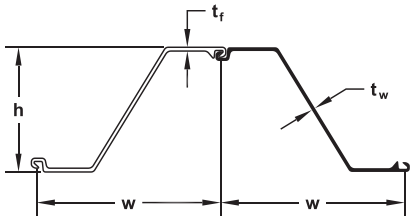
SHEET PILES

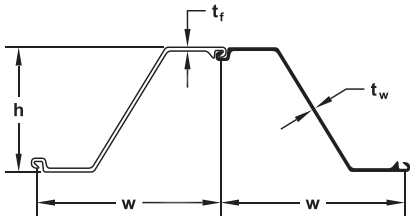
AZ HOT ROLLED STEEL SHEET PILE SERIES



JD FIELDS & COMPANY, INC. A FIELDS COMPANY			THICKNESS			WEIGHT		SECTION MODULUS			COATING AREA	
	Width (w)	Height (h)	Flange (t_f)	Web (t_W)	Cross Sec Area (A)	Single Pile	Wall Area	Elastic	Plastic	Moment of Inertia	Both Sides	Wall Surface
	in	in	in	in	in^2/ft	lb/ft	lb/ft^2	in^3/ft	in^3/ft	in^4/ ft	ft^2/ft of single	ft^2/ft^2
SECTION	mm	mm	mm	mm	cm^2/m	kg/m	kg/m^2	cm^3/m	cm^3/m	cm^4/m	m^2/m	m^2/m^2
AZ 12-770	30.31 770	13.52 344	0.335 8.5	0.335 8.5	5.67 120.1	48.78 72.6	19.31 94.3	23.2 1245	27.5 1480	156.9 21430	6.07 1.85	1.20 1.20
AZ 13-770	30.31 770	13.54 344	0.354 9.0	0.354 9.0	5.94 125.8	51.14 76.1	20.24 98.8	24.2 1300	28.8 1546	163.7 22360	6.07 1.85	1.20 1.20
*AZ 14-770	30.31 770	13.56 345	0.375 9.5	0.375 9.5	6.21 131.5	53.42 79.5	21.14 103.2	25.2 1355	30.0 1611	170.6 23300	6.07 1.85	1.20 1.20
AZ 17-700	27.56 700	16.52 420	0.335 8.5	0.335 8.5	6.28 133.0	49.12 73.1	21.38 104.4	32.2 1730	37.7 2027	265.3 36230	6.10 1.86	1.33 1.33
AZ 18-700	27.56 700	16.54 420	0.354 9.0	0.354 9.0	6.58 139.2	51.41 76.5	22.39 109.3	33.5 1800	39.4 2116	276.8 37800	6.10 1.86	1.33 1.33
AZ 19-700	27.56 700	16.56 421	0.375 9.5	0.375 9.5	6.88 145.6	53.76 80.0	23.35 114.3	34.8 1870	41.0 2206	288.4 39380	6.10 1.86	1.33 1.33
AZ 20-700	27.56 700	16.57 421	0.394 10.0	0.394 10.0	7.18 152.0	56.11 83.5	24.43 119.3	36.2 1945	42.7 2296	300.0 40960	6.10 1.86	1.33 1.33
AZ 18-800	31.5 800	17.68 449	0.335 8.5	0.335 8.5	6.07 128.6	54.26 80.7	20.67 100.9	34.2 1840	39.7 2135	302.6 41320	6.82 2.08	1.30 1.30
*AZ 20-800	31.5 800	17.72 450	0.375 9.5	0.375 9.5	6.66 141.0	59.50 88.6	22.67 110.7	37.2 2000	43.3 2330	329.9 45050	6.82 2.08	1.30 1.30
AZ 22-800	31.5 800	17.76 451	0.413 10.5	0.413 10.5	7.25 153.5	64.77 96.4	24.68 120.5	40.3 2165	47.0 2525	357.3 48790	6.82 2.08	1.30 1.30
AZ 23-800	31.50 800	18.66 474	0.453 11.5	0.354 9.0	7.12 150.6	63.56 94.6	24.22 118.2	43.3 2330	49.9 2680	404.6 55260	6.94 2.11	1.32 1.32
*AZ 25-800	31.50 800	18.70 475	0.492 12.5	0.394 10.0	7.71 163.3	68.91 102.6	26.26 128.2	46.5 2500	53.8 2890	435.1 59410	6.94 2.11	1.32 1.32
AZ 27-800	31.50 800	18.74 476	0.531 13.5	0.433 11.0	8.31 176.0	74.26 110.5	28.29 138.1	49.7 2670	57.6 3100	465.5 63570	6.94 2.11	1.32 1.32
AZ 24-700	27.56 700	18.07 459	0.441 11.2	0.441 11.2	8.23 174.1	64.30 95.7	28.00 136.7	45.2 2430	53.5 2867	408.8 55820	6.33 1.93	1.38 1.38
*AZ 26-700	27.56 700	18.11 460	0.480 12.2	0.480 12.2	8.84 187.2	69.12 102.9	30.10 146.9	48.4 2600	57.1 3070	437.3 59720	6.33 1.93	1.38 1.38
AZ 28-700	27.56 700	18.15 461	0.520 13.2	0.520 13.2	9.46 200.2	73.93 110.0	32.19 157.2	51.3 2760	60.9 3273	465.9 63620	6.33 1.93	1.38 1.38
AZ 28-750	29.53 750.0	20.04 509.0	0.472 12.00	0.394 10.00	8.09 171.2	67.73 100.80	27.53 134.40	52.3 2810	60.3 3245	523.9 71540	6.93 2.11	1.41 1.41
AZ 30-750	29.53 750.0	20.08 510.0	0.512 13.00	0.433 11.00	8.73 184.7	73.08 108.80	29.70 145.00	55.9 3005	64.8 3485	561.5 76670	6.93 2.11	1.41 1.41
AZ 32-750	29.53 750.0	20.12 511.0	0.551 14.00	0.472 12.00	9.37 198.3	78.44 116.70	31.88 155.60	59.5 3200	69.2 3720	599.0 81800	6.93 2.11	1.41 1.41
AZ 36-700N	27.56 700	19.65 499	0.591 15.0	0.441 11.2	10.20 215.9	79.72 118.6	34.71 169.5	66.8 3590	76.4 4110	656.2 89610	6.73 2.05	1.47 1.47
*AZ 38-700N	27.56 700	19.69 500	0.630 16.0	0.480 12.2	10.87 230.0	84.94 126.4	36.98 180.6	70.6 3795	81.1 4360	694.5 94840	6.73 2.05	1.47 1.47
AZ 40-700N	27.56 700	19.72 501	0.669 17.0	0.520 13.2	11.54 244.2	90.16 134.2	39.26 191.7	74.3 3995	85.7 4605	732.9 100080	6.73 2.05	1.47 1.47
*AZ 42-700N	27.56 700	19.65 499	0.709 18.0	0.551 14.0	12.22 258.7	95.51 142.1	41.59 203.1	78.2 4205	90.3 4855	768.4 104930	6.75 2.06	1.47 1.47
AZ 44-700N	27.56 700	19.69 500	0.748 19.0	0.591 15.0	12.89 272.8	100.74 149.9	43.87 214.2	81.9 4405	95.0 5105	806.6 110150	6.75 2.06	1.47 1.47
AZ 46-700N	27.56 700	19.72 501	0.787 20.0	0.630 16.0	13.56 287.0	105.97 157.7	46.14 225.3	85.7 4605	99.5 5350	844.9 115370	6.75 2.06	1.47 1.47
AZ 48-700	27.56 700.0	19.80 503.0	0.866 22.00	0.591 15.00	13.63 288.4	106.49 158.50	46.37 226.40	88.4 4755	102.1 5490	876.2 119650	6.70 2.04	1.46 1.46
AZ 50-700	27.56 700.0	19.84 504.0	0.906 23.00	0.630 16.00	14.30 302.6	111.73 166.30	48.65 237.50	92.2 4955	106.7 5735	914.6 124890	6.70 2.04	1.46 1.46
AZ 52-700	27.56 700.0	19.88 505.0	0.945 24.00	0.669 17.00	14.97 317.0	116.97 174.10	50.93 248.70	95.9 5155	111.3 5985	953.0 130140	6.70 2.04	1.46 1.46

*Indicates standard stocking sections. Please check with your local sales representative for material availability.

AZ HOT ROLLED STEEL SHEET PILE SERIES

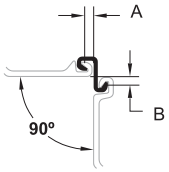


AVAILABLE STEEL GRADES

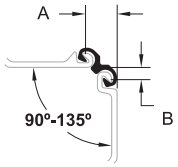
AMERICAN			CANADIAN			EUROPEAN			AMLoCor®**		
ASTM	Yield Strength		Grade	Yield Strength		Grade	Yield Strength		Grade	Yield Strength	
	ksi	MPa		ksi	MPa		ksi	MPa		ksi	MPa
A328	39	270	Grade 260 W	38	260	S240 GP	35	240	Blue 320	46	320
A572 Gr . 42	42	290	Grade 300 W	43	300	S270 GP	39	270	Blue 355	51	355
A572 Gr . 50	50	345	Grade 350 W	51	355	S320 GP	46	320	Blue 390	57	390
A572 Gr . 55	55	380	Grade 400 W	58	400	S355 GP	51	355			
A572 Gr . 60	60	415				S390 GP	57	390			
A572 Gr . 65	65	450				S430 GP	62	430			
A690	50	345				S460 GP	67	460			
A690	57*	390				S500 GP*	72	500			
A690	60*	415									

Highlighted fields represent the most commonly used and readily available steel grades. *On request ** Corrosion resistant steel; check for availability.

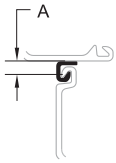
CORNER PILES



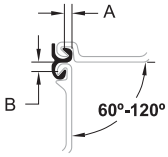
C 14
Gr: S355 GP / Gr. 51
Wt: 9.68 lb/ft
14.4 kg/m
A: ~0.98”
25 mm
B: ~0.98”
25 mm



Omega 18
Gr: S355 GP / Gr. 51
Wt: 12.10 lb/ft
18.0 kg/m
A: ~2.76”
~70 mm
B: ~1.18”
~30 mm



C 9
Gr: S355 GP / Gr. 51
Wt: 6.25 lb/ft
9.3 kg/m
A: ~1.18”
~30 mm

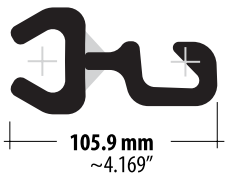


Delta 13
Gr: S355 GP / Gr. 51
Wt: 8.8 lb/ft
13.1 kg/m
A: ~0.59”
~15 mm
B: ~0.79”
~20 mm

DELIVERY CONDITIONS & TOLERANCES

	ASTM A6	EN 10248
Mass	± 2.5%	± 5%
Length	+ 5 in. – 0 in.	± 200 mm
Height	± 7 mm	
Thickness	≤ 8.5 mm	- 0.5 mm
	> 8.5 mm	- 6%
Single Pile Width		± 2%
Double Pile Width		± 3%
Straightness		0.2% of the length
Ends out of Square		20 mm

TRANSITIONAL PILES



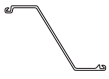
PZ-Larssen-Transition
Gr: S355 GP / A572 Gr. 51
Wt 12.08 lb/ft 18.0 kg/m

MAXIMUM ROLLED LENGTHS†

AZ	101.7 ft.	31.0 m
C6	59.1 ft.	18.0 m
C14	59.1 ft.	18.0 m
Delta 13	55.8 ft.	17.0 m
Omega 18	52.0 ft.	16.0 m

† Longer lengths may be possible upon request.

DELIVERY FORMS



Single Pile
Position A

Double Pile
Form I Standard

Single Pile
Position B

Double Pile
Form II on Request

AS 500
STRAIGHT WEB SHEET PILES

STRAIGHT WEB STEEL SHEET PILES

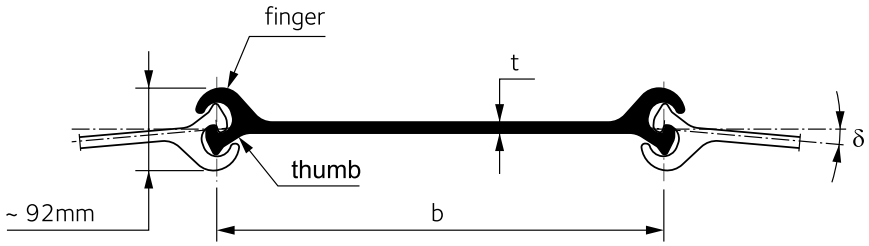


Fig. 2.1. Characteristics of AS 500 straight web sheet piles

CHARACTERISTICS OF AS 500® SECTIONS

JD FIELDS & COMPANY, INC. A FIELDS COMPANY SECTION	Width[1] b in mm	Web thickness t in mm	Deviation angle[2] δ °	Perimeter (single pile) in cm	Steel section (single pile) in² cm²	Mass (single pile) lb/ft kg/m	Mass per m² of wall Gw lb/ft² kg/m²	Moment of inertia (single pile) in⁴ cm⁴	Section modulus (single pile) in³ cm³	Coating area[3] (single pile) ft²/ft m²/m
AS 500 – 9.5	19.69 500	0.375 9.5	4.5	54.33 138	12.6 81.3	42.87 63.8	26.22 128	4.04 168	2.81 46	1.90 0.58
AS 500 – 11.0	19.69 500	0.433 11.0	4.5	54.72 139	13.9 89.4	47.17 70.2	28.67 140	4.47 186	2.99 49	1.90 0.58
AS 500 – 12.0	19.69 500	0.472 12.0	4.5	54.72 139	14.7 94.6	49.93 74.3	30.52 149	4.71 196	3.11 51	1.90 0.58
AS 500 – 12.5	19.69 500	0.492 12.5	4.5	54.72 139	15.1 97.2	51.27 76.3	31.34 153	4.83 201	3.11 51	1.90 0.58
AS 500 – 12.7	19.69 500	0.500 12.7	4.5	54.72 139	15.2 98.2	51.81 77.1	31.54 154	4.90 204	3.11 51	1.90 0.58
AS 500 – 13.0[4]	19.69 500	0.512 13.0	4.5	55.12 140	15.6 100.6	53.09 79.0	32.36 158	5.12 213	3.30 54	1.90 0.58

Note: All straight web sections interlock with each other.

[1] The calculation width, to be taken into account for design purposes and layout, is 503 mm for all AS 500 sheet piles.
[2] Max. deviation angle 4.0° for pile length > 20 m.
[3] One side, excluding inside of interlocks.
[4] Please contact JD Fields & Company for further information.

JUNCTION PILES

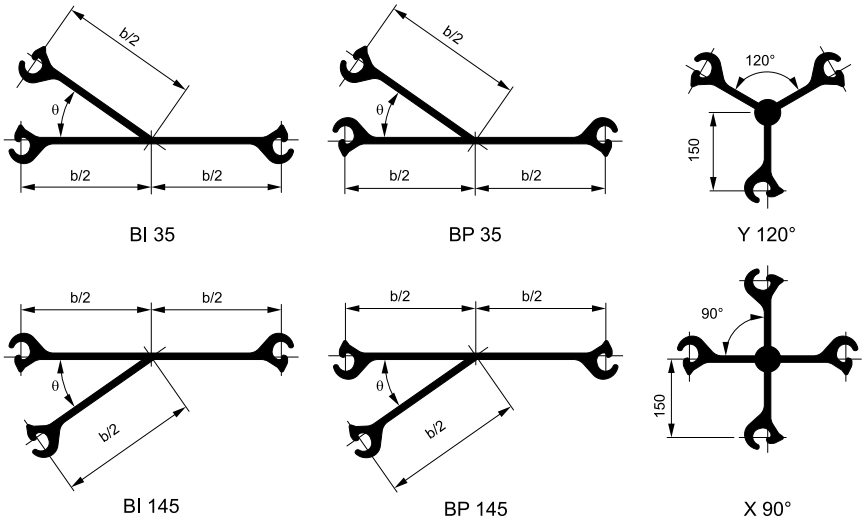


Fig. 2.2.: Characteristics of junction piles.

Connection angles Θ in the range from 30° to 45° are recommended.

It is nevertheless possible to have angles up to 90°.

BENT PILES

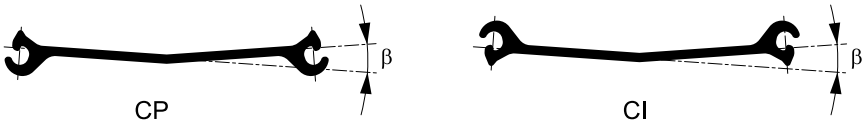


Fig. 2.3.: Bend angel β of AS 500 piles.

If deviation angles δ exceeding the values given in Table 2.1. are required, piles prebent in the mill may be used.

The maximum possible pile bend angle β is about 12°.

DELIVERY CONDITIONS

Interlock resistance

The following characteristic interlock resistance can be guaranteed:

SECTION	$R_{k,s}$ [kN/m][1)]	kips/in
AS 500 – 9.5	3500	20
AS 500 – 11.0	4000	23
AS 500 – 12.0	5000	29
AS 500 – 12.5	5500	31
AS 500 – 12.7	5500	31
AS 500 – 13.0	6000	34

[1)] For the related steel grade and further information, please contact JD Fields & Company.

For verification of the piles both, yielding of the web and failure of the interlock, should be checked.

The test procedure is based on Annex C of EN10248-1 (2023).

SELINE® SEALANT

Seline®

The watertightness of a sheet pile wall essentially depends on the number of interlocks and the interlock geometry. Despite the relatively compact nature of the Larssen interlock, which is a feature of all hot-rolled sheet piles from ArcelorMittal, additional interlock sealants are often used to further reduce water penetration.

SELINE® | PRODUCT FEATURES

Seline® is a completely newly-developed, environmentally friendly sealant for sheet piles from ArcelorMittal. Unlike all other existing sealants, Seline® contains a renewable raw material: balsam resin (also known as colophony or gum rosin). This resin is a natural raw material that was used by the ancient Romans and Egyptians. The tree resin is mainly obtained from pine trees by scratching the tree and collecting the balsam that drips out.

Seline® is heated in a similar way to bitumen-based sealants and then filled into the sheet pile interlocks. After briefly cooling down, Seline® provides an extremely reliable water seal for sheet pile walls.

Seline® is ideally suited for temporary and permanent sheet pile wall structures.

Photo: Ipswich tidal barrier, UK | ©MGF

SELINE® | SEALING PERFORMANCE

Before a new sealing product can be launched on the market, its performance must be evaluated in several tests. ArcelorMittal is the only sheet piling supplier that has implemented a realistic testing procedure to ensure the performance of its products under real-life conditions.

Once the laboratory tests had been completed and validated, the most important step to be followed was installation on site, followed by a direct watertightness test.

For this purpose, the sealed sheet piles were driven into a hard clay soil at the test site in Mittersheim, France, and the watertightness tests were carried out under the supervision of the independent testing institute DNV/GL.

The results showed that, after 24 hours under 100 kPa (1 bar), 24 hours under 200 kPa (2 bar) and again 24 hours under 300 kPa (3 bar) water pressure, Seline® improved the performance compared to the well-established sealants.

These results were verified by DNV/GL and thus provide reliable characteristic values for this newly developed product.

Further tests are planned for 2025. The aim is to examine the behaviour of Seline® in other soil types and different pile-driving methods in more detail.

The average inverse joint resistance pm was determined according to EN 12063, see table below:

	ρ_m (10-10 m/s) at a water pressure of	
	100 kPa	200 kPa
Seline®	< 600	< 700

SELINE® SEALANT

Seline®

SELINE® | ENVIRONMENTAL COMPATIBILITY

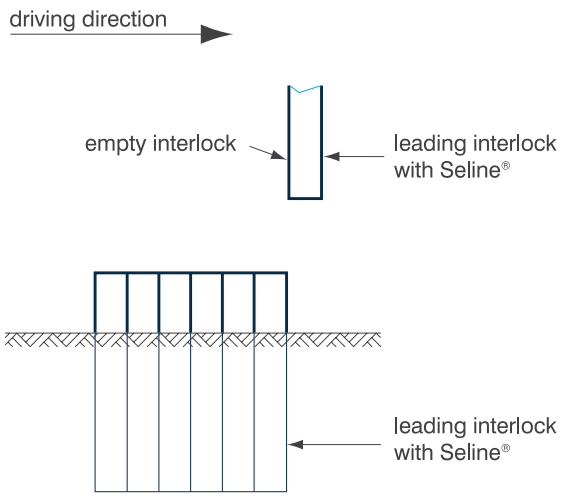
Seline® is a natural product and does not contain any substances that have to be listed in accordance with Regulation (EC) No. 1907/2006 (REACH).

Like all ArcelorMittal sealing systems/materials, Seline® has also been tested by the Hygiene Institute of the Ruhr. The "Ecotoxicological Test" showed that Seline® has no relevant ecotoxicological impact potential on the soil and existing groundwater and that from a water hygiene point of view there would be no negative impact on the living environment due to soluble ingredients. Consequently, the HY Institute came to the conclusion that the use can be assessed as ecotoxilogically harmless.

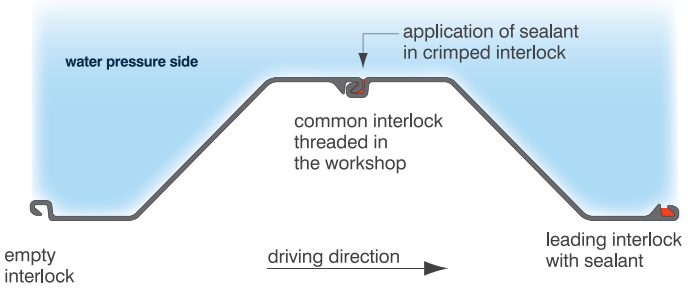
SELINE® | INSTALLATION RECOMMENDATION

The filling of the interlocks with Seline® in the factory takes place under consideration of the following aspects:

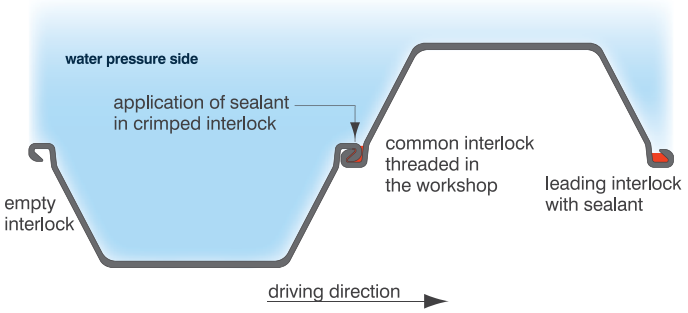
Interlocks must be clean and dry; the sheet piles must be laid out in a perfectly horizontal position. To prevent the hot product from flowing out, the interlock ends must be sealed with putty.



Detail of application in Z-piles



Detail of application in U-piles



SELINE® | SEALING PERFORMANCE

Seline® is heated to processing temperature; stirring ensures the homogeneity of the material; Seline® is then poured into the interlocks using a suitable pouring device.

The driving direction and the position in relation to the water pressure must be observed: The filled interlock must be installed on the side of the water.

If the piles are supplied as single piles, one free interlock per pile is filled. For double piles the crimped middle interlock and one free interlock are filled.

Seline® is suitable for all sheet pile driving methods (impact, vibration and pressing). The outside temperature should not be below 0°C.

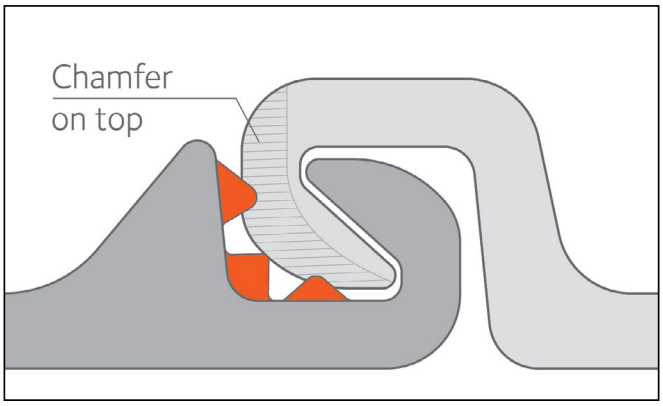
Interlock filling with a suitable can

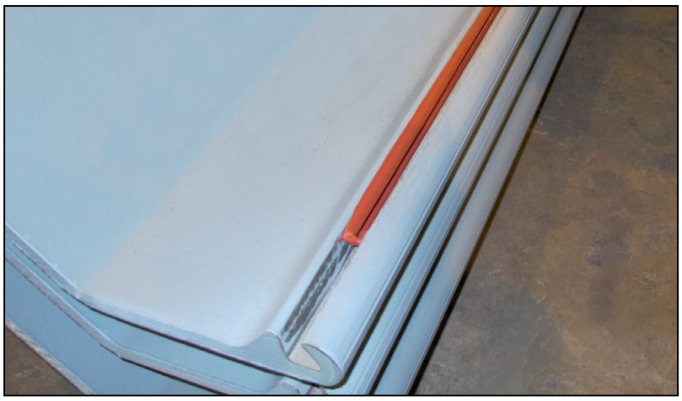
AKILA® SEALING SYSTEM

PRODUCT PROPERTIES

AKILA® is a well-proven environmentally friendly high performance sealing system for ArcelorMittal sheet piles. The system is based on three compression "lips" - consisting of a product called MSP-1 - mechanically extruded into the free interlocks of single or double piles. In the case of double piles, the intermediary (paired) interlock is sealed with a second product MSP-2.

MSP-1 and MSP-2 both belong to the family of silane modified polymers (also called MS-Polymers), and are single component elastic sealants with a density of 1.41 g/cm^3 and 1.48 g/cm^3, respectively. They are UV-stable and have an excellent adhesion to primerless steel. Both products are resistant to humidity, weathering and temperatures between -40°C and+90°C (even up to 120°C for short periods). They have an elongation at break of at least 380%, a Shore A hardness after complete polymerization of 58 for MSP-1 and 44 (after 14 days) for MSP-2, and are durable in contact with freshwater, seawater, as well as various hydrocarbons, bases and acids (depending on concentration, a complete list is available upon request).





AKILA system: MSP-1 product extruded into the interlock

WATERTIGHTNESS PERFORMANCE

A series of in situ tests were carried out in stiff clays near Mittersheim (FR) and in soft sandy soil near Zeebrugge (BE), in order to determine the inverse joint resistance factor or value ρ_m.

Single sheet piles and crimped double sheet piles fitted out with the AKILA® system were driven into the ground using an impact hammer as well as a vibratory hammer. After installation, watertightness was tested at water pressures of 2 and 3 bar, according to a procedure developed by Deltares and ArcelorMittal. The average inverse joint resistance values p_m were determined according to EN 12063.

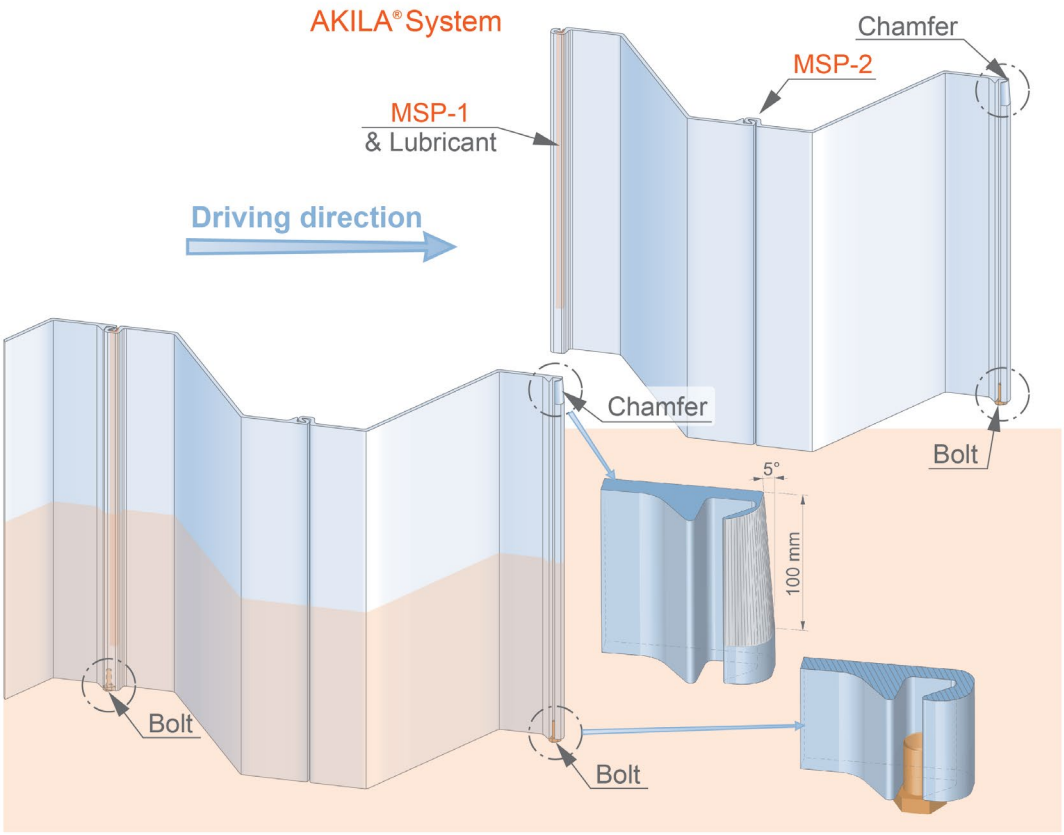
Testing and results were witnessed and certified by an independent third party (Germanischer Lloyd). The results for single and double piles are listed below.

	p_m (m/s) for water pressure of	
	2 bar	3 bar
Single Piles (MSP-1)	$4.9 \cdot 10^{-11}$	$8.6 \cdot 10^{-11}$
Single Piles (MSP-2)	$3.3 \cdot 10^{-11}$	$4.7 \cdot 10^{-11}$

ENVIRONMENTAL CERTIFICATION

MS-Polymers are considered environmentally friendly as they are solvent free and - unlike polyurethanes - do not contain isocyanates.

AKILA® is certified by the "Hygiene-Institut des Ruhrgebiets" as suitable for use in contact with groundwater.



Installation recommendations (driving direction, chamfer, etc.)

DRIVING RECOMMENDATIONS

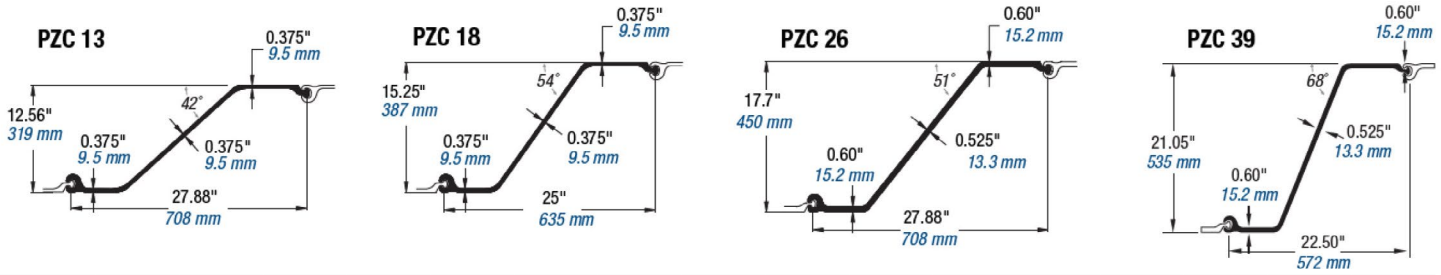
The above mentioned inverse joint resistance ρ_m values for the AKILA® system were determined through driving tests using the impact hammer and vibratory hammer. In the latter case, the driving speed must be faster than 3 m per minute. We recommend prior consultation of ArcelorMittal's technical department in case the press-in method is used.

An environmentally friendly lubricant must be applied to the sealant in the interlocks prior to driving.

During driving, the "empty" interlock must be the leading interlock (see sketch). The leading interlocks are chamfered on the top, and the filling of the free interlock with soil during driving can be prevented by fixing a bolt to the bottom of the interlock (or similar solution). Ambient temperature during installation must be above 0°C.

PZC HOT ROLLED SHEET PILE SERIES

MADE IN USA



	Minimum Grade 60 Standard				Per Single Section							Per Unit of Wall				
	Nominal Width	Wall Depth (Height)	Web Thick-ness	Flange Thick-ness	Cross Sectional Area	Weight	Moment of Inertia	Elastic Section Modulus	Plastic Section Modulus	Total Surface Area	Nominal Coating Area*	Cross Sectional Area	Weight	Moment of Inertia	Elastic Section Modulus	Plastic Section Modulus
Section	in (mm)	in (mm)	in (mm)	in (mm)	in^2 (cm^2)	lbs/ft (kg/m)	in^4 (cm^4)	in^3 (cm^3)	in^3 (cm^3)	ft^2/ft (m^2/m)	ft^2/ft (m^2/m)	in^2/ft (cm^2/m)	lbs/ft^2 (kg/m^2)	in^4/ft (cm^4/m)	in^3/ft (cm^3/m)	in^3/ft (cm^3/m)
PZC 12	**27.88**	**12.52**	**0.335**	**0.335**	**13.64**	**46.4**	**324.5**	**51.8**	**61.51**	**6.1**	**5.6**	**5.87**	**20.0**	**139.7**	**22.3**	**26.47**
	708	318	8.5	8.5	88.0	69.1	13,510	850	1,008	1.86	1.71	124.3	97.6	19,080	1,200	1,423
PZC 13	**27.88**	**12.56**	**0.375**	**0.375**	**14.82**	**50.4**	**353.0**	**56.2**	**66.93**	**6.1**	**5.6**	**6.38**	**21.7**	**152.0**	**24.2**	**28.81**
	708	319	9.5	9.5	95.6	75.1	14,690	920	1,097	1.86	1.71	135.1	106.0	20,760	1,300	1,549
PZC 14	**27.88**	**12.60**	**0.420**	**0.420**	**16.15**	**55.0**	**381.6**	**60.5**	**72.61**	**6.1**	**5.6**	**6.95**	**23.7**	**164.3**	**26.0**	**31.25**
	708	320	10.7	10.7	104.2	81.8	15,890	**991**	1,190	1.86	1.71	147.2	115.5	22,440	1,400	1,680
PZC 17	**25.00**	**15.21**	**0.335**	**0.335**	**13.64**	**46.4**	**491.8**	**64.6**	**76.04**	**6.1**	**5.6**	**6.55**	**22.3**	**236.1**	**31.0**	**36.5**
	635	386	8.5	8.5	88.0	69.1	20,470	1,060	1,246	1.86	1.71	138.6	108.8	32,235	1,670	1,962
PZC 18	**25.00**	**15.25**	**0.375**	**0.375**	**14.82**	**50.4**	**532.2**	**69.8**	**82.2**	**6.1**	**5.6**	**7.12**	**24.2**	**255.5**	**33.5**	**39.46**
	635	387	9.5	9.5	95.6	75.1	22,150	1,145	1,347	1.86	1.71	150.6	118.2	34,890	1,800	2,121
PZC 19	**25.00**	**15.30**	**0.420**	**0.420**	**16.16**	**55.0**	**576.3**	**75.3**	**89.14**	**6.1**	**5.6**	**7.75**	**26.4**	**276.6**	**36.1**	**42.79**
	635	388	10.7	10.7	104.2	81.8	23,990	1,235	1,461	1.86	1.71	164.1	128.8	37,780	1,945	2,301
PZC 25	**27.88**	**17.66**	**0.485**	**0.560**	**20.40**	**69.4**	**938.7**	**106.3**	**126.77**	**6.65**	**6.15**	**8.78**	**29.9**	**404.1**	**45.7**	**54.56**
	708	449	12.3	14.2	131.6	103.3	39,070	1,740	2,077	2.03	1.87	185.9	145.9	55,190	2,455	2,933
PZC 26	**27.88**	**17.70**	**0.525**	**0.600**	**21.72**	**73.9**	**994.3**	**112.4**	**134.46**	**6.65**	**6.15**	**9.35**	**31.8**	**428.1**	**48.4**	**57.89**
	708	450	13.3	15.2	140.1	110.0	41,390	1,840	2,203	2.03	1.87	197.9	155.4	58,460	2,600	3,112
PZC 28	**27.88**	**17.75**	**0.570**	**0.645**	**23.22**	**79.0**	**1,057**	**119.1**	**143.07**	**6.65**	**6.15**	**10.00**	**34.0**	**455.1**	**51.3**	**61.58**
	708	451	14.5	16.4	149.8	117.6	44,000	1,950	2,344	2.03	1.87	211.6	166.1	62,150	2,755	3,311
PZC 37	**22.50**	**21.01**	**0.485**	**0.560**	**20.44**	**69.6**	**1,352**	**128.7**	**152.3**	**6.75**	**6.3**	**10.90**	**37.1**	**721.1**	**68.6**	**81.20**
	572	534	12.3	14.2	131.9	103.6	56,270	2,109	2,496	2.06	1.92	230.7	181.2	98,470	3,688	4,366
PZC 39	**22.50**	**21.05**	**0.525**	**0.600**	**21.83**	**74.3**	**1,436**	**136.4**	**162.0**	**6.76**	**6.3**	**11.64**	**39.6**	**765.9**	**72.7**	**86.40**
	572	535	13.3	15.2	140.8	110.6	59,770	2,235	2,655	2.06	1.92	246.4	193.5	104,590	3,909	4,645
PZC 41	**22.50**	**21.09**	**0.562**	**0.637**	**23.10**	**78.6**	**1,512**	**143.4**	**170.8**	**6.76**	**6.3**	**12.32**	**41.9**	**806.4**	**76.5**	**91.10**
	572	536	14.3	16.2	149.0	117.0	62,930	2,350	2,799	2.06	1.92	260.8	204.7	110,120	4,113	4,898

All dimensions given are nominal. Actual flange and web thicknesses vary due to mill rolling practices; however, permitted variations for such dimensions are not addressed.

*Both sides of sheet; excludes interior of interlock.

Manufactured to ASTM A6 specifications.

ASTM DESIGNATION**	YIELD STRENGTH ksi	YIELD STRENGTH MPa	APPLICATION
A572	**60**	**415**	**Mill Standard Produced**
A588	50	345	Atmospheric Corrosion
A690	50	345	Marine Environment

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PZC HOT ROLLED SHEET PILE SERIES

MADE IN USA

SPECIFICATIONS

Gerdau Steel Grades for PZC and PS Profiles

North American Grades		
ASTM	Yield Strength	
	(ksi)	(MPa)
A 328	39	270
A 572 Grade 50	50	345
A 572 Grade 60	60	415
A 572 Grade 65	65	450
A 690*	50	345

European Grades		
EN 10248	Yield Strength	
	(ksi)	(MPa)
S 240 GP	35	240
S 270 GP	39	270
S 355 GP	51	355
S 430 GP	62	430
S 450 GP	65	450

* A690 contains specified levels of Ni, Cu, and P at higher levels than the other listed grades on the table.

A572 Grade 60 and S 355 GP are the most economical and readily available grades. Please inquire for minimum order requirements for other grades.

	ASTM A328	ASTM A572-50	ASTM A572-60	ASTM A572-65	ASTM A690
C %	**	0.23 max	0.26 max	0.23 max	0.22 max
Mn %	**	1.35 maxA	1.35 maxA	1.65 maxB	0.60 - 0.90C
P %	0.035 max	0.04 max	0.04 max	0.04 max	0.08 - 0.15
S %	0.04 max	0.05 max	0.05 max	0.05 max	0.04 max
Si %	**	0.40 max	0.40 max	0.40 max	0.40 max
Cu %	**	**	**	**	0.50 min
Ni %	**	**	**	**	0.40 - 0.75
Cr %	**	**	**	**	**
Mo %	**	**	**	**	**
Sn %	**	**	**	**	**
V %	**	0.010 -0.15*	0.010 -0.15*	0.010 -0.15*	**
Cb / Nb %	**	0.005 - 0.05*	0.005 - 0.05*	0.005 - 0.05*	**
Yield ksi [MPa]	39 min [270]	50 min [345]	60 min [415]	65 min [450]	50 min [345]
Tensile ksi [MPa]	65 min [450]	65 min [450]	75 min [520]	80 min [550]	70 min [485]
Elong %	17 @ 8 in.	18 @ 8 in.	16 @ 8 in.	15 @ 8 in.	18 @ 8 in.

*would contain singly or in combination, dependent on production type (1, 2 or 3)
**= not specified (Where **is shown for copper a minimum of 0.20 may be specified).
(A) For each reduction of 0.01% below C maximum, an increase of 0.06% Mn above specified maximum is permitted, up to a maximum of 1.50%.
(B) For material with thickness of 1/2" (13mm) or less, Mn maximum of 1.35% would apply when C is greater than 0.21%.
(C) For each reduction of 0.01% below C maximum, an increase of 0.06% Mn above specified maximum is permitted, up to a maximum of 1.10%.

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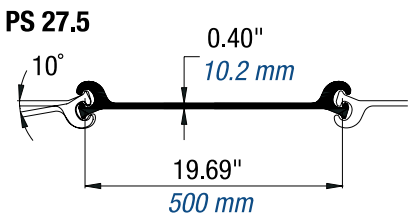
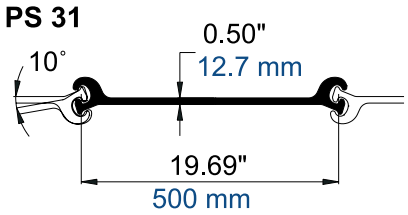
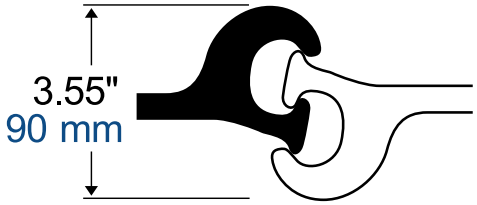
PS (FLAT SHEET) PILING PROPERTIES





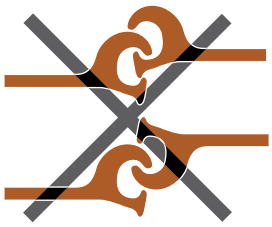


Minimum Grade 60 Standard					Per Single Section						Per Unit of Wall			
JD FIELDS & COMPANY, INC.	Nominal Width	Depth (Height)	Wall Depth (Height)	Web Thickness	Area	Weight	Moment of Inertia	Section Modulus	Total Surface Area	Nominal Coating Area*	Area	Weight	Moment of Inertia	Section Modulus
Section	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in.² (cm²)	lbs/ft (kg/m)	in.⁴ (cm⁴)	in.³ (cm³)	ft²/ft (m²/m)	ft²/ft (m²/m)	in.²/ft (cm²/m)	lbs/ft² (kg/m²)	in.⁴/ft (cm⁴/m)	in.³/ft (cm³/m)
PS 27.5	**19.69**	**2.83**	**3.55**	**0.40**	**13.26**	**45.1**	**5.0**	**3.2**	**4.50**	**3.64**	**8.08**	**27.5**	**3.0**	**1.9**
	500	72	90	10.2	85.5	67.1	207	52	1.37	1.11	171.0	134.2	414	103
PS 31	**19.69**	**2.83**	**3.55**	**0.50**	**14.96**	**50.9**	**5.0**	**3.2**	**4.50**	**3.64**	**9.11**	**31.0**	**3.0**	**1.9**
	500	72	90	12.7	96.5	75.7	207	52	1.37	1.11	192.9	151.4	414	103

*Both sides of sheet; excludes interior of interlock.

All listed dimensions are nominal. Due to rolling practices, variations in web thickness is common. Permitted variations for such dimensions are not addressed.


Proper Interlock


Improper Interlock

Grade	Minimum Interlock Strength(1)	Minimum Swing(2)
A328	16 kips/in. (2,800 kN/m)	10 degrees
A572-50	20 kips/in. (3,500 kN/m)	10 degrees
A572-60	24 kips/in. (4,200 kN/m)	10 degrees

Higher interlock strengths are available; obtainable swing may be reduced in interlock strengths above 24 kips/in (4,200 kN/m).

(1) These minimum ultimate interlock strengths assume proper interlocking of sheets. To verify the strength of PS Sheet Piling, consider both yielding of the web and failure of the interlock.

(2) Swing reduces 1.5 degrees for each 10 feet (3 meters) in length over 70 feet (21 meters).

As a general rule, Gerdau advises against interlocking PS sections with other producers' section(s).

Gerdau PS 27.5 and PS 31 can be interlocked together. PS and Z-Piling sections should not be interlocked together.

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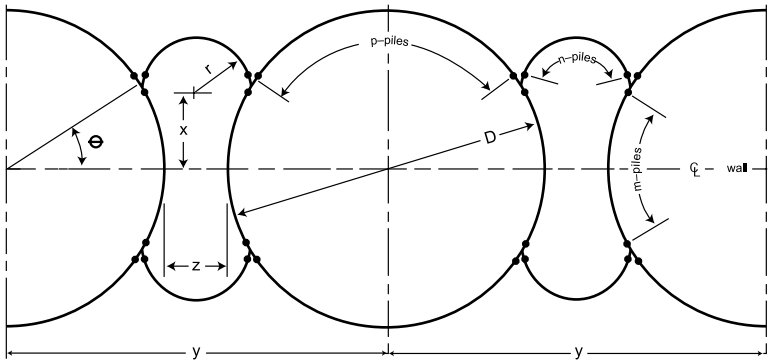
PS FLAT SHEET PILING 30° EXTRUDED WYE LAYOUT



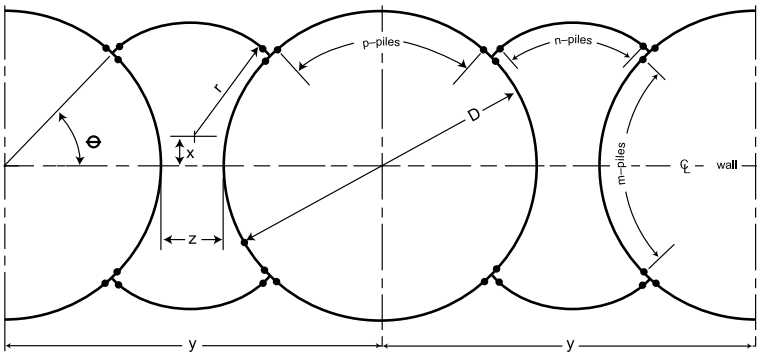
⊖ is measured to the center of the 30° connection

							Number of Piles			Area			
Number of Piles in Cell†	D ft (m)	z ft (m)	y ft (m)	r ft (m)	X ft (m)	⊖ deg	m	n	p	Within Circle sg ft (sw m)	Between Circles sg ft (sg m)	Average Width ft (m)	Layout Number (see Website)
78	**39.07**	**12.88**	**51.96**	**9.1**	**9.88**	**31.8**	**13**	**17**	**24**	**1199**	**549**	**33.6**	**2**
	11.91	3.93	15.84	2.77	3.01					111.4	51.0	10.2	
84	**42.21**	**12.47**	**54.61**	**9.1**	**10.66**	**31.6**	**14**	**17**	**26**	**1399**	**566**	**35.9**	**1**
	12.87	3.80	16.65	2.77	3.25					130.0	52.6	10.9	
90	**45.34**	**14.14**	**59.48**	**10.15**	**11.45**	**31.5**	**15**	**19**	**30**	**1615**	**692**	**38.8**	**2**
	13.82	4.31	18.13	3.09	3.49					150.0	64.3	11.8	
96	**48.48**	**13.72**	**62.19**	**10.15**	**12.23**	**31.4**	**16**	**19**	**30**	**1846**	**711**	**41.1**	**1**
	14.78	4.18	18.96	3.09	3.73					171.5	66.1	12.5	
102	**51.61**	**15.39**	**67**	**3.41**	**13.01**	**30.2**	**17**	**21**	**32**	**2092**	**853**	**44**	**2**
	15.73	4.69	20.42	0	3.97					194.4	79.2	13.4	
108	**54.74**	**14.97**	**69.71**	**11.2**	**13.8**	**31.3**	**18**	**21**	**34**	**2354**	**873**	**46.3**	**1**
	16.68	4.56	21.25	3.41	4.21					218.7	81.1	14.1	
114	**57.88**	**16.64**	**74.51**	**12.24**	**14.58**	**31.2**	**19**	**23**	**36**	**2631**	**1029**	**49.1**	**2**
	17.64	5.07	22.71	3.73	4.44					244.4	95.6	15.0	
120	**61.01**	**16.22**	**77.23**	**12.24**	**15.36**	**31.1**	**20**	**23**	**38**	**2923**	**1051**	**51.5**	**1**
	18.60	4.94	23.54	3.73	4.68					271.6	97.6	15.7	
126	**64.14**	**17.89**	**82.03**	**13.28**	**16.15**	**31.1**	**21**	**25**	**40**	**3232**	**1222**	**54.3**	**2**
	19.55	5.45	25.00	4.05	4.92					300.3	113.5	16.6	
132	**67.28**	**19.56**	**86.83**	**14.33**	**16.93**	**31**	**22**	**27**	**42**	**3555**	**1406**	**57.1**	**1**
	20.51	5.96	26.47	4.37	5.16					330.3	130.6	17.4	
138	**70.41**	**19.14**	**89.55**	**14.33**	**17.71**	**31**	**23**	**27**	**44**	**3894**	**1432**	**59.5**	**2**
	21.46	5.83	27.29	4.37	5.40					361.8	133.0	18.1	
144	**73.55**	**20.81**	**94.35**	**15.37**	**18.5**	**31**	**24**	**29**	**46**	**4248**	**1631**	**62.3**	**1**
	22.42	6.34	28.76	4.68	5.64					394.7	151.5	19.0	
150	**76.68**	**20.39**	**97.07**	**15.37**	**19.28**	**30.9**	**25**	**29**	**48**	**4618**	**1657**	**64.6**	**2**
	23.37	6.21	29.59	4.68	5.88					429.0	153.9	19.7	
156	**79.81**	**22.06**	**101.87**	**16.42**	**20.06**	**30.9**	**26**	**31**	**50**	**5003**	**1871**	**67.5**	**1**
	24.33	6.72	31.05	5.00	6.11					464.8	173.8	20.6	

†Includes 4 extruded 30˚ Wye connectors

All dimensions given are nominal.

PS FLAT SHEET PILING 90° EXTRUDED TEE LAYOUT



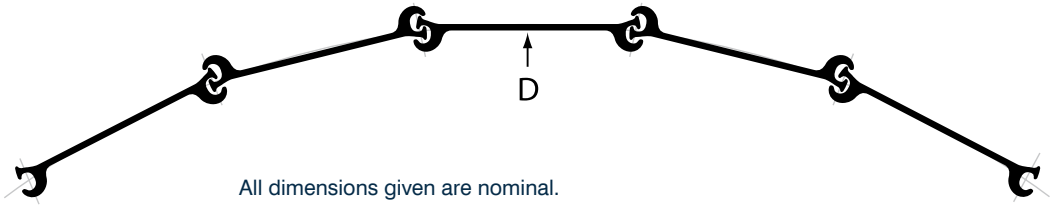
θ *is measured to the center of the 90˚ connection*

Number of Piles in Cell†	D ft (m)	z ft (m)	y ft (m)	r ft (m)	X ft (m)	θ deg	Number of Piles m	Number of Piles n	Number of Piles p	Area Within Circle sq ft (sw m)	Area Between Circles sq ft (sq m)	Average Width ft (m)	Layout Number (see Website)
44	21.20 6.46	7.53 2.30	28.73 8.76	9.72 2.96	0.68 0.21	45.3	10	9	10	353 32.8	197 18.3	19.2 5.9	4
48	23.29 7.10	6.84 2.08	30.13 9.18	9.67 2.95	1.45 0.44	45.2	11	9	11	426 39.6	203 18.9	20.9 6.4	6
52	25.38 7.74	6.31 1.92	31.69 9.66	9.73 2.97	2.15 0.66	45.2	12	9	12	506 47.0	210 19.5	22.6 6.9	4
56	27.47 8.37	5.62 1.71	33.09 10.09	9.68 2.95	2.92 0.89	45.2	13	9	13	593 55.1	213 19.8	24.3 7.4	6
60	29.56 9.01	5.09 1.55	34.64 10.56	9.73 2.97	3.62 1.10	45.2	14	9	14	686 63.7	218 20.3	26.1 8.0	4
64	31.65 9.65	5.95 1.81	37.60 11.46	10.76 3.28	3.58 1.09	45	15	10	15	787 73.1	264 24.5	27.9 8.5	3
68	33.73 10.28	5.42 1.65	9.15 11.93	10.82 3.30	4.28 1.30	45	16	10	16	894 83.1	269 25.0	29.7 9.1	5
72	35.82 10.92	4.73 1.44	40.55 12.36	10.76 3.28	5.05 1.54	45.2	17	10	17	1008 93.6	269 25.0	31.5 9.6	3
76	37.91 11.55	5.59 1.70	43.51 13.26	11.83 3.61	5.09 1.55	45.1	18	11	18	1129 104.9	324 30.1	33.4 10.2	4
80	40.00 12.19	4.91 1.50	44.91 13.69	11.77 3.59	5.87 1.79	45.1	19	11	19	1257 116.8	323 30.0	35.2 10.7	6
84	42.09 12.83	5.92 1.80	8.02 14.64	12.91 3.93	5.76 1.76	45	20	12	20	1391 129.2	386 35.9	37.0 11.3	5
88	44.18 13.47	5.24 1.60	49.42 15.06	12.85 3.92	6.53 1.99	45	21	12	21	1533 142.4	384 35.7	38.8 11.8	3
92	46.27 14.10	6.10 1.86	49.42 15.06	13.92 4.24	6.57 2.00	45.1	22	13	22	1681 156.2	450 41.8	40.7 12.4	4
96	48.36 14.74	5.42 1.65	3.77 16.39	13.86 4.22	7.34 2.24	45.1	23	13	23	1837 170.7	448 41.6	42.5 13.0	6
100	50.45 15.38	4.88 1.49	55.33 16.86	13.92 4.24	8.04 2.45	45.1	24	13	24	1999 185.7	451 41.9	44.3 13.5	4
104	52.54 16.01	5.74 1.75	58.28 17.76	14.94 4.55	8.01 2.44	45	25	14	25	2168 201.4	445 41.3	46.1 14.1	3
108	54.63 16.65	6.61 2.01	61.24 18.67	16.01 4.88	8.05 2.45	45.1	26	15	26	2344 217.8	596 55.4	48.0 14.6	4
112	56.72 17.29	5.92 1.80	62.64 19.09	15.95 4.86	8.82 2.69	45.1	27	15	27	2526 234.7	592 55.0	49.8 15.2	6
116	58.80 17.92	5.39 1.64	64.19 19.57	15.95 4.86	9.52 2.90	45.1	28	15	28	2716 252.3	595 55.3	51.6 15.7	4
120	60.89 18.56	6.25 1.91	67.14 20.46	17.03 5.19	9.49 2.89	45	29	16	29	2912 270.5	674 62.6	53.4 16.3	3
124	62.98 19.20	5.71 1.74	68.7 20.94	17.08 5.21	10.19 3.11	45	30	16	30	3116 289.5	677 62.9	55.2 16.8	5
128	65.07 19.83	5.03 1.53	70.1 21.37	17.03 5.19	10.96 3.34	45	31	16	31	3326 309.0	670 62.2	57.0 17.4	3

†Includes 4 extruded 90˚ Tee connectors

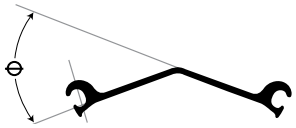
All dimensions given are nominal.

DIAMETERS AND AREAS OF CIRCULAR CELLS USING PS 27.5 AND PS 31



All dimensions given are nominal.

Number of Pieces	PS 27.5 & PS 31 D ft	PS 27.5 & PS 31 Area ft^2	Requires Swing degrees	Theoretical Bend degrees ⊖	Suggested Bend degrees ⊖
12	21.20	7.53	28.73	9.72	0.68
14	7.31	42	25.7	15.7	25.0
16	8.36	55	22.5	12.5	20.0
18	9.40	69	20.0	10.0	15.0
20	10.45	86	18.0	8.0	15.0
22	11.49	104	16.4	6.4	15.0
24	12.53	123	15.0	5.0	10.0
26	13.58	145	13.8	3.6	10.0
28	14.62	168	12.9	2.9	10.0
30	15.67	193	12.0	2.0	10.0
32	16.71	219	11.3	1.3	10.0
34	17.76	248	10.6	0.6	10.0
36	18.80	278	10.0		
38	19.85	309	9.5		
40	20.89	343	9.0		
42	21.94	378	8.6		
44	22.98	415	8.2		
46	24.03	453	7.8		
48	25.07	494	7.5		
50	26.11	536	7.2		
52	27.16	579	6.9		
54	28.20	625	6.7		
56	29.25	672	6.4		
58	30.29	721	6.2		
60	31.34	771	6.0		
62	32.38	824	5.8		
64	33.43	878	5.6		
66	34.47	933	5.5		
68	35.52	999	5.3		
70	36.56	1050	5.1		
72	37.61	1111	5.0		
74	38.65	1173	4.9		
76	39.69	1238	4.7		
78	40.74	1304	4.6		
80	41.78	1371	4.5		
82	42.38	1441	4.4		
84	43.87	1512	4.3		
86	44.92	1585	4.2		
88	45.96	1659	4.1		
90	47.01	1736	4.0		
92	48.05	1813	3.9		
94	49.10	1893	3.8		
96	50.14	1975	3.8		
98	51.18	2057	3.7		
100	52.23	2143	3.6		



Small cells constructed with bent web piles must have half of the piles bent with the fingers inside and half with the fingers outside.

PS 27.5 and PS 31 when properly swing up to 10 degrees (in either direction) for lengths up to 70 feet (21 meters). The ability to obtain a full 10 degrees swing decreases with length because of the difficulty in handling the longer pieces. For lengths over 70 feet (21 meters), it is necessary to anticipate a reduction in obtainable swing of 1.5 degrees for each 10 feet (3 meters) increase in length.

SETTING AND DRIVING TIPS FOR PS FLAT SHEETS:

Although setting and driving techniques vary with the individual contractor and site conditions, several basic principles can generally be applied. It should be realized that the lack of good setting and driving practice can result in job delays and an unsatisfactory structure. The following suggestions are offered to help avoid problems at the site:

Handling of PS sections: These sections have very little modulus (beam strength) and are, therefore, very susceptible to handling damage. It is important that great care be taken when transporting or lifting these sections. When sheets exceed 70 feet (21 meters) in length, they should be lifted at two or more points.

Have an adequate steel template: Longer sheeting lengths will require a two or three tier template with tiers spaced 15 feet (4.5 meters) or more apart. For example, a contractor should consider at least a two-tier template when installing 70 foot (21 meters) or longer sheets as this will facilitate setting and driving and result in a superior product. As with Z-Piling, it is important that each sheet be plumbed and secured when set.

The diameter of the template is predicated on the contractor's experience and method of setting circular cells. It is important that the template diameter be less than the theoretical inside clear cell diameter to easily close the cell. Wood blocking may be utilized to adjust the template to ensure the proper setting width. Upon filling, the finished cell will expand to meet or exceed published values. When a cell with long lengths is being constructed, it may be advisable to stiffen the starter sheet by reinforcing it full length with a structural shape.

Site conditions such as swift water or hard driving may require more sheets to be reinforced.

Splicing: When it is necessary to splice PS sections, the splice point on adjacent sheets should be staggered by several feet.

Mark the driving template for each pile or pair of piles: This allows for wall adjustments to be made during the setting phase, ensuring that the sheets are located properly for cell closure.

Ensure that the sheets are properly interlocked when set: Improper interlocks become the "weak links" and result in job delays and/or failures. A closed cell must have an even number of sections (including connectors) to avoid an improper interlock. Set all sheets in the cell before driving any of the sheets, other than nominal pinning of the starter sheet(s).

"Shake out" several sheets at any closure point: Following good practice as noted above should ideally result in the last sheet sliding smoothly down into the remaining gap. Although the first sheet is set plumb and the next to last sheet is plumb, the chances that the remaining gap is uniform (19.69 inches or 500 mm) the full length is improbable. Picking up and dropping, or "shaking out," several sheets near the closure point until the sheets run smoothly will minimize the chance of driving sheets out of interlock.

Drive piles in pairs: Once sheet piles are threaded and set, it is more economical to drive two at a time. Some experts suggest that the energy needed to drive a pair may be only 50% more than that required to drive a single pile.

Drive piles in stages and work around the entire cell by alternating sheets (pairs): This allows the piles to be guided by those previously driven and lessens the chance of driving sheets out of interlock. The distance a pile, or pair of piles, should be driven at any one time will be governed by the driving conditions. In the first pass around the cell, every other pair is driven perhaps 4 feet (1.2 meters). In the second pass around the cell, the un-driven pairs are driven 8 feet (2.4 meters), 4 feet (1.2 meters) restrained by the adjacent pairs and then 4 feet (1.2 meters) into virgin soil. This procedure is continued until the cell is driven to design tip elevation. A good practice to keep the cell plumb is to reverse the direction of driving for each pass around the cell.

SHEET PILE DRIVE POINTS

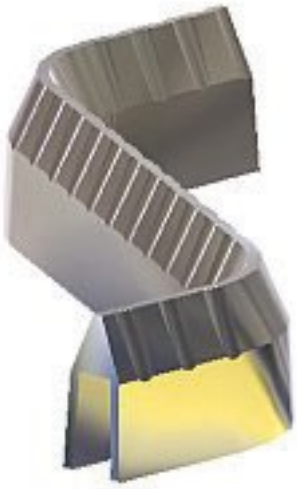
We make a “universal” tip to fit all piles, as well as a wide selection of tips made to fit each of the most popular sheet piles used.

WELD PROCEDURE

These points should be welded with a 5/16” fillet along the entire length of the top flange on both sides using 70xx series rod.

FEATURES

- Universal Straight Bar
- Other types can be made



Sheet pile shoes are only available for PZC 13 & 18. All other sizes require bar stock.

HANDLING HOLES

Handling holes are standard for all sheet pile sections and are located in the centerline of each section.

Y = 6” (152.4 mm)

Ø = 2.5” - 2.625” (63.5 mm - 66.7 mm)

Note: The Y location can be adjusted if needed upon request.