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CALIFORNIA

DEPARTMENT OF
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RESEARCH REPORT: RR 25867
(CSI # 03151)

BASED UPON ICC EVALUATION SERVICE
REPORT NO. ESR-2427

REEVALUATION DUE DATE:
September 1, 2011
Issued Date: September 1, 2010
Code: 2008 LABC

GENERAL APPROVAL – ITW Red Head TruBolt+ Wedge Anchors and Sammys TruBolt+ Wedge Anchors for Cracked and Uncracked Concrete

DETAILS

The above assemblies and/or products are approved when in compliance with the description, use, identification and findings of Report No.ESR-2427, reissued July 1, 2010, of the ICC Evaluation Service, Incorporated. The report, in its entirety, is attached and made part of this general approval.

The parts of Report No.ESR-2427 marked by the asterisks have been removed by the Los Angeles Building Department from this approval.

The approval is subjected to the following conditions:

1. The allowable and strength design values listed in the attached report and tables are for the fasteners only. Connected members shall be checked for capacity (which may govern).

2. The anchors shall be identified by labels on the packaging indicating the manufacturer's name and product designation.

3. The anchors shall be installed as per the attached manufacturer's instructions except as otherwise stated in this report. Copies of the installation instructions shall be available at each job site.

4. Design values and minimum embedment requirements shall be per Tables in ICC-ES Report No. ESR-2427.

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

6. Special inspection in accordance with Section 91.1704 of the 2008 Los Angeles City Building Code shall be provided for anchor installations.

7. The use of anchors is limited to dry interior locations.

8. Calculations demonstrating that the applied loads or factored loads are less than the allowable load values or design strength level values respectively, described in this report shall be submitted to the plan check Engineer at the time of permit application. The calculations shall be prepared by a Civil or Structural Engineer registered in the State of California.

DISCUSSION

The report is in compliance with 2008 Los Angeles Building Code.

The approval is based on tests in accordance with ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC193), dated February 2010, for use in cracked and uncracked concrete; including optional test for seismic tension and shear; profile steel deck soffit tests; and quality control documentation.

This general approval will remain effective provided the Evaluation Report is maintained valid and unrevised with the issuing organization. Any revision to the report must be submitted to this Department for review with appropriate fee to continue the approval of the revised report.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

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Attachment: ICC ES Report No. ESR-2427 (13 Pages)

ICC-ES Evaluation Report

ESR-2427

Reissued July 1, 2010

This report is subject to re-examination in one year.

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DIVISION: 03—CONCRETE
Section: 03151—Concrete Anchoring

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EVALUATION SUBJECT:

ITW RED HEAD TRUBOLT+ WEDGE ANCHORS AND SAMMYS TRUBOLT+ WEDGE ANCHORS FOR CRACKED AND UNCRACKED CONCRETE

1.0 EVALUATION SCOPE

Compliance with the following codes:

* ■ ~~2009 *International Building Code*® (2009 IBC)~~
■ ~~2009 *International Residential Code*® (2009 IRC)~~
■ 2006 *International Building Code*® (2006 IBC)
* ■ ~~2006 *International Residential Code*® (2006 IRC)~~
■ ~~2003 *International Building Code*® (2003 IBC)~~
■ ~~2003 *International Residential Code*® (2003 IRC)~~
■ ~~1997 *Uniform Building Code*™ (UBC)~~

Property evaluated:

Structural

2.0 USES

The Trubolt+ Wedge Anchors with diameters of $^3/_8$ inch (9.5mm), $^1/_2$ inch (12.7mm), $^5/_8$ inch (15.9mm) and $^3/_4$ inch (19.1mm) are used to resist static, wind, and seismic tension and shear loads in cracked and uncracked normal-weight and structural sand-lightweight concrete having a specified compressive strength, f'_c, ranging from 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa). The Trubolt+ Wedge Anchors with diameters of $^3/_8$ inch (9.5mm), $^1/_2$ inch (12.7mm) and $^5/_8$ inch (15.9mm) are used to resist static, wind, and seismic tension and shear loads in cracked and uncracked normal-weight or structural sand-lightweight concrete over steel deck having a minimum specified compressive strength, f'_c, of 3,000 psi (20.7 MPa).

The Trubolt+ Wedge anchors comply with requirements for anchors installed in hardened concrete as described in
* Section 1912 of ~~the 2009 and~~ 2006 IBC ~~and Section 1913 of the 2003 IBC~~. The anchors are alternatives to cast-in-place anchors described in Section 1911 of ~~the 2009 and~~ 2006 IBC, ~~Section 1912 of the 2003 IBC and Sections~~
* ~~1923.1 and 1923.2 of the UBC. 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 RED HEAD Trubolt+ Wedge Anchor:

The RED HEAD Trubolt+ Wedge Anchor is a torque-controlled, wedge-type mechanical expansion anchor, available in $^3/_8$-inch (9.5 mm), $^1/_2$-inch (12.7 mm), $^5/_8$-inch (15.9 mm) and $^3/_4$-inch (19.1 mm) diameters. The Trubolt+ Wedge Anchor consists of a high-strength threaded anchor body, expansion clip, hex nut and washer. The anchor body is cold-formed from low carbon steel materials with mechanical properties (yield and ultimate strengths) as described in Table 3 of this report. The zinc plating on the stud complies with ASTM B 633 SC1, Type III, with a minimum 0.0002-inch (5 µm) thickness. The expansion clip is fabricated from low carbon steel materials. The standard hexagonal steel nut conforms to ANSI B18.2.2-65 and the washer conforms to ANSI/ASME B18.22.1 1965 (R1981). The Trubolt+ Wedge anchor body consists of a threaded section throughout the majority of its length and a wedge section at the far end. The expansion clip is formed around the anchor, just above the wedge. The expansion clip consists of a split cylindrical ring with undercutting grooves at the bottom end. During torquing of the anchor, the grooves in the expansion clip are designed to cut into the walls of the concrete hole as the wedge portion of the stud is forced upward against the interior of the clip. The Trubolt+ Wedge anchor is illustrated in Figure 1 of this report.

3.2 Sammys Trubolt+ Wedge Anchor:

The Sammys Trubolt+ Wedge Anchor is a torque-controlled, wedge-type mechanical expansion anchor, available in $^3/_8$-inch (9.5 mm) diameter. The Sammys

* Deleted by City of Los Angeles

Trubolt+ Wedge Anchor consists of a high-strength threaded stud, expansion clip, coupling nut and washer. The anchor stud is cold-formed from low carbon steel materials with the mechanical properties (yield and ultimate strengths) as described in Tables 3 and 4 of this report. The zinc plating on the anchor body complies with ASTM B633 SC1, Type III, with a minimum 0.0002 inch (5 µm) thickness. The expansion clip is fabricated from low carbon steel materials. The coupling nut consists of grade 2 steel with $^3/_8$" -16 threads throughout the length of the nut. The washer complies with ANSI/ASME B18.22.1 1965 (R1981). The Sammys Trubolt+ Wedge anchor body consists of a threaded section throughout the majority of its length and a wedge section at the far end. The expansion clip is formed around the anchor, just above the wedge. The expansion clip consists of a split cylindrical ring with undercutting grooves at the bottom end. During torquing of the anchor (using coupling nut), the grooves in the expansion clip are designed to cut into the walls of the concrete hole as the wedge portion of the stud is forced upward against the interior of the clip. The Sammys Trubolt+ Wedge anchor is illustrated in Figure 2 of this report.

3.3 Concrete:

Normal-weight and structural sand-lightweight concrete must comply with Sections 1903 and 1905 of the IBC ~~and UBC, as applicable~~.

3.4 Steel Deck Panels:

Steel deck panels must comply with ASTM A 653, SS Grade 40 (minimum), and must have a minimum 0.034-inch (0.864 mm) base-metal thickness (No. 20 gage).

4.0 DESIGN AND INSTALLATION

4.1 Strength Design:

4.1.1 General: ~~Design strength of anchors in accordance with the 2009 IBC, 2003 IBC, and the UBC, as well as Section 301.1.3 of the 2009 IRC and 2003 IRC, must be determined in accordance with ACI 318-08 Appendix D and this report~~. Design strength of anchors in accordance with the 2006 IBC ~~and 2006 IRC~~ must be in accordance with ACI 318-05 Appendix D and this report. ~~Design parameters are based on the 2009 IBC (ACI 318-08) unless noted otherwise in Sections 4.1.1 through 4.1.12 of this report~~. The strength design of anchors must comply with ACI 318 D.4.1, except as required in ACI 318 D.3.3. Strength reduction factors, ϕ, as given in ACI 318 D.4.4, must be used for load combinations calculated in accordance with Section 1605.2.1 of the IBC, Section 9.2 of ACI 318, ~~or Section 1612.2. of the UBC~~. Strength reduction factors, ϕ, as given in ACI 318 D.4.5, must be used for load combinations calculated in accordance with ACI 318 Appendix C ~~or Section 1909.2 of the UBC~~. The value of f'_c used in calculations must be limited to 8,000 psi (55.2 MPa), maximum, in accordance with ACI 318 D.3.5. Strength reduction factors, ϕ, corresponding to ductile steel elements may be used except for the $^3/_8$-inch-diameter (9.5 mm) anchors loaded in shear, which have a strength reduction factor corresponding to brittle steel elements.

4.1.2 Requirements for Static Steel Strength in Tension, N_{sa}: The nominal static steel strength of a single anchor in tension, N_{sa}, calculated in accordance with ACI 318, Section D.5.1.2, is given in Table 3 of this report.

4.1.3 Requirements for Static Concrete Breakout Strength in Tension, N_{cb}, N_{cbg}: The nominal concrete breakout strength of a single anchor or a group of anchors in tension, N_{cb} or N_{cbg} respectively, must be calculated in accordance with ACI 318 D.5.2, with modifications as described in this section. The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.0 MPa). The basic concrete breakout strength of a single anchor in tension, N_b, must be calculated in accordance with ACI 318 D.5.2.2, using the values of h_{ef} and k_{cr} as given in Table 3 of this report. The nominal concrete breakout strength in tension in regions where analysis indicates no cracking in accordance with ACI 318 D.5.2.6 must be calculated with $\psi_{c,N} = 1.0$ and using the value of k_{uncr} as given in Table 3 of this report.

For anchors installed in the soffit of structural sand-lightweight or normal-weight concrete-filled steel deck floor and roof assemblies, as shown in Figure 6, calculation of the concrete breakout strength in accordance with ACI 318 D.5.2 is not required.

4.1.4 Requirements for Static Pullout Strength in Tension, N_{pn}: The nominal pullout strength of a single anchor in tension in accordance with ACI 318 D.5.3 in cracked and uncracked concrete, $N_{p,cr}$ or $N_{p,uncr}$, respectively, is given in Table 3 of this report. For all design cases, $\psi_{c,P} = 1.0$. In accordance with ACI 318 D.5.3.2, the nominal pullout strength in tension must be calculated according to Eq-1.

$$N_{p,f`c} = N_{p,cr}\sqrt{\frac{f`_c}{2{,}500}} \quad \text{(lb, psi)} \qquad \text{(Eq-1)}$$

$$N_{p,f`c} = N_{p,cr}\sqrt{\frac{f`_c}{17.2}} \quad \text{(N, MPa)}$$

In regions where analysis indicates no cracking in accordance with ACI 318 D.5.3.6, the nominal pullout strength in tension must be calculated according to Eq-2:

$$N_{p,f`c} = N_{p,uncr}\sqrt{\frac{f`_c}{2{,}500}} \quad \text{(lb, psi)} \qquad \text{(Eq-2)}$$

$$N_{p,f`c} = N_{p,uncr}\sqrt{\frac{f`_c}{17.2}} \quad \text{(N, MPa)}$$

Where values for $N_{p,cr}$ or $N_{p,uncr}$ are not provided in Table 3 of this report, the pullout strength in tension need not be evaluated.

The nominal pullout strength in tension of the anchors installed in the soffit of structural sand lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figure 6 of this report, is given in Table 7. In accordance with ACI 318 D.5.3.2, the nominal pullout strength in cracked concrete must be calculated according to Eq-1, whereby the value of $N_{p,deck,cr}$ must be substituted for $N_{p,cr}$ and the value 3,000 psi or 20.7 MPa must be substituted for 2,500 psi or 17.2 MPa. In regions where analysis indicates no cracking in accordance with ACI 318 D.5.3.6, the nominal pullout strength in tension 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 3,000 psi or 20.7 MPa must be substituted for 2,500 psi or 17.2 MPa.

4.1.5 Requirements for Static Steel in Shear, V_{sa}: The values of V_{sa} for a single anchor given in Table 4 of this report must be used in lieu of the values of V_{sa} derived by calculation according to ACI 318 D.6.1.2.

The shear strength, $V_{sa,deck}$, of anchors installed in the soffit of structural sand lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figure 6 of this report, is given in Table 7 of this report.

4.1.6 Requirements for Static Concrete Breakout Strength in Shear, V_{cb} or V_{cbg}: The nominal static concrete breakout strength in shear of a single anchor or a group of anchors, V_{cb} or V_{cbg}, must be calculated in accordance with ACI 318 D.6.2. The basic concrete breakout strength in shear of a single anchor in cracked concrete, V_b, must be calculated in accordance with ACI 318 D.6.2.2 using the value of d_a, given in Table 2 of this report, and the value l_e, given in Table 4, must be taken no greater than h_{ef}. In no cases must l_e exceed $8d_a$.

For anchors installed in the soffit of structural sand lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figure 6, calculation of the concrete breakout strength in accordance with ACI 318 D.6.2 is not required. *

4.1.7 Requirements for Static Concrete Pryout Strength of Anchor in Shear, V_{cp} or V_{cpg}: The nominal concrete pryout strength in shear of a single anchor or groups of anchors, V_{cp} or V_{cpg}, must be calculated in accordance with ACI 318 D.6.3, modified by using the value of k_{cp} provided in Table 4 of this report and the value of N_{cb} or N_{cbg} as calculated in Section 4.1.3 of this report.

For anchors installed in the soffit of structural sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, as shown in Figure 6 of this report, calculation of the concrete pryout strength in accordance with ACI 318 D.6.3 is not required. *

4.1.8 Requirements for Minimum Member Thickness, Minimum Anchor Spacing and Minimum Edge Distance: Values of c_{min} and s_{min} as given in Table 2 of this report must be used in lieu of ACI 318 D.8.3. Minimum member thicknesses, h_{min}, as given in Tables 2 through 4 of this report, must be used in lieu of ACI 318 D.8.5.

For anchors installed in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, the anchors must be installed in accordance with Figure 6 of this report and the minimum anchor spacing along the flute must be the greater of $3h_{ef}$ or 1.5 times the flute width.

4.1.9 Requirements for Critical Edge Distance and Splitting: 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 according to ACI 318 D.5.2, must be further multiplied by the factor $\Psi_{cp,N}$ given by Eq-3:

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

Whereby the factor $\Psi_{cp,N}$ need not be taken as less than $1.5h_{ef} / c_{ac}$. For all other cases $\Psi_{cp,N} = 1.0$. Values for the critical edge distance c_{ac} must be taken from Table 3 of this report.

4.1.10 Requirements for Seismic Design:

4.1.10.1 General: For load combinations including earthquake, the design must be performed according to ACI 318 D.3.3 as modified by ~~Section 1908.1.9 of the 2009 IBC or~~ Section 1908.1.16 of the 2006 IBC, ~~as follows~~: *

~~CODE~~	~~ACI 318 D.3.3 SEISMIC REGION~~	~~EQUIVALENT CODE DESIGNATION~~
~~2003 IBC and 2003 IRC~~	~~Moderate or high seismic risk~~	~~Seismic Design Categories C, D, E, and F~~
~~UBC~~	~~Moderate or high seismic risk~~	~~Seismic Zones 2B, 3 and 4~~

The nominal steel strength and the nominal concrete breakout strength for anchors in tension, and the nominal concrete breakout strength and pryout strength for anchors in shear, must be calculated according to ACI 318 D.5 and D.6, respectively, taking into account the corresponding values given in Tables 3 and 4 of this report.

The $^1/_2$-inch- (12.7 mm) $^5/_8$-inch (15.9 mm) and $^3/_4$-inch-diameter (19.1 mm) anchors, along with the $^3/_8$-inch-diameter (9.5 mm) anchor loaded in tension, comply with ACI 318 D.1 as ductile steel elements and must be designed in accordance with ~~2009 IBC Section 1908.1.9 D.3.3.4 or D.3.3.5 or~~ 2006 IBC Section 1908.1.16 D.3.3.4 or D.3.3.5. The $^3/_8$-inch-diameter (9.5 mm) anchor loaded in shear must be designed in accordance with ~~2009 IBC Section 1908.1.9 D.3.3.5 or~~ 2006 IBC Section 1908.1.16 D.3.3.5. * *

4.1.10.2 Seismic Tension: The nominal steel strength and nominal concrete breakout strength for anchors in tension must be calculated according to ACI 318 D.5.1 and D.5.2, as described in Sections 4.1.2 and 4.1.3 of this report and in accordance with ACI 318 D.5.3.2. The value for nominal pullout strength tension for seismic loads, N_{eq} or $N_{p,deck,cr}$, given in Table 3 or 7 of this report, must be used in lieu of N_p. The values of N_{eq} must be adjusted for the concrete strength in accordance with Eq-4:

$$N_{eq,f`c} = N_{eq}\sqrt{\frac{f`c}{2{,}500}} \quad \text{(lb, psi)} \qquad \text{(Eq-4)}$$

$$N_{eq,f`c} = N_{eq}\sqrt{\frac{f`c}{17.2}} \quad \text{(N, MPa)}$$

The value of $N_{p,deck,cr}$ must be calculated according to Eq-4, whereby the value 3,000 psi or 20.7 MPa must be substituted for 2,500 psi or 17.2 MPa.

If no values for N_{eq} are given in Table 3, the static design strength values govern. Section 4.1.4 provides additional requirements.

4.1.10.3 Seismic Shear: The nominal concrete breakout strength and pryout strength for anchors in shear must be calculated according to ACI 318 D.6.2 and D.6.3, as described in Sections 4.1.6 and 4.1.7 of this report and in accordance with ACI 318 D.6.1.2. The value for nominal steel strength in shear for seismic loads, V_{eq}, or $V_{sa,deck}$, given in Tables 4 or 7 of this report, must be used in lieu of V_{sa}.

4.1.11 Interaction of Tensile and Shear Forces: For designs that include combined tension and shear, the interaction of tension and shear loads must be calculated in accordance with ACI 318 D.7.

4.1.12 Requirements for Structural Sand Lightweight Concrete: For ACI 318-08, when anchors are used in structural sand-lightweight concrete, the modification factor λ for concrete breakout strength must be taken as 0.6. In addition, the pullout strength $N_{p,uncr}$, and N_{eq} must be multiplied by 0.60, as applicable. For ACI 318-05, the values N_b, N_{eq}, $N_{p,uncr}$, and V_b determined in accordance with this report must be multiplied by 0.60, in lieu of ACI 318 D.3.4. For anchors installed in the soffit of structural sand-lightweight concrete-filled steel deck floor and roof assemblies, this reduction is not required.

4.2 Allowable Stress Design (ASD):

4.2.1 General: For anchors designed using load combinations in accordance with IBC Section 1605.3 ~~or UBC Section 1612.3~~, allowable loads must be established using Eq-5 and Eq-6: *

$T_{allowable,ASD} = \phi N_n / \alpha$ (Eq-5)

and

$V_{allowable,ASD} = \phi V_n / \alpha$ (Eq-6)

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 Appendix D with amendments in Section 4.1 of this report and ~~Section 1908.1.9 of the 2009 IBC or~~ Section 1908.1.16 of the 2006 IBC, ~~as applicable~~.

ϕV_n = Lowest design strength of an anchor or anchor group in shear as determined in accordance with ACI 318 Appendix D with amendments in Section 4.1 of this report and ~~Section 1908.1.9 of the 2009 IBC or~~ Section 1908.1.16 of the 2006 IBC, ~~as applicable~~.

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.

An example of allowable stress design values for illustrative purposes is shown in Table 5 of this report.

4.2.2 Interaction of Tensile and Shear Forces: In lieu of ACI 318 D.7.1, D.7.2 and D.7.3, interaction must be calculated as follows:

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

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

For all other cases, Eq-7 applies:

$$T/T_{allowable,\ ASD} + V/V_{allowable,\ ASD} \leq 1.2 \quad \text{(Eq-7)}$$

4.3 Installation:

Installation parameters are provided in Tables 2 and 6 and Figures 4, 5, and 6 of this report. Anchor locations must comply with this report and the plans and specifications approved by the code official. The Trubolt+ Wedge Anchors must be installed according to ITW's published instructions and this report. Holes must be predrilled in concrete with a compressive strength from 2,500 to 8,500 psi (17.2 to 58.6 MPa) at time of installation, using carbide-tipped masonry drill bits manufactured within the range of the maximum and minimum drill tip dimensions of ANSI Standard B212.15-1994. The nominal drill bit diameter must be equal to that of the anchor size. The minimum drilled hole depth, h_o, must comply with Table 2 of this report. Embedment, spacing, edge distance, and minimum concrete thickness must comply with Table 2. The predrilled holes must be cleaned to remove loose particles, using pressurized air or a vacuum. For the RED HEAD Trubolt+ Wedge Anchor, the hex nut and washer must be assembled on the end of the anchor, leaving the nut flush with the end of the anchor. For the Sammys Trubolt+ Wedge Anchor, the coupling nut and washer must be assembled on the end of the anchor to obtain at least $^1/_2$ inch (12.7 mm) thread engagement on the anchor). The anchors must be hammered into the predrilled hole to the required embedment depth in concrete. Where a fixture is installed, the anchors must be hammered through the fixture into the predrilled hole to the required embedment depth into the concrete. The nut must be tightened against the washer until the specified torque values listed in Table 2 are achieved.

For installation in the soffit of sand-lightweight or normal-weight concrete on steel deck floor and roof assemblies, the hole diameter in the steel deck must not exceed the diameter of the hole in the concrete by more than $^1/_8$ inch (3.2 mm). For member thickness, edge distance, spacing restrictions, and installations torque values for installation into the soffit of sand lightweight or normal-weight concrete on steel deck floor and roof assemblies, see Figure 6, Table 6, and Section 4.1.8 of this report.

4.4 Special Inspection:

Special inspection is required in accordance with ~~Section 1704.15 of the 2009 IBC~~, Section 1704.13 of the 2006 ~~or 2003 IBC and Section 1701.5.2 of the UBC~~. The special inspector must make periodic inspections during anchor installation to verify anchor type, anchor dimensions, concrete type, concrete compressive strength, drill bit type, hole dimensions, hole cleaning procedures, edge distance, anchor spacing, concrete member thickness, anchor embedment, tightening torque, and adherence to the manufacturer's published 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 Trubolt+ Wedge Anchors described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions.

5.1 The anchors must be installed in accordance with ITW's published instructions and this report. In case of conflicts, this report governs.

5.2 Anchor sizes, dimensions, and installation parameters are as set forth in this report.

5.3 The anchors are limited to installation in cracked and uncracked, normal-weight or structural sand-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 anchors may also be installed in cracked and uncracked normal-weight or structural sand-lightweight concrete over profile steel deck having a minimum specified compressive strength, f'_c, of 3,000 psi (20.7 MPa).

5.4 The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.0 MPa).

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

5.6 Allowable design values must be established in accordance with Section 4.2 of this report.

5.7 Anchor spacing, edge distance, and minimum member thickness must comply with Tables 2 and 6 and Figures 4, 5, and 6 of this report.

5.8 Prior to installation, calculations and details justifying that the applied loads comply with this report must be submitted to the code official for approval. 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.

5.9 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.

5.10 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.

5.11 Anchors may be used to resist short-term loading due to wind or seismic forces, subject to the conditions of this report.

5.12 Where not otherwise prohibited in the code, Trubolt+ Wedge 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 that support a fire-resistance-rated envelope or a fire-resistance-rated membrane are protected by approved fire-resistance-rated materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards.
- Anchors are used to support nonstructural elements.

5.13 Use of the anchors is limited to dry, interior locations.

5.14 Special inspections are provided in accordance with Section 4.4 of this report.

5.15 The anchors are manufactured at Elgin, Illinois; Hanover Park, Illinois; Iron Ridge, Wisconsin; Watertown, Wisconsin; Itasca, Illinois; and Michigan City, Indiana; under a quality control program with inspections by PFS Corporation (AA-652).

6.0 EVIDENCE SUBMITTED

Data complying with the ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC193), dated February 2010, for use in cracked and uncracked concrete, including optional tests for seismic tension and shear; profile steel deck soffit tests; and quality control documentation.

7.0 IDENTIFICATION

The anchors are identified by their dimensional characteristics and the anchor size, and by a length identification marking stamped on the anchor, as indicated in Table 1 of this report. The anchors have the length identification marking underlined on the anchor head, as illustrated in Figure 3 of this report, and this is visible after installation for verification. Packages are identified with the anchor name, type and size; the manufacturer's name (ITW Red Head, ITW Brands, or ITW Buildex) and address; the evaluation report number (ICC-ES ESR-2427); and the name of the inspection agency (PFS Corporation).

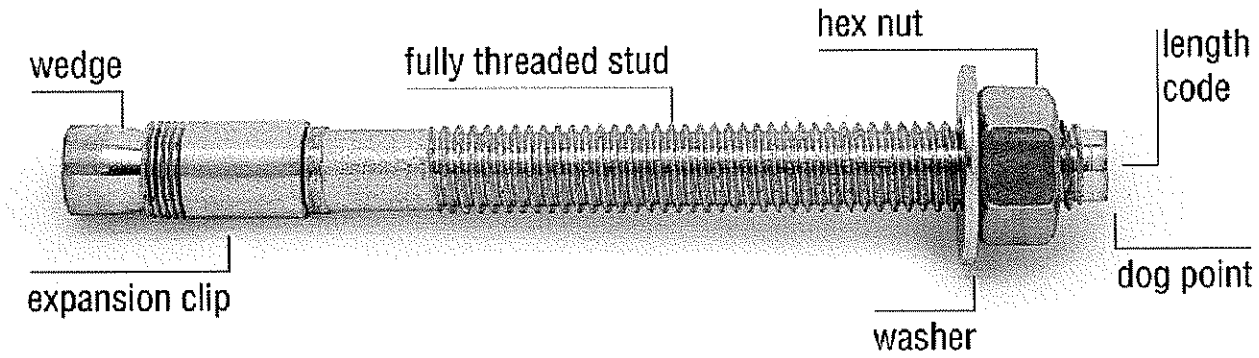

FIGURE 1—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR

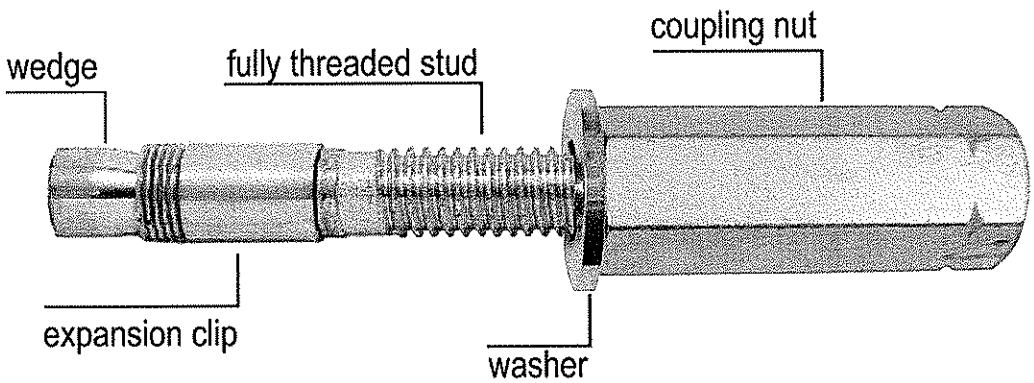

FIGURE 2—SAMMYS TRUBOLT+ WEDGE ANCHOR

TABLE 1—LENGTH IDENTIFICATION MARKINGS[1]

LENGTH (inches)	ID MARKING ON ANCHOR HEAD												
	C	D	E	F	G	H	I	J	K	L	M	N	O
From	2 1/2	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2
Up to, but not including	3	3 1/2	4	4 1/2	5	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9

For **SI:** 1 inch = 25.4 mm.

[1]Figure 3 shows a typical marking.

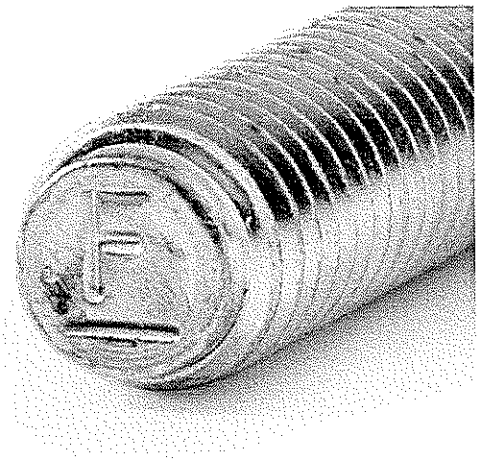

FIGURE 3—TRUBOLT+ WEDGE ANCHOR LENGTH IDENTIFICATION MARKING

TABLE 2—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR AND SAMMYS TRUBOLT+ WEDGE ANCHOR INSTALLATION INFORMATION

PARAMETER	NOTATION	UNITS	NOMINAL ANCHOR DIAMETER (inch)											
			3/8		1/2				5/8		3/4			
Anchor outer diameter	d_a[d_o][2]	inches	0.361		0.5				0.615		0.7482			
Nominal carbide bit diameter	d_{bit}	inches	3/8		1/2				5/8		3/4			
Effective embedment depth	h_{ef}	inches	1 5/8		2		3 1/4		2 3/4	4 1/4	3 3/4			
Minimum anchor embedment depth	h_{nom}	inches	2		2 1/2		3 3/4		3 1/4	4 3/4	4 3/8			
Minimum hole depth[1]	h_o	inches	2 1/4		2 3/4		4		3 1/2	5	4 5/8			
Minimum concrete member thickness[1]	h_{min}	inches	4	5	4	6	6	8	6	6 1/4	7	8		
Critical edge distance[1]	c_{ac}	In.	5	3	6	6	7 1/2	6	7 1/2	6½	12	10		
Minimum anchor spacing[1]	s_{min}	In.	3 1/2	2 1/2	6	5 3/4	4	5 3/4	8	6	6	6		
Minimum edge distance[1]	c_{min}	In.	3		6				7 1/2	5	7 1/2	7 1/2		
Minimum overall anchor length	l	inches	2 1/2		3 3/4		4 1/2		4 1/4	6	5 1/2			
Installation torque	T_{inst}	ft-lb	30		45				90		110			
Minimum diameter of hole in fastened part	d_h	inches	1/2		5/8				3/4		7/8			

For **SI:** 1 inch = 25.4 mm, 1 ft-lb = 1.356 N-m.

[1]For installation in the soffit of concrete on steel deck floor or roof assemblies, see Figure 6. Anchors in the lower and in the upper flute may be installed with a maximum 1-inch offset in either direction from the center of the flute. In addition, anchors must have an axial spacing along the flute equal to the greater of $3h_{ef}$ or 1.5 times the flute width.

[2]The notation in brackets is for the 2006 IBC.

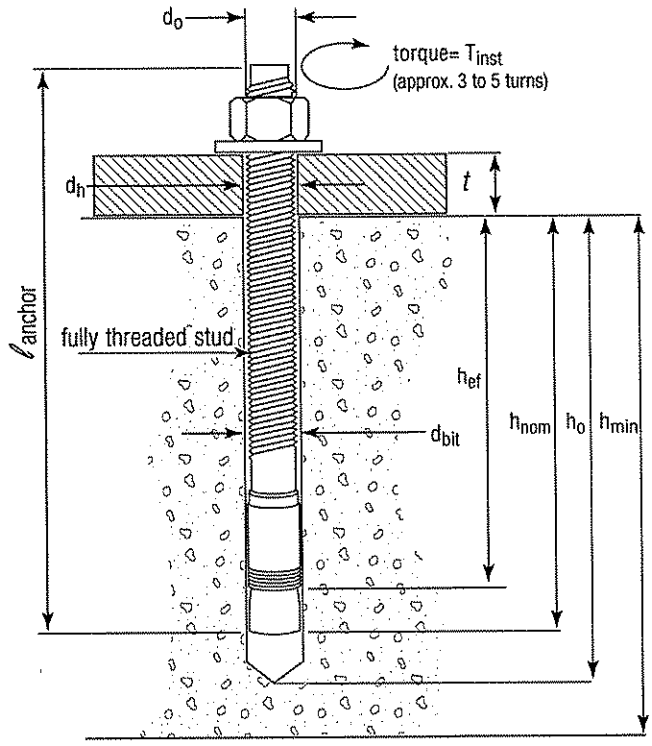

FIGURE 4—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR (INSTALLED)

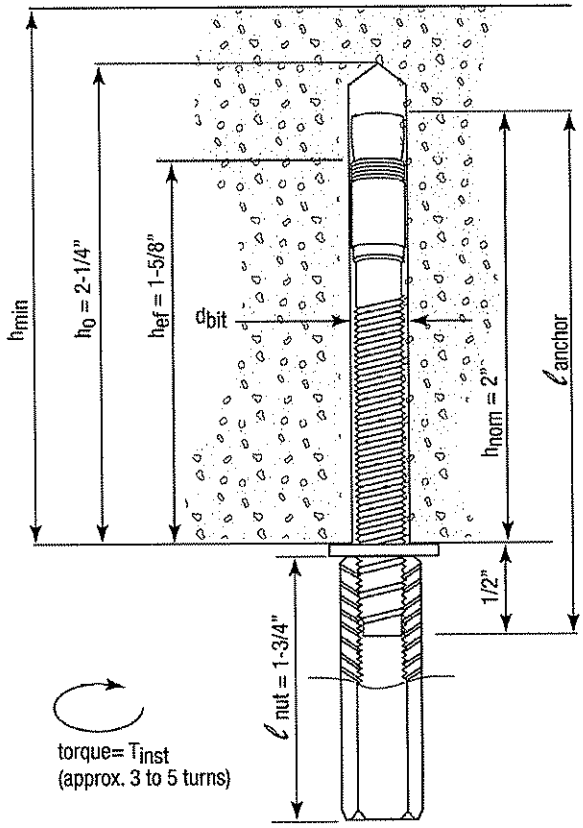

FIGURE 5—SAMMYS TRUBOLT+ WEDGE ANCHOR (INSTALLED), $^3/_8$ INCH NOMINAL ANCHOR DIAMETER (d_o)

TABLE 3—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR AND SAMMYS TRUBOLT+ WEDGE ANCHOR TENSION DESIGN INFORMATION[1,2,3]

CHARACTERISTIC	SYMBOL[7]	UNITS	NOMINAL ANCHOR DIAMETER (inch)[6]									
			3/8		1/2				5/8		3/4	
Anchor category	1, 2 or 3	—	1		1				1		1	
Minimum effective embedment depth	h_{ef}	In.	$1^5/_8$		2		$3^1/_4$		$2^3/_4$	$4^1/_4$	$3^3/_4$	
Minimum concrete member thickness	h_{min}	In.	4	5	4	6	6	8	6	$6^1/_4$	7	8
Critical edge distance	c_{ac}	In.	5	3	6	6	$7^1/_2$	6	$7^1/_2$	$6^1/_2$	12	10
Data for Steel Strengths – Tension												
Minimum specified yield strength	f_y	psi	60,000		55,000				55,000		55,000	
Minimum specified ultimate strength	f_{uta}	psi	75,000		75,000				75,000		75,000	
Effective tensile stress area (neck)	$A_{se,N}$ [A_{se}][9]	in^2	0.056		0.119				0.183		0.266	
Steel strength in tension	N_{sa}	lbf	4,200		8,925				13,725		19,950	
Strength reduction factor ϕ for tension, steel failure modes[4]	ϕ	—	0.75		0.75				0.75		0.75	
Data for Concrete Breakout Strengths in Tension												
Effectiveness factor - uncracked concrete	k_{uncr}	—	24		24				24		24	
Effectiveness factor - cracked concrete	k_{cr}	—	17		17				17		17	
Modification factor for cracked and uncracked concrete[5]	$\Psi_{c,N}$	—	1.0		1.0				1.0		1.0	
Strength reduction factor ϕ for tension, concrete failure modes, Condition B[4]	ϕ	—	0.65		0.65				0.65		0.65	
Data for Pullout Strengths												
Pullout strength, uncracked concrete	$N_{p,uncr}$	lbf	See Footnote 8		See Footnote 8		6,540		5,430	8,900	See Footnote 8	
Pullout strength, cracked concrete	$N_{p,cr}$	lbf	See Footnote 8		See Footnote 8				See Footnote 8		See Footnote 8	
Pullout strength for seismic loads	N_{eq}	lbf	See Footnote 8		See Footnote 8				See Footnote 8	6,715	See Footnote 8	
Strength reduction factor ϕ for tension, pullout failure modes, Condition B[4]	ϕ	—	See Footnote 8		0.65				0.65		See Footnote 8	
Additional Anchor Data												
Axial stiffness in service load range in uncracked concrete	β_{uncr}	lbf /in	100,000		250,000				250,000		250,000	
Axial stiffness in service load range in cracked concrete	β_{cr}	lbf /in	40,000		20,000				20,000		20,000	

For **SI:** 1 inch = 25.4 mm, 1 in^2 = 645.16 mm^2, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa, 1 lbf · 10^2/in = 17,500 N/m.

[1]The data in this table is intended to be used with the design provisions of ACI 318 Appendix D; for anchors resisting seismic load combinations, the additional requirements of ACI 318 D.3.3 shall apply.

[2]Installation must comply with the manufacturers printed installation instructions and details.

[3]The 3/8-, 1/2-, 5/8-, and 3/4-inch diameter Trubolt + Wedge Anchors are ductile steel elements as defined by ACI 318 D.1.

*[4]All values of ϕ apply to the load combinations of IBC Section 1605.2, ACI 318 Section 9.2 ~~or UBC Section 1612.2. If the load combinations of Appendix C or UBC Section 1909.2 are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.5.~~ For installations where reinforcement that complies with ACI 318 Appendix D requirements for Condition A is present, the appropriate ϕ factor must be determined in accordance with ACI 318 D.4.4.

[5]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.

[6]The actual diameter for the 3/8-inch diameter anchor is 0.361 inch, for the 5/8-inch diameter anchor is 0.615-inch, and for the 3/4-inch diameter anchor is 0.7482-inch.

*[7]~~For 2003 IBC code basis, replace f_{uta} with f_{ut}; N_{sa} with N_s; $\Psi_{c,N}$ with Ψ_3; and N_{eq} with $N_{p,seis}$.~~

[8]Anchor pullout strength does not control anchor design. Determine steel and concrete capacities only.

[9]The notation in brackets is for the 2006 IBC.

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TABLE 4—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR AND SAMMYS TRUBOLT+ WEDGE ANCHOR SHEAR DESIGN INFORMATION[1,2,3]

CHARACTERISTIC	SYMBOL[6]	UNITS	NOMINAL ANCHOR DIAMETER (inch)[5]									
			3/8		1/2				5/8		3/4	
Anchor category	1, 2 or 3	—	1		1				1		1	
Minimum effective embedment depth	h_{ef}	in.	1 5/8		2		3 1/4		2 3/4	4 1/4	3 3/4	
Minimum concrete member thickness	h_{min}	in.	4	5	4	6	6	8	6	6 1/4	7	8
Critical edge distance	c_{ac}	in.	5	3	6	6	7 1/2	6	7 1/2	6 1/2	12	10
Data for Steel Strengths – Shear												
Minimum specified yield strength	f_y	psi	60,000		55,000				55,000		55,000	
Minimum specified ultimate strength	f_{uta}	psi	75,000		75,000				75,000		75,000	
Effective tensile stress area (thread)	$A_{se,V}$ [A_{se}][8]	in^2	0.075		0.142				0.217		0.332	
Steel strength in shear, uncracked or cracked concrete[7]	V_{sa}	lbf	1,830		5,175				8,955		14,970	
Steel strength in shear - seismic loads	V_{eq}	lbf	1,545		5,175				8,955		11,775	
Strength reduction factor ϕ for shear, steel failure modes[4]	ϕ	—	0.60		0.65				0.65		0.65	
Data for Concrete Breakout and Concrete Pryout Strengths – Shear												
Coefficient for pryout strength	k_{cp}	—	1.0		1.0		2.0		2.0		2.0	
Load-bearing length of anchor	l_e	in	1 5/8		2		3 1/4		2 3/4	4 1/4	3 3/4	
Strength reduction factor ϕ for shear, concrete failure modes, Condition B[4]	ϕ	—	0.70		0.70				0.70		0.70	

For **SI:** 1 inch = 25.4 mm, 1 in^2 = 645.16 mm^2, 1 lbf = 4.45 N, 1 psi = 0.006895 MPa, 1 lbf · 10^2/in = 17,500 N/m.

[1]The data in this table is intended to be used with the design provisions of ACI 318 Appendix D; for anchors resisting seismic load combinations, the additional requirements of ACI 318 D.3.3 shall apply.

[2]Installation must comply with the manufacturers printed installation instructions and details.

[3]The 1/2-, 5/8-, and 3/4-inch diameter Trubolt + Wedge Anchors are ductile steel elements as defined by ACI 318 D.1. The 3/8" diameter Trubolt + is considered brittle under shear loading.

[4]All values of ϕ apply to the load combinations of IBC Section 1605.2, ACI 318 Section 9.2~~ or UBC Section 1612.2. If the load combinations of Appendix C or UBC Section 1909.2 are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.5.~~ For * installations where reinforcement that complies with ACI 318 Appendix D requirements for Condition A is present, the appropriate ϕ factor must be determined in accordance with ACI 318 D.4.4.

[5]The actual diameter for the 3/8" diameter anchor is 0.361-inch, for the 5/8" diameter anchor is 0.615-inch, and for the 3/4" diameter anchor is 0.7482".

* ~~[6]For 2003 IBC code basis, replace f_{uta} with f_{ut}; V_{sa} with V_s; $\Psi_{c,V}$ with Ψ_3; V_{eq} with $V_{p,seis}$; and ℓ_e with ℓ.~~

[7]Steel strength in shear values are based on test results per ACI 355.2, Section 9.4 and must be used for design.

[8]The notation in brackets is for the 2006 IBC.

TABLE 5—EXAMPLE ITW RED HEAD TRUBOLT+ WEDGE ANCHOR AND SAMMYS TRUBOLT+ WEDGE ANCHOR ALLOWABLE STRESS DESIGN (ASD) VALUES FOR ILLUSTRATIVE PURPOSES[1,2,3,4,5,6,7,8,9]

ANCHOR NOTATION	ANCHOR EMBEDMENT DEPTH (inches), h_{nom}	EFFECTIVE EMBEDMENT DEPTH (inches), h_{ef}	ALLOWABLE TENSION LOAD (lbs)
3/8	2	1 5/8	1,090
1/2	2 1/2	2	1,490
	3 3/4	3 1/4	2,870
5/8	3 1/4	2 3/4	2,385
	4 3/4	4 1/4	3,910
3/4	4 3/8	3 3/4	3,825

For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N.

Design assumptions:

[1]Single anchor with static tension load only.
[2]Concrete determined to remain uncracked for the life of the anchorage.
[3]Load combinations are in accordance with ACI 318 Section 9.2 and no seismic loading.
[4]Thirty percent dead load and 70 percent live load, controlling load combination 1.2*D* + 1.6*L*.
[5]Calculation of weighted average for α: 1.2*D* + 1.6*L* = 1.2(0.3) + 1.6(0.7) = 1.48.
[6]f'_c = 2,500 psi (normal-weight concrete).
[7]$c_{a1} = c_{a2} >= c_{ac}$.
[8]$h \geq h_{min}$.
[9]*Values are for Condition B where supplementary reinforcement in accordance with ACI 318 D.4.4 is not provided.*

Illustrative Procedure to Calculate Allowable Stress Design Tension Value:

RED HEAD Trubolt+ Wedge Anchor 1/2 inch diameter using an effective embedment of 3-1/4 inches, assuming the given conditions in Table 4.

	PROCEDURE		CALCULATION
Step 1	Calculate steel strength of a single anchor in tension per ACI 318 D 5.1.2, Table 3 of this report	ϕN_{sa}	$= \phi N_{sa}$ =0.75*8,925 **=6,694 lbs steel strength**
Step 2	Calculate concrete breakout strength of a single anchor in tension per ACI 318 D 5.2.2, Table 3 of this report	N_b	$= k_{uncr}\sqrt{f'_c}\ h_{ef}^{1.5}$ $= 24*\sqrt{2,500}*3.25^{1.5}$ = 7,031 lbs
		ϕN_{cb}	$=\phi A_{NC}/A_{NC0}\,\psi_{ed,N}\,\psi_{c,N}\,\psi_{cp,N}\,N_b$ = 0.65*(95/95)/1.0*1.0*1.0*7,031 = 0.65*7,031 **= 4,570 lbs concrete breakout strength**
Step 3	Calculate pullout strength in tension per ACI 318 D 5.3.2 and Table 3 of this report	ϕN_{pn}	$= \phi N_{p,uncr}\,\psi_{c,P}\,(f'_{c,act}/2,500)^n$ $= 0.65*6,540*1.0*1.0^{0.5}$ **= 4,251 lbs pullout strength**
Step 4	Determine controlling resistance strength in tension per ACI 318 D 4.1.1 and D 4.1.2		**= 4,251 lbs controlling resistance**
Step 5	Calculate allowable stress design conversion factor for loading condition per ACI 318 Section 9.2:	α	=1.2*D* + 1.6*L* =1.2(0.3) + 1.6(0.7) **=1.48**
Step 6	Calculate allowable stress design value per Section 4.2 of this report	$T_{allowable,ASD}$	$= \phi N_n / \alpha$ = 4,251 / 1.48 **= 2,870 lbs allowable stress design**

TABLE 6—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR AND SAMMYS TRUBOLT+ WEDGE ANCHOR INSTALLATION INFORMATION FOR INSTALLATION IN THE SOFFIT OF CONCRETE FILL ON METAL DECK FLOOR AND ROOF ASSEMBLIES[1]

PARAMETER	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER (inch)				
			3/8	1/2		5/8	
Anchor outer diameter	$d_a[d_o]^2$	inches	0.361	0.5		0.615	
Nominal carbide bit diameter	d_{bit}	inches	3/8	1/2		5/8	
Location of Installation	-	-	upper and lower flute	upper and lower flute	lower flute	lower flute	
Minimum effective embedment depth	h_{ef}	Inches	1 5/8	2	3 1/4	2 3/4	4 1/4
Anchor embedment depth	h_{nom}	Inches	2	2 1/2	3 3/4	3 1/4	4 3/4
Minimum hole depth	h_o	Inches	2 1/4	2 3/4	4	3 1/2	5
Minimum overall anchor length	l	Inches	2 1/2	3 3/4	4 1/2	4 1/4	6
Installation torque	T_{inst}	ft-lb	30	45		90	
Minimum diameter of hole in fastened part	d_h	inches	1/2	5/8		3/4	

For **SI:** 1 inch = 25.4 mm, 1 ft-lb = 1.356 N-m.

[1]Anchors in the lower and upper flute may be installed with a maximum 1-inch offset in either direction from the center of the flute. In addition, anchors must have an axial spacing along the flute equal to the greater of $3h_{ef}$ or 1.5 times the flute width.

[2]The notation in brackets is for the 2006 IBC.

TABLE 7—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR AND SAMMYS TRUBOLT+ WEDGE ANCHOR DESIGN INFORMATION FOR INSTALLATION IN THE SOFFIT OF CONCRETE FILL ON METAL DECK FLOOR AND ROOF ASSEMBLIES[1,2]

CHARACTERISTIC	SYMBOL	UNITS	NOMINAL ANCHOR DIAMETER (inch)				
			3/8	1/2		5/8	
Location of Installation	-	-	upper and lower flute	upper and lower flute	lower flute	lower flute	
Minimum effective embedment depth	h_{ef}	inches	1 5/8	2	3 1/4	2 3/4	4 1/4
Characteristic pullout strength, uncracked concrete over metal deck	$N_{p,\,deck,\,uncr}$[1]	lbf	2,170	2,515	5,285	3,365	6,005
Characteristic pullout strength, cracked concrete over metal deck	$N_{p,\,deck,\,cr}$[1]	lbf	1,650	1,780	4,025	2,405	5,025
Characteristic shear strength, concrete over metal deck	$V_{sa,\,deck}$[1]	lbf	1,640	2,200	3,790	2,890	6,560
Reduction factor for pullout strength in tension, Condition B	ϕ	-	0.65	0.65		0.65	
Reduction factor for steel strength in shear, Condition B	ϕ	-	0.60	0.65		0.65	

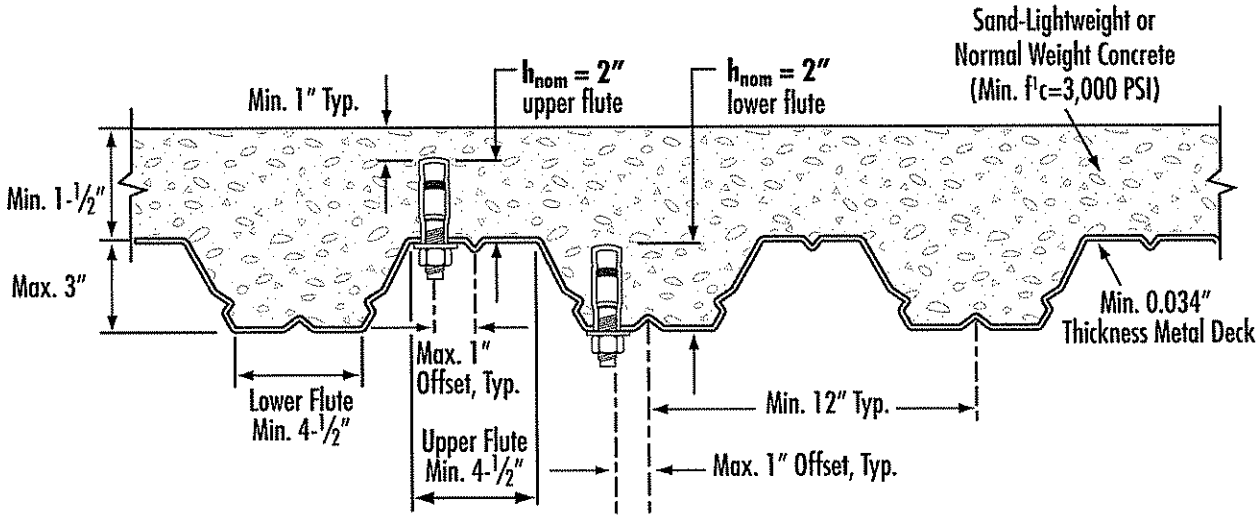
For **SI:** 1 inch = 25.4 mm, 1 lbf = 4.45 N.

[1]Values for $N_{p,deck}$ and $V_{sa,deck}$ apply to structural sand-lightweight concrete having a minimum concrete compressive strength, f'_c, of 3,000 psi.

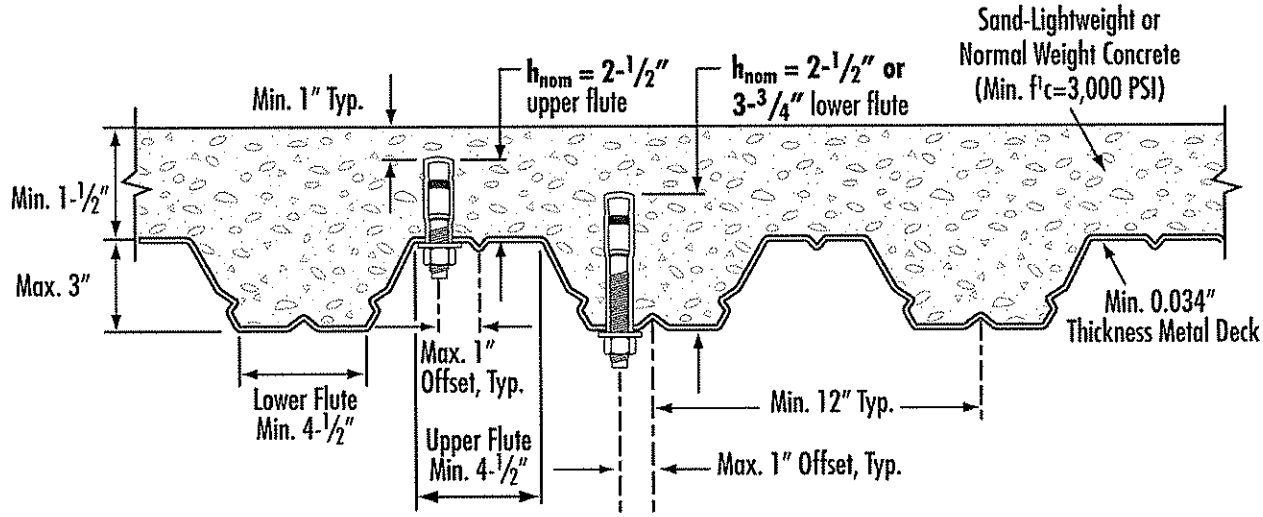
[2]All values of ϕ apply to the load combinations of IBC Section 1605.2, ACI 318 Section 9.2 ~~or UBC Section 1612.2. If the load combinations of Appendix C or UBC Section 1909.2 are used, the appropriate value of ϕ must be determined in accordance with ACI 318 D.4.5.~~ For installations where reinforcement that complies with ACI 318 Appendix D requirements for Condition A is present, the appropriate ϕ factor must be determined in accordance with ACI 318 D.4.4.

* Deleted by City of Los Angeles

Nominal Anchor Diameter = 3/8″



Nominal Anchor Diameter = 1/2″



Nominal Anchor Diameter = 5/8″

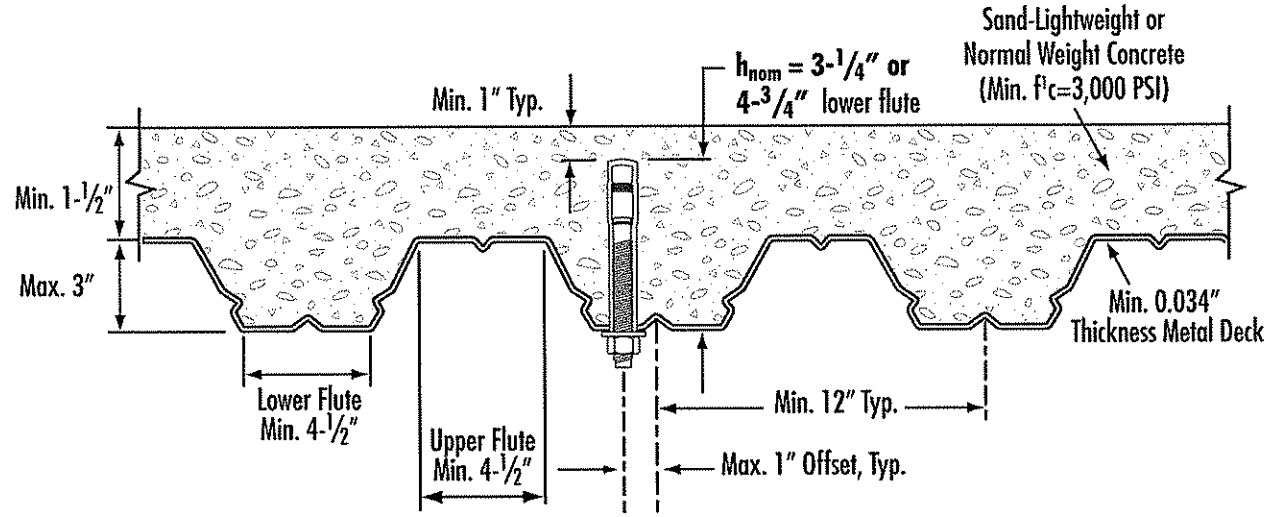


FIGURE 6—ITW RED HEAD TRUBOLT+ WEDGE ANCHOR AND SAMMYS TRUBOLT+ WEDGE ANCHOR INSTALLATION IN THE SOFFIT OF CONCRETE OVER STEEL DECK FLOOR AND ROOF ASSEMBLIES (1 inch = 25.4 mm)

ICC-ES Evaluation Report

ESR-2427 Supplement

Reissued July 1, 2010

This report is subject to re-examination in one year.

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EVALUATION SUBJECT

ITW RED HEAD TRUBOLT+ WEDGE ANCHORS AND SAMMYS TRUBOLT+ WEDGE ANCHORS FOR CRACKED AND UNCRACKED CONCRETE

*

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2007 *Florida Building Code—Building*
- 2007 *Florida Building Code—Residential*

Property evaluated:

Structural

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to indicate that the ITW Red Head Trubolt+ Wedge Anchors And Sammys Trubolt+ Wedge Anchors for Cracked and Uncracked Concrete, as described in the master report, comply with the 2007 *Florida Building Code—Building* and the 2007 *Florida Building Code—Residential*, when designed and installed in accordance with the master evaluation report.

Use of the ITW Red Head Trubolt+ Wedge Anchors and Sammys Trubolt+ Wedge Anchors for Cracked and Uncracked Concrete, as described in the master evaluation report, to comply with the High Velocity Hurricane Zone Provisions of the 2007 *Florida Building Code—Building* has not been evaluated, and is outside the scope of this supplement.

For products falling under Florida Rule 9B-72, 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 master report reissued July 1, 2010.

* Deleted by City of Los Angeles