



TECHNICAL BULLETIN 134

Anchor Bolt Grouting

Surface Preparation

Bolts: Degrease, sandblast, pickle, powerbrush or use other methods to achieve a “bright metal” surface.

- Holes:
- A. Dry drilled holes shall be cleaned of dust and debris.
 - B. Wet drilled holes shall be cleaned of drilling slurry.
 - C. Formed and/or core drilled holes shall be scarified to roughen anchor hole surface.
 - D. Standing water shall be removed and all anchor hole surfaces completely dry.

Dimensions

The dimensions called for in this technical bulletin are designed to eliminate the possibility of a grout failure. A concrete or steel failure is still possible. Therefore, if the concrete is designed to withstand maximum steel tension, the bolt/bar will be the governing design factor. (i.e. failure due to cone mechanism is eliminated due to reinforced concrete or because of baseplate.)

L = Length of Embedment

D = Diameter of Hole

d = Diameter of Bolt/Bar

F_y = Yield Strength of Bolt/Bar

C = Bolt/Bar Shape Factor

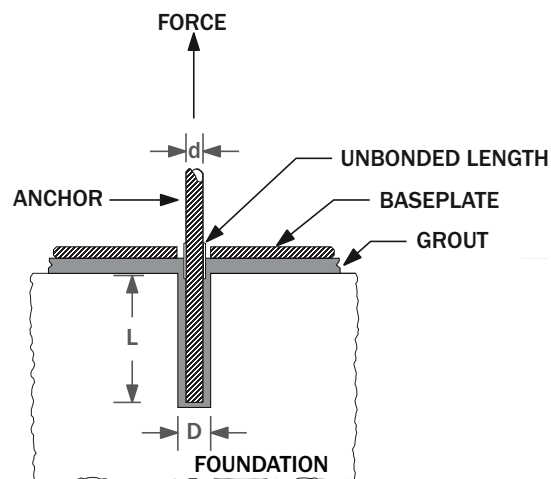
S = Factor of Safety

$C = 1.5$ for Smooth Bolt/Bar

$C = 2.0$ for Deformed Bolt/Bar

$C = 2.5$ for Threaded Bolt/Bar

[Epoxy grout bears a different relationship to steel surfaces than cement grout.]



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Length of Embedment

Using:

$$1,000\text{psi} \times C \times \pi d L = \pi d^2 F_y \times \frac{1}{4}$$

Solve for L: *minimum L = $F_y d \div [4,000 \times C]$*

Therefore:

With $F_y = 135,000$ psi (high strength steel):

minimum $L = 22.6d$ for Smooth Bolt/Bar

minimum $L = 17.0d$ for Deformed Bolt/Bar

minimum $L = 13.6d$ for Threaded Bolt/Bar

Hole Diameter

The diameters called for in this bulletin are minimum diameters. The requirements will ensure an adequate size bonding surface between grout and concrete. Larger dimensions may ease placement on deep or awkward pours.

When bolt diameter; $d \leq 1\frac{1}{2}$ in., then hole diameter; $D \geq d + 1\frac{1}{2}$ in.

When bolt diameter; $d \geq 1\frac{1}{2}$ in., then hole diameter; $D \geq d + 2$ in.

NOTE: These calculations are for reference only. Design calculation should be approved by a professional engineer.



NTSB Safety Recommendation H-07-23 prohibits the use of adhesive anchors in sustained tensile-load overhead highway applications where failure of the adhesive would result in a risk to the public until testing standards and protocols have been developed and implemented that ensure the safety of these applications.

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