

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263 Certified for United States

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263 Certified for United States

Design Criteria and Allowable Variances

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design Criteria and Allowable Variances

Design No. N644

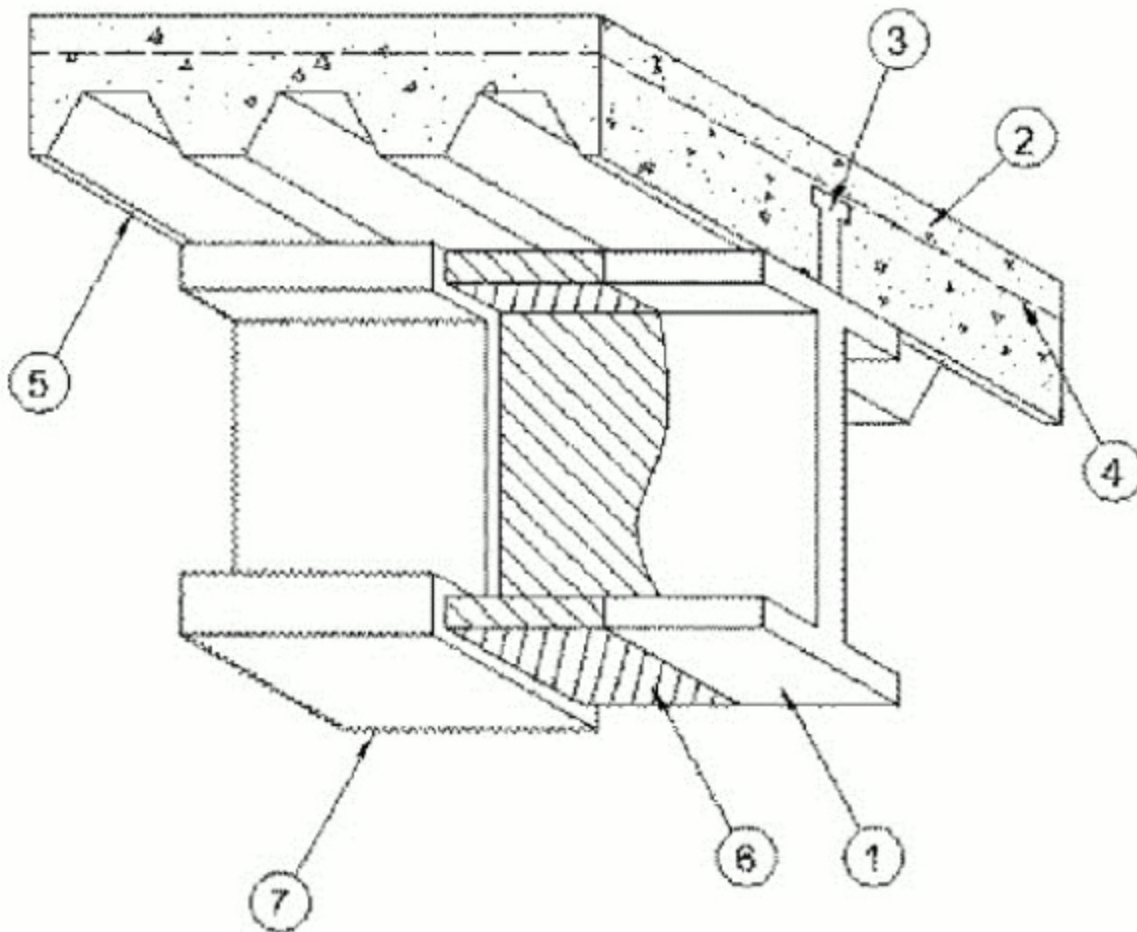
April 17, 2017

Restrained Beam Rating — 1, 1-1/2, 2 and 2-1/2 Hr (See Item 7)

Unrestrained Beam Rating — 1, 1-1/2 and 2 Hr (See Item 7)

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Beam** — Min size as shown in the table below (See Item 7). Beam shall be free of dirt, loose scale and oil.

2. **Normal Weight or Lightweight Concrete** — Compressive strength 3500 psi. For normal weight concrete either carbonate or siliceous aggregate may be used. Unit weight 145 +/- 3 lbs / cu ft for normal weight concrete and 107 +/- 3 lbs / cu ft for lightweight concrete.

3. **Shear Connectors** — (Optional) Studs, headed type or equivalent per AISC specifications welded to the top flange of beam through the steel floor units.

4. **Welded Wire Fabric** — 6x6 SWG.

5. **Steel Floor Units** — 1-1/2, 2 or 3 in. deep fluted units, welded to beam.

6. **Primer Coating** — Beams primed with a single component alkyd primer to an approximate dry film thickness of 102 microns (4 mil).

7. **Mastic and Intumescent Coating*** — One component material spray-applied in one or more coats as described in the application instructions to the thicknesses shown below. Flutes above beam to be completely filled with mineral wool insulation having a nominal density of 6 lbs / ft³. Thicknesses below include the 102 microns (4 mil) of primer.

Unrestrained Beam Rating, Hr Required Thickness

W/D	Hp/A	1 Hr, mil	1-1/2 Hr, mil	2 Hr, mil
0.52	257	76.33	211.2	NR
0.53	252	76.33	211.2	NR
0.54	247	76.33	211.2	NR
0.55	243	76.33	211.2	NR

0.56	238	76.33	211.2	NR
0.57	234	76.33	211	NR
0.58	230	76.33	207.36	NR
0.59	226	76.33	203.85	NR
0.6	223	76.33	200.45	NR
0.61	219	76.33	197.17	NR
0.62	215	76.33	193.99	NR
0.63	212	76.33	190.91	NR
0.64	209	76.33	187.92	NR
0.65	205	76.33	185.03	NR
0.66	202	76.33	182.23	NR
0.67	199	76.33	179.51	NR
0.68	196	76.33	176.87	NR
0.69	193	76.33	174.31	NR
0.7	191	75.28	171.82	NR
0.71	188	74.22	169.4	NR
0.72	185	73.18	167.04	NR
0.73	183	72.18	164.75	NR
0.74	180	71.21	162.53	NR
0.75	178	70.26	160.36	NR
0.76	176	69.33	158.25	NR
0.77	173	68.43	156.2	NR
0.78	171	67.56	154.19	NR
0.79	169	66.70	152.24	NR
0.8	167	65.87	150.34	NR
0.81	165	65.05	148.48	NR
0.82	163	64.26	146.67	NR
0.83	161	63.49	144.90	NR
0.84	159	62.73	143.18	NR
0.85	157	61.99	141.50	NR
0.86	155	61.27	139.85	NR
0.87	153	60.57	138.24	NR
0.88	152	59.88	136.67	NR

0.89	150	59.21	135.14	211.07
0.9	148	58.55	133.63	208.72
0.91	147	57.90	132.17	206.43
0.92	145	57.28	130.73	204.18
0.93	144	56.66	129.32	201.99
0.94	142	56.06	127.95	199.84
0.95	141	55.47	126.60	197.74
0.96	139	54.89	125.28	195.68
0.97	138	54.32	123.99	193.66
0.98	136	53.77	122.73	191.68
0.99	135	53.23	121.49	189.75
1.00	134	52.69	120.27	187.85
1.01	132	52.17	119.08	185.99
1.02	131	51.66	117.91	184.17
1.03	130	51.16	116.77	182.38
1.04	128	50.67	115.65	180.62
1.05	127	50.18	114.54	178.90
1.06	126	49.71	113.46	177.22
1.07	125	49.42	112.40	175.56
1.08	124	49.42	111.36	173.93
1.09	122	49.42	110.34	172.34
1.1	121	49.42	109.34	170.77
1.11	120	49.42	108.35	169.23
1.12	119	49.42	107.38	167.72
1.13	118	49.42	106.43	166.24
1.14	117	49.42	105.50	164.78
1.15	116	49.42	104.58	163.35
1.16	115	49.42	103.68	161.94
1.17	114	49.42	102.80	160.55
1.18	113	49.42	101.92	159.19
1.19	112	49.42	101.07	157.86
1.2	111	49.42	100.23	156.54
1.21	110	49.42	99.40	155.25

1.22	109	49.42	98.58	153.97
1.23	109	49.42	97.78	152.72
1.24	108	49.42	96.99	151.49
1.25	107	49.42	96.22	150.28
1.26	106	49.42	95.45	149.09
1.27	105	49.42	94.70	147.91
1.28	104	49.42	93.96	146.76
1.29	103	49.42	93.23	145.62
1.3	103	49.42	92.52	144.50
1.31	102	49.42	91.81	143.40
1.32	101	49.42	91.11	142.31
1.33	100	49.42	90.43	141.24
1.34	100	49.42	89.75	140.19
1.35	99	49.42	89.09	139.15
1.36	98	49.42	88.43	138.12
1.37	97	49.42	87.79	137.12
1.38	97	49.42	87.15	136.12
1.39	96	49.42	86.53	135.14
1.4	95	49.42	85.91	134.18
1.41	95	49.42	85.30	133.23
1.42	94	49.42	84.70	132.29
1.43	93	49.42	84.11	131.36
1.44	93	49.42	83.52	130.45
1.45	92	49.42	82.95	129.55
1.46	91	49.42	82.38	128.66
1.47	91	49.42	81.82	127.79
1.48	90	49.42	81.26	126.93
1.49	90	49.42	80.72	126.07
1.5	89	49.42	80.18	125.23
1.51	88	49.42	79.65	124.40
1.52	88	49.42	79.13	123.58
1.53	87	49.42	78.61	122.78
1.54	87	49.42	78.10	121.98

1.55	86	49.42	77.59	121.19
1.56	86	49.42	77.10	120.42
1.57	85	49.42	76.61	119.65
1.58	84	49.42	76.12	118.89
1.59	84	49.42	75.64	118.14
1.6	83	49.42	75.17	117.41
1.61	83	49.42	74.70	116.68
1.62	82	49.42	74.24	115.96
1.63	82	49.42	73.79	115.24
1.64	81	49.42	73.34	114.54
1.65	81	49.42	72.89	113.85
1.66	80	49.42	72.45	113.16
1.67	80	49.42	72.02	112.48
1.68	79	49.42	71.59	111.81
1.69	79	49.42	71.17	111.15
1.7	79	49.42	70.75	110.50
1.71	78	49.42	70.33	109.85
1.72	78	49.42	69.93	109.21
1.73	77	49.42	69.52	108.58
1.74	77	49.42	69.12	107.96
1.75	76	49.42	68.73	107.34
2.00	67	49.42	68.73	107.34
2.25	59	49.42	68.73	107.34
2.5	53	49.42	68.73	107.34
2.75	49	49.42	68.73	107.34
3.00	45	49.42	68.73	107.34
3.25	41	49.42	68.73	107.34
3.5	38	49.42	68.73	107.34
3.75	36	49.42	68.73	107.34
4.00	33	49.42	68.73	107.34

**Restrained Beam Rating, Hr
Required Thickness**

W/D	Hp/A	1 Hr, mil	1-1/2 Hr, mil	2 Hr, mil	2-1/2 Hr, mil
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0.52	257	76.33	174.21	211.20	NR
0.53	252	76.33	170.92	211.20	NR
0.54	247	76.33	167.76	211.20	NR
0.55	243	76.33	164.71	211.20	NR
0.56	238	76.33	161.77	211.20	NR
0.57	234	76.33	158.93	211.20	NR
0.58	230	76.33	156.19	211.20	NR
0.59	226	76.33	153.54	211.20	NR
0.6	223	76.33	150.98	211.20	NR
0.61	219	76.33	148.51	211.20	NR
0.62	215	76.33	146.11	211.20	NR
0.63	212	76.33	143.79	211.20	NR
0.64	209	76.33	141.55	211.20	NR
0.65	205	76.33	139.37	211.20	NR
0.66	202	76.33	137.26	211.20	NR
0.67	199	76.33	135.21	211.20	NR
0.68	196	76.33	133.22	211.20	NR
0.69	193	76.33	131.29	211.20	NR
0.7	191	75.28	129.41	211.20	NR
0.71	188	74.22	127.59	211.20	NR
0.72	185	73.18	125.82	211.19	NR
0.73	183	72.18	124.1	208.30	NR
0.74	180	71.21	122.42	205.49	NR
0.75	178	70.26	120.79	202.75	NR
0.76	176	69.33	119.2	200.08	NR
0.77	173	68.43	117.65	197.48	NR
0.78	171	67.56	116.14	194.95	NR
0.79	169	66.70	114.67	192.48	NR
0.8	167	65.87	113.24	190.08	NR
0.81	165	65.05	111.84	187.73	NR
0.82	163	64.26	110.48	185.44	NR
0.83	161	63.49	109.14	183.20	NR
0.84	159	62.73	107.85	181.02	NR

0.85	157	61.99	106.58	178.89	NR
0.86	155	61.27	105.34	176.81	NR
0.87	153	60.57	104.13	174.78	NR
0.88	152	59.88	102.94	172.80	NR
0.89	150	59.21	101.79	170.85	NR
0.9	148	58.55	100.66	168.96	NR
0.91	147	57.90	99.55	167.10	NR
0.92	145	57.28	98.47	165.28	NR
0.93	144	56.66	97.41	163.51	NR
0.94	142	56.06	96.37	161.77	NR
0.95	141	55.47	95.36	160.06	NR
0.96	139	54.89	94.36	158.40	NR
0.97	138	54.32	93.39	156.76	NR
0.98	136	53.77	92.44	155.16	NR
0.99	135	53.23	91.51	153.60	NR
1.00	134	52.69	90.59	152.06	NR
1.01	132	52.17	89.69	150.55	NR
1.02	131	51.66	88.81	149.08	209.34
1.03	130	51.16	87.95	147.63	207.31
1.04	128	50.67	87.11	146.21	205.32
1.05	127	50.18	86.28	144.82	203.36
1.06	126	49.71	85.46	143.45	201.44
1.07	125	49.42	84.66	142.11	199.56
1.08	124	49.42	83.88	140.80	197.71
1.09	122	49.42	83.11	139.50	195.90
1.1	121	49.42	82.35	138.24	194.12
1.11	120	49.42	81.61	136.99	192.37
1.12	119	49.42	80.88	135.77	190.65
1.13	118	49.42	80.17	134.57	188.96
1.14	117	49.42	79.46	133.39	187.31
1.15	116	49.42	78.77	132.23	185.68
1.16	115	49.42	78.09	131.09	184.08
1.17	114	49.42	77.43	129.97	182.50

1.18	113	49.42	76.77	128.86	180.96
1.19	112	49.42	76.13	127.78	179.44
1.2	111	49.42	75.49	126.72	177.94
1.21	110	49.42	74.87	125.67	176.47
1.22	109	49.42	74.25	124.64	175.02
1.23	109	49.42	73.65	123.63	173.60
1.24	108	49.42	73.06	122.63	172.20
1.25	107	49.42	72.47	121.65	170.82
1.26	106	49.42	71.90	120.68	169.47
1.27	105	49.42	71.33	119.73	168.13
1.28	104	49.42	70.77	118.80	166.82
1.29	103	49.42	70.22	117.88	165.53
1.3	103	49.42	69.68	116.97	164.25
1.31	102	49.42	69.15	116.08	163.00
1.32	101	49.42	68.63	115.20	161.77
1.33	100	49.42	68.11	114.33	160.55
1.34	100	49.42	67.60	113.48	159.35
1.35	99	49.42	67.10	112.64	158.17
1.36	98	49.42	66.61	111.81	157.01
1.37	97	49.42	66.12	110.99	155.86
1.38	97	49.42	65.64	110.19	154.73
1.39	96	49.42	65.17	109.40	153.62
1.4	95	49.42	64.71	108.61	152.52
1.41	95	49.42	64.25	107.84	151.44
1.42	94	49.42	63.80	107.08	150.37
1.43	93	49.42	63.35	106.34	149.32
1.44	93	49.42	62.91	105.60	148.28
1.45	92	49.42	62.48	104.87	147.26
1.46	91	49.42	62.05	104.15	146.25
1.47	91	49.42	61.63	103.44	145.26
1.48	90	49.42	61.21	102.74	144.28
1.49	90	49.42	60.80	102.05	143.31
1.5	89	49.42	60.39	101.37	142.35

1.51	88	49.42	59.99	100.70	141.41
1.52	88	49.42	59.60	100.04	140.48
1.53	87	49.42	59.21	99.39	139.56
1.54	87	49.42	58.82	98.74	138.66
1.55	86	49.42	58.45	98.10	137.76
1.56	86	49.42	58.07	97.47	136.88
1.57	85	49.42	57.70	96.85	136.01
1.58	84	49.42	57.34	96.24	135.15
1.59	84	49.42	56.97	95.64	134.30
1.6	83	49.42	56.62	95.04	133.46
1.61	83	49.42	56.27	94.45	132.63
1.62	82	49.42	55.92	93.86	131.81
1.63	82	49.42	55.58	93.29	131.00
1.64	81	49.42	55.24	92.72	130.20
1.65	81	49.42	54.90	92.16	129.41
1.66	80	49.42	54.57	91.60	128.63
1.67	80	49.42	54.25	91.05	127.86
1.68	79	49.42	53.92	90.51	127.10
1.69	79	49.42	53.60	89.98	126.35
1.7	79	49.42	53.29	89.45	125.61
1.71	78	49.42	52.98	88.92	124.87
1.72	78	49.42	52.67	88.41	124.15
1.73	77	49.42	52.36	87.90	123.43
1.74	77	49.42	52.06	87.39	122.72
1.75	76	49.42	51.77	86.89	118.93
2.00	67	49.42	51.77	86.89	118.93
2.25	59	49.42	51.77	86.89	118.93
2.5	53	49.42	51.77	86.89	118.93
2.75	49	49.42	51.77	86.89	118.93
3.00	45	49.42	51.77	86.89	118.93
3.25	41	49.42	51.77	86.89	118.93
3.5	38	49.42	51.77	86.89	118.93
3.75	36	49.42	51.77	86.89	118.93

4.00	33	49.42	51.77	86.89	118.93
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NR - No Rating

CONTEGO INTERNATIONAL INC — Type Contego HS, Type CON-RFB HS. Investigated for Conditioned Interior Space Purpose, Interior General Purpose, and Exterior Use.

8. **Topcoat** — (Not Shown) — Required for Interior Conditioned Space Purpose, Interior General Purpose, and Exterior Use. Type Rustoleum K7786 Smoke Grey Top Coat applied at a minimum thickness of 127 microns (5 mil) over the intumescent material.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2017-04-17

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