

ICC-ES Evaluation Report

ESR-5853

Issued December 2025

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DIVISION: 05 00 00—METALS Section: 05 40 00—Cold-Formed Metal Framing Section: 05 41 00—Structural Metal Stud Framing DIVISION: 09 00 00—FINISHES Section: 09 22 16.13—Non-Structural Metal Stud Framing	REPORT HOLDER: KING STEEL STUDS, INC.	EVALUATION SUBJECT: COLD-FORMED STEEL FRAMING	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2024 [International Building Code® \(IBC\)](#)

Property evaluated:

- Structural

2.0 USES

Members with a minimum G60 or equivalent coating (studs and tracks) as allowed by the North American Standard for Cold-Formed Steel Structural Framing (AISI S240) may be used as structural members.

Members with a minimum G40 or equivalent coating may be used as nonstructural members as defined by the North American Standard for Cold-Formed Steel Framing – Nonstructural Members (AISI S220).

3.0 DESCRIPTION

3.1 General:

The steel framing described in this report, consisting of structural C-shapes (studs) and tracks, is fabricated from coils of cold-rolled steel. The C-shapes are manufactured with or without web punch-outs; all other framing members (tracks) are manufactured without web punch-outs. When provided in the nonstructural C-shapes, punchouts measuring 1.52-inch by 2.5-inch (39 by 64 mm) are provided along centerline of webs. When provided in the structural C-shapes, punch-outs measuring up to 1.5-inch by 4-inch (38 by 102 mm) are located along the centerline of the webs. The minimum distance between the end of the C-shape and the near edge of the web punch-out is 10 inches (254 mm). The minimum on-center spacing between punch-outs is 24 inches (610 mm). See [Tables 1](#) and [2](#) and [Figure 1](#) for the evaluated framing sections and their dimensions. Minimum and design thicknesses of framing members are provided in [Table 3](#).

3.2 Materials:

Studs and tracks are cold-formed from galvanized steel coils conforming to ASTM A653, SS Grade 33 or Grade 50, Class 1. Structural steel members have a minimum metallic coating of G60 in accordance with ASTM A653. Nonstructural steel members have a minimum metallic coating of G40 in accordance with ASTM A653.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The section properties indicated in [Tables 4](#) and [5](#) have been determined in accordance with the applicable edition of the North American Specification for Design of Cold-formed Steel Structural Members (AISI S100). Effective section properties for the studs, except for V_{ag} , were calculated considering the effect of punch-outs. The allowable moments as indicated in [Tables 4](#) and [5](#) are for use with Allowable Strength Design (ASD), and are for flexural members installed with the compression flange continuously braced. For other conditions of compression flange bracing, the allowable moment must be determined in accordance with the applicable edition of AISI S100. Allowable concentrated loads and reactions based on web crippling are shown in [Table 6](#), for related web crippling loading conditions. The design of flexural members used for framing of nonload-bearing interior walls, curtain walls, load-bearing walls, floors, or ceilings must be in accordance with the IBC Section 2204, using the section properties and design values referenced in this evaluation report. The design must address other aspects such as, connections, combined bending and web crippling, and combined bending and shear, in accordance with AISI S100.

4.2 Installation:

The framing members must be installed in accordance with 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. The approved plans must be available at the jobsite at all times.

5.0 CONDITIONS OF USE:

The King Steel Studs cold-formed steel framing described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Minimum uncoated steel thickness of the framing members as delivered to the jobsite must be at least as noted in [Table 3](#).
- 5.2 The construction documents prepared or reviewed by a registered design professional, where required by the statutes of the jurisdiction in which the project is to be constructed specifying the cold-formed steel framing members, must indicate compliance with this evaluation report and applicable codes and must be submitted to the code official for approval.
- 5.3 The framing members are manufactured under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the [ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members \(AC46\)](#), dated October 2024.

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-5853) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, at a spacing not exceeding 96 inches (2440 mm) on center, each framing member is stamped with the member designation as provided in [Tables 1](#) and [2](#); the minimum yield strength (for nonstructural members, if other than 33 ksi, and for structural members); and the coating designation (for nonstructural members, if other than G40, and for structural members). Nonstructural members must have the designation "NS".
- 7.3 The report holder's contact information is the following:

KING STEEL STUDS, INC.
605 NEWSOME ROAD
KING, NORTH CAROLINA 27021
(336)409-9250
www.kingsteelstuds.com

TABLE 1—C-SHAPES⁴

MEMBER ¹	WEB ² (in)	FLANGE (in)	LIP (in)	THICKNESS ³ (mils)	GROSS AREA (in ²)	WEIGHT (lb/ft)
250DS125-18	2.500	1.250	0.281	18	0.1001	0.341
250DS125-30	2.500	1.250	0.281	30	0.1646	0.560
250DS125-33	2.500	1.250	0.281	33	0.1821	0.620
250S162-43	2.500	1.625	0.500	43	0.2890	0.984
250S162-54	2.500	1.625	0.500	54	0.3582	1.219
362DS125-18	3.625	1.250	0.281	18	0.1213	0.413
362DS125-30	3.625	1.250	0.281	30	0.1997	0.680
362DS125-33	3.625	1.250	0.281	33	0.2210	0.752
362S162-33	3.625	1.625	0.500	33	0.2621	0.892
362S162-43	3.625	1.625	0.500	43	0.3398	1.156
362S162-54	3.625	1.625	0.500	54	0.4219	1.436
600DS125-18	6.000	1.250	0.281	18	0.1659	0.565
600DS125-30	6.000	1.250	0.281	30	0.2738	0.932
600DS125-33	6.000	1.250	0.281	33	0.3032	1.032
600S162-43	6.000	1.625	0.500	43	0.4469	1.521
600S162-54	6.000	1.625	0.500	54	0.5563	1.893

For SI: 1 inch = 25.4 mm, 1 lb/ft = 1.4882 kg/m

¹Member designation including **DS** applies to nonstructural members. Members designation including **S** applies to structural members.

²Web height is measured from outside face to outside face of flanges.

³See Table 3 for design thickness and minimum base metal thickness.

⁴When provided, factory punchouts will be located along the centerline of the webs of the members and will have a minimum center-to-center spacing of 24 inches and 10 inches from end of stud.

TABLE 2—TRACKS

MEMBER ¹	WEB ² (in)	FLANGE (in)	THICKNESS ³ (mils)	GROSS AREA (in ²)	WEIGHT (lb/ft)
250DT125-18	2.620	1.250	18	0.0941	0.320
250DT125-30	2.640	1.250	30	0.1559	0.531
250T125-30	2.640	1.250	30	0.1559	0.531
250DT125-33	2.650	1.250	33	0.1729	0.588
250T125-43	2.660	1.250	43	0.2251	0.766
250T125-54	2.698	1.250	54	0.2823	0.961
362DT125-18	3.750	1.250	18	0.1213	0.413
362DT125-30	3.770	1.250	30	0.1997	0.680
362DT125-33	3.770	1.250	33	0.2210	0.752
362T125-33	3.770	1.250	33	0.2118	0.721
362T125-43	3.790	1.250	33	0.2621	0.892
362T125-54	3.823	1.250	43	0.3398	1.156
600DT125-18	6.120	1.250	18	0.1599	0.544
600DT125-30	6.140	1.250	30	0.2651	0.902
600T125-30	6.140	1.250	30	0.2651	0.902
600DT125-33	6.150	1.250	33	0.2940	1.000
600T125-43	6.160	1.250	43	0.3829	1.303
600T125-54	6.198	1.250	54	0.4804	1.635

For SI: 1 inch = 25.4 mm, 1 lb/ft = 1.4882 kg/m

¹Member designation including **DT** applies to nonstructural members. Members designation including **T** applies to structural members.

²Web height is measured from outside face to outside face of flanges.

³See Table 3 for design thickness and minimum base metal thickness.

TABLE 3—UNCOATED STEEL THICKNESS

THICKNESS DESIGNATION (mils)	DESIGN THICKNESS (in)	MINIMUM BASE METAL THICKNESS ¹ (in)
18	0.0188	0.0179
30	0.0312	0.0296
33	0.0346	0.0329
43	0.0451	0.0428
54	0.0566	0.0538

For SI: 1 inch = 25.4 mm.

¹Minimum thickness represents 95 percent of the design thickness and is the minimum acceptable thickness of the uncoated steel delivered to the jobsite.

TABLE 4—C-SHAPE PROPERTIES²

MEMBER	F _y (ksi)	GROSS PROPERTIES ³					EFFECTIVE PROPERTIES ^{4,5}						TORSIONAL PROPERTIES ³					
		I _{xx} (in ⁴)	S _{xx} (in ³)	R _x (in)	I _{yy} (in ⁴)	R _y (in)	I _{xx} (in ⁴)	S _{xx} (in ³)	M _{a-L} (in-k)	M _{a-D} (in-k)	V _{ag} (lb)	V _{aNet} (lb)	Jx1000 (in ⁴)	C _w (in ⁶)	X _o (in)	m (in)	R _o (in)	β
250DS125-18	50	0.1029	0.0823	1.0139	0.0212	0.4597	0.0968	0.0518	1.55	1.51	258	98	0.0118	0.0287	-0.9756	0.5840	1.4802	0.5656
250DS125-30	33	0.1674	0.1339	1.0083	0.0340	0.4541	0.1674	0.1153	2.28	2.29	833	188	0.0534	0.0454	-0.9615	0.5759	1.4654	0.5695
250DS125-33	33	0.1845	0.1476	1.0067	0.0373	0.4526	0.1845	0.1321	2.61	2.56	1024	208	0.0727	0.0497	-0.9576	0.5737	1.4613	0.5706
250S162-43	33	0.3020	0.2416	1.0222	0.1110	0.6197	0.3020	0.2315	4.57	4.45	1265	199	0.1960	0.1843	-1.4573	0.8523	1.8848	0.4022
250S162-54	50	0.3697	0.2958	1.0519	0.1348	0.6134	0.3697	0.2743	8.21	8.08	2353	276	0.3825	0.2229	-1.4429	0.8446	1.8683	0.4035
362DS125-18	50	0.2424	0.1337	1.4138	0.0238	0.4433	0.2319	0.0770	2.31	2.24	173	162	0.0143	0.0640	-0.8511	0.5278	1.7087	0.7519
362DS125-30	33	0.3957	0.2183	1.4076	0.0383	0.4376	0.3957	0.1783	3.52	3.50	794	444	0.0648	0.1019	-0.8378	0.5200	1.6955	0.7558
362DS125-33	33	0.4368	0.2410	1.4059	0.0420	0.4361	0.4368	0.2069	4.09	4.02	1024	516	0.0882	0.1117	-0.8342	0.5179	1.6919	0.7569
362S162-33	33	0.5512	0.3041	1.4501	0.0993	0.6155	0.5512	0.2677	5.29	5.21	1024	521	0.1046	0.2969	-1.3084	0.7887	2.0478	0.5918
362S162-43	33	0.7098	0.3916	1.4453	0.1268	0.6109	0.7098	0.3716	7.34	7.32	1740	676	0.2304	0.3759	-1.2966	0.7819	2.0355	0.5942
362S162-54	50	0.8727	0.4815	1.4382	0.1541	0.6044	0.8727	0.4436	13.28	12.93	3373	1016	0.4505	0.4569	-1.2825	0.7745	2.0196	0.5967
600DS125-18 ¹	50	0.8052	0.2684	2.2029	0.0272	0.4052	NA	NA	NA	NA	NA	NA	0.0195	0.1988	-0.6771	0.4408	2.3400	0.9163
600DS125-30	33	1.3198	0.4399	2.1955	0.0437	0.3995	1.2784	0.3516	6.95	5.99	468	468	0.0888	0.3178	-0.6656	0.4338	2.3287	0.9183
600DS125-33	33	1.4587	0.4862	2.1934	0.0480	0.3980	1.4259	0.4109	8.12	6.95	638	638	0.1210	0.3487	-0.6624	0.4318	2.3256	0.9189
600S162-43	33	2.3158	0.7719	2.2764	0.1484	0.5762	2.3158	0.7719	15.25	13.05	1416	1240	0.3030	1.0952	-1.0617	0.6704	2.5771	0.8303
600S162-54	50	2.8604	0.9535	2.2675	0.1805	0.5695	2.8604	0.9272	27.76	23.16	2823	1947	0.5941	1.3372	-1.0487	0.6634	2.5623	0.8325

For SI: 1 inch = 25.4 mm; 1 lb/lin ft = 14.5939 N/m; 1 kip-in = 112.99 N-m; 1 ksi = 6.89 Mpa; 1 lb = 4.45 N.

¹ "NA": Not applicable. Web height-to-thickness exceeds 300. Effective Properties are outside the scope of this evaluation report.

² When provided, factory punchouts will be located along the centerline of the webs of the members and will have a minimum center-to-center spacing of 24 inches.

³ Gross and torsional properties are based on the full, unreduced cross-section, away from web punchouts.

⁴ Use the effective moment of inertia for deflection calculation.

⁵ Allowable moment is lesser of M_{a-L} and M_{a-D}. Distortional buckling is based on an assumed k_φ = 0. M_{a-L} and M_{a-D} are based on fully braced compression flange. For other conditions of compression flange bracing, the allowable moment must be determined in accordance with AISI S100.

SYMBOLS

I_{xx} = Strong axis moment of inertia

m = Distance from shear center to mid-plane of web

J = St. Venant torsion constant

V_{aNet} = Allowable shear of punched web section

I_{yy} = Weak axis moment of inertia

R_y = Weak axis radius of gyration

M_{a-L} = Strong axis allowable bending moment

S_{xx} = Strong axis section modulus

R_o = Torsional radii of gyration

C_w = Torsional warping constant

X_o = Distance from shear center to the centroid along the principal X-axis

M_{a-D} = Allowable moment based on distortional buckling

V_{ag} = Allowable shear of unpunched web section

R_x = Strong axis radius of gyration

β = Torsional flexural constant

TABLE 5—TRACK PROPERTIES

MEMBER	F _y (ksi)	GROSS PROPERTIES					EFFECTIVE PROPERTIES ^{2,3}					TORSIONAL PROPERTIES					
		I _{xx} (in ⁴)	S _{xx} (in ³)	R _x (in)	I _{yy} (in ⁴)	R _y (in)	I _{xx} (in ⁴)	S _{xx} (in ³)	M _{a-L} (in-k)	V _{ag} (lb)	Jx1000 (in ⁴)	C _w (in ⁶)	X _o (in)	m (in)	R _o (in)	β	
250DT125-18	50	0.1040	0.0794	1.0516	0.0150	0.3995	0.0756	0.0369	1.10	245	0.0111	0.0180	-0.7674	0.4596	1.3618	0.6824	
250DT125-30	33	0.1729	0.1310	1.0531	0.0246	0.3972	0.1455	0.0896	1.77	833	0.0506	0.0297	-0.7615	0.4564	1.3589	0.6860	
250T125-30	33	0.1729	0.1310	1.0531	0.0246	0.3972	0.1455	0.0896	1.77	833	0.0506	0.0297	-0.7615	0.4564	1.3589	0.6860	
250DT125-33	33	0.1919	0.1450	1.0535	0.0272	0.3966	0.1657	0.1029	2.03	1024	0.0690	0.0328	-0.7599	0.4555	1.3582	0.6869	
250T125-43	33	0.2504	0.1882	1.0548	0.0350	0.3946	0.2310	0.1472	2.91	1356	0.1526	0.0425	-0.7550	0.4529	1.3558	0.6899	
250T125-54	50	0.3183	0.2359	1.0618	0.0434	0.3923	0.2967	0.1884	5.64	2563	0.3015	0.0539	-0.7486	0.4490	1.3571	0.6957	
362DT125-18	50	0.2379	0.1270	1.4370	0.0166	0.3801	0.1757	0.0536	1.60	167	0.0136	0.0416	-0.6646	0.4133	1.6282	0.8334	
362DT125-30	33	0.3950	0.2098	1.4380	0.0273	0.3778	0.3391	0.1525	3.01	762	0.0620	0.0684	-0.6594	0.4103	1.6265	0.8356	
362DT125-33	33	0.4381	0.2324	1.4383	0.0301	0.3772	0.3845	0.1740	3.44	1024	0.0845	0.0756	-0.6580	0.4095	1.6260	0.8363	
362T125-33	33	0.4381	0.2324	1.4383	0.0301	0.3772	0.3845	0.1740	3.44	1024	0.0845	0.0756	-0.6580	0.4095	1.6260	0.8363	
362T162-43	33	0.5713	0.3018	1.4392	0.0388	0.3752	0.5308	0.2449	4.84	1740	0.1870	0.0978	-0.6535	0.4070	1.6246	0.8382	
362T162-54	50	0.7226	0.3780	1.4452	0.0481	0.3729	0.6777	0.3120	9.34	3373	0.3695	0.1231	-0.6480	0.4035	1.6271	0.8414	
600DT125-18 ¹	50	0.7763	0.2536	2.2036	0.0187	0.3418	NA	NA	NA	NA	0.0188	0.1310	-0.5220	0.3408	2.2902	0.9481	
600DT125-30	33	1.2879	0.4195	2.2040	0.0306	0.3396	1.0951	0.2489	4.92	456	0.0860	0.2150	-0.5177	0.3382	2.2893	0.9489	
600T125-30	33	1.2879	0.4195	2.2040	0.0306	0.3396	1.0951	0.2489	4.92	456	0.0860	0.2150	-0.5177	0.3382	2.2893	0.9489	
600DT125-33	33	1.4282	0.4648	2.2042	0.0338	0.3390	1.2578	0.2970	5.87	622	0.1173	0.2377	-0.5165	0.3375	2.2891	0.9491	
600T125-43	33	1.8611	0.6041	2.2046	0.0435	0.3371	1.7683	0.4612	9.11	1377	0.2596	0.3069	-0.5129	0.3353	2.2884	0.9498	
600T125-54	50	2.3442	0.7564	2.2090	0.0539	0.3349	2.2411	0.5923	17.73	2728	0.5130	0.3840	-0.5084	0.3324	2.2913	0.9508	

For SI: 1 inch = 25.4 mm; 1 lb/lin ft = 14.5939 N/m; 1 kip-in = 112.99 N-m; 1 ksi = 6.89 Mpa; 1 lb = 4.45 N.

¹ "NA": Not applicable. Web height-to-thickness exceeds 300. Effective Properties are outside the scope of this evaluation report.

² Use the effective moment of inertia for deflection calculation.

³ M_{a-L} is based on fully braced compression flange. For other conditions of compression flange bracing, the allowable moment must be determined in accordance with AISI S100.

SYMBOLS

I_{xx} = Strong axis moment of inertia
 S_{xx} = Strong axis section modulus
 R_o = Torsional radii of gyration
 β = Torsional flexural constant
 R_y = Weak axis radius of gyration

M_{a-L} = Strong axis allowable bending moment
 V_{ag} = Allowable shear of unpunched web section
 R_x = Strong axis radius of gyration
 I_y = Weak axis moment of inertia

m = Distance from shear center to mid-plane of web
 J = St. Venant torsion constant
 C_w = Torsional warping constant
 X_o = Distance from shear center to the centroid along the principal X-axis

TABLE 6—ALLOWABLE CONCENTRATED LOADS AND END REACTIONS FOR C-SHAPES BASED ON WEB CRIPPLING^{1,2,3} (lbf)

STUD DESIGNATION	F_y (ksi)	CONDITION 1 (E1F)				CONDITION 2 (I1F)				CONDITION 3 (E2F)				CONDITION 4 (I2F)			
		Bearing Length (in)				Bearing Length (in)				Bearing Length (in)				Bearing Length (in)			
		1	3.5	4	6	1	3.5	4	6	1	3.5	4	6	1	3.5	4	6
250 -18	50	79	128	-	-	128	185	-	-	55	78	-	-	-	-	-	-
250 -30	33	141	223	235	-	264	365	381	-	119	161	167	-	-	-	-	-
250 -33	33	173	271	285	-	330	453	472	-	150	201	209	-	-	-	-	-
250 -43	33	287	443	466	-	580	780	810	-	267	351	364	-	-	-	-	-
250 -54	50	656	996	1046	-	1350	1785	1850	-	652	842	870	-	-	-	-	-
362 -18	50	74	120	-	-	125	180	-	-	42	59	-	-	-	-	-	-
362 -30	33	135	213	224	265	258	358	373	424	101	136	141	160	-	-	-	-
362 -33	33	165	259	273	322	323	444	462	525	129	173	179	202	-	-	-	-
362 -43	33	277	427	449	526	570	767	796	898	236	311	322	360	-	-	-	-
362 -54	50	634	963	1012	1182	1329	1758	1822	2043	588	760	785	874	-	-	-	-
600 -30	33	124	196	206	243	249	345	359	409	70	95	98	111	260	330	340	377
600 -33	33	153	240	253	297	313	430	447	507	93	125	130	146	329	416	429	473
600 -43	33	259	400	420	493	553	745	773	872	185	243	252	282	600	743	764	838
600 -54	50	599	909	956	1116	1295	1713	1775	1991	482	623	644	716	1478	1802	1850	2017

For SI: 1 inch = 25.4 mm, 1 pound-force = 4.4482 N

¹ Values are for members fastened to supports.

² Allowable web conditions are as follows (See Figure 2 for illustration):

Condition 1 – End One Flange Loading (E1F)

Condition 3 – End Two Flange Loading (E2F)

Condition 2 – Interior One Flange Loading (I1F)

Condition 4 – Interior Two Flange Loading (I2F)

³ Values are based on full-unreduced cross section of the member away from punch-outs, where the clear distance between the edge of bearing and the edge of the punch-out is larger than 2 times the full-depth of the web. Capacities for members not within the limits specified in Section G5 of AISI S100 were left blank "-".



**Nonstructural Stud (DS)
Designation**



Structural Stud (S) Designation



**Nonstructural Track (DT)
Designation**



Structural Track (T) Designation

FIGURE 1—SECTION PROFILES

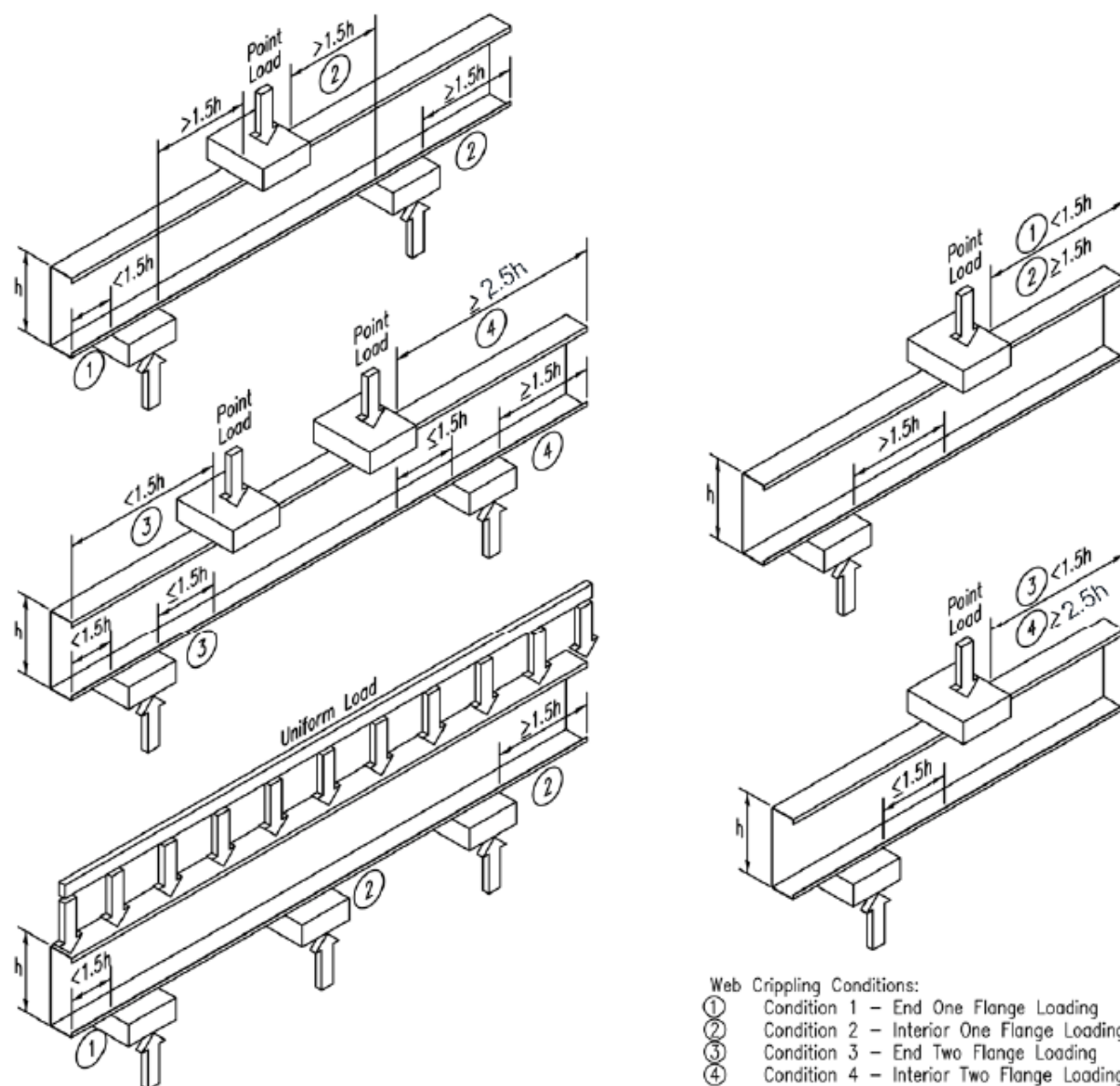


FIGURE 2