

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

ROBERT R. "BUD" OVROM
GENERAL MANAGER

RAYMOND S. CHAN, P.E., S.E.
EXECUTIVE OFFICER

Simpson Strong-Tie Co., Inc.
12246 Holly Street
Riverside, CA 92509

Attn: Jason M. Oakley
(714) 448-9143

RESEARCH REPORT: RR 25837
(CSI # 03160)

BASED UPON ICC ES EVALUATION
REPORT NO. ESR-2811

REEVALUATION DUE

DATE: November 1, 2014

Issued Date: June 1, 2011

Code: 2011 LABC

GENERAL APPROVAL – Reevaluation/Technical Modification/Clerical Modification-
Simpson Strong-Tie® GDP and GDPS Gas Actuated Fasteners.

DETAILS

The above assemblies and/or products are approved when in compliance with the description, use, identification and findings of Report No. ESR-2811, reissued February 1, 2011, 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-2811 which are excluded on the attached copy have been removed by the Los Angeles City Building Department as not being included in this approval.

The approval is subject to the following conditions:

1. Powder-Driven Fasteners are not allowed to resist any earthquake forces except as described in Sections 4.1.1 and 5.6 of ESR-2811.
2. Powder-Driven Fasteners must be installed in accordance with this report and Simpson Strong-Tie published installation instructions. A copy of the manufacturer's installation instructions shall be available at the job site.
3. Powder-Driven Fasteners must not be used in preservative-treated wood or fire-retardant treated wood.

RR 25837
Page 1 of 3

Simpson Strong-Tie Company, Inc.
RE: Simpson Strong-Tie® GDP and GDPS Gas Actuated Fasteners.

4. Installation is limited to dry, interior environments.
5. Calculations demonstrating that the applied loads are less than the maximum allowable loads must be submitted with plans and details to Structural Plan Check. The calculations must be prepared by a California registered Civil or Structural Engineer.
6. For fasteners installed into concrete, the minimum concrete thickness must be three times the fastener embedment in concrete.
7. Use of fasteners is limited to uncracked concrete and masonry.
8. For working values in steel, the fasteners shall have sufficient length so that the entire pointed portion of the shank pierces the steel plate.
9. The allowable values listed in the attached report and tables are for the fasteners only. Connected members shall be checked for their capacity (which may govern).
10. Fasteners used in structural light weight concrete filled steel deck applications are limited to installation in the lower flute or top surface as shown on Figures 1A, 1B, and 2 of ESR 2811
11. No increase is permitted in the tabulated allowable load values for short duration loading.
12. The containers of the fasteners shall be labeled with the Simpson Strong-Tie name; the fastener product name, length, catalog number, and quantity; the evaluation report number (ESR-2811); and the manufacturing date and lot number

DISCUSSION

The technical modification is to add GDPS fastener.

The clerical modification is to change the company address.

The report is in compliance with the 2011 Los Angeles City Building Code.

The Approval is based on and in accordance with the ICC-Acceptance Criteria AC 70.

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 for review with appropriate fee to continue the approval of the revised report.

Simpson Strong-Tie Company, Inc.
RE: Simpson Strong-Tie® GDP and GDPS Gas Actuated Fasteners.

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.

WILLIAM STUTSMAN, Chief
Engineering Research Section
201 N. Figueroa St., Rm 880
Los Angeles, CA 90012
Phone (213) 202-9812
Fax (213) 202-9943

BG:bg
RR25837/MSWord2007
R06/03/2011
5A1/5C2/1911/2107/2204.2

Attachment: ICC-ES Evaluation Report No. ESR-2811 (6 pages)

ICC-ES Evaluation Report

ESR-2811

Reissued February 1, 2011

This report is subject to re-examination in two years.

www.icc-es.org | (800) 423-6587 | (562) 699-0543

A Subsidiary of the International Code Council®

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

DIVISION 04 00 00—MASONRY
Section: 04 05 19.16—Masonry Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 23—Metal Fastenings

REPORT HOLDER:

SIMPSON STRONG-TIE COMPANY, INC.
 5956 WEST LAS POSITAS BOULEVARD
 PLEASANTON, CALIFORNIA 94588
 (925) 560-9000
www.simpsonanchors.com

EVALUATION SUBJECT:

SIMPSON STRONG-TIE® GDP AND GDPS GAS-ACTUATED FASTENERS

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)*~~

*Codes indicated with an asterisk are addressed in Section 8.0.

Property evaluated:

Structural

2.0 USES

Simpson Strong-Tie® GDP Gas-Actuated Fasteners are used for general fastening of building components, such as cold-formed steel framing members, to normal-weight concrete, structural sand-lightweight concrete, steel decks filled with structural sand-lightweight concrete, concrete masonry units (CMUs) and steel base materials. The fasteners are alternates to the cast-in-place anchors described in IBC Section 1911; the embedded anchors described in Section 2.1.4 of TMS 402/ACI 530/ASCE 5 (which is referenced in IBC Section 2107) for placement in grouted masonry; and the bolts used to attach materials to steel, described in IBC Section 2204.2.

Simpson Strong-Tie® GDPS Gas-Actuated Fasteners are used for general fastening of building components, such as cold-formed steel framing members, to steel base materials. The fasteners are alternates to the bolts used to attach materials to steel, described in IBC Section 2204.2.

The fasteners may also be used where an engineered design is submitted in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 Fasteners:

Simpson Strong-Tie® GDP and GDPS Gas-Actuated Fasteners are manufactured from steel complying with ASTM A 510, Grade 1060 or 10B60, and austempered to a Rockwell “C” core hardness of 53-56. GDP fasteners have a straight, smooth shank with a diameter of 0.106 inch (2.7 mm), and a head diameter of 0.24 inch (6.2 mm). GDPS fasteners have a step-shank with a diameter of 0.110 inch (2.8 mm) above the step and a diameter of 0.091 inch (2.3 mm) below the step, and a head diameter of 0.24 inch (6.2 mm). GDP fasteners are galvanized in accordance with ASTM B 695, Class 5, Type I. GDPS fasteners are zinc electroplated in accordance with ASTM B 633 SC 1, Type I. Both GDP and GDPS fasteners are supplied in collated strips.

3.2 Materials:

3.2.1 Concrete: Normal-weight and structural sand-lightweight concrete must comply with IBC Sections 1903 and 1905 or IRC Section R402.2, as applicable. The minimum concrete compressive strength at the time of fastener installation must be as noted in Tables 1, 2 and 3.

3.2.2 Concrete Masonry Units: Concrete masonry units (CMUs) must be minimum 8-inch-thick (203 mm) lightweight blocks complying with ASTM C 90.

3.2.3 Steel: Structural steel must comply with the minimum requirements of ASTM A 36 or ASTM A 572, Grade 50, and have the minimum thicknesses as noted in Table 5.

3.2.4 Steel Deck: Steel deck properties and configurations must be as described in Table 3 and Figures 1A, 1B and 2.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: The allowable shear and tension (pullout) values in Tables 1 through 5 are for use in allowable stress design, and are for fasteners driven into the materials specified. The stress increases and load reductions described in Section 1605.3 of the IBC are not allowed for wind loads acting alone or when combined with gravity

loads. No increase is allowed for vertical loads acting alone. Except for fasteners used with architectural, electrical and mechanical components described in Section 13.1.4 of ASCE/SEI 7 as exempt from seismic design requirements, use of fasteners to resist earthquake loads is outside the scope of this report.

Allowable shear and tension values for Simpson Strong-Tie® GDP and GDPS Gas-Actuated Fasteners driven into different base materials may be determined by referencing tables as follows:

BASE MATERIAL	FASTENER	TABLE
Normal-weight concrete	GDP	1, 2
Structural sand-lightweight concrete	GDP	3
Concrete masonry units (CMUs)	GDP	4
Steel	GDP & GDPS	5

Allowable loads for fasteners subjected to combined shear and tension forces are determined by the following equation:

$$(p/P_a) + (v/V_a) \leq 1$$

where:

- p = Actual tension load on fastener, lbf (N).
- P_a = Allowable tension load on fastener, lbf (N).
- v = Actual shear load on fastener, lbf (N).
- V_a = Allowable shear load on fastener, lbf (N).

4.1.2 Wood to Steel, Concrete, or Masonry: Reference lateral design values for nails with diameters equal to or less than the diameter of the Simpson Strong-Tie® Gas-Actuated Fasteners and penetration into the main member of 10 fastener diameters, determined in accordance with Part 11 and/or Table 11N of ANSI/AF&PA NDS are applicable to Simpson Strong-Tie® Gas-Actuated Fasteners. The wood element is the side member. The fastener bending yield strength must be limited to the value noted in the footnotes to Table 11N of ANSI/AF&PA NDS, based on the diameter of the Simpson Strong-Tie® Gas-Actuated Fasteners.

4.2 Installation:

The fasteners must be installed with a power fastening tool in accordance with Simpson Strong-Tie® recommendations. The fastening procedures must comply with the Simpson Strong-Tie® published installation instructions. These instructions must be available on the jobsite at all times during fastener installation.

The fasteners must be installed with the fastener penetration, spacing and edge distances specified in this report. Concrete thickness must be a minimum of three times the fastener penetration depth. Face shell thickness of a CMU must be a minimum of 1 1/4 inches (32 mm). Fasteners must not be installed into concrete until the concrete has reached the specified compressive strength. Fasteners must be placed through the steel deck into the structural sand-lightweight concrete in accordance with Table 3. Installation is limited to dry, interior locations.

Attachment of cold-formed steel tracks to the perimeter of concrete is allowed under the following conditions:

1. No cold joint exists between the slab and foundation below the track.
2. Tracks are not installed on slabs supported by concrete block foundation walls.

5.0 CONDITIONS OF USE

The Simpson Strong-Tie® GDP and GDPS Gas-Actuated Fasteners 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 fasteners are manufactured and identified in accordance with this report.
- 5.2 Fastener installation complies with this report and the Simpson Strong-Tie® published installation instructions. In the event of conflict between this report and the Simpson Strong-Tie® published installation instructions, this report governs.
- 5.3 Allowable tension and shear values are as noted in Tables 1 through 5. The stress increases and load reductions described in Section 1605.3 of the IBC are not allowed for wind loads acting alone or when combined with gravity loads. No increase is allowed for vertical loads acting alone.
- 5.4 Calculations demonstrating that the applied loads are less than the allowable loads described in this report must be submitted to the code official for approval. The calculations are to be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.5 The minimum concrete thickness must be three times the fastener penetration depth. Face shell thickness of CMUs must be a minimum of 1 1/4 inches (32 mm).
- 5.6 Except for fasteners used with architectural, electrical and mechanical components described in Section 13.1.4 of ASCE/SEI 7 as exempt from seismic design requirements, use of fasteners to resist earthquake loads is outside the scope of the report.
- 5.7 The use of fasteners is limited to installation in uncracked concrete or masonry. Cracking occurs when $f_t > f_r$ due to service loads or deformations.
- 5.8 Use of fasteners is limited to dry, interior locations.
- 5.9 Use of fasteners in contact with preservative-treated or fire-retardant-treated wood is not permitted.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements (AC70), dated February 2010.

7.0 IDENTIFICATION

Containers of fasteners are identified with the manufacturer's name (Simpson Strong-Tie®), the product name (GDP or GDPS Gas-Actuated Fasteners), the fastener catalog number, the length, the quantity, the manufacturing date and the evaluation report number (ESR-2811). In addition, each fastener is identified by ≠ (the "no equal" sign) stamped on the fastener head.

8.0 OTHER CODES

8.1 Scope:

In addition to the 2009 IBC and IRC, the products described in this report were evaluated for compliance with the requirements of the following codes:

- 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)

8.2 Uses:

Simpson Strong-Tie® GDP and GDPS Gas-Actuated Fasteners are used for general fastening of building components as described in Section 2.0. The fasteners are alternates to the cast-in-place anchors described in 2006 IBC Sections 1911 and 1912, ~~2003 IBC Sections 1912 and 1913 and UBC Section 1923.1~~ for placement in concrete; the embedded anchors described in Section 2.1.4 of ACI 530 (which is referenced in 2006 and 2003 IBC Section 2107) ~~and UBC Section 2107.1.5 for placement in grouted masonry~~; and the bolts used to attach materials to steel, described in 2006 ~~and 2003 IBC Section 2204.2 and UBC Section 2205.11~~. ~~The fasteners may be used where an engineered design is submitted in accordance with 2006 and 2003 IRC Section R301.1.3.~~

8.3 Description:

8.3.1 Fasteners: See Section 3.1.

8.3.2 Materials:

8.3.2.1 Concrete: ~~See Section 3.2.1. Under the UBC, concrete must conform to UBC Section 1903, as applicable.~~

8.3.2.2 CMUs: ~~Under the UBC, CMUs must be minimum 8-inch thick (203 mm), Grade N, Type II, lightweight blocks complying with UBC Standard 21-4.~~

8.3.2.3 Steel: See Section 3.2.3.

8.3.2.4 Steel Deck: See Section 3.2.4.

8.4 Design and Installation:

8.4.3 Design:

8.4.1.1 General: ~~See Section 4.1. Under the UBC, the stress increases described in Section 1612.3.2 of the UBC are not allowed for wind loads acting alone or when combined with gravity loads. Except for fasteners used with architectural, electrical and mechanical components as described in Section 13.1.4 of ASCE/SEI 7-05 (2006 IBC and IRC) or Section 9.6.1 of ASCE/SEI 7-02 (2003 IBC and IRC), use of fasteners to resist earthquake loads is outside the scope of this report.~~

8.4.1.2 Wood to Steel, Concrete, or Masonry: ~~For the 2006 IBC, 2006 IRC, 2003 IBC and 2003 IRC, see Section 4.1.2, For the UBC, design values for nails with diameters equal to or less than the diameter of the Simpson Strong-Tie® Gas Actuated Fasteners, determined in accordance with Section 2318.3 of the UBC, are applicable to Simpson Strong-Tie® Gas Actuated Fasteners. The wood element is the side member. The fastener bending yield strength must be limited to the value noted in the footnotes to UBC Tables 23-III C-1 and 23-III C-2, based on the diameter of the Simpson Strong-Tie® Gas Actuated Fasteners~~

8.4.2 Installation: See Section 4.2.

8.5 Conditions of Use:

See Section 5.0, and the following:

8.5.1 Allowable tension and shear values are as noted in Tables 1 through 5. The stress increases and load reductions described in Section 1605.3 of the 2006 ~~and 2003 IBC, and the stress increases described in Section 1612.3.2 of the UBC, are not allowed for wind loads acting alone or when combined with gravity loads. No increase is allowed for vertical loads acting alone.~~

8.5.2 Except for fasteners used with architectural, electrical and mechanical components as described in Section 13.1.4 of ASCE/SEI 7-05 (2006 IBC ~~and IRC) or Section 9.6.1 of ASCE/SEI 7-02 (2003 IBC and IRC)~~, use of fasteners to resist earthquake loads is outside the scope of this report.

8.6 Evidence Submitted:

Data in accordance with the ICC-ES Acceptance Criteria for Fasteners Power-driven into Concrete, Steel and Masonry Elements (AC70), dated October 2006.

8.7 Identification:

See Section 7.0.

TABLE 1—ALLOWABLE TENSION LOADS FOR SIMPSON STRONG-TIE® GDP GAS-ACTUATED FASTENERS INSTALLED IN NORMAL-WEIGHT CONCRETE^{1,2,3,4}

FASTENER MODEL NUMBER	SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH f'_c			
					2,000 psi (lbf)	3,000 psi (lbf)	4,000 psi (lbf)	5,000 psi (lbf)
GDP-XX ⁵	0.106	5/8	4	3	25	30	45	45
GDP-XX ⁵	0.106	3/4	4	3	30	30	30	30

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

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Concrete aggregate must comply with ASTM C 33. Minimum concrete thickness is three times the fastener embedment into the concrete.

²The allowable tension values are only for the fasteners in the concrete. Members connected to the concrete must be investigated in accordance with accepted design criteria.

³The stress increases and load reductions described in IBC Section 1605.3 ~~and the stress increases described in UBC Section 1612.3 are not allowed for wind loads acting alone or when combined with vertical loads.~~ No adjustment is allowed for vertical loads acting alone.

⁴For installations under the IBC and IRC, the concrete compressive strength, f'_c , at 28 days must be a minimum of 2,500 psi.

⁵The XX designation in the model number is replaced with the length of the fastener expressed in inches. The fastener must be long enough to provide for the minimum embedment.

TABLE 2—ALLOWABLE SHEAR LOADS FOR SIMPSON STRONG-TIE® GDP GAS-ACTUATED FASTENERS INSTALLED IN NORMAL-WEIGHT CONCRETE^{1,2,3,4}

FASTENER MODEL NUMBER	SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	CONCRETE COMPRESSIVE STRENGTH f_c			
					2,000 psi (lbf)	3,000 psi (lbf)	4,000 psi (lbf)	5,000 psi (lbf)
GDP-XX ⁵	0.106	$\frac{5}{8}$	4	3	25	25	25	25
GDP-XX ⁵	0.106	$\frac{3}{4}$	4	3	45	55	75	75

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

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Concrete aggregate must comply with ASTM C 33. Minimum concrete thickness is three times the fastener embedment into the concrete.

²The allowable shear values are only for the fasteners in the concrete. Members connected to the concrete must be investigated in accordance with accepted design criteria.

³~~The stress increases and load reductions described in IBC Section 1605.3 and the stress increases described in UBC Section 1612.3 are not allowed for wind loads acting alone or when combined with vertical loads.~~ No adjustment is allowed for vertical loads acting alone.

⁴For installations under the IBC and IRC, the concrete compressive strength, f_c , at 28 days must be a minimum of 2,500 psi.

⁵The XX designation in the model number is replaced with the length of the fastener expressed in inches. The fastener must be long enough to provide for the minimum embedment.

TABLE 3—ALLOWABLE TENSION AND SHEAR LOADS FOR SIMPSON STRONG-TIE® GDP GAS-ACTUATED FASTENERS INSTALLED IN MINIMUM 3,000 psi COMPRESSIVE STRENGTH (f_c) STRUCTURAL SAND-LIGHTWEIGHT CONCRETE^{1,2}

FASTENER MODEL NUMBER	SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE ³ (inches)	INSTALLED IN CONCRETE		INSTALLED THROUGH METAL DECK (LOWER FLUTE) ^{4,5}			
					TENSION (lbf)	SHEAR (lbf)	1.5-INCH "B" DECK		3-INCH "W" DECK	
							TENSION (lbf)	SHEAR (lbf)	TENSION (lbf)	SHEAR (lbf)
GDP-XX ⁶	0.106	$\frac{5}{8}$	4	3	75	35	65	195	60	180
GDP-XX ⁶	0.106	$\frac{3}{4}$	4	3	105	140	130	270	60	180

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

¹The fasteners must not be driven until the concrete has reached the designated minimum compressive strength. Concrete aggregate must comply with ASTM C 330. Minimum concrete thickness is three times the fastener embedment into the concrete.

²The allowable shear and tension values are only for the fasteners in the concrete. Members connected to the concrete must be investigated in accordance with the accepted design criteria.

³For fasteners installed in concrete (not through metal deck), the fastener must be installed with a minimum edge distance of 3 inches from the edge of the concrete.

⁴For fasteners installed through metal deck, the fastener must be installed through the lower flutes of the deck with minimum edge distances as shown in Figures 1A, 1B and 2, and 3 inches from the end of the deck.

⁵The allowable values are applicable to fasteners installed through the underside of a steel deck at the ribs and into structural sand-lightweight concrete with a minimum compressive strength, f_c , of 3,000 psi. See Figures 1A, 1B and 2. The steel deck must have a minimum base-metal thickness of 20 gage with a minimum yield strength of 38 ksi.

⁶The XX designation in the model number is replaced with the length of the fastener expressed in inches. The fastener must be long enough to provide for the minimum embedment.

TABLE 4—ALLOWABLE TENSION AND SHEAR LOADS FOR SIMPSON STRONG-TIE® GDP GAS-ACTUATED FASTENERS INSTALLED IN CONCRETE MASONRY UNITS (CMUs)^{1,2,3}

FASTENER MODEL NUMBER	SHANK DIAMETER (inch)	MINIMUM EMBEDMENT (inch)	MINIMUM SPACING (inches)	MINIMUM EDGE DISTANCE (inches)	INSTALLED IN CMU FACE SHELL	
					TENSION (lbf)	SHEAR (lbf)
GDP-XX ⁴	0.106	$\frac{5}{8}$	8	3	35	50

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

¹The tabulated allowable load values are for the fasteners only. Members connected to the CMU receiving elements must be designed in accordance with the applicable code and accepted design criteria.

²The tabulated allowable load values are for fasteners installed in a hollow CMU conforming to ASTM C 90 or UBC 21-4, as applicable. The minimum allowable nominal size of the CMU must be 8 inches high by 8 inches wide by 16 inches long, with a minimum, $\frac{1}{4}$ -inch-thick face shell thickness (Grade N, Type II, concrete masonry units).

³Installation may be anywhere on the face of the CMU, with distance from edge of individual blocks as shown in Table 4.

⁴The XX designation in the model number is replaced with the length of the fastener expressed in inches. The fastener must be long enough to provide for the minimum embedment.

TABLE 5—ALLOWABLE TENSION AND SHEAR LOADS FOR SIMPSON STRONG-TIE® GDP and GDPS GAS-ACTUATED FASTENERS INSTALLED IN STEEL^{1,2}

FASTENER MODEL NUMBER	SHANK DIAMETER (inch)	MINIMUM SPACING (inch)	MINIMUM EDGE DISTANCE (inch)	MINIMUM STEEL STRENGTH ⁴	STEEL THICKNESS (inch)									
					¹ / ₈		³ / ₁₆		¹ / ₄		³ / ₈		¹ / ₂	
					Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)	Tension (lbf)	Shear (lbf)
GDP-XX ³	0.106	1	0.5	ASTM A36	125	285	210	225	220	205	—	—	—	—
GDP-XX ³	0.106	1	0.5	ASTM A572, Grade 50	—	—	225	250	185	145	—	—	—	—
GDPS-XX ³	0.110	1	0.5	ASTM A36	—	—	95	180	170	265	165 ⁵	225 ⁵	145 ⁵	225 ⁵
GDPS-XX ³	0.110	1	0.5	ASTM A572, Grade 50	—	—	110	205	170	305	155 ⁵	205 ⁵	—	—

For **SI**: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N, 1 ksi = 6.895 MPa.

¹The entire pointed portion of the fastener must penetrate through the steel to obtain the tabulated values (see Figure 3), except as noted in footnote 5.

²The allowable tension and shear values are for the fastener only. Members connected to the steel must be investigated separately in accordance with accepted design criteria.

³The XX designation in the model number is replaced with the length of the fastener expressed in inches. The fastener must be long enough to provide for the minimum penetration.

⁴Steel strength must comply with the minimum requirements of ASTM A 36 ($F_y = 36$ ksi, $F_u = 58$ ksi) or ASTM A 572, Grade 50 ($F_y = 50$ ksi, $F_u = 65$ ksi).

⁵Tabulated values are based on minimum penetration of the fastener point into the steel of 0.35 inch (8.9 mm).

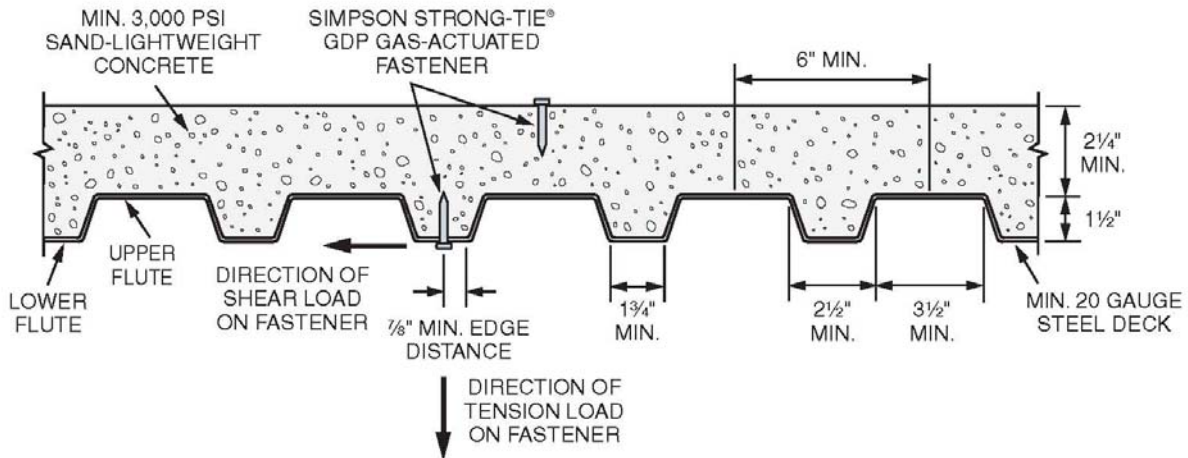


FIGURE 1A—GDP GAS-ACTUATED FASTENER INSTALLATION INTO CONCRETE FILLED 1 1/2-INCH-DEEP COMPOSITE FLOOR DECK

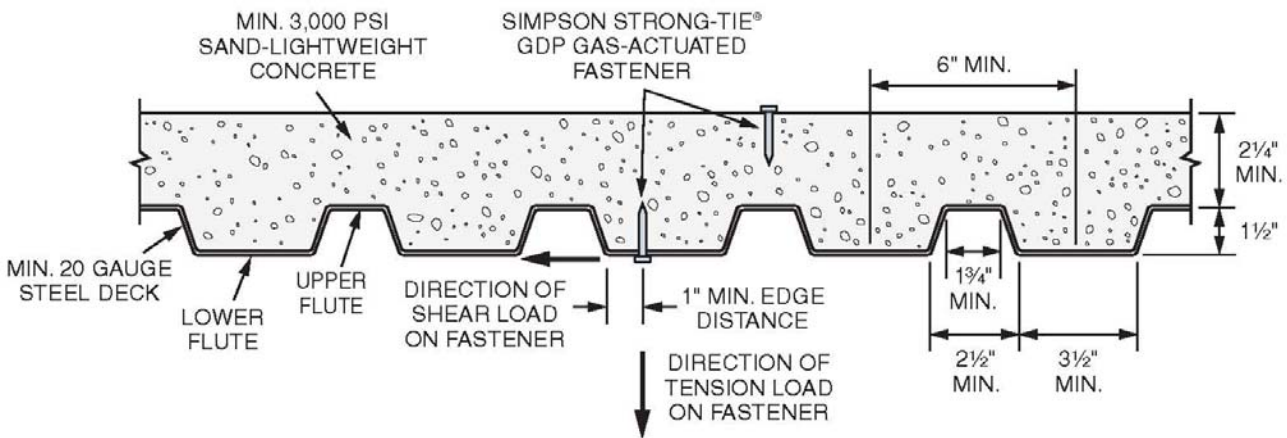


FIGURE 1B—GDP GAS-ACTUATED FASTENER INSTALLATION INTO CONCRETE FILLED INVERTED 1 1/2-INCH-DEEP COMPOSITE FLOOR DECK

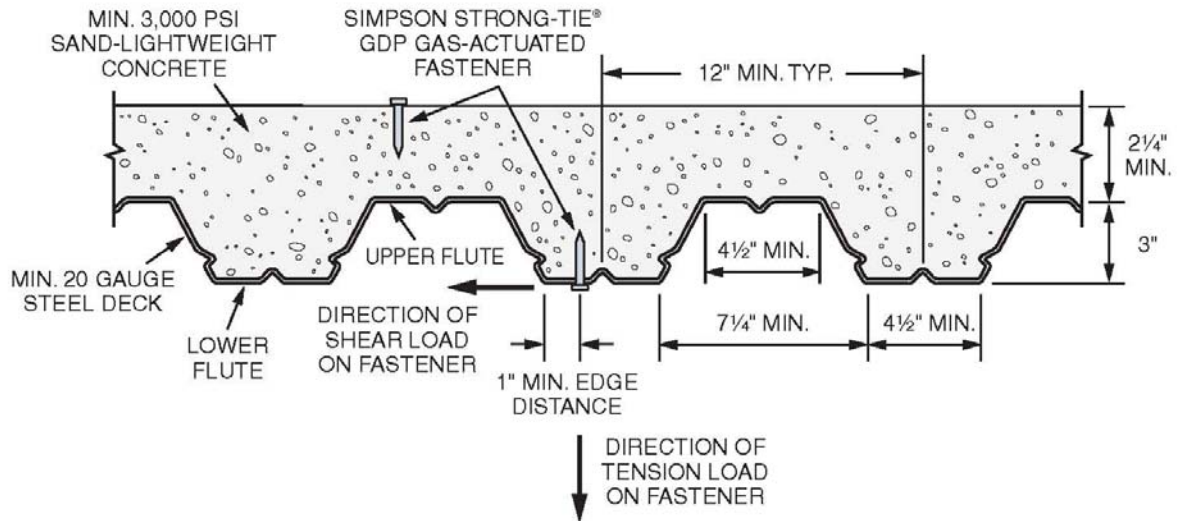


FIGURE 2—GDP GAS-ACTUATED FASTENER INSTALLED IN CONCRETE FILLED 3-INCH-DEEP COMPOSITE FLOOR DECK

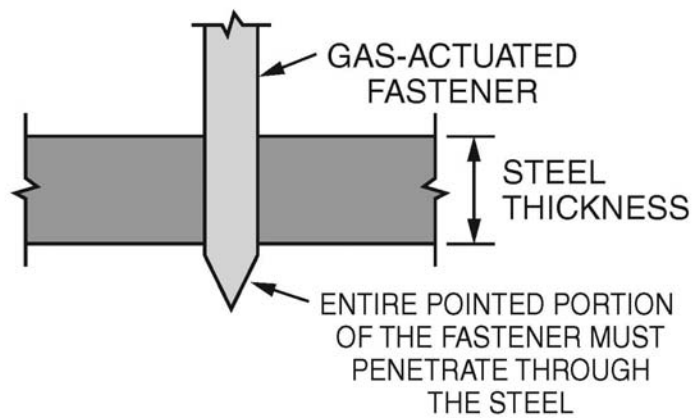


FIGURE 3—FASTENER PENETRATION THROUGH STEEL WHERE REQUIRED



FIGURE 4—COLLATED GDP GAS-ACTUATED FASTENER



FIGURE 5—COLLATED GDPS GAS-ACTUATED FASTENER