



Property Risk Consulting Guidelines

XL Risk Consulting

A Publication of AXA XL Risk Consulting

PRC.10.1.2.3

CAROUSEL STORAGE

INTRODUCTION

Carousel storage is an automated system where stock or material in bins, or on shelves or mandrels revolves on a track. Use of carousels allows for the storage of large quantities of stock in a small floor area. The storage can be located on an assembly floor area, or in a separate room. Carousels are also used in some processes where hot or warm stock is cooled as it travels through the unit.

There are two basic kinds of carousel storage systems, horizontal and vertical. As its name implies, the horizontal carousel travels horizontally along the floor or mezzanine, similar to those found in most dry cleaning establishments. The vertical carousel travels in a vertical direction, like a Ferris wheel.

Horizontal carousels (see Figure 1) store stock or material in open top or open front bins, wire baskets or on shelves that are attached to a backboard connected to the travel chains. Horizontal carousels could be as high as 20 ft (6 m) and as long as the area permits. These units are usually installed in groups with a narrow aisle between them, sometimes less than 1 ft (0.3 m).

Vertical carousels (see Figure 2) store stock or material in shallow trays, baskets or on shelves connected to the travel chains. The units are usually enclosed in a housing and have openings where the stock is loaded and unloaded. Vertical units are typically used to store office files, parts along an assembly line, and large quantities of small parts, such as electronic components or nuts and bolts in a small controlled area.

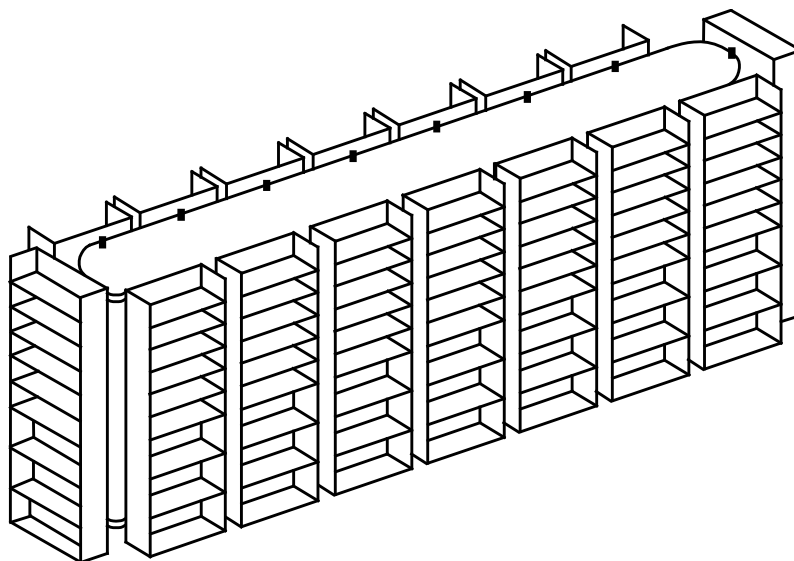


Figure 1. Horizontal Carousel.

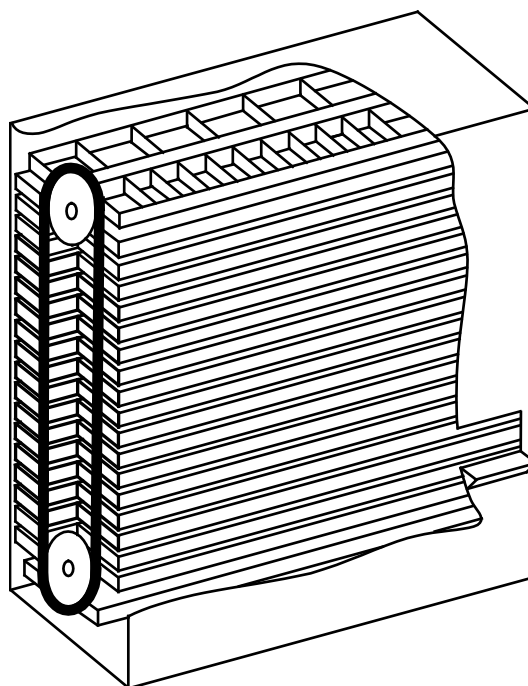


Figure 2. Vertical Carousel Up-and-Down Type.

Vertical carousels can be the simple “up-and-down” or the “up-over-and-down” type. Stock in the “up-and-down” type travels up to the top, over the pivot gear, then directly back down as shown in [Figure 2](#). Stock in the “up-over-and-down” type travels up, over the pivot gear, then, instead of returning directly back down, the stock travels horizontally for some distance before returning to the vertical and completing the loop.

Carousel mechanisms and enclosure, if provided, are usually noncombustible. Containers in which the stock is actually stored may be plastic, cardboard, or metal. They can be solid or mesh and can have an open top or face, or closed with a lid.

Specialty vertical carousels can store stock on mandrels that are connected to the travel chains. This arrangement can store rolls of cloth or paper.

POSITION

Protection requirements depend upon the material stored, storage method and height of storage.

Protect enclosed carousels storing high valued stock, such as electronic components, with a fixed pipe total flooding, automatic carbon dioxide or clean agent fire extinguishing system.

Protect all other carousels with automatic sprinklers installed in accordance with NFPA 13, PRC.12.1.1.0 and the following:

General

- Determine required density based on the commodity classification of the stock or the storage container, whichever is greater. For example, metal parts in exposed unexpanded Group A plastic bins would be protected as exposed unexpanded Group A plastic.
- Use sprinkler system design criteria for the appropriate class of commodity, as determined above, found in NFPA 13 for the protection of palletized, solid piled, in bin boxes, or in shelf storage of that commodity.
- Base sprinkler system design criteria on the storage height and building height.
- Carousels over 8 ft (2.4 m) in height require intermediate levels of sprinklers at 10 ft (3 m) vertical intervals
- Provide a horizontal barrier over the carousel, with sprinklers below, when the clearance between the top of stock and the ceiling sprinklers exceeds 10 ft (3 m).
- Provide 1½ in. (38 mm) hose to reach all areas of the carousels. Hose demand to be in accordance with PRC.12.1.1.0.

Horizontal Carousels

- If open grate mezzanines are provided between levels of horizontal carousels, design ceiling protection for the total height of storage and provide sprinklers below each mezzanine. If solid deck mezzanines are provided, sprinkler design can be based on storage height on that level.
- Provide a minimum 3 ft (0.9 m) clearance between top of stock and sprinklers to assure proper water distribution. If this clearance cannot be maintained, locate sprinklers over the inner flues, those spaces within the carousels, and over the spaces between the carousels.
- Locate sprinklers, for carousels that have solid backs (the vertical part that is attached to the track and upon which the storage containers hang), over the faces of the carousel or over the aisles between the carousels. Provide solid deck mezzanine or horizontal barrier above the sprinklers.

Vertical Carousels

- Locate sprinklers both above and below the pivot gear.
- Up-over-and-down carousels require sprinkler protection in the over area.

Intermediate Sprinklers

Design intermediate level sprinklers, when required due to open grate mezzanines, presence of horizontal barriers, storage height or presence of over areas, as follows:

- Install ordinary temperature rated quick response sprinklers 8 ft (2.4 m) on centers.
- For Class I through IV commodities design for 22 gpm (84 L/min) per sprinkler or 30 gpm (114 L/min) for plastic commodities.
- Calculate the most remote 14 sprinklers (7 sprinklers per line on most remote two lines).
- Do not take any reduction in ceiling density due to presence of intermediate sprinklers.