

WHY RACK FLUE SPACES ARE IMPORTANT

ALLIANZ RISK CONSULTING

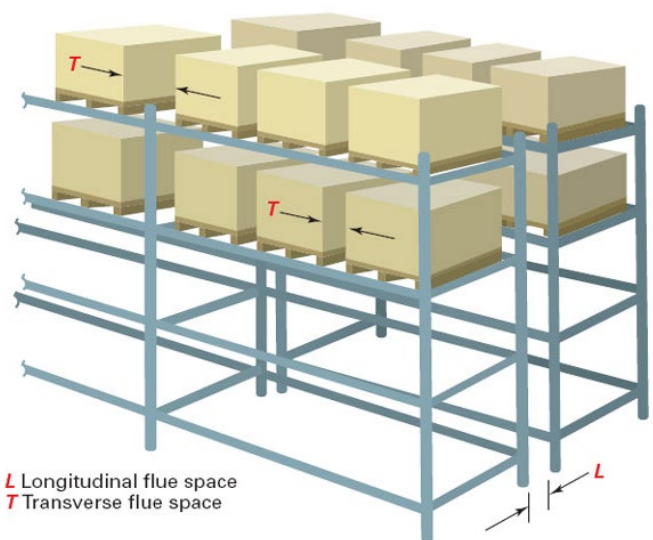


INTRODUCTION

Ever wondered why so much has been written about rack flue spaces in all the major fire sprinkler system standards?

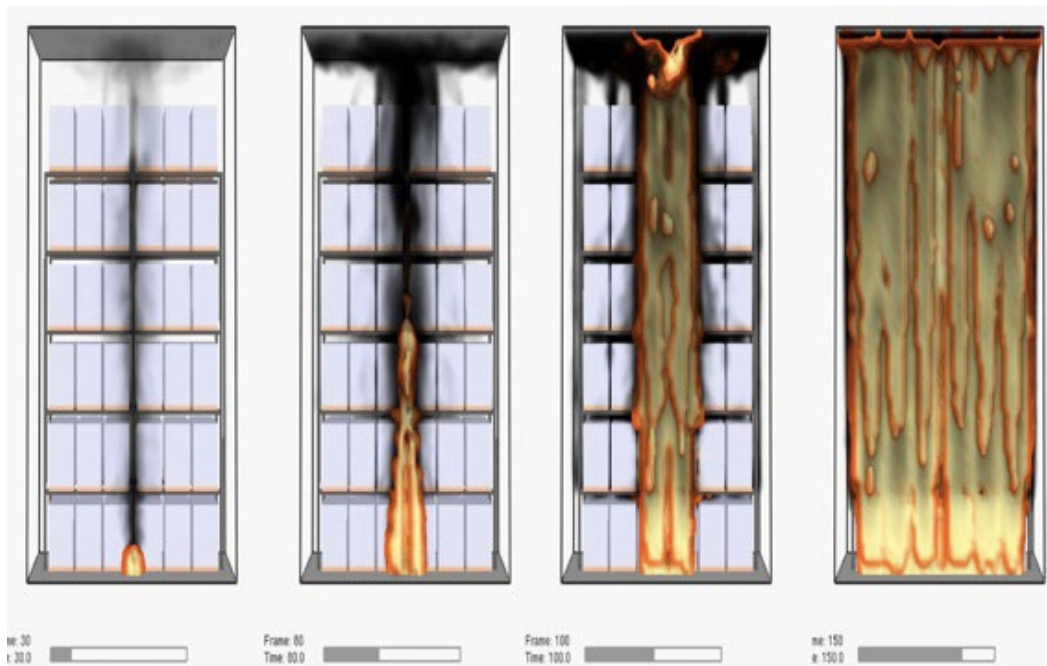
Flue spaces are clear vertical lines of sight from the floor up to the ceiling within rack storage areas. There are two types of flue spaces – Transverse flues and longitudinal flues (see diagram at right). Transverse flues are the spaces between rows of storage in the direction of loading. Longitudinal flues are the spaces between rows of storage perpendicular to the direction of loading with a width up to 24 in. (600 mm). Longitudinal flues greater than 24 in. (600 mm) wide are treated as aisles.

Unless in-rack sprinklers are installed below every storage tier, flue spaces are necessary for rack storage arrangements to allow heat from a fire to vent vertically. This allows the ceiling level sprinklers (and in-rack sprinklers if provided) to operate as quickly as possible and slows down the horizontal fire spread within the rack. Flue spaces are also necessary to allow sprinkler water to reach the base of the fire down through the racks. Without adequate water reaching the burning materials on the lower tiers, the fire may not be controlled.



L Longitudinal flue space
T Transverse flue space

Longitudinal and Transverse Flue Spaces

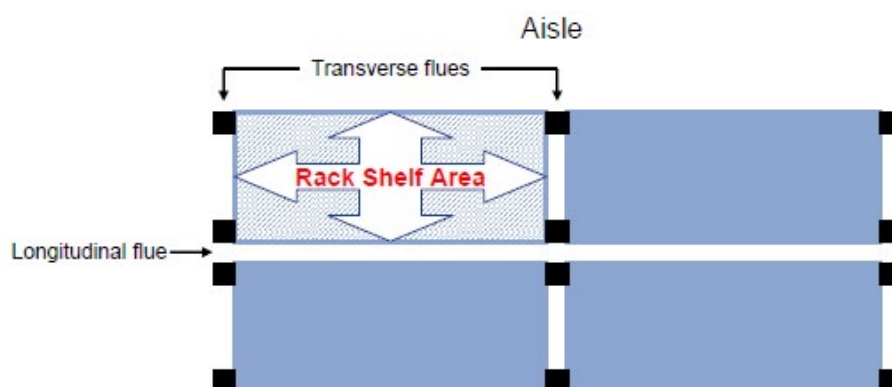


Fire Development In A Flue Space

RACK SHELF AREA AND SOLID SHELVING

The lack of flue spaces in racks can also create solid shelving issues, even for racks without shelving or racks with open shelving (e.g. wire mesh, slats, etc.). The placement of loads on the shelf must also be considered when calculating the rack shelf area, which is defined by the perimeter aisle or flue space on all four sides as indicated in the figure below.

The intent is to have aisles or flues surrounding the load or shelf material such that the blocked area does not exceed 20 ft² (1.9 m²). If the load or rack shelf area is greater than 20 ft² (1.9 m²), it is considered “solid shelving”, which requires in-rack sprinkler protection.



Double-Row Rack Plan View

ARC RECOMMENDATIONS

While not all inclusive, the following basic loss prevention recommendations can greatly improve the effectiveness of automatic sprinkler protection for rack storage and reduce the potential for significant property damage and resulting business interruption caused by inadequate flue spaces:

1. For single-, double-, and multiple-row rack storage, provide nominal 6 in. (150 mm) or a minimum net width of 3 in. (75 mm) transverse flue spaces between storage loads and at rack uprights.
Note: Net width is the gross width of a flue space minus any horizontal obstructions located within the flue space, such as the angle iron supports of rack uprights.
2. For double-row rack storage greater than 25 ft (7.6m) in height, provide nominal 6 in. (150 mm) or a minimum net width of 3 in. (75 mm) longitudinal flue spaces.
Note: Longitudinal flue spaces are not required for rack storage up to and including 25 ft (7.6 m) in height; however, if provided, maintain through the entire height of the rack.
3. Maintain vertical alignment of flue spaces as closely as possible. Random variation in the nominal width and vertical alignment of flue spaces is permitted.
4. Make sure rolled or similar types of commodities stored in racks are arranged so they cannot bulge into or encroach over flue spaces. If proper flue spaces are difficult to maintain, install physical barriers to ensure adequate flues are always provided (see examples in photos below).



Physical Barriers Used to Maintain Flues

5. If flue spaces are not provided as recommended above, treat as rack storage with solid shelving. For rack shelf areas greater than 20 ft² (1.9 m²), but less than 64 ft² (5.9 m²), install in-rack sprinklers below shelves at intermediate levels not more than 6 ft (1.8 m) apart vertically.

For solid shelf areas exceeding 64 ft² (5.9 m²) or where levels of storage exceed 6 ft (1.8 m) vertically, install in-rack sprinklers below each level of shelving.

Please contact your local ARC representative to discuss any proposed sprinkler system modifications prior to installation.

Note: Where multiple-row racks have no longitudinal flue, the situation is not considered solid shelves where transverse flues exist at maximum 5 ft (1.5 m) intervals and additional in-rack sprinklers are not required.

References:

NFPA 13, *Standard for the Installation of Sprinkler Systems*

QUESTIONS OR COMMENTS?

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Tech Talk is a technical document developed by ARC to assist our clients in property loss prevention. ARC has an extensive global network of more than 100 property risk engineers that offers tailor made, customer focused risk engineering solutions.

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