## GENERAL INFORMATION

## HAMMER-CAPSULE ${ }^{\oplus}$

Drive-In Capsule Adhesive

## PRODUGT DESGRIPTION

The Hammer-Capsule system consists of a self contained, single use, two-part glass capsule into which threaded anchor rod or reinforcing bars can be directly driven without the need for a chisel point or spinning action. It is designed for use in the installation of $3 / 8$ " through 1 " diameter threaded rod in solid concrete and masonry materials. It can also be used to install reinforcing bars.

A mixture of hardener and quartz aggregate is contained in the upper portion of the capsule while the lower portion contains an epoxy acrylate resin. Unlike traditional capsule anchors which required the use of chisel-pointed anchor rod and special installation tools, the Hammer-Capsule is designed for use with straight cut anchor rod.

## GENERAL APPLICATIONS AND USES

- Anchoring rebar (doweling), and threaded anchor rods in solid concrete and grouted concrete masonry
- Steel erection including anchoring of equipment and column base plates
- Resistant to vibratory loads introduced from machinery, moving vehicles, etc
- Barriers, fencing and railing attachments


## FEATURES AND BENEFIS

+ Fast, easy installation - no special adaptors required for setting
+ Excellent chemical resistance
+ Components are mixed during installation of rod or rebar
+ Pre-measured chemical component volumes - no waste and simplified placement
+ Ideal for small projects


## APPROVALS AND LSTINGS

- Department of Transportation listings - see www.DEWALT.com or contact transportation agency
- Independently tested to ASTM E1512 and AC58 criteria including creep resistance


## GUIDE SPEGIFIGATIONS

CSI Divisions: 031600 - Concrete Anchors, 0405 19.16-Masonry Anchors and 050519 -
Post-Installed Concrete Anchors. Capsule adhesive anchoring system shall be Hammer-Capsule as supplied by DEWALT, Towson, MD.

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HAMMER-CAPSULE(x,STRAIGHT CUT THREADED ROD
ANCHOR SIZE RANGE (TYPICAL)

- 3/8" to 1 " diameter rod
- No. 3 to No. 8 reinforcing bar


## SUITABLE BASE MATERIALS

- Normal-weight concrete
- Grouted concrete masonry

PERMISSIBLE INSTALLATION CONDITIONS (ADHESIVE)

- Dry concrete
- Water-saturated concrete (wet)


## MATERIAL SPECIFICATIONS

## Physical Properties

| Shelf Life | 2 Years |
| :---: | :---: |
| Storage Conditions | Store dry at $40^{\circ}$ to $90^{\circ} \mathrm{F}$ and out of direct sunlight |
| Installation Temperature | Condition capsules to $60^{\circ} \mathrm{F}$ minimum for best |
| results |  |

## Curing Times ${ }^{1}$

| Minimum Base <br> Material Temperature | Curing Time |
| :---: | :---: |
| $68^{\circ} \mathrm{F}\left(20^{\circ} \mathrm{C}\right)$ | 1 hour |
| $50^{\circ} \mathrm{F}\left(10^{\circ} \mathrm{C}\right)$ | 2 hours |
| $32^{\circ} \mathrm{F}\left(0^{\circ} \mathrm{C}\right)$ | 5 hours |
| 1. Cure time should be doubled for wet concrete. |  |

## INSTALLATION SPECIFICATIONS

## Hammer-Capsule ${ }^{1,2}$

| Dimension | Hammer-Capsule, Nominal Size |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 3/8' | 1/2" | 5/8' | 3/4' | 7/8' | 1" |
| Capsule Diameter (in.) | 0.43 | 0.51 | 0.67 | 0.78 | 0.87 | 0.95 |
| Capsule Length (in.) | 3.50 | 4.30 | 5.00 | 5.50 | 6.89 | 8.25 |
| Mortar Volume (in ${ }^{3}$ ) | 0.40 | 0.70 | 1.40 | 2.05 | 3.25 | 4.50 |
| Mortar Volume (fl. oz.) | 0.22 | 0.39 | 0.77 | 1.13 | 1.79 | 2.48 |
| 1. The mortar volume listed is for the mixed material. <br> 2. The diameter and length may be different than capsules offered by other suppliers because of variations in air content. When comparing capsules, use the installed mortar volume. |  |  |  |  |  |  |

## Threaded Rod in Normal-Weight Concrete

| Dimension | Hammer-Capsule, Nominal Size |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 3/8" | 1/2" | 5/8" | 3/4" | 7/8" | 1" |
| $\mathrm{A}_{\text {nom }}=$ Nominal area of threaded rod ( $\mathrm{in}^{2}$ ) | 0.111 | 0.196 | 0.307 | 0.442 | 0.601 | 0.785 |
| $\mathrm{A}_{\text {se }}=$ Tensile stress area of rod (in²) | 0.078 | 0.142 | 0.226 | 0.335 | 0.462 | 0.606 |
| dbit $=$ Nominal bit diameter (in.) | 7/16 | 9/16 | 11/16 | 7/8 | 1 | 1-1/8 |
| $h_{v}=$ Minimum Embedment Depth (in.) | 3-1/2 | 4-1/4 | 5 | $65 / 8$ | 7 | 8-1/4 |
| $\mathrm{T}_{\max }=$ Max. tightening torque range (ft.-lbs.) | 7.5-10 | 11-15 | 26-35 | 56-75 | 75-100 | 112-150 |
| Mortar per inch (in ${ }^{3}$ ) | 0.094 | 0.133 | 0.184 | 0.326 | 0.390 | 0.478 |

## Nomenclature

d = Diameter of anchor $\mathrm{d}_{\text {bit }}=$ Diameter of drill bit $\mathrm{dn}=$ Diameter of fixture clearance hole
$h=$ Base material thickness
The minimum value of $h$ should be $1.5 h_{v}$
$h_{v}=$ Minimum embedment depth
$\ell=$ Overall length of anchor
$\mathrm{T}_{\max }=$ Maximum tightening torque (only possible after curing time)


## Installation Guidelines



1. Drill a hole using a carbide tipped bit meeting the diameter requirements of ANSI B212.15 to the minimum depth required as shown in the chart.

Precaution: Use suitable eye and skin protection. Avoid inhalation of dust during drilling and/or removal.

Note! In case of standing water in the drilled hole (flooded hole condition), all the water has to be removed from the hole (e.g. vacuum, compressed air, etc.) prior to cleaning.

Drilling in dry base materials is recommended when using hollow drill bits (vacuum must be on).

2. Starting from the bottom or back of the anchor hole, remove dust and debris from the hole (e.g. dust extractor) to remove loose particles from drilling, brush the hole with a nylon brush, and again remove any remaining loose particles. Anchor holes may be dry or damp, but should be free of standing water or frost. Vacuuming only is not sufficient. Blow out bulbs generally do not provide enough dust removal for most drilled anchor holes. Holes should be clean and sound

3. Prior to installation check the capsule to be sure it is not damaged and invert several times at $60^{\circ} \mathrm{F}$ or above to confirm all of the resin is in a liquid state. Insert the capsule into the hole.

Note! Be careful to observe the direction of insertion. The arrow on the capsule should point toward the bottom of the hole.

4. Drive the threaded rod or reinforcing bar into the anchor hole through the capsule until it is fully embedded. A 2 -pound hammer and eye protection are recommended.

A rotary hammer set in the hammering only mode and Chem-Stud drive adapters can also be used. Stop driving immediately upon reaching the bottom of the anchor hole.

Note! Consideration must be given to installation direction. Overhead installations with glass capsules are sensitive and extremely dependent upon the skill and care taken by the user; additional equipment not supplied by DEWALT may be required. Consequently DEWALT does not recommend the use of the Hammer Capsule for overhead applications at this time. Use of the product in adverse installation conditions should not be done without proper training and direct supervision by the Design Professional.

## STEEL MATERIAL

Material Properties for Threaded Rod and Reinforcing Bar

| Anchor Type | Steel Description | Steel Specification (ASTM) | Rod Dia. or Rebar Size (inch or No.) | Minimum Yield Strength, $\mathbf{f y}^{\prime}$ (ksi) | Minimum Ultimate Strength, $\mathrm{fu}_{\mathbf{u}}$ (ksi) |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Threaded Rod | Standard carbon rod | A36 | All | 36.0 | 58.0 |
|  |  | A307 Grade C or F1554, Grade 36 | 3/8 thru 4 | 36.0 | 58.0 |
|  | High strength carbon rod | A 193, Grade B7 | 3/8 thru 2-1/2 | 105.0 | 120.0 |
|  | $\begin{gathered} \text { Stainless Rod } \\ \text { (Type } 304 \text { / } 316 \text { SS) } \end{gathered}$ | F 593, Condition CW | $3 / 8$ thru 5/8 | 65.0 | 100.0 |
|  |  |  | 3/4 thru 1-1/2 | 45.0 | 85.0 |
| Reinforcing Bar | Grade 40 Rebar | $\begin{gathered} \text { A 615, A 706, A } 767 \\ \text { or A996 } \end{gathered}$ | All | 40.0 | 70.0 |
|  | Grade 60 Rebar |  |  | 60.0 | 90.0 |

## Allowable Steel Strength Capacities for Threaded Rod

| Anchor Diameter din. (mm) | Allowable Tension |  |  |  | Allowable Shear |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{aligned} & \text { ASTM } \\ & \text { A36 } \\ & \text { Ibs. } \\ & \text { (kN) } \end{aligned}$ | $\begin{gathered} \text { ASTM } \\ \text { F1554 } \\ \text { Grade } 36 \\ \text { lbs. } \\ \text { (kN) } \end{gathered}$ | ASTM <br> A193 <br> Grade B7 <br> lles. <br> (kN) <br> ( | ASTM F593 304/316 SS lils. (kN) | $\begin{aligned} & \text { ASTM } \\ & \text { A36 } \\ & \text { Alis. } \\ & \text { (kN) } \end{aligned}$ | ASTM F1554 Grade 36 lis. (kN) | ASTM A193 Grade B7 lis.. (kN) | ASTM F593 304/316 SS lils. (kN) |
| $\begin{array}{r} 3 / 8 \\ (9.5) \\ \hline \end{array}$ | $\begin{array}{r} 2,115 \\ (9.5) \\ \hline \end{array}$ | $\begin{gathered} 2,115 \\ (9.5) \end{gathered}$ | $\begin{aligned} & 4,375 \\ & (19.7) \end{aligned}$ | $\begin{aligned} & 3,630 \\ & (16.3) \end{aligned}$ | $\begin{aligned} & 1,090 \\ & (4.9) \end{aligned}$ | $\begin{aligned} & 1,090 \\ & (4.9) \end{aligned}$ | $\begin{aligned} & 2,255 \\ & (10.1) \end{aligned}$ | $\begin{aligned} & 1,870 \\ & (8.4) \end{aligned}$ |
| $\begin{gathered} \hline 1 / 2 \\ (12.7) \end{gathered}$ | $\begin{aligned} & \hline 3,755 \\ & (16.9) \end{aligned}$ | $\begin{aligned} & 3,755 \\ & (16.9) \end{aligned}$ | $\begin{aligned} & 7,775 \\ & (35.0) \end{aligned}$ | $\begin{aligned} & \hline 6,470 \\ & (29.1) \end{aligned}$ | $\begin{aligned} & \hline 1,940 \\ & (8.7) \end{aligned}$ | $\begin{aligned} & 1,940 \\ & (8.7) \end{aligned}$ | $\begin{aligned} & 4,055 \\ & (18.2) \end{aligned}$ | $\begin{aligned} & 3,330 \\ & (15.0) \end{aligned}$ |
| $\begin{gathered} 5 / 8 \\ (15.9) \end{gathered}$ | $\begin{aligned} & 5,870 \\ & (26.4) \end{aligned}$ | $\begin{aligned} & 5,870 \\ & (26.4) \end{aligned}$ | $\begin{aligned} & 12,150 \\ & (54.7) \\ & \hline \end{aligned}$ | $\begin{aligned} & 10,130 \\ & (45.6) \end{aligned}$ | $\begin{aligned} & 3,025 \\ & (13.6) \\ & \hline \end{aligned}$ | $\begin{aligned} & 3,025 \\ & (13.6) \\ & \hline \end{aligned}$ | $\begin{aligned} & 6,260 \\ & (28.2) \end{aligned}$ | $\begin{aligned} & 5,210 \\ & (23.4) \end{aligned}$ |
| $\begin{gathered} 3 / 4 \\ (19.1) \\ \hline \end{gathered}$ | $\begin{aligned} & 8,455 \\ & (38.0) \\ & \hline \end{aligned}$ | $\begin{array}{r} 8,455 \\ (38.0) \\ \hline \end{array}$ | $\begin{aligned} & 17,495 \\ & (78.7) \\ & \hline \end{aligned}$ | $\begin{aligned} & 12,400 \\ & (55.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,355 \\ & (19.6) \\ & \hline \end{aligned}$ | $\begin{array}{r} 4,355 \\ (99.6) \\ \hline \end{array}$ | $\begin{aligned} & 9,010 \\ & (40.5) \\ & \hline \end{aligned}$ | $\begin{aligned} & 6,390 \\ & (28.8) \\ & \hline \end{aligned}$ |
| $\begin{gathered} 7 / 8 \\ (22.2) \end{gathered}$ | $\begin{aligned} & 11,510 \\ & (51.8) \end{aligned}$ | $\begin{aligned} & 11,510 \\ & (51.8) \end{aligned}$ | $\begin{aligned} & 23,810 \\ & (107.1) \end{aligned}$ | $\begin{aligned} & \hline 16,860 \\ & (75.9) \\ & \hline \end{aligned}$ | $\begin{aligned} & 5,930 \\ & (26.7) \end{aligned}$ | $\begin{array}{r} 5,930 \\ (26.7) \\ \hline \end{array}$ | $\begin{aligned} & 12,265 \\ & (55.2) \end{aligned}$ | $\begin{aligned} & 8,680 \\ & (39.1) \end{aligned}$ |
| $\begin{gathered} 1 \\ (25.4) \end{gathered}$ | $\begin{aligned} & 15,035 \\ & (67.7) \end{aligned}$ | $\begin{aligned} & 15,035 \\ & (67.7) \end{aligned}$ | $\begin{aligned} & 31,100 \\ & (140.0) \\ & \hline \end{aligned}$ | $\begin{gathered} 22,020 \\ (99.1) \end{gathered}$ | $\begin{aligned} & 7,745 \\ & (34.9) \\ & \hline \end{aligned}$ | $\begin{aligned} & 7,745 \\ & (34.9) \end{aligned}$ | $\begin{aligned} & \hline 16,020 \\ & (72.1) \\ & \hline \end{aligned}$ | $\begin{gathered} 11,340 \\ (51.0) \end{gathered}$ |
| 1. Allowable steel strength capacities are based on the standard minimum strengths of the tabulated materials. |  |  |  |  |  |  |  |  |

## Allowable Steel Strength Capacities for Reinforcing Bar

| Bar <br> Size | Tension <br> lbs. <br> (kN) |  | Shear <br> lis. <br> (kN) |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Grade 40 | Grade 60 | Grade 40 | Grade 60 |
| No. 3 | 2,200 | 2,640 | 1,310 | 1,680 |
| $\left(3 / 8^{\prime \prime}\right)$ | $(9.9)$ | $(11.9)$ | $(5.9)$ | $(7.6)$ |
| No. 4 | 4,000 | 4,800 | 2,380 | 3,060 |
| $\left(1 / 2^{\prime \prime}\right)$ | $(18.0)$ | $(21.6)$ | $(10.7)$ | $(13.8)$ |
| No. 5 | 6,200 | 7,440 | 3,690 | 4,740 |
| $\left(5 / 8^{\prime \prime}\right)$ | $(27.9)$ | $(33.5)$ | $(16.6)$ | $(21.3)$ |
| No. 6 | 8,800 | 10,560 | 5,235 | 6,730 |
| $\left(3 / 4^{\prime \prime}\right)$ | $(39.6)$ | $(47.5)$ | $(23.6)$ | $(30.3)$ |
| No. 7 | 12,000 | 14,400 | 7,140 | 9,180 |
| (7/8") | $(54.0)$ | $(64.8)$ | $(32.1)$ | $(41.3)$ |
| No. 8 | 15,800 | 18,960 | 9,400 | 12,085 |
| (1") | (71.1) | $(85.3)$ | $(42.3)$ | $(54.4)$ |
| 1. Allowable steel strength capacities are based on the requirements of ASTM A 615. |  |  |  |  |

Note:
Allowable design load must be the lesser of allowable steel strength (as shown on this page) and the allowable bond capacities.
Allowable steel strength values for threaded rod are based on the following equations:
$\mathrm{T}=0.33{ }^{*} \mathrm{f}_{\mathrm{u}}{ }^{*} \mathrm{Anom}$
$V=0.17{ }^{*} \mathrm{f}_{\mathrm{u}}{ }^{*}$ Anom
And, the allowable steel strength values for reinforcing bar are based on the following equations:
$\mathrm{T}=\mathrm{f}_{\mathrm{s}}{ }^{*} \mathrm{~A}_{b r}$
$\mathrm{~V}=0.17{ }^{*} \mathrm{f}_{\mathrm{u}}{ }^{*} \mathrm{~A}_{b r}$
Where:
$\mathrm{T}=$ Allowable tension load (pounds).
$\mathrm{V}=$ Allowable shear load (pounds).
$f_{u}=$ Minimum specified ultimate strength (psi).
$\mathrm{f}_{\mathrm{s}}=$ Tensile stress area in reinforcement (psi).
Anom $=$ Nominal cross-sectional area of threaded rod $\left(\mathrm{in}^{2}\right)$.
$A_{b r}=$ Nominal cross-sectional area of reinforcing bar (in²).

## PERFORMANCE DATA

Ultimate Load Capacities for Threaded Rod Installed with Hammer-Capsule in Normal-Weight Concrete ${ }^{1 / 2}$

| $\begin{gathered} \text { Anchor } \\ \text { Dia. } \\ \text { d } \\ \text { in. } \\ \text { (mm) } \end{gathered}$ | Min.Embed.Depth$\mathbf{h}_{V}$in.(mm) | Capsules Required | Minimum Concrete Compressive Strength (f'c) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{gathered} 2,000 \mathrm{psi} \\ (13.8 \mathrm{MPa}) \end{gathered}$ |  | $\begin{aligned} & 3,000 \mathrm{psi} \\ & (20.7 \mathrm{MPa}) \end{aligned}$ |  | $\begin{gathered} \text { 4,000 psi } \\ (27.6 \mathrm{MPa}) \end{gathered}$ |  | $\begin{aligned} & 5,000 \mathrm{psi} \\ & \text { (34.5 MPa) } \end{aligned}$ |  | $\begin{gathered} 6,000 \mathrm{psi} \\ (41.4 \mathrm{MPa}) \end{gathered}$ |  |
|  |  |  | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) |
| $\begin{gathered} 3 / 8 \\ (9.5) \end{gathered}$ | $\begin{aligned} & \hline 3-1 / 2 \\ & (88.9) \\ & \hline \end{aligned}$ | One 3/8" | $\begin{aligned} & 4,920 \\ & (22.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,440 \\ & (20.0) \end{aligned}$ | $\begin{aligned} & 5,880 \\ & (26.5) \end{aligned}$ | $\begin{aligned} & 4,440 \\ & (20.0) \end{aligned}$ | $\begin{aligned} & 6,120 \\ & (27.5) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,440 \\ & (20.0) \\ & \hline \end{aligned}$ | $\begin{aligned} & 6,320 \\ & (28.2) \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline 4,440 \\ & (20.0) \\ & \hline \end{aligned}$ | $\begin{aligned} & 6,320 \\ & (28.2) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,440 \\ & (20.0) \\ & \hline \end{aligned}$ |
|  | $\begin{gathered} 7 \\ (177.8) \end{gathered}$ | Two 3/8" | $\begin{aligned} & 9,840 \\ & (44.3) \end{aligned}$ | $\begin{aligned} & 4,440 \\ & (20.0) \end{aligned}$ | $\begin{aligned} & 11,760 \\ & (52.9) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,440 \\ & (20.0) \end{aligned}$ | $\begin{gathered} 12,240 \\ (55.1) \end{gathered}$ | $\begin{aligned} & 4,440 \\ & (20.0) \end{aligned}$ | $\begin{aligned} & 12,640 \\ & (56.4) \end{aligned}$ | $\begin{aligned} & 4,440 \\ & (20.0) \end{aligned}$ | $\begin{aligned} & 12,640 \\ & (56.4) \end{aligned}$ | $\begin{aligned} & 4,440 \\ & (20.0) \end{aligned}$ |
| $\begin{gathered} 1 / 2 \\ (12.7) \end{gathered}$ | $\begin{gathered} 4-1 / 4 \\ (108.0) \end{gathered}$ | One 1/2" | $\begin{aligned} & 8,235 \\ & (37.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & 10,720 \\ & (48.2) \\ & \hline \end{aligned}$ | $\begin{aligned} & 10,240 \\ & (45.7) \\ & \hline \end{aligned}$ | $\begin{gathered} 10,720 \\ (48.2) \end{gathered}$ | $\begin{gathered} 10,240 \\ (45.7) \\ \hline \end{gathered}$ | $\begin{gathered} 10,720 \\ (48.2) \end{gathered}$ | $\begin{gathered} 10,240 \\ (45.7) \\ \hline \end{gathered}$ | $\begin{gathered} 10,720 \\ (48.2) \\ \hline \end{gathered}$ | $\begin{gathered} 10,240 \\ (45.7) \\ \hline \end{gathered}$ | $\begin{gathered} 10,720 \\ (48.2) \end{gathered}$ |
|  | $\begin{gathered} \hline 8-1 / 2 \\ (215.9) \\ \hline \end{gathered}$ | Two 1/2" | $\begin{gathered} 16,470 \\ (74.1) \\ \hline \end{gathered}$ | $\begin{aligned} & 10,720 \\ & (48.2) \\ & \hline \end{aligned}$ | $\begin{gathered} 20,460 \\ (91.3) \\ \hline \end{gathered}$ | $\begin{gathered} 10,720 \\ (48.2) \\ \hline \end{gathered}$ | $\begin{gathered} 20,460 \\ (91.3) \\ \hline \end{gathered}$ | $\begin{gathered} 10,720 \\ (48.2) \\ \hline \end{gathered}$ | $\begin{gathered} 20,460 \\ (91.3) \\ \hline \end{gathered}$ | $\begin{gathered} 10,720 \\ (48.2) \\ \hline \end{gathered}$ | $\begin{gathered} 20,460 \\ (91.3) \\ \hline \end{gathered}$ | $\begin{gathered} 10,720 \\ (48.2) \\ \hline \end{gathered}$ |
| $\begin{gathered} 5 / 8 \\ (15.9) \end{gathered}$ | $\begin{gathered} 5 \\ (127.0) \\ \hline \end{gathered}$ | One 5/8" | $\begin{gathered} 10,160 \\ (45.7) \\ \hline \end{gathered}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ | $\begin{aligned} & 13,080 \\ & (58.9) \\ & \hline \end{aligned}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ | $\begin{gathered} 15,060 \\ (67.2) \\ \hline \end{gathered}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ | $\begin{array}{r} 15,060 \\ (67.2) \\ \hline \end{array}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ | $\begin{gathered} 15,060 \\ (67.2) \\ \hline \end{gathered}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ |
|  | $\begin{gathered} 10 \\ (254.0) \\ \hline \end{gathered}$ | Two 5/8" | $\begin{gathered} 20,320 \\ (91.4) \\ \hline \end{gathered}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ | $\begin{aligned} & 26,160 \\ & (117.7) \\ & \hline \end{aligned}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ | $\begin{array}{r} 30,100 \\ (134.4) \\ \hline \end{array}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ | $\begin{array}{r} 30,100 \\ (134.4) \\ \hline \end{array}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ | $\begin{aligned} & 30,100 \\ & (134.4) \\ & \hline \end{aligned}$ | $\begin{gathered} 17,160 \\ (77.2) \\ \hline \end{gathered}$ |
| $\begin{gathered} 3 / 4 \\ (19.1) \end{gathered}$ | $\begin{gathered} 6 \\ (152.4) \\ \hline \end{gathered}$ | One 3/4" | $\begin{gathered} 13,080 \\ (58.9) \\ \hline \end{gathered}$ | $\begin{aligned} & 24,990 \\ & (112.5) \\ & \hline \end{aligned}$ | $\begin{gathered} 17,125 \\ (77.1) \\ \hline \end{gathered}$ | $\begin{aligned} & 24,990 \\ & (112.5) \\ & \hline \end{aligned}$ | $\begin{gathered} 17,990 \\ (81.0) \\ \hline \end{gathered}$ | $\begin{aligned} & 24,990 \\ & (112.5) \\ & \hline \end{aligned}$ | $\begin{gathered} 19,190 \\ (86.4) \\ \hline \end{gathered}$ | $\begin{aligned} & 24,990 \\ & (112.5) \\ & \hline \end{aligned}$ | $\begin{gathered} 20,390 \\ (91.8) \\ \hline \end{gathered}$ | $\begin{aligned} & 24,990 \\ & (112.5) \\ & \hline \end{aligned}$ |
|  | $\begin{gathered} 12 \\ (304.8) \\ \hline \end{gathered}$ | Two 3/4" | $\begin{array}{r} 26,160 \\ (117.7) \\ \hline \end{array}$ | $\begin{array}{r} 24,990 \\ (112.5) \\ \hline \end{array}$ | $\begin{aligned} & 34,250 \\ & (154.1) \\ & \hline \end{aligned}$ | $\begin{array}{r} 24,990 \\ (112.5) \end{array}$ | $\begin{aligned} & 35,980 \\ & (161.9) \end{aligned}$ | $\begin{array}{r} 24,990 \\ (112.5) \end{array}$ | $\begin{aligned} & 38,380 \\ & (172.7) \\ & \hline \end{aligned}$ | $\begin{array}{r} 24,990 \\ (112.5) \\ \hline \end{array}$ | $\begin{aligned} & 40,780 \\ & (183.5) \\ & \hline \end{aligned}$ | $\begin{array}{r} 24,990 \\ (112.5) \\ \hline \end{array}$ |
| $\begin{gathered} 7 / 8 \\ (22.2) \end{gathered}$ | $\begin{gathered} 7 \\ (177.8) \end{gathered}$ | One 7/8" | $\begin{gathered} 16,265 \\ (73.2) \end{gathered}$ | $\begin{aligned} & 35,600 \\ & (160.2) \end{aligned}$ | $\begin{gathered} 21,065 \\ (94.8) \end{gathered}$ | $\begin{aligned} & 35,600 \\ & (160.2) \\ & \hline \end{aligned}$ | $\begin{aligned} & 24,640 \\ & (110.9) \end{aligned}$ | $\begin{aligned} & 35,600 \\ & (160.2) \end{aligned}$ | $\begin{aligned} & 28,425 \\ & (127.9) \end{aligned}$ | $\begin{aligned} & 35,600 \\ & (160.2) \end{aligned}$ | $\begin{gathered} 29,500 \\ (32.9) \end{gathered}$ | $\begin{aligned} & 35,600 \\ & (160.2) \\ & \hline \end{aligned}$ |
|  | $\begin{gathered} 14 \\ (355.6) \\ \hline \end{gathered}$ | Two 7/8" | $\begin{aligned} & 32,530 \\ & (146.4) \\ & \hline \end{aligned}$ | $\begin{aligned} & 35,600 \\ & (160.2) \end{aligned}$ | $\begin{aligned} & 42,130 \\ & (189.6) \\ & \hline \end{aligned}$ | $\begin{array}{r} 35,600 \\ (160.2) \\ \hline \end{array}$ | $\begin{aligned} & 49,280 \\ & (221.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & 35,600 \\ & (160.2) \\ & \hline \end{aligned}$ | $\begin{aligned} & 56,850 \\ & (255.8) \\ & \hline \end{aligned}$ | $\begin{array}{r} 35,600 \\ (160.2) \\ \hline \end{array}$ | $\begin{aligned} & 59,000 \\ & (263.4) \\ & \hline \end{aligned}$ | $\begin{array}{r} 35,600 \\ (160.2) \\ \hline \end{array}$ |
| $\begin{gathered} 1 \\ (25.4) \end{gathered}$ | $\begin{gathered} 8-1 / 4 \\ (209.6) \\ \hline \end{gathered}$ | One 1" | $\begin{aligned} & 28,720 \\ & (129.2) \\ & \hline \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & 32,265 \\ & (145.2) \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & 32,495 \\ & (146.2) \\ & \hline \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \end{aligned}$ | $\begin{aligned} & 35,205 \\ & (158.4) \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & 37,920 \\ & (170.6) \\ & \hline \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \\ & \hline \end{aligned}$ |
|  | $\begin{aligned} & 16-1 / 2 \\ & (419.1) \end{aligned}$ | Two 1" | $\begin{aligned} & 57,440 \\ & (258.5) \\ & \hline \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \end{aligned}$ | $\begin{aligned} & 64,530 \\ & (290.4) \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \end{aligned}$ | $\begin{aligned} & 64,990 \\ & (292.5) \\ & \hline \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \end{aligned}$ | $\begin{aligned} & 70,410 \\ & (316.8) \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \end{aligned}$ | $\begin{aligned} & 75,840 \\ & (341.3) \\ & \hline \end{aligned}$ | $\begin{aligned} & 46,840 \\ & (210.8) \end{aligned}$ |

1. Ultimate load capacities should be reduced by a minimum safety factor of 4.0 or greater to determine the allowable working load. Consideration of safety factors of 10.0 or higher may be necessary depending on the application, such as life safety.
2. Linear interpolation may be used to determine ultimate load capacities for intermediate embedments and compressive strengths

Allowable Load Capacities for Threaded Rod Installed with Hammer-Capsule in Normal-Weight Concrete ${ }^{1,23}$

| $\begin{gathered} \text { Anchor } \\ \text { Dia. } \\ \text { d } \\ \text { in. } \\ \text { (mm) } \end{gathered}$ | Min. Embed. Depth hv in. (mm) | Capsules Required | Minimum Concrete Compressive Strength (f'c) |  |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | $\begin{gathered} 2,000 \mathrm{psi} \\ (13.8 \mathrm{MPa}) \end{gathered}$ |  | $\begin{array}{r} 3,000 \mathrm{psi} \\ (20.7 \mathrm{MPa}) \\ \hline \end{array}$ |  | $\begin{array}{r} 4,000 \mathrm{psi} \\ (27.6 \mathrm{MPa}) \\ \hline \end{array}$ |  | $\begin{gathered} \text { 5,000 psi } \\ (34.5 \mathrm{MPa}) \end{gathered}$ |  | $\begin{gathered} 6,000 \mathrm{psi} \\ (41.4 \mathrm{MPa}) \end{gathered}$ |  |
|  |  |  | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) | Tension lbs. (kN) | Shear lbs. (kN) |
| $\begin{gathered} 3 / 8 \\ (9.5) \end{gathered}$ | $\begin{aligned} & \hline 3-1 / 2 \\ & (88.9) \\ & \hline \end{aligned}$ | One 3/8" | $\begin{gathered} 1,230 \\ (5.5) \\ \hline \end{gathered}$ | $\begin{gathered} 1,110 \\ (5.0) \\ \hline \end{gathered}$ | $\begin{aligned} & 1,470 \\ & (6.6) \\ & \hline \end{aligned}$ | $\begin{aligned} & 1,110 \\ & (5.0) \\ & \hline \end{aligned}$ | $\begin{gathered} 1,530 \\ (6.9) \\ \hline \end{gathered}$ | $\begin{gathered} 1,110 \\ (5.0) \\ \hline \end{gathered}$ | $\begin{gathered} 1,580 \\ (7.1) \\ \hline \end{gathered}$ | $\begin{aligned} & 1,110 \\ & (5.0) \\ & \hline \end{aligned}$ | $\begin{gathered} 1,580 \\ (7.1) \\ \hline \end{gathered}$ | $\begin{aligned} & 1,110 \\ & (5.0) \\ & \hline \end{aligned}$ |
|  | $\begin{gathered} 7 \\ (177.8) \\ \hline \end{gathered}$ | Two 3/8" | $\begin{aligned} & 2,460 \\ & (11.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & 1,110 \\ & (5.0) \\ & \hline \end{aligned}$ | $\begin{array}{r} 2,940 \\ (13.2) \\ \hline \end{array}$ | $\begin{aligned} & 1,110 \\ & (5.0) \\ & \hline \end{aligned}$ | $\begin{aligned} & 3,060 \\ & (13.8) \\ & \hline \end{aligned}$ | $\begin{gathered} 1,110 \\ (5.0) \\ \hline \end{gathered}$ | $\begin{aligned} & 3,160 \\ & (14.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & 1,110 \\ & (5.0) \\ & \hline \end{aligned}$ | $\begin{aligned} & 3,160 \\ & (14.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & 1,110 \\ & (5.0) \\ & \hline \end{aligned}$ |
| $\begin{gathered} 1 / 2 \\ (12.7) \end{gathered}$ | $\begin{gathered} \hline 4-1 / 4 \\ (108.0) \\ \hline \end{gathered}$ | One 1/2" | $\begin{gathered} 2,060 \\ (9.3) \\ \hline \end{gathered}$ | $\begin{aligned} & \hline 2,680 \\ & (12.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline 2,560 \\ & (11.4) \\ & \hline \end{aligned}$ | $\begin{aligned} & 2,680 \\ & (12.1) \end{aligned}$ | $\begin{aligned} & 2,560 \\ & (11.4) \end{aligned}$ | $\begin{aligned} & 2,680 \\ & (12.1) \end{aligned}$ | $\begin{aligned} & \hline 2,560 \\ & (11.4) \\ & \hline \end{aligned}$ | $\begin{aligned} & 2,680 \\ & (12.1) \end{aligned}$ | $\begin{aligned} & 2,560 \\ & (11.4) \\ & \hline \end{aligned}$ | $\begin{aligned} & \hline 2,680 \\ & (12.1) \end{aligned}$ |
|  | $\begin{gathered} 8-1 / 2 \\ (215.9) \end{gathered}$ | Two 1/2" | $\begin{aligned} & 4,120 \\ & (18.5) \end{aligned}$ | $\begin{aligned} & 2,680 \\ & (12.1) \end{aligned}$ | $\begin{aligned} & 5,115 \\ & (22.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & 2,680 \\ & (12.1) \end{aligned}$ | $\begin{aligned} & 5,115 \\ & (22.8) \end{aligned}$ | $\begin{aligned} & 2,680 \\ & (12.1) \end{aligned}$ | $\begin{aligned} & 5,115 \\ & (22.8) \end{aligned}$ | $\begin{aligned} & 2,680 \\ & (12.1) \end{aligned}$ | $\begin{aligned} & 5,115 \\ & (22.8) \end{aligned}$ | $\begin{aligned} & 2,680 \\ & (12.1) \end{aligned}$ |
| $\begin{gathered} 5 / 8 \\ (15.9) \end{gathered}$ | $\begin{gathered} 5 \\ (127.0) \\ \hline \end{gathered}$ | One 5/8" | $\begin{aligned} & 2,540 \\ & (11.4) \\ & \hline \end{aligned}$ | $\begin{array}{r} 4,290 \\ (19.3) \\ \hline \end{array}$ | $\begin{aligned} & 3,270 \\ & (14.7) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,290 \\ & (19.3) \\ & \hline \end{aligned}$ | $\begin{aligned} & 3,765 \\ & (16.8) \\ & \hline \end{aligned}$ | $\begin{array}{r} 4,290 \\ (19.3) \\ \hline \end{array}$ | $\begin{aligned} & 3,765 \\ & (16.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,290 \\ & (19.3) \\ & \hline \end{aligned}$ | $\begin{aligned} & 3,765 \\ & (16.8) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,290 \\ & (19.3) \\ & \hline \end{aligned}$ |
|  | $\begin{gathered} 10 \\ (254.0) \\ \hline \end{gathered}$ | Two 5/8" | $\begin{aligned} & 5,080 \\ & (22.9) \end{aligned}$ | $\begin{aligned} & 4,290 \\ & (19.3) \end{aligned}$ | $\begin{aligned} & \hline 6,540 \\ & (29.4) \end{aligned}$ | $\begin{aligned} & 4,290 \\ & (19.3) \end{aligned}$ | $\begin{aligned} & 7,525 \\ & (33.6) \end{aligned}$ | $\begin{aligned} & 4,290 \\ & (19.3) \end{aligned}$ | $\begin{aligned} & 7,525 \\ & (33.6) \end{aligned}$ | $\begin{aligned} & 4,290 \\ & (19.3) \end{aligned}$ | $\begin{aligned} & 7,525 \\ & (33.6) \end{aligned}$ | $\begin{aligned} & 4,290 \\ & (19.3) \end{aligned}$ |
| $\begin{gathered} 3 / 4 \\ (19.1) \end{gathered}$ | $\begin{gathered} 6 \\ (152.4) \\ \hline \end{gathered}$ | One 3/4" | $\begin{aligned} & 3,270 \\ & (14.7) \\ & \hline \end{aligned}$ | $\begin{aligned} & 6,250 \\ & (28.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,280 \\ & (19.3) \\ & \hline \end{aligned}$ | $\begin{aligned} & 6,250 \\ & (28.1) \end{aligned}$ | $\begin{array}{r} 4,500 \\ (20.3) \\ \hline \end{array}$ | $\begin{aligned} & 6,250 \\ & (28.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & 4,800 \\ & (21.6) \\ & \hline \end{aligned}$ | $\begin{aligned} & 6,250 \\ & (28.1) \end{aligned}$ | $\begin{array}{r} 5,100 \\ (23.0) \\ \hline \end{array}$ | $\begin{aligned} & 6,250 \\ & (28.1) \\ & \hline \end{aligned}$ |
|  | $\begin{gathered} 12 \\ (304.8) \end{gathered}$ | Two 3/4" | $\begin{aligned} & 6,540 \\ & (29.4) \end{aligned}$ | $\begin{aligned} & 6,250 \\ & (28.1) \end{aligned}$ | $\begin{aligned} & \hline 8,565 \\ & (38.5) \end{aligned}$ | $\begin{aligned} & 6,250 \\ & (28.1) \end{aligned}$ | $\begin{aligned} & 8,995 \\ & (40.5) \end{aligned}$ | $\begin{aligned} & 6,250 \\ & (28.1) \end{aligned}$ | $\begin{aligned} & 9,595 \\ & (43.2) \end{aligned}$ | $\begin{aligned} & 6,250 \\ & (28.1) \end{aligned}$ | $\begin{aligned} & 10,195 \\ & (45.9) \end{aligned}$ | $\begin{aligned} & 6,250 \\ & (28.1) \end{aligned}$ |
| $\begin{gathered} 7 / 8 \\ (22.2) \end{gathered}$ | $\begin{gathered} 7 \\ (177.8) \\ \hline \end{gathered}$ | One 7/8" | $\begin{aligned} & 4,065 \\ & (18.3) \\ & \hline \end{aligned}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ | $\begin{aligned} & 5,265 \\ & (23.7) \end{aligned}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ | $\begin{aligned} & 6,160 \\ & (27.7) \\ & \hline \end{aligned}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ | $\begin{aligned} & 7,105 \\ & (32.0) \\ & \hline \end{aligned}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ | $\begin{array}{r} 7,375 \\ (32.9) \\ \hline \end{array}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ |
|  | $\begin{gathered} 14 \\ (355.6) \end{gathered}$ | Two 7/8" | $\begin{aligned} & 8,135 \\ & (36.6) \end{aligned}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ | $\begin{gathered} 10,535 \\ (47.4) \end{gathered}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ | $\begin{gathered} 12,320 \\ (55.4) \end{gathered}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ | $\begin{gathered} 14,215 \\ (64.0) \end{gathered}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ | $\begin{gathered} 14,750 \\ (65.0) \end{gathered}$ | $\begin{aligned} & 8,900 \\ & (40.1) \end{aligned}$ |
| $\begin{gathered} 1 \\ (25.4) \end{gathered}$ | $\begin{gathered} \hline 8-1 / 4 \\ (209.6) \\ \hline \end{gathered}$ | One 1" | $\begin{aligned} & 7,180 \\ & (32.3) \\ & \hline \end{aligned}$ | $\begin{gathered} 11,710 \\ (52.7) \\ \hline \end{gathered}$ | $\begin{aligned} & \hline 8,065 \\ & (36.3) \\ & \hline \end{aligned}$ | $\begin{aligned} & 11,710 \\ & (52.7) \end{aligned}$ | $\begin{aligned} & 8,125 \\ & (36.6) \end{aligned}$ | $\begin{gathered} 11,710 \\ (52.7) \\ \hline \end{gathered}$ | $\begin{aligned} & 8,800 \\ & (39.6) \\ & \hline \end{aligned}$ | $\begin{gathered} 11,710 \\ (52.7) \\ \hline \end{gathered}$ | $\begin{aligned} & 9,480 \\ & (42.7) \end{aligned}$ | $\begin{gathered} 11,710 \\ (52.7) \\ \hline \end{gathered}$ |
|  | $\begin{aligned} & 16-1 / 2 \\ & (419.1) \\ & \hline \end{aligned}$ | Two 1" | $\begin{gathered} 14,360 \\ (64.6) \\ \hline \end{gathered}$ | $\begin{aligned} & 11,710 \\ & (52.7) \\ & \hline \end{aligned}$ | $\begin{gathered} 16,135 \\ (72.6) \\ \hline \end{gathered}$ | $\begin{aligned} & 11,710 \\ & (52.7) \end{aligned}$ | $\begin{aligned} & 16,250 \\ & (73.1) \\ & \hline \end{aligned}$ | $\begin{aligned} & 11,710 \\ & (52.7) \\ & \hline \end{aligned}$ | $\begin{gathered} 17,605 \\ (79.2) \\ \hline \end{gathered}$ | $\begin{array}{r} 11,710 \\ (52.7) \\ \hline \end{array}$ | $\begin{aligned} & 18,960 \\ & (85.3) \\ & \hline \end{aligned}$ | $\begin{gathered} 11,710 \\ (52.7) \\ \hline \end{gathered}$ |
| 1. Allowable bond capacities are calculated using an applied safety factor of 4.0 . Consideration of safety factors of 10.0 or higher may be necessary depending on the application, such as life safety. <br> 2. Linear interpolation may be used to determine allowable bond capacities for intermediate embedments and compressive strengths. <br> 3. Allowable design load should be the lesser of the bond or allowable steel strength. |  |  |  |  |  |  |  |  |  |  |  |  |

Ulimate Load Capacities for Threaded Rod Installed with Hammer-Capsule in Grout-Filled Concrete Masonry ${ }^{1,2,3}$

\begin{tabular}{|c|c|c|c|c|c|c|c|c|}

\hline \multicolumn{8}{|c|}{Anchor installed in Cell Opening (Top of Wall) For Sill Plates and Other Attachments} \& \multirow[b]{2}{*}{\begin{tabular}{l}
Minimum End Distance (Typ) <br>

\end{tabular}} <br>

\hline $$
\begin{gathered}
\text { Anchor } \\
\text { Diameter } \\
\text { d } \\
\text { in. } \\
(\mathbf{m m})
\end{gathered}
$$ \& Drill Bit Diameter dbit in. \& Minimum Block Width in. (mm) \& Minimum Embedment Depth hv in. (mm) \& Minimum Edge Distance in. (mm) \& Minimum End Distance in. (mm) \& Tension lbs. (kN) \& Shear Towards the Edge lbs. (kN) \& <br>

\hline $$
\begin{gathered}
\hline 3 / 8 \\
(9.5) \\
\hline
\end{gathered}
$$ \& 7/16 \& \[

$$
\begin{gathered}
6 \\
(152.4) \\
\hline
\end{gathered}
$$

\] \& \[

$$
\begin{aligned}
& \hline 3-1 / 2 \\
& (88.9) \\
& \hline
\end{aligned}
$$

\] \& \[

$$
\begin{array}{r}
2-1 / 4 \\
(57.2) \\
\hline
\end{array}
$$

\] \& \[

$$
\begin{gathered}
4 \\
(101.6) \\
\hline
\end{gathered}
$$

\] \& \[

$$
\begin{array}{r}
2,756 \\
(12.4) \\
\hline
\end{array}
$$

\] \& \[

$$
\begin{gathered}
1,622 \\
(7.3) \\
\hline
\end{gathered}
$$
\] \&  <br>

\hline $$
\begin{gathered}
1 / 2 \\
(12.7)
\end{gathered}
$$ \& 9/16 \& \[

$$
\begin{gathered}
6 \\
(152.4)
\end{gathered}
$$

\] \& \[

$$
\begin{gathered}
\hline 4-1 / 4 \\
(108.0)
\end{gathered}
$$

\] \& \[

$$
\begin{aligned}
& 2-3 / 4 \\
& (69.9)
\end{aligned}
$$

\] \& \[

$$
\begin{gathered}
4 \\
(101.6)
\end{gathered}
$$

\] \& \[

$$
\begin{aligned}
& 4,902 \\
& (22.0)
\end{aligned}
$$

\] \& \[

$$
\begin{gathered}
\hline 2,086 \\
(9.3)
\end{gathered}
$$
\] \& Minimum Edge

Distance (Typ) <br>

\hline $$
\begin{gathered}
5 / 8 \\
(15.9) \\
\hline
\end{gathered}
$$ \& 11/16 \& \[

$$
\begin{gathered}
8 \\
(203.2) \\
\hline
\end{gathered}
$$

\] \& \[

$$
\begin{gathered}
5 \\
(127.0) \\
\hline
\end{gathered}
$$

\] \& \[

$$
\begin{aligned}
& 2-3 / 4 \\
& (69.9)
\end{aligned}
$$

\] \& \[

$$
\begin{aligned}
& 11-1 / 4 \\
& (285.8)
\end{aligned}
$$

\] \& \[

$$
\begin{aligned}
& 6,189 \\
& (27.7) \\
& \hline
\end{aligned}
$$

\] \& \[

$$
\begin{gathered}
1,877 \\
(8.4) \\
\hline
\end{gathered}
$$
\] \& Top of Wall <br>

\hline $$
\begin{gathered}
3 / 4 \\
(19.1) \\
\hline
\end{gathered}
$$ \& 7/8 \& \[

$$
\begin{gathered}
8 \\
(203.2) \\
\hline
\end{gathered}
$$

\] \& \[

$$
\begin{array}{r}
6-5 / 8 \\
(168.3) \\
\hline
\end{array}
$$

\] \& \[

$$
\begin{array}{r}
2-3 / 4 \\
(69.9) \\
\hline
\end{array}
$$

\] \& \[

$$
\begin{aligned}
& 11-1 / 4 \\
& (285.8) \\
& \hline
\end{aligned}
$$

\] \& \[

$$
\begin{array}{r}
7,887 \\
(35.3) \\
\hline
\end{array}
$$

\] \& \[

$$
\begin{gathered}
2,005 \\
(9.0) \\
\hline
\end{gathered}
$$
\] \& <br>

\hline $$
\begin{gathered}
7 / 8 \\
(22.2) \\
\hline
\end{gathered}
$$ \& 1 \& \[

$$
\begin{gathered}
8 \\
(203.2) \\
\hline
\end{gathered}
$$

\] \& \[

$$
\begin{gathered}
7 \\
(177.8) \\
\hline
\end{gathered}
$$

\] \& \[

$$
\begin{aligned}
& \hline 3-3 / 4 \\
& (95.3)
\end{aligned}
$$

\] \& \[

$$
\begin{aligned}
& \hline 11-1 / 4 \\
& (285.8) \\
& \hline
\end{aligned}
$$

\] \& \[

$$
\begin{aligned}
& 8,648 \\
& (38.8)
\end{aligned}
$$

\] \& \[

$$
\begin{aligned}
& 3,379 \\
& (15.1)
\end{aligned}
$$
\] \& <br>

\hline $$
\begin{gathered}
1 \\
(25.4)
\end{gathered}
$$ \& 1-1/8 \& \[

$$
\begin{gathered}
8 \\
(203.2)
\end{gathered}
$$

\] \& \[

$$
\begin{gathered}
8-1 / 4 \\
(209.6)
\end{gathered}
$$

\] \& \[

$$
\begin{aligned}
& 3-3 / 4 \\
& (95.3)
\end{aligned}
$$

\] \& \[

$$
\begin{aligned}
& 11-1 / 4 \\
& (285.8)
\end{aligned}
$$

\] \& \[

$$
\begin{gathered}
10,679 \\
(47.9)
\end{gathered}
$$

\] \& \[

$$
\begin{aligned}
& 3,139 \\
& (14.1)
\end{aligned}
$$
\] \& <br>

\hline
\end{tabular}

1. Tabulated load capacities are for anchors installed in minimum Grade N, Type II, lightweight, medium-weight or normal-weight concrete masonry units conforming to ASTM C 90 that are fully grouted and have reached a designated minimum compressive strength at the time of installation. Mortar must be Types $\mathrm{N}, \mathrm{S}$ or M.
2. The allowable loads are calculated using a safety factor of 5.0 . Consideration of safety factors of 10 or higher may be necessary depending on the application, such as life safety.
3. Masonry members must have a minimum nominal width of 8 inches with the exception of $3 / 8^{\prime \prime}$ and $1 / 2^{\prime \prime}$ diameter anchors which may be installed in minimum nominal 6 -inch width masonry members.

## DESIGN CRITERIA (ALLOWABLE STRESS DESIGN)

## Combined Loading

For anchors loaded in both shear and tension, the combination of loads should be proportioned as follows:

$$
\left(\frac{\mathbf{N u}}{\mathbf{N n}}\right)+\left(\frac{\mathbf{V u}}{\mathbf{V n}}\right) \leq 1 \quad \text { Where: } \begin{aligned}
& N_{u}=\text { Applied Service Tension Load } \\
& N_{n}=\text { Allowable Tension Load } \\
& V_{u}=\text { Applied Service Shear Load } \\
& V_{n}=\text { Allowable Shear Load }
\end{aligned}
$$

## In-Service Temperature

Allowable tension and shear load bond strength reduction based on in-service temperature for the Hammer-Capsule adhesive.


| Temperature Conversion |  |  |
| :---: | :---: | :---: |
| Degree <br> Fahrenheit <br> ( ${ }^{\circ}$ ) | Degree <br> Celsius <br> ('⿳) | Percent <br> Allowable <br> Load <br> (\%) |
| 32 | 0 | 63 |
| 70 | 21 | 100 |
| 120 | 49 | 86 |
| 150 | 65 | 71 |
| 180 | 82 | 59 |
| 240 | 115 | 54 |
| 300 | 149 | 17 |

LOAD ADJUSTMENT FAGTORS FOR SPAGING AND EDGE DISTANGES
Anchor Installed in Normal-Weight Concrete

| Anchor Dimension | Load Type | Critical Distance (Full Anchor Capacity) | Critical Load Factor | Minimum Distance (Reduced Capacity) | Minimum Load Factor |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Spacing (s) | Tension and Shear | $S_{\text {cr }}=8 \mathrm{~d}$ | $\mathrm{F}_{\text {NS }}=\mathrm{F}_{\text {vS }}=1.0$ | $S_{\text {min }}=4 \mathrm{~d}$ | $\mathrm{F}_{\text {NS }}=\mathrm{F}_{\text {vs }}=0.70$ |
| Edge Distance (c) | Tension | $\mathrm{Ccr}_{\text {cr }}=8 \mathrm{~d}$ | $\mathrm{F}_{\mathrm{NC}}=1.0$ | $\mathrm{Cmin}=4 \mathrm{~d}$ | $\mathrm{F}_{\mathrm{NC}}=0.60$ |
|  | Shear | $\mathrm{Ccr}=12 \mathrm{~d}$ | $\mathrm{Fvc}^{\text {a }} 1.0$ | $\mathrm{Cmin}_{\text {min }}=4 \mathrm{~d}$ | $\mathrm{Fvc}=0.50$ |

Spacing, Tension ( $\mathbf{F N s}_{\text {s }}$ ) \& Shear ( $\mathrm{F}_{\mathrm{vs}}$ )

| Dia. (in.) |  | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 7/8 | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Scr (in.) |  | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| $S_{\text {min }}(\mathbf{i n .}$ ) |  | 1 | 1-1/2 | 2 | 2-1/2 | 3 | 3-1/2 | 4 |
|  | 1 | 0.70 | - | - | - | - | - | - |
|  | 1-1/2 | 0.85 | 0.70 | - | - | - | - | - |
|  | 2 | 1.00 | 0.80 | 0.70 | - | - | - | - |
|  | 2-1/2 | 1.00 | 0.90 | 0.78 | 0.70 | - | - | - |
|  | 3 | 1.00 | 1.00 | 0.85 | 0.76 | 0.70 | - | - |
|  | 3-1/2 | 1.00 | 1.00 | 0.93 | 0.82 | 0.75 | 0.70 | - |
|  | 4 | 1.00 | 1.00 | 1.00 | 0.88 | 0.80 | 0.74 | 0.70 |
|  | 5 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 | 0.83 | 0.78 |
|  | 5-1/2 | 1.00 | 1.00 | 1.00 | 1.00 | 0.95 | 0.87 | 0.81 |
|  | 6 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.91 | 0.85 |
|  | 7 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.93 |
|  | 8 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Notes: For anchors loaded in tension and shear, the critical spacing (Scr) is equal to 8 anchor diameters (8d) at which the anchor achieves $100 \%$ of load. Minimum spacing (smin) is equal to 4 anchor diameters (4d) at which the anchor achieves 70\% of load.


Edge Distance, Tension ( FNc $_{\mathrm{Nc}}$ )

| Dia. (in.) |  | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 7/8 | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Ccr (in.) |  | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| $C_{\text {min }}(\mathbf{i n}$.) |  | 1 | 1-1/2 | 2 | 2-1/2 | 3 | 3-1/2 | 4 |
|  | 1 | 0.60 | - | - | - | - | - | - |
|  | 1-1/2 | 0.80 | 0.60 | - | - | - | - | - |
|  | 2 | 1.00 | 0.73 | 0.60 | - | - | - | - |
|  | 2-1/2 | 1.00 | 0.87 | 0.70 | 0.60 | - | - | - |
|  | 3 | 1.00 | 1.00 | 0.80 | 0.68 | 0.60 | - | - |
|  | 3-1/2 | 1.00 | 1.00 | 0.90 | 0.76 | 0.67 | 0.60 | - |
|  | 4 | 1.00 | 1.00 | 1.00 | 0.84 | 0.73 | 0.66 | 0.60 |
|  | 5 | 1.00 | 1.00 | 1.00 | 1.00 | 0.87 | 0.77 | 0.70 |
|  | 6 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.89 | 0.80 |
|  | 7 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.90 |
|  | 8 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Notes: For anchors loaded in tension, the critical edge distance (cor) is equal to 8 anchor diameters (8d) at which the anchor achieves $100 \%$ of load.
Minimum edge distance (Cmin) is equal to 4 anchor diameters (4d) at which the anchor achieves 60\% of load.


Edge Distance, Shear ( $\mathrm{Fv}_{\mathrm{vc}}$ )

| Dia. (in.) |  | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 7/8 | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Ccr (in.) |  | 3 | 4-1/2 | 6 | 7-1/2 | 9 | 10-1/2 | 12 |
| $\mathbf{C a m i n}_{\text {(in.) }}$ |  | 1 | 1-1/2 | 2 | 2-1/2 | 3 | 3-1/2 | 4 |
|  | 1-1/2 | 0.63 | 0.50 | - | - | - | - | - |
|  | 2 | 0.75 | 0.58 | 0.50 | - | - | - | - |
|  | 2-1/2 | 0.88 | 0.67 | 0.56 | 0.50 | - | - | - |
|  | 3 | 1.00 | 0.75 | 0.63 | 0.55 | 0.50 | - | - |
|  | 3-1/2 | 1.00 | 0.83 | 0.69 | 0.60 | 0.54 | 0.50 | - |
|  | 4 | 1.00 | 0.92 | 0.75 | 0.65 | 0.58 | 0.54 | 0.50 |
|  | 4-1/2 | 1.00 | 1.00 | 0.81 | 0.70 | 0.63 | 0.57 | 0.53 |
|  | 5 | 1.00 | 1.00 | 0.88 | 0.75 | 0.67 | 0.61 | 0.56 |
|  | 5-1/2 | 1.00 | 1.00 | 0.94 | 0.80 | 0.71 | 0.64 | 0.59 |
|  | 6 | 1.00 | 1.00 | 1.00 | 0.85 | 0.75 | 0.68 | 0.63 |
|  | 7-1/2 | 1.00 | 1.00 | 1.00 | 1.00 | 0.88 | 0.79 | 0.72 |
|  | 9 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.89 | 0.81 |
|  | 10-1/2 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 0.91 |
|  | 12 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 |

Notes: For anchors loaded in shear, the critical edge distance (Cor) is equal to 12 anchor diameters (12d) at which the anchor achieves $100 \%$ of load.
Minimum edge distance (Cmin) is equal to 4 anchor diameters (4d) at which the anchor achieves $50 \%$ of load.


## ORDERING INFORMATION

Hammer-Capsule

| Cat.No. | Description | Standard Box | Std. Carton |
| :---: | :---: | :---: | :---: |
| 6702 | $3 / 8^{\prime \prime}$ Hammer-Capsule | 10 | 500 |
| 6703 | $1 / 2^{\prime \prime}$ Hammer-Capsule | 10 | 200 |
| 6704 | $5 / 8^{\prime \prime}$ Hammer-Capsule | 10 | 100 |
| 6705 | $3 / 4$ " Hammer-Capsule | 6 | 60 |
| 6706 | $7 / 8^{\prime \prime}$ Hammer-Capsule | 6 | 60 |
| 6707 | 1" Hammer-Capsule | 6 | 60 |
| For availability of threaded rod please contact DEWALT |  |  |  |



