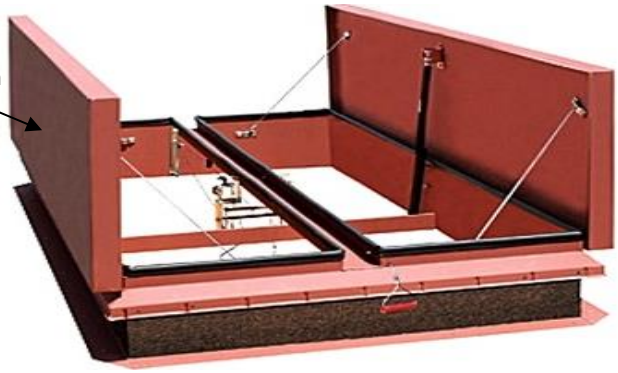
Smoke Hatches/Chutes

by Charles McGarvey
Roof Surveys and Informational Services

While working on commercial, industrial, and institutional low-slope roofing systems, you may find hatches constructed on factory-manufactured insulated metal curbs that extend about 12” above the roofing system's surface. They may be any of several different sizes, ranging from 3’ to 3’ to over 6’ x 8’, that don’t seem to be doing anything. They don’t have typical trap door handles to open from the inside to access the roof or handles on the top side to allow access into the building. They may be a single- or double-door that doesn’t appear to be doing anything and is constructed of solid steel panels that don’t let light into the building.

What are they, and why are they built into the building and exit through the roofing? These are Smoke Hatches that building codes require with certain types of building constructions.

Open smoke hatch with double door construction



Common smoke hatches have been constructed with an interior fusible link that melts at temperatures created by an interior fire. Once the link is melted, the spring-loaded doors will open to release smoke and heat from an interior fire. Modern smoke hatches are still constructed with fusible links, but there have been several improvements, including being part of a skylight design to let light into a building, immediately open when interior fire suppression equipment is activated without waiting for the fusible link to melt, incorporate interior building vents within its curb design; and be acoustically rated to keep interior sounds from reverberating and exterior noises outside if installed over auditoriums.

However, you may find a completely different type of rooftop construction designed to release smoke and heat from an interior fire, known as a Smoke Chute. These designs are various-sized unrestricted open shafts constructed of noncombustible materials that extend above the roof surface. Modern constructions would be capped with an exhaust vent cover, but a Smoke Chute may be mistaken for an old concrete chimney or incinerator on an older building. However, there are no interior flue pipes or evidence that it was ever used as a chimney, as there is no buildup of soot or carbon anywhere on its structure or on the surface of the surrounding roofing system.

Older building construction where the Smoke Chute appears to be an old chimney or incinerator.

Why are some buildings required by building codes to be constructed with Smoke Hatches/Chutes, but others are not? There are several factors, but this code requirement primarily depends on the building contents, known as the fire load, and/or the building's occupancy.

The fire load is the total amount of energy released during an interior fire. A solid concrete or masonry warehouse without interior flammable materials would not have a fire load. But add storage of combustible paper products, books, furniture, wall coverings, etc., and the building now has a fire load that could range from low to high. Building codes incorporate calculations to determine the severity of a fire load, which would cause a fire to spread quickly, and the amount of smoke produced for different types of building usage and the occupancy within the building.

Therefore, if a fire load is considered high and, during a fire, the building's interior contents produce large amounts of smoke that would inhibit a firefighter's ability to enter the building safely, Smoke Hatches/Chutes may be required. Their purpose is to allow the deadly heat (hot air) and smoke from a fire to be released to the outside, so firefighters can visually locate the fire's interior source and extinguish it and/or fight it with water through the open rooftop smoke hatches.

However, some building constructions may have low to medium fire loads that still require Smoke Hatches/Chutes. These buildings may be masonry constructed auditoriums, malls, and similar structures where large numbers of people gather indoors for events or shopping. In this case, fire spread may not be a large problem, but smoke inhalation from even a small or moderate fire may take people's lives in less than two minutes. So once a fire starts in such a building, open Smoke Hatches/Chutes can release much of the smoke, along with its deadly gases, giving people enough time to evacuate the building safely.

So, if Smoke Hatches/Chutes can help firefighters extinguish a fire and save lives by releasing deadly smoke, why aren't they installed in all commercial, industrial, or institutional buildings? There are several reasons, but one is a problem whenever a Smoke Hatch or the interior damper of a Smoke Chute opens during a fire - a chimney effect occurs.

This causes the heated air from an interior fire to be released to the outside through the rooftop Smoke Hatch/Chute, but as it does, it creates a draft that draws outside air (oxygen) into the lower parts of the building. Drawing outside air into the lower parts of the building can spread a fire faster than it would if there were no open Smoke Hatches/Chutes. So, there is a balance of when or when not to install Smoke Hatches/Chutes based on the size and height of a building, type of construction, and building usage, with the most critical factors being the fire load and occupancy level.

Source
Roof Surveys and Informational Services
106 Diane Dr.
Broomall, Pa.
Charles McGarvey
610-587-1384