

ICC-ES Evaluation Report

ESR-4651

Reissued April 2024


This reports also contains:

-CBC Supplement

Subject to renewal April 2026

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<p>DIVISION: 05 00 00—METALS</p> <p>Section: 05 12 00—Structural Steel Framing</p>	<p>REPORT HOLDER:</p> <p>STEELCON FABRICATION, INC.</p>	<p>EVALUATION SUBJECT:</p> <p>SIN BEAMS</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021 and 2018 [International Building Code® \(IBC\)](#)
- 2021 and 2018 [International Residential Code \(IRC\)](#)

Properties evaluated:

- Structural
- Fire-resistance ratings

2.0 USES

SIN Beams are flexural members that are used as floor and roof beams and girders. For structures regulated under the IRC, the SIN Beams may be used when addressed in an engineered design in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 General:

SIN Beams are fully fabricated steel framing members. Steel plates are used for the flanges and corrugated steel sheet material is used for the web. The sheet corrugations follow a sinusoidal curve. The web is continuously welded to the flanges on one side of the web using an automated process. See [Figure 1](#) for an image of multiple SIN Beams installed in a frame.

3.2 SIN Beam Materials:

SIN Beam flange and web material complies with both CSA G40.21 Grade 350W and ASTM A572 Grade 50. SIN Beams are available bare (without any coating), with a shop primer or with hot-dip galvanization.

3.3 SIN Beam Dimensions:

SIN Beams are available with web depths ranging from 13.1 to 59.1 inches (333 to 1500 mm), web thicknesses ranging from 0.0748 to 0.239 inch (1.90 to 6.07 mm), flange widths ranging from 5 to 17.7 inches (127 to 450 mm) and flange thickness ranging from 0.250 to 1.50 inches (6.35 to 38.1 mm).

SIN Beam designations identify the web depth and thickness and the flange width and thickness. For example, in beam designation WTC 24 / 10 x 1, “C” denotes the web thickness, “24” is the nominal web depth in inches, “10” is the flange width in inches and “1” is the flange thickness in inches. See [Table 1](#) for product ranges and a designation key.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 Structural: SIN Beams have been evaluated for use as flexural members. Only SIN Beams with uniform depth and equal size flanges have been evaluated. SIN Beams with an h/t ratio for the web of more than 525 are outside the scope of this evaluation.

SIN Beams have not been evaluated for bearing capacity or web crippling capacity. When concentrated loads or bearing supports are used, web stiffeners are required and must be designed in accordance with AISC 360.

Design properties for each available SIN Beam configuration are detailed in the Steelcon *SIN Beam Technical Guide, US Edition, Corrugated Web Steel Beam*, dated October 2022 (Steelcon Guide), which accompanies this report. See [Table 2](#) for reference to design information that has been evaluated. Pages of the Steelcon Guide which are not referenced in [Table 2](#) are outside the scope of this evaluation. Evaluation of section properties C_w and J, are also outside the scope of this report.

At a minimum, design of SIN Beam flexural members must consider the unbraced length of the compression flange; the flexural strength determined in accordance with the Steelcon Guide; the shear strength determined in accordance with the Steelcon Guide; and the deflection of the beam. The beam deflection must be determined considering the sum of deflection due to flexure and deflection due to shear deformation of the webs.

4.1.2 Fire-resistance Ratings: See [ESL-1245](#).

4.2 Installation:

The SIN Beams must be erected in accordance with the applicable provisions of the IBC for structural steel and this report. Each SIN Beam is designed and fabricated by the manufacturer for a particular location within each project. SIN Beams must be erected in the location indicated in the construction documents. A copy of the construction documents must be available on the jobsite at all times during installation.

4.3 Certification and Special Inspection:

Special inspections during fabrication of SIN Beams are not required, since quality control procedures have been documented by the manufacturer and the manufacturing facility is subject to periodic auditing as required by IBC Section 1704.2.5.1. The manufacturer must submit a certificate of compliance to the project owner, for submittal to the building official, in accordance with IBC Section 1704.2.5.1.

Special inspection of steel structures which include the SIN Beams must be in accordance with AISC 360, as directed by IBC Section 1705.2.

5.0 CONDITIONS OF USE:

SIN Beams 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 SIN Beams must be fabricated, designed, identified and erected as described in this report.
- 5.2 The minimum uncoated base-metal thickness of the SIN Beam web must be at least 95 percent of the design web thickness (t_w) noted in [Table 1](#). The web must have a protective coating as specified in Section A4.1.1 of the North American Standard for Cold-Formed Steel Structural Framing (AISI S240).
- 5.3 Design loads for the SIN Beams must not exceed the available flexural and shear strengths described in Section 4.1.1.
- 5.4 Expected beam deflection determined must not exceed the applicable deflection limit in IBC Table 1604.3.
- 5.5 Construction documents and calculations demonstrating compliance with Sections 5.2 and 5.3 must be submitted to the code official for each project at the time of permit application. The calculations must be prepared by a registered design professional where required by statutes of the jurisdiction in which the project is to be constructed.
- 5.6 The evaluation scope is limited to flexural and shear capacities of the SIN Beams. Other aspects such as connections, splices, bearing and web crippling are outside the scope of this evaluation report.
- 5.7 The SIN Beams are fabricated under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

- 6.1 Engineering analysis addressing determination of section properties, flexural strength and shear strength, signed and sealed by a registered design professional.
- 6.2 Quality documentation in accordance with the [ICC-ES Acceptance Criteria for Quality Documentation \(AC10\)](#) dated May 2022, and the requirements of Sections N2 and N3 of AISC 360.

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4651) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, SIN Beams are identified with the product name (SIN Beam), the applicable SIN Beam designation and the project-specific beam identification number for reference to the construction documents.
- 7.3 The report holder’s contact information is the following:

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TABLE 1—PRODUCT RANGES AND DESIGNATIONS
WTα #1 / #2 X #3

WT	α		#1		#2	#3	
	Designation	Web Thickness, t_w (inch)	Designation	Web Depth, h_c (inches)	Flange Width, b_f (inches)	Available Flange Thicknesses, t_f (inches)	
All SIN Beams	A	0.0747	13	13.1	5	1/4	
	B	0.105	20	19.7	6	1/4, 5/16, 3/8, 1/2, 3/4	
	C	0.120	24	24.0	7	3/8, 1/2	
	F	0.164	30	29.5	8	1/2, 5/8, 3/4, 1	
	H	0.194	36	35.4	10	3/4, 1, 1-1/4	
	K	0.239	40	39.4	11	1	
				48	48.0	12	1, 1-1/4
				60	59.1	13	1
						14	1, 1-1/4
						16	1, 1-1/4
						17.7	1-1/4

For SI: 1 inch = 25.4 mm.

TABLE 2—INDEX TO DESIGN INFORMATION

DESIGN INFORMATION	BEAM DEPTH	PAGE NO.
Section properties	WT 13	3-3 and 3-4
	WT 20	3-5 and 3-6
	WT 24	3-7 and 3-8
	WT 30	3-9 and 3-10
	WT 36	3-11 and 3-12
	WT 40	3-13 and 3-14
	WT 48	3-15 and 3-16
	WT 60	3-17 and 3-18
Allowable Flexural Strength (ASD) for various unbraced lengths	WT 13	3-19
	WT 20	3-20
	WT 24	3-21
	WT 30	3-22
	WT 36	3-23
	WT 40	3-24
	WT 48	3-25
	WT 60	3-26
Design Flexural Strength (LRFD) for various unbraced lengths	WT 13	3-27
	WT 20	3-28
	WT 24	3-29
	WT 30	3-30
	WT 36	3-31
	WT 40	3-32
	WT 48	3-33
	WT 60	3-34
Allowable Shear Strength (ASD) Design Shear Strength (LRFD)	All	3-35



FIGURE 1—SIN BEAM FRAMING

DIVISION: 05 00 00—METALS
Section: 05 12 00—Structural Steel Framing

REPORT HOLDER:

STEELCON FABRICATION, INC.

EVALUATION SUBJECT:

SIN BEAMS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that SIN Beams, described in ICC-ES evaluation report ESR-4651P, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2022 California Building Code (CBC)

For evaluation of applicable Chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- California Residential Code (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The SIN Beams, described in Sections 2.0 through 7.0 of the evaluation report ESR-4651P, comply with CBC Chapter 22, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 16, 17, and 22 as applicable.

2.1.1 OSHPD:

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CRC:

The SIN Beams, described in Sections 2.0 through 7.0 of the evaluation report ESR-4651P, comply with CRC Chapter 3, provided the design and installation are in accordance with the 2021 *International Residential Code*® (IRC) provisions noted in the evaluation report.

This supplement expires concurrently with the evaluation report, reissued April 2024.