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Quality Fasteners Specialist

No. 4, M.G.S. Complex, Benki Nawab Street, S.P. Road Cross, Bangalore 560002

8310165941 / 9008782885 sales@royalfastenersindia.com www.royalfastenersindia.com

ANCHOR FIXINGS GUIDE

TECHNICAL CATALOGUE NUMBER: TECH0007

Anchor bolts are used extensively in concrete, brick and block masonry and cavities to make structural attachments and connections. To date, a limited amount of information has been available to aid designers and users in the selection and design of anchor bolts in various types of substrates.

In new masonry construction, anchor bolts were commonly embedded in walls and columns to support beams, plates and ledgers. However, for flexibility and ease of construction, the use of post-installed anchors is increasing.

POST INSTALLED ANCHOR BOLT SYSTEMS

In prefabricated panel construction, anchor bolts are used to facilitate connections to the structural frame. Renovation and rehabilitation of existing masonry structures usually require that anchor bolts be attached to stair risers, elevator tracks and various frame assemblages for equipment installation.
This is only a fraction of the possible uses of anchor bolts in masonry construction and with the increase of new, innovative architectural masonry designs, the uses of anchor bolts in masonry construction are likely to increase.

Anchors can be divided into two generic categories:

Expansion type anchors & Adhesive / Chemical type anchors.

EXPANSION ANCHORS

a. Torque Controlled Expansion Anchors

Sleeve anchors develop their strength by the expansion of a cylindrical metal sleeve or shield into the base material as the bolt is tightened. The expansion of the sleeve along the length of the anchor provides a larger bearing surface than the wedge anchor, and is recommended for use in brick masonry.

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Wedge Anchors develop their hold by means of a wedge or wedges that are forced into the base material when the bolt is tightened. The wedges create large point bearing stresses within the hole.

Drop in Anchors are produced to allow shallow embedment depths and are expanded or set by an impact setting tool. These are extremely suitable for installations into roof slabs. As the combination of shallow embedment and high stresses imparted by the expansion tend to cause cracking or splitting in masonry, they are not recommended for use in brick.

b. Concrete Screw

Concrete screws are screwed into pre drilled holes by a special screw driver – TORX DRIVE.
The threads will cut into the concrete and create mechanical interlockbetween screw and concrete. This is an expansion free fixing.

c. Nylon Based Anchor Fixings

Wallplugs – Nylon wall plugs are placed in predrilled holes and screws are tightened into the plug creating expansion. These are available in many sizes and are very versatile. They are useful for light loads in Brick, Block and Concrete.

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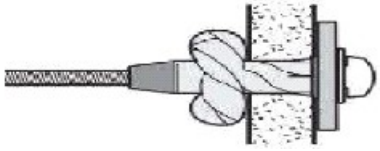
Nylon Frame Fixings – A hole is drilled through the frame and into the masonry. The whole fixing is inserted through the frame into the masonry and screw tightened. These fixings are available in various head styles and plug designs to make them suitable for multiple applications in Brick, Block, Concrete, Hollow Bricks, Aerated Concrete, etc. Suitable for fixing of facades, doors, windows, gates, cable trays, metal bracket, etc.

Cavity Fixings – Where objects need to be fixed onto plasterboard and other wall and ceiling cavities.

Expandet Rosett® is the strongest fastening solution in plaster boards, gypsum fibre boards, chipboards and other cavity walls.
No Special Tools are required for implementation. Designed for Heavy Loads.



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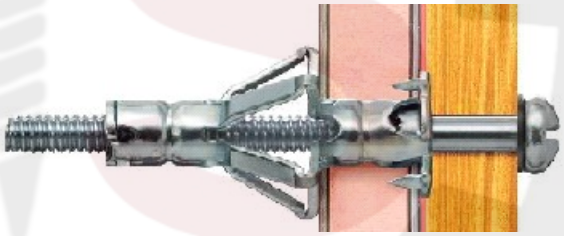
Plaster Plug Nylon Cavity Anchor – Used with screw is most effective in most of the quick and light solutions in both 1 and 2 layer of plaster board or other materials as chip boards, gypsum fibre boards and other walls with cavities.

JET Drive Metal Anchor- This can be used without a predrill in most cases making it a fast and easy fixing. It is used for light-fixings without the mess of drilling. This is a very popular design.

Metal Cavity Anchor – Suitable for fixing cable trays, brackets, pipings and boards, etc. It can be used with all metric-threaded screws in plasterboards with cavity. Installation with special installing tool.



Spring Toggle Anchor – Extremely useful for fixing or hanging objects from a false ceiling. Suitable for light duty fixings in ceilings and provides the possibility for bridging thick walls. Especially suitable for fixing of suspended ceilings, brackets, cable trays, pipings, etc.

ADHESIVE ANCHORS

Instead of the anchor holding itself against the surface, a chemical resin cures around the anchor and keeps it held in place.

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When to use Chemical Resin Anchors

If you need to fix something close to the edge of a brick or a stone because you intend to hang a gate or adda small fixing, anchors that expand can cause strength-ruining splits and cracks in the masonry. If the structure is subject to dynamic loads, vibration or wind, then chemical anchoring is preferable over machine anchoring.

Using anchors and fixing is all about getting that most secure fitting possible and sometimes the only way to ensure the surface stays intact is to use chemical resin.

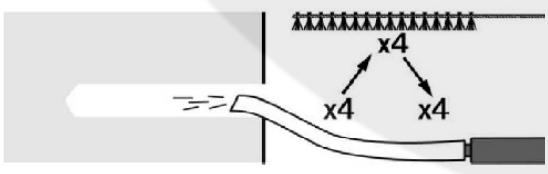
Because it doesn't expand or risk splitting/cracking, chemical resin anchors can also be used in weaker masonry that might crumble under expansion of sleeve anchors and screw threads.

There are a lots of benefits of using chemical resin anchors as they are more than capable of holding massive loads and their application can be fairly quick. However, correct preparation for fitting chemical resin anchors is essential.

HOW TO USE CHEMICAL RESIN ANCHORS

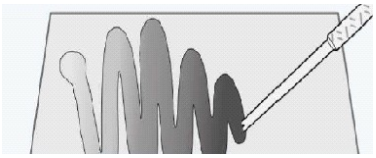
To use chemical resin and anchors together, ensure that you make an appropriate hole as recommended by the manufacturer's catalogue in terms of diameter, dept and spacing.

If your drilled holes are likely to have voids (frequent in hollow blocks or bricks), you'll need resin injection anchor sleeves to control the flow of the resin and provide a secure fix to the substrate.



- Remove any loose material from the hole to get the best hold againsta a debris-free surface. Use a resin hole brush to do this. Also use a tube to blow air into the hole to get rid of more debris.
- Using an applicator gun, inject the resin into the hole.

It is important to make sure it's mixing properly before you inject it into the holes.
It is advised to let some out first to allow it to mix.



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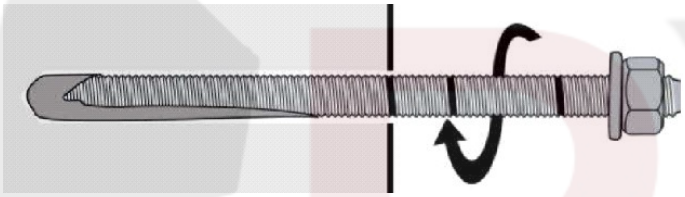
Always ensure that the nozzle width and length are correct, and make sure to slowly withdraw the nozzle, so trapped air pockets don't happen.

For deeper holes use a resin nozzle extension tube on the end of a mixer nozzle.

- In general filling about 70% of the hole will suffice to get complet6e coverage.
- As you push the stud in the hole, twist it a few times to break any air bubbles. It also pushes the resin into any voids in the hole.

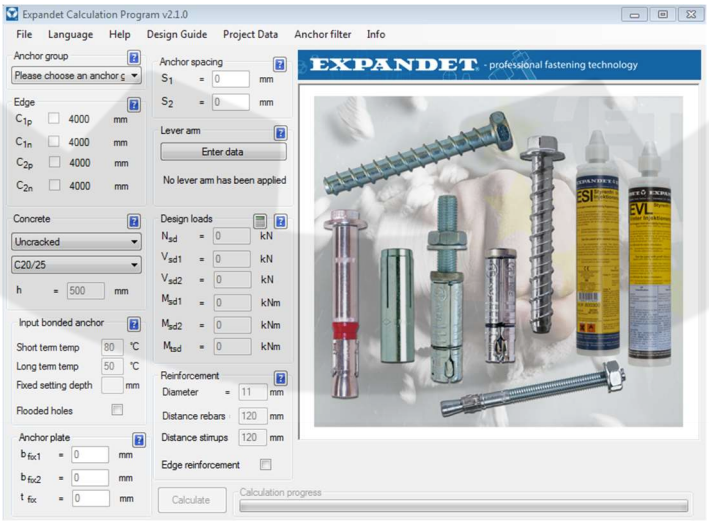


If the stud keeps pushing itself back out it may need a few more twists. All threads should have an even covering.

- Once all studs are in, you'll have to leave them alone. How long this takes will depend on the brand of resin as well as the temperature. Resin tubes will have a guide on the label : a gel time and full cure time. Don't load the studs until the full cure time.

The adhesive bond strength is reduced at elevated temperatures and may also be adversely affected by some chemicals.

ANCHOR BOLT DESIGN



Anchor bolts are used as a means of tying structural elements together in construction and therefore, provide continuity in overall structure. In virtually all applciations, anchor bolts are required to resist a

combination of tension and shear loads acting simultaneously due to combinations of imposed dead loads, live loads, wind loads, seismic loads, thermal loads and impact loads. For this reason, and also to ensure safety, anchor bolt details should receive the same design considerations as would any other structural connection.

This very useful free anchor design application can be downloaded from the below link:

https://expandet.dk/downloads/ACP.zip

CONSIDERATIONS FOR BRICK MASONRY

There are several considerations that should be examined when contemplating the use of expansion type anchors in brick masonry. These are:

1. Expansion anchors should not be used to resist vibratory loads. Vibratory loads tend to loosen the expansion anchors.
2. Specific torques are required to set expansion anchors. Excessive torque can reduce anschor strength or may lead to failure as excessive torque is applied.
3. Expansion anchors require solid, hard embedment material to develop their maximum capacities. Some brick construction may not provide a good embedment material due to voids formed by brick cores and partially filled mortar joints.

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CONSIDERATIONS FOR TORQUE CONTROLLED ANCHORS

Expansion anchors must be torqued per the values provided in the manufacturer's printed installation instructions to properly expand the wedges and clamp the fixture. Under-torquing results in under-expansion of the wedges, which reduces the amount of clamping developed. Once pre-load/ clamping is removed from an under- torqued expansion subjected to tensile loading the anchor will displace, resulting in follow-up wedge expansion and lift-off of the fixture.

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ANCHOR SELECTION GUIDE

● Suitable
○ Useable

	Concrete	Solid Brick	Sand-Lime Brick / Block	Hollow Brick	Lightweight aggregate concrete	Aerated concrete	Plasterboard	Fiber plasterboard	Chipboard	Wood
A2 Window Frame Screw		●		●	●	●				
Alum-Hammer Rivet	●	●	○							
Concrete Screw	●	●	●	●	●	●				
Concrete Hammer Rivet	●									
C-Bolt	●	●	●							
Driva							●			
Expansion Bolt	●	●								
Expansion Shield	●	●								
Spring Toggle Anchor							●	●	●	
Express Nail	●	●	○							
Throughbolt	●									
Plasterboard-Clips							●	●		
Heco Topix wood conctruction screw										●
Injection Mortar	●	●	●		●	●				
Injection Mortar with Sleeve				●						
Isoplug	●	●	●		○	○				
Isoplug with expansion	●	●	●		○	●				
Jet-Drive							●	●		
Adjustable Fram Screw with Super	●	●	●	●	●	●				●
Chemical Anchor	●	●	●			●				
LB					○	●				
LB Metal					●	●				
Light Rosett							●	●	●	
Celling Anchor	●									
Brass Anchor	●	●	●							○
Metal Cavity Anchor							●	●	●	
Metal Toggle Anchor							●	●	●	
MFA Frame Fixing	●	●	●	●	●	●				
Super Frame Fixing 8 mm	●	●	●	●	●	●				
Multi-Monti	●	●	●							
Wallplug	●	●	●							
Nylon Cavity Anchor							●	●	●	
Rosett							●	●	●	
Drop In Anchor	●									
Drop In Anchor with collar	●									
Special					●	●				
Super Nylon Plug	●	●	●	○	○	○				
Super with long expansion				●	●	●				
Super Frame Fixing	●	●	●	○	○	○				
Super Frame Fixing w/ long Exp.				●	●	●				
Heavy Duty Anchor	●									
Nail Anchor	●	●	●	○	○	○				
Toproc w/ Super/Super long Exp.	●	●	●	●	●	●				●