

<b>July 1, 2010</b>	<b>SANTA ROSA FIRE DEPARTMENT</b> <b>FIRE PREVENTION BUREAU</b> <b>PLAN REVIEW CHECKLIST</b>
	<b>HIGH PILED COMBUSTIBLE STORAGE</b>

<b>Address:</b>	<b>Permit #:</b>
<b>Inspector:</b>	<b>Date:</b>
<b>Inspector:</b>	<b>Date:</b>
<b>A-Approved; AC-Approved w/comments; I-Incomplete; D-Denied</b>	

**This Checklist outlines general requirements for High Piled Storage. Information contained herein applies to typical instances and may not address all circumstances.**

**CODE REFERENCES**

- 2007 California Fire Code (CFC) Chapter 23 & 9
- 2007 California Building Code (CBC) Chapter 4 & 9
- 2002 NFPA 13 – Sprinkler Systems
- 2003 NFPA 230 – Combustible Storage

**FILE REVIEW**

- REVIEW FILE – Is there an alternate method application approved
- REVIEW PLANS, PLAN NOTES AND FD APPROVAL LETTER

**REQUIRED INSPECTIONS**

1.    **Y**    **N**
- Fire Department Final - \*may include, but are not limited to, inspections of the racks, smoke/heat vents, and access doors.

Based on the design of the HPS, inspections may include:

- Fire Sprinkler Pipe, Rough & Hydro, and Final Inspection
- Fire Alarm Pre-wire and Final Inspection

**REQUIRED SUBMITTAL INFORMATION:**

- 2.         Permit fees entered in Permits Plus.
- 3.         Three (3) sets of scaled plans and specifications
- 4.         Contractor shall provide, or have on file, a current Contractor's License.
- 5.         Worker's Compensation Insurance certificate.
- 6.         Current Santa Rosa Business Tax Certificate.

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- |    | <b>Y</b>                 | <b>N</b>                 |   |
|----|--------------------------|--------------------------|---|
| 7. | <input type="checkbox"/> | <input type="checkbox"/> | Name and address of project                       |
| 8. | <input type="checkbox"/> | <input type="checkbox"/> | Contractor's name, address, and telephone number. |

**PLANS TO INCLUDE (2007 CFC 2301.3)**

- |     |                          |                          |  |
|-----|--------------------------|--------------------------|--|
| 9.  | <input type="checkbox"/> | <input type="checkbox"/> | A scaled site plan that shows the entire building, including all fire access lanes, fire hydrants, fire department connection, and fire sprinkler risers.  |
| 10. | <input type="checkbox"/> | <input type="checkbox"/> | 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.   |
| 11. | <input type="checkbox"/> | <input type="checkbox"/> | 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).  |
| 12. | <input type="checkbox"/> | <input type="checkbox"/> | The number of tiers within each rack.  |
| 13. | <input type="checkbox"/> | <input type="checkbox"/> | The commodity clearance between the top of storage and the sprinkler deflector for each storage arrangement.   |
| 14. | <input type="checkbox"/> | <input type="checkbox"/> | Aisle dimensions between each storage array. Aisles are measured from the actual edge of the commodity to commodity, not rack to rack.   |
| 15. | <input type="checkbox"/> | <input type="checkbox"/> | Maximum pile volume for each storage array.  |
| 16. | <input type="checkbox"/> | <input type="checkbox"/> | The location and classification of different commodity classes.  |
| 17. | <input type="checkbox"/> | <input type="checkbox"/> | The location of commodities that is banded or encapsulated.  |
| 18. | <input type="checkbox"/> | <input type="checkbox"/> | The dimension and location of the transverse and longitudinal flue spaces.   |
| 19. | <input type="checkbox"/> | <input type="checkbox"/> | Details on any specialty storage arrangement systems (i.e., automated, carousel, freezer, etc.).   |
| 20. | <input type="checkbox"/> | <input type="checkbox"/> | 2002 NFPA 13, Chapter 12 – The sprinkler design requirements based on commodity type, aisle width, and sprinkler temperature rating as outlined in (e.g., .45/3000 with 286degree heads). <i>A complete sprinkler design shall be submitted under a separate permit.</i> |
| 21. | <input type="checkbox"/> | <input type="checkbox"/> | 2002 NFPA 13, Section 12.3.1.7 – 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 will require protection.   |
| 22. | <input type="checkbox"/> | <input type="checkbox"/> | The location, make, model, type, and automatic link temperature of the automatic/manual release smoke vents. Fusible links shall be at least one temperature rating lower than the fire sprinklers (Local Ordinance)   |

**SPRINKLERS:**

***Code References from 2002 NFPA 13 unless otherwise noted***

- |     |                          |                          |  |
|-----|--------------------------|--------------------------|--|
| 23. | <input type="checkbox"/> | <input type="checkbox"/> | Total number of each type of sprinkler and their temperatures are noted.               |
| 24. | <input type="checkbox"/> | <input type="checkbox"/> | 8.3.2.7 – Minimum temperature for ceiling sprinkler for high-piled storage is 150 deg, |
| 25. | <input type="checkbox"/> | <input type="checkbox"/> | 14.1.3 – Ceiling and roof cross sectional views are provided.                          |

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- |     | Y                        | N                        |  |
|-----|--------------------------|--------------------------|--|
| 26. | <input type="checkbox"/> | <input type="checkbox"/> | 14.1.3(12) – For each type of sprinkler the K factor and temperature rating are provided.  |
| 27. | <input type="checkbox"/> | <input type="checkbox"/> | 8.6.2.2, Table 8.6.2.2.1 (c and d) – Each sprinkler coverage area is within its square footage and dimension limitations in accordance with its listing.                                 |
| 28. | <input type="checkbox"/> | <input type="checkbox"/> | 6.1.1 and 8.4.1- 8.4.9 – Control mode specific application, large drop, early suppression fast response sprinklers installation design comply with the standard and listing limitations. |

**LARGE DROP SPRINKLERS:**

***Code References from 2002 NFPA 13 unless otherwise noted.***

- |     |                          |                          |  |
|-----|--------------------------|--------------------------|--|
| 29. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.2.2.1 – Large drop sprinkler coverage area and maximum spacing is in accordance with Table 8.11.2.2.1.  |
| 30. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.2.3 – The minimum area of protection for large drop sprinklers is 80 sq. ft.  |
| 31. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.3.2 – Maximum perpendicular distance to the walls shall be in accordance with 8.11.3.2.   |
| 32. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.3.4 – 8 ft. is the minimum spacing between sprinklers.  |
| 33. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.4.1.1 – Large drop sprinklers installed in a building of unobstructed construction shall be in accordance with 8.11.4.1.1 and a cross sectional view is provided. |
| 34. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.4.1.2 – Large drop sprinklers installed in a building of obstructed construction shall be in accordance with 8.11.4.1.2. and a cross sectional view is provided.  |
| 35. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.5.1 – Sprinkler position in relation to the roof or hanging obstructions shall comply with 8.11.5.1.  |
| 36. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.5.2.1.3 – For obstructions 8 in. or less, sprinklers are positioned in accordance with 8.11.5.2.1.3.  |
| 37. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.5.2.2 – Depending on the diameter of the branch lines, large drop sprinklers shall be located in accordance with 8.11.5.2.2.                                      |
| 38. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.5.3.4 – Sprinkler position when more than 24 in. directly above the bottom of an obstruction shall be in accordance with 8.11.5.3.4.                              |
| 39. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.5.3.5 – For obstructions running parallel with a branch line, the sprinkler placement shall be in compliance with 8.11.5.3.5.                                     |
| 40. | <input type="checkbox"/> | <input type="checkbox"/> | 8.11.6 – Sprinklers deflectors shall be located at least 3 ft. above the top of storage, 8.11.6.   |
| 41. | <input type="checkbox"/> | <input type="checkbox"/> | Sprinkler position when above an obstruction more than 24 in. wide complies with Table 8.11.5.3.2. and Figure 8.11.5.3.2, 8.11.5.3.2.                                  |

**GENERAL STORAGE REQUIREMENTS:**

***Code References from 2002 NFPA 13 unless otherwise noted***

- |     |                          |                          |  |
|-----|--------------------------|--------------------------|--|
| 42. | <input type="checkbox"/> | <input type="checkbox"/> | 12.1.5 – When a structure has two or more hazard areas or design methods that are non-separated and are located adjacent to each other, the most hydraulic demanding area shall be extended as required by section 12.1.5. |
|-----|--------------------------|--------------------------|--|

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- | Y                            | N                        |   |
|------------------------------|--------------------------|---|
| 43. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.6.3 – Dry pipe and pre-action system design areas shall be increased 30 percent but shall not exceed the design area specified in 12.1.6.1. This does not apply to pre-action system designed in accordance with 12.1.6.3. |
| 44. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.7 – Ceiling slope is detailed, cross sectional view provided, and does not exceed a 2 in 12 slope.   |
| 45. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.8 – When adjustments are made to the design area, the designer shall provide an analysis explaining how the adjustments were made.   |
| 46. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – Design for idle pallets is in accordance with 12.1.9.  |
| 47. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.10 and Table 12.1.10.1 – Miscellaneous and Class I through IV commodity storage up to 12 ft. and Group A plastic, rolled paper, tires shall be protected accordance with Figure 12.1.10 and Table 12.1.10.1.               |

**GENERAL IN-RACK STORAGE REQUIREMENTS:**

- |                              |                          |  |
|------------------------------|--------------------------|--|
| 48. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – In-rack sprinklers are ordinary temperature and the K factor, orientation, temperature rating and type complies with 8.13.2.1 and 8.13.2.1.2.                   |
| 49. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – The area limitation for in-rack sprinkler systems is limited to 40,000 sq. ft. of floor area, 8.13.1.   |
| 50. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – When adjacent to a heat source the sprinkler temperature rating is in accordance with 8.13.2.2.   |
| 51. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – When in-rack sprinklers are required for Class I –IV commodities, water shields are provided when required by section 8.13.3.1.                                 |
| 52. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – When required for plastics storage, water shields are provided for in-rack sprinklers when required by 8.13.3.2.  |
| 53. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – When in-rack sprinklers are required for miscellaneous storage, the number of sprinklers calculated and the discharge pressure complies with section 12.1.12.   |
| 54. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – Sprinklers K-factors for storage applications; rack, tire, roll paper, and baled cotton are in compliance with 12.1.13 based on the required discharge density. |

**PALLETIZED, SOLID PILE, BIN BOX, SHELF STORAGE FOR CLASS I-IV COMMODITIES:**

- |                              |                          |   |
|------------------------------|--------------------------|---|
| 55. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – Hose connections are provided for storage exceeding 12 ft., 12.2.2.1.3.  |
| 56. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – The minimum design area/density for wet and for dry systems complies with 12.2.2.1.4.  |
| 57. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – The design for area/density using ordinary or high temperature sprinklers is based on Figures 12.2.2.1.5.1 and 12.2.2.1.5.2 respectively, 12.2.2.1.5.1 and 12.2.2.1.5.2. |
| 58. <input type="checkbox"/> | <input type="checkbox"/> | 12.1.9 – If the density is adjusted due to storage height, it is in accordance with Figure 12.2.2.1.5.3 and calculations are provided.  |

**PALLETIZED AND SOLID PILE FOR CLASS I-IV COMMODITIES:**

- |     | <b>Y</b>                 | <b>N</b>                 |   |
|-----|--------------------------|--------------------------|---|
| 59. | <input type="checkbox"/> | <input type="checkbox"/> | Large drop sprinklers protecting palletized or solid-pile Class I –IV commodities is in accordance with Tables 12.2.2.2.1(a) and (b), 12.2.2.2.               |
| 60. | <input type="checkbox"/> | <input type="checkbox"/> | The number of large drop sprinklers calculated for ordinary hazard and miscellaneous storage for the different types of systems complies with 12.2.2.2.2.1.   |
| 61. | <input type="checkbox"/> | <input type="checkbox"/> | Large drop and control mode specific application sprinklers protecting open wood joist construction shall be in accordance with 12.2.2.2.2.2 – 12.2.2.2.2.4.  |
| 62. | <input type="checkbox"/> | <input type="checkbox"/> | Large drop or control mode specific application sprinkler placement and branch line diameter limitations comply with 12.2.2.2.2.6.                            |
| 63. | <input type="checkbox"/> | <input type="checkbox"/> | ESFR sprinklers protecting palletized or solid-pile Class I –IV commodities are in accordance with Table 12.2.2.3.1.  |
| 64. | <input type="checkbox"/> | <input type="checkbox"/> | The number of ESFR sprinklers calculated for the most hydraulically demanding design area and the number of calculated branch lines complies with 12.2.2.3.3. |
| 65. | <input type="checkbox"/> | <input type="checkbox"/> | ESFR sprinklers installed above and below obstructions are hydraulically calculated in accordance with 12.2.2.3.4.  |

**PALLETIZED, SOLID PILE, BIN BOX, SHELF STORAGE FOR PLASTIC AND RUBBER COMMODITIES:**

- |     |                          |                          |   |
|-----|--------------------------|--------------------------|---|
| 66. | <input type="checkbox"/> | <input type="checkbox"/> | Sprinkler design protecting plastics stored up to 25 ft. are selected in accordance with Figure 12.2.3.1.1.   |
| 67. | <input type="checkbox"/> | <input type="checkbox"/> | The designer has provided design information for solid pile storage: closed or open array, clearance between storage, clearance between storage and the roof, pile height, and stable or unstable piles, 12.2.3.1.2. and 12.2.3.1.5.1 |
| 68. | <input type="checkbox"/> | <input type="checkbox"/> | Class B, free-flowing Group A, and Class C plastics are protected as the commodity specified in 12.2.3.1.3 and 12.2.3.1.4.  |
| 69. | <input type="checkbox"/> | <input type="checkbox"/> | Design area and density are based on Table 12.2.3.1.6 and Figure 12.2.3.1.1, 12.2.3.1.6.  |
| 70. | <input type="checkbox"/> | <input type="checkbox"/> | When determining the design area, the designer provided a calculations illustrating how the design area adjustments were made, 12.2.3.1.7.  |
| 71. | <input type="checkbox"/> | <input type="checkbox"/> | Large drop or control mode sprinklers K factor, storage height coverage, number of design sprinklers, and hose stream demand are in accordance with Table 12.2.3.2.1(a) or (b), 12.2.3.2.   |
| 72. | <input type="checkbox"/> | <input type="checkbox"/> | Large drop or control mode sprinklers for open wood joist construction, large drop sprinkler pressure, design area, and hose stream demand are in compliance with 12.2.3.2.2.2.   |
| 73. | <input type="checkbox"/> | <input type="checkbox"/> | Branch line diameters comply with 12.2.3.2.2.6.   |
| 74. | <input type="checkbox"/> | <input type="checkbox"/> | ESFR sprinklers protection design is in accordance with Table 12.2.3.3.1.   |
| 75. | <input type="checkbox"/> | <input type="checkbox"/> | The number of ESFR sprinkler for most hydraulically demanding design area and the number of branch lines calculated complies with 12.2.3.3.3.   |
| 76. | <input type="checkbox"/> | <input type="checkbox"/> | ESFR sprinklers installed above and below obstructions are hydraulically calculated in accordance with 12.2.2.3.4., 12.2.3.3.4.   |

**RACK STORAGE OF COMMODITIES:**

- | <b>Y</b>                     | <b>N</b>                 |  |
|------------------------------|--------------------------|--|
| 77. <input type="checkbox"/> | <input type="checkbox"/> | Structural columns that are within storage racks are protected when required by 12.3.1.7.  |
| 78. <input type="checkbox"/> | <input type="checkbox"/> | Solid shelving with an area of 20 sq. ft. up to 64 sq. ft., is protected by automatic sprinklers in accordance with 12.3.1.9.1.  |
| 79. <input type="checkbox"/> | <input type="checkbox"/> | Solid shelving with an area exceeding 64 sq. ft. or the storage level exceeds 6 ft. with solid shelves; sprinkler protection is in compliance with 12.3.1.9.2.   |
| 80. <input type="checkbox"/> | <input type="checkbox"/> | Where in-rack sprinklers protect a higher commodity hazard and the rack contains mixed commodities the in-rack sprinkler design shall comply with 12.3.1.11.2.   |
| 81. <input type="checkbox"/> | <input type="checkbox"/> | When required horizontal barriers within the rack shall comply with section 12.3.1.12.   |
| 82. <input type="checkbox"/> | <input type="checkbox"/> | For storage 25 ft. or less a longitudinal flue is not required in double and multi-row racks so long as solid shelves are not present. Transverse flues required in single, double, and multi-row racks are provided and detailed or noted, 12.3.1.13. |

**RACK STORAGE OF CLASS I THROUGH IV COMMODITIES STORED UP TO 25 FT.:**

- |                              |                          |  |
|------------------------------|--------------------------|--|
| 83. <input type="checkbox"/> | <input type="checkbox"/> | The density/area design for miscellaneous storage is in accordance with 12.1.10.   |
| 84. <input type="checkbox"/> | <input type="checkbox"/> | The density/area design for storage exceeding the height of miscellaneous storage is in accordance with 12.3.2.  |
| 85. <input type="checkbox"/> | <input type="checkbox"/> | The sprinkler design for single or double-row racks is derived from Table 12.3.2.1.2 using Figures 12.3.2.1.1(a)-(g), 12.3.2.1.2.  |
| 86. <input type="checkbox"/> | <input type="checkbox"/> | If aisles are less than 3.5 ft. consider the racks as multiple-row racks.  |
| 87. <input type="checkbox"/> | <input type="checkbox"/> | The sprinkler design for multiple-row racks 16 ft. or less in depth and with aisles 8 ft. or wider is derived from Table 12.3.2.1.3 using Figures 12.3.2.1.2(a)-(g), 12.3.2.1.3.   |
| 88. <input type="checkbox"/> | <input type="checkbox"/> | The sprinkler design for multiple-row racks more than 16 ft in depth and with aisles less than 8 ft. is derived from Table 12.3.2.1.4 using Figures 12.3.2.1.2(a)-(g), 12.3.2.1.4. |
| 89. <input type="checkbox"/> | <input type="checkbox"/> | If the design density curve requirements are adjusted, the designer provided calculations explaining how the design area adjustments were made in accordance with 12.3.2.1.5.      |
| 90. <input type="checkbox"/> | <input type="checkbox"/> | Hose stream demands were added to the hydraulic calculations in accordance with Table 12.3.2.1.6.  |
| 91. <input type="checkbox"/> | <input type="checkbox"/> | Large drop and specific application control mode sprinklers shall be calculated is in accordance with Table 12.3.2.2.1(a) or (b), 12.3.2.2.1.                                      |
| 92. <input type="checkbox"/> | <input type="checkbox"/> | When in-rack sprinklers are required by Table 12.3.2.2.1(a) or (b) the in-rack sprinkler design criteria is in accordance with 12.3.2.4.   |
| 93. <input type="checkbox"/> | <input type="checkbox"/> | Large drop or control mode sprinklers under open wood joist construction shall operate at a minimum pressure specified in 12.3.2.2.3.2(A).   |
| 94. <input type="checkbox"/> | <input type="checkbox"/> | Large drop K-11.2 sprinklers installed in open wood joist channel construction shall comply with, 12.3.2.2.3.2(B).   |

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- |      | Y                        | N                        |   |
|------|--------------------------|--------------------------|---|
| 95.  | <input type="checkbox"/> | <input type="checkbox"/> | The branch line diameter for pre-action automatic sprinklers shall comply with 12.3.2.2.3.6.  |
| 96.  | <input type="checkbox"/> | <input type="checkbox"/> | ESFR sprinkler orientation, K-factor, and minimum pressure design for single, double, and multiple-row racks without solid shelves is in accordance with Table 12.3.2.3.1, 12.3.2.3.1.  |
| 97.  | <input type="checkbox"/> | <input type="checkbox"/> | ESFR sprinklers are not used with solid shelves or combustible open-top cartons, 12.3.2.3.1.1.  |
| 98.  | <input type="checkbox"/> | <input type="checkbox"/> | The number of ESFR sprinkler for most hydraulically demanding design area and the number of calculated branch lines complies with 12.3.2.3.4.   |
| 99.  | <input type="checkbox"/> | <input type="checkbox"/> | ESFR sprinklers installed above and below obstructions are hydraulically calculated in accordance with 12.3.2.3.5.  |
| 100. | <input type="checkbox"/> | <input type="checkbox"/> | In-rack sprinklers are provided for single and double-row racks without solid shelves when required by Table 12.3.2.1.2, 12.3.4.1.1.  |
| 101. | <input type="checkbox"/> | <input type="checkbox"/> | In-rack sprinklers are provided for multiple-row rack less than 16 ft. deep and aisles 8 ft. wide or greater when required by Table 12.3.2.1.3, 12.3.2.4.1.2.   |
| 102. | <input type="checkbox"/> | <input type="checkbox"/> | In-rack sprinklers are provided for multiple-row rack more than 16 ft. deep and aisles up to 8 ft. wide when required by Table 12.3.2.1.4, 12.3.2.4.1.3.  |
| 103. | <input type="checkbox"/> | <input type="checkbox"/> | In-rack sprinklers for only one level are positioned at the first tier level at or above the halfway height of the storage, 12.3.2.4.1.4.   |
| 104. | <input type="checkbox"/> | <input type="checkbox"/> | In-rack sprinklers for only two levels are positioned at the first tier storage level at or above 1/3 and 2/3 the height of the storage, 12.3.2.4.1.5.  |
| 105. | <input type="checkbox"/> | <input type="checkbox"/> | In-rack maximum horizontal sprinkler spacing for single and double-row racks protecting non-encapsulated and encapsulated products are in accordance with 12.3.2.4.2.1.   |
| 106. | <input type="checkbox"/> | <input type="checkbox"/> | In-rack maximum horizontal sprinkler spacing and area limitations for multiple-row racks protecting non-encapsulated and encapsulated products are in compliance with 12.3.2.4.2.2.   |
| 107. | <input type="checkbox"/> | <input type="checkbox"/> | At least 6 in. of vertical clearance is detailed between the in-rack sprinkler deflector and the top of the tier of storage, 12.3.2.4.2.5.  |
| 108. | <input type="checkbox"/> | <input type="checkbox"/> | The in-rack water demand has been calculated based on the quantity of sprinklers specified for its storage conditions in accordance with section 12.3.2.4.3, and the in-rack sprinkler discharge pressure is in compliance with 12.3.2.4.4. |

**RACK STORAGE OF PLASTICS STORED UP TO 25 FT. AND CEILING CLEARANCES UP TO 10 FT.:**

- |      |                          |                          |   |
|------|--------------------------|--------------------------|---|
| 109. | <input type="checkbox"/> | <input type="checkbox"/> | Control mode sprinkler design for single, double, and multiple-row racks for aisles 3.5 ft. wide or greater is in accordance with the decision tree in Figure 12.3.3 .1.1.  |
| 110. | <input type="checkbox"/> | <input type="checkbox"/> | For control mode sprinklers, the ceiling water design density/area demand for Group A plastics packaged in cartons, encapsulated or not in single, double, or multiple-row racks are determined from Figures 12.3.3.1.5(a)-(f) and the designer has provided design rationale and plan details, 12.3.3.1.5. |
| 111. | <input type="checkbox"/> | <input type="checkbox"/> | For control mode sprinkler design requirements protecting plastic commodities stored in single, double, or multiple-row racks at varying heights and ceiling clearances, Figures 12.3.3.1.5(a)-(f) have been used as specified in sections 12.3.3.1.6 through 12.3.3.1.11.                                  |

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- | Y    | N                        |  |
|------|--------------------------|--|
| 112. | <input type="checkbox"/> | <input type="checkbox"/> Large drop and specific control mode sprinkler design quantity and minimum operating pressure for single, double, and multiple-row racks without solid shelves for unexpanded plastics is as specified in Tables 12.3.3.2.1(a) or (b) and when required in-rack sprinklers are hydraulically designed and positioned in accordance with 12.3.2.4, 12.3.3.2. |
| 113. | <input type="checkbox"/> | <input type="checkbox"/> Large drop K-11.2 sprinklers positioned under open wood joist construction operate at a minimum pressure specified in 12.3.3.2.3.2.   |
| 114. | <input type="checkbox"/> | <input type="checkbox"/> ESFR sprinkler orientation, K-factor, and minimum pressure design for single, double, and multiple-row racks without solid shelves for plastics are in accordance with Table 12.3.3.3.1, 12.3.3.3.1.  |
| 115. | <input type="checkbox"/> | <input type="checkbox"/> ESFR sprinklers are not used with solid shelves or combustible open-top cartons, 12.3.3.3.1.1.  |
| 116. | <input type="checkbox"/> | <input type="checkbox"/> The number of ESFR sprinkler for most hydraulically demanding design area and the number of branch calculated lines complies with 12.3.3.3.3.   |
| 117. | <input type="checkbox"/> | <input type="checkbox"/> ESFR sprinklers installed above and below obstructions are hydraulically calculated in accordance 12.3.3.3.4.   |
| 118. | <input type="checkbox"/> | <input type="checkbox"/> At least 6 in. of vertical clearance is provided between the in-rack sprinkler deflector and the top of the tier of storage, 12.3.3.4.2.1.  |
| 119. | <input type="checkbox"/> | <input type="checkbox"/> In-rack sprinklers are provided for single and double-row racks without solid shelves when required by Table 12.3.2.1.2, 12.3.4.1.1.  |
| 120. | <input type="checkbox"/> | <input type="checkbox"/> In-rack horizontal sprinkler spacing is provided and detailed on the plans as specified in Figures 12.3.3.1.5(a) and (f), 12.3.3.4.2.2.   |
| 121. | <input type="checkbox"/> | <input type="checkbox"/> The in-rack water demand calculations are provided and based on the number of sprinklers for each tier 12.3.2.4.3 and the discharge pressure complies with 12.3.3.4.4.  |



**TABLE 2306.2: GENERAL FIRE-PROTECTION AND LIFE-SAFETY REQUIREMENTS**

Commodity Class	Size of High-Piled Storage Area <sup>a</sup> (square feet) (See Sections 2306.2 and 2306.4)	ALL STORAGE AREAS (See Sections 2306, 2307 and 2308) <sup>b</sup>					SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (See Section 2307.3)		
		Automatic Fire-extinguishing System (See Section 2306.4)	Fire-detection System (See Section 2306.5)	Building Access (See Section 2306.6)	Smoke and Heat Removal (See Section 2306.7)	Draft curtains (See Section 2306.7)	Maximum Pile Dimension <sup>c</sup>	Maximum Permissible Storage Height <sup>d</sup> (feet)	Maximum Pile Volume (cubic feet)
I-IV	0-500	NR <sup>a</sup>	NR	NR <sup>a</sup>	NR	NR	NR	NR	NR
	501-2,500	NR <sup>a</sup>	Yes <sup>i</sup>	NR <sup>a</sup>	NR	NR	100	40	100,000
	2,501-12,000 Public Accessible	Yes	NR	NR <sup>a</sup>	NR	NR	100	40	400,000
	2,501-12,000 Nonpublic Accessible (Option 1)	Yes	NR	NR <sup>a</sup>	NR	NR	100	40	400,000
	2,501-12,000 Nonpublic Accessible (Option 2)	NR <sup>a</sup>	Yes	Yes	Yes <sup>j</sup>	Yes <sup>j</sup>	100	30 <sup>f</sup>	200,000
	12,001-20,000	Yes	NR	Yes	Yes <sup>j</sup>	NR	100	40	400,000
	20,001-500,000	Yes	NR	Yes	Yes <sup>j</sup>	NR	100	40	400,000
	500,000+ <sup>g</sup>	Yes	NR	Yes	Yes <sup>j</sup>	NR	100	40	400,000
High-hazard	0-500	NR <sup>a</sup>	NR	NR <sup>a</sup>	NR	NR	50	NR	NR
	501-2,500 Public Accessible	Yes	NR	NR <sup>a</sup>	NR	NR	50	30	75,000
	501-2,500 Nonpublic accessible (Option 1)	Yes	NR	NR <sup>a</sup>	NR	NR	50	30	75,000
	501-2,500 Nonpublic accessible (Option 2)	NR <sup>a</sup>	Yes	Yes	Yes <sup>j</sup>	Yes <sup>j</sup>	50	20	50,000
	2,501-300,000	Yes	NR	Yes	Yes <sup>j</sup>	NR	50	30	75,000
	300,001-500,000 <sup>g, h</sup>	Yes	NR	Yes	Yes <sup>j</sup>	NR	50	30	75,000

NR = Not Required

<sup>a</sup> When fire sprinklers are required for reasons other than those in Chapter 23, the portion of the sprinkler system protecting the high-piled storage area shall be designed and installed in accordance with Sections 2307 and 2308.

<sup>b</sup> For aisles, see Section 2306.9.

<sup>c</sup> Piles shall be separated by aisles complying with Section 2306.9.

<sup>d</sup> 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 28 and 34 for special limitations for aerosols and flammable and combustible liquids.

<sup>e</sup> Section 503 shall apply for fire apparatus access.

<sup>f</sup> For storage exceeding 30 feet in height, Option 1 shall be used.

<sup>g</sup> 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.

<sup>h</sup> 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.

<sup>i</sup> Not required when an automatic fire-extinguishing system is designed and installed to protect the high-piled storage area in accordance with Sections 2307 and 2308.

<sup>j</sup> Not required when storage areas are protected by early suppression fast response (ESFR) sprinkler systems installed in accordance with NFPA 13.

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**TABLE 910.3: REQUIREMENTS FOR DRAFT CURTAINS AND SMOKE AND HEAT VENTS<sup>a</sup> (See Section 2306.7)**

OCCUPANCY GROUP AND COMMODITY CLASSIFICATION	DESIGNATED STORAGE HEIGHT (feet)	MINIMUM DRAFT CURTAIN DEPTH (feet)	MAXIMUM AREA FORMED BY DRAFT CURTAINS (square feet)	VENT- AREA-TO FLOOR-AREA RATIO <sup>c</sup>	MAXIMUM SPACING OF VENT CENTERS (feet)	MAXIMUM DISTANCE TO VENTS FROM WALL OR DRAFT CURTAIN <sup>b</sup> (feet)
Group F-1 and S-1	-	0.2 x H <sup>d</sup> but ≥ 4	50,000	1:100	120	60
Commodity Classification I-IV (Option 1)	≤ 20	6	10,000	1:100	100	60
	> 20 ≤ 40	6	8,000	1:75	100	55
Commodity Classification I-IV (Option 2)	≤ 20	4	3,000	1:75	100	55
	> 20 ≤ 40	4	3,000	1:50	100	50
High-hazard (Option 1)	≤ 20	6	6,000	1:50	100	50
	> 20 ≤ 30	6	6,000	1:40	90	45
High-hazard (Option 2)	≤ 20	4	4,000	1:50	100	50
	> 20 ≤ 30	4	2,000	1:30	75	40

<sup>a</sup> Requirements for rack storage heights in excess of those indicated shall be in accordance with Chapter 23. For solid-piled storage heights in excess of those indicated, an approved engineered design shall be used.

<sup>b</sup> The distance specified is the maximum distance from any vent in a particular draft curtained area to walls or draft curtains which form the perimeter of the draft curtained area.

<sup>c</sup> Where draft curtains are not required, the vent area to floor area ratio shall be calculated based on a minimum draft curtain depth of 6 feet (Option 1.)

<sup>d</sup> "H" is the height of the vent, in feet above the floor.

**TABLE 2308.3: 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 Any Height	NON-SPRINKLERED Any Height
			≤ 25 feet		> 25 feet		
			Option 1	Option 2			
Single-row Rack	Transverse Flue Space	Size <sup>b</sup>	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 <sup>b</sup>	6 inch <sup>a</sup>	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 <sup>b</sup>	6 inch	NA	6 inch	NR	
		Vertically Aligned	NR	NA	Yes	NA	
	Longitudinal Flue Space	NR	NA	NR	NR		

NR = "not required." NA means "not applicable."

<sup>a</sup> Three-inch transverse flue spaces shall be provided at least every 10 feet where ESFR sprinkler protection is provided.

<sup>b</sup> Random variations are allowed, provided that the configuration does not obstruct water penetration.