

Penetrations and Openings

General

The information given in this section should be used as a guide towards handling penetrations and openings using Tray-dec flooring systems. Most small penetrations (<300mm) can be accommodated in the composite slab without additional design and reinforcement. Larger penetrations are typically subject to specific design and will require load distribution to accommodate for the superimposed and dead loads around the opening.

Method

Deck penetrations can be done one of two ways:

- **Deck-over method:** the opening is boxed and the Tray-dec cut after the concrete is cured.
- **Cut-out method:** the Tray-dec is cut prior to the concrete pour.

The deck-over method is recommended as it does not compromise the deck bending and shear capacity during the construction stage.

Small Penetrations

Small penetrations (up to 300mm) are typically done for piping and conduits and usually do not require specific structural design. A floor slab with many small penetrations close together or in a cluster are regarded as one large opening and will have to be handled as such.

- **Deck-over method:** it is recommended that the penetration is limited to 300mm. Load distribution still needs to be considered around the opening and can be strengthened by placing rebar around the opening.
- **Cut-out method:** an opening of 150mm or less generally does not require specific design. Deck stiffening may be required when using the cut-out method. It is recommended that for small openings between 150-300mm using the cut-out method will incorporate reinforcing via stiffening angles, tube steel or steel channels running perpendicular to the Tray-dec sheets. The reinforcing shall extend at least $\frac{1}{2}$ the opening width past the opening on each side in the transverse direction. The reinforcing shall be placed at least up to $\frac{1}{2}$ the opening width past the opening on each side in longitudinal direction (fig. 1).

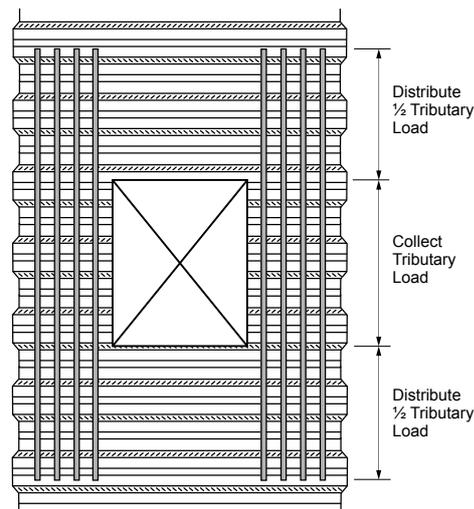


Fig. 1

Mid-Size Penetrations

Mid-sized penetrations are typically used for ductwork and it is recommended that they are subject to specific structural design. They range from 300mm to 1200mm with a limit of 300mm in the transverse direction without additional framing.

- **Deck-over method:** recommended for these applications, where additional reinforcing is to be used in the transverse direction of the Tray-dec sheets. Load distribution shall be like the cut-out method for small penetrations as shown in fig. 1.
- **Cut-out method:** generally, openings from 300mm to 600mm can be treated the same as small penetrations above 150mm using load distribution techniques. For penetrations from 600mm to 1200mm it is recommended that support frames or additional support beams are used to transfer the load back into the primary framework.

Large Penetrations

Larger openings are generally used for lift shafts and stair landings. These should always be designed as part of the primary steel framework.

Penetrations and FRR

Any opening in the slab will compromise the fire rating. Tray-dec suggests for pipework and other small openings to use Snap Fire Collars or similar approved products.