

BOARD OF
BUILDING AND SAFETY
COMMISSIONERS

MARSHA L. BROWN
PRESIDENT

VAN AMBATIELOS
VICE-PRESIDENT

VICTOR H. CUEVAS
HELENA JUBANY
ELENORE A. WILLIAMS

CITY OF LOS ANGELES
CALIFORNIA



ANTONIO R. VILLARAIGOSA
MAYOR

DEPARTMENT OF
BUILDING AND SAFETY
201 NORTH FIGUEROA STREET
LOS ANGELES, CA 90012

RAYMOND S. CHAN, C.E., S.E.
INTERIM GENERAL MANAGER

ITW Ramset/Red Head
2171 Executive Drive, Suite #100
Addison, IL 60106

Attn: Mark Timmerman
(630) 350-0370

RESEARCH REPORT: RR 25498
(CSI #03150)

BASED UPON ICC EVALUATION SERVICE
LEGACY REPORT NO. ER-5890

REEVALUATION DUE DATE:
November 1, 2010
Issued Date: October 1, 2009
Code: 2002 LABC

GENERAL APPROVAL - Reevaluation/Clerical Modification - ITW Ramset/Red Head - LDT
Concrete Screw Anchors.

DETAILS

The above assemblies and products are approved when in compliance with the description, use, identification and findings of Legacy Report No.ER-5890 dated February 1, 2004, revised January 2007 of the ICC Evaluation Service, Incorporated. The report, in its entirety, is attached and made part of this general approval.

The parts of Legacy Report No.ER-5890 which are excluded on the attached copy have been modified by the Los Angeles Building Department.

The approval is subject to the following conditions:

1. These anchors shall not be used in repair, retrofit and new construction of tilt-up wall anchorage (in tension) for the connection with horizontal wood diaphragms.
2. A 25% reduction in all allowable loads specified in the research report shall be taken in hold-down devices as required by Section 91.2315.5.6 of the 2002 Los Angeles City Building Code.
3. Concrete shall have attained its minimum design strength prior to installation of anchors.

RR 25498
Page 1 of 2

ITW Ramset/Red Head
RE: LDT Concrete Screw Anchors

4. **"SPECIAL INSPECTION"** when required is done by a City of Los Angeles registered reinforced concrete, steel, or reinforced masonry deputy inspector with controlled activity in drilled in anchor bolts.
5. The anchors shall be identified as required in Legacy Evaluation report No.ER-5890.
6. The anchors shall be installed per the manufacturer's instruction and Evaluation Report No. 5890, copies of which shall be available at each job site.

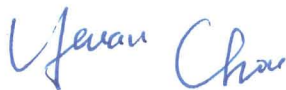
DISCUSSION

The approval is based on tests.

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.

This general approval will remain effective provided the Evaluation Report is maintained valid and unrevised with the issuing organization. Any revisions to the report must be submitted to this Department, with appropriate fee, for review in order 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.



YEUAN CHOU, Chief
Engineering Section
201 North Figueroa Street, Room 880
Los Angeles, CA 90012
Phone 213-202-9812
Fax 213-202-99443

*W*YC:elcm
RR25498/msw3
R10/20/09
5A1/2103.4

Attachment: ICC Legacy Evaluation Report No.ER-5890 (4 pages)


ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543

Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800

Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

Legacy report on the 1997 *Uniform Building Code*™, the 2000 *International Building Code*® and the 2000 *International Residential Code*®

DIVISION: 03—CONCRETE
Section: 03151—Concrete Anchoring
LDT CONCRETE SCREW ANCHOR
ITW RAMSET/RED HEAD

 1300 NORTH MICHAEL DRIVE
WOOD DALE, ILLINOIS 60191

1.0 SUBJECT

LDT Concrete Screw Anchor.

2.0 DESCRIPTION
2.1 General:

The Large Diameter Tapcon (LDT) concrete screw anchors are threaded screws with hex-washer heads. The screw anchors are manufactured from steel complying with AISI 1022, are case hardened and have a galvanized coating. The screw anchors are manufactured with nominal $\frac{3}{8}$ - and $\frac{1}{2}$ -inch (9.5 and 12.7 mm) shank diameters with washer head diameters of approximately $\frac{13}{16}$ inch and 1 inch, respectively, and are available in lengths to achieve embedment depths as noted in the tables in this report. The screw anchors are for installation in predrilled holes in normal-weight concrete having a minimum thickness of 1.5 times the anchor embedment. The concrete screw anchors are alternatives to cast-in-place anchors described in Section 1923.1 of the 1997 *Uniform Building Code*™ (UBC), and Section 1912 of the 2000 *International Building Code*® (IBC). The anchors may also be used where an engineered design is submitted in accordance with Section R-301.1.2 of the 2000 *International Residential Code*® (IRC).

2.2 Design:

Allowable shear and tension loads with corresponding anchor-to-concrete edge and anchor spacing conditions are noted in Tables 2 through 7 of this report. The allowable loads are permitted to be adjusted in accordance with UBC Section 1612.3 or IBC Section 1605.3 for short-term loading due to seismic or wind forces, provided the tension values in Tables 2, 4 and 6 are reduced by a multiplication factor of 0.79. Allowable loads for both the $\frac{3}{8}$ - and $\frac{1}{2}$ -inch-diameter (9.5 and 12.7 mm) anchors subject to combined shear and tension loads are determined by the following equation:

$$(P_s/P_t) + (V_s/V_t) \leq 1$$

where:

 P_s = Applied service tension load.

 P_t = Service tension loads in the tables.

 V_s = Applied service shear load.

 V_t = Service shear loads in the tables.

Use of the anchors to resist vibratory and moving loads such as those produced by reciprocating engines, cranes and vehicles is beyond the scope of this report.

2.3 Installation:

A pilot hole must be drilled into normal-weight concrete with a $\frac{5}{16}$ - or $\frac{7}{16}$ -inch-diameter (7.9 or 11.1 mm) carbide-tipped masonry drill bit complying with ANSI B212.15-1994 for the $\frac{3}{8}$ - and $\frac{1}{2}$ -inch-diameter (9.5 and 12.7 mm) screw anchors, respectively. Holes are drilled a minimum of 1 inch (25.4 mm) deeper than the desired embedment, using a rotary hammer drill. The screw anchor is driven into the hole to the desired embedment using a $\frac{1}{2}$ -inch (12.7 mm) electric impact wrench.

2.4 Special Inspection:

Continuous special inspection as noted in UBC Section 1701 (for the UBC) or IBC Section 1704 (for the IBC and IRC) shall be provided when required by the tables in this evaluation report. The special inspector must inspect and verify the fastener type, fastener dimensions, concrete type, concrete compressive strength, drill bit size, fastener spacing, edge distances and fastener embedment.

For fasteners installed without special inspection, the applicable tension loads noted in the tables are to be used.

2.5 Identification:

LDT screw anchor containers are marked with the product name, the ITW Ramset/Red Head name and address, screw anchor diameter, length, product designation (LDT), the evaluation report number (ER-5890) and the name of the inspection agency (PFS Corporation). In addition, a length code is on the head of each anchor, as indicated in Table 1.

3.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Interim Criteria for Predrilled Fasteners (Screw Anchors) in Concrete and Masonry (AC106), dated October 2003, including reports of static tension, shear, and seismic load tests, and a quality control manual.

*Revised January 2007

ICC-ES legacy reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, Inc., express or implied, as to any finding or other matter in this report, or as to any product covered by the report.



4.0 FINDINGS

That the ITW Ramset/Red Head concrete screw anchors described in this report comply with the 1997 *Uniform Building Code*[™], the 2000 *International Building Code*[®] and the 2000 *International Residential Code*[®], subject to the following conditions:

- 4.1 Anchors are identified and installed in accordance with this report and the manufacturer's instructions.
- 4.2 Allowable service shear and tension loads are as set forth in Tables 3 through 7 and Section 2.2 of this report.
- 4.3 Calculations demonstrating that the applied loads are less than the allowable loads described in this report, shall be submitted to the building official.
- 4.4 Anchors are not permitted for use in conjunction with fire-resistive construction. Exceptions would be:

- Anchors resist wind or seismic loading only.

- * ~~For other than wind or seismic loading, special consideration is given to fire exposure conditions.~~

- 4.5 Special inspection, when required by Section 2.4 in this report, is provided as noted in Section 2.4 of this report.

- 4.6 Anchors are limited to installation in dry, interior locations.

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

- 4.8 Since an ICC-ES acceptance criteria for evaluating the performance of anchors in cracked concrete is unavailable at this time, the use of anchors is limited to installation in uncracked concrete. Cracking occurs when $f_t > f_r$ due to service loads or deformations.

- 4.9 The anchors are manufactured at a facility in Charles City, Iowa, with quality control inspections by PFS Corporation (AA-652).

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

TABLE 1—FASTENER LENGTH IDENTIFICATION CODE

CODE LETTER	NOMINAL FASTENER LENGTH (inches)	
	³ / ₈ -inch-diameter LDT	¹ / ₂ -inch-diameter LDT
C	2 ¹ / ₂	—
D	3	3
F	4	4
H	—	5

For SI: 1 inch = 25.4 mm.

** TABLE 2—ALLOWABLE TENSION VALUES FOR ³/₈-INCH-DIAMETER LDT CONCRETE ANCHORS, INCLUDING EDGE DISTANCE LOAD FACTORS (pounds)^{1,2}

ANCHOR DIAMETER (inch)	CONCRETE STRENGTH, f_c' (psi)	ANCHOR EMBEDMENT DEPTH (inches)	WITH SPECIAL INSPECTION ³		WITHOUT SPECIAL INSPECTION ⁴		EDGE DISTANCE LOAD FACTORS ⁵ (percent)		
			Value for 100% Performance	Value at Minimum Edge Distance (¹ / ₄ inches)	Value for 100% Performance	Value at Minimum Edge Distance (¹ / ₄ inches)	¹ / ₄ inches	2 inches	3 inches
³ / ₈	2000	2 1/2 2	375	260	185	130	70	100	—
		3 2 1/2	935	655	465	325	70	76	100
	3000	2 1/2 2	400 505	355	200 255	175	87 70	100	—
		3 2 1/2	935	655	470	330	70	76	100
	4000	2 1/2 2	400 640	445	200 320	200 225	100 70	100	—
		3 2 1/2	940	660	470	330	70	76	100

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 6.89 kPa.

¹The allowable loads are applicable to the ³/₈-inch-diameter LDT anchors installed at a minimum spacing between anchors of 6 inches.

²The tabulated values are for anchors installed in normal-weight concrete having the designated compressive strength, or higher, at the time of anchor installation.

³These values are applicable only when the anchors are installed with special inspection in accordance with Section 2.4 of this report.

⁴These values are applicable when the anchors are installed without special inspection.

⁵For anchors installed at the tabulated concrete edge distances, the allowable load values tabulated for 100% performance shall be multiplied by the tabulated edge distance load factor.

* deleted by City of Los Angeles

** deleted by City of Los Angeles

**** TABLE 3—ALLOWABLE SHEAR VALUES FOR 3/8-INCH-DIAMETER LDT CONCRETE ANCHORS, INCLUDING EDGE DISTANCE LOAD FACTORS (pounds)^{1,2}**

ANCHOR DIAMETER (inch)	CONCRETE STRENGTH, f_c' (psi)	ANCHOR EMBEDMENT DEPTH (inches)	VALUE FOR 100% PERFORMANCE	VALUE AT MINIMUM EDGE DISTANCE (1 3/4 inches)	EDGE DISTANCE LOAD FACTORS (percent) ³				
					1 3/4 inches	2 inches	3 inches	4 inches	5 inches
3/8	2000	2 1/2 -2-	500 760	190	38 25	47 34	82 54	100 77	100
		3 2 1/2	830	205	25	31	54	77	100
	3000	2 1/2 -2-	500 805	200	40 25	50 34	87 54	100 77	100
		3 2 1/2	840	210	25	31	54	77	100
	4000	2 1/2 -2-	500 855	215	43 25	53 34	92 54	100 77	100
		3 2 1/2	855	215	25	31	54	77	100

For SI: 1 inch = 25.4 mm, 1 lb = 4.45 N, 1 psi = 6.89 kPa.

¹The allowable loads are applicable to the 3/8-inch-diameter LDT anchors installed at a minimum spacing between anchors of 6 inches.

²The tabulated values are for anchors installed in normal-weight concrete having the designated compressive strength, or higher, at the time of anchor installation.

³For anchors installed at the tabulated concrete edge distances, the allowable load values tabulated for 100% performance shall be multiplied by the tabulated edge distance load factor.

**** TABLE 4—ALLOWABLE TENSION VALUES FOR 1/2-INCH-DIAMETER LDT CONCRETE ANCHORS, INCLUDING EDGE DISTANCE LOAD FACTORS (pounds)^{1,2}**

ANCHOR DIAMETER (inch)	CONCRETE STRENGTH, f_c' (psi)	ANCHOR EMBEDMENT DEPTH (inches)	WITH SPECIAL INSPECTION ³		WITHOUT SPECIAL INSPECTION ⁴		EDGE DISTANCE LOAD FACTORS ⁵ (percent)				
			Value for 100% Performance	Value at Minimum Edge Distance (1 3/4 inches)	Value for 100% Performance	Value at Minimum Edge Distance (1 3/4 inches)	1 3/4 inches	2 inches	2 1/4 inches	3 inches	4 inches
1/2	2000	2 1/2	400 895	235 580	200 450	115 290	58 65	67 80	75 100	—	—
		3 1/2	1000 1045	585 1100	500 940	290 590	58 65	67 74	75 77	100	—
		4 1/2	2240 2545	1108 1655	1120 1270	554 825	58 65	56 60	63 72	76 82	100
	3000	2 1/2	400 975	235 635	200 490	115 320	58 65	67 80	75 100	—	—
		3 1/2	1000 2040	585 1340	500 1005	290 655	58 65	67 74	75 77	100	—
		4 1/2	2400 2585	1400 1600	1200 1290	700 840	58 65	52 60	59 72	76 82	100
	4000	2 1/2	400 1060	235 680	200 530	115 345	58 65	67 80	75 100	—	—
		3 1/2	1000 2210	585 1435	500 1405	290 720	58 65	67 74	75 77	100	—
		4 1/2	2480 2620	1446 1705	1240 1340	723 850	58 65	51 60	57 72	76 82	100

For SI: 1 inch = 25.4 mm, 1 lb = 4.45 N, 1 psi = 6.89 kPa.

¹For allowable load values for anchor-to-anchor spacing of less than 8 inches, see Table 6.

²The tabulated values are for anchors installed in normal-weight concrete having the designated compressive strength, or higher, at the time of anchor installation.

³These values are applicable only when the anchors are installed with special inspection in accordance with Section 2.4 of this report.

⁴These values are applicable when the anchors are installed without special inspection.

⁵For anchors installed at the tabulated concrete edge distances, the allowable load values tabulated for 100% performance shall be multiplied by the tabulated edge distance load factor.

**** TABLE 5—ALLOWABLE SHEAR VALUES FOR 1/2-INCH-DIAMETER LDT CONCRETE ANCHORS, INCLUDING EDGE DISTANCE LOAD FACTORS (pounds)^{1,2}**

ANCHOR DIAMETER (inch)	CONCRETE STRENGTH, f_c' (psi)	ANCHOR EMBEDMENT DEPTH (inches)	VALUE FOR 100% PERFORMANCE	VALUE AT MINIMUM EDGE DISTANCE (1 3/4 inches)	EDGE DISTANCE LOAD FACTORS ³ (percent)					
					1 3/4 inches	2 inches	3 inches	4 inches	5 inches	5 1/2 inches
1/2	2000	2 1/2	1440	290 355	58 25	67 34	100 54	100 77	100	100
		3 1/2	1640	400	36 25	45 34	79 54	100 77	100	100
		4 1/2	1845	460	30 25	37 34	64 54	80 77	100	100
	3000	2 1/2	1630	290 440	58 25	67 34	100 54	100 77	100	100
		3 1/2	1820	455	41 25	51 34	89 54	100 77	100	100
		4 1/2	1990	500	30 25	36 30	60 50	80 70	100 90	100
	4000	2 1/2	1845	290 460	58 25	67 34	100 54	100 77	100	100
		3 1/2	2035	510	46 25	57 34	100 54	100 77	100	100
		4 1/2	2140	535	30 25	36 30	61 50	80 70	100 90	100

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45 N, 1 psi = 6.89 kPa.

¹For allowable load values for anchor-to-anchor spacing of less than 8 inches, see Table 7.

²The tabulated values are for anchors installed in normal-weight concrete having the designated compressive strength, or higher, at the time of anchor installation.

³For anchors installed at the tabulated concrete edge distances, the allowable load values tabulated for 100% performance shall be multiplied by the tabulated edge distance load factor.

**** TABLE 6—ALLOWABLE TENSION VALUES FOR 1/2-INCH-DIAMETER LDT CONCRETE ANCHORS,
WITH SPACING DISTANCE REDUCTIONS (pounds)^{1,2}**

ANCHOR DIAMETER (inch)	CONCRETE STRENGTH, f'c (psi)	ANCHOR EMBEDMENT DEPTH (inches)	WITH SPECIAL INSPECTION ³		WITHOUT SPECIAL INSPECTION ⁴	
			Fastener Spacing (inches)		Fastener Spacing (inches)	
			8	3	8	3
1/2	2000	2	400 895	240	200 450	120
		3 1/2	1000 1815	—	500 910	—
		4 1/2	2240 2545	685	1000 1270	345
	3000	2	400 975	265	200 490	130
		3 1/2	1000 2010	—	500 1005	—
		4 1/2	2400 2585	700	1200 1290	350
	4000	2	400 1060	290	200 530	145
		3 1/2	1000 2210	—	500 1105	—
		4 1/2	2480 2620	710	1240 1310	355

For SI: 1 inch = 25.4 mm, 1 lb = 4.45 N, 1 psi = 6.89 kPa.

¹For fasteners installed with a fastener spacing of less than 8 inches and more than 3 inches, the allowable load is the value tabulated for anchors spaced at 3 inches on center.

²The tabulated values are for anchors installed in normal-weight concrete having the designated compressive strength, or higher, at the time of anchor installation.

³These values are applicable only when the anchors are installed with special inspection in accordance with Section 2.4 of this report.

⁴These values are applicable when the anchors are installed without special inspection.

**** TABLE 7—ALLOWABLE SHEAR VALUES FOR 1/2-INCH-DIAMETER LDT CONCRETE ANCHORS,
WITH SPACING DISTANCE REDUCTIONS (pounds)^{1,2}**

ANCHOR DIAMETER (inch)	CONCRETE STRENGTH, f'c (psi)	ANCHOR EMBEDMENT DEPTH (inches)	FASTENER SPACING (inches)	
			8	2 1/2 ³
1/2	2000	2	500 1410	250 805
		3 1/2	1100 1610	—
		4 1/2	1550 1845	775 1055
	3000	2	500 1630	250 930
		3 1/2	1100 1820	—
		4 1/2	1650 1990	825 1140
	4000	2	500 1845	250 1050
		3 1/2	1100 2035	—
		4 1/2	1750 2140	875 1220

For SI: 1 inch = 25.4 mm, 1 lb = 4.45 N, 1 psi = 6.89 kPa.

¹For fasteners installed with a fastener spacing of less than 8 inches and more than ³2 1/2 inches, the allowable load is the value tabulated for anchors spaced at ³2 1/2 inches on center.

²The tabulated values are for anchors installed in normal-weight concrete having the designated compressive strength, or higher, at the time of anchor installation.

**** deleted by City of Los Angeles**