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Sheet Piling - A Brief History

The origin of sheet piling dates back more than one hundred years. Sheet piles first took shape as a straight web section. Flat sheets are used for cellular membrane gravity structures. Over time, these sections evolved into corrugated profiles, transitioning the essential pile characteristics from tension to a bending element. Thus the U-Pile was born for retaining wall applications.

The Evolution

The U-Pile was a great innovation for steel producers and engineers. Piling applications expanded throughout the civil works industry as designers recognized the benefits. As with new technology, new concerns became evident. Over decades of use, experts began to recognize a potential structural concern for the interlock connection being located about the centroid of the axis. This was thought to compromise the section physical properties. This proved valid through research and testing. Today, U-Piles are still produced and in use, but crimping and or welding of the interlocks is required to assure the section properties are achieved.

The Next Generation

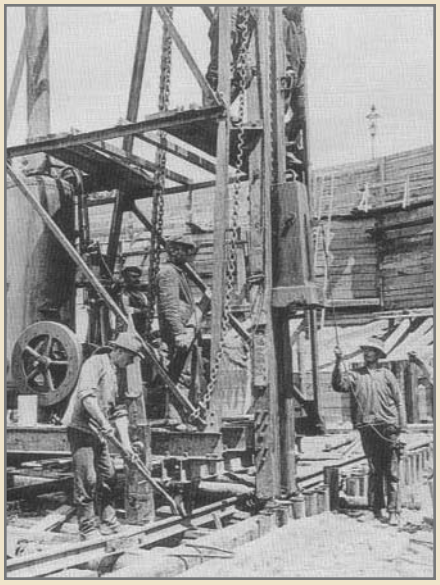
As the U-Pile concerns were discussed amongst industry experts, the steel mills strived to improve the sheet pile product market. Thus, the next generation Z-Pile was born. The essential changes of the Z-Pile are in the transition of the interlocks and the continuous form of the web. By moving the interlocks symmetrically on both sides of the neutral axis, the rotational issues of its' U-Pile predecessor were addressed. This and the continuous web development have a positive influence on the calculation of the section modulus, in addition to the following benefits:

- Excellent strength to weight ratio (Section modulus/mass)
- Increased inertia to reduce deflection
- Larger width of section for higher installation performance

The Right Connection

The interlock connection is a crucial component of the sheet pile design. The AZ sheet piles are engineered with a Larssen interlock. This is a four point connection that offers superior performance and shear load transfer.

For water retention applications, the Larssen interlock is unmatched. No other sheet pile connection can offer a theoretical watertight wall system. AZ sheet piles for permanent wall applications in below grade parking garages offer the drivability, efficiency and impermeability that no other material can. A standard non structural seal weld is specified down the interlock. This serves as a "belts and suspenders" measure for the design life of the structure. Conductivity/permeability calculations can be provided in the design services offered by Skyline Steel.



One of the first recorded hot rolled piling installations

AZ sheet piles

Larssen interlock connection

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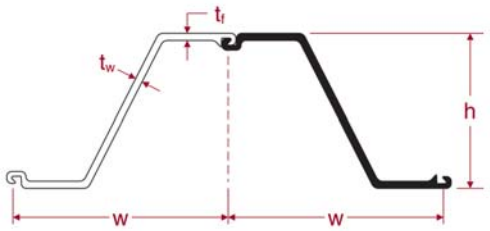

Section	Width (w) in (mm)	Height (h) in (mm)	Thickness Flange (t_f) in (mm)	Thickness Web (t_w) in (mm)	Cross Sectional Area in^2/ft (cm^2/m)	Weight Pile lb/ft (kg/m)	Weight Wall lb/ft^2 (kg/m^2)	Section Modulus in^3/ft (cm^3/m)	Moment of Inertia in^4/ft (cm^4/m)	Coating Area Both Sides ft^2/ft of single (m^2/m)	Coating Area Wall Surface ft^2/ft^2 (m^2/m^2)
AZ 12	26.38 670	11.89 302.0	0.335 8.50	0.335 8.50	5.94 125.7	44.42 66.10	20.22 98.70	22.3 1200	132.8 18140	5.45 1.66	1.23 1.23
AZ 13	26.38 670	11.93 303.0	0.375 9.50	0.375 9.50	6.47 136.9	48.38 72.00	22.02 107.50	24.2 1300	144.3 19700	5.45 1.66	1.23 1.23
AZ 14	26.38 670	11.97 304.0	0.413 10.50	0.413 10.50	7.03 148.9	52.62 78.30	23.94 116.90	26.0 1400	156.0 21300	5.45 1.66	1.23 1.23
AZ 17	24.80 630	14.92 379.0	0.335 8.50	0.335 8.50	6.53 138.3	45.96 68.40	22.24 108.60	31.0 1665	231.3 31580	5.64 1.72	1.35 1.35
AZ 18	24.80 630	14.96 380.0	0.375 9.50	0.375 9.50	7.11 150.4	49.99 74.40	24.19 118.10	33.5 1800	250.4 34200	5.64 1.72	1.35 1.35
AZ 19	24.80 630	15.00 381.0	0.413 10.50	0.413 10.50	7.74 163.8	54.43 81.00	26.34 128.60	36.1 1940	270.8 36980	5.64 1.72	1.35 1.35
AZ 17-700	27.56 700	16.52 419.5	0.335 8.50	0.335 8.50	6.28 133.0	49.12 73.10	21.38 104.40	32.2 1730	265.3 36230	6.10 1.86	1.33 1.33
AZ 18-700	27.56 700	16.54 420.0	0.354 9.00	0.354 9.00	6.58 139.2	51.41 76.50	22.39 109.30	33.5 1800	276.8 37800	6.10 1.86	1.33 1.33
AZ 19-700	27.56 700	16.56 420.5	0.375 9.50	0.375 9.50	6.88 145.6	53.76 80.00	23.41 114.30	34.8 1870	288.4 39380	6.10 1.86	1.33 1.33
AZ 20-700	27.56 700	16.57 421.0	0.394 10.00	0.394 10.00	7.18 152.0	56.11 83.50	24.43 119.30	36.2 1945	300.0 40960	6.10 1.86	1.33 1.33
AZ 25	24.80 630	16.77 426.0	0.472 12.00	0.441 11.20	8.74 185.0	61.49 91.50	29.74 145.20	45.7 2455	382.6 52250	5.91 1.80	1.41 1.41
AZ 26	24.80 630	16.81 427.0	0.512 13.00	0.480 12.20	9.35 198.0	65.72 97.80	31.79 155.20	48.4 2600	406.5 55510	5.91 1.80	1.41 1.41
AZ 28	24.80 630	16.85 428.0	0.551 14.00	0.520 13.20	9.97 211.1	70.15 104.40	33.94 165.70	51.2 2755	431.6 58940	5.91 1.80	1.41 1.41
AZ 34	24.80 630	18.07 459.0	0.669 17.00	0.512 13.00	11.03 233.5	77.61 115.50	37.54 183.30	63.8 3430	576.3 78700	6.10 1.86	1.47 1.47
AZ 36	24.80 630	18.11 460.0	0.709 18.00	0.551 14.00	11.67 247.1	82.11 122.20	39.73 194.00	67.0 3600	606.3 82800	6.10 1.86	1.47 1.47
AZ 38	24.80 630	18.15 461.0	0.748 19.00	0.591 15.00	12.33 261.0	86.75 129.10	41.97 204.90	70.3 3780	637.7 87080	6.10 1.86	1.47 1.47
AZ 36 - 700	27.56 700	19.65 499.0	0.669 17.00	0.441 11.20	10.19 215.7	79.63 118.50	34.68 169.30	67.0 3600	657.2 89740	6.76 2.06	1.46 1.46
AZ 38 - 700	27.56 700	19.69 500.0	0.709 18.00	0.480 12.20	10.85 229.7	84.80 126.20	36.93 180.30	70.7 3800	694.5 94840	6.76 2.06	1.46 1.46
AZ 40 - 700	27.56 700	19.72 501.0	0.748 19.00	0.520 13.20	11.50 243.5	89.91 133.80	39.14 191.10	74.4 4000	731.8 99930	6.76 2.06	1.46 1.46
AZ 46	22.83 580	18.94 481.0	0.709 18.00	0.551 14.00	13.76 291.2	89.10 132.60	46.82 228.60	85.5 4595	808.8 110450	6.23 1.90	1.63 1.63
AZ 48	22.83 580	18.98 482.0	0.748 19.00	0.591 15.00	14.48 306.5	93.81 139.60	49.28 240.60	89.3 4800	847.1 115670	6.23 1.90	1.63 1.63
AZ 50	22.83 580	19.02 483.0	0.787 20.00	0.630 16.00	15.22 322.2	98.58 146.70	51.80 252.90	93.3 5015	886.5 121060	6.23 1.90	1.63 1.63