

# Data of Advanced High Strength Steel Column Pure Compression Tests

Chu Ding<sup>1</sup>, Benjamin W. Schafer<sup>2</sup>

## Introduction

An experimental investigation (Ding 2022) has been conducted on the compressive strengths of columns made from Advanced High Strength Steel (AHSS) with nominal yield stresses ranging from 340 MPa to 1200 MPa. In total, 156 column pure compression tests were performed at the Thin-Walled Structures Lab at Johns Hopkins University. The obtained ultimate loads are compared with the strength predictions under the Direct Strength Method (DSM) (AISI S100 2022; AS/NZS 4600 2018). This article contains tabulated data of each test.

## Tabulated data for each test

Table 1. Elastic critical buckling loads under C-C and corresponding nominal buckling strengths by DSM

Name	$P_u$ (kN)	$P_y$ (kN)	$P_{cr1}$ (kN)	$P_{cr2}$ (kN)	$P_{cre}$ (kN)	$P_{ne}$ (kN)	$P_{nlg}$ (kN)	$P_{nd}$ (kN)	$P_{nld}$ (kN)	$P_{ndg}$ (kN)
305 mm columns										
102C-340Fy-1.3t-305L-1	77.6	104.7	51.2	552.8	3270.8	103.3	69.2	104.7	69.8	103.3
102C-340Fy-1.3t-305L-2	78.1	104.6	51.4	553.4	3242.4	103.2	69.3	104.6	69.9	103.2
102C-550Fy-1.2t-305L-1	91.7	182.6	38.8	536.8	2817.4	177.7	88.8	182.2	90.3	177.6
102C-700Fy*-1.4t-305L-1	138.1	231.6	63.7	608.8	3378.5	225.0	123.5	228.9	124.9	223.1
102C-700Fy-1.4t-305L-1	131.2	242.4	59.7	661.3	3268.0	235.0	124.0	240.6	125.9	233.9
102C-700Fy-1.4t-305L-2	130.4	243.5	60.0	585.6	3340.0	236.2	124.7	237.8	125.2	231.7
102C-1030Fy-1.0t-305L-1	92.8	267.2	24.6	356.8	2363.9	254.8	94.2	223.3	86.7	216.5
102C-1030Fy-1.0t-305L-2	94.1	266.9	24.3	355.8	2357.0	254.5	93.7	222.9	86.2	216.1
102C-1200Fy-1.4t-305L-1	191.5	447.3	67.3	690.7	3495.8	424.0	188.5	392.2	179.5	377.8
102C-1200Fy-1.4t-305L-2	188.1	448.3	67.5	688.5	3445.9	424.6	188.8	392.4	179.7	377.8
102C-1200Fy-2.0t-305L-1	345.1	665.2	188.0	1125.0	4799.5	627.7	351.7	599.4	341.4	574.8
102C-1200Fy-2.0t-305L-2	349.4	669.2	186.2	1124.9	4909.7	632.0	352.0	601.8	341.1	577.6
102Sigma-340Fy-1.3t-305L-1	118.8	112.2	305.4	626.6	3373.6	110.6	110.6	112.2	112.2	110.6
102Sigma-340Fy-1.3t-305L-2	124.6	112.0	304.8	628.6	3357.5	110.5	110.5	112.0	112.0	110.5
102Sigma-550Fy-1.2t-305L-1	163.6	202.5	233.6	535.1	3164.5	197.2	177.1	200.3	179.0	195.6
102Sigma-550Fy-1.2t-305L-2	171.6	202.5	233.6	535.1	3164.5	197.2	177.1	200.3	179.0	195.6
102Sigma-700Fy*-1.4t-305L-2	220.3	253.3	378.2	769.5	3662.7	246.1	240.2	253.2	244.9	246.1
102Sigma-700Fy-1.4t-305L-1	232.7	265.2	353.6	728.4	3596.8	257.1	242.3	263.4	246.3	256.0
102Sigma-700Fy-1.4t-305L-2	232.7	264.4	355.5	725.5	3546.4	256.2	242.1	262.5	246.2	255.1
102Sigma-1030Fy-1.0t-305L-1	175.3	292.1	156.3	609.3	2639.9	278.9	194.9	277.6	194.3	267.6
102Sigma-1030Fy-1.0t-305L-3	167.0	289.9	158.3	608.9	2610.3	276.7	194.8	275.9	194.4	266.0
102Sigma-1030Fy-1.0t-305L-4	161.8	291.5	159.0	611.5	2608.9	278.2	195.7	277.4	195.4	267.3
102Sigma-1200Fy-1.0t-305L-1	178.9	327.3	162.9	387.9	2762.4	311.4	212.5	262.1	189.8	253.9
102Sigma-1200Fy-1.0t-305L-2	167.4	319.8	157.7	623.3	2696.8	304.3	207.0	299.2	204.7	288.1
102Sigma-1200Fy-1.0t-305L-3	170.5	326.9	163.1	573.0	2759.0	311.1	212.4	297.5	206.3	286.9
102Sigma-1200Fy-1.0t-305L-4	193.5	320.5	157.8	622.7	2712.3	305.0	207.3	299.6	204.9	288.5
102Sigma-1200Fy-1.4t-305L-1	299.9	487.0	382.0	1352.2	3605.1	460.2	367.7	484.1	380.2	459.3
102Sigma-1200Fy-1.4t-305L-2	344.5	487.0	380.2	1353.9	3605.7	460.2	367.1	484.1	379.7	459.3
152C-340Fy-1.3t-305L-1	81.0	148.7	32.8	1460.9	6718.2	147.3	74.1	148.7	74.6	147.3

<sup>1</sup> Adjunct Assistant Research Scientist, Dept. of Civil and Systems Engineering, Johns Hopkins Univ., Baltimore, MD 21218, United States (corresponding author). ORCID: <https://orcid.org/0000-0002-9327-593X>. Email: [chud@jhu.edu](mailto:chud@jhu.edu)

<sup>2</sup> Professor, Dept. of Civil and Systems Engineering, Johns Hopkins Univ., Baltimore, MD 21218, United States. ORCID: <https://orcid.org/0000-0002-5375-3511>. Email: [schafer@jhu.edu](mailto:schafer@jhu.edu)

152C-340Fy-1.3t-305L-2	81.9	148.8	32.4	1462.2	6737.9	147.5	73.8	148.8	74.3	147.5
152C-550Fy-1.2t-305L-1	104.6	263.7	24.1	1235.5	6202.5	259.0	94.4	263.7	95.4	259.0
152C-700Fy*-1.4t-305L-1	137.1	335.3	40.1	1678.9	7269.3	328.9	132.5	335.3	134.1	328.9
152C-700Fy-1.4t-305L-1	133.2	349.4	38.3	1623.1	7120.1	342.3	133.6	349.4	135.3	342.3
152C-700Fy-1.4t-305L-2	139.1	350.8	37.9	1634.8	7100.1	343.6	133.5	350.8	135.2	343.6
152C-1030Fy-1.0t-305L-1	94.9	386.3	14.9	886.2	5081.7	374.2	98.7	374.2	98.7	364.5
152C-1030Fy-1.0t-305L-2	106.5	387.3	15.0	1124.2	5057.3	375.0	99.2	386.2	101.0	374.6
152C-1200Fy-1.0t-305L-1	107.8	417.7	15.1	1127.4	5143.1	403.7	104.1	414.1	105.7	401.5
152C-1200Fy-1.0t-305L-2	116.3	415.7	15.4	897.0	5060.7	401.6	104.4	397.9	103.8	387.1
152C-1200Fy-1.4t-305L-1	190.3	645.2	40.2	1694.4	7303.9	621.8	197.4	637.7	200.5	617.0
152C-1200Fy-1.4t-305L-2	208.9	646.2	40.2	1685.7	7224.7	622.5	197.6	638.2	200.7	617.3
152C-1200Fy-2.0t-305L-1	368.9	964.8	114.2	1781.5	10151.7	927.1	375.1	890.4	365.7	864.4
152C-1200Fy-2.0t-305L-2	388.4	967.1	115.1	1760.5	10238.4	929.6	376.9	889.2	366.5	863.6
152Sigma-340Fy-1.3t-305L-1	118.6	154.6	161.8	1437.4	6652.0	153.1	132.5	154.6	133.4	153.1
152Sigma-340Fy-1.3t-305L-2	118.4	156.3	163.6	1443.5	6676.4	154.8	134.0	156.3	134.9	154.8
152Sigma-550Fy-1.2t-305L-2	175.7	277.9	121.4	1219.2	5990.7	272.6	175.8	277.9	178.0	272.6
152Sigma-700Fy*-1.4t-305L-1	212.5	354.0	206.1	1432.5	7176.1	346.8	247.3	354.0	250.7	346.8
152Sigma-700Fy*-1.4t-305L-2	213.1	354.0	206.1	1432.5	7176.1	346.8	247.3	354.0	250.7	346.8
152Sigma-700Fy-1.4t-305L-1	216.8	372.1	195.9	1374.3	7067.3	364.0	250.8	372.1	254.5	364.0
152Sigma-700Fy-1.4t-305L-2	225.6	369.0	194.2	1614.9	7403.8	361.4	248.9	369.0	252.3	361.4
152Sigma-1030Fy-1.0t-305L-1	197.5	411.1	71.6	946.8	5111.2	397.5	185.1	398.5	185.4	387.5
152Sigma-1030Fy-1.0t-305L-2	173.1	412.7	71.9	1214.8	5200.3	399.2	185.9	411.9	189.6	398.9
152Sigma-1200Fy-1.0t-305L-1	188.3	442.7	84.0	1290.0	5231.0	427.3	205.4	441.6	209.8	426.9
152Sigma-1200Fy-1.0t-305L-2	190.8	441.7	83.8	1188.2	5215.2	426.3	205.0	437.7	208.4	423.9
152Sigma-1200Fy-1.4t-305L-1	299.8	689.0	217.4	1433.6	7477.3	662.9	383.7	654.4	380.5	634.9
152Sigma-1200Fy-1.4t-305L-2	322.1	677.5	208.8	1441.3	7178.4	651.3	373.9	646.6	372.1	626.6

610 mm columns

102C-340Fy-1.3t-610L-1	71.6	104.5	51.4	182.8	1207.9	100.8	68.2	95.0	65.6	92.6
102C-340Fy-1.3t-610L-2	72.6	103.4	55.0	204.5	1186.7	99.7	69.3	97.1	68.1	94.4
102C-340Fy-1.3t-610L-3	74.0	103.3	55.2	201.5	1104.1	99.3	69.2	96.7	68.0	93.8
102C-550Fy-1.2t-610L-1	87.2	182.6	38.8	145.9	1056.4	169.9	86.3	124.7	70.9	119.7
102C-700Fy*-1.4t-610L-1	120.8	231.3	63.9	202.7	1243.0	214.0	119.7	164.3	101.0	157.0
102C-700Fy-1.4t-610L-1	114.3	243.3	59.9	195.6	1236.5	224.0	120.5	166.6	99.6	158.9
102C-700Fy-1.4t-610L-2	115.4	243.3	59.9	194.1	1234.3	224.0	120.5	166.1	99.4	158.4
102C-700Fy-1.4t-610L-3	116.7	244.1	59.8	194.5	1158.7	223.5	120.2	166.5	99.5	158.3
102C-1030Fy-1.0t-610L-1	76.8	268.1	25.4	124.4	955.9	238.4	91.4	142.5	66.1	134.1
102C-1030Fy-1.0t-610L-2	77.1	269.4	24.8	120.9	970.1	239.8	91.0	140.8	65.1	132.7
102C-1200Fy-1.4t-610L-1	179.0	449.4	66.6	226.6	1294.6	388.6	177.7	248.6	133.8	230.3
102C-1200Fy-1.4t-610L-2	155.9	449.9	63.8	210.2	1106.9	379.5	172.4	239.9	128.8	219.6
102C-1200Fy-1.4t-610L-3	166.2	450.9	64.3	214.9	1396.1	393.9	176.9	242.7	130.1	226.2
102C-1200Fy-2.0t-610L-1	299.9	668.4	185.8	481.4	1791.5	571.7	329.8	436.2	277.0	399.4
102C-1200Fy-2.0t-610L-2	300.8	670.7	185.5	474.7	1924.8	579.7	332.6	434.3	276.1	400.2
102C-1200Fy-2.0t-610L-3	295.4	668.4	184.9	303.8	1659.1	564.7	326.6	351.6	240.4	322.2
102Sigma-340Fy-1.3t-610L-1	108.2	111.7	308.3	293.0	1299.5	107.7	107.7	110.4	110.4	106.9
102Sigma-340Fy-1.3t-610L-2	103.3	111.9	304.9	293.0	1342.9	108.1	108.1	110.6	110.6	107.2
102Sigma-340Fy-1.3t-610L-3	102.1	111.6	309.2	289.6	1226.1	107.4	107.4	110.1	110.1	106.5
102Sigma-550Fy-1.2t-610L-1	149.2	199.1	238.1	243.7	1128.2	184.9	170.7	161.3	155.5	153.9
102Sigma-550Fy-1.2t-610L-2	147.1	200.6	233.7	267.2	1423.1	189.1	172.2	167.5	158.6	161.1
102Sigma-700Fy*-1.4t-610L-1	180.2	251.4	383.7	330.4	1403.4	233.3	232.6	209.0	209.0	198.9
102Sigma-700Fy-1.4t-610L-1	181.7	265.2	357.7	326.0	1403.1	245.0	235.3	215.2	215.2	204.5
102Sigma-700Fy-1.4t-610L-2	168.3	265.2	353.3	327.7	1433.0	245.4	234.7	215.6	214.7	205.1
102Sigma-700Fy-1.4t-610L-3	175.2	264.9	359.3	319.5	1317.4	243.5	234.7	213.5	213.5	202.3
102Sigma-1030Fy-1.0t-610L-1	131.4	292.7	156.5	193.3	1050.7	260.5	186.5	183.7	148.1	172.3
102Sigma-1030Fy-1.0t-610L-2	135.4	290.2	159.2	188.4	1033.0	258.0	186.4	180.7	147.3	169.4
102Sigma-1200Fy-1.0t-610L-1	142.3	320.5	157.9	188.5	1077.1	283.0	197.5	190.7	152.3	178.3
102Sigma-1200Fy-1.0t-610L-2	140.6	328.3	162.2	182.4	1116.0	290.2	202.6	190.2	153.3	178.1
102Sigma-1200Fy-1.4t-610L-1	249.8	488.6	380.7	336.2	1437.3	423.8	347.7	312.4	283.2	288.6
102Sigma-1200Fy-1.4t-610L-2	244.5	488.6	381.1	333.0	1439.5	423.9	347.8	311.1	282.5	287.4
102Sigma-1200Fy-1.4t-610L-3	252.9	487.0	383.5	324.0	1318.2	417.2	344.9	306.7	280.3	281.5
102Sigma-1200Fy-2.0t-610L-1	380.5	722.6	989.7	622.6	1973.3	619.9	612.3	509.7	509.7	465.7
102Sigma-1200Fy-2.0t-610L-2	396.8	724.1	997.2	625.8	1979.1	621.3	614.7	511.5	511.5	467.3

152C-340Fy-1.3t-610L-1	68.9	148.5	30.8	355.1	2781.1	145.2	71.8	144.8	71.7	142.1
152C-340Fy-1.3t-610L-2	84.7	148.5	30.9	361.5	2994.4	145.4	72.0	145.3	71.9	142.7
152C-550Fy-1.2t-610L-1	92.6	264.9	23.6	443.9	2789.1	254.6	92.7	238.1	88.9	231.4
152C-550Fy-1.2t-610L-2	88.4	263.2	23.9	320.6	2537.5	252.1	92.5	212.9	83.2	207.1
152C-700Fy*-1.4t-610L-1	132.8	334.5	40.0	432.5	3045.9	319.5	130.0	276.4	118.7	268.3
152C-700Fy-1.4t-610L-1	137.7	351.1	38.2	441.4	3185.0	335.3	131.8	287.3	119.6	278.8
152C-700Fy-1.4t-610L-2	113.7	350.5	38.2	442.2	3187.6	334.8	131.6	287.2	119.5	278.7
152C-700Fy-1.4t-610L-3	132.9	350.8	38.2	432.1	3029.4	334.2	131.5	284.9	119.0	276.2
152C-1030Fy-1.0t-610L-1	73.2	388.2	15.2	284.4	2154.6	360.0	97.3	255.3	78.6	244.7
152C-1030Fy-1.0t-610L-2	84.6	387.9	15.2	294.4	2285.3	361.3	97.4	259.1	79.3	248.9
152C-1030Fy-1.0t-610L-3	81.5	387.9	14.9	282.4	2284.6	361.3	96.8	254.4	77.9	244.4
152C-1200Fy-1.0t-610L-1	86.3	422.1	14.5	297.1	2380.2	391.9	100.7	272.7	80.5	261.6
152C-1200Fy-1.0t-610L-2	97.5	416.7	15.3	290.7	2299.6	386.2	101.7	268.1	81.2	257.0
152C-1200Fy-1.0t-610L-3	83.1	421.7	14.5	287.2	2213.7	389.4	100.3	268.4	79.7	256.9
152C-1200Fy-1.4t-610L-1	151.4	648.8	40.1	440.7	3119.9	594.7	191.9	412.4	152.7	393.1
152C-1200Fy-1.4t-610L-2	178.7	647.3	39.7	451.2	3275.0	595.9	191.5	416.3	153.1	397.6
152C-1200Fy-1.4t-610L-3	181.9	647.3	39.9	439.3	3081.3	592.8	191.1	411.3	152.2	391.8
152C-1200Fy-2.0t-610L-1	316.0	961.6	114.6	410.5	4606.4	881.2	363.8	490.4	251.2	469.1
152C-1200Fy-2.0t-610L-2	302.0	969.5	110.1	387.5	4674.2	888.9	360.4	478.6	243.7	458.1
152Sigma-340Fy-1.3t-610L-1	109.0	156.8	167.9	476.2	3229.9	153.6	134.5	156.7	136.2	153.6
152Sigma-340Fy-1.3t-610L-2	128.0	156.2	163.5	327.5	2968.5	152.8	132.8	148.6	130.3	146.0
152Sigma-340Fy-1.3t-610L-3	109.3	156.8	168.0	324.8	3032.2	153.4	134.3	148.8	131.6	146.3
152Sigma-550Fy-1.2t-610L-1	136.3	276.6	120.8	762.7	2754.8	265.2	172.5	274.8	176.5	264.4
152Sigma-550Fy-1.2t-610L-2	144.7	277.3	121.1	408.0	2765.5	265.9	172.9	239.4	161.5	232.6
152Sigma-700Fy*-1.4t-610L-1	168.0	353.5	205.8	389.2	3381.4	338.3	243.2	275.3	212.3	267.9
152Sigma-700Fy*-1.4t-610L-2	177.5	353.7	205.9	386.9	3393.0	338.6	243.4	274.8	212.1	267.5
152Sigma-700Fy-1.4t-610L-1	180.7	369.0	194.2	369.2	3163.6	351.4	244.4	276.8	209.0	268.8
152Sigma-700Fy-1.4t-610L-2	159.9	369.3	194.4	375.0	3127.5	351.4	244.5	278.7	209.9	270.4
152Sigma-700Fy-1.4t-610L-3	164.6	369.3	194.4	377.3	3340.1	352.6	245.0	279.3	210.3	271.6
152Sigma-1030Fy-1.0t-610L-2	121.5	409.5	71.3	293.9	2273.0	379.8	179.6	266.9	143.5	255.8
152Sigma-1030Fy-1.0t-610L-3	136.1	413.3	72.0	308.3	2307.8	383.5	181.3	273.9	146.4	262.6
152Sigma-1200Fy-1.0t-610L-1	138.0	443.7	81.6	298.1	2276.8	408.9	197.7	280.7	155.6	268.3
152Sigma-1200Fy-1.0t-610L-2	145.7	436.9	80.3	305.0	2306.2	403.6	195.0	281.2	154.9	269.1
152Sigma-1200Fy-1.0t-610L-3	173.4	440.3	81.0	301.6	2291.5	406.3	196.3	281.0	155.2	268.7
152Sigma-1200Fy-1.4t-610L-1	221.8	676.5	208.4	374.7	3095.8	617.4	361.0	391.4	268.7	372.8
152Sigma-1200Fy-1.4t-610L-2	211.4	677.0	208.6	374.2	3108.4	618.0	361.4	391.3	268.8	372.8
152Sigma-1200Fy-1.4t-610L-3	227.9	677.5	208.8	378.1	3125.1	618.8	361.8	393.3	269.8	374.8
152Sigma-1200Fy-2.0t-610L-1	372.7	1003.4	565.7	651.4	4556.8	915.0	661.5	624.9	513.9	594.1
152Sigma-1200Fy-2.0t-610L-2	418.6	1004.1	566.1	650.4	4625.1	916.9	662.6	624.7	514.0	594.4
152Sigma-1200Fy-2.0t-610L-3	296.4	999.4	563.4	635.6	4313.7	907.1	656.8	616.6	508.7	584.8

1219 mm columns

102C-340Fy-1.3t-1219L-1	68.8	104.3	51.5	106.6	327.1	91.2	63.9	78.9	58.1	72.7
102C-340Fy-1.3t-1219L-2	68.8	103.8	51.3	105.7	324.0	90.8	63.6	78.4	57.8	72.2
102C-700Fy-1.4t-1219L-1	100.2	243.5	60.3	117.4	338.2	180.2	105.0	131.8	85.8	112.4
102C-1030Fy-1.0t-1219L-1	65.1	269.7	24.6	61.6	242.3	169.3	72.8	99.8	52.1	79.7
102C-1200Fy-1.0t-1219L-1	59.5	292.5	24.1	61.4	249.6	179.1	74.9	103.4	52.9	81.8
102C-1200Fy-1.4t-1219L-1	135.6	450.4	64.2	124.7	350.3	263.0	136.9	184.4	109.0	141.2
102C-1200Fy-2.0t-1219L-1	222.2	669.2	184.2	258.2	494.0	379.6	252.3	324.6	227.8	241.5
102Sigma-340Fy-1.3t-1219L-1	94.8	111.9	308.8	189.9	372.9	98.7	98.7	100.9	100.9	92.1
102Sigma-700Fy-1.4t-1219L-1	140.4	264.9	351.6	209.7	405.5	201.5	201.5	180.2	180.2	153.5
102Sigma-1030Fy-1.0t-1219L-1	91.7	295.2	152.5	119.0	314.6	199.3	154.9	146.4	126.1	119.4
102Sigma-1030Fy-1.0t-1219L-2	97.6	292.7	157.1	117.7	303.9	195.6	154.5	145.0	126.5	117.6
102Sigma-1200Fy-1.0t-1219L-1	94.7	328.3	151.9	125.7	336.0	218.1	164.2	158.6	132.9	128.5
102Sigma-1200Fy-1.0t-1219L-2	86.6	322.9	155.0	127.3	312.8	209.6	161.1	158.3	133.6	126.6
102Sigma-1200Fy-1.4t-1219L-1	199.4	491.7	381.1	215.6	409.1	297.3	274.0	254.1	246.1	194.6
102Sigma-1200Fy-2.0t-1219L-1	288.0	720.2	1012.5	434.4	548.7	415.8	415.8	433.6	433.6	317.3
102Sigma-1200Fy-2.0t-1219L-2	295.2	720.2	998.9	436.5	542.3	413.1	413.1	434.6	434.6	316.6
152C-340Fy-1.3t-1219L-1	77.8	148.6	31.0	151.4	879.9	138.5	69.9	112.3	61.1	107.6
152C-700Fy-1.4t-1219L-1	117.8	351.7	38.2	185.2	954.3	301.4	123.2	198.6	94.7	183.0
152C-1030Fy-1.0t-1219L-1	69.3	388.5	14.7	86.9	677.2	305.6	86.8	142.0	53.9	126.8
152C-1200Fy-1.0t-1219L-1	73.3	422.1	14.8	90.5	698.6	327.8	90.9	151.0	56.1	134.0

152C-1200Fy-1.4t-1219L-1	160.5	648.3	40.1	190.3	974.3	490.7	170.2	273.5	118.0	238.6
152C-1200Fy-2.0t-1219L-1	275.5	964.8	115.3	466.1	1362.3	717.3	320.4	522.8	262.2	446.9
152Sigma-340Fy-1.3t-1219L-1	120.6	156.1	163.4	201.2	1006.8	146.3	128.9	128.8	118.3	123.5
152Sigma-700Fy-1.4t-1219L-1	178.7	369.0	194.2	223.3	1064.1	319.1	229.5	222.5	180.8	205.6
152Sigma-1030Fy-1.0t-1219L-1	99.3	410.2	71.4	127.3	773.5	328.5	163.9	178.1	110.7	159.7
152Sigma-1200Fy-1.4t-1219L-1	178.8	672.9	207.3	229.4	1028.4	511.7	319.2	306.6	228.5	267.3
152Sigma-1200Fy-2.0t-1219L-1	376.3	1004.1	566.1	432.8	1466.3	753.9	582.4	514.6	451.3	443.5

Table 2. Elastic critical buckling loads under S-S and corresponding nominal buckling strengths by DSM

Name	P <sub>u</sub> (kN)	P <sub>y</sub> (kN)	P <sub>crit</sub> (kN)	P <sub>crd</sub> (kN)	P <sub>cre</sub> (kN)	P <sub>nc</sub> (kN)	P <sub>nlg</sub> (kN)	P <sub>nd</sub> (kN)	P <sub>nd</sub> (kN)	P <sub>ndg</sub> (kN)
305 mm columns										
102C-340Fy-1.3t-305L-1	77.6	104.7	51.2	109.8	1131.0	100.8	68.0	80.0	58.5	78.2
102C-340Fy-1.3t-305L-2	78.1	104.6	51.4	111.2	1118.1	100.6	68.1	80.4	58.8	78.5
102C-550Fy-1.2t-305L-1	91.7	182.6	38.8	89.2	963.7	168.7	85.9	99.5	61.3	95.4
102C-700Fy*-1.4t-305L-1	138.1	231.6	63.7	122.0	1155.6	212.9	119.2	130.8	87.0	125.2
102C-700Fy-1.4t-305L-1	131.2	242.4	59.7	111.6	1114.6	221.3	119.4	128.3	84.0	122.4
102C-700Fy-1.4t-305L-2	130.4	243.5	60.0	116.6	1144.4	222.8	120.1	131.4	85.5	125.5
102C-1030Fy-1.0t-305L-1	92.8	267.2	24.6	64.2	807.0	232.6	88.9	101.5	52.7	95.1
102C-1030Fy-1.0t-305L-2	94.1	266.9	24.3	63.4	802.8	232.2	88.4	100.8	52.2	94.3
102C-1200Fy-1.4t-305L-1	191.5	447.3	67.3	140.8	1207.3	383.0	176.8	195.6	115.2	181.3
102C-1200Fy-1.4t-305L-2	188.1	448.3	67.5	141.1	1182.8	382.6	176.8	196.1	115.4	181.4
102C-1200Fy-2.0t-305L-1	345.1	665.2	188.0	257.0	1639.9	561.4	327.3	322.9	228.7	296.3
102C-1200Fy-2.0t-305L-2	349.4	669.2	186.2	257.3	1687.8	566.8	328.2	324.0	228.4	297.9
102Sigma-340Fy-1.3t-305L-1	118.8	112.2	305.4	216.7	1238.4	108.0	108.0	104.7	104.7	101.7
102Sigma-340Fy-1.3t-305L-2	124.6	112.0	304.8	218.9	1231.9	107.9	107.9	104.9	104.9	101.9
102Sigma-550Fy-1.2t-305L-1	163.6	202.5	233.6	193.7	1173.8	188.4	171.8	149.2	146.5	142.9
102Sigma-550Fy-1.2t-305L-2	171.6	202.5	233.6	193.7	1173.8	188.4	171.8	149.2	146.5	142.9
102Sigma-700Fy*-1.4t-305L-2	220.3	253.3	378.2	251.1	1348.2	234.2	232.1	189.3	189.3	180.5
102Sigma-700Fy-1.4t-305L-1	232.7	265.2	353.6	236.5	1322.7	243.9	233.7	189.8	189.8	180.6
102Sigma-700Fy-1.4t-305L-2	232.7	264.4	355.5	235.8	1299.3	242.8	233.4	189.2	189.2	180.0
102Sigma-1030Fy-1.0t-305L-1	175.3	292.1	156.3	151.6	983.5	258.0	185.2	163.8	137.1	153.4
102Sigma-1030Fy-1.0t-305L-3	167.0	289.9	158.3	152.6	970.0	255.8	185.0	163.7	137.6	153.2
102Sigma-1030Fy-1.0t-305L-4	161.8	291.5	159.0	152.4	968.3	257.0	185.8	164.1	138.0	153.5
102Sigma-1200Fy-1.0t-305L-1	178.9	327.3	162.9	149.1	1018.0	286.1	201.0	172.3	143.8	160.8
102Sigma-1200Fy-1.0t-305L-2	167.4	319.8	157.7	151.3	991.2	279.4	195.7	171.6	141.8	159.9
102Sigma-1200Fy-1.0t-305L-3	170.5	326.9	163.1	151.2	1017.4	285.8	201.0	173.4	144.5	161.8
102Sigma-1200Fy-1.0t-305L-4	193.5	320.5	157.8	149.9	997.7	280.2	196.1	171.0	141.5	159.4
102Sigma-1200Fy-1.4t-305L-1	299.9	487.0	382.0	237.2	1316.7	417.1	344.4	264.9	253.4	244.3
102Sigma-1200Fy-1.4t-305L-2	344.5	487.0	380.2	239.5	1317.8	417.2	343.9	266.2	253.9	245.4
152C-340Fy-1.3t-305L-1	81.0	148.7	32.8	293.7	2788.5	145.4	73.5	139.6	71.6	137.2
152C-340Fy-1.3t-305L-2	81.9	148.8	32.4	290.4	2795.7	145.6	73.2	139.3	71.2	136.9
152C-550Fy-1.2t-305L-1	104.6	263.7	24.1	314.6	2603.0	252.7	92.9	211.7	83.2	206.0
152C-700Fy*-1.4t-305L-1	137.1	335.3	40.1	321.4	3015.2	320.1	130.3	247.2	110.7	240.5
152C-700Fy-1.4t-305L-1	133.2	349.4	38.3	315.5	2957.8	332.5	131.2	251.4	110.0	244.2
152C-700Fy-1.4t-305L-2	139.1	350.8	37.9	325.3	2998.7	334.1	131.1	255.2	110.7	247.9
152C-1030Fy-1.0t-305L-1	94.9	386.3	14.9	224.7	2101.1	357.7	96.0	228.7	72.8	219.4
152C-1030Fy-1.0t-305L-2	106.5	387.3	15.0	219.6	2090.0	358.4	96.5	226.5	72.6	217.4
152C-1200Fy-1.0t-305L-1	107.8	417.7	15.1	242.3	2132.7	384.8	101.0	246.9	76.8	236.3
152C-1200Fy-1.0t-305L-2	116.3	415.7	15.4	241.0	2087.8	382.4	101.3	245.7	77.0	234.9
152C-1200Fy-1.4t-305L-1	190.3	645.2	40.2	337.8	3100.2	591.4	191.3	363.4	141.2	347.1
152C-1200Fy-1.4t-305L-2	208.9	646.2	40.2	334.7	3015.6	590.8	191.3	362.1	141.0	345.4
152C-1200Fy-2.0t-305L-1	368.9	964.8	114.2	543.8	4310.1	878.5	362.6	562.7	273.7	535.3
152C-1200Fy-2.0t-305L-2	388.4	967.1	115.1	536.8	4260.2	879.4	364.0	560.0	273.7	532.4
152Sigma-340Fy-1.3t-305L-1	118.6	154.6	161.8	309.3	2941.2	151.3	131.4	145.6	128.1	143.1
152Sigma-340Fy-1.3t-305L-2	118.4	156.3	163.6	311.9	2954.1	152.9	132.9	147.1	129.5	144.6
152Sigma-550Fy-1.2t-305L-2	175.7	277.9	121.4	272.7	2648.9	266.0	173.0	206.9	146.9	201.5
152Sigma-700Fy*-1.4t-305L-1	212.5	354.0	206.1	353.1	3172.2	337.9	243.1	265.2	207.3	257.9
152Sigma-700Fy*-1.4t-305L-2	213.1	354.0	206.1	353.1	3172.2	337.9	243.1	265.2	207.3	257.9
152Sigma-700Fy-1.4t-305L-1	216.8	372.1	195.9	337.6	3119.8	354.0	246.3	268.2	205.3	260.5
152Sigma-700Fy-1.4t-305L-2	225.6	369.0	194.2	353.3	3355.4	352.4	244.8	271.9	206.5	264.6
152Sigma-1030Fy-1.0t-305L-1	197.5	411.1	71.6	210.5	2268.5	381.1	180.3	229.1	130.3	220.2
152Sigma-1030Fy-1.0t-305L-2	173.1	412.7	71.9	207.0	2319.9	383.1	181.1	227.7	130.0	219.0
152Sigma-1200Fy-1.0t-305L-1	188.3	442.7	84.0	206.2	2334.6	408.9	199.8	235.7	140.5	226.2
152Sigma-1200Fy-1.0t-305L-2	190.8	441.7	83.8	198.5	2317.6	407.8	199.3	231.0	138.6	221.8
152Sigma-1200Fy-1.4t-305L-1	299.8	689.0	217.4	347.8	3328.3	631.8	372.0	381.3	268.1	364.4
152Sigma-1200Fy-1.4t-305L-2	322.1	677.5	208.8	346.4	3160.7	619.4	362.0	377.3	262.5	359.9
610 mm columns										
102C-340Fy-1.3t-610L-1	71.6	104.5	51.4	95.0	337.6	91.8	64.1	75.4	56.3	69.8
102C-340Fy-1.3t-610L-2	72.6	103.4	55.0	100.4	330.9	90.7	65.1	76.7	58.3	70.8

102C-340Fy-1.3t-610L-3	74.0	103.3	55.2	102.2	305.5	89.7	64.7	77.2	58.6	70.8
102C-550Fy-1.2t-610L-1	87.2	182.6	38.8	74.2	294.5	140.9	76.6	90.9	57.8	79.6
102C-700Fy*-1.4t-610L-1	120.8	231.3	63.9	114.1	346.7	175.0	105.2	126.6	85.3	109.2
102C-700Fy-1.4t-610L-1	114.3	243.3	59.9	108.6	345.0	181.1	105.1	126.9	83.5	108.8
102C-700Fy-1.4t-610L-2	115.4	243.3	59.9	108.4	344.4	181.0	105.1	126.7	83.5	108.6
102C-700Fy-1.4t-610L-3	116.7	244.1	59.8	111.3	321.0	177.6	103.7	128.6	84.2	108.8
102C-1030Fy-1.0t-610L-1	76.8	268.1	25.4	53.6	267.9	176.4	75.7	92.4	50.2	75.8
102C-1030Fy-1.0t-610L-2	77.1	269.4	24.8	53.2	272.1	178.0	75.4	92.2	49.7	75.8
102C-1200Fy-1.4t-610L-1	179.0	449.4	66.6	117.2	361.9	267.3	140.1	178.2	108.0	138.1
102C-1200Fy-1.4t-610L-2	155.9	449.9	63.8	121.2	304.7	242.5	129.7	181.5	107.7	133.6
102C-1200Fy-1.4t-610L-3	166.2	450.9	64.3	111.4	394.1	279.3	142.3	173.8	105.0	137.7
102C-1200Fy-2.0t-610L-1	299.9	668.4	185.8	257.8	504.2	383.7	254.9	324.1	228.3	242.7
102C-1200Fy-2.0t-610L-2	300.8	670.7	185.5	265.2	545.4	400.9	262.1	329.3	230.6	251.8
102C-1200Fy-2.0t-610L-3	295.4	668.4	184.9	251.1	463.5	365.5	246.5	319.9	226.0	233.6
102Sigma-340Fy-1.3t-610L-1	108.2	111.7	308.3	144.5	375.8	98.6	98.6	92.3	92.3	85.0
102Sigma-340Fy-1.3t-610L-2	103.3	111.9	304.9	144.8	390.2	99.3	99.3	92.5	92.5	85.5
102Sigma-340Fy-1.3t-610L-3	102.1	111.6	309.2	142.2	351.5	97.7	97.7	91.7	91.7	84.1
102Sigma-550Fy-1.2t-610L-1	149.2	199.1	238.1	118.8	324.2	154.0	150.6	119.3	119.3	103.6
102Sigma-550Fy-1.2t-610L-2	147.1	200.6	233.7	126.1	424.7	164.6	156.7	123.1	123.1	110.4
102Sigma-700Fy*-1.4t-610L-1	180.2	251.4	383.7	167.4	405.8	194.0	194.0	158.4	158.4	136.9
102Sigma-700Fy-1.4t-610L-1	181.7	265.2	357.7	161.2	406.9	201.9	201.9	160.2	160.2	137.9
102Sigma-700Fy-1.4t-610L-2	168.3	265.2	353.3	160.9	416.9	203.2	203.2	160.1	160.1	138.3
102Sigma-700Fy-1.4t-610L-3	175.2	264.9	359.3	158.2	378.3	197.6	197.6	158.8	158.8	135.1
102Sigma-1030Fy-1.0t-610L-1	131.4	292.7	156.5	87.1	306.9	196.4	154.8	124.4	113.9	102.1
102Sigma-1030Fy-1.0t-610L-2	135.4	290.2	159.2	87.0	300.9	193.8	154.3	123.8	114.2	101.3
102Sigma-1200Fy-1.0t-610L-1	142.3	320.5	157.9	93.4	312.9	208.8	161.7	134.7	120.6	109.0
102Sigma-1200Fy-1.0t-610L-2	140.6	328.3	162.2	93.4	325.0	215.1	166.4	136.3	122.6	110.7
102Sigma-1200Fy-1.4t-610L-1	249.8	488.6	380.7	167.5	417.2	299.2	275.1	223.2	223.2	174.0
102Sigma-1200Fy-1.4t-610L-2	244.5	488.6	381.1	167.5	417.7	299.4	275.3	223.2	223.2	174.0
102Sigma-1200Fy-1.4t-610L-3	252.9	487.0	383.5	163.4	377.4	283.8	265.9	220.0	220.0	167.2
102Sigma-1200Fy-2.0t-610L-1	380.5	722.6	989.7	320.2	568.9	424.6	424.6	375.4	375.4	282.8
102Sigma-1200Fy-2.0t-610L-2	396.8	724.1	997.2	320.5	570.8	425.8	425.8	375.9	375.9	283.4
152C-340Fy-1.3t-610L-1	68.9	148.5	30.8	76.0	834.8	137.8	69.5	82.7	50.1	79.6
152C-340Fy-1.3t-610L-2	84.7	148.5	30.9	77.0	911.0	138.7	69.8	83.2	50.4	80.3
152C-550Fy-1.2t-610L-1	92.6	264.9	23.6	69.4	853.1	232.6	87.6	105.3	53.2	99.0
152C-550Fy-1.2t-610L-2	88.4	263.2	23.9	68.0	763.5	227.9	86.8	103.9	52.9	97.0
152C-700Fy*-1.4t-610L-1	132.8	334.5	40.0	94.4	917.9	287.2	121.6	138.2	76.5	128.4
152C-700Fy-1.4t-610L-1	137.7	351.1	38.2	95.1	972.5	301.9	123.4	142.0	76.5	132.1
152C-700Fy-1.4t-610L-2	113.7	350.5	38.2	95.0	973.5	301.5	123.2	141.9	76.5	132.0
152C-700Fy-1.4t-610L-3	132.9	350.8	38.2	93.6	914.9	298.8	122.6	140.8	76.1	130.4
152C-1030Fy-1.0t-610L-1	73.2	388.2	15.2	53.1	648.4	302.1	87.3	108.7	46.1	97.1
152C-1030Fy-1.0t-610L-2	84.6	387.9	15.2	54.0	696.6	307.2	88.2	109.8	46.4	98.7
152C-1030Fy-1.0t-610L-3	81.5	387.9	14.9	51.1	696.8	307.3	87.5	106.4	45.2	95.8
152C-1200Fy-1.0t-610L-1	86.3	422.1	14.5	52.4	726.9	331.0	90.7	112.1	46.2	100.4
152C-1200Fy-1.0t-610L-2	97.5	416.7	15.3	53.7	700.8	324.9	91.4	112.9	47.3	100.9
152C-1200Fy-1.0t-610L-3	83.1	421.7	14.5	51.4	667.2	323.7	89.5	110.9	45.9	98.5
152C-1200Fy-1.4t-610L-1	151.4	648.8	40.1	96.0	944.1	486.6	169.3	189.8	93.7	166.4
152C-1200Fy-1.4t-610L-2	178.7	647.3	39.7	96.9	1001.3	493.8	170.4	190.5	93.6	168.4
152C-1200Fy-1.4t-610L-3	181.9	647.3	39.9	95.5	929.8	483.7	168.4	189.0	93.3	165.4
152C-1200Fy-2.0t-610L-1	316.0	961.6	114.6	195.1	1404.8	722.1	320.9	333.9	196.4	291.8
152C-1200Fy-2.0t-610L-2	302.0	969.5	110.1	188.4	1426.2	729.4	318.2	328.8	191.7	287.8
152Sigma-340Fy-1.3t-610L-1	109.0	156.8	167.9	150.6	1074.1	147.5	130.8	115.7	110.9	111.5
152Sigma-340Fy-1.3t-610L-2	128.0	156.2	163.5	145.7	968.3	146.0	128.8	113.9	108.8	109.4
152Sigma-340Fy-1.3t-610L-3	109.3	156.8	168.0	145.1	991.3	146.7	130.4	113.9	109.8	109.6
152Sigma-550Fy-1.2t-610L-1	136.3	276.6	120.8	127.4	906.2	243.5	163.1	146.5	116.8	137.1
152Sigma-550Fy-1.2t-610L-2	144.7	277.3	121.1	129.1	911.0	244.1	163.5	147.6	117.4	138.1
152Sigma-700Fy*-1.4t-610L-1	168.0	353.5	205.8	172.4	1118.7	309.7	229.5	192.4	167.2	179.6
152Sigma-700Fy*-1.4t-610L-2	177.5	353.7	205.9	171.6	1122.7	310.0	229.7	192.1	167.0	179.3
152Sigma-700Fy-1.4t-610L-1	180.7	369.0	194.2	162.6	1034.0	317.8	228.8	191.1	163.3	177.0
152Sigma-700Fy-1.4t-610L-2	159.9	369.3	194.4	163.8	1020.2	317.3	228.7	191.9	163.8	177.5
152Sigma-700Fy-1.4t-610L-3	164.6	369.3	194.4	167.8	1106.8	321.1	230.5	194.2	165.1	180.7
152Sigma-1030Fy-1.0t-610L-2	121.5	409.5	71.3	94.6	741.7	325.0	162.7	152.4	100.0	136.5
152Sigma-1030Fy-1.0t-610L-3	136.1	413.3	72.0	99.9	756.5	328.8	164.5	157.5	102.6	141.2
152Sigma-1200Fy-1.0t-610L-1	138.0	443.7	81.6	95.1	742.2	345.5	177.6	158.6	107.6	140.9
152Sigma-1200Fy-1.0t-610L-2	145.7	436.9	80.3	98.9	756.8	343.1	175.9	160.8	108.0	143.4
152Sigma-1200Fy-1.0t-610L-3	173.4	440.3	81.0	97.0	749.5	344.3	176.8	159.7	107.8	142.2
152Sigma-1200Fy-1.4t-610L-1	221.8	676.5	208.4	169.3	1001.3	509.9	319.1	262.6	206.7	229.2
152Sigma-1200Fy-1.4t-610L-2	211.4	677.0	208.6	169.1	1006.1	510.8	319.6	262.5	206.7	229.3
152Sigma-1200Fy-1.4t-610L-3	227.9	677.5	208.8	170.1	1013.0	512.1	320.2	263.4	207.2	230.2
152Sigma-1200Fy-2.0t-610L-1	372.7	1003.4	565.7	319.4	1490.2	756.9	583.8	441.4	406.7	383.9
152Sigma-1200Fy-2.0t-610L-2	418.6	1004.1	566.1	317.5	1516.7	761.1	586.0	440.2	406.1	383.8
152Sigma-1200Fy-2.0t-610L-3	296.4	999.4	563.4	312.7	1381.6	738.3	573.4	435.8	402.6	375.1

1219 mm columns										
102C-340Fy-1.3t-1219L-1	68.8	104.3	51.5	95.5	85.2	62.5	49.8	75.4	56.4	54.6
102C-340Fy-1.3t-1219L-2	68.8	103.8	51.3	94.6	84.4	62.0	49.5	74.9	56.1	54.2
102C-700Fy-1.4t-1219L-1	100.2	243.5	60.3	103.6	88.4	77.5	60.6	124.0	82.5	64.8
102C-1030Fy-1.0t-1219L-1	65.1	269.7	24.6	52.4	62.3	54.7	35.4	91.5	49.3	40.3
102C-1200Fy-1.0t-1219L-1	59.5	292.5	24.1	52.3	64.2	56.3	35.8	94.9	50.1	41.0
102C-1200Fy-1.4t-1219L-1	135.6	450.4	64.2	110.1	91.7	80.4	63.4	172.7	104.5	67.8
102C-1200Fy-2.0t-1219L-1	222.2	669.2	184.2	235.2	134.0	117.5	115.4	309.6	220.9	110.7
102Sigma-340Fy-1.3t-1219L-1	94.8	111.9	308.8	143.7	96.1	68.7	68.7	92.3	92.3	65.4
102Sigma-700Fy-1.4t-1219L-1	140.4	264.9	351.6	158.6	104.6	91.7	91.7	158.9	158.9	83.2
102Sigma-1030Fy-1.0t-1219L-1	91.7	295.2	152.5	85.9	81.4	71.4	71.4	123.9	112.7	57.5
102Sigma-1030Fy-1.0t-1219L-2	97.6	292.7	157.1	85.6	78.5	68.8	68.8	123.2	113.4	56.1
102Sigma-1200Fy-1.0t-1219L-1	94.7	328.3	151.9	91.0	86.9	76.2	76.2	134.4	118.9	61.2
102Sigma-1200Fy-1.0t-1219L-2	86.6	322.9	155.0	92.9	80.7	70.8	70.8	134.8	119.9	58.8
102Sigma-1200Fy-1.4t-1219L-1	199.4	491.7	381.1	165.7	105.5	92.5	92.5	222.7	222.7	84.7
102Sigma-1200Fy-2.0t-1219L-1	288.0	720.2	1012.5	316.3	141.2	123.8	123.8	372.5	372.5	122.0
102Sigma-1200Fy-2.0t-1219L-2	295.2	720.2	998.9	313.3	139.5	122.4	122.4	370.8	370.8	120.6
152C-340Fy-1.3t-1219L-1	77.8	148.6	31.0	76.4	232.6	113.7	61.6	83.0	50.3	72.0
152C-700Fy-1.4t-1219L-1	117.8	351.7	38.2	95.9	252.6	196.4	94.0	142.8	76.8	107.0
152C-1030Fy-1.0t-1219L-1	69.3	388.5	14.7	50.0	178.5	156.2	57.2	105.2	44.7	68.9
152C-1200Fy-1.0t-1219L-1	73.3	422.1	14.8	51.5	184.3	161.6	58.6	111.0	46.3	71.1
152C-1200Fy-1.4t-1219L-1	160.5	648.3	40.1	97.1	258.1	226.3	104.7	190.9	94.0	115.7
152C-1200Fy-2.0t-1219L-1	275.5	964.8	115.3	198.1	363.9	319.2	191.2	337.0	198.0	194.7
152Sigma-340Fy-1.3t-1219L-1	120.6	156.1	163.4	113.0	272.2	122.8	114.5	102.1	100.9	89.0
152Sigma-700Fy-1.4t-1219L-1	178.7	369.0	194.2	126.2	287.7	215.7	177.1	168.4	149.9	128.0
152Sigma-1030Fy-1.0t-1219L-1	99.3	410.2	71.4	65.7	209.1	180.5	111.7	125.3	88.1	85.0
152Sigma-1200Fy-1.4t-1219L-1	178.8	672.9	207.3	132.7	276.7	242.6	195.7	230.1	188.9	139.5
152Sigma-1200Fy-2.0t-1219L-1	376.3	1004.1	566.1	257.1	395.4	346.7	344.9	394.4	376.8	229.2

## Notation

The following symbols are used in this paper

$P_u$	=	Ultimate load (kN)
$P_{cre}$	=	Critical buckling load (kN)
$P_{crd}$	=	Critical distortional buckling load (kN)
$P_{cr\ell}$	=	Critical local buckling load (kN)
$P_{ne}$	=	Nominal global buckling load (kN)
$P_{nd}$	=	Nominal distortional buckling load (kN)
$P_{n\ell g}$	=	Nominal local-global buckling load (kN)
$P_{ndg}$	=	Nominal distortional-global buckling load (kN)
$P_{n\ell d}$	=	Nominal local-distortional buckling load (kN)

## References

- AISI S100. 2022. *North American Specification for the Design of Cold-Formed Steel Structural Members*.  
 AISI S100-20/S3-22. Washington, DC: American Iron and Steel Institute.
- AS/NZS 4600. 2018. *Australian/New Zealand Standard: Cold Formed Steel Structures*.
- Ding, C. 2022. "Strength and behavior of advanced high strength steel structural components." Ph.D. Dissertation. Baltimore, USA: Johns Hopkins University.