

Steel Joists, Joist Girders and Steel Deck

Floor Design with Joists, Joist Girders and Steel Deck

**Presented by NUCOR/Vulcraft
with
Contributions by the Steel Joist Institute**



Topics

- Floor Deck
 - Types of floor deck
 - Strength design
 - Fire ratings
- Floor Joists and Joist Girders
 - Types of floor joists and Joist Girders
 - Strength design
 - Other considerations
- Design Example



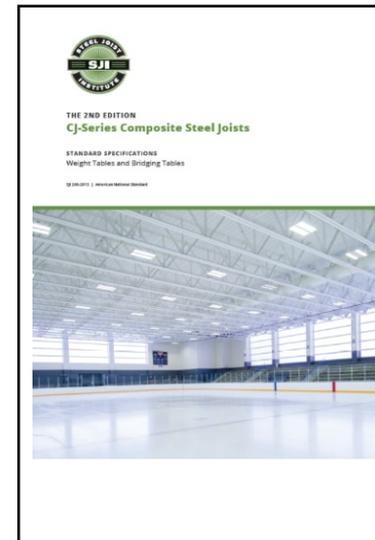
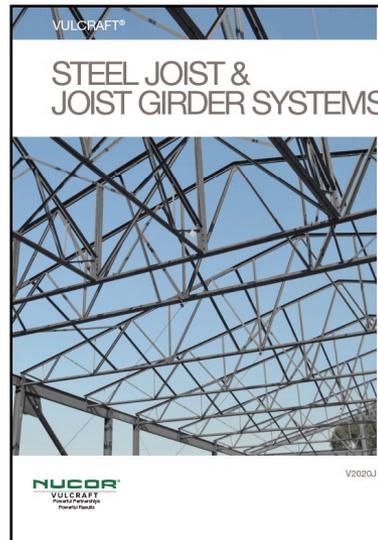
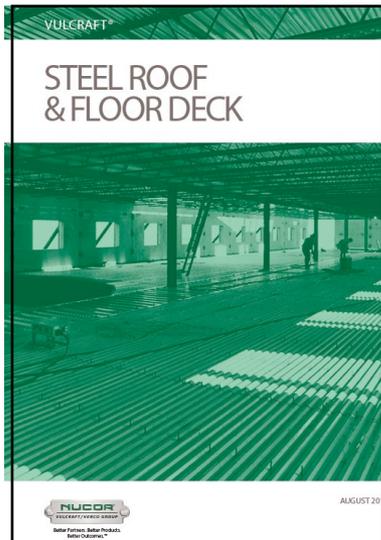
See Chapter 3



Designing with Vulcraft Steel Joists Joist Girders Steel Deck

Also available for download:

1. [Steel Roof & Floor Deck](#)
2. [Composite Joists CJ-Series](#)
3. [Steel Joists & Joist Girder Systems](#)
4. [SJI CJ-Series Composite Steel Joist](#)



Floor Deck Topics

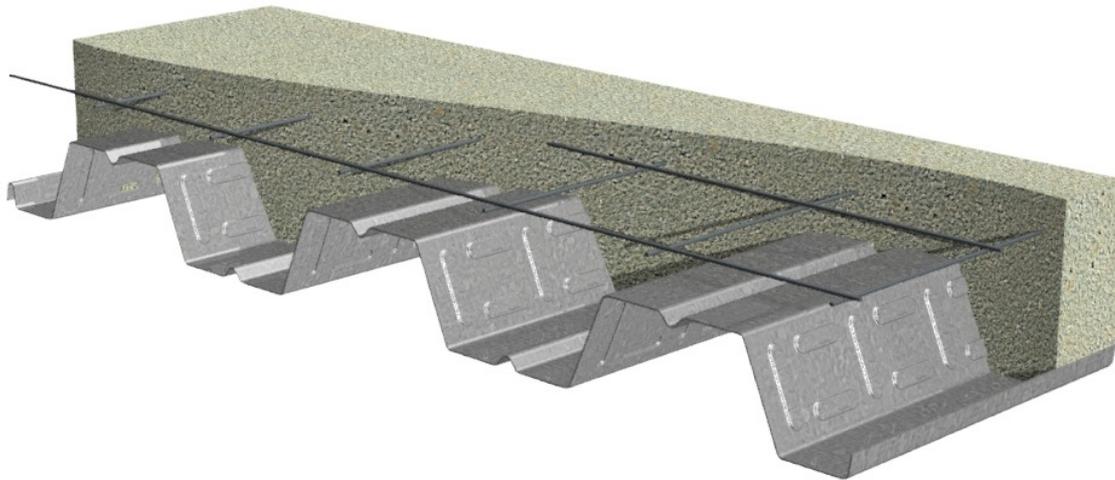
- Types of floor deck
 - Non-Composite Decks
 - Composite Decks
 - Typical Steel Decks for Floors
- Strength design
 - Deck Load Tables
 - Maximum Construction Spans
 - Maximum Uniform Loads
- Fire Ratings



Non-Composite and Composite Decks



Non-Composite Deck



Composite Deck



Composite Decks and Shear Bond

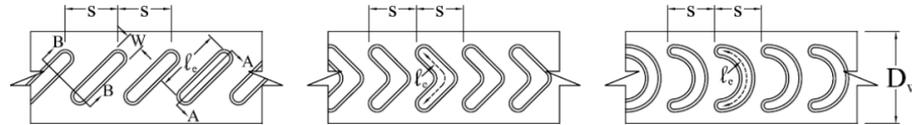


Figure A2.1 – Type 1 Embossments with length measured along centerline

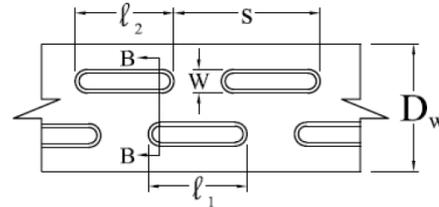


Figure A2.2 – Type 2 Embossments

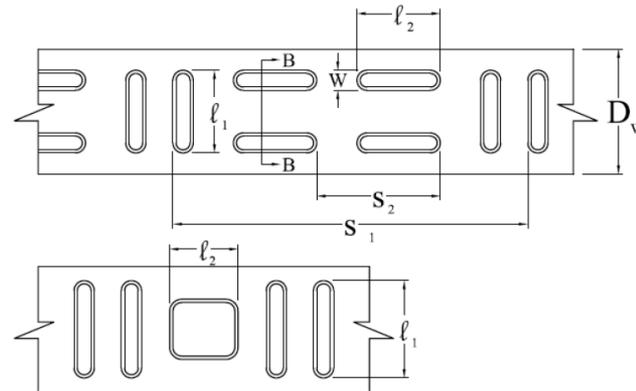


Figure A2.3 – Type 3 Embossments



Typical Steel Decks for Floors

NON-COMPOSITE FLOOR DECK

0.6C/0.6CSV.....	24
1.0C/1.0CSV.....	26
1.3C/1.3CSV.....	28
1.5C.....	30
2C.....	32
3C.....	34

COMPOSITE FLOOR DECK

1.5VL / 1.5VLI.....	46
1.5VLR.....	48
2VLI.....	50
3VLI.....	52
Fire Resistance Ratings with Composite Deck	54



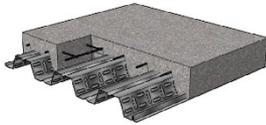
Maximum Deck Construction Spans Normal Weight Concrete

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3VLI COMPOSITE DECK

SECTION PROPERTIES

Deck Gauge	Design Thickness	Deck Weight	I_p	S_x	I_y	S_y	V_x	F_y
(in.)	(in.)	(lb/ft ²)	(in ⁴)	(in ³)	(in ⁴)	(in ³)	(in ²)	(ksi)
22	0.0295	1.71	0.710	0.307	0.715	0.410	1407	50
20	0.0358	2.07	0.907	0.512	0.909	0.538	2495	50
19	0.0418	2.42	1.098	0.630	1.100	0.668	3330	50
18	0.0474	2.75	1.292	0.761	1.292	0.794	4391	50
16	0.0598	3.47	1.892	1.015	1.892	1.019	4901	40



(N = 9.35) NORMAL WEIGHT CONCRETE (145 PCF)

TOTAL SLAB DEPTH	DECK TYPE	SDI Max. Unshored Clear Span	Superimposed Live Load (PSF)																
			1 SPAN	2 SPAN	3 SPAN	7-0	7-6	8-0	8-6	9-0	9-6	10-0	10-6	11-0	11-6	12-0	12-6	13-0	13-6
6.00 (1-2.00) 45 psf	SVL22	10'-0	10'-8	11'-1	216	185	176	161	148	137	127	93	83	76	70	64	59	54	50
	SVL20	11'-8	12'-6	12'-10	241	210	190	178	162	150	139	129	121	113	79	72	65	61	57
	SVL19	12'-3	13'-11	14'-4	265	237	214	194	178	163	151	140	131	122	115	79	73	68	62
	SVL18	12'-7	13'-2	14'-0	289	261	238	216	201	186	173	161	151	142	134	127	92	86	80
	SVL16	13'-4	13'-9	15'-7	327	294	267	243	223	206	191	178	167	157	149	139	132	86	89
6.50 (1-2.50) 51 psf	SVL22	9'-6	9'-11	10'-7	247	222	201	184	169	156	113	103	94	87	80	73	67	62	57
	SVL20	11'-3	11'-11	12'-5	275	247	223	203	180	171	159	148	136	97	89	82	73	70	65
	SVL19	11'-10	12'-4	13'-8	312	273	244	222	203	186	172	160	149	138	98	91	84	77	71
	SVL18	12'-3	14'-8	14'-4	330	298	271	245	220	212	197	184	173	162	153	112	106	98	92
	SVL16	12'-11	14'-7	15'-1	373	335	304	277	256	236	218	208	190	179	168	159	117	109	102
6.50 (1-3.00) 67 psf	SVL22	9'-2	9'-2	10'-2	277	249	225	205	190	140	127	116	105	97	89	82	79	70	65
	SVL20	10'-9	11'-5	11'-10	309	277	250	225	200	133	123	116	109	100	92	85	79	73	
	SVL19	11'-7	12'-9	13'-2	339	304	274	249	227	209	193	179	167	156	111	102	94	87	80
	SVL18	11'-11	13'-11	14'-0	370	334	304	279	257	238	221	207	194	182	136	125	118	110	103
	SVL16	12'-7	14'-0	14'-9	400	370	341	311	286	264	245	228	213	200	159	173	152	123	115
6.50 (1-3.50) 83 psf	SVL22	8'-8	8'-8	9'-8	307	277	251	229	171	155	141	123	119	108	90	91	84	78	72
	SVL20	10'-4	11'-0	11'-4	343	307	278	253	232	214	198	144	132	121	111	103	95	87	81
	SVL19	11'-3	12'-4	12'-9	377	337	304	276	252	232	214	196	185	184	123	113	104	90	89
	SVL18	11'-8	13'-5	13'-8	400	371	338	309	285	264	245	228	216	207	151	140	131	123	115
	SVL16	12'-4	13'-9	14'-0	400	400	378	345	317	286	272	253	237	222	209	157	146	137	123
7.00 (1-4.00) 89 psf	SVL22	8'-6	7'-11	9'-0	338	304	278	252	188	171	155	142	130	119	109	101	93	86	79
	SVL20	10'-0	10'-8	11'-0	377	338	308	278	256	236	217	199	146	133	122	113	104	96	89
	SVL19	11'-0	11'-11	12'-3	400	370	334	303	277	256	235	218	204	147	136	124	115	106	96
	SVL18	11'-5	13'-0	13'-4	400	400	371	340	313	280	270	252	236	179	166	154	144	135	128
	SVL16	12'-1	13'-1	13'-6	400	400	400	379	348	322	293	278	260	246	230	172	161	150	141
7.50 (1-4.50) 75 psf	SVL22	8'-2	7'-5	8'-6	398	351	300	258	205	196	169	154	141	130	119	110	101	93	86
	SVL20	9'-8	10'-3	10'-7	400	369	333	303	278	256	190	173	158	145	134	123	114	105	97
	SVL19	10'-8	11'-5	11'-11	400	400	364	331	302	278	257	238	175	160	147	139	126	116	107
	SVL18	11'-2	12'-7	13'-0	400	400	400	370	341	316	294	275	255	195	151	168	157	147	133
	SVL16	11'-10	12'-8	13'-1	400	400	400	400	380	351	325	300	283	266	202	188	175	164	153

COMPOSITE

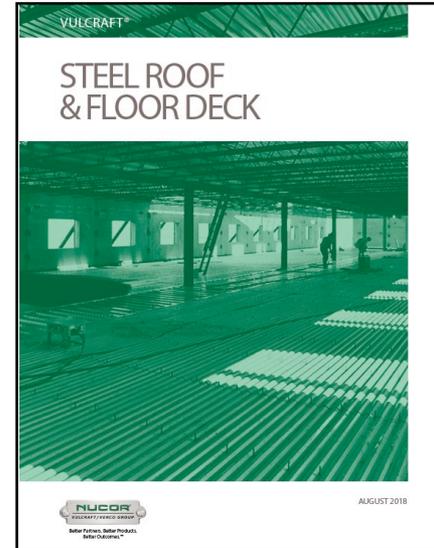
Notes:

- Maximum unshored spans do not consider web crippling. Required bearing should be determined based on allowable reactions on page 43 or with the Vulcraft Unshored Span Calculator available at www.vulcraft.com/designtools. The following conditions are required to meet the maximum unshored spans shown:
 - Minimum exterior bearing length of 1.5' for 19 to 16 gauges. Minimum end bearing varies from 1.5' to 3.5' for 22 and 20 gauges, depending on slab thickness.
 - Minimum interior bearing length of 2' for 16 gauges. Minimum interior bearing varies from 2' to 6.25' for 18 to 22 gauges, depending on gauge and slab thickness.
- Always contact Vulcraft when using loads in excess of 250 psf. Span loads often result from concentrated, dynamic or "long term" load cases for which reductions due to bond breakage, concrete creep, etc. should be evaluated.
- All fire rated assemblies are subject to an upper live load limit of 250 psf.

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The Catalog shown is for ASD designs. A Catalog is also available from the Vulcraft Website for LRFD designs.

Maximum Deck Construction Spans Light Weight Concrete

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3VLI COMPOSITE DECK

DIMENSIONS

(N = 14.15) LIGHT WEIGHT CONCRETE (110 PCF)

TOTAL SLAB DEPTH	DECK TYPE	SDI Max. Unshored Clear Span			Superimposed Live Load (PSF)														
		1 SPAN	2 SPAN	3 SPAN	Clear Span (ft-in.)														
		8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	14'-6"	15'-0"			
5.00 (t=2.00) 35 psf	3VLI22	11'-0"	11'-10"	12'-2"	141	127	115	105	96	88	82	54	49	45	40				
	3VLI20	12'-6"	13'-8"	14'-1"	163	147	133	121	110	102	94	87	81	75	49	44	40		
	3VLI19	13'-1"	15'-3"	15'-4"	185	168	150	136	124	114	105	97	90	84	79	52	47	43	
	3VLI18	13'-8"	16'-7"	16'-10"	244	222	204	188	174	162	151	142	133	126	119	112	85	79	75
	3VLI16	14'-3"	16'-8"	16'-8"	279	253	231	213	196	182	170	159	149	140	132	125	118	90	84
5.50 (t=2.50) 38 psf	3VLI22	10'-7"	11'-4"	11'-8"	161	145	131	120	110	101	69	62	56	51	46	42			
	3VLI20	12'-2"	13'-1"	13'-7"	186	167	151	138	126	118	107	99	92	81	56	51	46	42	
	3VLI19	12'-8"	14'-8"	14'-11"	211	189	171	155	142	130	120	111	103	96	85	59	54	49	45
	3VLI18	13'-1"	15'-11"	15'-4"	278	253	232	214	198	184	172	161	152	143	135	108	97	91	85
	3VLI16	13'-10"	16'-0"	16'-2"	318	289	264	242	224	208	193	181	170	160	151	142	109	103	98
6.00 (t=3.00) 44 psf	3VLI22	10'-2"	10'-11"	11'-3"	181	163	147	134	123	86	78	70	63	57	52	47	43		
	3VLI20	11'-10"	12'-8"	13'-1"	209	188	170	155	141	130	120	111	76	69	63	57	52	47	43
	3VLI19	12'-4"	14'-1"	14'-6"	237	212	192	174	159	146	135	125	116	80	73	67	61	56	51
	3VLI18	12'-9"	15'-4"	14'-11"	312	284	261	240	223	207	193	181	170	161	124	116	109	102	96
	3VLI16	13'-6"	15'-6"	15'-9"	357	324	296	272	251	233	217	203	190	179	169	160	123	115	108
6.25 (t=2.25) 46 psf	3VLI22	9'-11"	10'-8"	11'-1"	191	172	155	142	101	91	82	74	67	60	55	50	45	41	
	3VLI20	11'-8"	12'-5"	12'-10"	221	198	179	163	149	137	127	117	80	73	66	60	55	50	46
	3VLI19	12'-3"	13'-10"	14'-4"	250	224	202	184	168	154	142	131	122	84	77	70	64	59	54
	3VLI18	12'-7"	15'-1"	14'-9"	329	300	275	253	235	218	204	191	180	169	151	122	115	108	101
	3VLI16	13'-4"	15'-2"	15'-7"	377	342	312	287	265	248	229	214	201	189	178	139	130	122	114
6.50 (t=3.5) 48 psf	3VLI22	9'-9"	10'-5"	10'-10"	200	180	164	149	107	96	86	78	70	64	58	52	47	43	
	3VLI20	11'-6"	12'-3"	12'-7"	232	209	189	172	157	144	133	123	84	77	70	63	58	53	48
	3VLI19	12'-1"	13'-8"	14'-1"	263	236	215	193	176	162	149	138	128	89	81	74	68	62	57
	3VLI18	12'-5"	14'-10"	14'-7"	346	316	289	267	247	230	215	201	189	147	138	129	121	113	107
	3VLI16	13'-2"	14'-11"	15'-5"	396	360	329	302	279	259	241	225	211	199	188	146	137	128	121
7.25 (t=4.25) 55 psf	3VLI22	9'-4"	9'-6"	10'-4"	230	207	188	137	122	110	99	89	81	73	66	60	55	49	45
	3VLI20	11'-0"	11'-8"	12'-0"	267	240	217	197	180	168	153	107	97	88	80	73	67	61	55
	3VLI19	11'-8"	13'-0"	13'-5"	302	271	244	222	203	188	171	159	112	102	93	85	78	71	65
	3VLI18	12'-1"	14'-2"	14'-2"	398	362	332	306	284	264	246	231	217	170	158	148	139	130	123
	3VLI16	12'-9"	14'-3"	14'-9"	400	400	377	347	320	297	277	259	243	228	190	168	157	148	139

SLAB INFORMATION

Total Slab Depth (in.)	Theo. Concrete Volume (Yd/100 Ft)	(ft ³ /ft)	Recommended Welded Wire Fabric
5	1.08	0.292	6x6 - W1.4xW1.4
5 1/2	1.23	0.333	6x6 - W1.4xW1.4
6	1.39	0.375	6x6 - W1.4xW1.4
6 1/4	1.47	0.396	6x6 - W1.4xW1.4
6 1/2	1.54	0.417	6x6 - W2.1xW2.1
7	1.70	0.458	6x6 - W2.1xW2.1
7 1/4	1.77	0.479	6x6 - W2.1xW2.1
7 1/2	1.85	0.500	6x6 - W2.1xW2.1

*Volumes and weights do not include allowance for deflection.

COMPOSITE

NOTES:

- Maximum unshored spans do not consider web crippling. Required bearing should be determined based on allowable reactions on page 45 or with the Vulcraft Unshored Span Calculator available at www.vulcraft.com/designtools. The following conditions are required to meet the maximum unshored spans shown:
 - Minimum exterior bearing length of 1.5" for 20 to 16 gage. Minimum end bearing varies from 1.5" to 2.5" for 22 gage, depending on slab thickness.
 - Minimum interior bearing length of 2" for 16 and 18 gage. Maximum end bearing varies from 2" to 6.25" for 22 to 19 gage, depending on gage and slab thickness.
- Always contact Vulcraft when using loads in excess of 200 psf. Such loads often result from concentrated, dynamic or "long term" load cases for which reductions due to bond breakage, concrete creep etc. should be evaluated.
- All fire-rated assemblies are subject to an upper fire load limit of 250 psf.

STEEL ROOF & FLOOR DECK

AUGUST 2018

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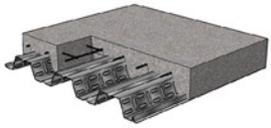
Deck Load Tables

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SECTION PROPERTIES

Deck Gauge	Design Thickness (in.)	Deck Weight (psf)	Section Properties					
			I_x (in ⁴ /ft)	S_x (in ³ /ft)	I_y (in ⁴ /ft)	S_y (in ³ /ft)	V_x (in ² /ft)	F_y (ksi)
22	0.0295	1.71	0.710	0.387	0.715	0.410	1407	50
20	0.0358	2.07	0.907	0.512	0.909	0.538	2485	50
19	0.0418	2.42	1.098	0.639	1.100	0.668	3390	50
18	0.0474	2.75	1.252	0.781	1.252	0.794	4361	50
16	0.0598	3.47	1.582	1.013	1.582	1.013	4901	40



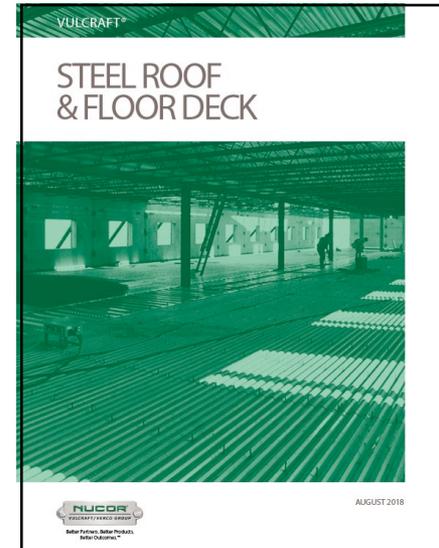
(N = 9.35) NORMAL WEIGHT CONCRETE (145 PCF)

TOTAL SLAB DEPTH	DECK TYPE	SDI Max. Unshored Clear Span																	
		SPAN			Superimposed Live Load (PSF)														
		1 SPAN	2 SPAN	3 SPAN	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	14'-0"	
5.00 (h=2.00) 45 psf	3VLI22	10'-0"	10'-9"	11'-1"	216	195	176	161	148	137	127	90	83	76	70	64	59	54	50
	3VLI20	11'-8"	12'-5"	12'-10"	241	216	196	178	163	150	139	129	121	113	78	72	66	61	57
	3VLI19	12'-3"	13'-11"	14'-4"	265	237	214	194	178	163	151	140	131	122	115	79	73	68	62
	3VLI18	12'-7"	15'-2"	14'-9"	289	261	238	218	201	186	173	161	151	142	134	127	92	86	80
	3VLI16	13'-4"	15'-3"	15'-7"	327	294	267	243	223	206	191	178	167	156	147	139	132	96	89
5.50 (h=2.50) 51 psf	3VLI22	9'-6"	9'-11"	10'-7"	247	222	201	184	169	156	113	103	94	87	80	73	67	62	57
	3VLI20	11'-3"	11'-11"	12'-4"	275	247	223	203	186	171	159	148	138	97	89	82	76	70	65
	3VLI19	11'-10"	13'-4"	13'-9"	302	270	244	222	208	186	172	160	149	139	98	91	84	77	71
	3VLI18	12'-3"	14'-6"	14'-4"	330	298	271	248	229	212	197	184	173	162	153	112	105	98	92
	3VLI16	12'-11"	14'-7"	15'-1"	373	335	304	277	255	235	218	203	190	178	168	159	117	109	102
6.00 (h=3.00) 57 psf	3VLI22	9'-2"	9'-2"	10'-2"	277	249	228	208	190	140	127	116	106	97	89	82	76	70	65
	3VLI20	10'-9"	11'-5"	11'-10"	309	277	250	228	209	193	178	166	119	109	100	92	85	79	73
	3VLI19	11'-7"	12'-9"	13'-2"	339	304	274	249	227	209	193	179	167	156	111	102	94	87	80
	3VLI18	11'-11"	13'-11"	14'-0"	370	334	304	279	257	238	221	207	194	182	136	128	118	110	103
	3VLI16	12'-7"	14'-0"	14'-6"	400	376	341	311	286	264	245	228	213	200	189	179	132	123	115
6.50 (h=3.50) 63 psf	3VLI22	8'-6"	8'-6"	9'-6"	307	277	251	229	171	155	141	129	116	108	99	91	84	78	72
	3VLI20	10'-4"	11'-0"	11'-4"	343	307	278	253	232	214	198	144	132	121	111	103	95	87	81
	3VLI19	11'-3"	12'-4"	12'-9"	377	337	304	278	252	232	214	199	185	134	123	113	104	96	89
	3VLI18	11'-8"	13'-5"	13'-8"	400	371	338	309	285	264	245	229	215	202	151	140	131	123	115
	3VLI16	12'-4"	13'-6"	14'-0"	400	400	376	345	317	290	272	253	237	222	206	157	146	137	128
7.00 (h=4.00) 69 psf	3VLI22	8'-6"	7'-11"	9'-0"	338	304	276	252	188	171	155	142	130	119	109	101	93	86	79
	3VLI20	10'-0"	10'-8"	11'-0"	377	338	305	278	255	235	217	159	145	133	122	113	104	96	89
	3VLI19	11'-0"	11'-11"	12'-3"	400	370	334	303	277	255	236	219	204	147	135	124	115	106	98
	3VLI18	11'-5"	13'-0"	13'-4"	400	400	371	340	313	290	270	252	236	178	166	154	144	135	126
	3VLI16	12'-1"	13'-1"	13'-6"	400	400	400	379	345	322	298	278	260	244	230	172	161	150	141
7.50 (h=4.50) 75 psf	3VLI22	8'-2"	7'-5"	8'-6"	368	331	300	228	205	186	169	154	141	130	119	110	101	93	86
	3VLI20	9'-8"	10'-3"	10'-7"	400	368	333	303	278	256	190	173	158	145	134	123	114	105	97
	3VLI19	10'-8"	11'-6"	11'-11"	400	400	364	331	302	278	257	238	175	160	147	136	125	116	107
	3VLI18	11'-2"	12'-7"	13'-0"	400	400	400	370	341	316	294	275	258	195	181	168	157	147	138
	3VLI16	11'-10"	12'-8"	13'-1"	400	400	400	380	351	325	303	283	260	202	188	175	164	153	

COMPOSITE

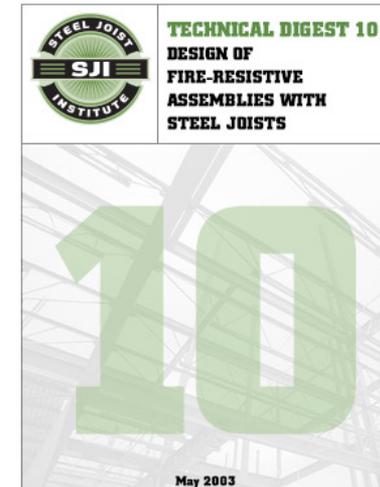
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52 AUG 2018



Fire Resistance

- Fire Rated Systems of Construction
 - SJI Technical Digest #10
 - <http://steeljoist.org>
 - ASTM E119
- Protection Types
 - Direct Application of Insulation Material
 - Cementitious Mixture
 - Sprayed Fiber Product
 - Continuous Barrier Membrane
 - Suspended Acoustical Tile
 - Gypsum Board System Beneath Framing



Fire Ratings

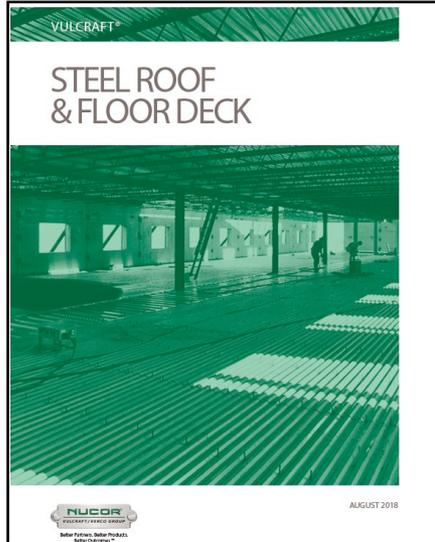
VULCRAFT®

COMPOSITE DECK FIRE RESISTANCE RATINGS

Restrained Assembly Rating	Type of Protection	Concrete Thickness & Type (t)	U.L. Design No. (2,3,4)	Classified Deck Type		Unrestrained Beam Rating	
				Flat Deck	Cellular Deck (E)		
3/4 Hr.	Unprotected Deck	2 1/2" LW	D914 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1 Hr.	
			D918 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
	Cementitious	2 1/2" HW	D216 *	1.5VL,1.5VL,2VL,2VL,1	2VL,3,3VL,3	2,3 Hr.	
			2" HW&LW	D740 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2,3 Hr.
			D700 *	1.5VL,2VL,1,3VL,1	1.5VL,2VL,3,3VL,3	1.5 Hr.	
			D742 *	3VL	3VL,3	2 Hr.	
			D722 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2 Hr.	
			D730 *	1.5VL,2VL,1,3VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3,4 Hr.	
			D759	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
			D659 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2,3 Hr.	
1 Hr.	Sprayed Fiber	2" HW&LW	D632 *	1.5VL,2VL,1,3VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
			D847 *	2VL,3,3VL,3	3VL,3	1,1.5,2 Hr.	
			D659 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2,4 Hr.	
			D871 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2,3 Hr.	
			D902 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.	
			D914 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1 Hr.	
			D918 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
			D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.	
	Unprotected Deck	2 1/2" LW	D902 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.	
			D918 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
3 1/2" HW		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
1 1/2 Hr.	Gypsum Board	2 1/2" HW	D662 *	1.5VL,1.5VL,2VL,2VL,1	2VL,3,3VL,3	1.5,2 Hr.	
			D740 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2,3 Hr.	
	Cementitious	2" HW&LW	D700 *	1.5VL,2VL,1,3VL,1	1.5VL,2VL,3,3VL,3	1.5 Hr.	
			D742 *	3VL	3VL,3	2 Hr.	
			D722 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2 Hr.	
			D730 *	1.5VL,2VL,1,3VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3,4 Hr.	
			D759	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
			2" HW&LW	D659 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2,3 Hr.
			D632 *	1.5VL,2VL,1,3VL,1	3VL,3	1,1.5,2,3 Hr.	
			D847 *	2VL,3,3VL,3	3VL,3	1,1.5,2 Hr.	
	Sprayed Fiber	2 1/2" HW&LW	D659 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2,4 Hr.	
			D871 *	2VL,3,3VL,3	2VL,3,3VL,3	1,1.5,2,3 Hr.	
			D902 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.	
			D918 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
			D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.	
			D902 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.	
			D918 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
			D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.	
	Unprotected Deck	3" LW	D902 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.	
			D918 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.	
D919 #			1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
D902 #			1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
4" HW		D918 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5,2,3 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		
		D919 #	1.5VL,1.5VL,2VL,2VL,1	1.5VL,2VL,3,3VL,3	1,1.5 Hr.		

Notes:
 1. Concrete thickness is thickness of slab above deck, in.
 2. Refer to the U.L. "Fire Resistance Directory" for the necessary construction details.
 3. Cellular deck finish shall be galvanized.
 4. Flat deck finish shall be galvanized unless noted otherwise.
 * Denotes flat deck finish is not critical when used in D2- & D5- Series designs. Deck finish shall be galvanized or phosphatized/painted.
 * Flat deck finish is critical for fire resistance. Flat deck finish shall be galvanized or phosphatized/painted. This paint is a special type of paint and is compatible with the spray-applied fire protection and is U.L. approved for use in the denoted D7- & D8- Series designs.
 # Denotes flat deck finish is not critical for fire resistance. Flat deck finish shall be galvanized or phosphatized/painted.
 5. Vulcraft cellular deck units are approved by U.L. for use as electrical raceways under U.L. Standard 500.

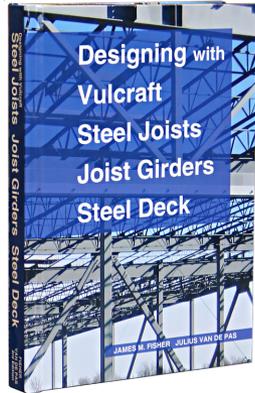
COMPOSITE



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Sprinklers, Etc.



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Considerations:

Main lines and branch lines

Hangers and spacing of hangers

Weight estimates

Early Suppression Fast Response Systems (ESFR)

SPRINKLER WEIGHTS

Pipe Dia. (inches)	Pipe & Water (pounds/ft.)		Hanger Load 5 ft. spacing (pounds)		Hanger Load 12 ft. spacing (pounds)	
	Schedule 10	Schedule 40	Schedule 10	Schedule 40	Schedule 10	Schedule 40
2	4.3	5	22	26	52	61
3	8	11	40	54	96	130
4	12	16	60	82	144	196
5	18	23	90	117	216	280
6	24	32	120	158	288	378
8	41	50	205	251	492	603
10	58	75	290	373	696	895
12	-	99	-	493	-	1184

Table 5.2.3 Typical Sprinkler System Weights



Floor Joists and Joist Girder Topics

- Types of floor joists and Joist Girders
 - K-Series and LH-Series Joists
 - CJ-Series Composite Joists
 - Joist Girders
- Strength Design
- Flush-Frame End Connections
- Ductwork Clearances
- Floor Vibration



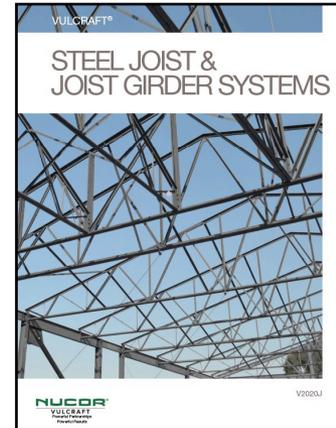
Advantages of Floor Joists

- They are economical
- High strength to weight ratio
- Available in a multitude of depths and shapes
- Openings permit passage of pipes and duct work



Floor Joists and Joist Girders

- K-Series
- LH-Series
- CJ-Series Composite Joists
- Joist Girders



LH-Series Joists

- Used for Roof and Floor Construction
- Designations: 18LH02 to 48LH25
- Depths: 18 to 48 in.
- Standard Seat Depth (Height): 5 in. up to #17, and 7.5 in. up to #25
- Span Range: 18 to 96 ft
- **ASD Load Range: 199 to 3000 plf**
- **LRFD Load Range: 298 to 4500 plf**



Joist Load Tables

General Information: Bridging & Acc. Economic Joist Guide Code of Standard Practice, Standard Specification K & KCS LH & DLH Joist Girders, Fire Ratings

LOAD TABLES LRFD - LH-SERIES

LRFD

STANDARD LOAD TABLES FOR STEEL JOISTS, LH-SERIES
Based on a 50 ksi Minimum Yield Strength - Loads Shown in Pounds Per Linear Foot (plf)

Joist Designation	24LH16		24LH20		24LH24		24LH28		24LH32		24LH36		24LH40		24LH44		24LH48		
	13	15	17	19	21	23	25	27	30	35	40	45	50	55	60	65	70	75	
20	600	1348	1492	1654	2013	2197	2505	2758	3051	3488	3987								
22	820	201	818	1656	1343	1439	1570	1804	1944	2439	2995								
24	980	1198	1500	1414	1648	2043	2229	2414	2803	3488	3771	4443							
26	980	781	820	893	1271	1392	1487	1674	1747	2324	2519	2939							
28	603	1123	1214	1401	1494	1698	2129	2476	2737	3288	3474	4187							
30	600	755	874	931	1189	1294	1399	1590	1616	2139	2317	2664							
32	815	1091	1246	1332	1714	1837	2000	2281	2488	3124	3385	3917							
34	775	1033	1158	1268	1627	1744	1905	2202	2446	3082	3270	3760	4332						
36	695	906	718	725	975	1051	1201	1361	1386	1751	1901	2206	2466						
38	741	964	1129	1260	1648	1839	2010	2191	2325	2812	3048	3566	4167						
40	690	900	977	772	987	1061	1211	1361	1386	1751	1901	2206	2466						
42	708	940	1077	1162	1475	1579	1723	2018	2211	2619	2859	3388	4004						
44	676	906	1037	1098	1432	1533	1661	1923	2103	2543	2795	3285	3897	4488					
46	660	900	988	991	743	766	882	948	818	1332	1453	1609	1802	2084					
48	640	861	941	1000	1338	1434	1564	1804	2000	2411	2625	3077	3605	4260	4892				
50	349	481	520	555	692	715	781	899	897	1235	1374	1608	1912	2127					
52	621	622	627	1063	1278	1398	1498	1748	1908	2288	2502	3279	3748	4340					
54	321	434	478	511	620	624	731	800	839	1131	1227	1396	1620	1770	2020				
56	581	760	837	903	1218	1338	1438	1678	1838	2282	2388	2742	3168	3663	4237				
58	296	381	411	471	579	621	671	738	773	1040	1124	1291	1513	1633	1839				
60	278	327	359	418	518	558	608	678	703	958	1025	1187	1407	1522	1722				
62	547	727	825	880	1114	1185	1260	1460	1580	2010	2179	2488	2880	3338	3831				
64	525	688	789	843	1082	1144	1209	1404	1526	1923	2093	2399	2805	3283	3854	4258			
66	298	311	315	370	460	461	510	560	560	816	816	1100	1100	1400	1400				
68	500	632	757	810	1000	1063	1130	1300	1442	1843	1990	2218	2588	3058	3581	4160			
70	399	506	569	609	680	680	749	806	806	1056	1056	1399	1399	1800	1800				
72	485	643	718	775	900	1035	1123	1255	1311	1705	1872	2115	2421	2798	3138	3520	4287		
74	478	618	678	728	848	983	1053	1183	1233	1627	1778	2021	2327	2688	3088	3588	4287		
76	460	616	686	744	918	1018	1104	1229	1281	1683	1834	2018	2311	2671	3097	3581	4168		
78	192	253	285	303	375	414	442	490	518	680	720	800	847	1000	1100	1200	1400	1600	1800
80	440	562	627	712	879	916	1000	1100	1150	1504	1599	1800	2004	2264	2600	3000	3400	4000	4600
82	199	238	267	285	351	389	423	479	499	624	679	739	827	879	1005	1105	1205	1405	1605
84	429	568	646	684	844	937	1023	1173	1234	1589	1682	1940	2163	2443	2800	3200	3612	4142	
86	182	232	251	263	329	354	387	454	472	584	635	712	802	848	1013	1100	1200	1300	1478
88	412	546	616	647	807	860	941	1101	1166	1488	1620	1800	2023	2246	2588	3000	3467	4023	
90	189	238	258	272	309	342	373	433	453	547	585	638	711	768	889	1019	1105	1200	1400
92	387	505	561	636	776	864	943	1103	1173	1427	1564	1800	2047	2314	2648	3087	3607	4225	
94	187	212	222	224	261	281	299	349	373	450	477	560	600	691	800	900	1000	1100	1300
96	387	505	568	654	789	851	927	1083	1148	1378	1500	1800	2060	2351	2712	3071	3537	4020	4294
98	182	182	188	222	274	305	331	381	415	491	526	600	651	767	817	900	1000	1100	1300
100	367	486	547	580	721	796	873	1023	1100	1333	1460	1661	1900	2160	2460	2820	3261	3861	4640
102	175	175	187	200	240	260	280	330	350	400	400	480	480	620	720	820	920	1020	1220
104	500	660	738	800	964	700	841	984	1083	1272	1399	1600	1716	1984	2220	2527	2911	3421	3937
106	180	180	188	200	240	260	280	330	350	400	400	480	480	620	720	820	920	1020	1220
108	451	618	688	750	920	1000	1080	1264	1340	1523	1630	1840	1974	2240	2540	2900	3361	3931	4511
110	156	176	185	200	225	228	228	228	228	228	228	228	228	228	228	228	228	228	228
112	388	508	588	628	748	811	881	1041	1100	1348	1488	1748	1938	2248	2588	3008	3508	4008	4608
114	148	168	175	216	241	263	283	333	353	403	414	487	533	587	680	810	930	1030	1110
116	421	578	648	692	848	933	1011	1181	1259	1459	1550	1770	1983	2268	2673	3140	3640	4180	4760
118	146	166	166	180	204	220	235	285	300	350	361	432	464	564	636	736	836	936	1036
120	390	480	487	473	601	666	727	849	930	1082	1184	1380	1474	1700	1912	2194	2572	3040	3493
122	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130
124	383	503	442	482	600	643	702	819	887	1033	1130	1322	1422	1644	1843	2100	2577	3035	3390
126	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130	130

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STEEL JOIST & JOIST GIRDER SYSTEMS

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V2020J



Economical Joist Guide

ECONOMICAL JOIST GUIDE													
JOIST DESIG.	TOTAL LOAD (ASD)	LL for L/960 DEFL.	TOTAL LOAD (LRFD)	JOIST WEIGHT (lb/ft)	MAX CHORD WIDTH (IN)	BRDG. (H/W/E)	JOIST DESIG.	TOTAL LOAD (ASD)	LL for L/960 DEFL.	TOTAL LOAD (LRFD)	JOIST WEIGHT (lb/ft)	MAX CHORD WIDTH (IN)	BRDG. (H/W/E)
44LH13	910	910	1365	27.2	8	2/0/0	96LH18	1771	1221	2657	57.2	11	1/0/0
96LH13	934	890	1401	30.1	8	2/0/0	32LH19	1787	1052	2681	81.4	11	1/0/0
44LH14	1077	1077	1616	31.6	8	2/0/0	96LH19	2022	1355	3093	62.7	11	1/0/0
48LH15	1229	1229	1844	33	8	2/0/0	32LH20	2341	1310	3382	80.9	11	1/0/0
44LH15	1253	1253	1880	35.1	8	2/0/0	96LH20	2542	1890	3813	89	11	1/0/0
44LH16	1470	1480	2205	40.8	9	2/0/0	96LH21	2790	1873	4199	92.1	11	1/0/0
44LH17	1640	1561	2460	46.3	9	2/0/0	51' LENGTH						
32LH18	1659	1009	2487	54.5	9	1/0/0	26K5	139	89	200	7.7	5	2/0/1
96LH18	1834	1207	2751	57.4	11	1/0/0	26K6	151	75	227	8.2	5	2/0/1
32LH19	1862	1118	2799	61.4	11	1/0/0	28K6	163	88	245	8.4	5	2/0/1
96LH19	2096	1440	3144	62.8	11	1/0/0	28K7	182	97	279	8.8	5	2/0/1
32LH20	2334	1392	3501	81.2	11	1/0/0	28K8	201	106	302	9.4	5	2/0/1
96LH20	2636	1797	3954	83.4	11	1/0/0	28K9	219	115	320	10	5	2/0/1
96LH21	2902	1991	4353	92.6	11	1/0/0	28K10	241	116	362	11.2	11	2/0/1
50' LENGTH						90K10	279	157	419	11.6	13	2/0/1	
26K5	144	73	216	7.7	5	2/0/1	90K11	320	179	480	13.1	13	3/0/0
26K6	157	80	236	8.2	5	2/0/1	90K12	343	192	515	14	13	3/0/0
26K8	170	93	255	8.3	5	2/0/1	96LH07	357	261	536	13.7	6	2/0/1
26K7	180	103	284	8.8	5	2/0/1	96LH08	397	286	596	15.1	6	2/0/1
28K8	209	113	314	9.4	5	2/0/1	44LH09	481	481	722	16.7	6	3/0/0
28K9	228	123	342	10	5	2/0/1	44LH10	530	530	795	17.7	7	2/0/0
26K10	250	124	375	11.2	11	2/0/1	40LH10	584	470	878	19.7	7	2/0/0
30K10	291	166	437	11.6	13	2/0/1	40LH11	613	509	920	20.5	7	2/0/0
30K11	339	190	500	13.2	13	3/0/0	44LH12	728	719	1002	23.4	7	2/0/0
30K12	350	199	525	14	13	3/0/0	96LH12	738	522	1107	25.7	7	2/0/0
96LH07	968	277	552	13.7	5	2/0/1	48LH13	835	835	1253	25.1	7	2/0/0
96LH08	410	304	615	15.1	6	2/0/1	44LH13	859	845	1289	27.5	8	2/0/0
44LH09	494	494	741	16.3	6	3/0/0	96LH13	872	612	1308	29.9	8	2/0/0
40LH09	515	483	773	17.4	6	2/0/1	44LH14	1013	968	1520	31	8	2/0/0
44LH10	545	545	818	17.9	7	2/0/0	48LH15	1161	1161	1742	33.8	8	2/0/0
40LH10	603	499	905	19.7	7	2/0/0	44LH15	1179	1125	1789	36.6	8	2/0/0
96LH11	837	485	956	21.4	7	2/0/0	96LH16	1310	878	1965	43.1	9	2/0/0
44LH12	750	750	1125	23.2	7	2/0/0	40LH16	1332	1021	1998	41.6	9	2/0/0
40LH12	768	859	1152	24.5	7	2/0/0	48LH17	1536	1536	2304	45.5	9	2/0/0
48LH13	857	857	1288	25.3	7	2/0/0	96LH18	1710	1150	2585	57.4	11	1/0/0
44LH13	884	884	1326	27.3	8	2/0/0	96LH19	1951	1276	2927	62.6	11	1/0/0
96LH13	903	850	1355	29.9	8	2/0/0	32LH20	2154	1234	3231	81.2	11	1/0/0
44LH14	1045	1028	1568	31.1	8	2/0/0	32LH21	2405	1368	3608	89.3	11	1/0/0
48LH15	1194	1194	1791	32.7	8	2/0/0	96LH21	2701	1754	4052	91.9	11	1/0/0
44LH15	1215	1194	1823	35.8	8	2/0/0	32LH22	2985	1859	4478	119.6	13	1/0/0
96LH16	1359	933	2029	43.2	9	2/0/0	52' LENGTH						
40LH16	1377	1084	2088	41.8	9	2/0/0	26K5	133	85	200	7.7	5	2/0/1
44LH17	1589	1488	2384	47	9	2/0/0	26K6	145	71	218	7.9	5	2/0/1

General Information: Bridging & Acc. Economical Joist Guide Code of Standard Practice, Standard Specification K & KCS, LH & DU, Joist Guides, Fire Ratings

80 V2020J



WWW.VULCRAFT.COM



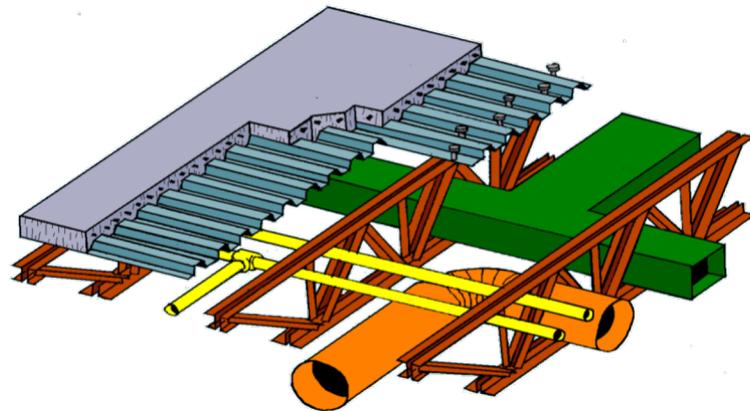
Composite Joists CJ-Series

■ Advantages of CJ System

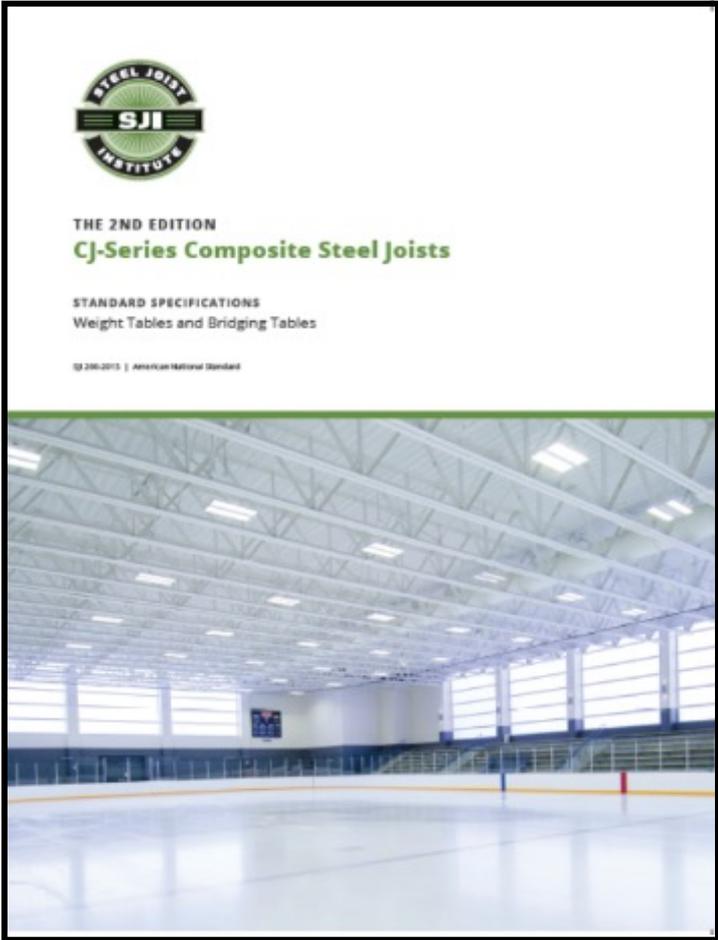
- Lighter overall structure weight
- Fewer framing pieces to erect
- Open webs for MEP
- Excellent Vibration Performance
 - Especially with Flush-Frame End Connections

■ Estimating Tool:

- [Composite Joist Floor System Aid](#)



Composite Joists CJ-Series



Composite Joists CJ-Series

NORMAL WEIGHT CONCRETE

DESIGN GUIDE LRFD WEIGHT TABLE FOR COMPOSITE STEEL JOISTS, CJ-SERIES

Based on a 50 ksi Maximum Yield Strength											
BEARING HEIGHT		2 1/2"	5"	7 1/2"							
Joist Span (ft.)	Joist Depth (in.)	Concrete Slab Parameters									
		Normal Weight Concrete (145 pcf) f'c = 4.0 ksi									
		hr (in.)	1	1	1	1	1	1	1	1.5	
		tc (in.)	2	2	2	2	2	2	2	2	
		Js (ft.)	3	3	3	3	3	3	3.5	4	
		Total Safe Factored Uniformly Distributed Joist Load in Pounds Per Linear Foot									
		TL	300	400	500	600	700	800	900	1000	1200
60	24	Wt(plf)	10.9	12.6	14.4	16.5	18.9	20	24	25	30
		W360(plf)	128	158	185	211	242	252	288	314	379
		N-ds	30-1/2"	30-1/2"	36-1/2"	42-1/2"	52-1/2"	56-1/2"	48-5/8"	50-5/8"	52-3/4"
		leff(in4)	643	793	932	1060	1220	1270	1450	1580	1910
		Bridging	(1)X+(3)H	(3)H							
	26	Wt(plf)	10.4	12.3	13.8	15.5	17.5	19.1	22	24	30
		W360(plf)	141	174	205	230	263	283	319	351	443
		N-ds	36-3/8"	30-1/2"	34-1/2"	40-1/2"	48-1/2"	52-1/2"	44-5/8"	46-5/8"	52-3/4"
		leff(in4)	711	877	1030	1160	1320	1420	1600	1760	2230
		Bridging	(1)X+(3)H	(3)H							
	28	Wt(plf)	9.7	11.1	12.5	15.5	16.6	19.3	21	23	27
		W360(plf)	152	189	218	265	282	326	351	383	466
N-ds		32-3/8"	30-1/2"	32-1/2"	40-1/2"	44-1/2"	52-1/2"	40-5/8"	42-5/8"	56-5/8"	
leff(in4)		765	950	1100	1330	1420	1640	1760	1930	2340	
Bridging		(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(3)H	
30	Wt(plf)	9.5	10.8	12.0	13.8	16.6	18.3	20	22	26	
	W360(plf)	161	206	236	277	322	350	379	416	505	
	N-ds	30-3/8"	30-1/2"	30-1/2"	36-1/2"	44-1/2"	46-1/2"	52-1/2"	40-5/8"	52-5/8"	
	leff(in4)	808	1030	1190	1390	1620	1760	1910	2090	2540	
	Bridging	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(3)H	
32	Wt(plf)	9.5	10.4	11.6	13.4	16.0	17.3	19.0	21	26	
	W360(plf)	181	217	254	297	343	368	402	449	571	
	N-ds	30-3/8"	30-1/2"	30-1/2"	34-1/2"	40-1/2"	42-1/2"	46-1/2"	36-5/8"	52-5/8"	
	leff(in4)	912	1090	1270	1490	1720	1850	2020	2260	2870	
	Bridging	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(3)H	
		Wt(plf)	8.5	9.7	11.6	13.2	15.1	16.7	18.5	21.0	23
		W360(plf)	107	142	203	241	302	337	475	536	627



Maximum Construction Clear Spans 3 in. Deck

MAXIMUM CONSTRUCTION CLEAR SPANS (S.D.I. CRITERIA) (ft-in.)

Total Slab Depth	Deck	Weight (psf)	NW Concrete N=9 145 PCF			Weight (psf)	LW Concrete N=14 110 PCF		
			1 SPAN	2 SPAN	3 SPAN		1 SPAN	2 SPAN	3 SPAN
5 (t=2.00)	3C22	44	10'-0	10'-9	11'-1	34	11'-0	11'-10	12'-2
	3C20	44	11'-8	12'-5	12'-10	34	12'-6	13'-8	14'-1
	3C18	45	12'-7	15'-2	14'-9	35	13'-6	16'-7	15'-10
	3C16	46	13'-4	15'-3	15'-7	36	14'-3	16'-8	16'-8
5.5 (t=2.50)	3C22	50	9'-6	9'-11	10'-7	38	10'-7	11'-4	11'-8
	3C20	50	11'-3	11'-11	12'-4	39	12'-2	13'-1	13'-7
	3C18	51	12'-3	14'-6	14'-4	39	13'-1	15'-11	15'-4
	3C16	52	12'-11	14'-7	15'-1	40	13'-10	16'-0	16'-2
6 (t=3.00)	3C22	56	9'-2	9'-2	10'-2	43	10'-2	10'-11	11'-3
	3C20	56	10'-9	11'-5	11'-10	43	11'-10	12'-8	13'-1
	3C18	57	11'-11	13'-11	14'-0	44	12'-9	15'-4	14'-11
	3C16	58	12'-7	14'-0	14'-6	45	13'-6	15'-6	15'-9
6.5 (t=3.50)	3C22	62	8'-9	8'-6	9'-8	48	9'-9	10'-5	10'-10
	3C20	62	10'-4	11'-0	11'-4	48	11'-6	12'-3	12'-7
	3C18	63	11'-8	13'-5	13'-8	49	12'-5	14'-10	14'-7
	3C16	64	12'-4	13'-6	14'-0	49	13'-2	14'-11	15'-5
7 (t=4.00)	3C22	68	8'-6	7'-11	9'-0	52	9'-5	9'-9	10'-6
	3C20	69	10'-0	10'-8	11'-0	52	11'-2	11'-10	12'-3
	3C18	69	11'-5	13'-0	13'-4	53	12'-2	14'-5	14'-3
	3C16	70	12'-1	13'-1	13'-6	54	12'-11	14'-6	15'-0
7.5 (t=4.50)	3C22	74	8'-2	7'-5	8'-6	57	9'-2	9'-3	10'-2
	3C20	75	9'-8	10'-3	10'-7	57	10'-10	11'-6	11'-10
	3C18	75	11'-2	12'-7	13'-0	58	11'-11	14'-0	14'-0
	3C16	76	11'-10	12'-8	13'-1	58	12'-8	14'-1	14'-6
8 (t=5.00)	3C22	80	7'-11	7'-0	8'-0	61	8'-11	8'-8	9'-10
	3C20	81	9'-4	10'-0	10'-4	62	10'-6	11'-2	11'-6
	3C18	81	10'-10	12'-2	12'-7	62	11'-9	13'-7	13'-9
	3C16	82	11'-7	12'-3	12'-8	63	12'-5	13'-8	14'-2

Notes:
1. Maximum unshored spans do not consider web crippling. Required bearing should be determined based on allowable reactions on page 43 or with the Vulcraft Unshored Span Calculator available at www.vulcraft.com/designtools. The following conditions are required to meet the maximum unshored spans shown:

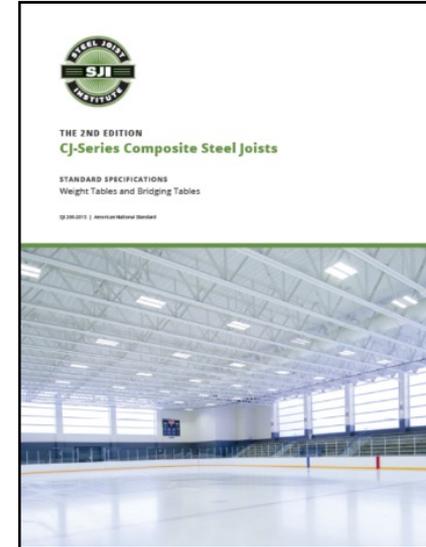
For Normal Weight Concrete:

- Minimum exterior bearing length of 1.5" for 19 to 16 gage. Minimum end bearing varies from 1.5" to 3.75" for 22 and 20 gage, depending on slab thickness.
- Minimum interior bearing length of 2" for 16 gage. Minimum interior bearing varies from 2" to 6.25" for 18 to 22 gage, depending on gage and slab thickness.

For Lightweight Concrete:

- Minimum exterior bearing length of 1.5" for 20 to 16 gage. Minimum end bearing is 1.5" to 2.75 for 22 gage, depending on gage and slab thickness.
- Minimum interior bearing length of 2" for 18 and 16 gage. Minimum end bearing varies from 2" to 6.25" for 22 to 19 gage, depending on gage and slab thickness.

See page 39 for Reinforced Concrete Slab Allowable Loads for 3C.



VULCRAFT
VULCRAFT/VERCO

Composite Joists CJ-Series

The composite steel joist designation: **30 CJ 2188 / 1168 / 420**

30	CJ	2188	1168	420
Depth (in.)	Composite Joist Series	¹ Total Factored Composite Design Load (plf)	Total Factored Composite Live Load (plf)	Total Factored Composite Dead Load (plf)

¹ Total Factored Composite Design Load = Total Factored Composite Live Load + Total Factored Composite Dead Load + Total Factored Non-composite Dead Load.

SJI CJ COSP-2015 Appendix A, Required Design Parameters (Nominal Uniform Loads), provides a form that can be utilized for organizing loading information. See also SJI CJ COSP - 2015, Section 6.1.1, Design Input Required for Composite Steel Joists.

In this example, the CJ-Series composite steel joist designation shown on the structural plans would be **30 CJ 2188 / 1168 / 420**.



Composite Joists CJ-Series

Appendix A of the SJI Catalog contains a handy outline for the recording of the loads.

Date _____ Project _____

Joist Geometry:

- 1) Depth _____ in. (mm)
- 2) Span _____ ft. (m)
- 3) Adjacent Member Spacing (left) _____ ft. (m)
- 4) Adjacent Member Spacing (right) _____ ft. (m)

Concrete and Deck:

- 1) Type of Floor Deck
- 2) Depth of Floor Deck _____ in. (mm)
- 3) Slab Thickness above Deck _____ in. (mm)
- 4) Concrete Unit Weight _____ pcf (kg/m³)
- 5) Concrete Compressive Strength _____ ksi (MPa)



Composite Joists CJ-Series

Nominal Loads:

1) Non-composite Construction Dead Load

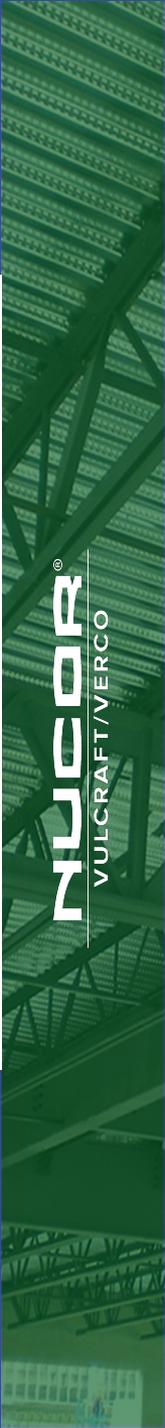
- a) Concrete _____ psf (kPa)
- b) Joist and Bridging _____ psf (kPa)
- c) Deck _____ psf (kPa)
- d) **Total** _____ psf (kPa) _____ plf (kN/m)

2) ¹Construction Live Load

- a) During Concrete Placement _____ psf (kPa) _____ plf (kN/m)

3) Composite Dead Load

- a) Fixed Partitions _____ psf (kPa)
- b) Mechanical _____ psf (kPa)
- c) Electrical _____ psf (kPa)
- d) Fireproofing _____ psf (kPa)
- e) Floor Covering and Ceiling _____ psf (kPa)
- f) Miscellaneous Dead Loads _____ psf (kPa)
- g) **Total** _____ psf (kPa) _____ plf (kN/m)



Composite Joists CJ-Series

5) Total Factored Non-composite Dead Load, $1.2 \times (1d)$

_____ psf (kPa) _____ plf (kN/m)

6) Total Factored Composite Dead Load, $1.2 \times (3g)$

_____ psf (kPa) _____ plf (kN/m)

7) Total Factored Composite Live Load, $1.6 \times (4c)$

_____ psf (kPa) _____ plf (kN/m)

8) Total Factored Composite Design Load, $(5) + (6) + (7)$

_____ psf (kPa) _____ plf (kN/m)

9) Joist Designation:

_____ CJ _____ / _____ / _____
 dd (8) (7) (6)

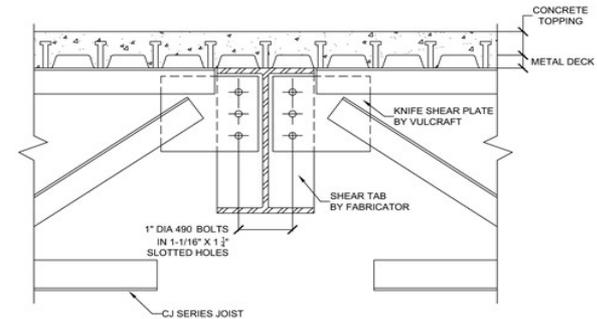
dd = joist depth



Flush-Frame End Connections

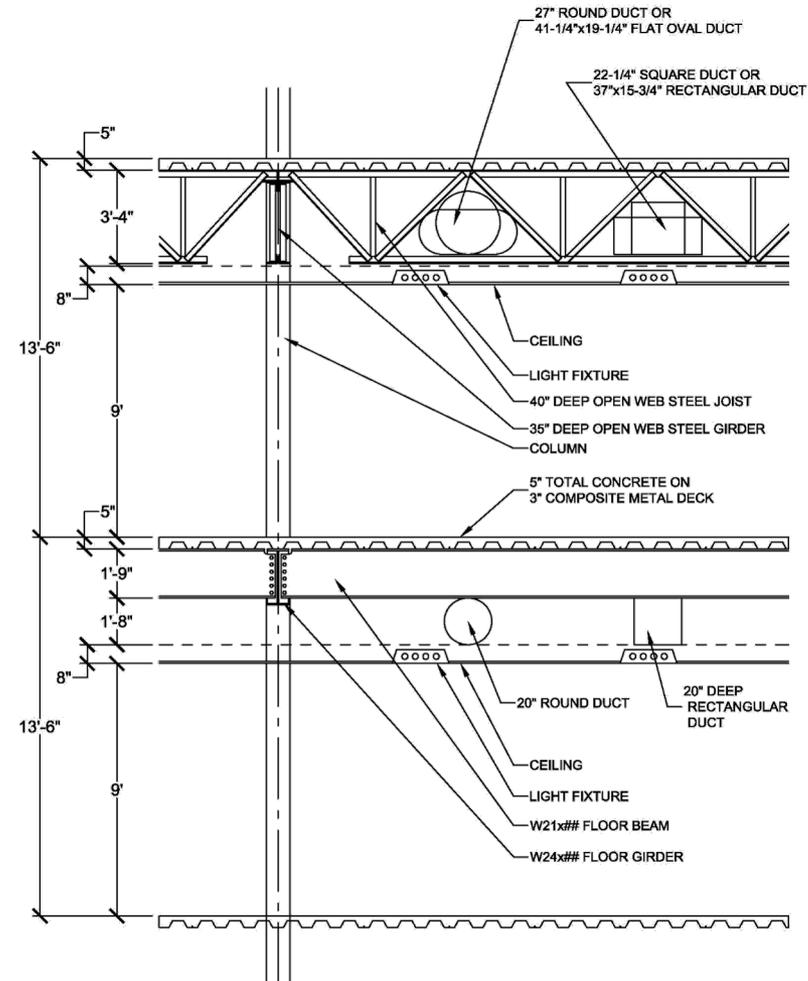
ADVANTAGES

- Reduced floor-to-floor heights
- Simplified deck installation – Eliminate blocking between joists
- Girders can be designed deeper and/or composite
- Easier MEP installation vs. solid framing
- Excellent vibration response



Allowed Ductwork Clearances

- Equivalent Plenum Heights
- More Room
 - Larger Ducts, etc.
- Lighter Structure
 - Cost Savings in Foundations, Seismic Framing, etc.
- Further Savings
 - Composite Joists
 - Flush-Framed Connections

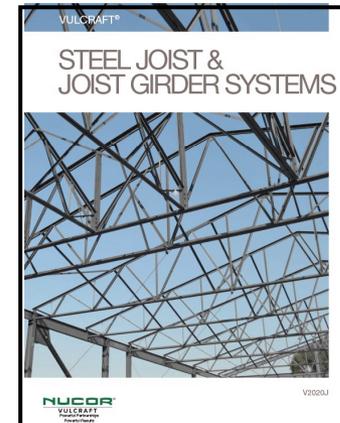
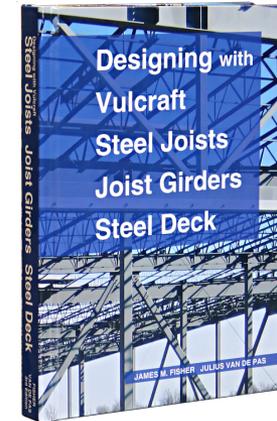


Allowed Ductwork Clearances

- Table 3.5.2 - Aid for Max. Ductwork Clearances through Joists

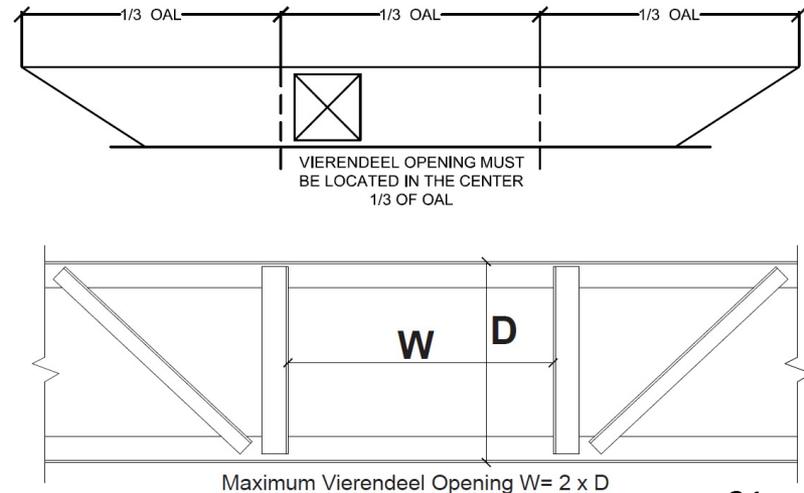
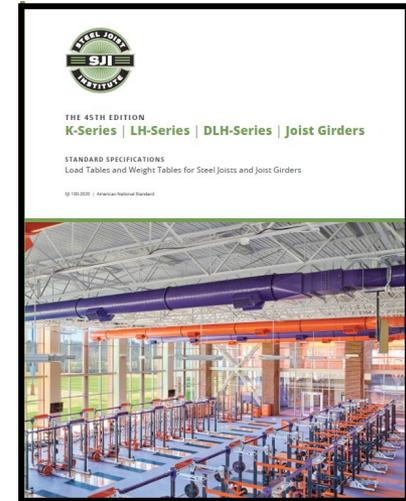
ALLOWABLE DUCTWORK

Joist Depth (in.)	Panel Length (in.)	Maximum Span (ft.)	Round (in.)	Square (in.)	Rectangular (in. x in.)	Flat Oval (in. x in.)
18	48	22	11.0	9.25	6.0 x 18.25	20.50x 7.50
20	48	25	12.5	10.25	7.0 x 18.75	21.25x 8.75
22	48	26	14.0	11.25	8.0 x 19.25	21.75x10.00
24	48	32	14.5	12.0	8.75 x 19.0	22.00x10.75
26	56	38	16.0	12.75	9.5 x 19.25	25.50x11.75
28	56	45	15.5	12.75	9.75 x 18.5	25.00x12.25
30	64	45	17.5	14.25	11.0 x 19.5	30.00x14.00
32	64	50	19.5	15.75	11.5 x 25.25	29.50x14.50
34	78	52	21.5	17.5	12.75 x 28.0	36.00x15.75
36	78	56	22.5	18.25	13.25 x 29.25	36.75x17.00
38	86	60	23.5	19.0	13.75 x 30.75	40.75x18.00
40	86	60	25.0	20.25	14.75 x 32.5	41.25x19.25



Allowed Ductwork Clearances

Need more room? Vierendeel Openings



Floor Vibration

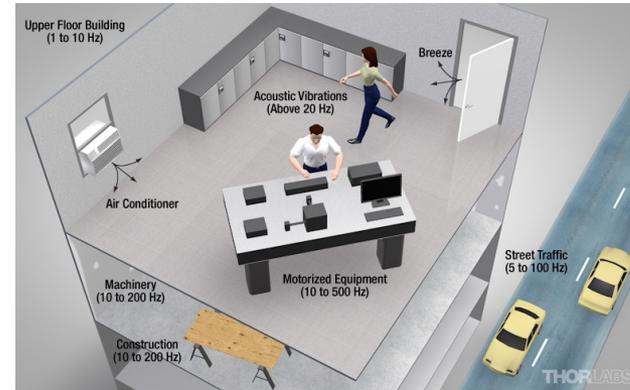
- All elevated floors will exhibit vibration due to pedestrian traffic
 - Though it may go unnoticed
- The human perception is dependent on:
 - Floor frequency, amplitude, damping, and duration of movement
- Structural characteristics affecting vibration response:
 - Natural frequency, stiffness, floor mass, and amount of damping present
- Layout and mass of Joist+Girder+Composite Deck-Slab directly affect vibration response



Floor Vibration (cont'd)

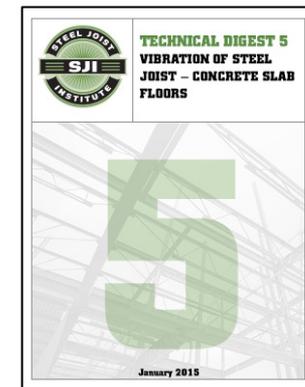
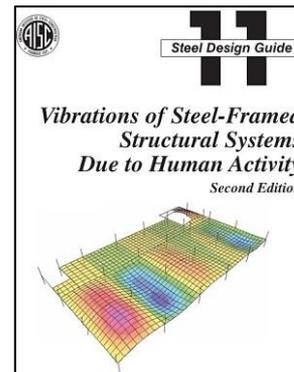
- Specifier must determine:

- Frequency of the floor system
- Recommended damping for building type
- Recommended acceptability criterion based on a maximum acceptable acceleration for given occupancy



- Excellent References:

- AISC Design Guide 11, *Vibration of Steel-Framed Structural Systems Due to Human Activity*, 2nd Ed.
- SJI Technical Digest 5, *Vibration of Steel Joist – Concrete Slab Floors*



Floor Vibration - Tools

- Free tool at: [Vibration Analysis - Walking](#)
 - Analysis of Joist+Composite Deck-Slab for Walking Excitation
 - Joists and Girders are assumed to be simple span.
- Other floor systems or types of excitation:
 - FloorVibe v3.0 @ <https://www.floorvibe.com>
- RISA
 - <https://risa.com/>



Vibration Analysis - Walking

Analyze floor system for Vibration based on Walking criteria using SJI TD5 and AISC DG11. Tool is for Joist floor with several Girder options.

FloorVibe v3.0 - Structural Engineers, Inc.
FLOORVIBE is like having a floor vibration expert at your desk...



Floor Bay Design Example

Given:

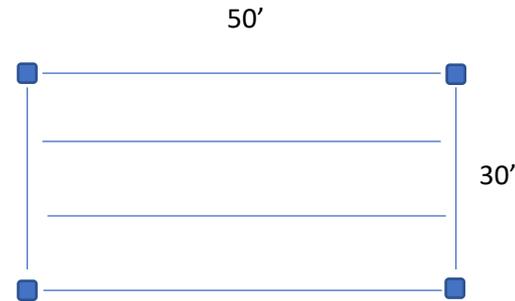
Live Load = 80 psf

Superimposed Dead Load = 15 psf

3 - hour fire rating required

Design Steps:

1. Select deck
2. Select joist
3. Select Joist Girder



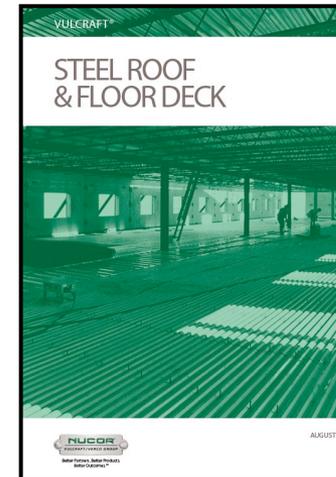
Typical Interior Bay

Identify Fire Rating Requirements



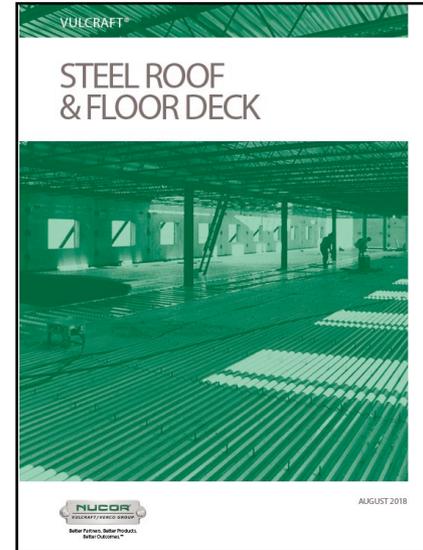
Unprotected Deck	4 3/16" LW	D902 #	✓	✓	✓	✓	✓	✓	1,1½,2,3
		D916 #	✓	✓	✓	✓	✓	✓	1,1½,2,3
		D919 #	✓	✓	✓	✓	✓	✓	1,1½
	5¼" NW	D902 #	✓	✓	✓	✓	✓	✓	1,1½,2,3
		D916 #	✓	✓	✓	✓	✓	✓	1,1½,2,3
		D919 #	✓	✓	✓	✓	✓	✓	1,1½

**Use 5-1/4 in. Normal Weight Concrete
UL Design No. D902**



Maximum Deck Construction Spans Normal Weight Concrete

Try 3 VLI 20 Composite deck



VULCRAFT®
3VLI COMPOSITE DECK

SECTION PROPERTIES

Deck Gauge	Design Thickness (in.)	Deck Weight (psf)	I_x (in ⁴ /ft)	S_x (in ³ /ft)	I_y (in ⁴ /ft)	S_y (in ³ /ft)	V_x (lbs/ft)	F_y (ksi)
22	0.0206	1.71	0.710	0.367	0.715	0.410	1407	50
20	0.0358	2.07	0.907	0.512	0.909	0.538	2485	50
19	0.0418	2.42	1.008	0.630	1.100	0.668	3300	50
18	0.0474	2.75	1.252	0.761	1.252	0.794	4381	50
16	0.0508	3.47	1.582	1.013	1.582	1.013	4001	40

(N = 9.35) NORMAL WEIGHT CONCRETE (145 PCF)

TOTAL SLAB DEPTH	DECK TYPE	SDI Max. Unshored Clear Span			Superimposed Live Load (PSF)															
		1 SPAN	2 SPAN	3 SPAN	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"	10'-0"	10'-6"	11'-0"	11'-6"	12'-0"	12'-6"	13'-0"	13'-6"	14'-0"	
6.00 (t=2.00) 45 psf	3VL22	10'-0"	10'-9"	11'-1"	218	196	178	161	148	137	90	83	76	70	64	59	54	50		
	3VL20	11'-8"	12'-3"	12'-10"	241	216	198	179	160	150	99	125	121	113	78	72	66	61	57	
	3VL19	12'-9"	13'-11"	14'-4"	265	237	214	194	178	163	140	131	122	115	73	73	68	62		
	3VL18	12'-7"	13'-2"	14'-9"	289	261	238	218	201	186	153	161	151	142	134	127	62	60	80	80
	3VL16	12'-4"	13'-3"	14'-7"	327	294	267	243	223	208	181	178	167	158	147	139	132	96	80	
	3VL22	9'-8"	9'-11"	10'-7"	247	222	201	184	169	155	113	103	94	87	80	73	67	62	57	
6.00 (t=2.50) 51 psf	3VL20	11'-3"	11'-11"	12'-4"	275	247	223	203	186	171	150	148	138	97	89	82	76	70	65	
	3VL19	11'-10"	12'-4"	13'-0"	302	270	244	222	201	187	172	180	149	139	98	91	64	77	71	
	3VL18	12'-3"	14'-6"	14'-4"	330	298	271	248	229	212	197	184	173	162	143	112	106	98	92	
	3VL16	12'-11"	14'-7"	15'-1"	373	335	304	277	255	235	216	203	190	178	168	150	117	100	102	
	3VL22	9'-2"	9'-2"	10'-2"	277	249	228	208	190	142	127	116	108	97	89	82	76	70	65	
	3VL20	10'-0"	11'-5"	11'-10"	300	277	250	228	206	193	178	186	119	109	100	92	85	79	73	
6.00 (t=3.00) 57 psf	3VL19	11'-7"	12'-9"	13'-2"	339	304	274	240	227	209	193	179	187	158	111	102	94	87	80	
	3VL18	11'-11"	13'-11"	14'-0"	370	334	304	270	257	238	221	207	194	182	138	128	118	110	103	
	3VL16	12'-7"	14'-0"	14'-8"	400	378	341	311	286	264	245	228	213	200	189	178	132	123	115	
	3VL22	8'-9"	8'-8"	9'-8"	307	277	251	223	171	155	141	120	118	108	99	91	84	78	72	
	3VL20	10'-4"	11'-0"	11'-4"	343	307	278	253	232	214	198	144	132	121	111	103	96	87	81	
	3VL19	11'-3"	12'-4"	12'-9"	377	337	304	278	252	232	214	199	185	134	123	113	104	96	89	
6.00 (t=3.50) 63 psf	3VL18	11'-8"	13'-6"	13'-8"	400	371	338	300	285	264	248	229	216	202	151	140	131	123	115	
	3VL16	12'-4"	13'-6"	14'-0"	400	400	378	345	317	293	272	253	237	222	200	187	148	137	128	
	3VL22	8'-8"	7'-11"	9'-0"	358	304	278	252	198	171	155	142	130	119	109	101	93	86	79	
	3VL20	10'-0"	10'-0"	11'-0"	377	338	305	279	255	236	217	199	146	133	122	113	104	96	89	
	3VL19	11'-0"	11'-11"	12'-3"	400	370	334	303	277	256	238	219	204	147	136	124	115	106	98	
	3VL18	11'-6"	13'-0"	13'-4"	400	400	371	340	313	290	270	252	236	178	166	154	144	135	128	
7.00 (t=4.50) 69 psf	3VL16	12'-11"	13'-1"	13'-8"	400	400	379	348	322	298	278	260	244	230	172	161	150	141		
	3VL22	8'-2"	7'-6"	8'-6"	368	331	300	228	205	188	169	154	141	130	119	110	101	93	86	
	3VL20	9'-8"	10'-3"	10'-7"	400	368	333	303	278	258	190	173	158	145	134	123	114	105	97	
	3VL19	10'-8"	11'-8"	11'-11"	400	400	364	331	302	278	257	236	175	160	147	136	125	116	107	
	3VL18	11'-2"	12'-7"	13'-0"	400	400	370	341	318	294	275	258	195	181	168	157	147	138		
	3VL16	11'-10"	12'-8"	13'-1"	400	400	400	380	351	325	303	283	268	202	188	175	164	153		

COMPOSITE

5.5 (t=2.50) 51 psf

3 SPAN

10'-0"

3VL22

9'-8"

113

3VL20

11'-4"

159

3VL19

12'-0"

172

3VL18

13'-8"

197

3VL16

14'-0"

218

Notes:
 1. Maximum unshored spans do not consider self-cippling. Required bearing should be determined based on allowable reactions on page 43 or with the Vulcraft Unshored Span Calculator available at www.vulcraft.com/designtools. The following conditions are required to meet the maximum unshored spans shown:
 48k minimum exterior bearing length of 12" for 18 to 16 psf. Minimum and bearing varies from 1.5" to 3.5" for 22 and 20 psf, depending on slab thickness.
 48k minimum exterior bearing length of 21" for 16 psf. Minimum exterior bearing varies from 2" to 6.52" for 18 to 22 psf, depending on size and slab thickness.
 2. Always contact Vulcraft when using loads in excess of 200 psf. Such loads often result from concentrated, dynamic or long term loads cases for which reductions due to bond breakage, concrete creep etc. should be evaluated.
 3. All inverted assemblies are subject to an upper live load limit of 50 psf.

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NUCOR
VULCRAFT/VERCO

Deck, Joist and Joist Girder Loads

1.2D + 1.6L (Dead Load + Live Load):

- Load supported by the deck:
 $(1.2)(51 \text{ psf}) + (1.6)(80 \text{ psf}) = \mathbf{189 \text{ psf}}$
- Load supported by the joists (add the 15 psf superimposed dead load, assumed to be hanging on the joists and 5 psf for self-weight of joists):
 $[(1.2)(51 \text{ psf} + 15 \text{ psf} + 5 \text{ psf}) + (1.6)(80 \text{ psf})](10 \text{ ft}) = \mathbf{2130 \text{ plf}}$
- Load supported by the Joist Girders (add 4 psf for self-weight of the Joist Girders, note that this Joist Girder has two joists framing in at each panel point):
 $[2130 \text{ plf} + (1.2)(4.0 \text{ psf})(10 \text{ ft})](50 \text{ ft})/1000 = \mathbf{109 \text{ kips}}$



Joist Selection: Use Economical Joist Guide



ECONOMICAL JOIST GUIDE

JOIST DESIG.	TOTAL LOAD (ASD)	LOAD for L/360 DEFL.	TOTAL LOAD (LRFD)	JOIST WEIGHT (lb/ft)	MAX CHORD WIDTH (IN)	BRIDG. (H-X/E-X)	JOIST DESIG.	TOTAL LOAD (ASD)	LOAD for L/360 DEFL.	TOTAL LOAD (LRFD)	JOIST WEIGHT (lb/ft)	MAX CHORD WIDTH (IN)	BRIDG. (H-X/E-X)
49' LENGTH (continued)							50' LENGTH (continued)						
44LH13	910	1385	27.2	8	2/0/0	36LH18	1771	1221	2657	57.2	11	1/0/0	
36LH13	924	800	1401	30.1	8	2/0/0	32LH19	1787	1052	2681	61.4	11	1/0/0
44LH14	1077	1077	1616	31.6	8	2/0/0	36LH19	2022	1355	3033	62.7	11	1/0/0
49LH15	1229	1229	1844	33	8	2/0/0	32LH20	2241	1310	3382	80.9	11	1/0/0
44LH15	1253	1253	1690	35.1	8	2/0/0	36LH20	2542	1600	3613	83	11	1/0/0
44LH16	1470	1490	2205	40.8	9	2/0/0	36LH21	2709	1873	4100	92.1	11	1/0/0
44LH17	1640	1581	2480	46.8	9	2/0/0	51' LENGTH						
32LH18	1658	1009	2487	54.5	9	1/0/0	26K5	130	89	200	7.7	5	2/0/1
36LH18	1634	1207	2729	54.4	11	1/0/0	26K6	151	75	227	8.2	5	2/0/1
32LH19	1882	1118	2705	61.4	11	1/0/0	26K7	162	97	273	8.8	5	2/0/1
36LH19	2006	1440	3144	62.8	11	1/0/0	26K8	201	106	302	9.4	5	2/0/1
32LH20	2334	1302	3507	81.2	11	1/0/0	26K9	210	115	329	10	5	2/0/1
36LH20	2638	1707	3910	83.4	11	1/0/0	26K10	241	118	362	11.2	11	2/0/1
36LH21	2902	1901	4333	92.8	11	1/0/0	30K10	270	157	410	11.8	13	2/0/1
50' LENGTH							30K11	320	179	480	13.1	13	3/0/0
26K5	144	73	218	7.7	5	2/0/1	30K12	343	192	515	14	13	3/0/0
26K6	157	80	238	8.2	5	2/0/1	36LH07	357	261	538	13.7	8	2/0/1
26K7	170	93	255	8.3	5	2/0/1	36LH08	397	286	598	15.1	6	2/0/1
26K8	200	113	314	9.4	5	2/0/1	44LH09	481	481	722	16.7	6	3/0/0
26K9	228	123	342	10	5	2/0/1	44LH10	530	530	795	17.7	7	2/0/0
26K10	250	124	375	11.2	11	2/0/1	40LH10	584	470	878	19.7	7	2/0/0
30K10	291	168	437	11.6	13	2/0/1	40LH11	613	500	920	20.5	7	2/0/0
30K11	323	190	500	13.2	13	3/0/0	44LH12	728	713	1002	23.4	7	2/0/0
30K12	350	190	525	14	13	3/0/0	36LH12	738	522	1107	25.7	7	2/0/0
36LH07	368	277	552	13.7	5	2/0/1	49LH13	835	835	1253	25.1	7	2/0/0
36LH08	410	304	615	15.1	6	2/0/1	44LH13	850	845	1289	27.5	8	2/0/0
44LH09	494	494	741	16.3	6	3/0/0	36LH13	872	612	1308	29.9	8	2/0/0
40LH09	515	453	773	17.4	6	2/0/1	44LH14	1013	968	1520	31	8	2/0/0
44LH10	545	545	818	17.9	7	2/0/0	49LH15	1161	1161	1742	33.8	8	2/0/0
40LH10	603	490	905	19.7	7	2/0/0	44LH15	1179	1125	1789	36.8	8	2/0/0
36LH11	637	465	968	21.4	7	2/0/0	36LH16	1310	878	1985	43.1	9	2/0/0
44LH12	750	750	1125	23.2	7	2/0/0	40LH16	1332	1021	1908	41.8	9	2/0/0
40LH12	768	659	1152	24.5	7	2/0/0	49LH17	1538	1538	2304	45.5	9	2/0/0
49LH13	857	857	1296	25.3	7	2/0/0	36LH18	1710	1150	2585	57.4	11	1/0/0
44LH13	884	884	1328	27.3	8	2/0/0	36LH19	1951	1278	2927	62.8	11	1/0/0
36LH13	903	650	1355	29.9	8	2/0/0	32LH20	2154	1234	3231	81.2	11	1/0/0
44LH14	1045	1028	1568	31.1	8	2/0/0	32LH21	2405	1386	3806	80.3	11	1/0/0
49LH15	1104	1104	1701	32.7	8	2/0/0	36LH21	2701	1764	4052	91.9	11	1/0/0
44LH15	1215	1104	1823	35.8	8	2/0/0	32LH23	2985	1689	4478	119.8	13	1/0/0
36LH16	1359	933	2039	43.2	9	2/0/0	52' LENGTH						
40LH16	1377	1084	2086	41.8	9	2/0/0	26K5	133	85	200	7.7	5	2/0/1
44LH17	1589	1468	2384	47	9	2/0/0	26K6	145	71	218	7.9	5	2/0/1

JOIST DESIG.	TOTAL LOAD (ASD)	LOAD for L/360 DEFL.	TOTAL LOAD (LRFD)	JOIST WEIGHT (lb/ft)	MAX CHORD WIDTH (IN)	BRIDG. (H-X/E-X)
50' Length						
36LH16	1359	933	2039	43.2	9	2/0/0
40LH16	1377	1084	2086	41.8	9	2/0/0
44LH17	1589	1468	2384	47	9	2/0/0

DL Joist: 47 plf = 47 plf/10 ft = 4.7 psf
 4.7 psf < 5 psf (estimated) ok
 2130 plf < 2066 40LH17 ok

Select 40LH17

Joist Girders:

GIRDER SPAN (ft)	JOIST SPACES (ft)	GIRDER DEPTH (in)	JOIST GIRDER WEIGHT -- POUNDS PER LINEAR FOOT																					
			LOAD ON EACH PANEL POINT -- KIPS																	ASD			LRFD	
			6	8	10	12	14	16	18	20	24	28	32	36	40	44	48	52	56	60	70	80	90	100
	9	12	15	18	21	24	27	30	36	42	48	54	60	66	72	78	84	90	105	120	135	150		
28	3N@ 9.33	24	18	19	22	24	27	29	36	39	43	53	62	70	71	78	85	89	98	111	130	138		
		28	18	19	20	22	25	26	28	31	39	43	46	55	61	66	76	83	86	96	112	122	132	160
	4N@ 7.00	24	16	20	24	27	32	38	40	48	55	62	71	82	95	104	108	120	135	144				
		28	15	18	21	25	28	32	36	49	49	56	64	71	79	96	97	108	107	125	147	171	180	206
	5N@ 5.60	24	18	24	29	34	39	46	52	58	66	78	96	102	111	126	138							
		28	17	21	26	30	35	39	46	50	61	68	77	90	99	107	114	130	142	162	184	213	239	257
	6N@ 4.67	24	21	28	35	41	49	55	63	70	79	96	106	134	137									
		28	20	24	30	36	42	50	54	58	71	82	99	107	118	138	142	170	174	193	228	261	288	
	7N@ 4.00	24	24	32	41	49	56	64	74	79	96	110	135	156										
		28	22	27	35	43	51	57	62	69	82	99	108	129	140	162	173	195	198	222	265	305		
8N@ 3.50	24	28	37	48	55	64	74	79	95	105	134													
	28	25	32	39	50	58	65	72	81	99	108	129	141	172	197	203	231	237	263					
10N@	24	36	46	57	70	79	96	102	117	137														
	28	30	41	50	60	69	82	99	100	120	141	174	203	219	239	265	295	311						
30	3N@ 10.00	24	18	21	24	27	31	35	38	40	48	58	66	71	80	92	98	117	119	120	137			
		28	18	19	22	25	27	30	35	37	42	49	56	63	70	79	82	93	99	103	121	132	161	183
	4N@ 7.50	24	16	20	24	27	32	38	40	48	55	62	71	82	95	104	108	120	135	144				
		28	15	18	22	26	30	34	37	43	51	55	62	70	77	87	103	105	116	121	148	157	180	202
	5N@ 6.00	24	19	25	30	37	43	51	55	58	73	86	96	109	125	134								
		28	17	23	27	32	37	44	47	53	61	75	88	97	102	112	128	138	159	170	192	224	242	270
	6N@ 5.00	24	24	29	37	45	52	58	66	73	94	104	116	134										
		28	20	27	32	38	44	50	57	65	75	97	99	107	137	140	170	180	196	192	227	284		
	8N@ 3.75	24	32	42	51	58	65	82	98	100	109	121	142	144	174	183	197	233	257	299				
		28	30	39	46	54	61	79	104	117	130	154	161	184	203	208	240	243	307					
10N@ 3.00	24	38	51	65	78	99	111	124	146	149	170	172	192	220	224	258	284							
	28	36	47	57	69	80	94	113	138	161	183	204	226	249	282									

Joist Girder weight = 101 plf/50 ft = 2.0 psf
 2.0 psf < 4.0 psf estimated ok

Specify a 36G3N109F

GIRDER SPAN (ft)	JOIST SPACES (ft)	GIRDER DEPTH (in)	JOIST GIRDER WEIGHT -- POUNDS PER LINEAR FOOT																					
			LOAD ON EACH PANEL POINT -- KIPS																	ASD			LRFD	
			6	8	10	12	14	16	18	20	24	28	32	36	40	44	48	52	56	60	70	80	90	100
	9	12	15	18	21	24	27	30	36	42	48	54	60	66	72	78	84	90	105	120	135	150		
	3N@ 10.00	24	18	21	24	27	31	35	38	40	48	58	66	71	80	92	98	117	119	120	137			
		28	18	19	22	25	27	30	35	37	42	49	56	63	70	79	82	93	99	103	121	132	161	183
		32	18	19	20	22	26	28	31	32	39	46	51	57	64	71	73	83	84	91	99	113	126	141
		36	19	19	19	21	23	26	28	31	35	39	46	52	57	64	65	73	75	80	94	101	122	126

Select a CJ-Series Joist

Determine the Factored Loads:

- Factored Composite Live Load =
 $(1.6)(80 \text{ psf})(10 \text{ ft}) = 1,280 \text{ plf}$
- Factored Composite Dead Load =
 $(1.2)(15 \text{ psf})(10 \text{ ft}) = 180 \text{ plf}$
- Factored Non-Composite Construction Dead Load =
 $(1.2)(51 + 5)(10 \text{ ft}) = 670 \text{ plf}$
- Factored Composite Design Load =
 $1280 \text{ plf} + 180 \text{ plf} + 670 \text{ plf} = 2130 \text{ plf}$

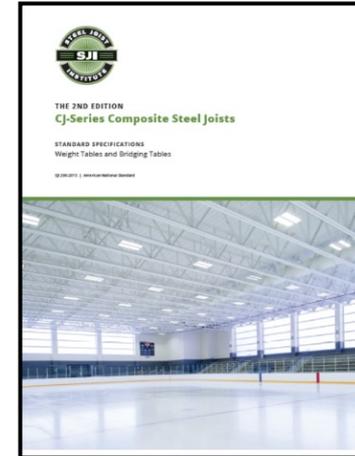


CJ-Series Weight Table (page 74)

NORMAL WEIGHT CONCRETE

DESIGN GUIDE LRFD WEIGHT TABLE FOR COMPOSITE STEEL JOISTS, CJ-SERIES

Based on a 50 ksi Maximum Yield Strength											
BEARING HEIGHT		2 1/2"	5"	7 1/2"							
		Concrete Slab Parameters									
		Normal Weight Concrete (145 pcf) f'c = 4.0 ksi									
		hr (in.)	1	1	1	1	1	1	1	1	
		to (in.)	2	2	2	2	2	2	2	2	
		Js (ft.)	3	3	3	3	3	3	3	4	
Joist Span (ft.)	Joist Depth (in.)	Total Safe Factored Uniformly Distributed Joist Load in Pounds Per Linear Foot									
		TL	300	400	500	600	700	800	900	1000	1200
50	20	Wt(p/ft)	9.0	10.5	11.8	13.6	16.1	17.4	18.7	21	25
		W960(p/ft)	128	163	187	219	253	271	289	322	389
		N-ds	26-1/2"	26-1/2"	30-1/2"	36-1/2"	44-1/2"	48-1/2"	54-1/2"	40-5/8"	50-5/8"
		Wt(l/ft)	373	475	545	636	736	790	839	936	1130
	Bridging	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(2)H	(1)X+(2)H	(3)H	(3)H	(3)H	
	22	Wt(p/ft)	8.4	10.2	11.4	13.0	14.5	16.3	17.8	19.9	24
		W960(p/ft)	142	183	214	249	278	304	327	371	446
		N-ds	28-3/8"	26-1/2"	28-1/2"	34-1/2"	40-1/2"	44-1/2"	48-1/2"	38-5/8"	46-5/8"
		Wt(l/ft)	412	533	621	724	808	885	950	1090	1300
	Bridging	(1)X+(3)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(3)H	(3)H	
	24	Wt(p/ft)	8.0	9.4	10.5	11.9	13.7	15.5	17.8	18.5	23
		W960(p/ft)	157	203	237	271	310	338	386	407	499
N-ds		26-3/8"	36-3/8"	42-3/8"	52-3/8"	36-1/2"	40-1/2"	48-1/2"	46-1/2"	42-5/8"	
Wt(l/ft)		456	590	689	789	903	984	1120	1190	1450	
Bridging	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(3)H	(3)H		
26	Wt(p/ft)	7.5	8.9	9.9	11.1	12.2	14.8	16.6	18.1	22	
	W960(p/ft)	168	220	259	296	342	371	419	467	553	
	N-ds	26-3/8"	32-3/8"	40-3/8"	48-3/8"	34-1/2"	36-1/2"	44-1/2"	46-1/2"	40-5/8"	
	Wt(l/ft)	489	641	755	862	995	1080	1220	1360	1610	
Bridging	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(3)H	(3)H		
28	Wt(p/ft)	7.4	8.4	9.6	10.5	12.8	13.9	15.9	17.2	21	
	W960(p/ft)	191	235	279	311	372	415	453	498	606	
	N-ds	26-3/8"	30-3/8"	38-3/8"	42-3/8"	32-1/2"	36-1/2"	40-1/2"	42-1/2"	36-5/8"	
	Wt(l/ft)	555	683	812	908	1090	1210	1320	1450	1780	
Bridging	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(3)H		
30	Wt(p/ft)	6.9	7.9	9.2	11.0	12.3	14.1	15.0	16.7	19.8	
	W960(p/ft)	198	245	303	350	402	459	485	539	644	
	N-ds	26-3/8"	28-3/8"	36-3/8"	26-1/2"	30-1/2"	34-1/2"	36-1/2"	38-1/2"	34-5/8"	
	Wt(l/ft)	575	713	883	1020	1170	1330	1410	1570	1890	
Bridging	(1)X+(3)H	(1)X+(3)H	(1)X+(3)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(3)H	(3)H		
32	Wt(p/ft)	6.9	7.6	8.6	10.0	11.8	12.9	14.7	16.3	19.5	
	W960(p/ft)	222	260	317	379	429	475	516	598	718	
	N-ds	26-3/8"	26-3/8"	32-3/8"	40-3/8"	28-1/2"	32-1/2"	34-1/2"	38-1/2"	34-5/8"	
	Wt(l/ft)	648	758	922	1100	1250	1390	1500	1740	2090	
Bridging	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(3)H	(3)H		
36	Wt(p/ft)	6.9	7.8	8.5	9.5	10.7	12.3	14.1	15.0	17.8	
	W960(p/ft)	249	298	362	418	472	527	600	652	766	
	N-ds	26-3/8"	26-3/8"	30-3/8"	36-3/8"	40-3/8"	28-1/2"	30-1/2"	32-1/2"	28-5/8"	
	Wt(l/ft)	725	868	1050	1220	1370	1530	1750	1900	2230	
Bridging	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(3)H	(3)H	(3)H		
40	Wt(p/ft)	6.9	7.5	8.0	10.3	11.3	12.8	13.7	14.4	16.9	
	W960(p/ft)	257	325	414	482	540	620	680	728	856	
	N-ds	26-3/8"	26-3/8"	28-3/8"	32-3/8"	28-1/2"	26-1/2"	28-1/2"	30-1/2"	26-5/8"	
	Wt(l/ft)	748	847	1200	1400	1570	1800	1980	2120	2490	
Bridging	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(1)X+(2)H	(3)H	(3)H	(3)H	(3)H		



The CJ-Series Weight Tables are on two facing pages.

Select a CJ-Series Joist (page 75)

NORMAL WEIGHT CONCRETE

DESIGN GUIDE LRFD WEIGHT TABLE FOR COMPOSITE STEEL JOISTS, CJ-SERIES

Based on a 50 ksi Maximum Yield Strength												
BEARING HEIGHT	2 1/2"	5'	7 1/2"									
Concrete Slab Parameters												
Normal Weight Concrete (145 pcf) $f'_c = 4.0$ ksi												
1.5	1.5	1.5	2	2	2	2	2	3	3	3	3	3
2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
5	5.5	6	7	7.5	8	9	10	11	12	13	14	15
Total Safe Factored Uniformly Distributed Joist Load in Pounds Per Linear Foot												
1400	1600	1800	2000	2200	2400	2700	3000	3300	3600	3900	4200	4500

20	22	24	27	30	32	37	43	45	50	53	57	65
1083	1201	1320	1483	1691	1735	2085	2402	2545	2850	2927	3135	3520
34-5/8"	36-5/8"	34-3/4"	32-3/4"	38-3/4"	36-3/4"	46-3/4"	54-3/4"	48-3/4"	56-3/4"	56-3/4"	64-3/4"	74-3/4"
3150	3480	3840	4310	4920	5050	6070	6990	7400	8290	8520	9120	10240
(2)H	(1)X	(1)X	(1)X									

40 in. Depth	Wt(plf)	30
	W360(plf)	1691
	N-ds	38-3/4"
	leff(in4)	4920
	Bridging	(2)H

Specify: 40 CJ 2130/1280/180



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