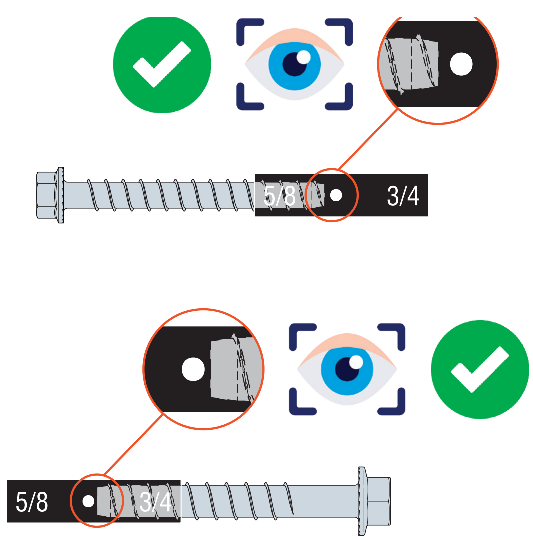
# Titen HD® Thread Gauge

The Titen HD Thread Gauge allows users to check thread wear on previously installed carbon steel THD anchors to determine suitability for reuse in temporary applications. The dual-sided design can gauge both ⅝" and ¾" diameter carbon steel Titen HD anchors. The gauge is designed for a quick and easy check to assess if a THD anchor can be used again.

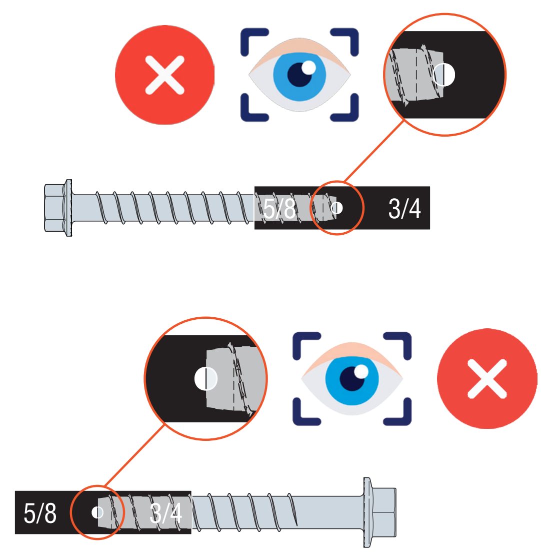
To use, insert the THD anchor into the appropriate end of the gauge. If any part of the anchor passes through the witness hole in the center of the gauge, it is not suitable to be used again. If the THD anchor does not pass into the witness hole, it can be used. If you see any part of the THD anchor when you look through the witness hole, you must discard the THD anchor immediately. Do not reuse the THD anchor if any part of the anchor is visible in the witness hole.


See pages 20-23 for reused Titen HD design data.

### Suitable for Reuse




### Not Suitable for Reuse




Note: ⅝" diameter Titen HD must be inserted on the side of Titen HD Thread Gauge marked with ⅝.

Similarly, ¾" diameter Titen HD must be inserted on the side of Titen HD Thread Gauge marked with ¾.

# Reused Titen HD® Technical Information

SIMPSON Strong-Tie®

## Reused Titen HD® Carbon Steel Installation Parameters and Strength Design Data for Temporary Applications[1,6]

| Characteristic | Symbol | Units | Nominal Anchor Diameter (in.) | | | |
|---|---|---|---|---|---|---|
| | | | 5/8 | | 3/4 | |
| **Installation Parameters** | | | | | | |
| Drill Bit Diameter | $d_{bit}$ | in. | 5/8 | | 3/4 | |
| Baseplate Clearance Hole Diameter | $d_h$ | in. | 3/4 | | 7/8 | |
| Maximum Installation Torque[2] | $T_{inst,max}$ | ft-lbf | 100 | | 150 | |
| Maximum Impact Wrench Torque Rating[3] | $T_{impact,max}$ | ft-lbf | 340 | | 385 | |
| Minimum Hole Depth | $h_{hole}$ | in. | 4½ | 6 | 4½ | 6¾ |
| Nominal Embedment Depth | $h_{nom}$ | in. | 4 | 5½ | 4 | 6¼ |
| Effective Embedment Depth | $h_{ef}$ | in. | 2.97 | 4.24 | 2.94 | 4.86 |
| Critical Edge Distance | $c_{ac}$ | in. | 4½ | 6⅜ | 6 | 7 5/16 |
| Minimum Edge Distance | $c_{min}$ | in. | 1¾ | | 1¾ | |
| Minimum Spacing | $s_{min}$ | in. | 3 | | 2¾ | 3 |
| Minimum Concrete Thickness | $h_{min}$ | in. | 6 | 8½ | 6 | 10 |
| Wrench Size | - | in. | 15/16 | | 1⅛ | |
| **Steel Strength in Tension** | | | | | | |
| Tension Resistance of Steel | $N_{sa}$ | lb. | 30,360 | | 45,540 | |
| Strength Reduction Factor – Steel Failure[4] | $\phi_{sa}$ | - | 0.65 | | | |
| **Concrete Breakout Strength in Tension** | | | | | | |
| Effectiveness Factor – Uncracked Concrete | $k_{uncr}$ | - | 24 | | 24 | |
| Modification Factor | $\psi_{c,N}$ | - | 1.0 | | | |
| Strength Reduction Factor – Concrete Breakout Failure[4] | $\phi_{cb}$ | - | 0.65 | | | |
| **Pullout Strength in Tension** | | | | | | |
| Pullout Resistance – Uncracked Concrete ($f'_c$ = 2,500 psi) | $N_{p,uncr}$ | lb. | 4,740[5] | 9,010[5] | 5,495[5] | 9,400[5] |
| Strength Reduction Factor – Concrete Pullout Failure[4] | $\phi_p$ | - | 0.65 | | | |
| **Steel Strength in Shear** | | | | | | |
| Shear Resistance of Steel | $V_{sa}$ | lb. | 10,000 | | 13,150 | |
| Strength Reduction Factor – Steel Failure[4] | $\phi_{sa}$ | - | 0.60 | | | |
| **Concrete Breakout Strength in Shear** | | | | | | |
| Outside Diameter | $d_a$ | in. | 0.625 | | 0.750 | |
| Load Bearing Length of Anchor in Shear | $\ell_e$ | in. | 2.97 | 4.24 | 2.94 | 4.86 |
| Strength Reduction Factor – Concrete Breakout Failure[4] | $\phi_{cb}$ | - | 0.70 | | | |
| **Concrete Pryout Strength in Shear** | | | | | | |
| Coefficient for Pryout Strength | $k_{cp}$ | - | 2.0 | | | |
| Strength Reduction Factor – Concrete Pryout Failure[4] | $\phi_{cp}$ | - | 0.70 | | | |

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-19 Chapter 17, ACI 318-14 Chapter 17 and ACI 318-11 Appendix D.
2. $T_{inst,max}$ is the maximum permitted installation torque for the embedment depth range covered by this table using a torque wrench. Exceeding the maximum torque can reduce its holding capacity.
3. $T_{impact,max}$ is the maximum permitted torque rating for impact wrenches for the embedment depth range covered by this table.
4. The strength reduction factor applies when the load combinations from the IBC or ACI 318 are used and the requirements of ACI 318-19 17.5.3, ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, are met. If the load combinations of ACI 318-11 Appendix C are used, the appropriate strength reduction factor must be determined in accordance with ACI 318-11 D.4.4.
5. Adjust the characteristic pullout resistance for other concrete compressive strengths by multiplying the tabular value by $(f'_{c,specified} / 2{,}500)^{0.5}$.
6. Installation parameters are for reused Titen HD that have passed a check using the Simpson Strong-Tie® Titen HD Thread Gauge.

# Reused Titen HD® Technical Information

SIMPSON Strong-Tie®

## Reused Titen HD® Carbon Steel Design Strengths in Normal-Weight Uncracked Concrete for Temporary Applications[3,4,6,7,8,9,10]

| Anchor Dia. (in.) | Nominal Embed. Depth (in.) | Critical Edge Distance $c_{ac}$ (in.) | Design Strength (lb.) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | f'c = 2,500 psi | | | f'c = 4,000 psi | | | f'c = 6,000 psi | | |
| | | | Tension $\phi N_n$ | Shear $\phi V_n$ | 60-degree[5] | Tension $\phi N_n$ | Shear $\phi V_n$ | 60-degree[5] | Tension $\phi N_n$ | Shear $\phi V_n$ | 60-degree[5] |
| Single-use[1] **IMPORTANT: these values are higher as compared to a reused anchor** | | | | | | | | | | | |
| ⅝ | 4 | 4½ | 3,990 | 3,335 | 3,270 | 5,050 | 4,215 | 4,135 | 6,185 | 5,165 | 5,065 |
| | 5½ | 6⅜ | 6,375 | 6,000 | 5,475 | 8,065 | 6,000 | 6,290 | 9,880 | 6,000 | 7,020 |
| ¾ | 4 | 6 | 4,425 | 4,685 | 3,970 | 5,595 | 5,925 | 5,015 | 6,855 | 7,255 | 6,145 |
| | 6¼ | 7⁵⁄₁₆ | 8,355 | 8,145 | 7,270 | 10,565 | 10,105 | 9,130 | 12,940 | 10,105 | 10,310 |
| Reused after passing a check with the Simpson Strong-Tie® Titen HD Thread Gauge[2] **IMPORTANT: these values are reduced as compared to a single-use anchor** | | | | | | | | | | | |
| ⅝ | 4 | 4½ | 3,080 | 3,335 | 2,785 | 3,895 | 4,215 | 3,520 | 4,775 | 5,165 | 4,315 |
| | 5½ | 6⅜ | 5,855 | 6,000 | 5,190 | 7,410 | 6,000 | 5,995 | 9,070 | 6,000 | 6,710 |
| ¾ | 4 | 6 | 3,570 | 4,685 | 3,435 | 4,520 | 5,925 | 4,350 | 5,535 | 7,255 | 5,325 |
| | 6¼ | 7⁵⁄₁₆ | 6,110 | 7,890 | 5,850 | 7,725 | 7,890 | 6,840 | 9,465 | 7,890 | 7,750 |

1. Tabulated values are based on the characteristic ultimate values obtained from testing a Simpson Strong-Tie® Titen HD anchor installed for the first time in concrete.
2. Tabulated values are based on the characteristic ultimate values obtained from testing a Simpson Strong-Tie® Titen HD anchor meeting the minimum thread outside diameter requirement as checked with the Simpson Strong-Tie® Titen HD Thread Gauge.
3. For lightweight concrete, multiply design strength by $\lambda_a$ as follows: for sand-lightweight, $\lambda_a = 0.68$; for all-lightweight, $\lambda_a = 0.60$.
4. Design strength in 2,500 psi, 4,000 psi and 6,000 psi concrete are based on test data and calculations according to ACI 318-19 Chapter 17.
5. 60-degree loads are calculated for a pinned connection where the load acts 60 degrees from a line parallel to the concrete surface using the interaction equation between tension and shear failure with the tabulated tension and shear design strength.
6. Tabulated values are for single anchor with no influence of another anchor.
7. Tabulated values are based on an anchor placed at critical edge distance from one concrete edge. See Figure 1 below.
8. Interpolation between embedment depth is not permitted.
9. The Designer of Record is responsible for the foundation design.
10. For anchor subjected to both tension and shear loads, it shall be designed to satisfy following:
   - For $N_a/\phi N_n \leq 0.2$, the full design strength in shear is permitted.
   - For $V_a/\phi V_n \leq 0.2$, the full design strength in tension is permitted.
   - For all other cases: $N_a/\phi N_n + V_a/\phi V_n \leq 1.2$.

   where:
   $N_a$ = Applied tension load
   $\phi N_n$ = Tension design strength from table
   $V_a$ = Applied shear load
   $\phi V_n$ = Shear design strength from table

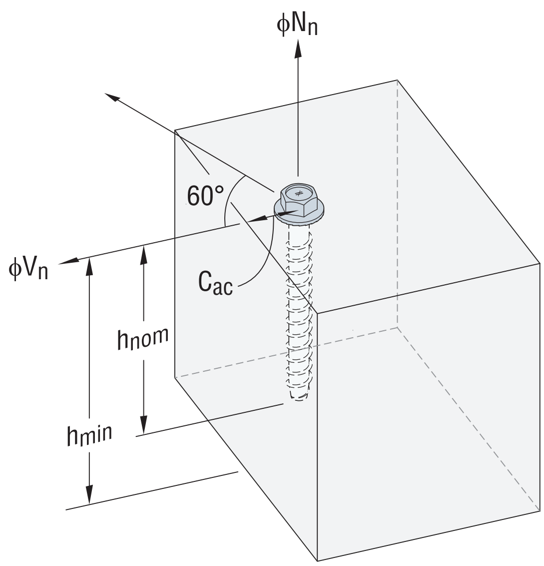



**Figure 1**

* See page 3 for an explanation of the load table icons.

# Reused Titen HD® Technical Information

SIMPSON Strong-Tie®

## Reused Titen HD® Carbon Steel Allowable Loads in Normal-Weight Uncracked Concrete for Temporary Applications - Dead Load[3,4,6,7,8,9,10,11]

IBC *

| Anchor Dia. (in.) | Nominal Embed. Depth (in.) | Critical Edge Distance $c_{ac}$ (in.) | Allowable Loads (lb.) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $f'_c$ = 2,500 psi | | | $f'_c$ = 4,000 psi | | | $f'_c$ = 6,000 psi | | |
| | | | Tension $N_{al}$ | Shear $V_{al}$ | 60-degree[5] | Tension $N_{al}$ | Shear $V_{al}$ | 60-degree[5] | Tension $N_{al}$ | Shear $V_{al}$ | 60-degree[5] |
| Single-use[1] **IMPORTANT: these values are higher as compared to a reused anchor** | | | | | | | | | | | |
| ⅝ | 4 | 4½ | 3,325 | 2,780 | 2,725 | 4,210 | 3,515 | 3,445 | 5,155 | 4,305 | 4,220 |
| | 5½ | 6⅜ | 5,315 | 5,000 | 4,565 | 6,720 | 5,000 | 5,240 | 8,235 | 5,000 | 5,850 |
| ¾ | 4 | 6 | 3,690 | 3,905 | 3,310 | 4,665 | 4,940 | 4,180 | 5,715 | 6,045 | 5,120 |
| | 6¼ | 7⁵⁄₁₆ | 6,965 | 6,790 | 6,060 | 8,805 | 8,420 | 7,610 | 10,785 | 8,420 | 8,590 |
| Reused after passing a check with the Simpson Strong-Tie® Titen HD Thread Gauge[2] **IMPORTANT: these values are reduced as compared to a single-use anchor** | | | | | | | | | | | |
| ⅝ | 4 | 4½ | 2,565 | 2,780 | 2,320 | 3,245 | 3,515 | 2,935 | 3,980 | 4,305 | 3,595 |
| | 5½ | 6⅜ | 4,880 | 5,000 | 4,325 | 6,175 | 5,000 | 4,995 | 7,560 | 5,000 | 5,590 |
| ¾ | 4 | 6 | 2,975 | 3,905 | 2,865 | 3,765 | 4,940 | 3,625 | 4,615 | 6,045 | 4,440 |
| | 6¼ | 7⁵⁄₁₆ | 5,090 | 6,575 | 4,875 | 6,440 | 6,575 | 5,700 | 7,890 | 6,575 | 6,460 |

See footnotes on page 23.

## Reused Titen HD® Carbon Steel Allowable Loads in Normal-Weight Uncracked Concrete for Temporary Applications - Wind Load[3,4,6,7,8,9,10,11]

IBC *

| Anchor Dia. (in.) | Nominal Embed. Depth (in.) | Critical Edge Distance $c_{ac}$ (in.) | Allowable Loads (lb.) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | $f'_c$ = 2,500 psi | | | $f'_c$ = 4,000 psi | | | $f'_c$ = 6,000 psi | | |
| | | | Tension $N_{al}$ | Shear $V_{al}$ | 60-degree[5] | Tension $N_{al}$ | Shear $V_{al}$ | 60-degree[5] | Tension $N_{al}$ | Shear $V_{al}$ | 60-degree[5] |
| Single-use[1] **IMPORTANT: these values are higher as compared to a reused anchor** | | | | | | | | | | | |
| ⅝ | 4 | 4½ | 2,495 | 2,085 | 2,045 | 3,155 | 2,635 | 2,585 | 3,865 | 3,230 | 3,165 |
| | 5½ | 6⅜ | 3,985 | 3,750 | 3,420 | 5,040 | 3,750 | 3,930 | 6,175 | 3,750 | 4,390 |
| ¾ | 4 | 6 | 2,765 | 2,930 | 2,480 | 3,495 | 3,705 | 3,135 | 4,285 | 4,535 | 3,840 |
| | 6¼ | 7⁵⁄₁₆ | 5,220 | 5,090 | 4,545 | 6,605 | 6,315 | 5,705 | 8,090 | 6,315 | 6,445 |
| Reused after passing a check with the Simpson Strong-Tie® Titen HD Thread Gauge[2] **IMPORTANT: these values are reduced as compared to a single-use anchor** | | | | | | | | | | | |
| ⅝ | 4 | 4½ | 1,925 | 2,085 | 1,740 | 2,435 | 2,635 | 2,200 | 2,985 | 3,230 | 2,695 |
| | 5½ | 6⅜ | 3,660 | 3,750 | 3,245 | 4,630 | 3,750 | 3,745 | 5,670 | 3,750 | 4,195 |
| ¾ | 4 | 6 | 2,230 | 2,930 | 2,145 | 2,825 | 3,705 | 2,720 | 3,460 | 4,535 | 3,330 |
| | 6¼ | 7⁵⁄₁₆ | 3,820 | 4,930 | 3,655 | 4,830 | 4,930 | 4,275 | 5,915 | 4,930 | 4,845 |

See footnotes on page 23.

* See page 3 for an explanation of the load table icons.

# Reused Titen HD® Technical Information

1. Tabulated allowable loads are for a Simpson Strong-Tie® Titen HD anchor installed for the first time in concrete.
2. Tabulated allowable loads are for a Simpson Strong-Tie® Titen HD anchor meeting the minimum thread outside diameter requirement as checked with the Simpson Strong-Tie® Thread Gauge.
3. For lightweight concrete, multiply allowable loads by $\lambda_a$ as follows: for sand-lightweight, $\lambda_a$ = 0.68; for all-lightweight, $\lambda_a$ = 0.60.
4. Allowable loads in 2,500 psi, 4,000 psi and 6,000 psi concrete are based on test data and calculations according to ACI 318-19 Chapter 17.
5. 60-degree loads are calculated for a pinned connection where the load acts 60 degrees from a line parallel to the concrete surface using the interaction equation between tension and shear failure with the tabulated allowable tension and shear loads.
6. Tabulated values are for single anchor with no influence of another anchor.
7. Tabulated values are based on an anchor placed at critical edge distance from one concrete edge. See Figure 2 below.
8. Interpolation between embedment depth is not permitted.
9. The Designer of Record is responsible for the foundation design.
10. Allowable loads are calculated based on design strength values using a conversion factors as follows:

$$T_{al} = \frac{\phi N_n}{\alpha}$$

and

$$V_{al} = \frac{\phi V_n}{\alpha}$$

where:
$T_{al}$ = Allowable tension load
$V_{al}$ = Allowable shear load
$\alpha$ = Conversion factor calculated as a weighted average of the load factors for the controlling load combination
For example:
$\alpha$ = 1.2 for load combination of 1.2D assuming 100% dead load
$\alpha$ = 1.6 for load combination of 1.6W assuming 100% wind load

11. For anchor subjected to both tension and shear loads, it shall be designed to satisfy following:
- For $N_a/N_{al} \leq 0.2$, the full allowable load in shear is permitted.
- For $V_a/V_{al} \leq 0.2$, the full allowable load in tension is permitted.
- For all other cases: $N_a/N_{al} + V_a/V_{al} \leq 1.2$.

where:
$N_a$ = Applied ASD tension load
$N_{al}$ = Allowable tension load from table
$V_a$ = Applied ASD shear load
$V_{al}$ = Allowable shear load from table

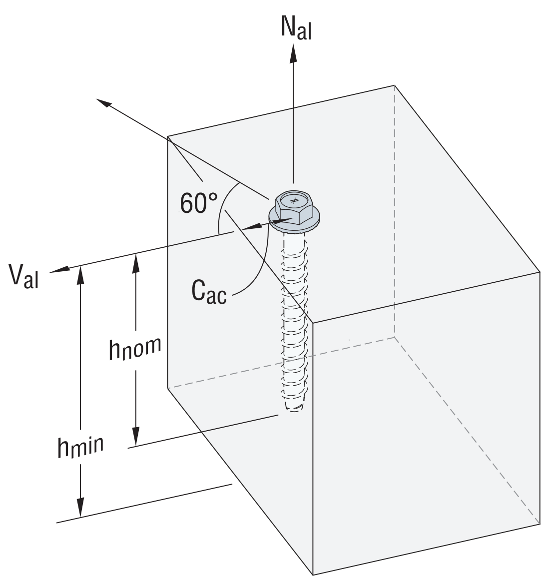



**Figure 2**