



ICC-ES Evaluation Report

Reissued August 2023

ESR-4519

This report is subject to renewal August 2024.

DIVISION: 05 00 00—METALS

Section: 05 40 00—Cold-Formed Metal Framing

Section: 05 42 00—Cold-Formed Metal Joist Framing

REPORT HOLDER:

OEG BUILDING MATERIALS, INC.

EVALUATION SUBJECT:

OEG BIG APPLE JOIST

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015 and 2012 *International Building Code (IBC)*
- 2018, 2015 and 2012 *International Residential Code (IRC)*

Property evaluated:

Structural

2.0 USES

The OEG Big Apple Joists are cold-formed steel framing members used for floor and roof framing joists.

3.0 DESCRIPTION

3.1 General:

The OEG Big Apple Joists are manufactured with web punch-outs from coils of light gage steel. Punch-outs measure between 5 inches by 7.5 inches long (127 mm by 190.5) at 14 inches on center (355.6 mm), to 9 inches by 11.75 inches long (228.6 mm by 298.42 mm) at 17.5 inches on center (444.5 mm). The minimum distance between the end of the joist and the center of the web punch-out is 24 inches (610 mm). Punch-outs are web stiffened as shown in Figure 1. See Tables 1 and 2 for section dimensions and properties.

3.2 Material:

The OEG Big Apple Joists are cold-formed from steel coils complying with ASTM A653. Cold-formed steel thicknesses measure between 43 mils (18 ga.) to 118 mils (10 ga). 43 mil joists have a minimum yield strength of 33 ksi (227.5 MPa), and 54, 68, 97 and 118 mil (16, 14, 12 and 10 ga.) joists have a minimum yield strength of 50 ksi (344.7 MPa). All joists are galvanized in accordance with ASTM A1003 with a G-60 hot-dipped galvanized coating.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The OEG Big Apple Joists section properties listed in Tables 1 and 2 have been determined in accordance with the North American Specification for Design of Cold-formed Steel Structural Members (AISI S100-16 S1/18).

Joists are to be analyzed as single span members and are to be assumed fully restrained with respect to lateral instability.

Under the IRC, the used of the cold-formed steel framing members must be limited to engineered structures, in accordance with IRC Section R301.1.3.

4.2 Installation:

The OEG Big Apple Joists 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 during the installation.

5.0 CONDITIONS OF USE

The OEG Big Apple Joists described in this report comply 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** The OEG Big Apple Joists must be installed in accordance with the applicable code, the approved plans and this report.
- 5.2** Minimum uncoated base-metal thickness of the framing members as delivered to the jobsite must be at least 95 percent of the design base-metal thickness.
- 5.3** Complete plans and calculations verifying compliance with this report must be submitted to the code official for each project at the time of permit application. The calculations and drawings must be prepared and sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4** Web crippling and concentrated loading are outside the scope of this report.
- 5.5** Joists must be restrained against rotation at each end by track components at each end or the installation of bridging.
- 5.6** Cutting through the punchout is not permitted.

5.7 The cold-formed steel framing members are manufactured in Sayreville, New Jersey.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Cold-formed Steel Framing Members (AC46), dated October 2019.

7.0 IDENTIFICATION

7.1 Each OEG Big Apple Joist must have a legible label, stamp or embossment, at a maximum distance of 96 inches (2438 mm) on center, indicating the report holder's name; the evaluation report number

(ESR-4519); member designation; minimum base-metal thickness (uncoated) in decimal thickness or mils; minimum specified yield strength; and the Z180 (G60) galvanization coating.

7.2 The report holder's contact information is the following:

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TABLE 1—JOIST DIMENSIONS AND WEIGHT

MEMBER DESIGNATION	HOLE DEPTH (in)	JOIST DEPTH (in)	FLANGE WIDTH (in)	LIP LENGTH (in)	DESIGN BASE METAL THICKNESS (in)	WEIGHT (Lbs./ft)	NET w/o HOLE WEIGHT (Lbs./ft)
800OEG300-43	5	8	3.0	0.75	0.0451	2.17	1.98
800OEG300-54	5	8	3.0	0.75	0.0566	2.91	2.67
800OEG300-68	5	8	3.0	0.75	0.0713	3.63	3.33
800OEG300-97	5	8	3.0	0.75	0.1017	5.12	4.69
800OEG300-118	5	8	3.0	0.75	0.1242	6.19	5.67
800OEG350-54	5	8	3.5	1	0.0566	3.2	2.96
800OEG350-68	5	8	3.5	1	0.0713	3.99	3.69
800OEG350-97	5	8	3.5	1	0.1017	5.63	5.20
800OEG350-118	5	8	3.5	1	0.1242	6.82	6.30
1000OEG200-54	7	10	2.0	0.75	0.0566	2.89	2.65
1000OEG200-68	7	10	2.0	0.75	0.0713	3.63	3.33
1000OEG200-97	7	10	2.0	0.75	0.1017	5.12	4.69
1000OEG200-118	7	10	2.0	0.75	0.1242	6.19	5.67
1000OEG250-54	7	10	2.5	0.75	0.0566	3.08	2.84
1000OEG250-68	7	10	2.5	0.75	0.0713	3.86	3.56
1000OEG250-97	7	10	2.5	0.75	0.1017	5.46	5.03
1000OEG250-118	7	10	2.5	0.75	0.1242	6.61	6.09
1000OEG300-54	7	10	3.0	0.75	0.0566	3.27	3.03
1000OEG300-68	7	10	3.0	0.75	0.0713	4.11	3.81
1000OEG300-97	7	10	3.0	0.75	0.1017	5.89	5.46
1000OEG300-118	7	10	3.0	0.75	0.1242	7.03	6.51
1000OEG350-54	7	10	3.5	1	0.0566	3.56	3.32
1000OEG350-68	7	10	3.5	1	0.0713	4.47	4.17
1000OEG350-97	7	10	3.5	1	0.1017	6.33	5.90
1000OEG350-118	7	10	3.5	1	0.1242	7.66	7.14
1200OEG200-54	9	12	2.0	0.75	0.0566	3.27	2.50
1200OEG200-68	9	12	2.0	0.75	0.0713	4.11	3.14
1200OEG200-97	9	12	2.0	0.75	0.1017	5.81	4.42
1200OEG200-118	9	12	2.0	0.75	0.1242	7.03	5.33
1200OEG250-54	9	12	2.5	0.75	0.0566	3.46	2.69
1200OEG250-68	9	12	2.5	0.75	0.0713	4.35	3.38
1200OEG250-97	9	12	2.5	0.75	0.1017	6.16	4.77
1200OEG250-118	9	12	2.5	0.75	0.1242	7.45	5.75
1200OEG300-54	9	12	3.0	0.75	0.0566	3.66	2.89
1200OEG300-68	9	12	3.0	0.75	0.0713	4.59	3.62
1200OEG300-97	9	12	3.0	0.75	0.1017	6.51	5.12
1200OEG300-118	9	12	3.0	0.75	0.1242	7.88	6.18
1200OEG350-54	9	12	3.5	1	0.0566	3.95	3.18
1200OEG350-68	9	12	3.5	1	0.0713	4.96	3.99
1200OEG350-97	9	12	3.5	1	0.1017	7.02	5.63
1200OEG350-118	9	12	3.5	1	0.1242	8.51	6.81

(continued)

TABLE 1—JOIST DIMENSIONS AND WEIGHT (CONTINUED)

1400OEG200-54	9	14	2.0	0.75	0.0566	3.66	2.89
1400OEG200-68	9	14	2.0	0.75	0.0713	4.59	3.62
1400OEG200-97	9	14	2.0	0.75	0.1017	6.50	5.11
1400OEG200-118	9	14	2.0	0.75	0.1242	7.88	6.18
1400OEG250-54	9	14	2.5	0.75	0.0566	3.85	3.08
1400OEG250-68	9	14	2.5	0.75	0.0713	4.84	3.87
1400OEG250-97	9	14	2.5	0.75	0.1017	6.85	5.46
1400OEG250-118	9	14	2.5	0.75	0.1242	8.30	6.60
1400OEG300-54	9	14	3.0	0.75	0.0566	4.04	3.27
1400OEG300-68	9	14	3.0	0.75	0.0713	5.08	4.11
1400OEG300-97	9	14	3.0	0.75	0.1017	7.19	5.80
1400OEG300-118	9	14	3.0	0.75	0.1242	8.72	7.02
1400OEG350-54	9	14	3.5	1	0.0566	4.33	3.56
1400OEG350-68	9	14	3.5	1	0.0713	5.44	4.47
1400OEG350-97	9	14	3.5	1	0.1017	7.71	6.32
1400OEG350-118	9	14	3.5	1	0.1242	9.35	7.65
1600OEG200-68	9	16	2.0	0.75	0.0713	5.08	4.11
1600OEG200-97	9	16	2.0	0.75	0.1017	7.19	5.80
1600OEG200-118	9	16	2.0	0.75	0.1242	8.72	7.02
1600OEG250-68	9	16	2.0	0.75	0.0713	5.32	4.35
1600OEG250-97	9	16	2.0	0.75	0.1017	7.54	6.15
1600OEG250-118	9	16	2.0	0.75	0.1242	9.14	7.44
1600OEG300-68	9	16	2.0	0.75	0.0713	5.56	4.59
1600OEG300-97	9	16	2.0	0.75	0.1017	7.79	6.40
1600OEG300-118	9	16	2.0	0.75	0.1242	9.56	7.86
1600OEG350-68	9	16	3.5	1	0.0713	5.93	4.96
1600OEG350-97	9	16	3.5	1	0.1017	8.4	7.01
1600OEG350-118	9	16	3.5	1	0.1242	10.21	8.51

TABLE 2—JOIST SECTION PROPERTIES^{1,2,3,4,5}

MEMBER DESIGNATION	Gross Properties						Effective Properties				Torsional Properties		
	A _g (in ²)	I _x (in ⁴)	S _x (in ³)	R _x (in)	I _y (in ⁴)	R _y (in)	I _{xe} (in ⁴)	S _{xe} (in ³)	M _a (in-k)	V _a (kip)	Jx1000 (in ⁴)	C _w (in ⁶)	R _o (in)
800OEG300-43	0.639	6.08	1.42	3.08	0.565	0.940	6.04	1.31	39.21	1.05	0.434	5.74	3.83
800OEG300-54	0.857	8.55	2.14	3.16	0.994	1.076	8.31	1.75	52.34	2.09	0.912	12.65	3.93
800OEG300-68	1.066	10.51	2.63	3.14	1.203	1.062	10.41	2.23	66.88	4.22	1.807	15.20	3.90
800OEG300-97	1.509	14.68	3.67	3.12	1.659	1.049	14.58	3.47	103.79	10.89	5.194	20.79	3.87
800OEG300-118	1.821	17.57	4.39	3.1	1.962	1.037	17.06	4.72	141.46	16.24	9.363	24.39	3.84
800OEG350-54	0.943	9.73	2.43	3.21	1.610	1.31	9.05	1.98	59.35	2.09	1.006	21.95	4.39
800OEG350-68	1.173	11.98	3.00	3.20	1.963	1.293	11.60	2.56	76.67	4.22	1.988	26.57	4.35
800OEG350-97	1.658	16.75	4.18	3.18	2.712	1.28	16.31	3.81	113.92	10.89	5.700	36.46	4.31
800OEG350-118	2.006	20.10	5.03	3.16	3.240	1.27	19.48	4.79	158.83	16.24	10.300	43.21	4.30
1000OEG200-54	0.851	11.41	2.28	3.66	0.384	0.672	10.63	2.22	66.6	1.66	0.908	7.63	3.90
1000OEG200-68	1.066	14.23	2.84	3.65	0.473	0.666	13.25	2.84	94.8	3.35	1.807	9.37	3.88
1000OEG200-97	1.506	19.87	3.97	3.63	0.644	0.654	18.48	3.97	137.1	9.86	5.194	12.66	3.85
1000OEG200-118	1.821	23.74	4.24	3.61	0.752	0.642	22.08	5.62	168.29	16.24	9.363	14.68	3.82
1000OEG250-54	0.907	12.81	2.56	3.76	0.665	0.856	12.03	2.28	68.3	1.66	0.968	12.95	4.14
1000OEG250-68	1.137	15.98	3.20	3.75	0.822	0.850	15	2.95	88.3	3.35	1.927	15.95	4.13
1000OEG250-97	1.608	22.36	4.47	3.72	1.127	0.837	20.97	4.47	146.4	9.86	5.545	21.23	4.10
1000OEG250-118	1.945	26.77	5.35	3.71	1.372	0.825	25.11	6.15	184.22	16.24	10.000	25.40	4.06

(continued)

TABLE 2—JOIST SECTION PROPERTIES^{1,2,3,4,5} (CONTINUED)

1000OEG300-54	0.964	14.21	2.84	3.84	1.042	1.040	12.7	2.37	70.9	1.66	1.029	19.99	4.41
1000OEG300-68	1.209	17.74	3.55	3.83	1.291	1.034	16.46	3.05	91.4	3.35	2.049	24.69	4.39
1000OEG300-97	1.710	24.85	4.97	3.81	1.782	1.061	23.46	4.71	140.9	9.86	5.895	33.84	4.36
1000OEG300-118	2.069	29.80	5.96	3.79	2.108	1.009	28.14	6.42	192.33	16.24	10.641	39.76	4.33
1000OEG350-54	1.0487	16.1	3.22	3.92	1.702	1.274	14.54	2.71	81.21	1.66	1.120	34.20	4.81
1000OEG350-68	1.316	20.11	4.02	3.91	2.115	1.267	18.68	3.47	104.10	3.35	2.230	42.36	4.79
1000OEG350-97	1.862	28.21	5.64	3.89	2.935	1.255	26.74	5.14	153.92	9.86	6.421	58.41	4.75
1000OEG350-118	2.255	33.88	6.77	3.87	3.491	1.244	29.11	6.46	214.35	16.24	11.600	69.08	4.73
1200OEG200-54	0.963	17.89	2.98	4.31	0.403	0.647	15.81	2.91	87.11	1.10	1.029	11.38	4.48
1200OEG200-68	1.208	23.32	3.72	4.30	0.496	0.641	19.71	3.44	103	2.77	2.049	13.97	4.47
1200OEG200-97	1.710	31.24	5.21	4.27	0.676	0.629	27.43	5.21	157.6	8.15	5.895	18.90	4.44
1200OEG200-118	2.069	37.41	6.23	4.25	0.790	0.617	32.83	7.38	220.97	14.92	10.641	21.94	4.41
1200OEG250-54	1.020	19.90	3.32	4.42	0.699	0.827	17.68	2.98	89.1	1.10	1.090	19.36	4.70
1200OEG250-68	1.280	24.86	4.14	4.41	0.864	0.821	22.25	3.84	115.1	2.77	2.169	23.86	4.69
1200OEG250-97	1.811	34.84	5.81	4.39	1.186	0.809	31.03	5.66	190.3	8.15	6.246	32.56	4.66
1200OEG250-118	2.193	41.79	6.96	4.36	1.396	0.797	33.79	6.96	239.64	14.92	11.279	38.10	4.63
1200OEG300-54	1.077	21.92	3.65	4.51	1.098	1.010	18.61	3.07	92	1.10	1.150	29.96	4.95
1200OEG300-68	1.351	27.39	4.56	4.50	1.361	1.003	24.04	3.97	119	2.77	2.290	37.02	4.93
1200OEG300-97	1.913	38.44	6.41	4.48	1.878	0.991	34.63	6.08	182.1	8.15	6.597	50.81	4.90
1200OEG300-118	2.317	46.17	7.69	4.46	2.223	0.979	41.58	7.39	248.87	14.92	11.918	59.76	4.87
1200OEG350-54	1.161	24.69	4.12	4.61	1.801	1.245	21.36	3.50	104.68	1.10	1.241	0.74	5.30
1200OEG350-68	1.458	30.87	5.15	4.6	2.238	1.235	27.39	4.49	134.48	2.77	2.471	62.81	5.28
1200OEG350-97	2.066	43.38	7.23	4.58	3.106	1.226	39.45	6.61	198.12	8.15	7.122	86.70	5.26
1200OEG350-118	2.504	52.18	8.69	4.56	3.696	1.214	42.97	8.30	275.48	14.92	12.876	102.64	5.23
1400OEG200-54	1.027	26.29	3.75	4.94	0.418	0.623	24.23	3.60	107.7	0.94	1.150	16.02	5.07
1400OEG200-68	1.351	32.83	4.69	4.93	0.515	0.617	30.01	4.67	139.9	2.36	2.290	19.68	5.06
1400OEG200-97	1.913	46.00	6.57	4.90	0.700	0.605	42.25	6.57	226.8	6.94	6.594	26.61	5.02
1400OEG200-118	2.317	55.23	7.88	4.88	0.819	0.595	45.96	7.88	279.56	12.74	11.918	30.96	5.00
1400OEG250-54	1.133	29.04	4.15	5.06	0.726	0.800	26.98	3.66	109.7	0.94	1.211	27.33	5.28
1400OEG250-68	1.422	36.29	5.18	5.05	0.898	0.794	33.47	4.80	143.7	2.36	2.110	33.70	5.27
1400OEG250-97	2.014	50.91	7.27	5.03	1.231	0.781	47.16	7.27	238.8	6.94	6.945	45.97	5.24
1400OEG250-118	2.442	61.20	8.74	5.01	1.451	0.771	56.67	8.74	300.79	12.74	12.557	53.90	5.21
1400OEG300-54	1.190	31.79	4.54	5.17	1.144	0.980	28.34	3.77	112.9	0.94	1.271	42.37	5.51
1400OEG300-68	1.491	39.75	5.67	5.16	1.417	0.974	36.21	4.94	147.8	2.36	2.532	52.38	5.49
1400OEG300-97	2.110	55.82	7.97	5.13	1.955	0.961	52.07	7.60	227.4	6.94	7.296	71.86	5.47
1400OEG300-118	2.566	67.18	9.59	5.11	2.315	0.949	62.65	9.23	311.04	12.74	13.195	89.70	5.44
1400OEG350-54	1.275	35.61	5.08	5.29	1.882	1.215	31.52	4.26	127.81	0.94	1.362	71.15	5.83
1400OEG350-68	1.601	44.55	6.36	5.27	2.339	1.208	40.54	5.54	166.10	2.36	2.713	88.23	5.82
1400OEG350-97	2.268	62.64	8.94	5.25	3.244	1.196	58.70	8.23	246.45	6.94	7.822	121.78	5.79
1400OEG350-118	2.752	75.49	10.78	5.23	3.864	1.184	69.64	10.31	342.18	12.74	14.153	144.41	5.76
1600OEG200-68	1.494	45.98	5.75	5.55	0.530	0.595	43.05	5.75	172.01	1.65	2.532	27.08	5.65
1600OEG200-97	2.116	64.52	8.07	5.52	0.780	0.583	60.86	8.07	278.35	6.04	7.296	36.67	5.62
1600OEG200-118	2.566	77.57	9.69	5.49	0.843	0.573	73.14	9.69	343.59	11.08	13.195	42.72	5.59
1600OEG250-68	1.565	50.50	6.31	5.68	0.926	0.769	49.67	5.96	178.50	1.65	2.653	46.27	5.85
1600OEG250-97	2.218	70.95	8.87	5.66	1.269	0.757	67.26	8.87	291.94	6.04	7.646	63.18	5.82
1600OEG250-118	2.690	85.40	10.67	5.63	1.469	0.746	85.40	10.67	367.23	11.08	13.834	74.17	5.79
1600OEG300-68	1.636	55.02	6.87	5.80	1.464	0.946	51.91	6.06	181.57	1.65	2.774	71.80	6.07

(continued)

For SI: 1 inch = 25.4 mm; 1 k = 1000 lb = 4.448 kN

TABLE 1—JOIST DIMENSIONS AND WEIGHT (CONTINUED)

1600OEG300-97	2.320	77.37	9.67	5.78	2.019	0.933	73.69	9.23	276.43	6.04	7.997	98.61	6.04
1600OEG300-118	2.814	93.23	11.65	5.75	2.390	0.922	88.77	11.65	378.42	11.08	14.473	116.36	6.01
1600OEG350-68	1.744	61.36	7.67	5.93	2.424	1.179	56.97	6.77	202.69	1.65	2.956	120.03	6.37
1600OEG350-97	2.472	86.38	10.8	5.91	3.362	1.166	82.44	9.97	298.58	6.04	8.523	165.83	6.34
1600OEG350-118	3.002	104.26	13.04	5.89	4.01	1.156	99.43	12.50	414.75	11.08	15.427	197.35	6.32

1. Tabulated gross properties are based on the full-unreduced cross section of the joist away from punchouts.
2. Tabulated effective properties are based on the reduced cross sections of the joists at the punchouts.
3. For deflection calculations, use the effective moment of inertia.
4. Joists are assumed to be fully restrained against lateral torsional buckling. Therefore, maximum unbraced lengths greater than 0 are outside the scope of this report.

Gross Properties

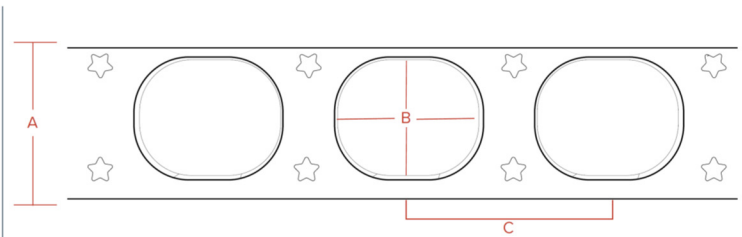
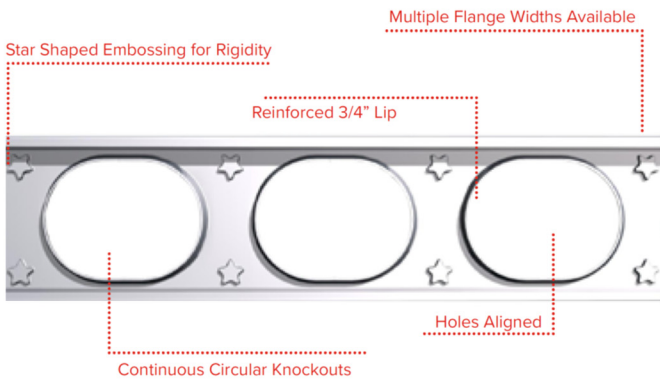
- I_x - moment of inertia of the cross section about the x-axis
- S_x - section modulus about the x-axis
- R_x - radius of gyration of cross section about the x-axis
- I_y - moment of inertia of the cross section about the y-axis
- S_y - section modulus about the y-axis

Effective Properties

- I_{xe} - moment of inertia of the cross section about the x-axis
- S_{xe} - section modulus about the x-axis
- M_a - allowable moment based on lesser of local buckling or distortional buckling, assuming $K\phi = 0$
- V_a - allowable strong axis shear away from the punchout and at the supports

Torsional and Other Properties

- J - St. Venant torsion constant.
- C_w - Warping constant.
- R_o - Polar radius of gyration of cross section about the shear center



HOLE SIZES		
A. SECTION DEPTH IN.	B. HOLE SIZE IN.	C. SPACING
8	5x7.5"	14" OC
10	7x9.25"	14" OC
12	9x11.75"	17.5" OC
14	9x11.75"	17.5" OC
16	9x11.75"	17.5" OC

FIGURE 1