ICC EVALUATION SERVICE®

ICC-ES Evaluation Report

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DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-Installed Concrete Anchors

REPORT HOLDER:

HILTI, INC.

EVALUATION SUBJECT:

HILTI HDI-P TZ AND HDI-TZ ANCHORS IN CRACKED AND UNCRACKED CONCRETE

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024, 2021, 2018, and 2015 *International Building Code®* (IBC)
- 2024, 2021, 2018, and 2015 *International Residential Code®* (IRC)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see ESR-4236 LABC and LARC Supplement.

Property evaluated:

Structural

2.0 USES

The Hilti HDI-P TZ and HDI-TZ anchors are used as anchorage to resist static, wind, and seismic (Sesimic Design Categories A through F) tension and shear loads in cracked and uncracked normal-weight concrete and lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa).

The $^1/_4$-inch, $^3/_8$-inch, and ½-inch (6.4 mm, 9.5 mm, and 12.7 mm) HDI-P TZ and $^3/_8$-inch (9.5 mm) HDI-TZ anchors are limited to installation in the formed concrete surface. Use of these anchors are limited to supporting non-structural components.

The $^1/_4$-inch, $^3/_8$-inch, and ½-inch (6.4 mm, 9.5 mm, and 12.7 mm) HDI-P TZ and $^3/_8$-inch and $^1/_2$-inch (9.5 mm and 12.7 mm) HDI-TZ anchors may be installed in the soffit of cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a minimum specified compressive strength, f'_c, of 3,000 psi (20.7 MPa).

The ½-inch and $^5/_8$-inch diameter (12.7 mm and 15.9 mm) HDI-TZ anchors may be installed in top of cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a minimum member thickness, $h_{min,deck}$, as noted in Table 6 of this evaluation report and a specified compressive strength, f'_c, of 3,000 psi to 8,500 psi (20.7 MPa to 58.6 MPa).

The ¼-inch and $^3/_8$-inch (6.4 mm and 9.5 mm) HDI-P TZ anchors may be installed in the underside of cracked and uncracked hollow-core concrete slabs having a minimum specified compressive strength, f'_c, of 6,000 psi (41.4 MPa). Use of anchors is limited to supporting non-structural components.

The anchor is an alternative to cast-in-place anchors described in Section 1901.3 of the 2024, 2021, 2018 and 2015 IBC. The anchors may also be used where an engineered design is submitted in accordance with Section R301.1.3 of the IRC.

3.0 DESCRIPTION

3.1 HDI-P TZ:

HDI-P TZ anchors are internally-threaded, displacement-controlled, mechanical expansion anchors. HDI-P TZ anchors consist of an internally-threaded anchor body with an expansion cone, a wedge (expansion element), and an internal setting plug which expands the anchor and activates the wedge when engaged with the HDI-P TZ setting tool. The HDI-P TZ is illustrated in Figures 1 and 5. The anchor components are manufactured from carbon steel and have a minimum 5 µm (0.0002 inch) zinc plating conforming to DIN EN ISO 4042 A2K.

The anchor is installed in a predrilled hole using a carbide-tipped hammer drill bit meeting the requirements of ANSI B212.15 or with a Hilti HDI-P TZ stop drill bit. The HDI-P TZ is inserted into the predrilled hole and the setting plug is engaged with the manual HDI-P TZ setting tool and a hammer, or the automatic HDI-P TZ setting tool and a hammer drill. See Figure 5 for the proper drilling and setting tools.

3.2 HDI-TZ:

HDI-TZ anchors are internally-threaded, displacement-controlled, mechanical expansion anchors. HDI-TZ anchors consist of an internally-threaded anchor body with an expansion cone, a wedge (expansion element), and an internal setting plug, which expands the anchor and activates the wedge when engaged with the HDI-TZ setting tool. The HDI-TZ is illustrated in Figures 2 and 5. The anchor components are manufactured from carbon steel and have a minimum 5 µm (0.0002 inch) zinc plating conforming to DIN EN ISO 4042 A2K.

The anchor is installed in a predrilled hole using a carbide-tipped hammer drill bit meeting the requirements of ANSI B212.15 or with a Hilti HDI-TZ stop drill bit. The HDI-TZ is

inserted into the predrilled hole and the setting plug is engaged with the manual HDI-TZ setting tool and a hammer, or the automatic HDI-TZ setting tool and a hammer drill. See Figure 5 for the proper drilling and setting tools.

3.3 Steel Insert Elements:

A threaded steel insert element must be threaded into the Hilti HDI-P TZ or HDI-TZ anchor after the anchor is set in the concrete. The properties of the insert element must comply with ASTM A36 minimum, or equivalent. See Tables 3 and 4.

3.4 Concrete:

Normal-weight and lightweight concrete must conform to Sections 1903 and 1905 of the IBC. The minimum concrete compressive strength at the time of anchor installation is noted in Section 5.5 of this report.

3.5 Steel Deck Panels:

Steel deck panels must be in accordance with the configuration in Figures 4A, 4B, and 4C and have a minimum base steel thickness of 0.035 inch (0.899 mm, 20 gauge). Steel must comply with ASTM A653/A653M SS Grade 33 and have a minimum yield strength of 33,000 psi (345 MPa).

3.6 Hollow Core Concrete Panels:

Hollow core concrete panels shall have a minimum thickness of $1^3/_8$ inches (35 mm) between the horizontal surface and the hollow core as indicated in Figure 3.

4.0 DESIGN AND INSTALLATION

4.1 Strength Design:

4.1.1 General: Design strength of anchors complying with the 2024 and 2021 IBC, as well as Section R301.1.3 of the 2024 and 2021 IRC, must be determined in accordance with ACI 318-19 Chapter 17 and this report.

Design strength of anchors complying with the 2018 and 2015 IBC, as well as Section R301.1.3 of the 2018 and 2015 IRC, must be determined in accordance with ACI 318-14 Chapter 17 and this report.

Design parameters provided in Tables 2, 3, and 4, of this report are based on the 2024 and 2021 IBC (ACI 318-19), and the 2018 and 2015 IBC (ACI 318-14) unless noted otherwise in Sections 4.1.1 through 4.1.12. The strength design of anchors must comply with ACI 318-19 17.5.1.2 or ACI 318-14 17.3.1, as applicable, except as required in ACI 318-19 17.10 or ACI 318-14 17.2.3, as applicable.

Strength reduction factors, ϕ, as given in Tables 2 and 4 of this report must be used in lieu of ACI 318-19 17.5.3 or ACI 318-14 17.3.3, as applicable, for load combinations calculated in accordance with Section 1605.1 of the 2024 or 2021 IBC or Section 1605.2 of the 2018, and 2015 IBC and Section 5.3 of ACI 318 (-19 and -14), as applicable. The value of f'_c used in the calculations must be limited to a maximum of 8,000 psi (55.2 MPa), in accordance with ACI 318-19 17.3.1 or ACI 318-14 17.2.7, as applicable.

4.1.2 Requirements for Static Steel Strength in Tension: The nominal static steel strength, N_{sa}, of a single anchor in tension must be calculated in accordance with ACI 318-19 17.6.1.2 or ACI 318-14 17.4.1.2, as applicable for the threaded steel element, $N_{sa,rod}$, as noted in Table 4 of this report. The lesser of $\phi N_{sa,rod}$ in Table 4 or ϕN_{sa} provided in Table 2 for the HDI-P TZ and HDI-TZ anchors shall be used as the steel strength in tension.

4.1.3 Requirements for Static Concrete Breakout Strength in Tension: The nominal concrete breakout strength of a single anchor or group of anchors in tension, N_{cb} or N_{cbg}, respectively, must be calculated in accordance with ACI 318-19 17.6.2 or ACI 318-14 17.4.2, as applicable, with modifications as described in this section. The basic concrete breakout strength in tension, N_b, must be calculated in accordance with ACI 318-19 17.6.2.2 or ACI 318-14 17.4.2.2, as applicable, using the values of h_{ef} and k_{cr} as given in Table 2 of this report. The nominal concrete breakout strength in tension in regions where analysis indicates no cracking in accordance with ACI 318-19 17.6.2.5.1 or ACI 318-14 17.4.2.6, as applicable, must be calculated with k_{uncr} as given in Table 2 of this report and with $\Psi_{c,N}$ = 1.0.

For HDI-P TZ and HDI-TZ anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figures 4A and 4B, calculation of the concrete breakout strength is not required.

4.1.4 Requirements for Static Pullout Strength in Tension: The nominal pullout strength of a single anchor in accordance with ACI 318-19 17.6.3.1 and 17.6.3.2.1, or ACI 318-14 17.4.3.1 and 17.4.3.2, respectively, as applicable, in cracked and uncracked concrete, $N_{p,cr}$ and $N_{p,uncr}$, respectively, is given in Table 2. For all design cases $\Psi_{c,P}$ = 1.0. In accordance with ACI 318-19 17.6.3 or ACI 318-14 17.4.3, as applicable, the nominal pullout strength in cracked concrete may be calculated in accordance with the following equation where the specified concrete compressive strength, f'_c, exceeds 2,500 psi (17.2 MPa):

$$N_{p,f'_c} = N_{p,cr}\left(\frac{f'_c}{2{,}500}\right)^{0.35} \quad \text{(lb, psi)} \qquad \text{(Eq-1)}$$

$$N_{p,f'_c} = N_{p,cr}\left(\frac{f'_c}{17.2}\right)^{0.35} \quad \text{(N, MPa)}$$

In regions where analysis indicates no cracking in accordance with ACI 318-19 17.6.3.3 or ACI 318-14 17.4.3.6, as applicable, the nominal pullout strength in tension may be calculated in accordance with the following equation:

$$N_{p,f'_c} = N_{p,uncr}\left(\frac{f'_c}{2{,}500}\right)^{0.35} \quad \text{(lb, psi)} \qquad \text{(Eq-2)}$$

$$N_{p,f'_c} = N_{p,uncr}\left(\frac{f'_c}{17.2}\right)^{0.35} \quad \text{(N, MPa)}$$

Where values for $N_{p,cr}$ and $N_{p,uncr}$ are not provided in Table 2, the pullout strength in tension need not be evaluated.

The nominal pullout strength in cracked concrete of the HDI-P TZ and HDI-TZ anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figures 4A and 4B is given in Table 5. In accordance with ACI 318-19 17.6.3.2.1 or ACI 318-14 17.4.3.2, as applicable, the nominal pullout strength in cracked concrete must be calculated in accordance with Eq-1, whereby the value of $N_{p,deck,cr}$ must be substituted for $N_{p,cr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator. In regions where analysis indicates no cracking in accordance with ACI 318-19 17.6.3.3 or ACI 318-14 17.4.3.6, as applicable, the nominal strength in uncracked concrete must be calculated according to Eq-2, whereby the value of $N_{p,deck,uncr}$ must be substituted for $N_{p,uncr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator.

4.1.5 Requirements for Static Steel Strength in Shear: The nominal steel strength in shear, V_{sa}, of a single anchor must be taken as the threaded steel element strength, $V_{sa,rod}$, as noted in Table 4 of this report. The lesser of $\phi V_{sa,rod}$ in Table 4 or ϕV_{sa} provided in Table 2 for the HDI-P TZ and HDI-TZ anchors shall be used as the steel strength in shear, and must be used in lieu of the values derived by calculation from ACI 318-19 17.7.1.2b or ACI 318-14 Eq. 17.5.1.2b, as applicable. The shear strength,

$V_{sa,deck}$, of the HDI-P TZ and HDI-TZ anchors as governed by steel failure of the HDI-P TZ or HDI-TZ anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figures 4A and 4B, is given in Table 5.

4.1.6 Requirements for Static Concrete Breakout Strength in Shear: The nominal concrete breakout strength of a single anchor or group of anchors in shear, V_{cb} or V_{cbg}, respectively, must be calculated in accordance with ACI 318-19 17.7.2 or ACI 318-14 17.5.2, as applicable, with modifications as described in this section. The basic concrete breakout strength, V_b, must be calculated in accordance with ACI 318-19 17.7.2.2.1 or ACI 318-14 17.5.2.2, as applicable, based on the values of ℓ_e and d_a provided in Table 2 of this report.

For HDI-P TZ and HDI-TZ anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figures 4A and 4B, calculation of the concrete breakout strength in shear is not required.

For anchors installed in hollow-core concrete panels, the nominal concrete breakout strength of a single anchor or group of anchors in shear, V_{cb} or V_{cbg}, must be calculated in accordance with ACI 318-19 17.7.2 or ACI 318-14 17.5.2, as applicable, using the actual member cover thickness for anchors in the hollow-core concrete slabs as given in Table 1 and Figure 3 of this report, as applicable.

4.1.7 Requirements for Static Concrete Pryout Strength in Shear: The nominal concrete pryout strength of a single anchor or group of anchors, V_{cp} or V_{cpg}, respectively, must be calculated in accordance with ACI 318-19 17.7.3 or ACI 318-14 17.5.3, as applicable, using the value of k_{cp} provided in Table 2 of this report and the value of N_{cb} or N_{cbg} as calculated in Section 4.1.3 of this report.

For HDI-P TZ and HDI-TZ anchors installed in the soffit of sand-lightweight or normal-weight concrete over profile steel deck floor and roof assesmblies, as shown in Figures 4A and 4B, calculation of the concrete pryout strength in accordance with ACI 318-19 17.7.3 or ACI 318-14 17.5.3, as applicable, is not required.

4.1.8 Requirements for Seismic Design:

4.1.8.1 General: For load combinations including seismic, the design must be performed in accordance with ACI 318-19 17.10 or ACI 318-14 17.2.3, as applicable. Modifications to ACI 318-19 17.10 or ACI 318-14 17.2.3 shall be applied under Section 1905.1.8 of the 2024, 2021, 2018 and 2015 IBC.

The anchors comply with ACI 318 (-19 and -14) 2.3, as applicable, as brittle steel elements and must be designed in accordance with ACI 318-19 17.10.5, 17.10.6, 17.10.7, or 17.10.4; or ACI 318-14 17.2.3.4, 17.2.3.5, 17.2.3.6 or 17.2.3.7, as applicable. Strength reduction factors, ϕ, are given in Table 2 of this report. The Hilti HDI-P TZ and HDI-TZ anchors may be installed in regions designated as IBC Seismic Design Categories A through F.

4.1.8.2 Seismic Tension: The nominal steel strength and nominal concrete breakout strength for anchors in tension must be calculated in accordance with ACI 318-19 17.6.1 and 17.6.2, or ACI 318-14 17.4.1 and 17.4.2, as applicable, as described in Sections 4.1.2 and 4.1.3 of this report. In accordance with ACI 318-19 17.6.3.2.1 or ACI 318-14 17.4.3.2, as applicable, the appropriate pullout strength in tension for seismic loads, $N_{p,eq}$, described in Table 2 or $N_{p,deck,eq}$ described in Table 5 must be used in lieu of N_p, as applicable. The value of $N_{p,eq}$ or $N_{p,deck,eq}$ may be adjusted by calculation for concrete strength in accordance with Eq-1 and Section 4.1.4 of this report whereby the value of $N_{p,deck,eq}$ must be substituted for $N_{p,cr}$ and the value of 3,000 psi (20.7 MPa) must be substituted for the value of 2,500 psi (17.2 MPa) in the denominator. If no values for $N_{p,eq}$ are given in Table 2, the pullout strength need not be calculated and does not govern.

4.1.8.3 Seismic Shear: The nominal concrete breakout strength and pryout strength in shear must be calculated in accordance with ACI 318-19 17.7.2 and 17.7.3, or ACI 318-14 17.5.2 and 17.5.3, respectively, as applicable, as described in Sections 4.1.6 and 4.1.7 of this report. In accordance with ACI 318-19 17.7.1.2 or ACI 318-14 17.5.1.2, as applicable, the appropriate value for nominal steel strength for seismic loads, $V_{sa,eq}$, described Table 2 or $V_{sa,deck,eq}$ described in Table 5, must be used in lieu of V_{sa}, as applicable.

4.1.9 Requirements for Interaction of Tensile and Shear Forces: For anchors or groups of anchors that are subject to the effects of combined tension and shear forces, the design must be performed in accordance with ACI 318-19 17.8 or ACI 318-14 17.6, as applicable.

4.1.10 Requirements for Minimum Member Thickness, Minimum Anchor Spacing and Minimum Edge Distance: In lieu of ACI 318-19 17.9.2 or ACI 318-14 17.7.1 and 17.7.3, respectively, as applicable, values of s_{min} and c_{min} as given in Table 1 of this report must be used. In lieu of ACI 318-19 17.9.4 or ACI 318-14 17.7.5, as applicable, minimum member thicknesses, h_{min}, as given in Table 1 of this report must be used.

For HDI-TZ anchors installed in the topside of sand-lightweight or normal-weight concrete over profile steel deck floor and roof assemblies, the anchors must be installed in accordance with Table 6 and Figure 4C.

For HDI-P TZ and HDI-TZ anchors installed in the soffit of sand-lightweight or normal-weight concrete over profile steel deck floor and roof assemblies, the anchors must be installed in accordance with Figures 4A and 4B and shall have an axial spacing along the flute equal to the greater of $3h_{ef}$ or 1.5 times the flute width.

4.1.11 Requirements for Critical Edge Distance: In applications where $c < c_{ac}$ and supplemental reinforcement to control splitting of the concrete is not present, the concrete breakout strength in tension for uncracked concrete, calculated in accordance with ACI 318-19 17.6.2 or ACI 318-14 17.4.2, as applicable, must be further multiplied by the factor $\Psi_{cp,N}$ as given by Eq-3:

$$\Psi_{cp,N} = \frac{c}{c_{ac}} \quad \text{(Eq-3)}$$

whereby the factor $\Psi_{cp,N}$ need not be taken as less than $\frac{1.5h_{ef}}{c_{ac}}$. For all other cases, $\Psi_{cp,N} = 1.0$. In lieu of using ACI 318-19 17.9.5 or ACI 318-14 17.7.6, as applicable, values of c_{ac} in Table 2 must be used.

4.1.12 Lightweight Concrete: For the use of anchors in lightweight concrete, the modification factor λ_a equal to 0.8λ is applied to all values of $\sqrt{f'_c}$ affecting N_n and V_n.

For ACI 318-19 (2024 or 2021 IBC), and ACI 318-14 (2018 and 2015 IBC), λ shall be determined in accordance with the corresponding version of ACI 318.

For anchors installed in the soffit of sand-lightweight concrete-filled steel deck floor and roof assemblies, further reduction of the pullout values provided in this report is not required.

4.1.13 Hollow Core Concrete Panels: Installations in hollow core concrete panels shall be in accordance with the requirements in normal weight concrete provided installations are in accordance with Table 1 and Figure 3.

4.2 Allowable Stress Design (ASD):

4.2.1 General: Design values for use with allowable stress design load combinations calculated in accordance with Section 1605.1 of the 2024 and 2021 IBC or Section 1605.3 of the 2018, and 2015 IBC, must be established as follows:

$$T_{allowable,ASD} = \frac{\phi N_n}{\alpha} \quad \text{(Eq-4)}$$

$$V_{allowable,ASD} = \frac{\phi V_n}{\alpha} \quad \text{(Eq-5)}$$

where:

$T_{allowable,ASD}$ = Allowable tension load (lbf or kN).

$V_{allowable,ASD}$ = Allowable shear load (lbf or kN).

ϕN_n = Lowest design strength of an anchor or anchor group in tension as determined in accordance with ACI 318 (-19 and -14) Chapter 17, 2024 IBC Section 1905.7, 2021, 2018 and 2015 IBC Section 1905.1.8, and Section 4.1 of this report, as applicable (lbf or N).

ϕV_n = Lowest design strength of an anchor or anchor group in shear as determined in accordance with ACI 318 (-19 and -14) Chapter 17, 2024 IBC Section 1905.7, 2021, 2018 and 2015 IBC Section 1905.1.8, and Section 4.1 of this report, as applicable (lbf or N).

α = Conversion factor calculated as a weighted average of the load factors for the controlling load combination. In addition, α must include all applicable factors to account for nonductile failure modes and required over-strength.

The requirements for member thickness, edge distance and spacing, described in Table 1, must apply.

4.2.2 Interaction of Tensile and Shear Forces: The interaction must be calculated and consistent with ACI 318-19 17.8 or ACI 318-14 17.6, as applicable, as follows:

For shear loads $V \leq 0.2V_{allowable,ASD}$, the full allowable load in tension $T_{allowable,ASD}$, must be permitted.

For tension loads $T \leq 0.2T_{allowable,ASD}$, the full allowable load in shear $V_{allowable,ASD}$,must be permitted.

For all other cases:

$$\frac{T_{applied}}{T_{allowable,ASD}} + \frac{V_{applied}}{V_{allowable,ASD}} \leq 1.2 \quad \text{(Eq-6)}$$

4.3 Installation:

Installation parameters are provided in Table 1 and Figures 1, 2, 3 and 6. Anchor locations must comply with this report and plans and specifications approved by the code official. The Hilti HDI-P TZ and HDI-TZ anchors must be installed in accordance with manufacturer's published instructions and this report. In case of conflict, this report governs. Anchors must be installed in holes drilled into the concrete using carbide-tipped masonry drill bits complying with ANSI B212.15-1994 or with a Hilti HDI-P TZ or HDI-TZ stop drill bit. The minimum drilled hole depth, h_0, is given in Table 1. The HDI-P TZ or HDI-TZ is inserted into the predrilled hole and the setting plug is engaged into the anchor body using the manual HDI-P TZ or HDI-TZ setting tool and a hammer, or the automatic HDI-P TZ or HDI-TZ setting tool and a hammer drill. The setting plug must be driven until the shoulder of the HDI-P TZ or HDI-TZ setting tool is flush with the surface of the HDI-P TZ or HDI-TZ body. The minimum thread engagement of a threaded rod or bolt insert element assembly into the HDI-P TZ or HDI-TZ anchor must be the minimum thread engagement length as listed in Table 1 of this report.

4.4 Special Inspection:

Periodic special inspection is required in accordance with Section 1705.1.1 and Table 1705.3 of the 2024, 2021, 2018, and 2015 IBC; as applicable. The special inspector must make periodic inspections during anchor installation to verify anchor type, anchor dimensions, concrete type, concrete compressive strength, anchor spacing, edge distances, concrete member thickness, hole dimensions, anchor embedment and adherence to the manufacturer's printed installation instructions. The special inspector must be present as often as required in accordance with the "statement of special inspection." Under the IBC, additional requirements as set forth in Sections 1705, 1706 and 1707 must be observed, where applicable.

5.0 CONDITIONS OF USE

The Hilti HDI-P TZ or HDI-TZ anchors described in this report comply with or are suitable alternatives to what is specified in the codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Anchor sizes, dimensions, minimum embedment depths and other installation parameters are as set forth in this report.

5.2 The anchors must be installed in accordance with the manufacturer's published instructions and this report. In case of conflict, this report governs.

5.3 The $^1/_4$-inch and $^3/_8$-inch (6.4 mm and 9.5 mm) HDI-P TZ anchors are limited to installation in the formed surface of cracked and uncracked normal-weight concrete and lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa), cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a specified compressive strength, f_c, of 3,000 psi to 8,500 psi (20.7 MPa to 58.6 MPa), and cracked and uncracked hollow-core concrete panels with the configuration and dimensions as indicated in Figure 3 having a minimum specified compressive strength, f'_c, of 6,000 psi (41.4 MPa).

5.4 The ½-inch (12.7 mm) HDI-P TZ and $^3/_8$-inch (9.5 mm) HDI-TZ anchors are limited to installation in the formed surface (underside) of cracked and uncracked normal-weight concrete and lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa) and cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a specified compressive strength, f_c, of 3,000 psi to 8,500 psi (20.7 MPa to 58.6 MPa).

5.5 The ½-inch and $^5/_8$-inch diameter (12.7 mm and 15.9 mm) HDI-TZ anchors are limited to use in cracked and uncracked normal-weight concrete and lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa) and cracked and uncracked normal-weight or sand-lightweight concrete over metal deck having a specified compressive strength, f_c, of 3,000 psi to 8,500 psi (20.7 MPa to 58.6 MPa).

5.6 The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.2 MPa).

5.7 The concrete shall have attained its minimum design strength prior to installation of the anchors.

5.8 Strength design values must be established in accordance with Section 4.1 of this report.

5.9 Allowable design values are established in accordance with Section 4.2 of this report.

5.10 Anchor spacing and edge distance as well as minimum member thickness must comply with Table 1 and Figures 1, 2, 3, 4A, and 4B of this report.

5.11 Prior to installation, calculations and details demonstrating compliance with this report must be submitted to the code official. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.12 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of expansion anchors subjected to fatigue or shock loading is unavailable at this time, the use of these anchors under such conditions is beyond the scope of this report.

5.13 Anchors may be installed in regions of concrete where cracking has occurred or where analysis indicates cracking may occur ($f_t > f_r$), subject to the conditions of this report.

5.14 Anchors may be used to resist short-term loading due to wind or seismic forces in locations designated as Seismic Design Categories A through F of the IBC, subject to the conditions of this report.

5.15 Where not otherwise prohibited in the code, anchors are permitted for use with fire-resistance-rated construction provided that at least one of the following conditions is fulfilled:

- Anchors are used to resist wind or seismic forces only.
- Anchors are used to support nonstructural elements.

5.16 Use of zinc-coated carbon steel anchors is limited to dry, interior locations.

5.17 Use of $^1/_4$-inch, $^3/_8$-inch, and ½-inch (6.4 mm, 9.5 mm, and 12.7 mm) HDI-P TZ and $^3/_8$-inch (12.7 mm) HDI-TZ anchors are limited to supporting non-structural components.

5.18 Anchors are manufactured under an approved quality-control program with inspections by ICC-ES.

5.19 Special inspection must be provided in accordance with Section 4.4.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC193), dated October 2017 (editorially revised April 2024), which incorporates requirements in ACI 355.2 (-19 and -07) for use in cracked and uncracked concrete.

6.2 Reports of tension and shear tests of anchors in hollow-core concrete panels in accordance with ASTM E488 and applicable sections of ACI 355.2 (-19 and -07) which are referenced under the ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC193) in Section 6.1 of this report.

6.3 Quality-control documentation.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4236) along with the name, registered trademark, or registered logo of the report holder must be included in the product label

7.2 In addition, the anchors are identified by packaging labeled with the company name (Hilti, Inc.) and contact information, anchor name, and anchor size.

7.3 The report holder's contact information is as follows:

HILTI, INC.
7250 DALLAS PARKWAY, SUITE 1000
PLANO, TEXAS 75024
(800) 879-8000
www.hilti.com

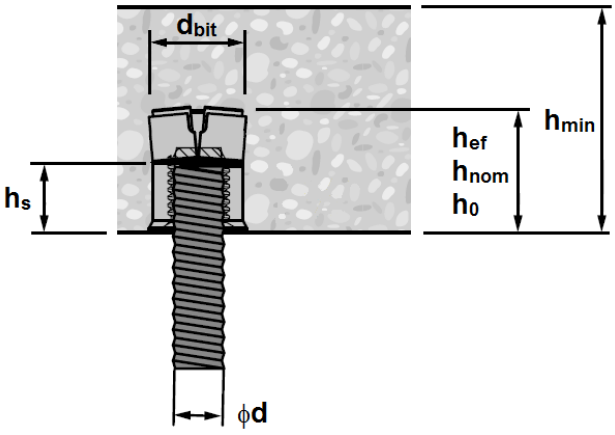


FIGURE 1—HILTI HDI-P TZ INSTALLATION PARAMETERS IN CONCRETE

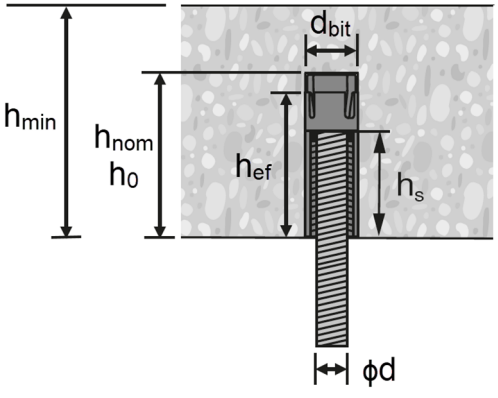


FIGURE 2—HILTI HDI-TZ INSTALLATION PARAMETERS IN CONCRETE

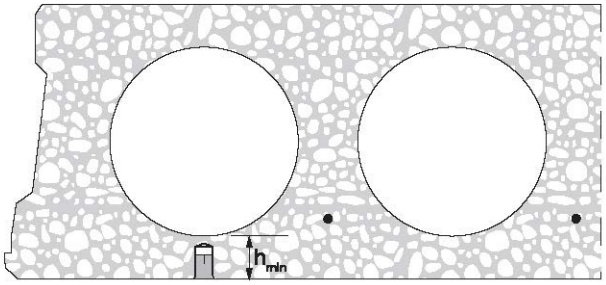


FIGURE 3 – HILTI HDI-P TZ INSTALLATION PARAMETERS IN HOLLOW CORE CONCRETE PANELS

TABLE 1—HILTI HDI-P TZ AND HDI-TZ SETTING INFORMATION

Setting information		Symbol	Units	Nominal anchor size / internal thread diameter (in)							
				HDI-P TZ					HDI-TZ		
				1/4		3/8		1/2	3/8	1/2	5/8
Internal thread diameter		d	in.	1/4		3/8		1/2	3/8	1/2	5/8
Nominal bit diameter		d_{bit}	in.	9/16		9/16		5/8	9/16	5/8	27/32
Effective embedment		h_{ef}	in.	3/4		3/4		1	1.42	1.65	3
			(mm)	(19)		(19)		(25)	(36)	(42)	(76)
Nominal embedment		h_{nom}	in.	3/4		3/4		1	1 9/16	2	3 1/4
			(mm)	(19)		(19)		(25)	(40)	(51)	(83)
Hole depth in base material		h_0	in.	3/4		3/4		1	1 9/16	2	3 1/4
			(mm)	(19)		(19)		(25)	(40)	(51)	(83)
Thread engagement length		h_s	in.	3/16		3/8		1/2	3/8 - 5/8	1/2 - 7/8	5/8 - 1 3/8
			(mm)	(5)		(10)		(13)	(10 – 16)	(13 – 22)	(16 – 35)
Maximum installation torque for threaded element		T_{max}	ft-lb	4.2		5.0		10.4	5.0	10.4	20.8
			(Nm)	(6)		(7)		(14)	(7)	(14)	(28)
Concrete	Minimum base material thickness	h_{min}	in.	2 ½	4	2 ½	4	4	3 1/4	4	6
			(mm)	(64)	(102)	(64)	(102)	(102)	(83)	(102)	(152)
	Minimum edge distance	c_{min}	in.	6	2 ½	6	2 ½	2 ½	3	6	8
			(mm)	(152)	(64)	(152)	(64)	(64)	(76)	(152)	(203)
	Minimum anchor spacing	s_{min}	in.	8	3	8	3	3	6	7	9
			(mm)	(203)	(76)	(203)	(76)	(76)	(152)	(178)	(229)
Hollowcore Concrete Planks	Minimum base material thickness	h_{min}	in.	1 3/8		1 3/8		N/A	N/A	N/A	N/A
			(mm)	(35)		(35)					
	Minimum edge distance	c_{min}	in.	6		6		N/A	N/A	N/A	N/A
			(mm)	(152)		(152)					
	Minimum anchor spacing	s_{min}	in.	8		8		N/A	N/A	N/A	N/A
			(mm)	(203)		(203)					

For **SI:** 1 inch = 25.4 mm, 1 ft-lb = 1.356 Nm

TABLE 2—HDI-P TZ AND HDI-TZ DESIGN INFORMATION

Design information	Symbol	Units	Nominal anchor size / internal thread diameter (in)					
			HDI-P TZ			HDI-TZ		
			1/4	3/8	1/2	3/8	1/2	5/8
Anchor O.D.	d_a	in. (mm)	0.561 (14.2)	0.561 (14.2)	0.625 (15.9)	0.561 (14.2)	0.625 (15.9)	0.844 (21.4)
Effective embedment	h_{ef}	in. (mm)	3/4 (19)	3/4 (19)	1 (25)	1.42 (36)	1.65 (42)	3 (76)
Tension - Steel Failure Mode								
Strength reduction factor for steel in tension [1,2]	$\phi_{sa,N}$	-	0.65					
Min. specified yield strength	f_{ya}	psi (N/mm^2)	70,400 (485)	70,400 (485)	70,400 (484)	79,600 (549)	70,400 (485)	58,000 (400)
Min. specified ult. strength	f_{uta}	psi (N/mm^2)	88,000 (607)	88,000 (607)	88,000 (607)	99,500 (686)	88,000 (607)	72,500 (500)
Effective-cross sectional steel area in tension	$A_{se,N}$	in^2 (mm^2)	0.071 (45.8)	0.071 (45.8)	0.072 (46.5)	0.058 (37.4)	0.068 (43.9)	0.169 (109.0)
Nominal steel strength in tension	N_{sa}	lb (kN)	2000 (8.9)	6,250 (27.8)	6,335 (28.2)	5,770 (25.7)	5,985 (26.6)	12,255 (54.5)
Tension - Concrete Failure Modes								
Anchor category	-	-	1					
Strength reduction factor for concrete failure in tension [2]	$\phi_{c,N}$	-	0.40				0.65	
Effectiveness factor for uncracked concrete	k_{uncr}	in-lb (SI)	24 (10.0)				27 (11.3)	24 (10.0)
Effectiveness factor for cracked concrete	k_{cr}	in-lb (SI)	17 (7.1)		21 (8.8)		24 (10.0)	21 (8.8)
Modification factor for anchor resistance, tension, uncracked conc. [3]	$\psi_{c,N}$	-	1.0					
Critical edge distance	c_{ac}	in. (mm)	6 1/2 (165)	6 1/2 (165)	4 (102)	5 1/2 (140)	6 1/2 (165)	12 (305)
Pullout strength in uncracked concrete [4]	$N_{p,uncr}$	lb (kN)	N/A					
Pullout strength in cracked concrete [4]	$N_{p,cr}$	lb (kN)	470 (2.1)	470 (2.1)	910 (4.0)	N/A		
Pullout strength in cracked concrete, seismic [4]	$N_{p,eq}$	lb (kN)	465 (2.1)	465 (2.1)	820 (3.6)	N/A		
Shear - Steel Failure Mode								
Strength reduction factor for steel in shear [1,2]	$\phi_{sa,V}$	-	0.60					
Nominal steel strength in shear	V_{sa}	lb (kN)	975 (4.3)	975 (4.3)	3,800 (16.9)	3,465 (15.4)	3,590 (16.0)	7,350 (32.7)
Nominal steel strength in shear, seismic	$V_{sa,eq}$	lb (kN)	975 (4.3)	975 (4.3)	2,385 (10.6)	2,355 (10.5)	2,600 (11.6)	5,265 (23.4)
Shear - Concrete Failure Modes								
Strength reduction factor for concrete breakout failure in shear [2]	$\phi_{c,V}$	-	0.45				0.70	
Effectiveness factor for pryout	k_{cp}	-	1.0					2.0
Tension - Axial Stiffness								
Mean axial stiffness [5] Uncracked concrete	β_{uncr}	lbf/in.	164,365	164,365	95,620	65,420	111,055	101,960
Mean axial stiffness [5] Cracked concrete	β_{cr}	lbf/in.	48,895	48,895	35,050	66,485	40,450	84,940

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 N/mm^2.

[1] The HDI-P TZ and HDI-TZ anchors are considered a brittle steel element as defined by ACI 318 (-19 and -14) 2.3, as applicable.

[2] 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 or ACI 318-14 17.3.3, as applicable, are met. For concrete failure modes with h_{ef} < 1.5-inch (40mm), no increase for Condition A (supplementary reinforcement present) is permitted.

[3] For all design cases, $\psi_{c,N}$ = 1.0. The appropriate effectiveness factor for cracked concrete (k_{cr}) or uncracked concrete (k_{uncr}) must be used.

[4] For all design cases, $\psi_{c,P}$ = 1.0. Tabular value for pullout strength is for a concrete compressive strength of 2,500 psi (17.2 MPa). Pullout strength for concrete compressive strength greater than 2,500 psi (17.2 MPa) may be increased by multiplying the tabular pullout strength by $(f'_c / 2{,}500)^{0.35}$ for psi or $(f'_c / 17.2)^{0.35}$ for MPa. N/A (not applicable) denotes that pullout strength does not need to be considered for design.

[5] Mean values shown. Actual stiffness varies considerably depending on concrete strength, loading, and geometry of application.

TABLE 3—SPECIFICATIONS AND PHYSICAL PROPERTIES OF COMMON CARBON STEEL THREADED ROD ELEMENTS

Threaded rod specification	Units	Min. specified ultimate strength f_{uta}	Min. specified yield strength, 0.2 percent offset, f_{ya}	f_{uta} / f_{ya}	Elongation, min. percent	Reduction of area, min. percent	Specification for nuts [2]
Carbon steel: ASTM A36 / A36M [1]	psi (MPa)	58,000 (400)	36,000 (248)	1.61	23	40	ASTM A194 or ASTM A563

For **SI:** 1 inch = 25.4 mm, 1 psi = 0.006895 N/mm^2.

[1] *Standard Specification for Carbon Structural Steel.*
[2] Nuts of other grades and styles having specified proof load stresses greater than the specified grade and style are also suitable.

TABLE 4—STEEL DESIGN INFORMATION FOR THREADED ELEMENTS USED WITH HDI-P TZ AND HDI-TZ ANCHORS [1,2,3]

Design Information		Symbol	Units	Nominal anchor size / internal thread diameter (in)			
				$^1/_4$	$^3/_8$	$^1/_2$	$^5/_8$
Nominal rod diameter		d_{rod}	in. (mm)	0.250 (6.4)	0.375 (9.5)	0.500 (12.7)	0.625 (15.9)
Rod effective cross-sectional area		$A_{se,rod}$	in^2 (mm^2)	0.0318 (21)	0.0775 (50)	0.1419 (92)	0.2260 (146)
ASTM A36 Steel Material	Strength reduction factor for steel in tension[4]	$\phi_{sa,rod,N}$	-	0.75			
	Nominal steel strength in tension	$N_{sa,rod}$	lb (kN)	1,845 (8.2)	4,495 (20.0)	8,230 (36.6)	13,110 (58.3)
	Nominal steel strength in tension, seismic	$N_{sa,rod,eq}$	lb (kN)	1,845 (8.2)	4,495 (20.0)	8,230 (36.6)	13,110 (58.3)
	Strength reduction factor for steel in shear[4]	$\phi_{sa,rod,V}$	-	0.65			
	Nominal steel strength in shear	$V_{sa,rod}$	lb (kN)	1,105 (4.9)	2,695 (12.0)	4,940 (22.0)	7,865 (35.0)
	Nominal steel strength in shear, seismic	$V_{sa,rod,eq}$	lb (kN)	775 (3.4)	1,885 (8.4)	3,460 (15.4)	5,505 (24.5)

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 0.006895 N/mm^2.

[1] Values provided for steel element material types, or equivalent, based on minimum specified strengths and calculated in accordance with ACI 318-19 Eq. (17.6.1.2) and Eq. (17.7.1.2b); or ACI 318-14 Eq. (17.4.1.2) and Eq. (17.5.1.2b), as applicable. $V_{sa,eq,rod}$ must be taken as $0.7V_{sa,rod}$.
[2] ϕN_{sa} shall be the lower of $\phi N_{sa,rod}$ or ϕN_{sa} for static steel strength in tension; for seismic loading, $\phi N_{sa,eq}$ shall be the lower of $\phi N_{sa,rod,eq}$ or $\phi N_{sa,eq}$.
[3] ϕV_{sa} shall be the lower of $\phi V_{sa,rod}$ or ϕV_{sa} for static steel strength in shear; for seismic loading, $\phi V_{sa,eq}$ shall be the lower of $\phi V_{sa,rod,eq}$ or $\phi V_{sa,eq}$.
[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 or ACI 318-14 17.3.3, as applicable, are met.

TABLE 5—HDI-P TZ AND HDI-TZ TENSION AND SHEAR DESIGN DATA FOR INSTALLATION IN THE SOFFIT OF 3,000 PSI, LIGHTWEIGHT CONCRETE-FILLED PROFILE STEEL DECK ASSEMBLIES[2,3]

Design Information	Symbol	Units	Nominal Anchor Size / Internal Thread Dia. (in)				
			HDI-P TZ			HDI-TZ	
			1/4	3/8	1/2	3/8	1/2
Effective Embedment[1]	h_{ef}	in.	3/4	3/4	1	1.42	1.65
		(mm)	(19)	(19)	(25)	(36)	(42)
Hole Depth in Base Material	h_o	in.	3/4	3/4	1	1 9/16	2
		(mm)	(19)	(19)	(25)	(40)	(51)
Loads According to Figure 4A							
Minimum Concrete Thickness Over Upper Flute - Lower Flute Installation[4]	$h_{min,deck,lower}$	in.	2	2	2	2	2
		(mm)	(51)	(51)	(51)	(51)	(51)
Minimum Concrete Thickness Over Upper Flute - Upper Flute Installation[4]	$h_{min,deck,upper}$	in.	2	2	2	2 1/2	3 1/4
		(mm)	(51)	(51)	(51)	(64)	(83)
Pullout Strength Uncracked Concrete[5,6]	$N_{p,deck,uncr}$	lb	825	825	1235	1330	1910
		(kN)	(3.7)	(3.7)	(5.5)	(5.9)	(8.5)
Pullout Strength Cracked Concrete[5,6]	$N_{p,deck,cr}$	lb	400	400	935	1165	1695
		(kN)	(1.8)	(1.8)	(4.2)	(5.2)	(7.5)
Pullout Strength Seismic[5,7]	$N_{p,deck,eq}$	lb	395	395	845	1165	1695
		(kN)	(1.8)	(1.8)	(3.8)	(5.2)	(7.5)
Steel Strength in Shear[8]	$V_{sa,deck}$	lb	2995	2995	3425	3210	3590
		(kN)	(13.3)	(13.3)	(15.2)	(14.3)	(16.0)
Steel Strength in Shear, Seismic[7]	$V_{sa,deck,eq}$	lb	2995	2995	2150	2180	2600
		(kN)	(13.3)	(13.3)	(9.6)	(9.7)	(11.6)
Loads According to Figure 4B							
Minimum Concrete Thickness Over Upper Flute - Lower Flute Installation[4]	$h_{min,deck,lower}$	in.	2	2	2	2	2
		(mm)	(51)	(51)	(51)	(51)	(51)
Minimum Concrete Thickness Over Upper Flute - Upper Flute Installation[4]	$h_{min,deck,upper}$	in.	2	2	2	2 1/2	3 1/4
		(mm)	(51)	(51)	(51)	(64)	(83)
Pullout Strength Uncracked Concrete[5,6]	$N_{p,deck,uncr}$	lb	530	530	925	1070	1385
		(kN)	(2.4)	(2.4)	(4.1)	(4.8)	(6.2)
Pullout Strength Cracked Concrete[5,6]	$N_{p,deck,cr}$	lb	255	255	700	940	1235
		(kN)	(1.1)	(1.1)	(3.1)	(4.2)	(5.5)
Pullout Strength Seismic[5,7]	$N_{p,deck,eq}$	lb	250	250	635	940	1235
		(kN)	(1.1)	(1.1)	(2.8)	(4.2)	(5.5)
Steel Strength in Shear[8]	$V_{sa,deck}$	lb	1775	1775	2130	2370	2435
		(kN)	(7.9)	(7.9)	(9.5)	(10.5)	(10.8)
Steel Strength in Shear, Seismic[7]	$V_{sa,deck,eq}$	lb	1775	1775	1335	1610	1765
		(kN)	(7.9)	(7.9)	(5.9)	(7.2)	(7.9)

[1] Installations must comply with Section 4.1.10, Section 4.3, Figure 4A, and Figure 4B of this report.
[2] The values for $\Phi_{p,N}$ in tension can be found in Table 2 of this report. The values for $\Phi_{sa,V}$ in shear can be found in Table 2 of this report.
[3] Evaluation of concrete breakout capacity in accordance with ACI 318-19 17.6.2, 17.7.2, and 17.7.3 or ACI 318-14 17.4.2, 17.5.2, and 17.5.3, as applicable, is not required for anchors installed in the deck soffit.
[4] Minimum concrete thickness refers to concrete thickness above upper flute. See Figures 4A and 4B.
[5] Characteristic pullout resistance for concrete compressive strengths greater than 3,000 psi (20.7 MPa) may be increased by multiplying the value in the table by $(f'_c / 3{,}000)^{0.35}$ for psi or $(f'_c / 20.7)^{0.35}$ for MPa.
[6] The values listed must be used in accordance with Section 4.1.4 of this report.
[7] The values listed must be used in accordance with Sections 4.1.4 and 4.1.8 of this report.
[8] The values listed must be used in accordance with Section 4.1.5 of this report.

TABLE 6— HDI-TZ SETTING INFORMATION FOR INSTALLATION ON THE TOP OF CONCRETE-FILLED PROFILE STEEL DECK ASSEMBLIES ACCORDING TO FIGURE 4C

Design Information	Symbol	Units	Nominal anchor size / internal thread dia. (in)	
			$^1/_2$	$^5/_8$
Effective Embedment Depth	h_{ef}	in.	1.65	3
		(mm)	(42)	(76)
Nominal Embedment Depth	h_{nom}	in.	2	3 1/4
		(mm)	(51)	(83)
Minimum Hole Depth	h_o	in.	2	3 1/4
		(mm)	(51)	(83)
Minimum Concrete Thickness[4]	$h_{min,deck}$	in.	2 1/2	3 1/4
		(mm)	(64)	(83)
Critical Edge Distance	$c_{ac,deck,top}$	in.	6.50	16
		(mm)	(165)	(406)
Minimum Edge Distance	$c_{min,deck,top}$	in.	2	2
		(mm)	(51)	(51)
Minimum Spacing	$s_{min,deck,top}$	in.	4	4
		(mm)	(102)	(102)

[1] Installations must comply with Section 4.1.10, Section 4.3, and Figure 4C of this report.
[2] Design capacity shall be based on calculations according to values in Table 2 of this report.
[3] Applicable for $h_{min,deck} < h_{min,Table\ 1}$. For $h_{min,deck} > h_{min,Table\ 1}$, use setting information in Table 1 and critical edge distances in Table 2 of this report.
[4] Minimum concrete thickness refers to concrete thickness above the upper flute. See Figure 4C.

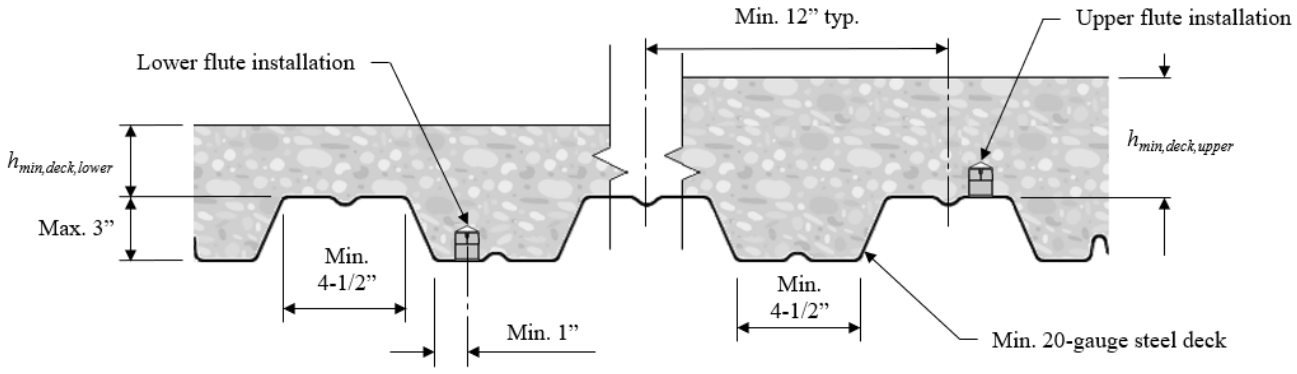


FIGURE 4A – HDI-P TZ AND HDI-TZ IN THE SOFFIT OF CONCRETE FILLED PROFILE STEEL DECK ASSEMBLIES – W DECK

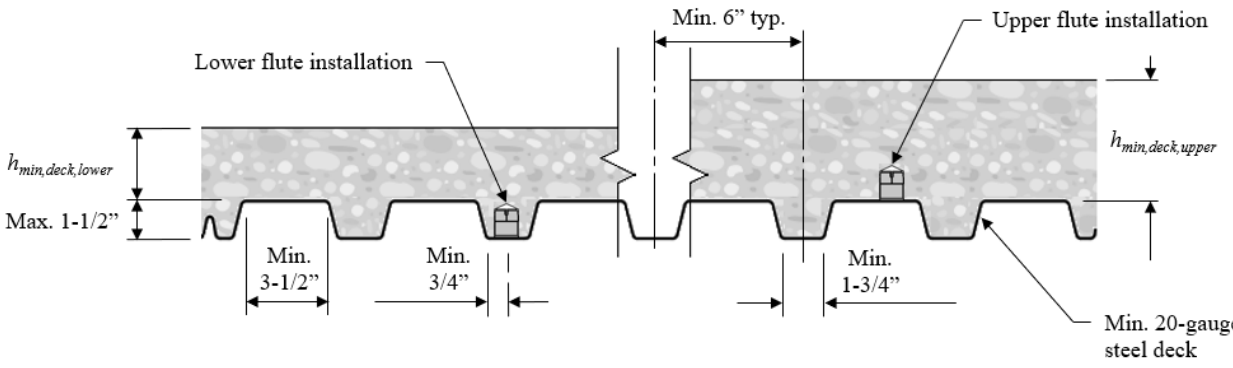


FIGURE 4B – HDI-P TZ AND HDI-TZ IN THE SOFFIT OF CONCRETE FILLED PROFILE STEEL DECK ASSEMBLIES – B DECK

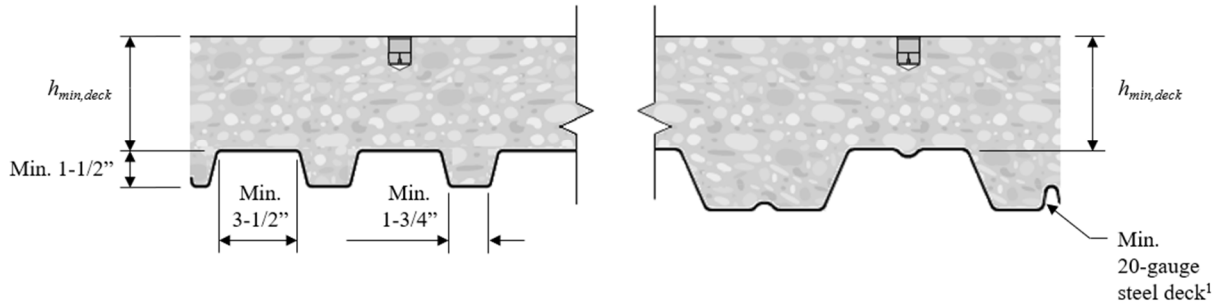


FIGURE 4C – HDI-TZ IN THE TOP OF CONCRETE FILLED PROFILE STEEL DECK ASSEMBLIES

[1] 1-1/2 inches (38mm) B-deck as a minimum profile size. Other deck profiles meeting the B-deck minimum dimensions are also permitted.

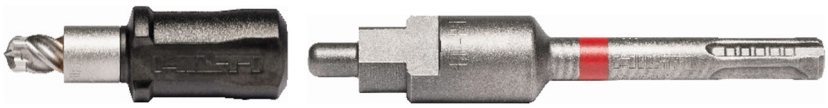
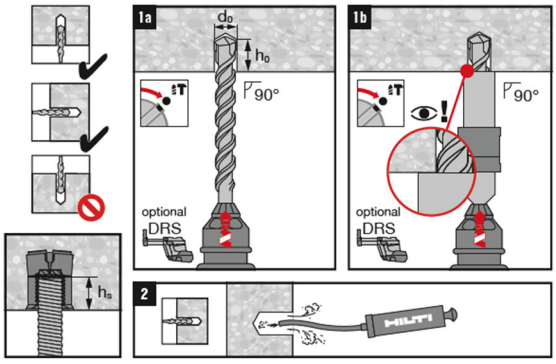
Hilti HDI-P TZ and HDI-TZ anchor	
Optional Dust Removal (DRS) module for drilling for use with Hilti hammer drills	
Hilti HDI-P TZ and HDI-TZ stop drill bit with automatic setting tool combination for use with hammer drill	
Hilti HDI-P TZ and HDI-TZ manual setting tool for use with hammer	

FIGURE 5—HILTI HDI-P TZ AND HDI-TZ ANCHOR, DRILLING, AND SETTING TOOLS

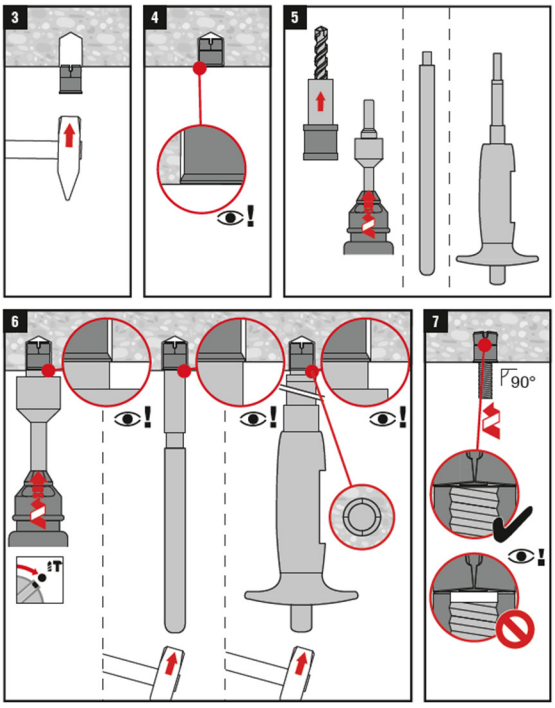
HDI-P TZ

2400468-01.2024

Specification	¼"	⅜"	½"
Hole Diameter d_0	9/16"	9/16"	5/8"
Rod size	¼"	⅜"	½"
Thread engagement h_s	~3/16" (4.5 mm)	~⅜" (10 mm)	~½" (13 mm)
Drilling deph h_0	¾"	¾"	1"
Max. Installation torque T_{inst}	4.2 ft-lb (5 Nm)	5 ft-lb (7 Nm)	10.4 ft-lb (14 Nm)
Hand Setting tools	HST-P TZ ¼" HSD-G-P TZ ¼"	HST-P TZ ⅜" HSD-G P TZ ⅜"	HST-P TZ ½" HSD-G P TZ ½"
2-in-1 Setting tools	Setting tool HDI-P TZ ¼"	Setting tool HDI-P TZ ⅜"	Setting tool HDI-P TZ ½"



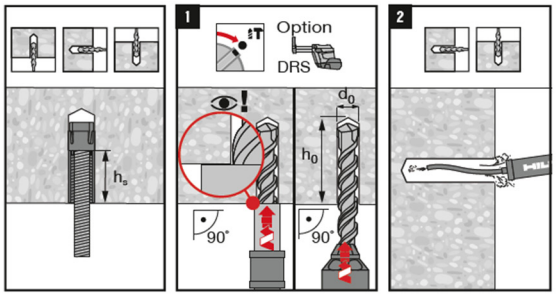
HDI-P TZ



HDI-TZ

2368343-01.2024

Specification	⅜"	½"	5/8"
Hole Diameter d_0	9/16"	5/8"	27/32"
Rod size	⅜"	½"	5/8"
Fixture hole diameter d_{fix}	7/16"	9/16"	11/16"
Thread engagement h_s	~⅜–5/8" (10–16 mm)	~½–7/8" (13–22 mm)	~ 5/8–1⅜" (16–35 mm)
Drilling deph h_0	1 9/16"	2"	3¼"
Max. Installation torque T_{inst}	5 ft-lb (7 Nm)	10.4 ft-lb (14 Nm)	20.8 ft-lb (28 Nm)
Hand Setting tools	HST TZ ⅜" HSD-G TZ ⅜"	HST TZ ½" HSD-G TZ ½"	HST TZ 5/8" HSD-G TZ 5/8"
2-in-1 Setting tools	Setting tool HDI TZ ⅜"	Setting tool HDI TZ ½"	Stop drillbit HDI-TZ 5/8" Setting tool HDI-TZ 5/8"



HDI-TZ

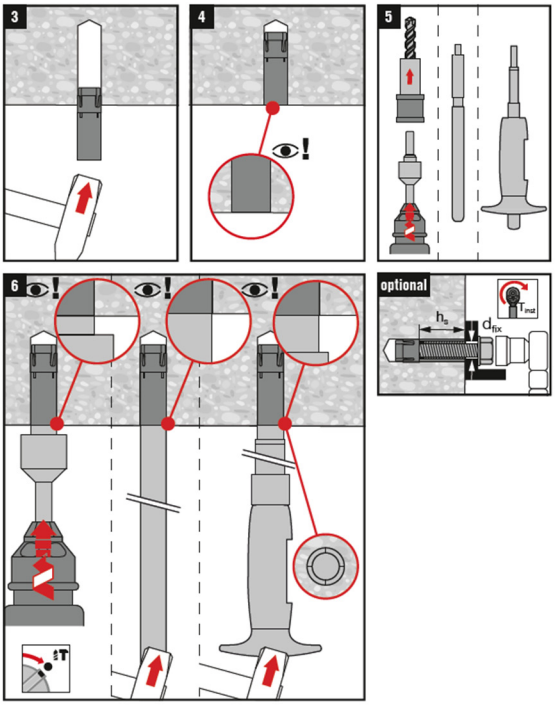


FIGURE 6—INSTALLATION INSTRUCTIONS

DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-Installed Concrete Anchors

REPORT HOLDER:

HILTI, INC.

EVALUATION SUBJECT:

HILTI HDI-P TZ AND HDI-TZ ANCHORS IN CRACKED AND UNCRACKED CONCRETE

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Hilti HDI-P TZ and HDI-TZ anchors in cracked and uncracked concrete, described in ICC-ES evaluation report ESR-4236, have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2023 *City of Los Angeles Building Code* (LABC)
- 2023 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The Hilti HDI-P TZ and HDI-TZ anchors, described in Sections 2.0 through 7.0 of the evaluation report ESR-4236, comply with LABC Chapter 19, and the LARC, and are subjected to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The Hilti HDI-P TZ and HDI-TZ anchors described in this evaluation report supplement must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-4236.
- The design, installation, conditions of use and identification of the anchors are in accordance with the 2021 *International Building Code®* (IBC) provisions noted in the evaluation report ESR-4236.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, and City of Los Angeles Information Bulletin P/BC 2020-092, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.
- The allowable and strength design values listed in the evaluation report and tables are for the connection of the anchors to the concrete. The connection between the anchors and the connected members shall be checked for capacity (which may govern).

This supplement expires concurrently with the evaluation report, reissued July 2023 and revised May 2024.

DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

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Purpose:

The purpose of this evaluation report supplement is to indicate that the Hilti HDI-P TZ and HDI-TZ anchors in cracked and uncracked concrete, described in ICC-ES evaluation report ESR-4236, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2023 *Florida Building Code—Building*
- 2023 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Hilti HDI-P TZ and HDI-TZ anchors in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-4236, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*. The design requirements must be determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-4236 for the 2021 *International Building Code®* meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable.

Use of the Hilti HDI-P TZ and HDI-TZ anchors in cracked and uncracked concrete have also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential*, with the following condition:

a) For anchorage to wood members, the connection subject to uplift, must be designed for no less than 700 pounds (3114 N).

For products falling under Florida Rule 61G20-3, verification that the report holder's quality-assurance program is audited by a quality-assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued July 2023 and revised May 2024.