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ICC-ES Evaluation Report

ESR-3477

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DIVISION: 05 00 00—METALS
SECTION: 05 05 23—METAL FASTENINGS

REPORT HOLDER:

NEW MILLENNIUM BUILDING SYSTEMS, LLC

EVALUATION SUBJECT:

VERSA-WEDGE® STEEL DECK HANGERS



“2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence”



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NEW MILLENNIUM BUILDING SYSTEMS, LLC

EVALUATION SUBJECT:

VERSA-WEDGE® STEEL DECK HANGERS

1.0 EVALUATION SCOPE

Compliance with the following code:

2015, 2012, 2009 and 2006 *International Building Code*®

Properties evaluated:

Structural

2.0 USES

Versa-Wedge® hangers are used to suspend building components from the underside of New Millennium's Versa-Dek® (re-entrant-type) steel deck panels recognized in [ESR-2657](#) and [ESR-2635](#), for both bare-deck and concrete-filled installations.

3.0 DESCRIPTION

The Versa-Wedge steel deck hanger system consists of a Versa-Wedge Clip (VWC) or Versa-Wedge Tube (VWT) hanger and the following components: threaded rod or hex bolt; hex nuts; steel washer; and steel rivets. Versa-Wedge hangers (VWC and VWT) are formed from steel per the approved quality documentation and are made in different sizes to accommodate different Versa-Dek steel deck panels. Minimum sizes of Versa-Wedge hanger system components must be in accordance with Figure 1. The steel rivets must be Celus® Tigerbolt® Structural Blind Rivets.

4.0 DESIGN AND INSTALLATION

4.1 Design:

Allowable tension loads (gravity loads) and deflections (at allowable tension load) for Versa-Wedge hangers installed in the underside re-entrant-type Versa-Dek steel deck panels are provided in Table 1 for concrete-filled floor decks and in Tables 2 and 3 for bare roof decks with and without rivets, respectively. Tabular allowable tension loads and deflections are applicable to one Versa-Wedge hanger installed at the mid-span of the steel deck panel and in either the center of the steel deck panel width or the flute immediately adjacent to center of the steel deck panel. Allowable tension loads and deflections do not take

into account effects of the threaded rod, hex bolt, steel washer, or hex nut. Tabular deflection values are of the Versa-Wedge hanger (VWC and VWT) relative to the steel deck panel at the allowable tension load. Maximum panel spans noted in Tables 1, 2 and 3 are measured from the centerline of panel bearing width.

Design of the threaded rod, hex bolt, steel washer, and hex nut must be completed by a registered design professional and design capacities must not be less than the allowable loads in Tables 1 through 3. Analysis and design of the steel deck panels must consider uniform loads and point loads applied through the Versa-Wedge hanger system according to the installed condition and must not exceed the spans permitted under [ESR-2635](#) and [ESR-2657](#), as applicable.

4.2 Installation:

The Versa-Wedge steel deck hanger system must be installed in accordance with the manufacturer's published installation instructions, into the underside of the steel deck panels, complying with and installed in accordance with [ESR-2657](#) and [ESR-2635](#), as applicable. The steel deck panels must not be installed at a slope greater than 5 percent.

For installation of the Versa-Wedge hanger system, a threaded rod or bolt is inserted into the hanger and secured with nuts that are finger-tight with at least one-half turn more. The hanger is inserted into the gap at the dovetail rib of the steel deck panel by rotating the hanger 90 degrees. The hanger is pulled down to seat into the steel deck panel rib. A washer is inserted and secured with a nut that is finger-tight. The washer must be flush with the bottom flange of the steel deck panel and the hanger must be seated into the steel deck panel rib. When installation is in roof (bare) deck panels, in addition to the nut, the washer may be attached to the bottom flange of the deck panel with rivets (see Table 2). For assemblies using rivets, holes matching the rivet diameter (d) noted in Table 2 are predrilled into the steel deck and washer, leaving a minimum $1.5d$ edge distance. See Figures 2 and 3 for installation details of floor (concrete-filled) and roof (bare) deck applications, respectively.

5.0 CONDITIONS OF USE

The Versa-Wedge hanger systems described in this report comply with, or are suitable alternatives to what is specified in, the code indicated in Section 1.0 of this report, subject to the following conditions:

5.1 Installation must comply with this report, the IBC and the manufacturer's published installation instructions. If there is a conflict, this report governs.

- 5.2 Calculations demonstrating that the applied loads are less than the allowable loads provided in this report must be submitted to the code official. Design of the connection of the hanger system to the suspended building component, must be determined in accordance with the IBC for each project, where required by code. The analysis and design calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.3 Use of the Versa-Wedge hanger system for earthquake load resistance is outside the scope of this report.
- 5.4 Installation of the Versa-Wedge hanger system is limited to dry, interior conditions.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fastening Systems for Use with Re-entrant-type Steel Deck Panel Profiles (AC379), dated June 2007 (editorially revised May 2015).

7.0 IDENTIFICATION

7.1 VWC and VWT hangers are supplied in containers which bear the New Millennium Building Systems, LLC, name and address, the product name, and the evaluation report number (ESR-3477). Deck panels must be labeled in accordance with evaluation reports [ESR-2635](#) and [ESR-2657](#).

7.2 The report holder's contact information is the following:

NEW MILLENNIUM BUILDING SYSTEMS, LLC
7575 WEST JEFFERSON BOULEVARD
FORT WAYNE, INDIANA 46804
(260) 969-3500
www.newmill.com

**TABLE 1—ALLOWABLE TENSION LOADS FOR VERSA-WEDGE HANGERS
 INSTALLED IN RIBS OF CONCRETE-FILLED VERSA-DEK STEEL DECK PANELS¹**

VERSA-DEK STEEL DECK PANELS (See ESR-2635 and ESR-2657)				MINIMUM CONCRETE REQUIREMENTS ⁴		VERSA-WEDGE HANGER		
Product Designation	Base Metal Thickness		Maximum Panel Span	Compressive Strength	Slab Thickness ⁵	Product Designation	Allowable Tension Load	Deflection
	gage	inch	feet-inch				psi	inch
S, S Acoustical, LS, and LS Acoustical ²	20	0.0358	12'-4"	3500	4	VWT-20-250 ² VWT-20ES-250 ³	314	0.04
	18	0.0474	14'-9"				308	0.01
	16	0.0598	14'-9"				308	0.01
S ES, S ES Acoustical, LS ES, and LS ES Acoustical ³	20	0.0358	15'-4"		6	VWT-20-375 ² VWT-20ES-375 ³	323	0.01
	18	0.0474	18'-5"				243	0.01
	16	0.0598	18'-5"				243	0.01
Composite 3.5LS and Composite 3.5LS Acoustical	20	0.0358	18'-0"	3500	5.5	VWT-35-375 VWT-35-500	691	0.01
	18	0.0474	18'-0"				691	0.01
	16	0.0598	19'-7"				934	0.01
	20	0.0358	20'-9"		7.25		600	0.01
	18	0.0474	20'-9"				600	0.01
	16	0.0598	23'-9"				1069	0.01

For SI: 1 inch = 25.4 mm; 1 foot = 0.305 m; 1lbf = 4.45N.

¹ See Section 4.1 for hanger design requirements.

² VWT-20-250 and VWT-20-375 is for use with the S, S Acoustical, LS and LS Acoustical.

³ VWT-20ES-250 and VWT-20ES-375 is for use with the S ES, S ES Acoustical, LS ES, and LS ES Acoustical.

⁴ Concrete must be either lightweight (110 pcf) or normal weight (145pcf) complying with IBC Chapter 19.

⁵ Concrete slab thickness is measured from the bottom of steel deck panel to top of concrete.

**TABLE 2—ALLOWABLE TENSION LOADS FOR VERSA-WEDGE HANGERS
INSTALLED WITH RIVETS, IN RIBS OF BARE VERSA-DEK STEEL DECK PANELS¹**

VERSA-DEK STEEL DECK PANELS (See ESR-2657)				RIVET DIAMETER (Celus Tigerbolt Structural Blind Rivet Part Number)	VERSA-WEDGE HANGER SYSTEMS				
Product Designation	Base Metal Thickness		Maximum Panel Span		Product Designation	Allowable Tension Load	Deflection		
	gage	inch	feet-inch			lbf	inch		
S, S Acoustical, LS, and LS Acoustical ²	20	0.0358	2'-7"	³ / ₁₆ " (SBS-64-TB)	VWT-20-250 ²	126	0.14		
	18	0.0474			VWT-20ES-250 ³	252	0.16		
	16	0.0598		¹ / ₄ " (SBS-86-TB)	VWT-20-375 ²	370	0.10		
	20	0.0358			VWT-20ES-375 ³				
	S ES, S ES Acoustical, LS ES, and LS ES Acoustical ³	20		0.0358	2'-7"	³ / ₁₆ " (SBS-64-TB)	VWC-20-250 ²	150	0.09
		18		0.0474			VWC-20ES-250 ³	257	0.09
16		0.0598	¹ / ₄ " (SBS-86-TB)	VWC-20-375 ²		376	0.08		
20	0.0358	VWC-20ES-375 ³							
3.5 LS and 3.5 LS Acoustical	20	0.0358	2'-7"	¹ / ₄ " (SBS-86-TB)	VWT-35-375	299	0.31		
	18	0.0474			VWT-35-500	568	0.35		
	16	0.0598				822	0.36		

For **SI**: 1 inch = 25.4 mm; 1 foot = 0.305 m; 1lbf = 4.45N.

¹See Section 4.1 for hanger design requirements.

²VWC/VWT-20-250 and VWC/VWT-20-375 is for use with the S, S Acoustical, LS and LS Acoustical.

³VWC/VWT-20ES-250 and VWC/VWT-20ES-375 is for use with the S ES, S ES Acoustical, LS ES, and LS ES Acoustical.

**TABLE 3—ALLOWABLE TENSION LOADS FOR VERSA-WEDGE HANGERS
INSTALLED WITHOUT RIVETS, IN RIBS OF BARE STEEL VERSA-DEK STEEL DECK PANELS¹**

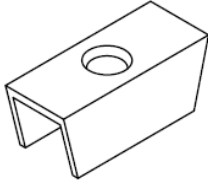
VERSA-DEK STEEL DECKS PANELS (See ESR-2657)				VERSA-WEDGE HANGERS			
Product Designation	Base Metal Thickness		Maximum Panel Span	Product Designation	Allowable Tension Load	Deflection	
	gage	inch	feet-inch		lbf	inch	
S, S Acoustical, LS, and LS Acoustical ²	20	0.0358	2'-7"	VWT-20-250 ² VWT-20ES-250 ³	155	0.252	
	18	0.0474			262	0.159	
	16	0.0598			334	0.145	
	S ES, S ES Acoustical, LS ES, and LS ES Acoustical ³	20	0.0358	12'-0"	VWT-20-375 ² VWT-20ES-375 ³	51	0.092
		18	0.0474	13'-9"		94	0.070
		16	0.0598	15'-9"		153	0.111
S ES, S ES Acoustical, LS ES, and LS ES Acoustical ³	20	0.0358	2'-7"	VWC-20-250 ² VWC-20ES-250 ³	171	0.102	
	18	0.0474			266	0.088	
	16	0.0598			306	0.055	
	3.5 LS and 3.5 LS Acoustical	20	0.0358	12'-0"	VWC-20-375 ² VWC-20ES-375 ³	45	0.042
		18	0.0474	13'-9"		91	0.012
		16	0.0598	15'-9"		151	0.013
3.5 LS and 3.5 LS Acoustical	20	0.0358	2'-7"	VWC-35-250 VWC-35-375	170	0.164	
	18	0.0474			360	0.219	
	16	0.0598			356	0.184	
	3.5 LS and 3.5 LS Acoustical	20	0.0358	2'-7"	VWT-35-375 VWT-35-500	186	0.185
		18	0.0474			346	0.146
		16	0.0598			521	0.227
	3.5 LS and 3.5 LS Acoustical	20	0.0358	19'-0"	VWC-35-250 VWC-35-375 VWT-35-375 VWT-35-500	53	0.039
		18	0.0474	20'-0"		121	0.118
		16	0.0598	21'-9"		225	0.219

For **SI**: 1 inch = 25.4 mm; 1 foot = 0.305 m; 1lbf = 4.45N.

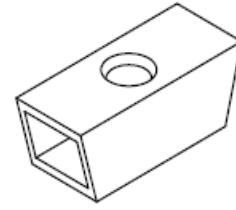
¹See Section 4.1 for hanger design requirements.

²VWC/VWT-20-250 and VWC/VWT-20-375 is for use with the S, S Acoustical, LS and LS Acoustical.

³VWC/VWT-20ES-250 and VWC/VWT-20ES-375 is for use with the S ES, S ES Acoustical, LS ES, and LS ES Acoustical.

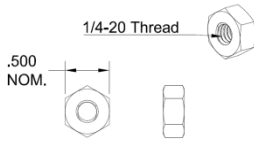


Versa-Wedge Clip (VWC)



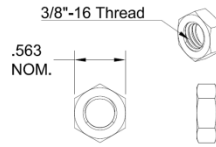
Versa-Wedge Tube (VWT)

COMPONENTS USED WITH THE VWC/VWT-250 PRODUCTS



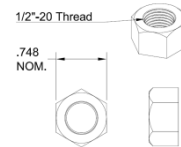
1/4-20 HEAVY NUT

COMPONENTS USED WITH THE VWC/VWT-375 PRODUCTS



3/8-16 THREADED ROD

COMPONENTS USED WITH THE VWC/VWT-500 PRODUCTS



1/2-20 THREADED ROD



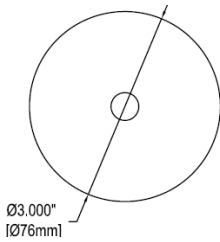
1/4-20 THREADED ROD



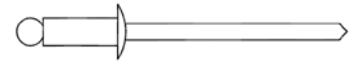
3/8-16 THREADED ROD



1/2-20 THREADED ROD

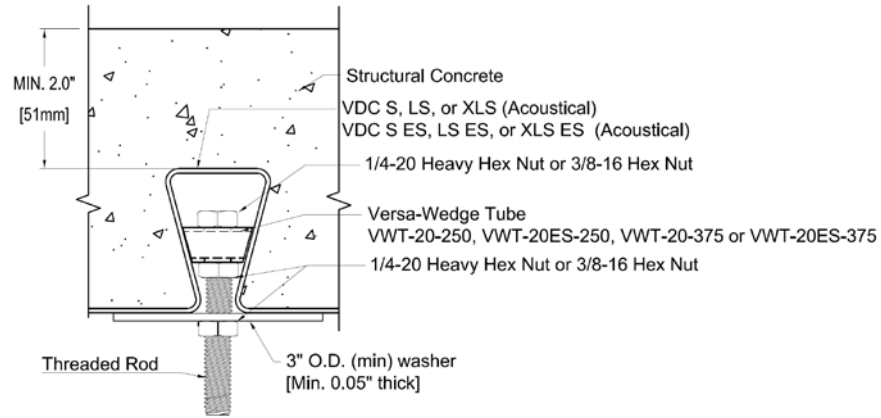


STEEL WASHER

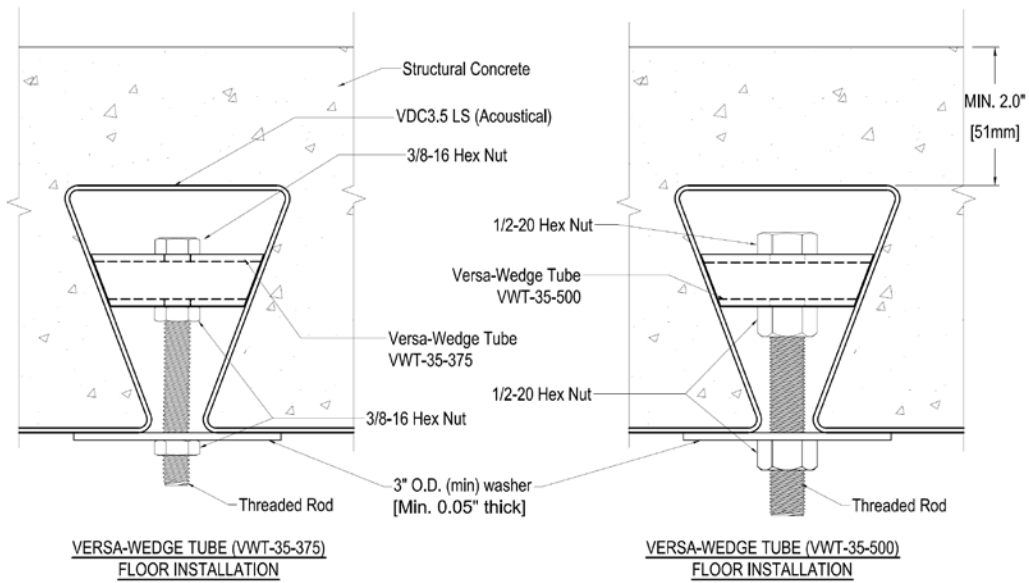


CELUS® TIGERBOLT® STEEL RIVET

FIGURE 1—VERSA WEDGE HANGER SYSTEM COMPONENTS
Note: Hex bolts not shown but must have head dimensions similar to the nuts shown above.



**VERSA-WEDGE TUBE (VWT-20)
FLOOR INSTALLATION**



**VERSA-WEDGE TUBE (VWT-35-375)
FLOOR INSTALLATION**

**VERSA-WEDGE TUBE (VWT-35-500)
FLOOR INSTALLATION**

FIGURE 2—VWC AND VWT FLOOR INSTALLATION DETAILS
Note: Hex bolts not shown.

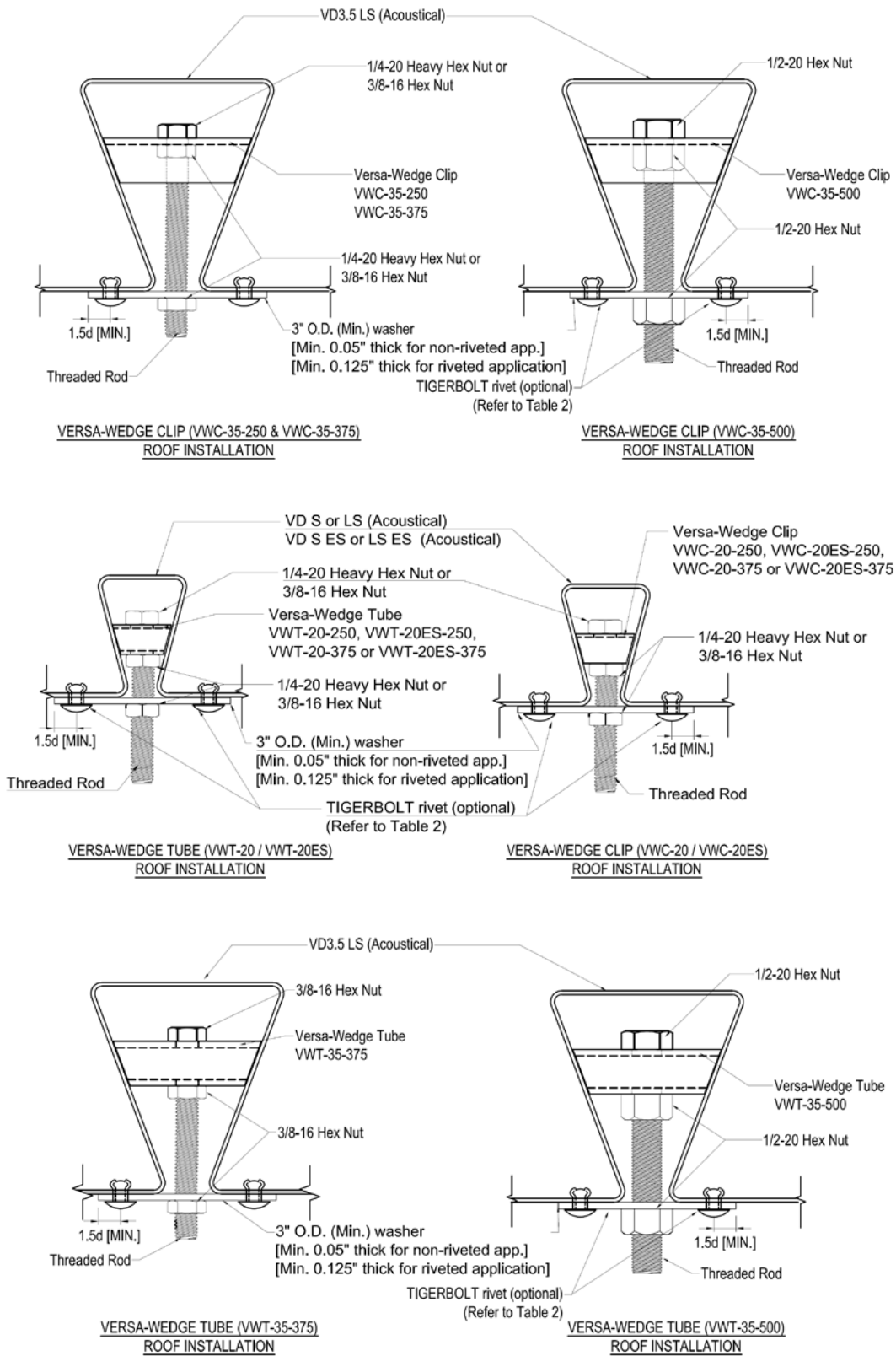


FIGURE 3—VWC AND VWT ROOF INSTALLATION DETAILS
 Note: Hex bolts not shown.

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ESR-3477 CBC Supplement

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EVALUATION SUBJECT:

VERSA-WEDGE® STEEL DECK HANGERS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Versa-Wedge® steel deck hangers, recognized in ICC-ES master evaluation report ESR-3477, have also been evaluated for compliance with CBC Chapters 22 and 22A of the code noted below.

Applicable code edition:

2013 *California Building Code*® (CBC)

2.0 CONCLUSIONS

CBC:

The Versa-Wedge® steel deck hangers, described in Sections 2.0 through 7.0 of the master evaluation report ESR-3477, comply with CBC Chapters 22 and 22A, provided the design and installation are in accordance with the 2012 *International Building Code*® provisions noted in the master report and the additional requirements of CBC Chapters 17, 17A, 22 and 22A, as applicable.

This supplement expires concurrently with the master report, reissued November 2018.