

ICC-ES Evaluation Report

ESR-4237

Reissued December 2020

Revised January 2022

This report is subject to renewal December 2022.

DIVISION: 03 00 00—CONCRETE
Section: 03 48 00—Precast Concrete Specialties

DIVISION: 31 00 00—EARTHWORK
Section: 31 60 00—Special Foundations and Load-Bearing Elements

REPORT HOLDER:

PERMA-COLUMN, LLC

ADDITIONAL LISTEES:

MIDWEST PERMA-COLUMN, INC.

PERMA-COLUMN EAST, LLC

TRI STATE PERMA-COLUMN

EVALUATION SUBJECT:

PERMA-COLUMN DECK POSTS: DP4430, DP4440, DP4448, DP4460, DP6630, DP6640, DP6648, DP6660, DP6430, DP6440, DP6448, DP6460

1.0 EVALUATION SCOPE

Compliance with the following codes:

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

Property evaluated:

Structural

2.0 USES

Perma-Column deck posts described in this report are used as pre-cast concrete piers with steel brackets on top for attachment of vertical wood posts in decks. Perma-Column deck posts are installed into holes in the ground and backfilled with suitable compacted soils, wet-poured concrete or a self-leveling and self-compacting cementitious material. Under the IRC, the Perma-Column deck posts may be used where an engineering design is submitted in accordance with Section R301.1.3.

3.0 DESCRIPTION

3.1 General:

The Perma-Column deck posts are factory manufactured precast reinforced concrete posts with a steel “U” shaped

bracket on the top for attaching deck posts. The deck post protrudes above finish grade, to allow for the attachment of a wood post. See Figure 1 for an illustration of a typical deck post.

3.2 Materials:

3.2.1 Concrete: The concrete used for the Perma-Column deck post complies with the requirements shown in Table 19.3.2.1 of ACI 318 for exposure classes F2 and C1, defined in Table 19.3.1.1 of ACI 318. The concrete has a minimum compressive strength (f'_c) of 10,000 psi (70 MPa) at 28 days.

3.2.2 Reinforcement: The steel reinforcing bars used in the Perma-Column deck posts are No. 4 bars complying with ASTM A706 Grade 60.

3.2.3 Bracket: The Perma-Column deck post bracket is manufactured from $1/8$ -inch-thick (3 mm) steel complying with ASTM A1018 SS Grade 40. The bracket is powder coated with a proprietary powder chemistry.

3.2.4 Wood: Wood posts for which the brackets are used, must be made of dimension lumber, solid-sawn timber posts or glued-laminated (glulam) timber, complying with ANSI/AWC National Design Specifications (NDS) for Wood Construction. The wood posts are outside the scope of this report.

3.2.5 Fasteners: The screws used to install wood posts to Perma-Column deck posts must be #14 x 2 inches (50.8 mm) in length, carbon or stainless steel wood screws.

The screws are optionally supplied by Perma-Column. The fasteners are outside the scope of this report.

3.2.6 Fasteners used in contact with preservative-treated or fire-retardant-treated lumber must comply with IBC Section 2304.10.5 and IRC Section R317.3, as applicable. The lumber treater or this evaluation report holder (Perma-Column, LLC), or both, must be contacted for recommendations on the appropriate coating or material to specify for the fasteners as well as the connection capacities of fasteners used with the specific proprietary preservative-treated or fire-retardant-treated lumber.

3.2.7 Foundation: The Perma-Column deck posts are installed into holes in the ground and backfilled with suitable compacted soils, wet-poured concrete or a self-leveling and self-compacting material. The backfill material and foundation are outside the scope of this report.

4.0 DESIGN AND INSTALLATION

4.1 Structural Design:

4.1.1 General: The Perma-Column deck posts must be designed to resist the design loads in accordance with the applicable sections of the IBC.

4.1.2 Design: The reference design values provided in Tables 1 and 2 of this report are for Allowable Stress Design (ASD) method and Load and Resistance Factor Design (LRFD) method. The design values in Table 1 apply to the capacity of the Perma-Column deck posts only, and the design values in Table 2 are for connections between brackets and wood posts. The bracket is not designed to transfer moments between the attached wood member and the Perma-Column deck post. Horizontal shear forces applied to the Perma-Column deck post through the bracket, however, will create internal moments inside the Perma-Column deck post as dictated by standard engineering mechanics. The uplift and horizontal forces applied to the bracket must not exceed the design values specified in Table 2. The calculated internal forces and moments in the Perma-Column deck post must not exceed the design values specified in Table 1.

4.2 Installation:

4.2.1 General:

Perma-Column deck posts must be installed in accordance with Perma-Column's published installation instructions, the applicable code, the approved plans, and this report. If there is a conflict between the plans submitted for approval and this report, this report governs.

4.2.2 Perma-Column Deck Posts Installation:

The Perma-Column deck posts must be placed into holes in the ground with the top concrete end protruding above finish grade no more than 10 inches (254 mm). The wood column must be no less than 8 inches (203 mm) above exposed earth in accordance with IBC Section 2304.12.2.2, except naturally durable or preservative-treated wood columns must be no less than 3 inches (76 mm) above exposed earth. Once in place, the holes must be backfilled with suitable compacted soil, wet-poured concrete, or a self-leveling and self-compacting cementitious material. See Tables 1 and 2 and Figure 1 of this report for deck posts sizes, and design information.

5.0 CONDITIONS OF USE

The Perma-Column deck posts 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 deck posts must be installed in accordance with the applicable code, the approved plans and this report.
- 5.2 Complete plans and calculations demonstrating compliance with this report must be submitted to the code official for approval when required. 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.
- 5.3 The interaction between the soil and the Perma-Column deck post is outside the scope of this report and must be justified to the satisfaction of the code official.

- 5.4 Wood posts, and fasteners must comply, respectively, with Sections 3.2.4 and 3.2.5 of this evaluation report.
- 5.5 Use of Perma-Column deck posts with preservative treated or fire-retardant-treated lumber must be in accordance with Section 3.2.6 of this evaluation report.
- 5.6 The Perma-Column deck posts must not be field modified (e.g. cut, drilled, torched, etc.) in any way.
- 5.7 The Perma-Column deck posts are manufactured at the Perma-Column LLC's facility located in Ossian, Indiana, under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Reports of uplift and shear load tests of DP Series in accordance with ICC-ES Acceptance Criteria for Joist Hangers and Similar Devices (AC13), dated October 2018 as required in Section 1.2.4 of ICC-ES Acceptance Criteria for Steel Connectors for Connecting Light-Frame Construction Members to Concrete (AC398), dated February 2020 (Editorially revised December 2020).
- 6.2 Manufacturer's descriptive literature and installation instructions.
- 6.3 Engineering calculations in accordance with ACI 318 and AISC 360.
- 6.4 Quality documentation in accordance with ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated January 2018.

7.0 IDENTIFICATION

- 7.1 The precast deck posts bear the name of the report holder (Perma-Column, LLC) or listee (Midwest Perma-Column, Inc., Perma-Column East, LLC, or Tri State Perma-Column), Model ID, date of manufacture, and the evaluation report number (ESR-4237).
- 7.2 The report holder's contact information is the following:

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TABLE 1—DECK POSTS¹

LOAD AND RESISTANCE FACTOR DESIGN (LRFD)									
MODEL ID	WIDTH (inch)	DEPTH (inch)	LENGTH (inch)	P _{LRFD} (lbf)	M _{LRFD-x} (ft-lb)	M _{LRFD-z} (ft-lb)	V _{LRFD-x} (lbf)	V _{LRFD-z} (lbf)	T _{LRFD} (lbf)
DP4430	3 ⁵ / ₈	3 ¹ / ₂	30	46,076	1,456	1,400	952	986	956
DP4440	3 ⁵ / ₈	3 ¹ / ₂	40	46,076	1,456	1,400	952	986	956
DP4448	3 ⁵ / ₈	3 ¹ / ₂	48	46,076	1,456	1,400	952	986	956
DP4460	3 ⁵ / ₈	3 ¹ / ₂	60	46,076	1,456	1,400	952	986	956
DP6630	5 ⁵ / ₈	5	30	101,268	2,981	4,048	2,109	2,900	1,658
DP6640	5 ⁵ / ₈	5	40	101,268	2,981	4,048	2,109	2,900	1,658
DP6648	5 ⁵ / ₈	5	48	101,268	2,981	4,048	2,109	2,900	1,658
DP6660	5 ⁵ / ₈	5	60	101,268	2,981	4,048	2,109	2,900	1,658
DP6430	6 ¹ / ₈	5	30	109,556	3,215	4,048	2,297	3,388	1,289
DP6440	6 ¹ / ₈	5	40	109,556	3,215	4,048	2,297	3,388	1,289
DP6448	6 ¹ / ₈	5	48	109,556	3,215	4,048	2,297	3,388	1,289
DP6460	6 ¹ / ₈	5	60	109,556	3,215	4,048	2,297	3,388	1,289
ALLOWABLE STRENGTH DESIGN (ASD)									
MODEL ID	WIDTH (inch)	DEPTH (inch)	LENGTH (inch)	P _{ASD} (lbf)	M _{ASD-x} (ft-lb)	M _{ASD-z} (ft-lb)	V _{ASD-x} (lbf)	V _{ASD-z} (lbf)	T _{ASD} (lbf)
DP4430	3 ⁵ / ₈	3 ¹ / ₂	30	28,798	910	875	595	616	636
DP4440	3 ⁵ / ₈	3 ¹ / ₂	40	28,798	910	875	595	616	636
DP4448	3 ⁵ / ₈	3 ¹ / ₂	48	28,798	910	875	595	616	636
DP4460	3 ⁵ / ₈	3 ¹ / ₂	60	28,798	910	875	595	616	636
DP6630	5 ⁵ / ₈	5	30	63,293	1,863	2,530	1,318	1,813	1,103
DP6640	5 ⁵ / ₈	5	40	63,293	1,863	2,530	1,318	1,813	1,103
DP6648	5 ⁵ / ₈	5	48	63,293	1,863	2,530	1,318	1,813	1,103
DP6660	5 ⁵ / ₈	5	60	63,293	1,863	2,530	1,318	1,813	1,103
DP6430	6 ¹ / ₈	5	30	68,472	2,009	2,553	1,436	2,117	857
DP6440	6 ¹ / ₈	5	40	68,472	2,009	2,553	1,436	2,117	857
DP6448	6 ¹ / ₈	5	48	68,472	2,009	2,553	1,436	2,117	857
DP6460	6 ¹ / ₈	5	60	68,472	2,009	2,553	1,436	2,117	857

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

¹For biaxial bending: $\frac{m_x}{M_x} + \frac{m_y}{M_y} \leq 1$

²The tabulated values account for combined axial compression load and bending moment load. No reduction in axial compression loads and bending moment loads for combined axial compression and bending moment is required.

³For combined tension loads and bending moment loads: $\frac{t}{T} + \frac{m}{M} \leq 1$

⁴See notations below for design properties:

- P_{LRFD} = Maximum compression capacity (ΦP_n) of the deck post based on Load and Resistance Factor Design (LRFD).
- P_{ASD} = Maximum compression capacity (P_n/Ω) of the deck post based on Allowable Strength Design (ASD).
- M_{LRFD-x} = Maximum moment capacity (ΦM_n) of the deck post about the x-axis based on LRFD.
- M_{ASD-x} = Maximum moment capacity (M_n/Ω) of the deck post about the x-axis based on ASD.
- M_{LRFD-z} = Maximum moment capacity (ΦM_n) of the deck post about the z-axis based on LRFD.
- M_{ASD-z} = Maximum moment capacity (M_n/Ω) of the deck post about the z-axis based on ASD.
- V_{LRFD-x} = Maximum shear capacity (ΦV_n) of the deck post parallel to the x-axis based on LRFD.
- V_{ASD-x} = Maximum shear capacity (V_n/Ω) of the deck post parallel to the x-axis based on ASD.
- V_{LRFD-z} = Maximum shear capacity (ΦV_n) of the deck post parallel to the z-axis based on LRFD.
- V_{ASD-z} = Maximum shear capacity (P_n/Ω) of the deck post parallel to the z-axis based on ASD.
- T_{LRFD} = Maximum tension capacity (ΦP_n) of the deck post based on LRFD.
- T_{ASD} = Maximum tension capacity (P_n/Ω) of the deck post based on ASD.
- m = Design moment load.
- t = Design tension load.

TABLE 2—REFERENCE DESIGN VALUES PERMA-COLUMN DECK POST ANCHOR BRACKETS^{1,2,3}

MODEL NO.	BRACKET DIMENSIONS			THICKNESS OF WOOD MEMBER	FASTENERS ⁴		ASD (C _D = 1.6)			LRFD (λ = 1.0)		
	W (inch)	D (inch)	H (inch)		Qty	Screw	F ₁ ⁴ (lbf)	F ₂ ⁴ (lbf)	F _{uplift} (lbf)	F ₁ ⁴ (lbf)	F ₂ ⁴ (lbf)	F _{uplift} (lbf)
DP4430	3 ⁵ / ₈	3 ¹ / ₂	5	3 ¹ / ₂	8	#14 X 2-inch	595	616	636	952	986	956
DP4440	3 ⁵ / ₈	3 ¹ / ₂	5	3 ¹ / ₂	8	#14 X 2-inch	595	616	636	952	986	956
DP4448	3 ⁵ / ₈	3 ¹ / ₂	5	3 ¹ / ₂	8	#14 X 2-inch	595	616	636	952	986	956
DP4460	3 ⁵ / ₈	3 ¹ / ₂	5	3 ¹ / ₂	8	#14 X 2-inch	595	616	636	952	986	956
DP6630	5 ⁵ / ₈	5	7	5 ¹ / ₂	10	#14 X 2-inch	1,318	1,813	1,103	2,109	2,900	1,658
DP6640	5 ⁵ / ₈	5	7	5 ¹ / ₂	10	#14 X 2-inch	1,318	1,813	1,103	2,109	2,900	1,658
DP6648	5 ⁵ / ₈	5	7	5 ¹ / ₂	10	#14 X 2-inch	1,318	1,813	1,103	2,109	2,900	1,658
DP6660	5 ⁵ / ₈	5	7	5 ¹ / ₂	10	#14 X 2-inch	1,318	1,813	1,103	2,109	2,900	1,658
DP6430	6 ¹ / ₈	5	7	6	10	#14 X 2-inch	1,436	2,117	857	2,297	3,388	1,289
DP6440	6 ¹ / ₈	5	7	6	10	#14 X 2-inch	1,436	2,117	857	2,297	3,388	1,289
DP6448	6 ¹ / ₈	5	7	6	10	#14 X 2-inch	1,436	2,117	857	2,297	3,388	1,289
DP6460	6 ¹ / ₈	5	7	6	10	#14 X 2-inch	1,436	2,117	857	2,297	3,388	1,289

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

¹The reference design values are for Allowable Strength Design (ASD) method and the Load and Resistance Factor Design (LRFD) method and have been increased for wind or earthquake loading with no further increase allowed. The ASD values must be reduced when other load durations govern.

²Download shall be checked and limited by the design capacity of the foundation, deck post or wood column.

³Screws must comply with Section 3.2.5 of this evaluation report and used together in order to achieve the tabulated allowable loads.

⁴Lateral load, F₁, is perpendicular to the axis of the fasteners in x-x direction; lateral load, F₂, is parallel to the axis of the fasteners in z-z direction.

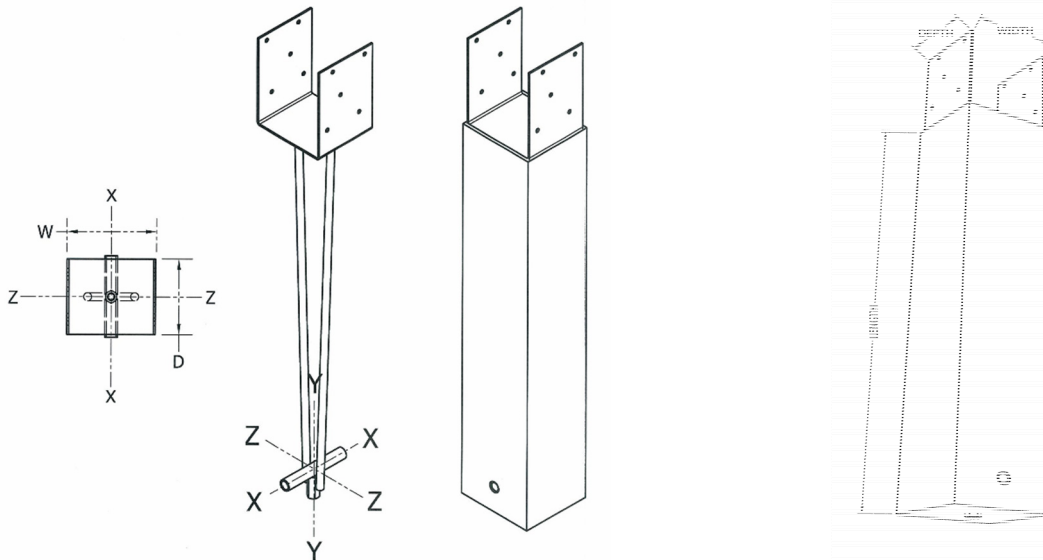


FIGURE 1—PERMA-COLUMN DECK POST

DIVISION: 03 00 00—CONCRETE

Section: 03 48 00—Precast Concrete Specialties

DIVISION: 31 00 00—EARTHWORK

Section: 31 60 00—Special Foundations and Load-Bearing Elements

REPORT HOLDER:

PERMA-COLUMN, LLC

EVALUATION SUBJECT:

PERMA-COLUMN DECK POSTS: DP4430, DP4440, DP4448, DP4460, DP6630, DP6640, DP6648, DP6660, DP6430, DP6440, DP6448, DP6460

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Perma-Column Deck Posts: DP4430, DP4440, DP4448, DP4460, DP6630, DP6640, DP6648, DP6660, DP6430, DP6440, DP6448, DP6460 recognized in ICC-ES evaluation report ESR-4237, has also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2016 *California Building Code* (CBC)
- 2016 *California Residential Code* (CRC)

2.0 CONCLUSIONS

The Perma-Column Deck Posts: DP4430, DP4440, DP4448, DP4460, DP6630, DP6640, DP6648, DP6660, DP6430, DP6440, DP6448, DP6460, described in Sections 2.0 through 7.0 of the evaluation report ESR-4237, complies with CBC Chapters 19 and 19A and CRC Section R301.1.3 provided the design and installation are in accordance with the 2015 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of the CBC Chapters 16, 16A, 17, 17A, 18, 18A, 19 and 19A, as applicable.

3.0 CONDITIONS OF USE

The Perma-Column Deck Posts: DP4430, DP4440, DP4448, DP4460, DP6630, DP6640, DP6648, DP6660, DP6430, DP6440, DP6448, DP6460, described in this evaluation report must comply with the following condition:

The ASD capacities described in the evaluation report must not be increased for seismic or wind load combinations.

This supplement expires concurrently with the evaluation report ESR-4237, reissued December 2020 and revised January 2022.

DIVISION: 03 00 00—CONCRETE

Section: 03 48 00—Precast Concrete Specialties

DIVISION: 31 00 00—EARTHWORK

Section: 31 60 00—Special Foundations and Load-Bearing Elements

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PERMA-COLUMN, LLC

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Applicable code editions:

- 2017 Florida Building Code—Building
- 2017 Florida Building Code—Residential

2.0 CONCLUSIONS

The Perma-Column Deck Posts: DP4430, DP4440, DP4448, DP4460, DP6630, DP6640, DP6648, DP6660, DP6430, DP6440, DP6448, DP6460, described in Sections 2.0 through 7.0 of the evaluation report ESR-4237, complies with the *Florida Building Code—Building* and *Florida Building Code—Residential*, provided the design and installation are in accordance with the 2015 *International Building Code*® provisions noted in the evaluation report.

Use of the Perma-Column Deck Posts: DP4430, DP4440, DP4448, DP4460, DP6630, DP6640, DP6648, DP6660, DP6430, DP6440, DP6448, DP6460 has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and *Florida Building Code—Residential*.

For products falling under Florida Rule 9N-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

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