100	40	400,000
	2,501-12,000 Nonpublic Accessible (Option 1)	Yes	NR	NR [e]	NR	100	40	400,000
	2,501-12,000 Nonpublic Accessible (Option 2)	NR [a]	Yes	Yes	Yes [j]	100	30 [f]	200,000
	12,001-20,000	Yes	NR	Yes	Yes [j]	100	40	400,000
	20,001-500,000	Yes	NR	Yes	Yes [j]	100	40	400,000
	500,000+ [g]	Yes	NR	Yes	Yes [j]	100	40	400,000
High-hazard	0-500	NR [a]	NR	NR [e]	NR	50	NR	NR
	501-2,500 Public Accessible	Yes	NR	NR [e]	NR	50	30	75,000
	501-2,500 Nonpublic accessible (Option 1)	Yes	NR	NR [e]	NR	50	30	75,000
	501-2,500 Nonpublic accessible (Option 2)	NR [a]	Yes	Yes	Yes [j]	50	20	50,000
	2,501-300,000	Yes	NR	Yes	Yes [j]	50	30	75,000
	300,001-500,000 [g, h]	Yes	NR	Yes	Yes [j]	50	30	75,000

NR = Not Required

[a] When fire sprinklers are required for reasons other than those in Chapter 32, the portion of the sprinkler system protecting the high-piled storage area shall be designed and installed in accordance with Sections 3207 and 3208.

[b] For aisles, see Section 3206.9.

[c] Piles shall be separated by aisles complying with Section 3206.9.

[d] For storage in excess of the height indicated, special fire protection shall be provided in accordance with Footnote g when required by the chief. See also Chapters 51 and 57 for special limitations for aerosols and flammable and combustible liquids, respectively.

[e] Section 503 shall apply for fire apparatus access.

[f] For storage exceeding 30 feet in height, Option 1 shall be used.

[g] Special fire-protection provisions including, but not limited to, fire protection of exposed steel columns; increased sprinkler density; additional in-rack sprinklers, without associated reductions in ceiling sprinkler density; or additional fire department hose connections shall be provided when required by the chief.

[h] High-piled storage areas shall not exceed 500,000 square feet. A two-hour fire wall constructed in accordance with the California Building Code shall be used to divide high-piled storage exceeding 500,000 square feet in area.

[i] Not required when an automatic fire-extinguishing system is designed and installed to protect the high-piled storage area in accordance with Sections 3207 and 3208.

[j] Smoke and heat vents are *not* required when storage areas with an exit access travel distance of 250 feet or less are protected by either early suppression fast response (ESFR) sprinkler systems installed in accordance with NFPA 13 or control mode special application sprinklers with a response time index of 50 $(m \cdot s)^{1/2}$ or less that are listed to control fire in the stored commodities within 12 or fewer sprinklers, installed in accordance with *Section 903.3.1.1*.

TABLE 3208.3: REQUIRED FLUE SPACES FOR RACK STORAGE

RACK CONFIGURATION	FIRE SPRINKLER PROTECTION Storage Height		SPRINKLER AT THE CEILING WITH OR WITHOUT MINIMUM IN-RACK SPRINKLERS			IN-RACK SPRINKLERS AT EVERY TIER	NON-SPRINKLERED
			≤ 25 feet		> 25 feet	Any Height	Any Height
			Option 1	Option 2			
Single-row Rack	Transverse Flue Space	Size [b]	3 inch	NA	3 inch	NR	NR
		Vertically Aligned	NR	NA	Yes	NA	
	Longitudinal Flue Space		NR	NA	NR	NR	
Double-row Rack	Transverse Flue Space	Size [b]	6 inch [a, c]	3 inch	3 inch	NR	
		Vertically Aligned	NR	NR	Yes	NA	
	Longitudinal Flue Space		NR	6 inch	6 inch	NR	
Multi-row Rack	Transverse Flue Space	Size [b]	6 inch [c]	NA	6 inch	NR	
		Vertically Aligned	NR	NA	Yes	NA	
	Longitudinal Flue Space		NR	NA	NR	NR	

NR = “not required” NA means “not applicable”

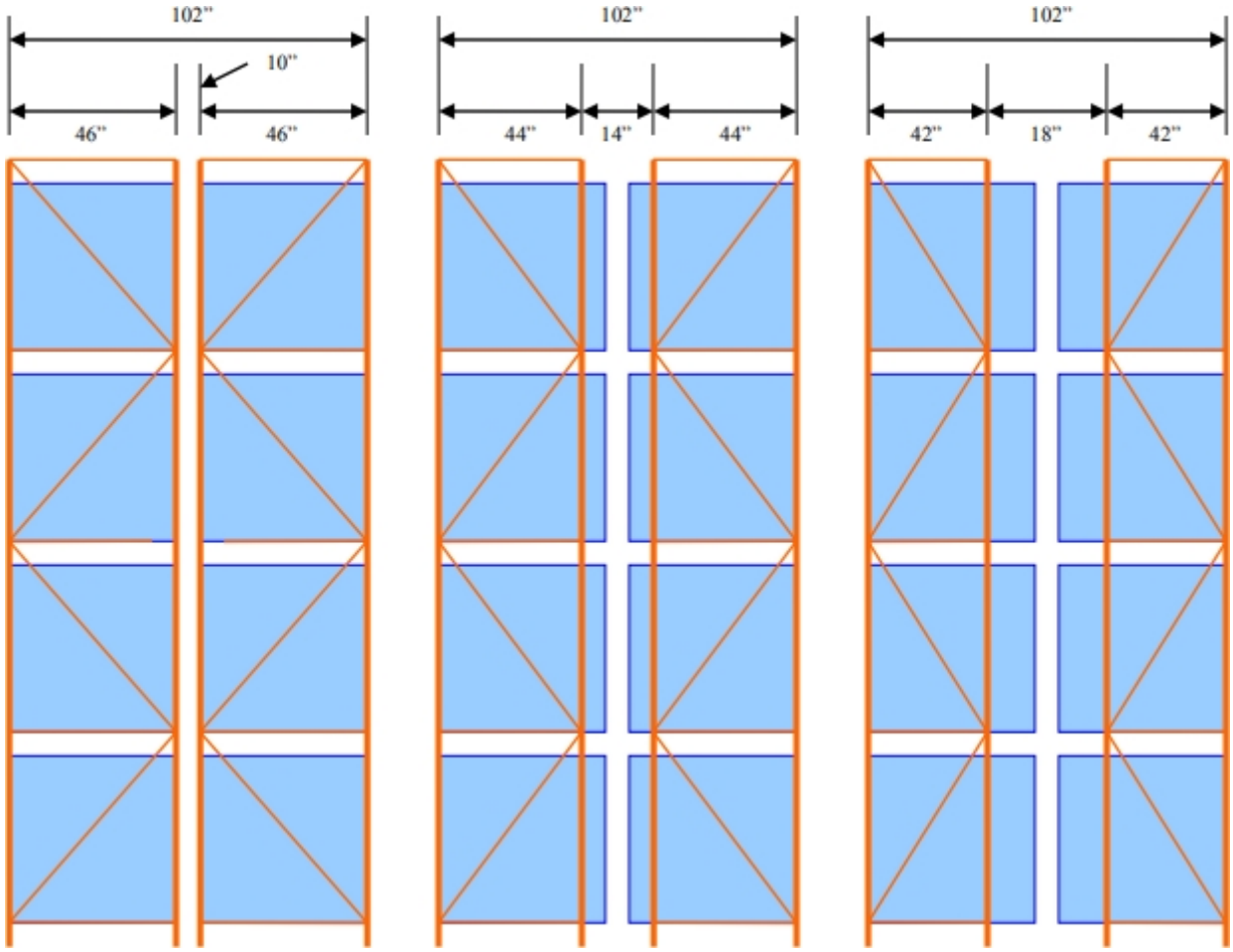
[a] Three-inch transverse flue spaces shall be provided at least every 10 feet where ESFR sprinkler protection is provided.

[b] Random variations are allowed, provided that the configuration does not obstruct water penetration.

[c] Transverse flue spaces shall be maintained by methods as approved. (See NFPA 13 section 16.1.6.3 for situations where transverse flues spaced at maximum 5 ft. intervals can remove the consideration as solid shelving and the need for in-rack sprinkler protection.)

ATTACHMENT 1

LOAD BEAM CONFIGURATION NOT REQUIRING PALLET STOPS



NOTES:

1. MAXIMUM PALLET DEPTH 48”
2. STORAGE ON LOAD BEAM ONLY, NO SHELVING, WIRE MESH GRATING, OR PALLET SUPPORTS.
3. 6” FLUE SPACE SHALL BE MAINTAINED AT ALL TIMES.
4. CHANGE TO THE STORAGE CONFIGURATION REQUIRES PRIOR CFD APPROVAL.

NOTES:

1. WHEN 42” UPRIGHTS ARE UTILIZED WITH AN 18” ROW SPACER AND A TYPICAL 48”x40” PALLET IS USED, NO PALLET STOPS ARE REQUIRED.
2. WHEN 44” UPRIGHTS ARE UTILIZED WITH A 14” ROW SPACER AND A TYPICAL 48”x40” PALLET IS USED, NO PALLET STOPS ARE REQUIRED.
3. WHEN 46” UPRIGHTS ARE UTILIZED WITH A 10” ROW SPACER AND A TYPICAL 48”x40” PALLET IS USED, NO PALLET STOPS ARE REQUIRED.

ATTACHMENT 2

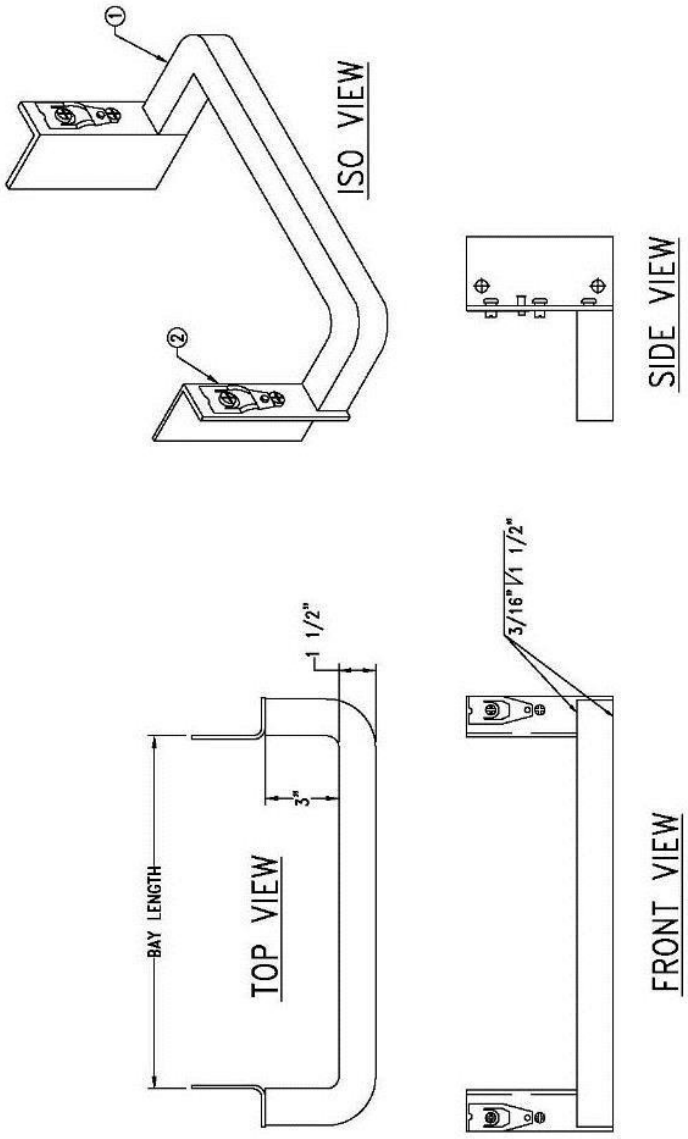
STORAGE CONFIGURATION REQUIRING PALLET STOPS

ATTACHMENT 3

STRUCTURAL “C” CHANNEL BEAM DETAIL

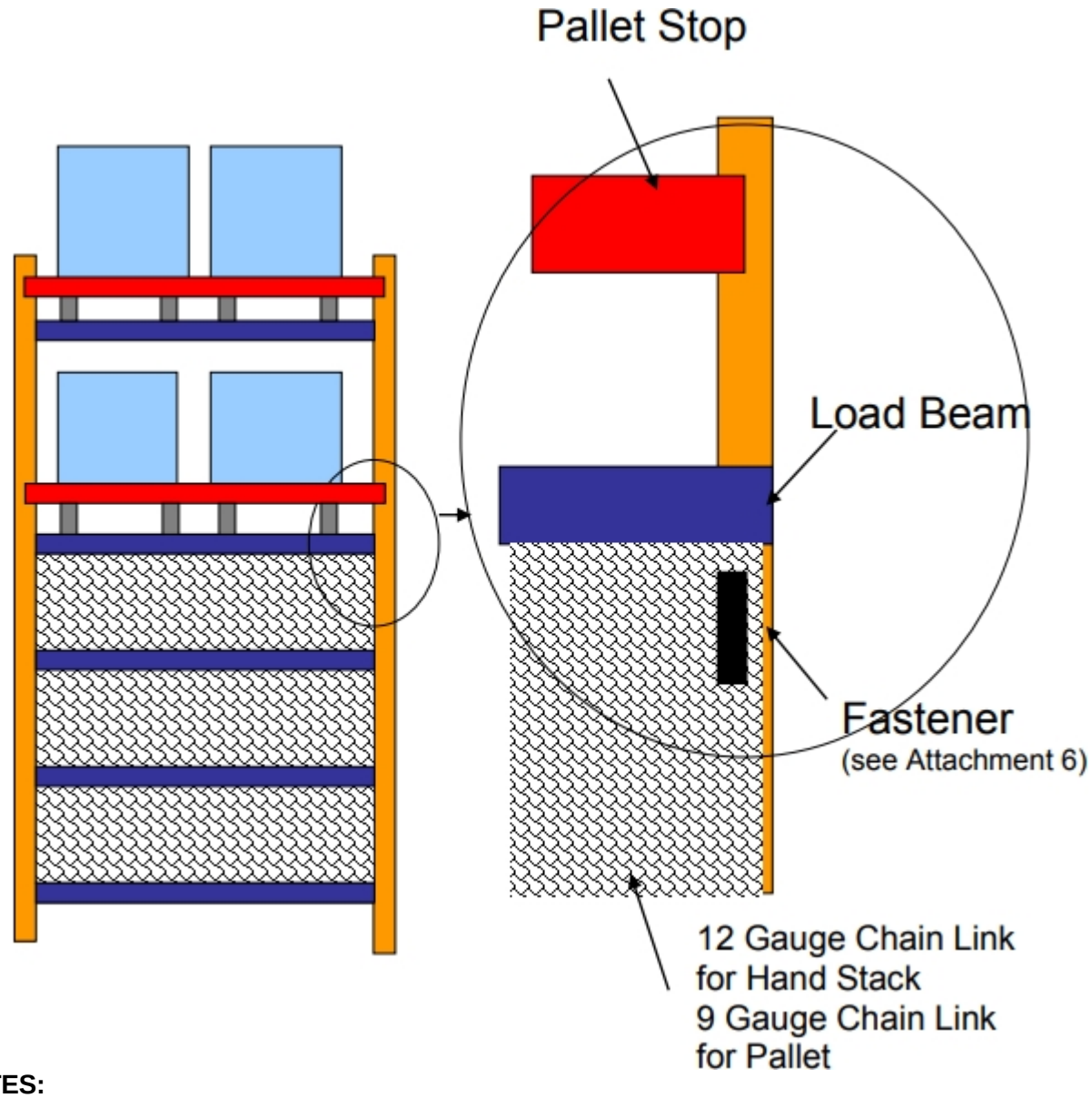
ATTACHMENT 4

ROLL FORM RACKING DETAIL



ATTACHMENT 5

STORAGE CONFIGURATION FOR HAND STACK RACK



NOTES:
HAND STACKING/PICKING RACKS: HAND STACKING NON-PALLETIZED AREAS SHALL BE PROVIDED WITH A MEANS TO ENSURE THAT THE FLUE SPACESA RE MAINTAINED. HAND STACK LOCATION WILL BE SECURED FLUSH TO THE REAR COLUMN OF EACH FRAME AS SHOWN IN ATTACHED DETAIL (SEE ATTACHMENT 6 FOR CHAIN LINK).

9 Gauge Chain Link Fence for Pallet Loads.
12 Gauge Chain Link for Hand Stack Loads.

ATTACHMENT 6

CHAIN LINK ATTACHMENT METHOD DETAIL

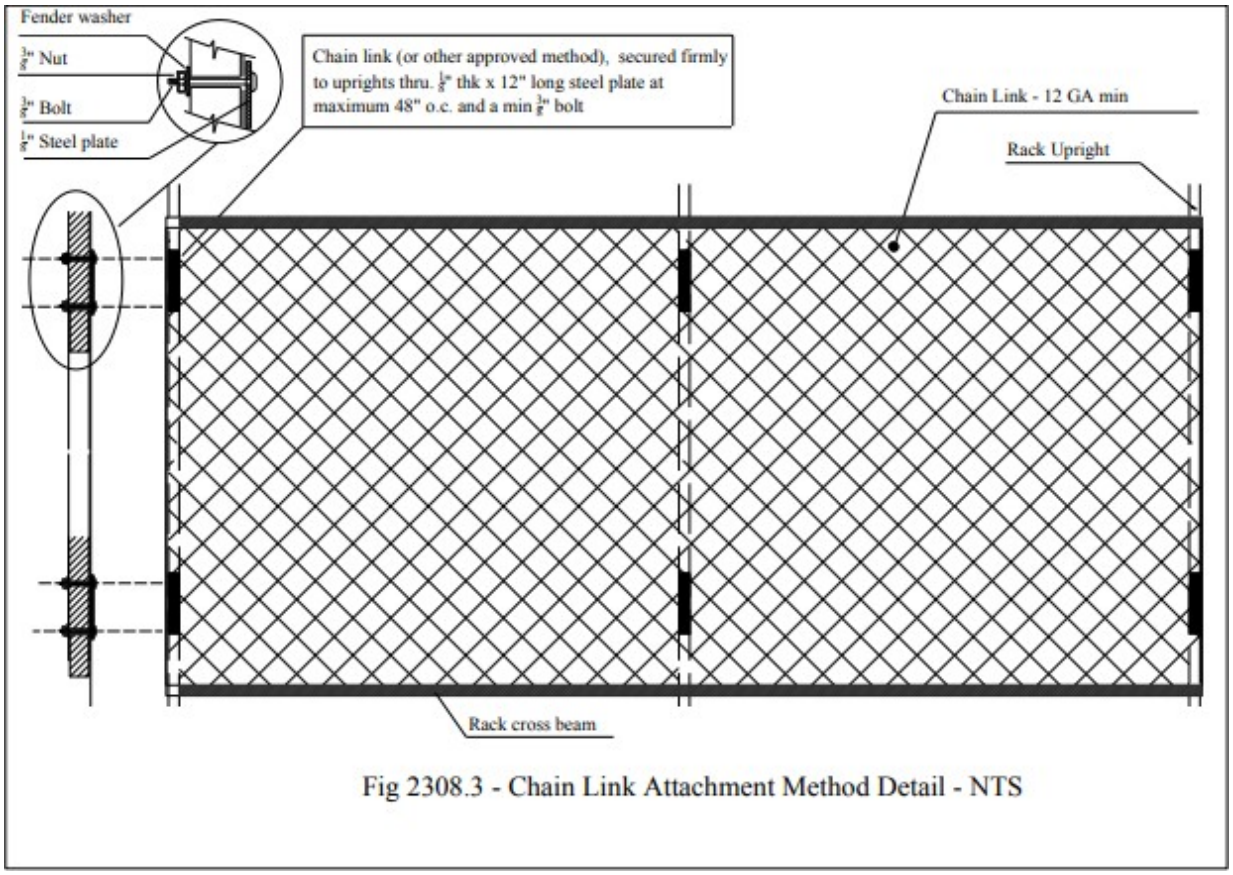
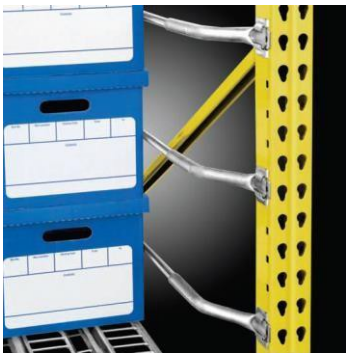


Fig 2308.3 - Chain Link Attachment Method Detail - NTS

ATTACHMENT 7

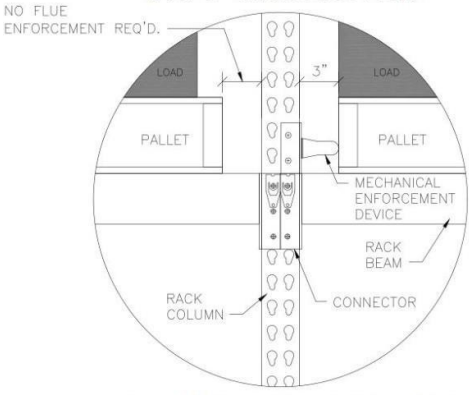


Method 1

Method 2

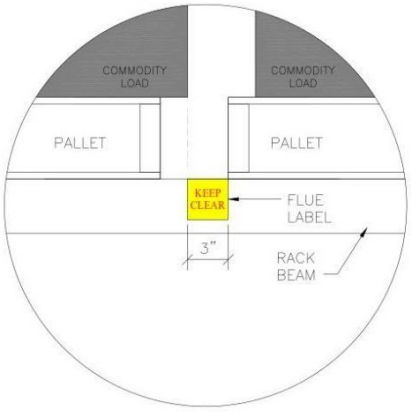
AISLE SHIELD

DETAIL 1
MECHANICAL ENFORCEMENT DEVICE AT RACK COLUMN
(NET 3" TRANSVERSE FLUE)



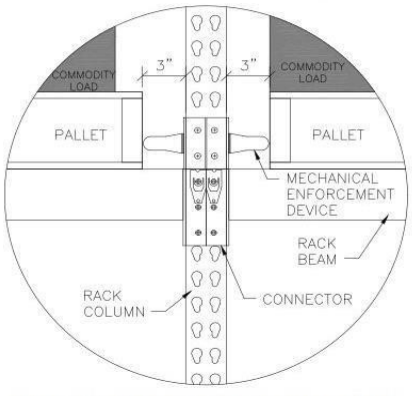
NOTE: TO BE USED WITH DETAIL 2 ONLY

DETAIL 2
3" TRANSVERSE FLUE LABEL
BETWEEN PALLET LOADS



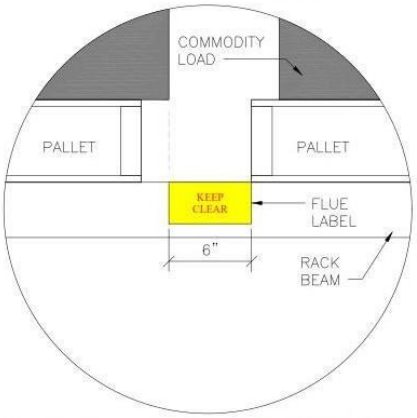
NOTE: TO BE USED WITH DETAIL 1 ONLY

DETAIL 3
MECHANICAL ENFORCEMENT DEVICE AT RACK COLUMN
(NET 6" TRANSVERSE FLUE)



NOTE: TO BE USED WITH DETAIL 4 ONLY

DETAIL 4
6" TRANSVERSE FLUE LABEL
BETWEEN PALLET LOADS



NOTE: TO BE USED WITH DETAIL 3 ONLY

ATTACHMENT 8
Pallet Stop
Longitudinal Flue Clear Space

ATTACHMENT 9

High Pile Storage (HPS) Required Information

The following form shall be completed for each storage configuration and/or storage area. The completed form shall be copied onto the HPS plans for all projects within CFD jurisdiction:

Commodity Classification:
I II III IV High Hazard Group A plastic
Commodity description: _____
_____
_____
_____
_____

Cartoned Free flowing Non-expanding Encapsulated Non-encapsulated
Other_____
The area designated in the building and used for high piled storage is _____square feet.
CLASS ____commodity, ____sq. ft.
CLASS ____commodity, ____sq. ft.
CLASS ____commodity, _____sq. ft.
The maximum permitted storage height (solid pile _____rack _____)
The following storage methods are employed at this facility:
Solid pile storage Palletized Single row rack Double row rack Multi-row rack
Other (Describe):_____
Rack storage shelf: N/A Load beam only Wire mesh Wood slates Plywood
Other (Describe):_____
Minimum distance between top of storage and sprinkler_____
Smoke vents required Yes No
Operation of smoke vents (if applicable)
Manual
Automatic via fusible link which releases at_____degree F.
(Note: New installations require manual & automatic release)
Inspection Report shall indicate which vents were tested
Draft Curtains Required? Yes No
The overhead fire sprinkler system utilizes the following heads:
ESFR: K_____at_____PSI with ^{O}F heads
Standard Coverage Heads: K_____ Pendant Upright _____degree with a density of____
gpm over_____square feet spaced at a maximum of _____square feet per fire sprinkler
The fire sprinkler system density and area of application for the storage area is _____gpm/ft^2 over___ ft^2
In-rack sprinklers required Yes No
There is/are_____level(s) of in-rack fire sprinkler protection.
The aisles between the racks shall be maintained at _____feet.
Fire Doors required? Yes No
Flue Spaces required? Yes No
Flue space between racks shall be maintained a minimum of:
Transverse _____" clear. Must be vertically aligned (for storage >25')
Longitudinal _____" clear
Column protection required? Yes No
Pallet Stops required? Yes No
Longitudinal pallet stop configuration
Chain Link Roll Form "C" Channel Other _____
Transverse Flue Pallet Stop configuration
Mechanical means (flue keepers, etc.) Load beam markings "Keep Clear"
Hand Stack? Yes No # of tiers: _____Chain link required Yes No
Idle wood pallet floor storage shall not exceed 5 feet. Yes No
Storage configuration and height delineated by indication on floor or walls. Yes No
Additional conditions: _____

Are there any hazardous materials stored in the High Piled Storage Area?
Yes – Provide the Service Request (SR#) for the approved hazardous material review – **SR#**_____
No – Provide a note on the plans stating "No hazardous material storage allowed without OCFA approval."

ATTACHMENT 10

Do I need to submit a high-piled storage plan to CFD?

Use the following flow chart to determine whether you have High Piled Storage (HPS) that requires review and approval by CFD via a plan submittal. To qualify, the answer to each of the three questions in the blue boxes must be "yes." Additional clarifying information for each question is provided in the footnotes.

START HERE:

Is the commodity, packaging, or pallet combustible? [1]

YES

Is storage higher than 12' for ordinary combustibles or 6' for high-hazard materials? [2]

YES

Is the aggregate HPS area larger than 500 sq.ft.? [3]

YES

Storage is HPS. Submittal of a HPS plan (fee code PR330) to CFD is required. Submittal of other plan types may also be necessary based on the type of commodities stored (e.g., hazardous materials, flammable or combustible liquids) or requirements of CFC Chapter 32 (e.g., smoke detection system, fire sprinklers).

No

No

No

Storage is not HPS. Submittal of a HPS plan to CFD is not required, though other plan types may be required based on the type of commodity stored (e.g., flammable/combustible liquids, hazardous materials)

FOOTNOTES:

1. **Is any part of the commodity, including its packaging or pallet, combustible?**
   - An example of non-combustible commodity storage would be metal engine parts stored directly on metal skids; metal parts on wood pallets or stored in cardboard boxes or plastic bins/bags are considered combustible because of the pallets or packaging.
2. **Is the storage height greater than 12 ft. for ordinary combustibles and/or greater than 6 ft. for high-hazard combustibles?**
   - Storage height is measured to the top of the commodity, not the rack or shelf the commodity is stored on. The stated maximum storage height needs to be within reason relative to rack or shelf heights; for example, 18 ft. racking/shelving is proposed but storage is stated to be kept to 12 ft. with no physical means to limit storage height; this should be reviewed as HPS.
   - Ordinary combustibles include, but are not limited to: wood and paper products; natural and synthetic fabric/clothing (other than rayon); food products; Level 1 or 2 aerosols; water-based paint in plastic containers or oil-based paint; wood or metal furniture with combustible components (padding, upholstery); and similar products.
   - High-hazard combustible commodities include, but are not limited to: plastic; rubber, foam rubber and foam plastic; tires; storage of idle pallets; Level 3 aerosols; lacquers and solvents; flammable or combustible liquids; rayon fabric/clothing; mattresses; and similar products and materials.
   - Any combustible storage above or below high-hazard combustibles is considered as part of the high-hazard combustible storage overall height
3. **Is the aggregate HPS area greater than 500 sq. ft.?**
   - HPS area definition: An area within a building that is designated, intended, proposed, or actually used for high-piled combustible storage.
   - Aggregate area for rack storage shall include:
     - the "footprint" of the actual HPS rack storage array, inclusive of aisles within the storage area(s). When individual storage arrays are separated by less than 15-foot spaces, the spaces shall be considered aisles and shall be included in a single storage area footprint. When individual storage arrays are separated by more than 15-foot spaces, the individual arrays shall be considered separate storage areas with their own footprint calculation.
     - a 48-inch perimeter aisle calculated in the footprint. This additional perimeter aisle is not required for areas that abut a wall. The aisle is the space that parallels the rack and does not include open space along the end of the rack.
   - Aggregate area for palletized, solid-piled, and shelf storage shall include:
     - the "footprint" of each palletized, solid-piled and shelf storage array, non-inclusive of aisles.