

CABLE MANAGEMENT STEEL FRAMING

About this guide

AS/NZS 3000 contains cable management rules covering all types of materials and forms of construction in all types of building. Cable installation in Light Gauge Steel (LGS) frames requires some specific skills and practices to comply with AS/NZS 3000. This Guide contains information to make the job easier and to help you meet your obligation to comply with AS/NZS 3000 when working on steel framing buildings.



This resource was produced by the National Association of Steel-Framed Housing Inc and the College of Electrical Training.

SERVICE HOLES

Modern LGS frames are supplied with pre-punched holes in appropriate locations and sufficient quantity to cover the majority of requirements for electrical and plumbing routing. Typically service holes are provided in each top plate, noggin and stud. Common service holes range from 28-34 mm diameter and these are generally aligned between adjacent frame members.

The more service holes the frame supplier has placed in the frame during manufacture, the fewer holes you will need to make on site. Where congestion occurs such as in wet areas and kitchens, or where specific routing is required, additional site cut service holes may be needed.

Service hole diameter and spacing, whether factory applied or made on site, needs to meet NASH Residential and low-rise steel framing design standards.

PRE PUNCHED AND FLARED SERVICE HOLES

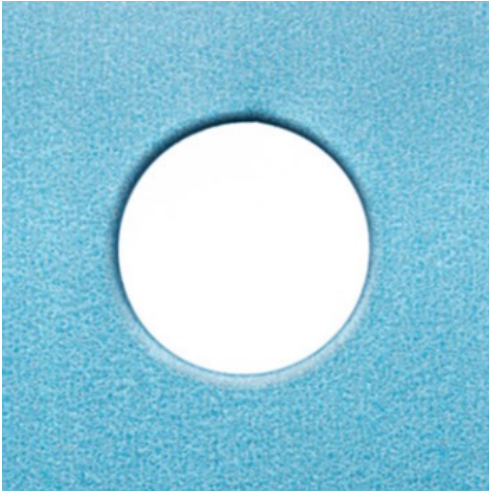
This Guide focusses on the use of service holes for electrical and communications cabling. Service holes are also used for plumbing services and consideration is usually given to the number, location and size during the detailing stage.

As LGS frames vary between fabricators, electrical trades should communicate with builders on the frame systems they are working with, to understand what service hole options can be provided.

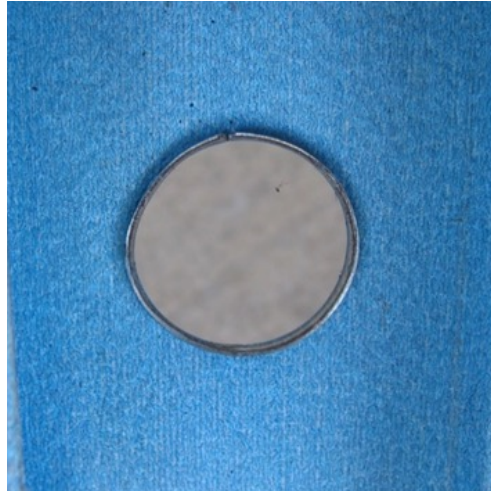
Depending on the frame design, the pre-punched service holes may be punched and flared, (no need for cable grommets), or if not flared, site installed grommets as shown below should be placed in the holes. If additional holes are made on site then these will also require grommets to provide cable protection.



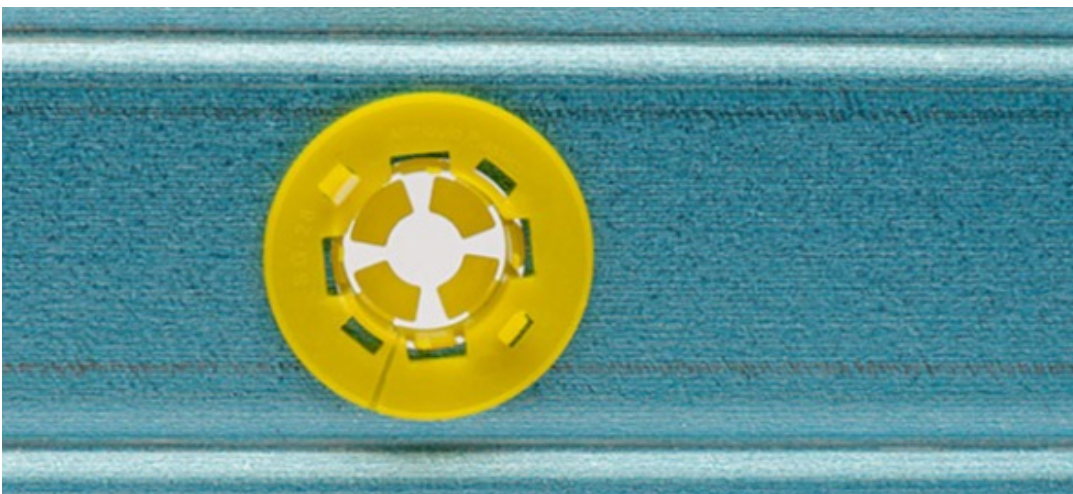
Unflared pre-punched holes or site made holes will require grommets to be inserted for cable protection. It is important to match the grommet size to the frame manufacturer's pre punched hole sizes provided. As a guide a house may require an average of 700 grommets.



Pre-punched service hole



Flare hole



Punched holes with site applied grommet

LGS frame service hole types

HOLE SIZE AND SPACING

When providing input to your fabricator on service hole requirements - location and arrangement - in wall studs, floor joists and bearers, the following should be considered:

- Predictability/convenience of hole locations for initial build and future services
- Proximity of different services – regulatory, functional and practical considerations
- Hole grommets and protection:
 - Most common industry size for unflared holes is 28 mm for which plumbing and electrical grommets are readily available.
 - Grommets assist plumbing and electrical trade work by protecting cables, preventing metallic contact between pipes and framing and providing pipework support to prevent water hammer.

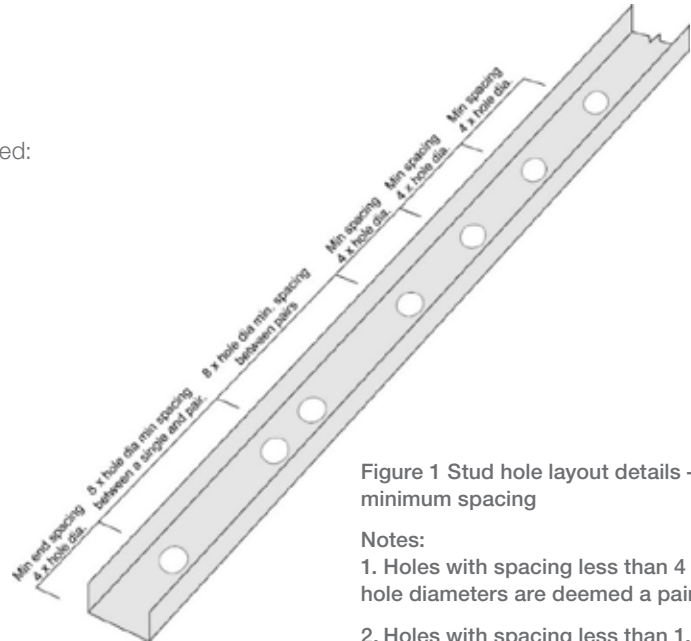


Figure 1 Stud hole layout details – minimum spacing

Notes:

1. Holes with spacing less than 4 hole diameters are deemed a pair.
2. Holes with spacing less than 1.5 hole diameters may be joined to form a single elongated hole. This hole is still deemed to be a pair.

The NASH Handbook – Design of Residential and Low-rise Steel Framing shows a recommended maximum density of holes, without reference to the manufacturer – see Figure 1. Figure 2 shows a typical stud hole layout. Figure 3 shows suggested floor beam penetration details - placement of service holes in LGS web showing hole position and diameter relative to section depth, while meeting design standards.

For wall top plates and solid noggins, generally, a minimum of one hole is placed midway between adjacent studs.

Where additional holes are required, site holes may be easily made using a manual or hydraulic punch, stepped/ cone drill or hole saw.

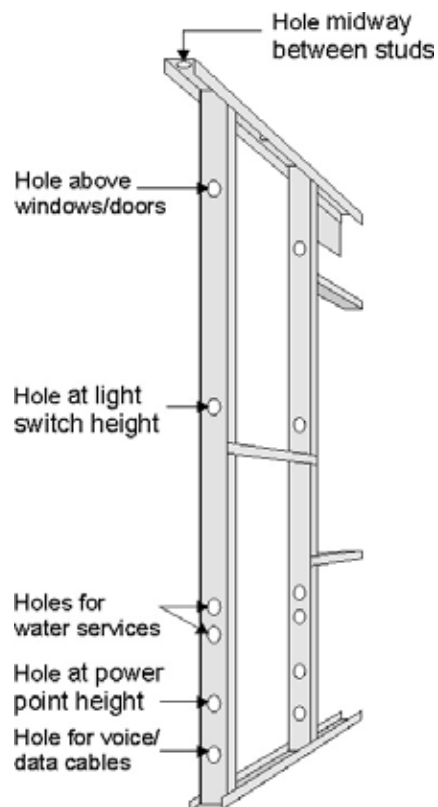


Figure 2 Typical stud hole layout

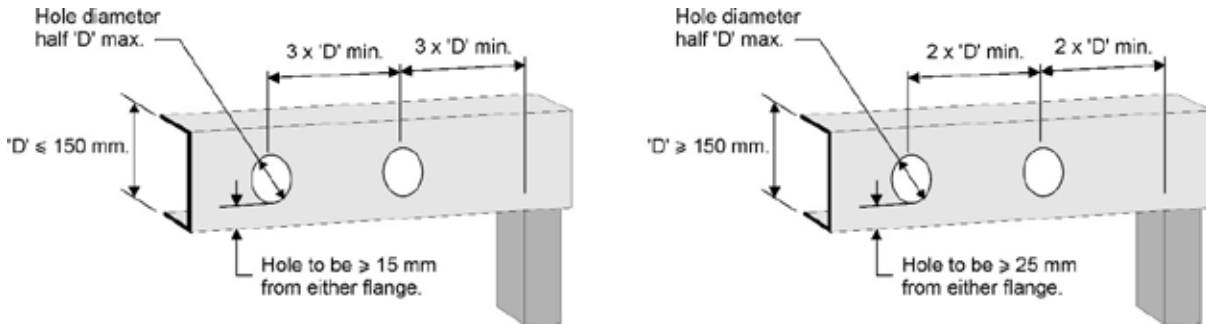


Figure 3 Floor beam penetration – size and spacing

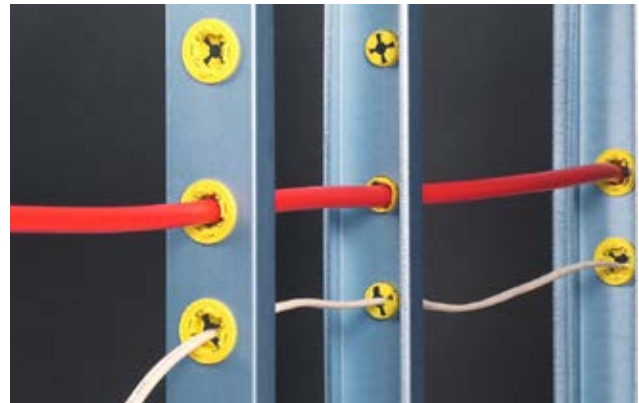
Note: Service holes should not be placed in the flanges of steel members without reference to the frame manufacturer or engineer.

CABLE ROUTING

When routing the cables, AS/NZS 3000 requires that they be protected from mechanical damage. This includes protection from cut edges of the frame and any fasteners installed by following trades. The drawing of cables through service holes that are not protected should be avoided.

Plastic grommets

Routing cables through LGS frames may result in cable being placed within the cavity of the section. These cavities are areas that may receive self-drilling fasteners and/or nails during and after construction. Examples of this are studs and ceiling battens. While technically acceptable within the requirements of AS/NZS 3000 (Section 3.9.4.4), running cables within channels is not deemed best practice as later trades may drill or screw into these cables. Where this cannot be avoided, the requirements of AS/NZS 3000 must be adhered to.



A ceiling batten is open from the top. The second image below shows a wall stud where plasterboard would later be attached to the flanges. In both situations AS/NZS 3000 allows cables to be run through these channels, however this is not considered best practice as these sections receive fasteners when internal linings are attached



Ceiling batten

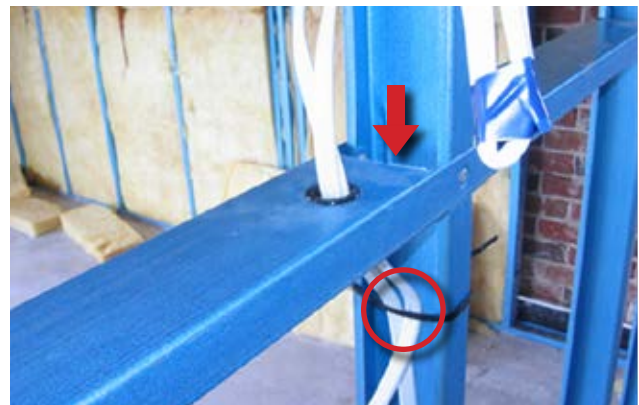


Wall stud

Cable Restraint

Cable ties, tape, clips and saddles are all suitable to support cables. Cables should only be secured or supported to keep them where they are intended to be in accessible areas. In cavities that will be concealed or inaccessible after lining, permanent fixing of cables is discouraged, Refer AS/NZS 3000 (Section 3.9.4.2).

Image (right) shows the preferred practice when running cabling down a stud. If the cable is run directly down the stud, following the red arrow, the cabling must be protected from the cut edge of the noggin. The recommended practice is to run the cabling through the flared or grommeted service hole in the noggin as shown, and secured if necessary to keep cables away from plasterboard fixing surface.



TOOLS AND ACCESSORIES

Grommets

A range of grommet types and sizes are commercially available. Grommets have tabs to lock into the frame to ensure they stay in place when routing cables.



Reference Allmould Grommets

Site installed holes

Mechanical punches are the most efficient tools for adding service holes on site. The tools have interchangeable die sets which are quick to change over to adjust the hole diameter. These tools tend to be durable with a long tool life. The tool produces a clean hole and single disc waste in the punching process.

Step drills and hole saws are a fast way to place additional holes in difficult areas where punches are unable to reach. Choose good quality tools designed for steel use.



Mechanical hole punch



Hole saw



Step drill

Fasteners

Low headed fasteners are recommended for face fixing wall plates to LGS frame members. These provide a flat surface for attaching internal linings. Wafer and button head screws are also suitable but use Low head wherever possible.



Stud bracket



Low head fastener

Note: C clip brackets may be used by electricians rather than the use of the stud bracket.

ADDITIONAL CABLE SUPPORT

Areas where additional support may be required:

- long vertical cable runs
- large diameter cables entering switchboard
- fixing heavy appliances such as ceiling fans

Where additional support, or noggins, are required there are three main options:

- site manufacture of noggin from LGS
- the use of a commercial noggin with adjustable width
- site manufacture of a timber noggin. Where treated timber noggins are used, they must be isolated from the frame (Refer BlueScope TB34). Care should also be taken when introducing combustible materials where building design has fire or bushfire requirements.



Adjustable noggin

LGS frames are delivered to site with pre-punched service holes for follow-on trades to complete efficient installation. They aim to make it easier for the electrician to comply with AS/NZS 3000 requirements.

Service holes that are not flared in the factory or are punched on site require grommets to be inserted to protect electrical cables from mechanical damage.

There is a small number of prohibited cable locations, eg; within steel roof or ceiling battens. Otherwise, cable runs are basically the same for timber, steel and masonry structures.

Follow NASH guidelines when adding holes to LGS frames on site.

Engage with your local frame supplier(s) to keep them advised of your needs.