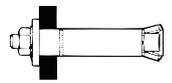


Plugs and anchors: Selection and assembly aids



8.1 Drilling

Table 4:

Anchoring base	Drill	Drilling technique	Machine	Notes
Concrete \geq B 25	Hammer drills	Rotary/Hammer drilling low hammer count and high hammer power	Drilling hammer	for very large drillhole \varnothing or very strong concrete reinforcement or diamond/ core drilling method.
	B 15	Stone drills	Impact drilling	
Solid building materials with dense/fixed structure	Stone drills Hammer drills	Impact drilling Rotary/Hammer drilling	Impact drilling machine Drilling hammer	depending on the component thickness and component stability
Light-weight building material with low strength (Porous/Light-weight concrete)	Stone drills	Rotary drilling without impact	Drilling machine	
Perforated bricks	Stone drills	Rotary drilling without impact	Drilling machine	make sure that the drillhole does not get too large and that the bars of the hole/ hollow brick stones don't break off
Panels: Plasterboard/ Fibre cement	Stone drills			
Chipboard/Wood/ Wood-fibre boards	Spiral drill for wood			

8.2 Borehole cleaning

Since drill dust can not provide grip or can block the space of an undercut, all loose elements need to be removed from the drillhole before the plugs or anchors are inserted, e.g. by air-cleaning.

8.3 Assembly types (→ Picture 1)

8.3.1 The **push-through installation** is usually easiest for series assemblies and plug pairs as the insert holes of the building component can be used as drill gauges.

8.3.2 With **pre-positioned installation** the drillhole is to be accurately marked out. Internal thread anchors must end flush with the building material surface.

8.3.3 With **stand-off installation** pre-positioned inside thread/compound anchors with sufficiently long projecting lengths are to be used or fastening should be done with a suitably long screw.

8.4 Tightening torques/preloads

The values applicable for the various manufacturers and types are to be specified according to the technical approval by the construction engineer. Typical values can be found on the package or in the package insert.

8.5 Wrench sizes

For ready-to-install plugs and anchors, the wrench sizes are indicated on the package/in the package insert. The wrench sizes standardised for DIN/ISO screws apply to standard screws used for fastening, for example, inside thread anchors.

9. The approvals

For fasteners and anchors whose failure presents a danger to public safety, only plugs and anchors may be used which have been given approval for the use intended. General technical approvals are granted after type testing by the Deutsche Institut für Bautechnik (German Institute for Civil Engineering), Berlin (DIBT). Special approvals for particular uses are granted by the institutes declared responsible for them or the inspection centres of the relevant professional associations. Plugs and anchors with CE logos require "European Technical Approval" (ETA).

Picture 1

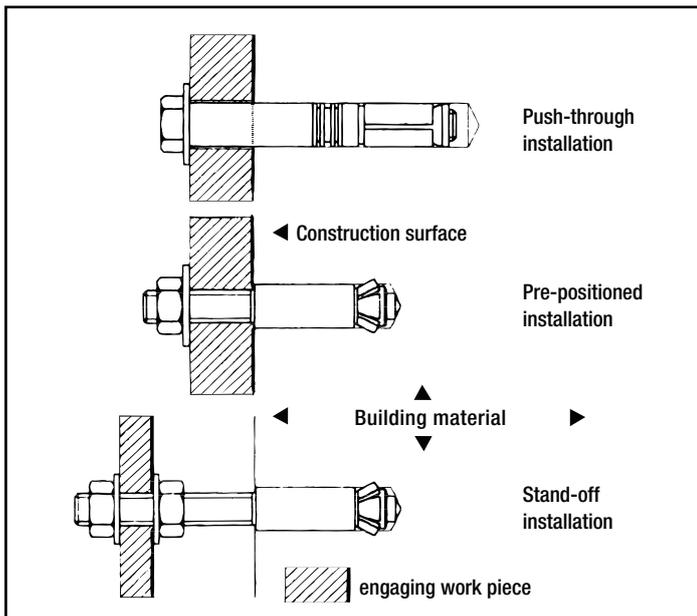


Table 5: Overview of the currently valid types of approval

German approvals  	– for metal plugs, compound anchors, plastic plugs for facade coverings and curtain wallings, plugs for light-weight suspended ceilings only, plugs for special building materials, injection anchoring for holes and hollow building materials, plugs for special requirements – for plugs with proof of suitability for use in cracks = thus usable in the tension and pressure zones of the concrete (It is fundamentally recommended that planners and operators use crack plugs/plugs suited for tension zones because attaining this means that pressure zone proof, which is difficult to attain, is not required.)
European approvals 	Building materials with the CE symbol may be traded freely in the EU economic zone. One of the requirements for the CE logo on plugs is the prior granting of "European Technical Approval" (ETA). ETA approvals are classified according to the use of the plug into Options 1-6 for cracked concrete and 7-12 for non-cracked concrete.