

## Part 1: Devices for securing and mounting accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to hollow walls

The most suitable device to secure the clips to the wall is Toggle device

The most suitable device to attach a **socket outlet to a hollow plasterboard wall** is Wall bracket (C clip)

A box containing humidity measuring instrumentation and weighing **1.2 kilograms** is to be mounted onto **16mm timber panelling**. The suitable device is "Self-tapping wood screws"

A **wood screw** would be a safe and suitable fixing device for Fixing a 100mm x 100mm x 20mm metal support bracket to a timber post

A device suitable for fixing a telecommunications meter box **weighing 7 kilograms** onto a **timber beam** is Coach bolts

A **coach bolt** would be a safe and suitable fixing device for Fixing a 90mm x 70mm x 3.0m timber brace to a timber panelled wall

To terminate the electrical wiring for a lighting circuit in a junction box but need to secure **the junction box base to the timber rafter**. Wood screw is the best for this situation.

Copper piping for an air conditioning system must be secured to a **timber panelled wall with piping saddles**. Self-tapping screw is the best to secure the pipe saddles?

A **self-tapping screw** would be a safe and suitable fixing device for Fixing a 400mm x 150mm x 75mm sheet metal drip tray to a timber beam

A **self-drilling screw** would be a safe and suitable for Fixing an air conditioner wall controller to metal framing and Fixing a 400mm x 400mm sheet metal sign to a sheet metal hollow wall

A **hollow wall anchor** would be a safe and suitable fixing device for Fixing an air conditioner wall controller to a plasterboard wall

A **plastic collapsible plasterboard anchor** would be a safe and suitable fixing device for Fixing a photo frame support bracket to a timber panel hollow wall

**A toggle type wall anchor** can not be used for Fixing a picture frame support bracket to a masonry wall AND Fixing a 50mm x 25mm x 1.2m timber batten to a concrete wall

**A stud bracket** would be a safe and suitable support accessory for Fixing a socket outlet to a timber frame stud before plasterboard is fitted AND Fixing a socket outlet to a steel frame stud before plasterboard is fitted

The method (or technique) you would follow to **fix a steel angle bracket** supporting the outdoor unit of an air conditioner to a **wooden framed external wall using coach screws** (also known as coach bolts)..

- Measure and mark the location of the holes to be drilled into the timber wall.
- Use a power drill and HSS drill to make 4 holes.
- Hold the bracket against the wall and insert a coach screw (bolt) through the bracket and into the timber.
- Use a socket wrench to drive the bolt most of the way into the timber. Insert the second screw and drive in fully.
- Finish driving the first screw home.

The fixing devices that are suitable for use in **wood and/or hollow wall structures**



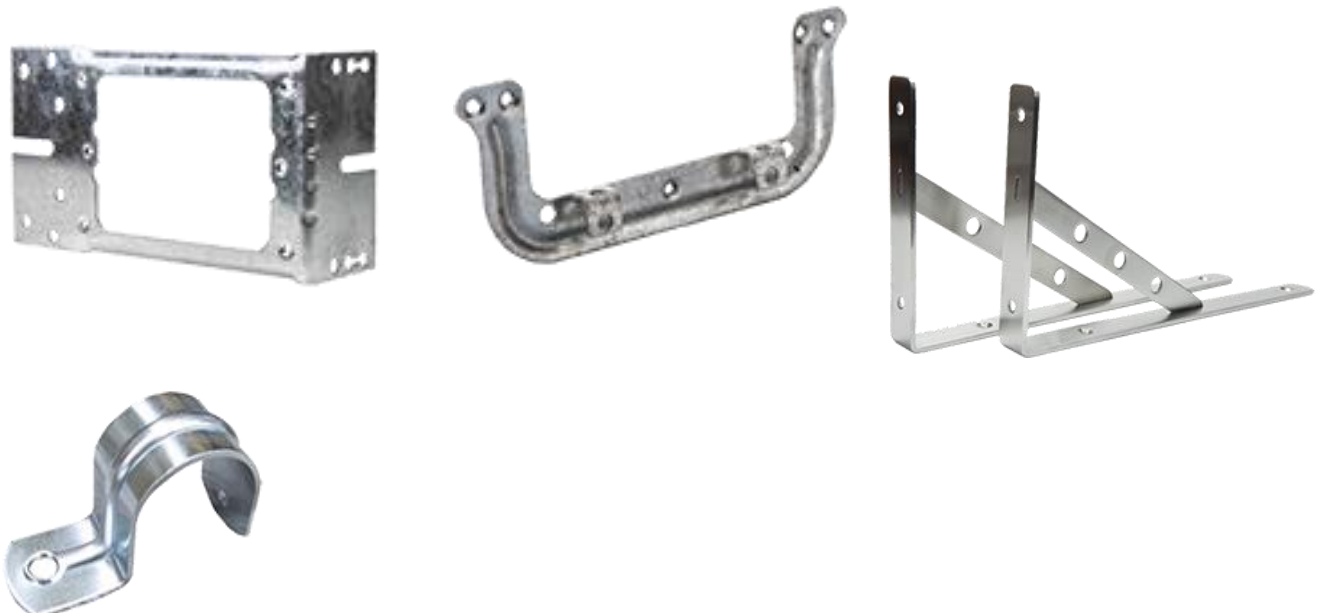
The tools that are suitable for use **with hollow wall fixings and supports**



When installing the **metal bracket** for the indoor head (coil) of a hi-wall split air conditioner, that has a **mass of 12kg**, on an **existing gyprock (plasterboard)** and timber frame wall, the following devices are used.

- 15kg rated self-drilling cavity anchors and appropriate self-tapper screws.

1.1 **support accessories** that are suitable for use with **wood and hollow wall structures**



The method (or technique) to follow to **fix a sheet metal caution sign to a plywood panel** using **self-tapping screws**. (Answer between 10-20 words)

- Use a cordless drill driver to drive 4 pan head self-tapping screws, one into each corner of the sign.

The method (or technique) you would follow to fix a timber post to a Masonry block using dynabolts. (Answer between 30-40 words)

- Use a power drill and HSS bit to drill a hole in the timber post. Use a masonry drill and SDS concrete bit to drill a hole in the masonry block. Use a hammer to drive a dynabolt into the hole on the masonry block. Place the timber post onto the masonry block, fit the nut onto the dynabolt and tighten.

The method (or technique) you would follow to fix an **8kg indoor unit for an air conditioner** to a **plasterboard wall** using **plasterboard hollow wall anchors**.

- Hold the support bracket against the plasterboard wall and mark the positions of 4 holes. Use a power drill to place 4 holes in the plasterboard. Use a hollow wall anchor setting tool to fix 4 plasterboard anchors in place. Remove the screws from each anchor and place the support bracket against the wall. Insert and secure each of the 4 retaining screws.

## Part 2: Devices for securing and mounting accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to solid walls

Chemical anchor is the most suitable device to attach a **heavy steel enclosure** being used to house pressure monitoring instrumentation, with an overall mass of 30kg, installed close to the edge (corner) of soft brick wall.

For high-volume, **fast fixing of electrical conduits or refrigeration piping to a masonry wall**, the best system to use is Gas powered fastening (or powder actuated)

Masonry drill bit is best to drill a hole into concrete?

The fixing device known as a **Loxin** is best suited to **securing electrical and air conditioning equipment** to a Concrete floor

There are no regulations covering the use of powder actuated hand held tools however, the operation and maintenance of these tools are covered by AS/NZS 1873.

A bracket needs to be secured to a **brick wall to support an electronic controller** weighing **150 grams**. Wall plug & screw is the most suitable:

Electrical wiring is typically run in conduits which can be **saddled to a concrete wall** using Plastic knock-ins

An **expanding masonry fixing device** is a safe and suitable fixing device for Fixing a 90mm x 70mm x 3.0m timber brace to a solid brick wall .

A device that could be used to fix condensate piping to a brick surface that puts **no stress on the brick** is An injection or chemical anchor

To fix a long length of pipe to a **large steel beam** on a telecommunications tower as **quickly as possible** and need to fix a large number of pipe saddles in order to do this job. Gas powered (or powder actuated) nail gun is the best for this situation.

Heavy duty expanding type anchors are only suitable for **full concrete** construction. **Hollow block** construction does not have the necessary support for this type of anchor.

A large quantity of electrical, security and instrumentation cabling must be supported under a **concrete ceiling**. The job requires the installation of a cable tray to achieve this. Loxins is best suited to securing the **cable tray to the ceiling**.

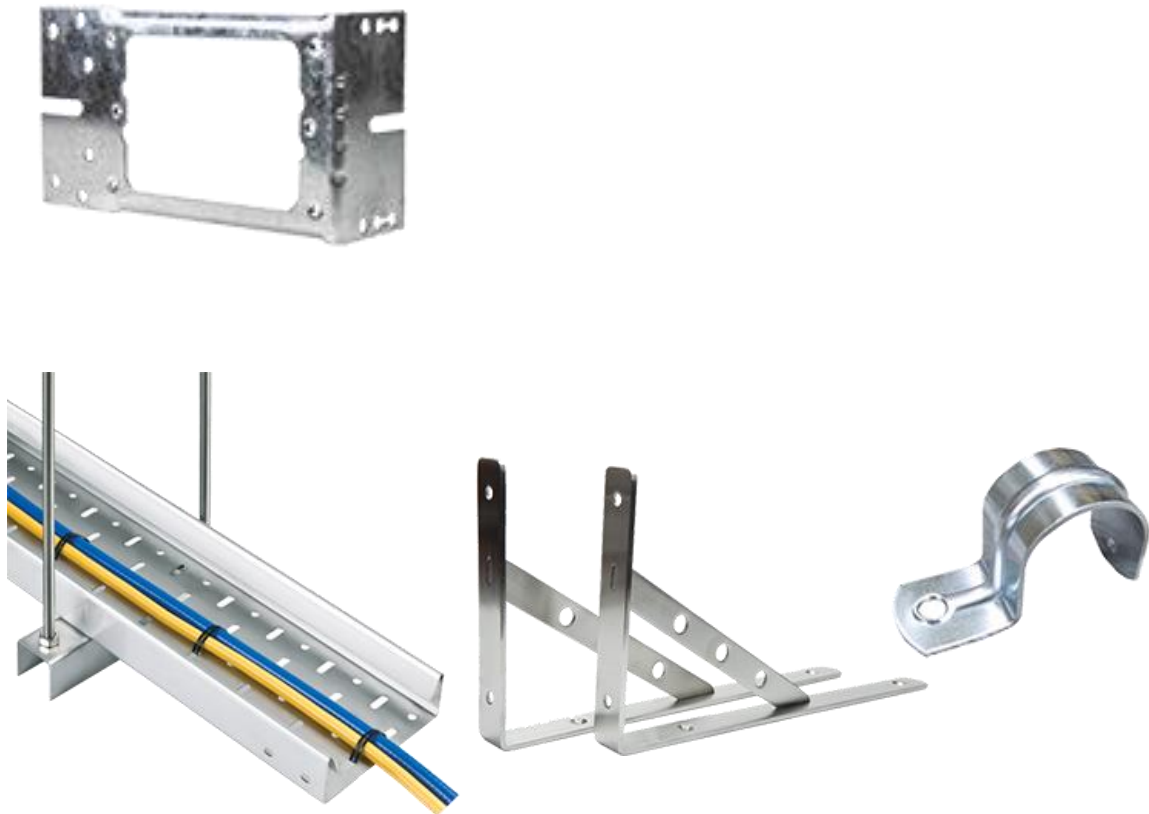
The method (or technique) you would follow to **fix a sheet metal caution sign to a brick wall** using a **construction adhesive** (e.g. liquid nails or sika flex

- Use a clean brush to clean the surface where the sign is to be attached and the back of the sign. Fit a tube of adhesive into a caulking gun. Apply the adhesive to the wall by applying pressure to the trigger of the gun. Fix the sign over the wall and apply pressure to assist in spreading the adhesive and improving the bond.

The method (or technique) to follow to **fix a metal post** (with a square mounting plate welded to its base), **to a concrete floor** using **chemical anchors**.

- Place the post on the floor in the location it is to be mounted and mark the position of the holes on the concrete. Fit a masonry bit into a rotary hammer drill and drill 4 holes into the concrete floor. Use a puffer or length of plastic tubing to blow out the hole and remove any remaining debris. Place a chemical capsule in each of the holes. Place a bolt in each of the holes and hit with a hammer to break the capsule. Wait for the recommended time for the chemical to set before fixing the post.

The **support accessories** that are suitable for use with **solid wall (masonry, bricks, and concrete) structures**.



Chemical anchors have a major advantage in that they can be fixed closer to edges than expansion anchors.

The **fixing devices** that are suitable for use in **solid wall (masonry, bricks, and concrete) structures** .





The tools that are suitable for use with **solid wall (masonry, bricks, concrete) fixings and supports**



**Three hazards** associated with Powder actuated tools tools.

- Flying Particles
- Ricochets
- Loud Noise
- Explosion
- Blow-Through

### Part 3: Devices for securing and mounting accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories to metal fixing

A 10 mm metal thread bolt has a maximum outer thread diameter of 10 mm

Water pumps in refrigeration plant rooms are commonly secured to a **metal base** with **machine bolts and nuts**. The best technique used to ensure the nut **does not** work loose is to fit a Spring washer

Self-drilling screws is the best to secure a **light switch** to a **metal cabinet** containing temperature sensing instrumentation?

A length of shielded electronic data cable needs to be secured along a **steel girder**. From the options below, Spring clips (girder clips) is the best suited to this situation?

When using a High Speed Steel (HSS) drill bit the drill speed is important. The drill machine should be set to a faster speed with small drill bits and a slower speed with larger drill bits.

A small air conditioning compressor must be **secured to a sheet metal base**, using **metal thread screws and spring washers**. Nutserts and machine screws is the best suited to this situation?

A short length of electrical wiring **inside a switchboard** needs to be safely secured. From the options below, Trunking or flexible conduit is the best suited to this situation.

A High Speed Steel (HSS) drill bit is used to place a round hole in wood and steel while a masonry drill bit is used to place a round hole in bricks and concrete.

Screwdrivers are classified by their **head types**. There are now literally hundreds of drive types available. Johnson is **NOT** one of the common types?

Metric spanner sizes are measured in Millimetres between the jaws (across the flats).

A **reamer** can not be used to make a 'rough' sized hole in a material before a drill bit is used to make the final 'exact' sized hole.

The method (or technique) you would follow to fix a sheetmetal identification sign to the front of a metal switchboard using a pop rivets.

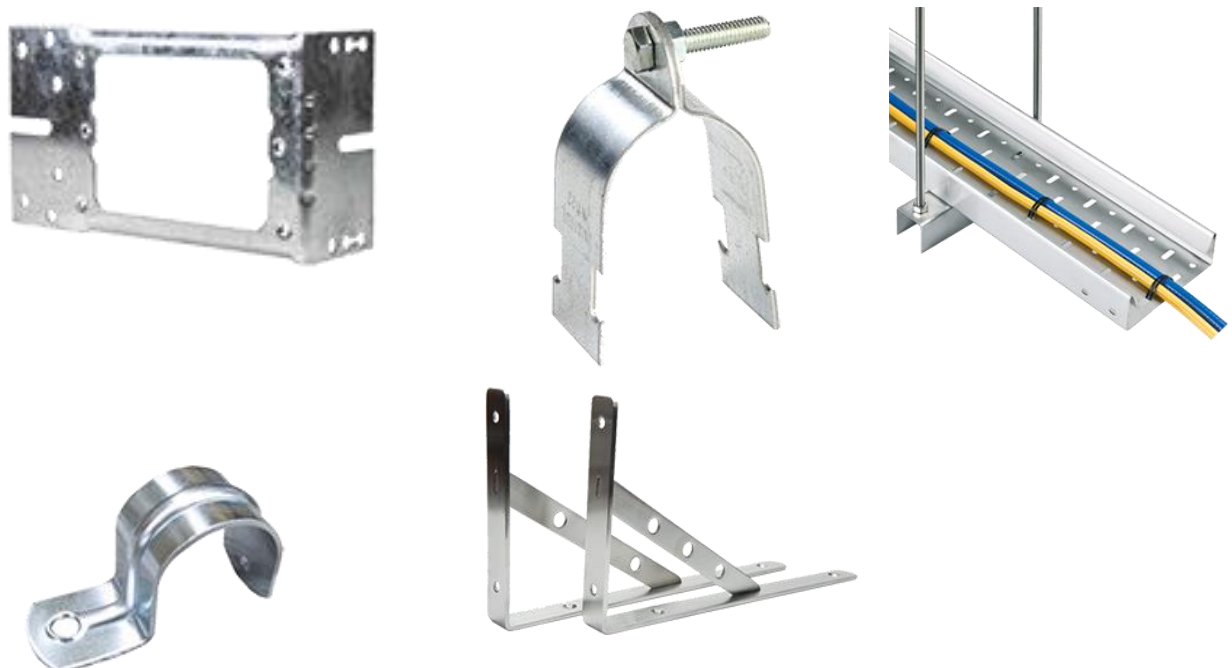
- Use a cordless drill to make 4 holes in the sign if they are not already available. Place the sign against the door of the switchboard and mark the location of the holes onto the door. Use the cordless drill to make 4 holes in the steel door. Hold the sign against the door. Load a pop rivet into the pop rivet gun. Place the end of the protruding rivet through the hole in the sign and the hole in the door. Squeeze the handles of the gun until the pop rivet pin separates from the rivet head. Repeat this on the other 3 holes.

Following is a list of the steps to follow when using a power drill,

1. Select the proper drill bit for the type of material you are drilling into.
2. Put on the correct PPE (Safety glasses. May also include ear muffs, dust mask and hair net
3. Adjust the speed of the drill to match the drill bit size
4. Hold the drill securely with both hands and at right angles to the surface you are about to drill into.
5. Pull the trigger on the drilling machine to start the drilling process.
6. Apply gentle pressure against the drilling machine while cutting the hole.
7. Pull the drill totally out of the hole every now and then to ensure that the bit remains free of swarf and does not bind up (causing small bits to snap).
8. If the drill bit catches the material as it breaks through the bottom, release the trigger and run the drilling machine in reverse to extract the bit.

The main difference between masonry and metal drill bits is The masonry bit has a tungsten tip

The **support accessories that** are suitable for use with **metal structures**

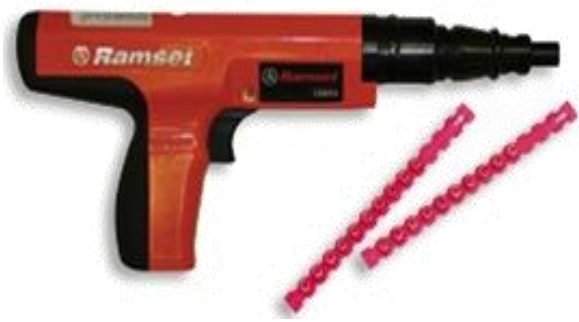


The **fixing devices** that are suitable for use with **metal structures** by placing a cross X in the box under the device.



**Metal Fixing and Support Tools**





Two types of rivets.

- Blind (or Pop) rivets
- Closed (or Solid) rivets
- Compression rivets
- Drive rivets
- Flush rivets

A file is a tool that can be used to remove burrs, straighten uneven edges and smooth rough surfaces on metal and wood.

3.1 The hazards and two suitable items of PPE for each of the following situations:

Situation	Two Hazards	Two suitable items of PPE
Drilling steel with a cordless drill.	<p>Flying metal (swarf)</p> <p>High pitched noise</p> <p>Rotating parts</p>	<p>Safety glasses</p> <p>Ear plugs</p> <p>Hair net</p>
Cutting Gyprock with a plasterboard saw.	<p>Cut to hand</p> <p>Inhalation of dust</p>	<p>Leather gloves</p> <p>Dust mask</p>
Using a powder actuated hand tool to fix a bracket to concrete.	<p>Loud noise</p> <p>Exploding concrete</p>	<p>Ear plugs</p> <p>Face shield or Safety glasses</p>
Using an electric angle grinder on a metal post	<p>Laceration to flesh</p> <p>Inhalation of metal filings</p> <p>Rotating parts</p>	<p>Leather gloves</p> <p>Dust mask</p> <p>Hair net</p>

# Part 4: Devices for securing and mounting accessories for supporting, fixing and protecting wiring/cabling/piping and functional accessories using fixing adhesives and tapes

Double-sided tape is suitable for mounting Mini trucking.

If the load limit of 'brand X' double sided adhesive tape was 2.4kg per metre, 0.5m or 500mlength of tape would be required to support a 850mm x 600mm picture frame containing a circuit diagram with a total weight of 1.2kg?

A manufacturers' specification shows that an 8mm chemical anchor has a load limit of 14.3 kN when used in concrete. If the conversion factor from kilonewtons (kN) to kilograms (kg) is 102, 1458 kgm is the maximum weight that this anchor would be able to support?


The correct technique used to apply chemical adhesives to a surface involves 3 factors that ensure the bond performs as expected. They are .





- Curing time required by the chemical.
- Temperature of the surface and the adhesive must be within the range specified for the chemical.
- The surface to which the adhesive is being applied must be clean and dry.

The correct technique used to apply adhesive tape to a surface involves 3 factors that ensure the bond performs as expected. List the 3 factors.

- Increased pressure applied to the surface of the tape speeds up the bond.
- The temperature of the surface and the tape should be above 15°C.
- The surface to which the tape is being applied must be clean and dry.

Adhesives/tapes and appropriate tools

Adhesive	Appropriate Tool
	<p>Caulking Gun</p> 

	<p>Utility Knife</p> 
	<p>Hammer</p> 

The **adhesives (glues)** that are suitable for use as **commercial fixing devices**



PVA Wood Glue



Concrete Glue



Construction Adhesive



Contact Cement



Silicon Adhesive



Chemical Capsule and bolt



**2 safety issues** to be considered when applying **chemical adhesives** to a surface.

- Toxicity - Avoid inhalation of fumes.
- Flammability - Avoid applying near sources of ignition.

**2 safety issues** to be considered when applying **adhesive tapes** to a surface.

- Finger lacerations/cuts – cut away from the body and wear gloves.
- Flammability - Avoid applying near sources of ignition.

The **tapes** that are suitable for use as a **commercial fixing devices**



Double sided tape



Packing Tape



Duct Tape











Foil Tape



Gaffer (Cloth) tape

Accessories/items with different surfaces and four types of chemical adhesives

Fixing Device	
	<p>PVA Wood Glue</p> 
	<p>Chemical Anchor</p> 
	<p>Construction Adhesive</p> 
	<p>Silicon Sealant</p> 

**Accessories/items with different surfaces and four types of adhesive tape.**

	Fixing Device
	Duct Tape 
	Double Sided Tape 
	Electrical Tape 
	Packing Tape 

Chemical anchors

Securing equipment to a **concrete and brick surfaces** but present a range of hazards. Name **three hazards and the safety measures** that should be applied when working with the chemicals used to set these anchors.

- :
- Inhalation of fumes; Ensure area is well ventilated. Contact with eyes; Wear safety glasses or goggles. Contact with skin; Wear gloves and clothing on legs and arms. Poison/Ingestion; Do not swallow. Dust when cutting/grinding; Wear respirator