GRESHAM FIRE DEPARTMENT

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Fire Sprinkler & Storage Racking Guidelines
for
High Piled Combustible Storage

This guide outlines high piled storage requirements found in the 2022 Oregon Fire Code (OFC) (Chapter 32), NFPA 13 (Chapters 12, 14-18) and Gresham Fire Department (GFD) policies. This guide includes plan review submittal requirements for racking systems subject to approval by the City of Gresham and GFD as the authority having jurisdiction.

This guide includes Description of Storage Inventory **(Appendix I)** and Storage Design forms **(Appendix II)** that can assist in the engineering design of sprinkler protection and/or racking systems for high piled storage areas. **These completed form(s) must be attached to plans and submitted for review.**

Approval must be granted prior to the installation of racking systems and/or modifications to an existing sprinkler system for the accommodation of high piled storage. There may be additional material specific requirements as found in the OFC.

Work that deviates from any approved plans shall require additional written approval from GFD. Utilizing information in this guide will avoid incomplete plan review submittals that cause delays and effect permit approvals that may interfere with installation timelines.

Plan Review Submittal Requirements:

Plans submitted for review must comply with the applicable requirements in this guide.

- Scaled floor plans of building detailing location and dimensions of high plied storage areas.
- Identify usable storage height for each storage area. Refer to OFC Table 3206.2 General Fire Protection and Life Safety Requirements when determining applicable storage height(s). Storage height signage must be posted in storage areas. Signs shall be constructed and installed as described in **Appendix III.**
- Determine flue space requirements. Provide code support for the determination. If required, identify flue space for each racking configuration. Note: flue space is measured by the space between the loads, not between the pallets. If the load extends three inches off the side of the pallet, begin measuring the flue space from there, not the end of the pallet.
- Flue space signage must be posted in storage areas. Signs shall be constructed and installed as described in **Appendix III.**
- Number of tiers within each rack, if applicable.
- Aisle dimensions between each storage array.
- Maximum pile volume for each storage array.
- Location and classification of commodities which are banded or encapsulated.
- Location of Exits. NOTE: Storage is not allowed above the egress aisles including tunnels between racks and exit doors. Structural supports and catwalks are allowed. OFC 3206.10.2

- Location of required fire department access doors. Firefighter access doors are required maximum every 125 lineal feet along exterior walls that face fire apparatus access roads (OFC 3206.7.5)
- Classification and location of portable fire extinguishers.
- Type of fire suppression and fire detection systems.
- Location of valves controlling the water supply of ceiling and in-rack sprinklers.
- Type, location and specifications of smoke removal and draft curtain systems.
- Additional information regarding required design features, commodities, storage arrangement and fire protection features within the high piled area shall be provided at the time of the permit submittal as required by GFD.

Appendix I

Description of Storage Inventory for Determining Sprinkler Requirements*

Business Name_____Address:_____Date:_____

Item #	Product Description	Packaged: CB, WC, PC	Packing Material: P, S, CB, NA	Pallet Type: W, HDP, RP, URP	If on Pallet: E, NE, B	Commodity Class: I, II, III, IV Plastics: A, B, C	Storage Location
1.							
2.							
3.							

***Definition-Encapsulation:**

Packaging with a plastic sheet completely enclosing the sides and top of a pallet load containing a combustible commodity. Banding around the sides is not encapsulation. Individually wrapped combustible commodities stored exposed in a pallet are encapsulated.

- **Packaged:**
  CB= Cardboard Box WC= Wood Crate PC=Plastic Crate/box
- **Packing Material (interior of package)**
  P = Packing Peanuts (expanded foam) S= Styrofoam CB = Cardboard
  NA = None
- **Pallets:**
  RP = Reinforced Polypropylene URP = Unreinforced polypropylene
  HDP = High Density Polyethylene WP = Wood Pallet
- **If on a pallet:**
  E = Encapsulated, see definition above NE = Not encapsulated B = Banding

Appendix II

Storage Design Information

Storage up to 25 feet

Type of Storage: ____Pallet ____Solid Pile ____Shelf ____Bin Box ____Rack

Entire storage design based on highest commodity class: ____Y ____N **or** mixed commodity ____Y ____N

NFPA Code Year utilized for design_____Code/Table Section_____

If based as a mixed commodity is the design approach as: ____lower commodity class or ____commodity segregation in accordance with NFPA 13-5.6.1.2.

Business Name_____Address_____Date_____

Rack or Area ID Per Floor Plan	Stg. Ht.	Ceiling Ht. & Slope	Commodity Class Storage Type	Encapsulated ___Y ___N	Aisle Width ___4' ___8'	Rack __Single __Double __Multiple	Rack Shelving __Solid __Slat __N/A	Rack Sprinkler ___Y ___N Provide Ref.	Sprinkler System ___Wet ___Dry	Type Sprinkler __Std. __Lg. drop __ESFR	Sprinkler Temp __165F __286F	K Factor	Sprinkler Coverage area	Design Area & Density	Ceiling Design Used: Provide Ref.	Design Adjustment Provide Code Ref and Percentage

Commodity Class and Type of Storage: The commodity class should be determined from the product inventory provided by the architect, design professional or owner. The inventory must describe the product, provide the weight or package volume of the amount of plastic or rubber, how the product is packaged, stacked on wood or the type of plastic pallet, and if encapsulated. This information must accompany this Storage Design Information so commodity classification can be verified. State type of storage i.e. pallet, shelf, bin box or rack.

Column Legend: If the entire storage area is going to utilize the highest commodity class, at least one row of design information must be provided. Use N/A if a column is not applicable.

Rack Identification or Area Identification: Provide a copy of the building floor plans showing racking layout and designate commodity storage locations. The architectural floor plans must designate the rack and or storage locations and the inventory commodity classification for each rack and/or storage area. From those plans note in this column the designation of the rack/area to be covered by the sprinkler design specified in the same row.

Sprinkler System Information: Include information in these columns about the type, temperature rating, coverage area and K factor of sprinkler heads used. Include the sprinkler system design area and density information. Include sprinkler head product information specifications for the type of heads installed/to be installed.

Ceiling Design Curve Used: Provide the NFPA code reference, table, and associated figure references and the adjustment percentage from which the design adjustments are taken. The design adjustment percentages are related to storage height, system type, encapsulation, in-rack sprinklers, and footnotes.

In-rack sprinkler Code reference. Provide the NFPA reference, table and association figure references used for the in-rack sprinkler design.

Storage Design Information

Storage Greater than 25 feet

Type of Storage: ____Pallet ____Solid Pile ____Shelf ____Bin Box ____Rack

Entire storage design based on highest commodity class: ____Y ____N **or** mixed commodity ____Y ____N

NFPA Code Year utilized for design_____Code/Table Section_____

If based as a mixed commodity is the design approach as: ____lower commodity class or ____commodity segregation in accordance with NFPA 13-5.6.1.2.

Business Name_____Address_____Date_____

Rack or Area ID Per Floor Plan	Stg. Ht.	Ceiling Ht. & Slope	Commodity Class Storage Type	Encapsulated ___Y ___N	Aisle Width ___4' ___8'	Rack __Single __Double __Multiple	Rack Shelving __Solid __Slat __N/A	Rack Sprinkler ___Y ___N Provide Ref.	Sprinkler System ___Wet ___Dry	Type Sprinkler __Std. __Lg. drop __ESFR	Sprinkler Temp __165F __286F	K Factor	Sprinkler Coverage area	Design Area & Density	Ceiling Design Used: Provide Ref.	Design Adjustment Provide Code Ref and Percentage

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In-rack sprinkler Code reference. Provide the NFPA reference, table and association figure references used for the in-rack sprinkler design.

Storage Design Information

Miscellaneous and/or Class I –IV Storage up to 12feet

Or

Group A plastics, tires, rolled paper and pallet storage up to 12 feet

Type of Storage: ____Pallet ____Solid Pile ____Shelf ____Bin Box ____Rack

Entire storage design based on highest commodity class: ____Y ____N **or** mixed commodity ____Y ____N

If based as a mixed commodity is the design approach as: ____lower commodity class or ____commodity segregation in accordance with NFPA 13-5.6.1.2.

Business Name_____Address_____Date_____

Rack or Area ID Per Floor Plan	Stg. Ht.	Ceiling Ht. & Slope	Commodity Class Storage Type	Encapsulated ___Y ___N	Aisle Width ___4' ___8'	Rack __Single __Double __Multiple	Rack Shelving __Solid __Slat __N/A	Rack Sprinkler ___Y ___N Provide Ref.	Sprinkler System ___Wet ___Dry	Type Sprinkler __Std. __Lg. drop __ESFR	Sprinkler Temp __165F __286F	K Factor	Sprinkler Coverage area	Design Area & Density	Ceiling Design Used: Provide Ref.	Design Adjustment Provide Code Ref and Percentage

Commodity Class and Type of Storage: The commodity class should be determined from the product inventory provided by the architect, design professional or owner. The inventory must describe the product, provide the weight or package volume of the amount of plastic or rubber, how the product is packaged, stacked on wood or the type of plastic pallet, and if encapsulated. This information must accompany this Storage Design Information so commodity classification can be verified. State type of storage i.e. pallet, shelf, bin box or rack.

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In-rack sprinkler Code reference. Provide the NFPA reference, table and association figure references used for the in-rack sprinkler design.

Appendix III

Signage Requirements

- Install rigid plastic or metal signs on every other rack end. Signage must include:

  MAXIMUM STORAGE HEIGHT 0’ (example)

  LONGITUDINAL FLUE SPACE 0” (example)
  TRANSVERSE FLUE SPACE 0” (example)

  KEEP FLUE SPACE CLEAR AT ALL TIMES

- Signs shall be white in color.
- Letters on signs shall be a minimum 3” black letters.
- Signs shall be permanently affixed to racks between 80” to 96” measured from the floor.

MAX. STORAGE HT. 0’ 0”

LONGITUDINAL FLUE SPACE 0”

TRANSVERSE FLUE SPACE 0”

KEEP FLUE SPACE CLEAR AT ALL TIMES