

Chapter Nine – Ducts

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A rather unbelievable adaptation to the exhaust duct. This material would not last seconds in a fire.

Ductwork

The ductwork is similar to the drainpipe of our bathtub example used earlier. It carries heat and vapor out of the building.

NFPA 96, Chapter 7 is one of the most extensive in the Standard. IMC 506.3 also covers duct installation and for the most part, reflects NFPA 96 Standards. It includes information on metal thickness, access, interior and exterior installations, enclosures, and termination requirements.

General duct requirements according to NFPA 96, Section 7.1 through 7.6:

- Ducts must be constructed of 16-gauge carbon steel 0.054 in. (1.37 mm) or 18-gauge stainless steel 0.043 in. (1.09 mm). Experts have determined that this thickness of metal will withstand and contain the heat of an internal fire.
- All duct seams shall be liquidtight (greasetight) and continuous welded. Grease-tight is defined as not allowing the passage of grease through the seams under normal cooking conditions.
- It is imperative that grease exhaust ducts be treated as if they will be chimneys for fire, not just air conditioning ductwork. Therefore they must not pass through building firewalls, unless tested and listed for such use.
- Exhaust ductwork cannot physically join other ducting systems (such as HVAC)
- In most cases, ducts need to have enclosures (protective clearance from combustible shafts) within the building
- When two exhaust ducts are joined together, the bottom edges shall be flush; therefore, no dips or valleys should exist where grease can accumulate and cause a firetrap



An exhaust system running up the outside of a building in Anchorage Alaska

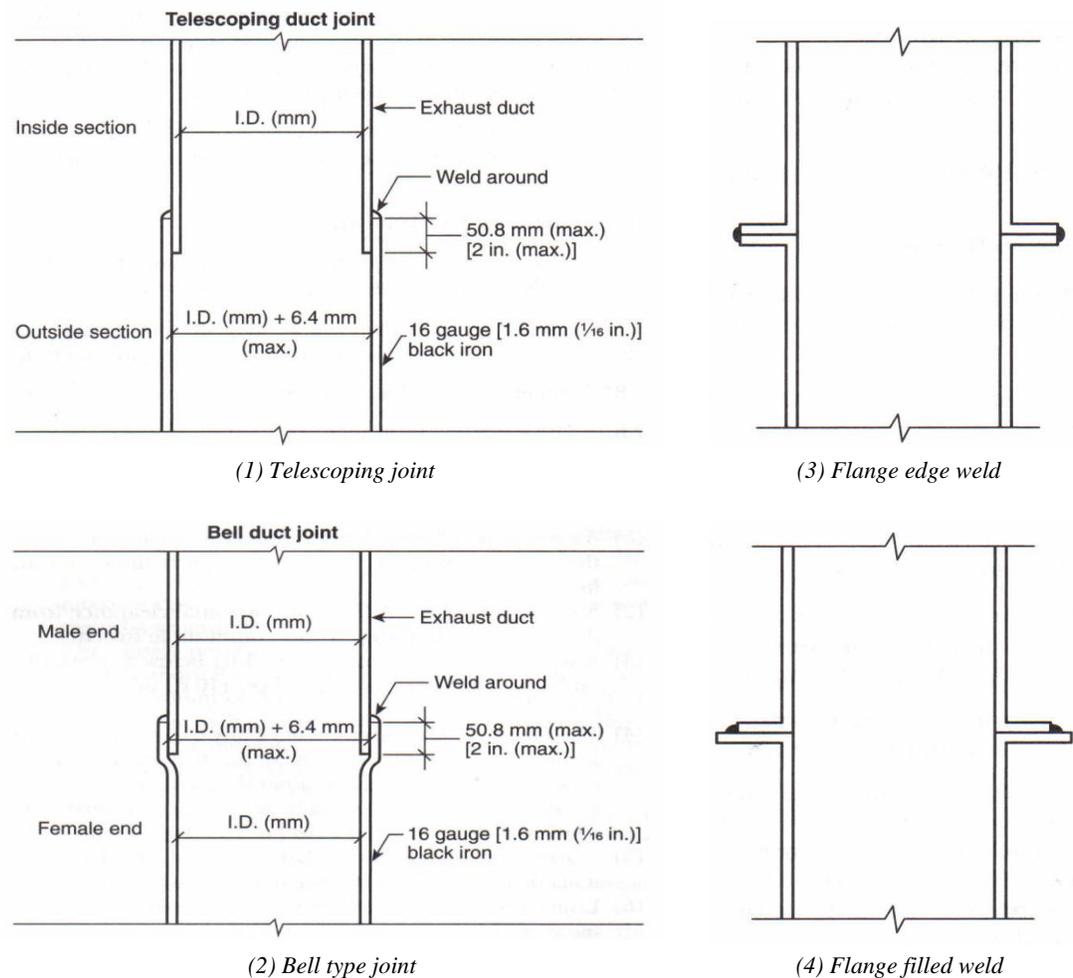
Installation

Ducts are installed in two ways. On single story buildings, the duct may arrive from a sheet metal shop in one long piece. In other cases and on multi-story buildings, sections of pre-made (approx. 121.9 cm or 4 ft.) ductwork are welded together onsite. In either case it is imperative to confirm that all welds are liquidtight.

A solidly welded duct is defined as a continuous, uninterrupted duct that has been installed in sections and then welded together on site. Smooth internal welding is permitted.

In reality most welded ductwork leaks. Testing prior to occupancy with light or pressure-testing will confirm that leaks exist. It may take multiple tests to locate all leaks. Should the duct be covered or concealed (enclosed) in some way, grease that leaks out will build up behind the insulation and create a hidden fire hazard.

NFPA 96, Section 7.5.5.1: Acceptable duct-to-duct connection shall be as follows:



Telescoping and Bell Type Connections

- The inside duct section shall always be uphill of the outside duct section
- The difference between inside dimensions of overlapping sections shall not exceed 6.4 mm (0.25 in.)
- The overlap shall not exceed 50.8 mm (2 in.)

Butt-welded connections are not permitted. This style of connections generally results in a poor union of the two ducts sections. This in turn creates leakage. If this type of weld is encountered it is imperative that the duct be pressure or liquid tested.

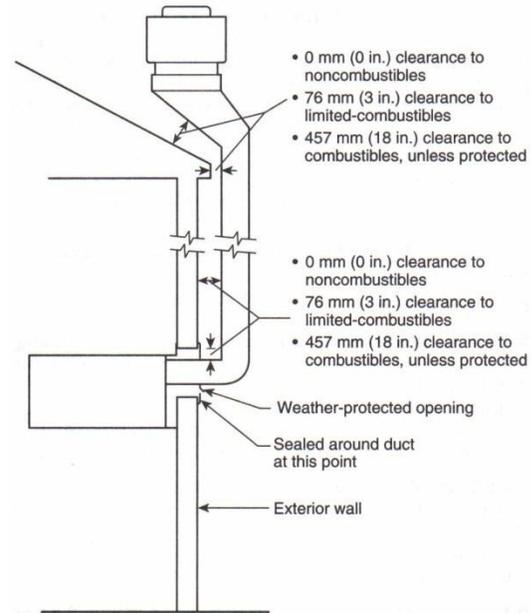
Exterior Installations

More information on this subject can be found at NFPA 96, Section 7.6.

- Ductwork on the exterior of a building shall be vertical wherever possible and adequately supported
- Duct material subject to corrosion should have limited contact with the building
- Fasteners that support the vertical duct to the building (bolts, screws, rivets, and other mechanical fasteners) shall not penetrate duct walls
- Non-stainless steel ducts shall be protected on the exterior by paint or other suitable weather-protective coating



Two completely unsafe, inaccessible vertical ducts



NFPA 96 diagram for proper installation of exterior ductwork

Long Horizontal Ducting

Ducts must be constructed and installed so that grease cannot collect in low spots. In long horizontal ducts, a slope is required of 6.4 mm (0.25 in.) over 305 mm (12 in.). Additionally, it must drain into an approved grease reservoir. In some areas a pitch of 1 inch may be required with accompanying approved sumps. Check local by-laws for these requirements.

Kitchen exhaust ductwork shall be rigidly fastened to the framing of the building. Support systems for horizontal grease ducts 609 mm (24 in.) and larger shall be designed for the weight of entrants up to 363 kg (800 lb.) at any point in the duct systems.

However, it is not uncommon that over time, buildings will settle. If this happens, the rigid fastening can cause the duct to crack, resulting in leakage of grease. This can be a contributing factor in spread of fire within the building. This is particularly important if there are large horizontal sections.



Several long horizontal round ducts