

# Rack Storage/Shelving General Requirements

Below are only basic requirements and can be further influenced by type of commodities to be stored and types of shelving.

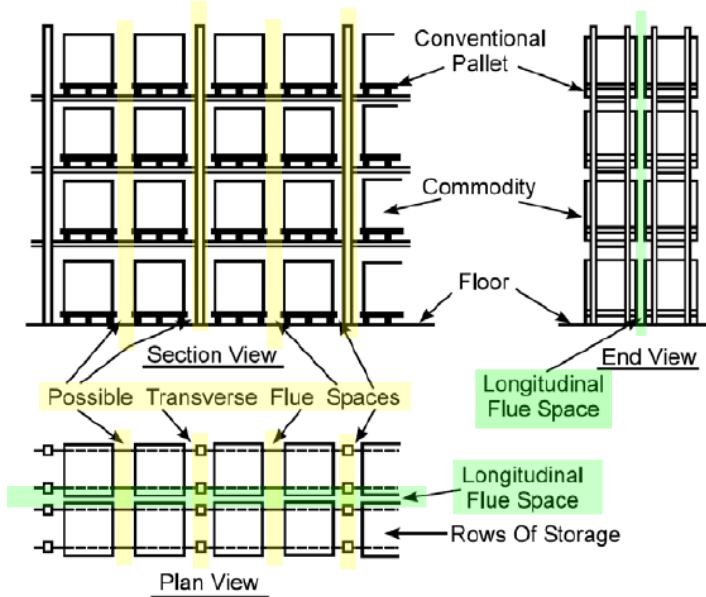


Fig. 1  
Typical Double-Row (Back-To-Back) Rack Arrangement

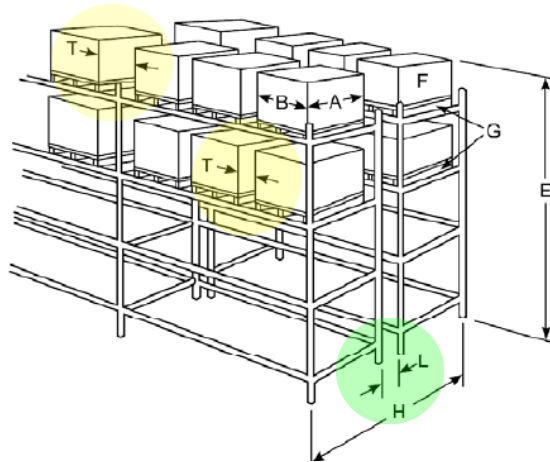


Diagram from FM Approval Standards for Shelving, and dimensional requirements/information from NFPA 13 (Standard for the Installation of Sprinkler Systems, 2013), Chapter 16.

- Solid Shelving >20 sq.ft., but ≤ 64 sq. ft. does not require sprinklers below every shelf, but at the ceiling and below shelves at intermediate levels not greater than 6' ft. vertically. [16.1.6.1]
- Solid Shelving > 64 sq. ft. or where level exceeds 6 feet vertically shall have sprinklers at the ceiling and below each level of shelving. [16.1.6.2]
- Longitudinal flue space [16.1.10.1 & 16.1.11.1]
  - Double and multiple rows without solid shelves, storage ≤25 feet in height— not required between loads.
  - Double row > 25 feet in height requires 6 inch longitudinal flue spaces
- NO LONGITUDINAL FLUE SPACE is required if Transverse flues are provided at a maximum of 5 foot intervals.
- Transverse flue space [16.1.10.2 & 16.1.11.1]
  - Single, double, and multiple row racks require nominal 6 inch transverse flue spaces between loads, and at rack uprights. (Applies to all storage heights).
- Slatted Shelving [16.2.4.1] (considered solid shelving unless all provisions of 16.2.4.1.2 are met)
  - Slats shall be a minimum of 2 inches thick and 6 inches wide with spacers maintaining a minimum of 2 inches between slats.
  - Minimum of 3 inch Transvers flue space every 10 feet horizontally
  - Minimum of 6 inch Longitudinal flue space for double row racks
  - Solid plywood or similar materials shall not be placed to block the 2 inch spaces between slats.
- UFC 3-600-01, 6-11.1: Racks with solid shelves over 12 ft. in height must be protected with in-rack sprinklers at every tier or shelf level.
- Inability to meet above shelving/flue requirements may require the installation of sprinklers below shelving. Certain types of commodities may require sprinklers below shelving regardless of above criteria.
- **When materials are stacked to a height less than 15 feet, maintain an 18-inch clearance below ceiling sprinkler deflectors, joists, rafters, beams and roof trusses. If the stack is over 15 feet in height, increase the clearance to 36 inches. [AFI 91-203, 5.6]**

3.9.1.7 **Compact Storage.** Storage on solid shelves not exceeding 36 in. (0.9 m) in total depth, arranged as part of a compact storage module, with no more than 30 in. (0.76 m) between shelves vertically and with no internal vertical flue spaces other than those between individual shelving sections.

3.9.2.6\* **Shelf Storage.** Storage on structures up to and including 30 in. (0.76 m) deep and separated by aisles at least 30 in. (0.76 m) wide.

A.3.9.2.6 **Shelf Storage.** Shelves are usually 2 ft (0.6 m) apart vertically.

3.9.2.6.1\* **Back-to-Back Shelf Storage.** Two solid or perforated shelves up to 30 in. (0.76 m) in depth each, not exceeding a total depth of 60 in. (1.52 m), separated by a longitudinal vertical barrier such as plywood, particleboard, sheet metal, or equivalent, with a maximum 0.25 in. (6.4 mm) diameter penetrations and no longitudinal flue space and a maximum storage height of 15 ft (4.57 m).

A.3.9.2.6.1 **Back-to-Back Shelf Storage.** The requirement for the lack of a longitudinal flue space does not prohibit a small gap between the units or a small gap between the shelves and the vertical barrier. See Figure A.3.9.2.6.1.

3.9.3.7.7 **Open Rack.** Racks without shelving or with shelving in racks that are fixed in place with shelves having a solid surface and a shelf area equal to or less than 20 ft<sup>2</sup> (1.9m<sup>2</sup>) 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 rack members and where the flue spaces are maintained.

3.9.3.8 **Solid Shelving.** Shelving that is fixed in place, slatted, wire mesh, or other type of shelves located within racks. The area of a solid shelf is defined by perimeter aisle or flue space on all four sides. Solid shelves having an area equal to or less than 20 ft<sup>2</sup> (1.9 m<sup>2</sup>) are defined as open racks. Shelves of wire mesh, slats, or other materials more than 50 percent open and where the flue spaces are maintained are defined as open racks.