



**MEEVER INDIA**

## **ENGINEERED SOLUTIONS FOR SHORING, FOUNDATION AND MARINE CONSTRUCTION WORKS**

STEEL SHEET PILES • TUBULAR PILES •  
STEEL SECTIONS • COMBI WALLS •  
TIE RODS

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## INTRODUCTION

### Meever India

Meever India is subsidiaries of Meever&Meever head quartered in the Netherlands

Meever&Meever operates through global offices and stock locations as distributor of steel piling products and also providing engineering solutions and services for deep excavation, shoring structures (temporary & permanent) and marine quay walls.

Meever&Meever has been expanding throughout decades to extend the support with most experienced professionals and reliable steel producing partners which are globally recognized and approved .

Meever India work on a principle of satisfying the client's requirement both technically and commercially on project basis. Meever has no boundaries of supplying hot rolled / cold formed sheet piles and other structural components for projects and also advice their clients with options to fully tailored piling solutions.

This makes Meever to stand alone and independent beyond the client's expectation for extending the support at the hard phase of the project to its clients.

All our products are designed, produced and supplied as per international standards which are globally accepted.

Meever India is located in New Delhi, the Capital of India, and extents services towards Indian Sub-continent.

MATERIALS  
FOR SALE  
OR RENT!

## OUR GLOBAL OFFICES AND STOCK LOCATIONS

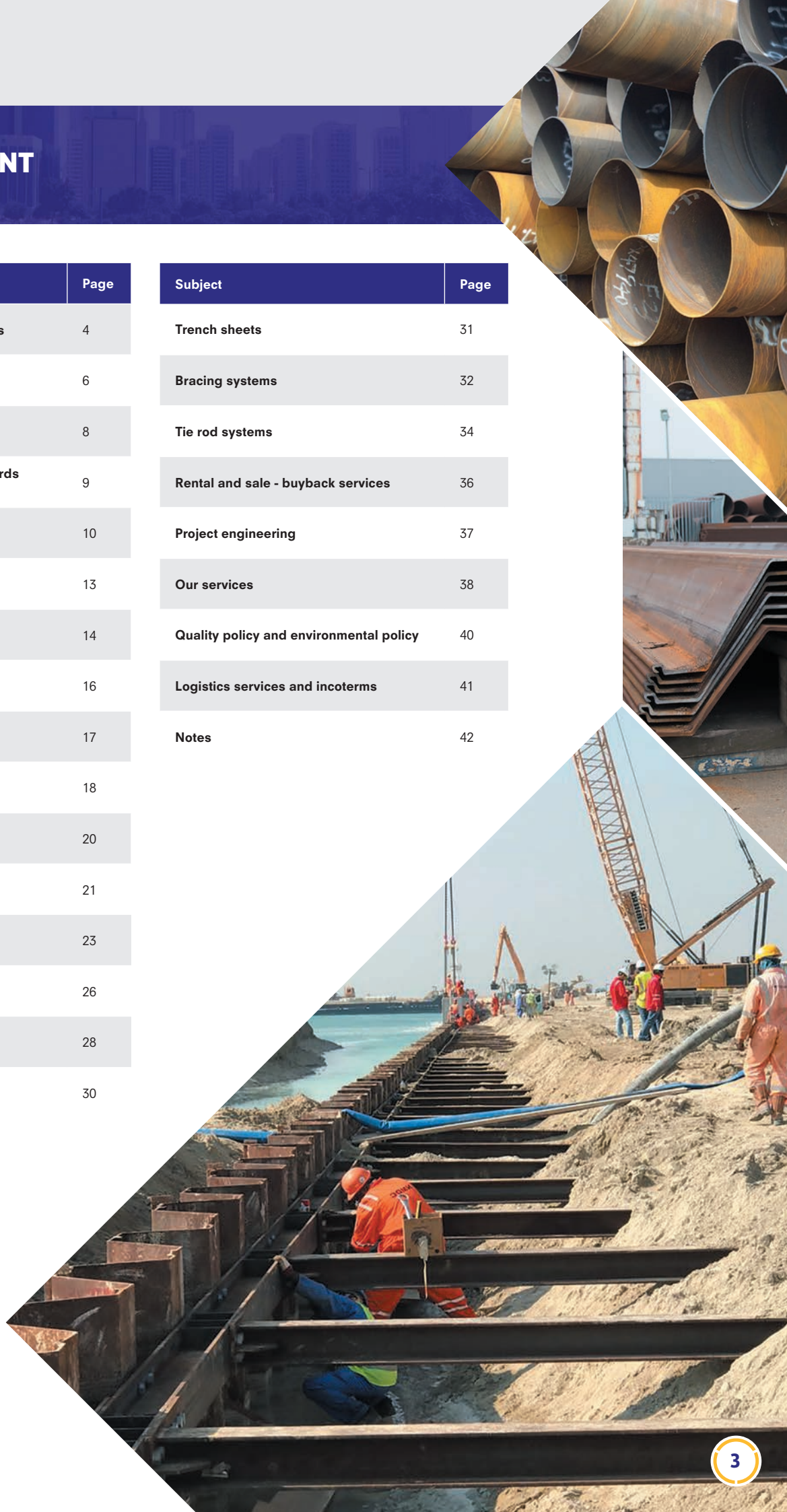




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## ESZ - HOT ROLLED Z TYPE SHEET PILES

Hot rolled sheet piles were originated in early 19th century and the development of interlocks started in later stages. The modern sheet piling industry is more than 100 years old, the most important changes in profile type and selection of products occurred since the early 1970's. Most common and known types of hot rolled sheet piles are of U and Z type, Meever is offering both from mills production and ready stock available.

Z shaped sheet piles are designed based on the concept of wave-shaped profile but with the added advantage that the interlocks are formed on the outer elements of the section. Z-shaped piles interlock on the wall extremities and provide a solid web connecting the two flanges.

As the interlocks are well out from the neutral axis of the wall which helps to deny the bending moment phenomenon or slippage when the piles undergo loading. Two-piece Z-shapes were introduced in the 1930's and became quite popular.

Steel grades accordance to EN 10248: S355GP, S390GP, S430GP and ASTM A572 / A572M – 15 Grade 50, 60 and 65.

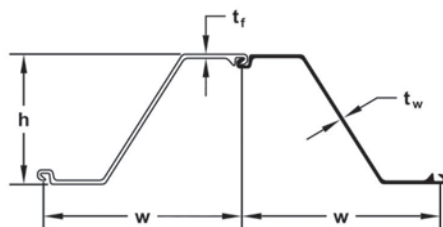
ESZ hot rolled Sheet Piles manufactured in accordance with the requirements of EN 10248 - Part 1 & 2 have the below engineering advantages.

- Larssen interlocks
- Improved water tightness
- Low water permeability.
- Excellent strength to weight ratio.
- Optimized section profile.
- Deep profile enables high inertia enabling reduction in deflections for serviceability.
- large width resulting in high installation performance.
- Easy drivability and great durability performance.
- Can be delivered in singles, pairs – crimped / welded / loose.
- Available in different steel grades.
- Lengths up to 31.00 meters.
- Lifting holes for easy handling.
- Containerized lengths for fast delivery





# ESZ - HOT ROLLED Z TYPE SHEET PILES



## ESZ series 630

Section	Single Pile						Per m of wall				
	Width (w) mm	Height (h) mm	Thickness (t <sub>f</sub> ) mm	Thickness (t <sub>w</sub> ) mm	Mass (G) kg/m	*Coating Area m <sup>2</sup> /m	Mass (G) kg/m <sup>2</sup>	Sectional Area (A) cm <sup>2</sup> /m	Moment of Inertia (I <sub>x</sub> ) cm <sup>4</sup> /m	Elastic Modulus (W <sub>x</sub> ) cm <sup>3</sup> /m	*Coating Area m <sup>2</sup> /m
ESZ 17 - 630	630	374	8.5	8.5	69.8	1.68	110.8	141.2	31,300	1,675	2.67
ESZ 18 - 630	630	375	9.5	9.5	76.0	1.68	120.7	153.7	33,860	1,805	2.67
ESZ 18 - 630 + 0.5	630	376	10.0	10.0	79.2	1.68	125.6	160	35,150	1,870	2.67
ESZ 19 - 630	630	376	10.5	10.5	82.2	1.68	130.5	166.3	36,410	1,935	2.67
ESZ 20 - 630	630	377	11.0	11.0	85.4	1.68	135.6	172.7	37,730	2,005	2.67

## ESZ series 700

Section	Single Pile						Per m of wall				
	Width (w) mm	Height (h) mm	Thickness (t <sub>f</sub> ) mm	Thickness (t <sub>w</sub> ) mm	Mass (G) kg/m	*Coating Area m <sup>2</sup> /m	Mass (G) kg/m <sup>2</sup>	Sectional Area (A) cm <sup>2</sup> /m	Moment of Inertia (I <sub>x</sub> ) cm <sup>4</sup> /m	Elastic Modulus (W <sub>x</sub> ) cm <sup>3</sup> /m	*Coating Area m <sup>2</sup> /m
ESZ 17 - 700	700	420	8.5	8.5	74.0	1.84	105.7	134.6	36,360	1,735	2.63
ESZ 18 - 700	700	420	9.0	9.0	77.4	1.84	110.6	140.9	37,890	1,805	2.63
ESZ 19 - 700	700	421	9.5	9.5	80.8	1.84	115.4	147.1	39,420	1,875	2.63
ESZ 19 - 700 10/10	700	421	10.0	10.0	84.2	1.84	120.3	153.3	40,940	1,945	2.63
ESZ 20 - 700	700	422	10.5	10.5	87.6	1.84	125.2	159.5	42,470	2,015	2.63
ESZ 24 - 700	700	459	12.0	9.0	89.5	1.93	127.9	162.9	55,870	2,435	2.76
ESZ 25 - 700	700	460	12.5	9.5	93.1	1.93	133	169.4	57,840	2,520	2.76
ESZ 26 - 700	700	460	13.0	10.0	96.7	1.93	138.1	176	59,810	2,600	2.76
ESZ 27 - 700	700	461	13.5	10.5	100.3	1.93	143.3	182.5	61,780	2,685	2.76
ESZ 28 - 700	700	461	14.0	11.0	103.9	1.93	148.4	189.1	63,750	2,765	2.76
ESZ 29 - 700	700	462	15.0	12.0	111.1	1.93	158.8	202.3	67,740	2,930	2.76
ESZ 36 - 700	700	509	14.0	11.5	116.2	2.11	166.1	211.5	91,130	3,580	3.02
ESZ 37 - 700	700	510	14.5	12.0	120.2	2.11	171.8	218.8	94,000	3,690	3.02
ESZ 38 - 700	700	510	15.0	12.5	124.2	2.11	177.4	226	96,860	3,800	3.02
ESZ 39 - 700	700	511	15.5	13.0	128.2	2.11	183.1	233.3	99,720	3,905	3.02
ESZ 40 - 700	700	511	16.0	13.5	132.2	2.11	188.8	240.5	102,590	4,015	3.02

\*Indicates coating area both sides of pile, excluding inside of interlocks.



## HOT ROLLED SHEET PILES U TYPE (ASIAN ORIGIN)

The origin of hot rolled U shaped sheet pile is more than 100 years, this form of sheet piles is still utilized all over the world as the most popular steel sheet pile section till date. Segments with indented profiles (troughs) interlock to form a wall with alternating indents and outdents. The troughs increase resistance to bending.

U type profiles with interlock at both sides to form the continuous walls, which has center lines in the middle of the double U section wall. The common interlock may be crimped or welded to prevent inter-pile movement, creating an asymmetric section which may exhibit a reduced bending strength due to oblique (biaxial) bending. The Eurocode 3: part 5 takes this into account and applies a reduction factor on bending strength.

U type sheet piling was the tradition, especially in Middle East and Asian sub-continent and is frequently used for temporary works.

U type Hot rolled Sheet Piles manufactured in accordance with the requirements of EN 10248 - Part 1 & 2 have the below engineering advantages.

- Combination of great wave depth and high flange thickness leading to excellent statical properties.
- Symmetrical form of single elements resulting in great aptitude for re-use.
- Possibility of assembling and fixing piles into pairs at the mill providing better installation quality and performance.
- Suitability for almost all soil types.
- The option of extracting and reusing the sections.
- Easy and compatible with other hot rolled.

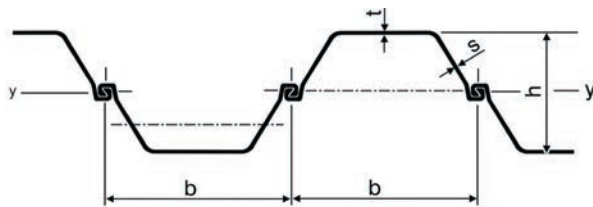
### **Available steel grades for U type sheet piles:**

SY295, Q345B, S275GP, S355GP and S390GP.





# HOT ROLLED SHEET PILES U TYPE (ASIAN ORIGIN)



## SPU

Size (width x height)	Width (w) kg/m	Height (h) mm	Thickness (t) mm	Thickness (s) mm	Plastic section modulus (cm <sup>3</sup> /m)	Weight kg/m	Inertia moment I <sub>x</sub> (cm <sup>4</sup> )	Elastic Section modulus (cm <sup>3</sup> /m)
SPU601	600	309	7.5	6.5	858	46.7	11496	742
SPU602	600	309	8.2	8.0	990	54.3	13075	845
SPU603	600	309	9.7	8.4	1308	64.8	18251	1180
SPU604	600	380	10.5	9.0	1822	74.1	30726	1620
SPU605	600	410	12.8	9.0	2256	82.4	41127	2006
SPU606A	600	420	14.0	9.0	2476	86.2	46217	2200
SPU18-1	600	430	10.2	8.4	1988	72.6	35950	1670
SPU22-1	600	450	11.1	9.0	2422	81.9	46380	2060
SPU28	600	454	15.2	10.1	3269	101.8	64460	2840
SPU32	600	452	19.5	11.0	3687	114.1	72320	3200
SPU16	750	411	11.5	9.3	1891	86.3	32850	1600
SPU20	750	444	12.0	10.0	2339	96.9	44440	2000
SPU25	750	450	14.5	10.2	2866	110.4	56240	2500

## JIS

Section	Width (b)	Height (h)	Thickness		Cross Sectional Area (A)	Unit Weight		Elastic Section Modulus (W <sub>x</sub> )	Moment of Inertia (I <sub>xx</sub> )	*Coating Area (both sides per pile)
	mm	mm	Flange (t) mm	Web (s) mm	cm <sup>2</sup> /m	Per Pile (G <sub>p</sub> ) kg/m	per m of wall (G <sub>w</sub> ) kg/m <sup>2</sup>	cm <sup>3</sup> /m	cm <sup>4</sup> /m	m <sup>2</sup> /m
Type II	400	200	10.5	-	152.9	48.0	120.0	874	8,740	1.33
Type III	400	250	13.0	-	191.1	60.0	150.0	1,340	16,800	1.44
Type IIIA	400	300	13.1	-	186.0	58.4	146.0	1,520	22,800	1.44
Type IIIn	400	290	13.0	9.0	198.1	62.2	155.5	1,600	23,206	1.38
Type IV	400	340	15.5	-	242.0	76.1	190.0	2,270	38,600	1.61
Type VL	500	400	24.3	-	267.5	105.0	210.0	3,150	63,000	1.75
Type IIw	600	260	10.3	-	131.2	61.8	103.0	1,000	13,000	1.77
SPU 3W	600	360	13.4	-	173.2	81.6	136.0	1,800	32,400	1.90
SPU 4W	600	420	18.0	-	225.5	106.0	177.0	2,700	56,700	1.99
Type VII	500	450	27.6	-	305.7	120.0	240.0	3,820	86,000	1.82

\*Indicates coating area both sides of pile, excluding inside of interlocks.



## HOT ROLLED SHEET PILES U TYPE (EUROPEAN ORIGIN)

VL

Section	Width (b)	Height (h)	Thickness		Cross Sectional Area (A)	Unit Weight		Elastic Section Modulus (W <sub>x</sub> )	Moment of Inertia (I <sub>xx</sub> )	*Coating Area (both sides per pile)
	mm	mm	Flange (t) mm	Web (s) mm	cm <sup>2</sup> /m	Per Pile (G <sub>p</sub> ) kg/m	per m of wall (G <sub>w</sub> ) kg/m <sup>2</sup>	cm <sup>3</sup> /m	cm <sup>4</sup> /m	m <sup>2</sup> /m
VL504A	500	340	11.2	8.7	161.7	63.5	127.0	1,423	24,198	1.56
VL504	500	340	12.0	9.0	169.7	66.6	133.2	1,504	25,575	1.56
VL504K	500	340	13.0	9.3	179.1	70.3	140.6	1,602	27,233	1.56
VL507A	500	437	17.5	10.2	235.2	92.3	184.6	2,800	61,185	1.73
VL601	600	310	7.5	6.4	98.3	46.3	77.2	744	11,530	1.60
VL601K	600	310	7.8	6.8	102.9	48.5	80.8	775	12,019	1.60
VL602A	600	310	8.0	7.3	109.0	51.3	85.5	806	12,499	1.60
VL602	600	310	8.4	7.6	113.3	53.4	89.0	842	13,046	1.60
VL602K	600	310	8.8	7.9	117.7	55.4	92.3	877	13,590	1.60
VL603A	600	320	9.0	8.0	130.6	61.5	102.5	1,138	18,205	1.72
VL603	600	320	9.6	8.2	136.3	64.2	107.0	1,200	19,199	1.72
VL603K	600	320	9.8	9.0	143.9	67.8	113.0	1,241	19,853	1.73
VL603Z	600	322	10.0	10.0	153.1	72.1	120.2	1,300	20,930	1.73
VL603Z11	600	320	11.0	11.0	166.9	78.6	131.0	1,404	22,470	1.73
VL604A	600	390	9.6	8.8	150.8	71.0	118.3	1,564	30,495	1.85
VL604	600	390	10.0	9.0	155.2	73.1	121.8	1,618	31,548	1.85
VL604K	600	390	10.4	9.2	159.7	75.2	125.3	1,672	32,600	1.85
VL604Z	600	390	10.8	10.0	168.8	79.5	132.5	1,748	34,087	1.85
VL604D	600	390	10.9	8.7	158.6	74.7	124.5	1,709	33,330	1.85
VL604E	600	390	12.3	9.0	170.2	80.2	133.7	1,878	36,623	1.85
VL605A	600	420	10.7	9.0	162.5	76.5	127.5	1,821	38,243	1.89
VL605	600	420	12.3	9.2	174.2	82.1	136.8	2,021	42,433	1.89
VL605K	600	420	12.4	10.0	182.0	85.7	142.8	2,068	43,435	1.89
VL606A	600	430	13.4	9.0	181.3	85.4	142.3	2,205	47,402	1.95
VL606	600	430	15.8	9.3	199.3	93.9	156.5	2,502	53,785	1.95
VL606K	500	437	18.4	10.5	235.2	92.3	184.6	2,800	61,185	1.90

\*Indicates coating area both sides of pile, excluding inside of interlocks.



# SHEET PILE MANUFACTURING STANDARDS AND STEEL GRADES

Hot rolled sheet piles are produced globally to international standards, steel grades are classified based on the chemical and mechanical properties. List of international standards and corresponding grades are mentioned below.

## INTERNATIONAL STANDARD AND STEEL GRADES

American Standard			
ASTM	Minimum Yield strength (MPa)	Ultimate tensile strength (MPa)	Elongation (%)
A 252 Gr.1	205	345	18
A 252 Gr.2	240	414	14
A 252 Gr.3	310	455	-
A 328	270	485	17
A 572 Gr. 42	290	415	20
A 572 Gr. 50	345	450	18
A 572 Gr. 55	380	485	20
A 572 Gr. 60	415	520	16
A 572 Gr. 65	450	550	15

European Standard			
EN 10248	Minimum Yield strength (MPa)	Ultimate tensile strength (MPa)	Elongation (%)
S240GP	240	340	26
S270GP	270	410	24
S320GP	320	440	23
S355GP	355	480	22
S390GP	390	490	20
S430GP	430	510	19

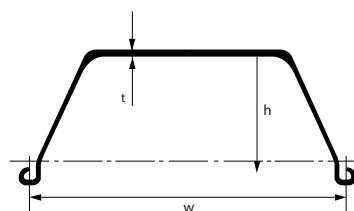
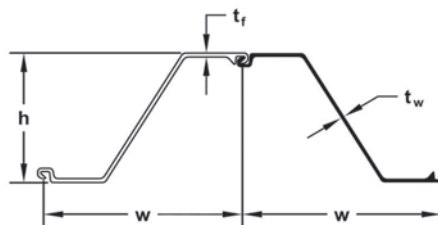
Chinese Standard			
GB/T 1591	Minimum Yield strength (MPa)	Ultimate tensile strength (MPa)	Elongation (%)
Q235B*	235	500	26
Q345B	345	630	20
Q345C	345	630	21
Q390B	390	650	20
Q420B	420	680	19

Japanese Standard			
JIS A5528	Minimum Yield strength (MPa)	Ultimate tensile strength (MPa)	Elongation (%)
SY 295	295	490	17
SY 390	390	540	15

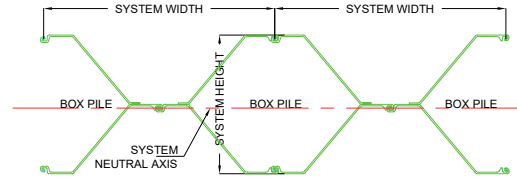
Note: \* Grade according to GB/T 700 Standard

## MANUFACTURING TOLERANCES FOR SHEET PILES

Component	Z Profile	U Profile
Mass	± 5%	± 5%
Length	± 200mm	± 200mm
Height (≤ 200mm)	± 5.0mm	± 4.0mm
Height (> 200mm & ≤ 300mm)	± 6.0mm	± 5.0mm
Height (> 300mm)	± 7.0mm	± 5.0mm
Thickness (≤ 8.5 mm)	± 0.5 mm	± 0.5 mm
Thickness (> 8.5 mm)	± 6% of thickness	± 6% of thickness
Width of Single	± 2% of width	± 2% of width
Straightness	± 0.2% of the length	± 0.2% of the length
Squareness of Ends	± 2% of the width	± 2% of the width



## ESZ COMBI PILES

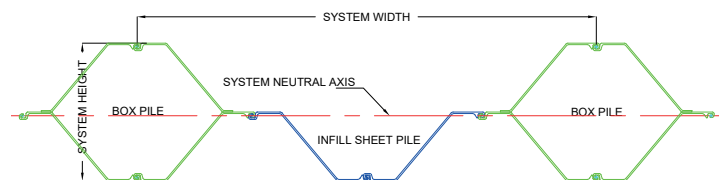


### ESZ

#### ESZ combi piles Box pile 1.4m wide

System	Inertia of Box pile of 1.4m wide (cm <sup>4</sup> )	Width (m)	System Height (cm)	Neutral Axis (cm)	Inertia per m of wall (cm <sup>4</sup> /m)	Combined Wall section modulus (cm <sup>3</sup> /m)	Moment Capacity (kNm/m)		Stiffness of system. EI (kNm <sup>2</sup> /m)	
							355 Grade	430 Grade	355 Grade	430 Grade
ESZ 18	279,854.44	1.40	84.00	42.00	199,896.03	4,759.43	1,689.60	2,046.56	3,548.16	4,297.78
ESZ 19 (10/10)	304,640.42	1.40	84.20	42.10	217,600.30	5,168.66	1,834.88	2,222.53	3,853.25	4,667.31
ESZ 20	317,093.06	1.40	84.30	42.15	226,495.05	5,373.55	1,907.62	2,310.63	4,006.01	4,852.32
ESZ 24	396,480.62	1.40	91.80	45.90	283,200.45	6,169.95	2,190.34	2,653.08	4,599.72	5,571.47
ESZ 25	412,181.00	1.40	91.90	45.95	294,415.01	6,407.30	2,274.60	2,755.14	4,776.66	5,785.79
ESZ 26	427,924.57	1.40	92.00	46.00	305,660.41	6,644.80	2,358.91	2,857.27	4,953.72	6,000.27
ESZ 27	443,714.62	1.40	92.10	46.05	316,939.02	6,882.50	2,443.29	2,959.48	5,130.91	6,214.91
ESZ 28	459,550.19	1.40	92.20	46.10	328,250.14	7,120.40	2,527.75	3,061.78	5,308.28	6,429.74
ESZ 29	491,593.14	1.40	92.40	46.20	351,137.96	7,600.39	2,698.14	3,268.17	5,666.10	6,863.16
ESZ 36	638,578.26	1.40	101.80	50.90	456,127.33	8,961.25	3,181.25	3,853.34	6,680.63	8,092.01
ESZ 37	660,501.32	1.40	101.90	50.95	471,786.66	9,259.80	3,287.23	3,981.72	6,903.19	8,361.61
ESZ 38	682,479.81	1.40	102.00	51.00	487,485.59	9,558.55	3,393.29	4,110.18	7,125.91	8,631.38
ESZ 39	704,513.86	1.40	102.10	51.05	503,224.19	9,857.48	3,499.41	4,238.72	7,348.77	8,901.31
ESZ 40	726,603.57	1.40	102.20	51.10	519,002.55	10,156.61	3,605.60	4,367.35	7,571.76	9,171.44

- System Inertia per m of wall = combined section modulus of box pile / system width.
- Combination of any box pile can be calculated on this basis.
- Stiffness of the system also needed to be checked during selecting the combination along with bending moment capacity.



### ESZ

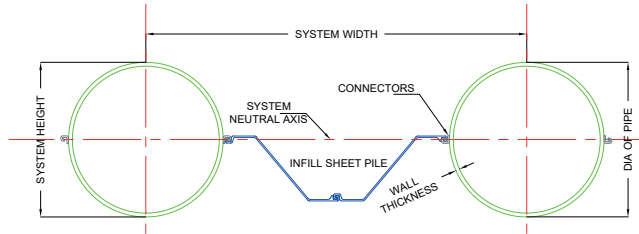
#### Box piles spaced at 2.8 m c/c

System	Sheet pile Infill type	System Height (cm)	Inertia of Box pile spaced at 2.8m c/c (cm <sup>4</sup> )	Inertia of infill sheet pile (cm <sup>4</sup> )	System Inertia per m of wall (cm <sup>4</sup> /m)	Combined Wall section modulus (cm <sup>3</sup> /m)	Weight (kg/m length of pile)			
							Box piles	Infill sheet pile	Combined system weight	Per m of wall
ESZ 18	ESZ 18	84.0	279,858.21	53,031.37	118,889.13	2,830.69	277.94	154.80	432.74	154.55
ESZ 19 10/10	ESZ 19 10/10	84.2	304,644.36	57,308.14	129,268.75	3,070.52	303.46	168.40	471.86	168.52
ESZ 20	ESZ 20	84.3	317,097.11	59,447.83	134,480.34	3,190.52	316.22	175.20	491.42	175.51
ESZ 24	ESZ 24	91.8	396,488.38	78,220.20	169,538.78	3,693.66	317.45	179.00	496.45	177.30
ESZ 25	ESZ 25	91.9	412,188.95	80,977.38	176,130.83	3,833.10	330.77	186.20	516.97	184.63
ESZ 26	ESZ 26	92.0	427,932.71	83,735.59	182,738.68	3,972.58	344.09	193.40	537.49	191.96
ESZ 27	ESZ 27	92.1	443,722.97	86,494.85	189,363.51	4,112.13	357.41	200.60	558.01	199.29
ESZ 28	ESZ 28	92.2	459,558.75	89,255.16	196,004.97	4,251.73	370.73	207.80	578.53	206.62
ESZ 29	ESZ 29	92.4	491,602.34	94,829.35	209,439.89	4,533.33	397.51	222.20	619.71	221.33
ESZ 36	ESZ 36	101.8	638,614.23	127,584.14	273,642.27	5,376.08	409.85	232.40	642.25	229.38
ESZ 37	ESZ 37	101.9	660,538.30	131,590.86	282,903.27	5,552.57	424.30	240.40	664.70	237.39
ESZ 38	ESZ 38	102.0	682,517.87	135,598.84	292,184.54	5,729.11	438.74	248.40	687.14	245.41
ESZ 39	ESZ 39	102.1	704,553.06	139,608.09	301,486.13	5,905.70	453.19	256.40	709.59	253.43
ESZ 40	ESZ 40	102.2	726,643.98	143,618.65	310,808.08	6,082.35	467.63	264.40	732.03	261.44

- System Inertia per m of wall = combined section modulus of box pile + infill sheet pile/ system width.
- Combination of any box pile with any sheet pile can be calculated on this basis.
- Stiffness of the system also needed to be checked during selecting the combination along with bending moment capacity.



# ESZ COMBI PILES



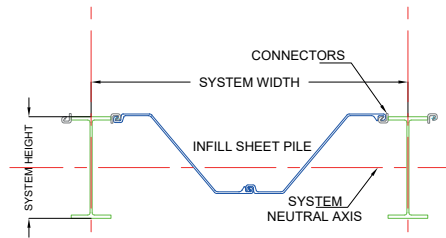
## PIPE + ESZ

Pipe Dia., (mm)	Wall thickness (mm)	Infill sheet pile	System width (m)	Combined Wall Inertia (cm <sup>4</sup> /m)	Combined Wall Modulus (cm <sup>3</sup> /m)	Unit weight per m of wall (kgs)
762.00	9.5	ESZ 18	2.226	95,487.00	2,506.23	157.98
762.00	9.5	ESZ 27	2.226	110,512.16	2,900.59	178.55
508.00	12.7	ESZ 29	1.972	78,858.67	3,104.68	201.49
508.00	15.9	ESZ 28	1.972	83,004.28	3,267.89	213.26
609.60	15.9	ESZ 26	2.074	103,363.01	3,391.18	215.01
609.60	12.7	ESZ 37	2.074	112,694.36	3,697.33	211.84
762.00	12.7	ESZ 36	2.226	151,612.09	3,979.32	218.82
762.00	19.1	ESZ 18	2.226	161,754.88	4,245.54	235.33
1,219.20	9.5	ESZ 26	2.684	278,040.15	4,561.03	185.44
1,066.80	12.7	ESZ 27	2.531	265,009.95	4,968.32	217.61
762.00	19.1	ESZ 38	2.226	198,842.93	5,218.98	277.38
762.00	19.1	ESZ 40	2.226	202,446.70	5,313.57	284.57
762.00	22.2	ESZ 37	2.226	217,851.10	5,717.88	298.94
1,219.20	12.7	ESZ 36	2.684	373,917.67	6,133.83	234.83
1,066.80	15.9	ESZ 38	2.531	339,630.41	6,367.28	268.66
1,066.80	15.9	ESZ 40	2.531	342,799.91	6,426.70	274.98
1,066.80	19.1	ESZ 36	2.531	390,499.76	7,320.96	294.21
1,066.80	22.2	ESZ 18	2.531	413,767.80	7,757.18	295.03
1,371.60	15.9	ESZ 18	2.836	566,707.91	8,263.46	248.86
1,219.20	19.1	ESZ 24	2.684	511,089.87	8,384.03	284.22
1,219.20	19.1	ESZ 40	2.684	535,459.47	8,783.79	316.04
1,219.20	22.2	ESZ 18	2.684	577,041.96	9,465.92	309.30
1,524.00	15.9	ESZ 29	2.988	747,705.20	9,812.41	278.73
1,524.00	15.9	ESZ 38	2.988	761,349.10	9,991.46	287.49
1,524.00	15.9	ESZ 38	2.988	761,349.10	9,991.46	287.49

- System Inertia per m of wall = combined section modulus of tubular pile + sheet pile infill / system width.
- Stiffness of the system also needed to be checked during selecting the combination along with bending moment capacity.



## ESZ COMBI PILES



### BEAM + ESZ

Beam section	Height of beam (mm)	Infill sheet pile	System width (m)	Combined Wall Inertia (cm <sup>4</sup> /m)	Combined Wall Modulus (cm <sup>3</sup> /m)	Weight (kg/m length of pile)
UB 610 x 229 x 101	602.60	ESZ 18	1.692	76,158.36	2,527.66	163.13
UB 533 x 210 x 92	533.10	ESZ 24	1.674	79,736.70	2,990.88	173.93
IPE 550 A	597.00	ESZ 24	1.684	95,706.60	3,206.26	182.05
UB 762 x 267 x 147	754.00	ESZ 18	1.73	128,081.68	3,397.40	185.99
IPE 750x 134	750.00	ESZ 24	1.728	132,194.36	3,525.19	192.48
UB 762 x 267 x 147	754.00	ESZ 24	1.73	142,631.96	3,783.35	199.98
UB 610 x 229 x 101	602.60	ESZ 36	1.692	120,210.37	3,989.73	208.99
UB 838 x 292 x 176	834.90	ESZ 18	1.756	170,330.60	4,079.78	199.70
UB 838 x 292 x 176	834.90	ESZ 24	1.756	184,665.45	4,423.13	213.48
IPE 550 A	597.00	ESZ 40	1.684	134,547.45	4,507.46	232.76
HE 650 AA	620.00	ESZ 40	1.764	146,033.20	4,710.75	239.44
UB 838 x 292 x 176	834.90	ESZ 36	1.756	212,777.07	5,096.46	243.89
UB 838 x 292 x 176	834.90	ESZ 39	1.756	219,625.59	5,260.50	257.56
W 1016 x 305 x 272	990.00	ESZ 18	1.764	344,061.11	6,950.73	253.45
W 1016 x 305 x 272	990.00	ESZ 26	1.764	361,457.94	7,302.19	275.33
W 1016 x 305 x 272	990.00	ESZ 27	1.764	363,021.43	7,333.77	279.42
W 1016 x 305 x 272	990.00	ESZ 36	1.764	386,315.08	7,804.35	297.44
W 1016 x 305 x 272	990.00	ESZ 37	1.764	388,592.86	7,850.37	301.98
W 1016 x 305 x 272	990.00	ESZ 38	1.764	390,862.70	7,896.22	306.51
W 1016 x 305 x 272	990.00	ESZ 40	1.764	395,410.32	7,988.09	315.58

- System Inertia per m of wall = combined section modulus of beam + sheet pile infill / system width.
- Stiffness of the system also needed to be checked during selecting the combination along with bending moment capacity.



# SHEET PILE CONNECTORS

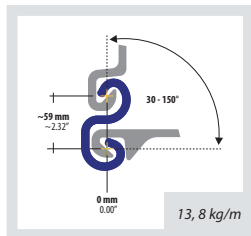
Connectors are used to transform the sheet piling corners and junction piles which can be used as replacement for special tailor-made piles, which requires time and accuracy.

Connectors have effectively rendered fabricating corners and other connection processes in steel piling construction projects a relic of the past. For today's temporary and permanent port construction projects connectors are cost-effective, readily available engineered solution that increases efficiency, ease of installation, and increases the strength of their retaining system. The foundation construction industry quickly recognized the advantages of extruded connectors.

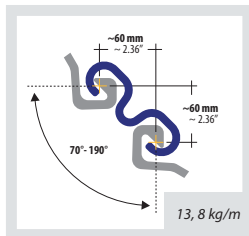
## Advantages of connectors

- Light weight and ease of use.
- Precisely engineered and superior design.
- One-piece construction that does not rely on a single vertical weld seam.
- Elimination of costly fabrication and specifically, removing welded connections that are susceptible to increased rates of corrosion.
- Less corrosion risk than fabricated piles.
- Single unit integrity of the steel wall unit is always maintained.
- Stronger and more durable than other alternatives.
- Connectors are easily and efficiently transported with minimal risk of damage. No special packing required.
- Connectors are easier to drive and extract so that construction time is reduced. No special equipment is required.
- Compatible with regular interlocks.
- Available in typical steel grade - S355GP or equivalent, S430 Grade, ASTM and Chinese grades up on prior order.
- Accepted globally with the leading consultants and contractors.

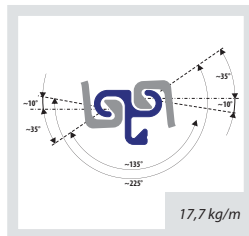
**LV20** Larssen / Z



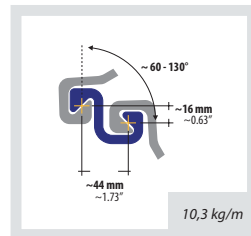
**LV-Omega** Larssen / Z



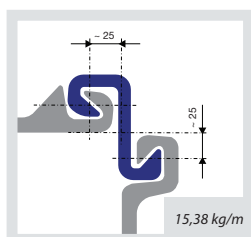
**LT / VTS** Larssen / Z



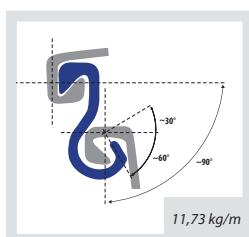
**L90** Larssen / Z



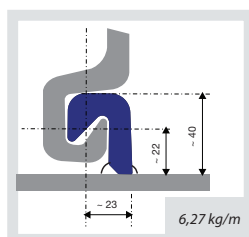
**E-20** Larssen / Z



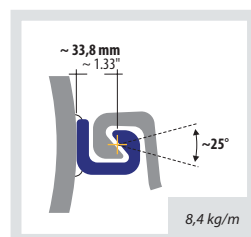
**E-20 XL** Larssen / Z



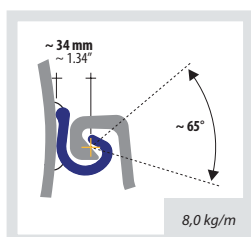
**E-21** Larssen / Z



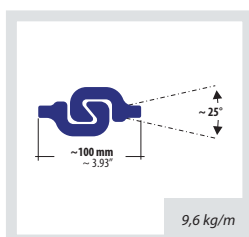
**L8 / E22** Larssen / Z



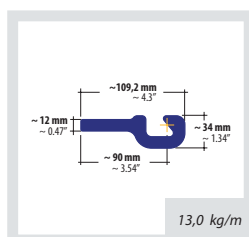
**LV22** Larssen / Z



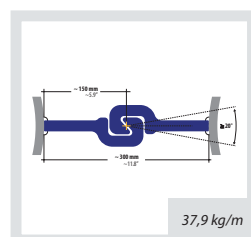
**LPB 100 -10** Larssen / Z



**LPB 180 -10** Larssen / Z



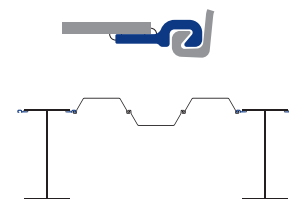
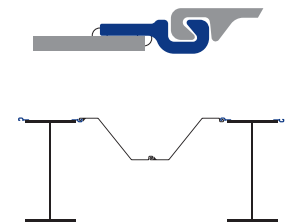
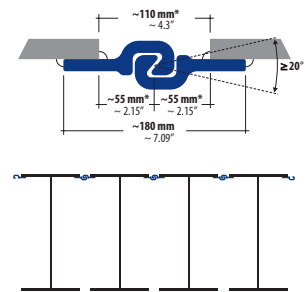
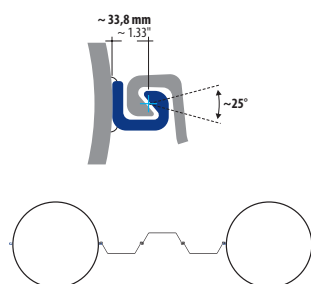
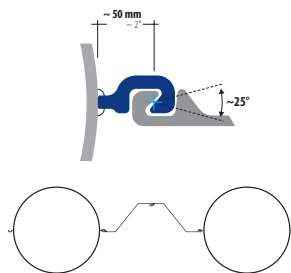
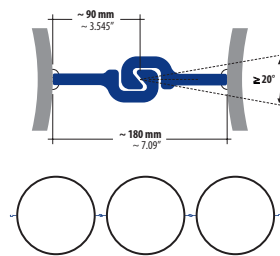
**LPB 300-20** Larssen / Z



# COMBI WALL AND CONNECTORS

## Combi wall type pile

- Combination of high strength primary pile (king piles) with sheet pile infill (either Z, U or Hat type)
- Heavy duty systems capable of achieving very high strengths
- King piles are normally much longer than infill piles
- Generally only used for permanent works
- Primarily used in marine applications
- Generally requires special clutches to be attached to king pile to allow connection with sheet pile





## TUBULAR PILES

Steel tubular piles are large hollow tubes which are driven or vibrated into the ground with the use of a vibro hammer or other efficient modern accelerated hammers. They can be supplied as a single length or in sections depending on the project requirements.

There are a wide range of pile sizes available to cater for any application. Tubular piles are mainly used in marine projects and in environments with a limited working area or limited height. Steel tubular piles provide a robust and versatile foundation solution. They can be used in most ground conditions including soft alluvium deposits, made ground and contaminated ground. A wide range of pile sizes, joints and rig types allow

tubular steel driven piles to be used as the foundation for the majority of structures including bridge foundations, port and harbour pier, buildings, power plant foundations and base for heavy civil works.

The suitable tube diameter and wall thickness can be determined depending on the application and the required load-bearing capacity. For additional tip bearing capacity, the tube can be outfitted with a base plate.

Meever is supplying LSAW , SSAW, ERW and seamless pipes manufactured according to EN, ASTM and API standards.





## SSAW AND ERW PIPES

## SSAW

## Spiral submerged arc welded pipes (kgs/mtr)

OD / WT	5.16	5.56	6.35	7.92	9.53	12.70	15.88	19.05	22.20	25.40
355.60	44.60	48.00	54.70	67.91	81.34	107.40				
406.40		54.97	62.65	77.84	93.28	123.31				
457.20		61.93	70.61	87.76	105.22	139.22	172.84			
508.00		68.90	78.56	97.68	117.16	155.13	192.73			
609.60		82.83	94.47	117.52	141.04	186.95	232.52	277.45		
762.00		103.73	118.34	147.29	176.85	234.69	292.20	349.04	405.03	461.41
914.40		124.62	142.21	177.06	212.67	282.42	351.89	420.64	488.47	556.88
1,066.80		145.52	166.07	206.82	248.49	330.15	411.57	492.24	571.91	652.34
1,219.20			189.94	236.59	284.31	377.88	471.25	563.84	655.34	747.80
1,371.60					320.12	425.61	530.94	635.44	738.78	843.27
1,524.00					355.94	473.35	590.62	707.03	822.22	938.73
1,828.80						568.81	709.99	850.23	989.09	1,129.66
2,133.60						664.27	829.36	993.42	1,155.97	1,320.59
2,438.40							948.72	1,136.62	1,322.84	1,511.51
2,743.20							1,068.09	1,279.82	1,489.71	1,702.44
3,048.00							1,187.46	1,423.01	1,656.59	1,893.37

## ERW

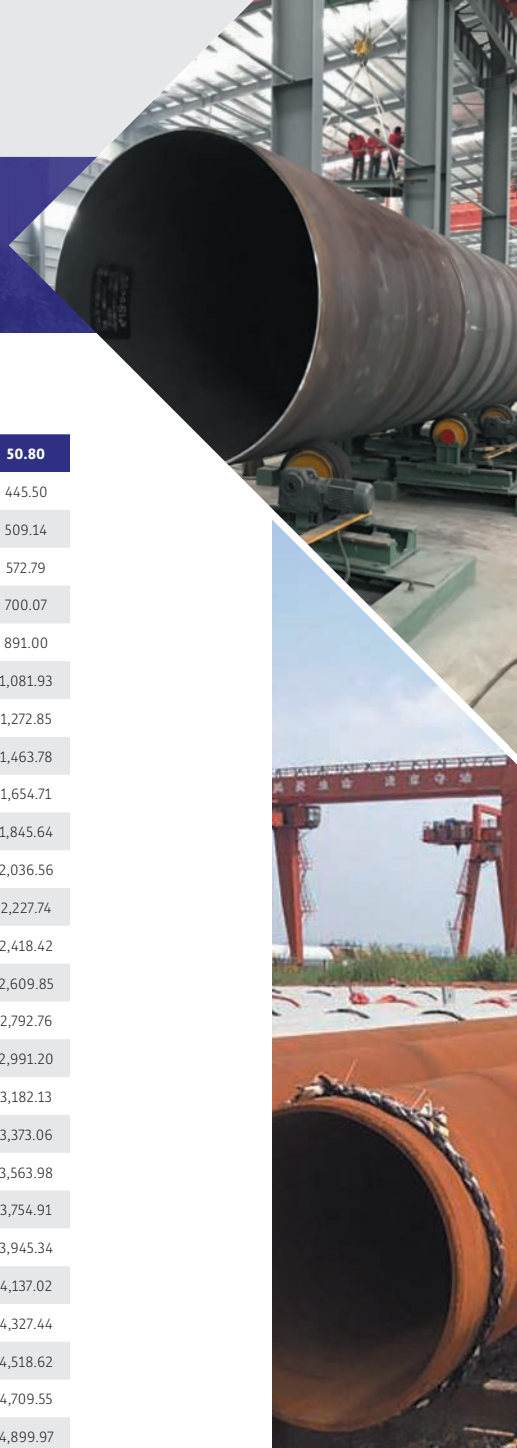
## Electrical resistance welded pipes (kgs/mtr)

OD / WT	2.10	2.50	3.20	3.73	3.91	4.19	4.55	4.78	4.85	5.08	5.54	7.14	8.08	8.58	9.53	10.97	12.70	15.10	22.00
21.30	1.00	1.16	1.43	1.62															
26.70	1.28	1.50	1.86	2.12	2.20														
33.40	1.63	1.91	2.39	2.73	2.85	3.02	3.24												
42.20	2.08	2.45	3.08	3.54	3.70	3.93	4.23	4.42	4.47	4.66									
48.30	2.40	2.83	3.56	4.10	4.29	4.56	4.91	5.14	5.20	5.42									
60.30	3.02	3.57	4.51	5.21	5.44	5.80	6.26	6.55	6.64	6.92	7.49	9.37							
73.00		4.35	5.51	6.38	6.67	7.12	7.69	8.05	8.16	8.51	9.22	11.60							
89.90		5.39	6.85	7.93	8.30	8.86	9.58	10.04	10.18	10.63	11.53	14.58							
101.60		6.11	7.77	9.01	9.42	10.07	10.89	11.42	11.58	12.10	13.13	16.64	18.64						
114.30		6.90	8.77	10.18	10.65	11.38	12.32	12.92	13.10	13.69	14.86	18.87	21.17	22.37					
141.30		8.56	10.90	12.66	13.25	14.17	15.35	16.10	16.33	17.07	18.55	23.63	26.55	28.09	30.97				
168.30		10.23	13.03	15.14	15.86	16.96	18.38	19.28	19.55	20.45	22.24	28.38	31.93	33.80	37.32	42.57			
219.10			17.04	19.82	20.76	22.21	24.08	25.27	25.63	26.82	29.18	37.33	42.05	44.55	49.26	56.31	64.65		
273.00							30.13	31.62	32.08	33.57	36.55	46.82	52.79	55.96	61.93	70.89	81.53	96.04	
323.90										39.95	43.50	55.78	62.94	66.73	73.89	84.66	97.47	115.00	
355.60						36.32	39.40	41.36	41.96	43.92	47.83	61.36	69.25	73.43	81.34	93.24	107.40	126.80	181.00
406.40						41.57	45.10	47.35	48.03	50.28	54.77	70.31	79.38	84.18	93.28	106.98	123.31	145.72	208.56
457.00						46.79	50.77	53.31	54.09	56.62	61.69	79.22	89.46	94.89	105.17	120.67	139.16	164.56	236.02
500.00								58.38	59.23	62.01	67.56	86.79	98.03	103.99	115.28	132.31	152.63	180.58	259.35
559.00								65.34	66.29	69.40	75.62	97.18	109.78	116.47	129.14	148.27	171.11	202.55	291.36
610.00											82.59	106.16	119.95	127.26	141.13	162.06	187.08	221.54	319.03





# LSAW PIPES



LSAW	Longitudinal welded pipes (kgs/mtr)											
OD/WT	12.70	14.27	15.87	17.48	19.05	22.22	25.40	31.75	34.90	38.10	44.50	50.80
406.40	123.31	138.00	152.85	167.66	181.98	210.53	238.66	293.36	319.75	346.06	397.17	445.50
457.20	139.22	155.88	172.73	189.56	205.85	238.36	270.49	333.13	363.47	393.79	452.92	509.14
508.00	155.13	173.76	192.61	211.46	229.71	266.20	302.31	372.91	407.20	441.52	508.67	572.79
609.60	186.95	209.51	232.38	255.26	277.45	321.88	365.95	452.46	494.64	536.99	620.17	700.07
762.00	234.69	263.15	292.02	320.95	349.04	405.39	461.41	571.79	625.81	680.18	787.42	891.00
914.40	282.42	316.78	351.67	386.65	420.64	488.90	556.88	691.12	756.98	823.38	954.67	1,081.93
1,066.80	330.15	370.41	411.32	452.35	492.24	572.41	652.34	810.45	888.15	966.57	1,121.91	1,272.85
1,219.20	377.88	424.04	470.96	518.05	563.84	655.92	747.80	929.78	1,019.32	1,109.77	1,289.16	1,463.78
1,371.60	425.61	477.68	530.61	583.74	635.44	739.44	843.27	1,049.11	1,150.48	1,252.97	1,456.41	1,654.71
1,524.00	473.35	531.31	590.25	649.44	707.03	822.95	938.73	1,168.44	1,281.65	1,396.16	1,623.66	1,845.64
1,676.40	521.08	584.94	649.90	715.14	778.63	906.46	1,034.19	1,287.77	1,412.82	1,539.36	1,790.91	2,036.56
1,829.00	568.87	638.64	709.62	780.92	850.32	990.08	1,129.78	1,407.26	1,544.16	1,682.74	1,958.38	2,227.74
1,981.20	616.54	692.21	769.19	846.53	921.83	1,073.48	1,225.12	1,526.43	1,675.16	1,825.75	2,125.41	2,418.42
2,134.00	664.40	745.98	828.99	912.40	993.61	1,157.22	1,320.84	1,646.07	1,806.67	1,969.32	2,293.10	2,609.85
2,280.00		797.36	886.14	975.34	1,062.20	1,237.22	1,412.29	1,760.39	1,932.33	2,106.50	2,453.33	2,792.76
2,438.40		853.10	948.13	1,043.62	1,136.62	1,324.02	1,511.51	1,884.42	2,068.66	2,255.33	2,627.16	2,991.20
2,590.80		906.74	1,007.78	1,109.32	1,208.22	1,407.53	1,606.98	2,003.75	2,199.83	2,398.53	2,794.41	3,182.13
2,743.20		960.37	1,067.42	1,175.02	1,279.82	1,491.04	1,702.44	2,123.08	2,331.00	2,541.73	2,961.66	3,373.06
2,895.60			1,127.07	1,240.71	1,351.41	1,574.56	1,797.90	2,242.41	2,462.17	2,684.92	3,128.91	3,563.98
3,048.00			1,186.71	1,306.41	1,423.01	1,658.07	1,893.37	2,361.74	2,593.34	2,828.12	3,296.16	3,754.91
3,200.00				1,371.94	1,494.42	1,741.36	1,988.58	2,480.75	2,724.16	2,970.94	3,462.97	3,945.34
3,353.00				1,437.89	1,566.30	1,825.20	2,084.42	2,600.55	2,855.85	3,114.70	3,630.87	4,137.02
3,505.00					1,637.71	1,908.49	2,179.63	2,719.57	2,986.67	3,257.52	3,797.69	4,327.44
3,657.60					1,709.40	1,992.12	2,275.22	2,839.06	3,118.01	3,400.90	3,965.15	4,518.62
3,810.00						2,075.63	2,370.69	2,958.38	3,249.18	3,544.09	4,132.40	4,709.55
3,962.00						2,158.92	2,465.90	3,077.40	3,380.01	3,686.91	4,299.21	4,899.97
4,115.00						2,242.76	2,561.74	3,197.20	3,511.69	3,830.67	4,467.12	5,091.65
4,267.00						2,326.05	2,656.95	3,316.22	3,642.52	3,973.49	4,633.93	5,282.08





## EMBANKMENT

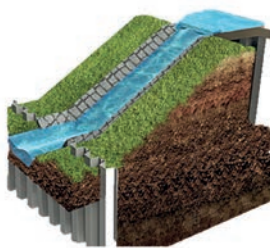
India is the biggest sub-continent with a shore line of 7,516.6 kms and also several rivers which usually reaches the highest flood levels almost every year and even higher which inundates the nearby locations. The country is having a large variety of virgin and longstanding problematic soils which are almost soft and permeable.

### Various uses of sheet piles are as below.

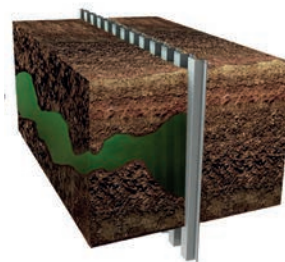
- Flood Walls
- Levee Freeboard Increases
- Dam Stabilization
- Piping Protection
- Seepage Barrier
- Levee Repair
- Chemical Containment
- Underground chemical tanks
- Seepage Barriers
- Groundwater Cut Off / diversion
- Foundation Protection
- Tide Walls
- Breakwaters / Wave Breaks
- Jetties
- Groins
- Erosion Control / Scour Protection
- Retaining Walls for abutments & slopes
- Basements

### ADVANTAGES:

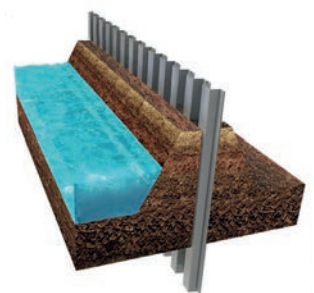
- Dry fix – No requirement of shuttering / cement concrete
- Readily available
- Quick installation
- Sustainable
- Engineered strength
- Flexible
- Requires less space therefore more development land achieved
- Versatile
- Optimal land use
- Modern method of construction
- Environment friendly



WATER CONTROL STRUCTURES



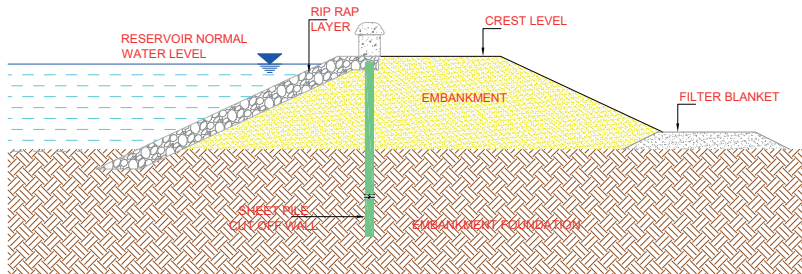
GROUND / GROUND WATER  
CONTAMINANT CUTT OFF WATER



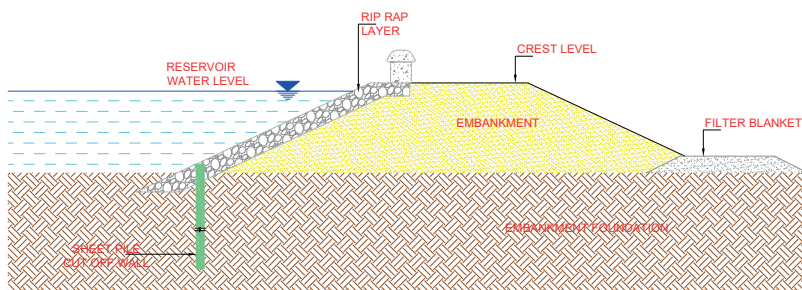
FLOOD PROTECTION BARRIER



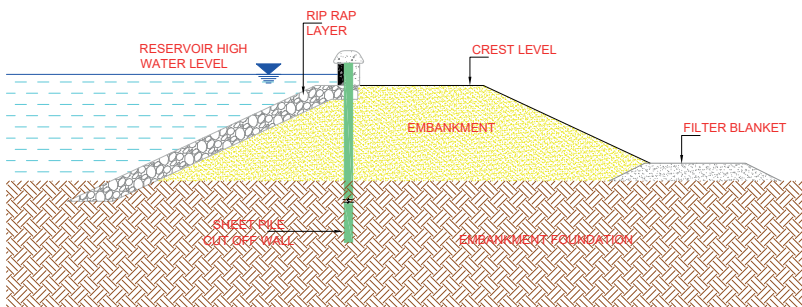
# EMBANKMENT



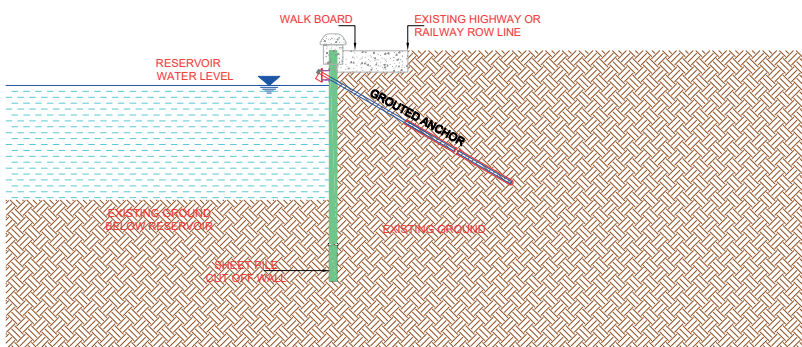
SHEET PILE AS CUT OFF WALL FOR NORMAL WATER BODIES



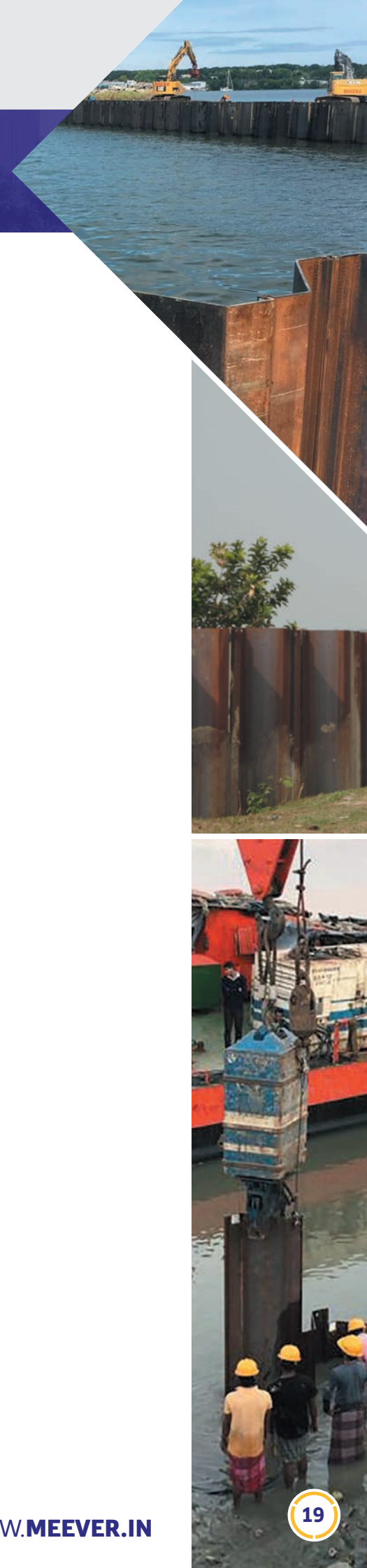
SHEET PILE AS SCOUR PROTECTION FOR RESERVOIRS IN UPSTREAM



SHEET PILE AS CUT OFF WALL FOR HIGH WATER LEVELS IN RESERVOIR



SHEET PILE AS WATER BARRIER WALL INCLUDING GROUND ANCHOR AT PLACE CONSTRAINTS LOCATIONS



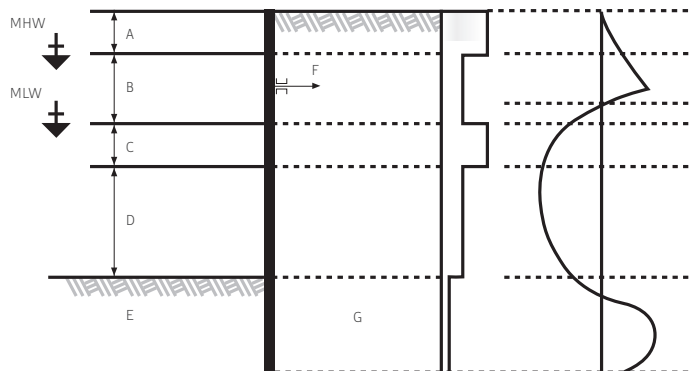
# CORROSION OF STEEL

The corrosion of structural steel is an electrochemical process that requires the simultaneous presence of moisture and oxygen. Initial attack occurs at anodic areas on the surface, where ferrous ions go into solution. Electrons are released from the anode and move through the metallic structure to the adjacent cathodic sites on the surface, where they combine with oxygen and water to form hydroxyl ions.

Design of sheet-piled quay wall for a design structure life will be based on allowing a reduction in thickness of the sheet-pile section during a structure's lifetime. The reduction in thickness to be allowed for is dependent upon the relevant rate of corrosion at the proposed location, which depends on groundwater/seawater conditions, the presence of oxygen/contaminants, and soil type.

The rate at which the corrosion process progresses depends on a number of factors relating to the micro-climate immediately surrounding the structure, principally the time of wetness and the atmospheric pollution level. It is usually the case that corrosion will not be uniform over the whole length of a sheet pile. Below image gives an indicative corrosivity affect on sheet piles in each different zones.

It may be possible to prolong the lifetime of a structure by using a thicker sheet-pile section, applying a protective organic coating e.g. epoxy painting or cathodic protection depending on the project-specific requirements, it may also be possible to adapt the design so that the maximum bending moment occurs in a zone with lower corrosion rates.



a) Vertical Zoning of sea water aggressively

b) Corrosion rate distribution at side exposed to sea water

c) Typical bending moment distribution

A Zone of high attack (splash zone);

C Zone of high attack (low water zone);

E Buried zone (water side);

G Buried zone (soil side);

MHW Mean high water;

B Interidal zone;

D Permanent immersion zone;

F Anchor;

MLW Mean low water

## NOTE:

Corrosion rate distribution and zones of sea water aggressiveness may vary considerably from the example shown depending upon the conditions prevailing at the location of the structure.

The highest corrosion rate is usually found at the splash zone or at the low water level. However, in most cases, the highest stresses are in the permanent immersion zone as the Eurocode states (BS EN 1993-5: 1997 and BS EN 1993-5: 2007)

# CORROSION RATES

## Atmospheric-corrosivity categories and examples of typical environments

	Mass loss per unit surface/thickness loss (after first year of exposure)				Examples of typical environments in a temperate climate (informative only)	
	Low-carbon steel		Zinc		Exterior	Interior
	Mass loss g/m <sup>2</sup>	Thickness loss µm	Mass loss g/m <sup>2</sup>	Thickness loss µm		
C1 very low	≤ 10	≤ 1,3	≤ 0,7	≤ 0,1	—	Heated buildings with clean atmospheres, e.g. offices, shops, schools, hotels.
C2 low	> 10 to 200	> 1,3 to 25	> 0,7 to 5	> 0,1 to 0,7	Atmospheres with low level of pollution. Mostly rural areas.	Unheated buildings where condensation may occur, e.g. depots, sport halls.
C3 medium	> 200 to 400	> 25 to 50	> 5 to 15	> 0,7 to 2,1	Urban and industrial atmospheres moderate sulfur dioxide pollution. Coastal areas with low salinity.	Production rooms with high humidity and some air pollution, e.g. food-processing plants, laundries, breweries, dairies.
C4 high	> 400 to 650	> 50 to 80	> 15 to 30	> 2,1 to 4,2	Industrial areas and coastal areas with moderate	Chemical plants, swimming pools, coastal ship- and boatyards.
C5-I very high (industrial)	> 650 to 1.500	> 80 to 200	> 30 to 60	> 4,2 to 8,4	Industrial areas with high humidity and aggressive atmosphere.	Buildings or areas with almost permanent condensation and with high pollution.
C5-M very high (marine)	> 650 to 1.500	> 80 to 200	> 30 to 60	> 4,2 to 8,4	Coastal and offshore areas with high salinity.	Buildings or areas with almost permanent condensation and with high pollution.

### Notes:

1. The loss values used for the corrosivity categories are identical to those given in ISO 9223.
2. In coastal areas in hot, humid zones, the mass or thickness losses can exceed the limits of category C5-M. Special precautions must therefore be taken when selecting protective paint systems for structures in such areas.

Recommended corrosion rates as per BS EN ISO 12944-2: 1998

## CORROSION RATES FOR DESIGN

Corrosion rates given in this section should be considered as for design only.

**Note:** Suitable values for corrosion rates may be given in the National Annex, taking into account local conditions.

Values that may be used for guidance are given in Table 4-1 and Table 4-2

The loss of thickness due to atmospheric corrosion may be taken as 0,01 mm per year in normal atmospheres and as 0,02 mm per year in locations where marine conditions may affect the performance of the structure.

**Note:** The following have a major influence on the corrosion rates in soils:

- the type of soil;
- the variation of the level of the groundwater table;
- the presence of oxygen;
- the presence of contaminants.



## CORROSION RATES

**Recommended value for the loss of thickness (mm) due the corrosion for piles and sheet piles in soils, with of without groundwater**

Required design working life	5 years	25 years	50 years	75 years	100 years
Undisturbed natural soils (sand, silt, clay, schist, ...)	0.00	0.30	0.60	0.90	1.20
Polluted natural soils and industrial sites	0.15	0.75	1.50	2.25	3.00
Aggressive natural soils (swamp, marsh, peat, ...)	0.20	1.00	1.75	2.50	3.25
Non-compacted and non-aggressive fills (clay, schist, sand and silt, ...)	0.18	0.70	1.20	1.70	2.20
Non-compacted and aggressive fills (ashes, slag, ...)	0.50	2.00	3.25	4.50	5.75

**Notes:**

- Corrosion rates in compacted fills are lower than those in non-compacted ones. In compacted fills the figures in the table should be divided by two.
- The values given for 5 and 25 years are based on measurements, where as the other values are extra polated.

**Recommended value for the loss of thickness (mm) due the corrosion for piles and sheet piles in fresh water or in sea water**

Required design working life	5 years	25 years	50 years	75 years	100 years
Common fresh water (river, ship canal, ...) in the zone of high attack (water line)	0.15	0.55	0.90	1.15	1.40
Very polluted fresh water (sewage, industrial effluent, ...)	0.30	1.30	2.30	3.30	4.30
Sea water in temperate climate in the zone of high attack (low water and splash zones)	0.55	1.90	3.75	5.60	7.50
Sea water in temperate climate in the zone of permanent immersion in the intertidal zone	0.25	0.90	1.75	2.60	3.50

**Notes:**

- Corrosion rates in compacted fills are lower than those in non-compacted ones. In compacted fills the figures in the table should be divided by two.
- The values given for 5 and 25 years are based on measurements, where as the other values are extra polated.

Recommended Corrosion rates as per Euro code 3 - part 5: 2007

**According to BS 6349 Part : 1 – Maritime structures - Code of practice for general criteria.**

Exposure zone	Corrosion rate mm/side/year	
	Mean <sup>a</sup>	Upper limit <sup>b</sup>
<b>Atmospheric zone:</b> Above splash zone and where direct wave or spray impingement is infrequent	0.04	0.10
<b>Splash zone:</b> Above mean high-water to a height depending on mean wave height and exposure to wind	0.08	0.17
<b>Tidal zone:</b> Between mean high-water and mean low-water spring level	0.04	0.10
<b>Intertidal low water zone:</b> Between low-water spring and 0,5 m below LAT	0.08	0.17
<b>Continuous seawater immersion zone:</b> From 0,5 m below LAT te seabed level	0.04	0.13
<b>Below seabed level or in contact with soil</b>		0,015 max

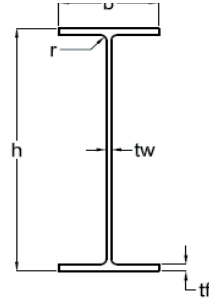
<sup>a</sup> The rate is for each face exposed to the environment of the zone.

<sup>b</sup> The upper limit figures are the 95% probability values.

# STEEL SECTIONS **EN** STANDARD

## **IPE** Parallel Flange Beams as per Euronorm 19-57 / DIN 1025

Product		Dimensions				
Designation	Mass per meter (G) kg/m	Web height (h) mm	Flange width (b) mm	Web thickness (t <sub>w</sub> ) mm	Flange thickness (t <sub>f</sub> ) mm	Root radius (r) mm
IPE 270 A	30.7	267	135	5.5	8.7	15
IPE 270	36.1	270	135	6.6	10.2	15
IPE 270 O	42.3	274	136	7.5	12.2	15
IPE 270 R	44.0	276	133	7.7	13.1	15
IPE 300 A	36.5	297	150	6.1	9.2	15
IPE 300	42.2	300	150	7.1	10.7	15
IPE 300 O	49.3	304	152	8.0	12.7	15
IPE 300 R	51.7	306	147	8.5	13.7	15
IPE 330 A	43.0	327	160	6.5	10.0	18
IPE 330	49.1	330	160	7.5	11.5	18
IPE 330 O	57.0	334	162	8.5	13.5	18
IPE 330 R	60.3	336	158	9.2	14.5	18
IPE 360 A	50.2	357.6	170	6.6	11.5	18
IPE 360	57.1	360	170	8.0	12.7	18
IPE 360 O	66.0	364	172	9.2	14.7	18
IPE 360 R	70.3	366	168	9.9	16.0	18
IPE 400 A	57.4	397	180	7.0	12.0	21
IPE 400	66.3	400	180	8.6	13.5	21
IPE 400 O	75.7	404	182	9.7	15.5	21
IPE 400 R	81.5	407	178	10.6	17.0	21
IPE 450 A	67.2	447	190	7.6	13.1	21
IPE 450	77.6	450	190	9.4	14.6	21
IPE 450 O	92.4	456	192	11.0	17.6	21
IPE 450 R	95.2	458	188	11.3	18.6	21
IPE 500 A	79.4	497	200	8.4	14.5	21
IPE 500	90.7	500	200	10.2	16.0	21
IPE 500 O	107.3	506	202	12.0	19.0	21
IPE 550 A	92.1	547	210	9.0	15.7	24
IPE 550	105.5	550	210	11.1	17.2	24
IPE 550 O	122.5	556	212	12.7	20.2	24
IPE 600 A	107.6	597	220	9.8	17.5	24
IPE 600	122.4	600	220	12.0	19.0	24
IPE 600 O	154.5	610	224	15.0	24.0	24
IPE 750 x 134	133.9	750	264	12.0	15.5	17
IPE 750 x 147	147.2	753	265	13.2	17.0	17
IPE 750 x 161	160.5	758	266	13.8	19.3	17
IPE 750 x 174	173.7	762	267	14.4	21.6	17
IPE 750 x 185	185.0	766	267	14.9	23.6	17
IPE 750 x 197	196.9	770	268	15.6	25.4	17





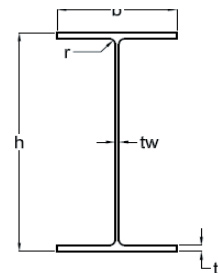
## STEEL SECTIONS EN STANDARD

Meever is providing a wide range of structural sections from 200 to 1,036 millimetres in depth, including jumbo sections. The structural steel sections are produced according to standards EN, BS, ASTM & JIS in grades S275JR, S355JR/JO/J2, ASTM A572 G50 and A992.

### HE

Wide Flange Beams As per Euronorm 19-57 / DIN 1025

Product		Dimensions				
Designation	Mass per meter (G) kg/m	Web height (h) mm	Flange width (b) mm	Web thickness (t <sub>w</sub> ) mm	Flange thickness (t <sub>f</sub> ) mm	Root radius (r) mm
HE 200 AA	34.6	186	200	5.5	8.0	18
HE 200 A	42.3	190	200	6.5	10.0	18
HE 200 B	61.3	200	200	9.0	15.0	18
HE 200 M	103.1	220	206	15.0	25.0	18
HE 220 AA	40.4	205	220	6.0	8.5	18
HE 220 A	50.5	210	220	7.0	11.0	18
HE 220 B	71.5	220	220	9.5	16.0	18
HE 220 M	117.3	240	226	15.5	26.0	18
HE 240 AA	47.4	224	240	6.5	9.0	21
HE 240 A	60.3	230	240	7.5	12.0	21
HE 240 B	83.2	240	240	10.0	17.0	21
HE 240 M	156.7	270	248	18.0	32.0	21
HE 260 AA	54.1	244	260	6.5	9.5	24
HE 260 A	68.2	250	260	7.5	12.5	24
HE 260 B	93.0	260	260	10.0	17.5	24
HE 260 M	172.4	290	268	18.0	32.5	24
HE 280 AA	61.2	264	280	7.0	10.0	24
HE 280 A	76.4	270	280	8.0	13.0	24
HE 280 B	103.1	280	280	10.5	18.0	24
HE 280 M	188.5	310	288	18.5	33.0	24
HE 300 AA	69.8	283	300	7.5	10.5	27
HE 300 A	88.3	290	300	8.5	14.0	27
HE 300 B	117.0	300	300	11.0	19.0	27
HE 300 M	237.9	340	310	21.0	39.0	27
HE 320 AA	74.2	301	300	8.0	11.0	27
HE 320 A	97.6	310	300	9.0	15.5	27
HE 320 B	126.7	320	300	11.5	20.5	27
HE 320 M	245.0	359	309	21.0	40.0	27
HE 340 AA	78.9	320	300	8.5	11.5	27
HE 340 A	104.8	330	300	9.5	16.5	27
HE 340 B	134.2	340	300	12.0	21.5	27
HE 340 M	247.9	377	309	21.0	40.0	27
HE 360 AA	83.7	339	300	9.0	12.0	27
HE 360 A	112.1	350	300	10.0	17.5	27
HE 360 B	141.8	360	300	12.5	22.5	27
HE 360 M	250.3	395	308	21.0	40.0	27
HE 400 AA	92.4	378	300	9.5	13.0	27
HE 400 A	124.8	390	300	11.0	19.0	27
HE 400 B	155.3	400	300	13.5	24.0	27
HE 400 M	255.7	432	307	21.0	40.0	27
HE 450 AA	99.7	425	300	10.0	13.5	27
HE 450 A	139.8	440	300	11.5	21.0	27
HE 450 B	171.1	450	300	14.0	26.0	27
HE 450 M	263.3	478	307	21.0	40.0	27



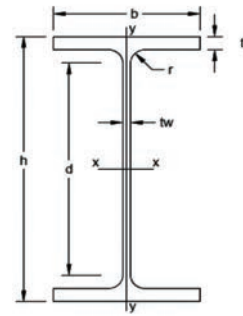


# STEEL SECTIONS EN STANDARD

## HE

European Wide Flange Beams As per Euronorm 19-57 / DIN 1025

Product		Dimensions				
Designation	Mass per meter (G) kg/m	Web height (h) mm	Flange width (b) mm	Web thickness (t <sub>w</sub> ) mm	Flange thickness (t <sub>f</sub> ) mm	Root radius (r) mm
HE 500 AA	107.4	472	300	10.5	14.0	27
HE 500 A	155.1	490	300	12.0	23.0	27
HE 500 B	187.3	500	300	14.5	28.0	27
HE 500 M	270.3	524	306	21.0	40.0	27
HE 550 AA	120.0	522	300	11.5	15.0	27
HE 550 A	166.2	540	300	12.5	24.0	27
HE 550 B	199.4	550	300	15.0	29.0	27
HE 550 M	278.2	572	306	21.0	40.0	27
HE 600 AA	128.8	571	300	12.0	15.5	27
HE 600 A	177.8	590	300	13.0	25.0	27
HE 600 B	211.9	600	300	15.5	30.0	27
HE 600 M	285.5	620	305	21.0	40.0	27
HE 650 AA	138.0	620	300	12.5	16.0	27
HE 650 A	189.7	640	300	13.5	26.0	27
HE 650 B	224.8	650	300	16.0	31.0	27
HE 650 M	293.4	668	305	21.0	40.0	27
HE 700 AA	149.9	670	300	13.0	17.0	27
HE 700 A	204.5	690	300	14.5	27.0	27
HE 700 B	240.5	700	300	17.0	32.0	27
HE 700 M	300.7	716	304	21.0	40.0	27
HE 800 AA	171.5	770	300	14.0	18.0	30
HE 800 A	224.4	790	300	15.0	28.0	30
HE 800 B	262.3	800	300	17.5	33.0	30
HE 800 M	317.3	814	303	21.0	40.0	30
HE 900 AA	198.0	870	300	15.0	20.0	30
HE 900 A	251.6	890	300	16.0	30.0	30
HE 900 B	291.5	900	300	18.5	35.0	30
HE 900 M	332.5	910	302	21.0	40.0	30
HE 1000 AA	221.5	970	300	16.0	21.0	30
HE 1000 x 249	248.7	980	300	16.5	26.0	30
HE 1000 A	272.3	990	300	16.5	31.0	30
HE 1000 B	314.0	1000	300	19.0	36.0	30
HE 1000 M	348.7	1008	302	21.0	40.0	30
HE 1000 x 393	392.7	1016	303	24.4	43.9	30
HE 1000 x 415	415.0	1020	304	26.0	46.0	30
HE 1000 x 438	436.9	1026	305	26.9	49.0	30
HE 1000 x 487	486.6	1036.1	308.5	30.0	54.1	30

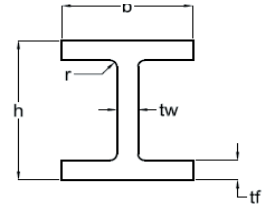




# STEEL SECTIONS **BS** STANDARD

## UB Universal Beams as per BS4-1:2005

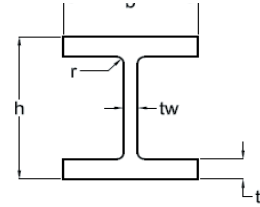
Product		Dimensions				
Designation	Mass per meter (G) kg/m	Web height (h) mm	Flange width (b) mm	Web thickness (t <sub>w</sub> ) mm	Flange thickness (t <sub>f</sub> ) mm	Root radius (r) mm
UB 254 x 146 x 31	31.1	251.4	146.1	6.0	8.6	7.6
UB 254 x 146 x 37	37.0	256.0	146.4	6.3	10.9	7.6
UB 254 x 146 x 43	43.0	259.6	147.3	7.2	12.7	7.6
UB 305 x 127 x 37	37.0	304.4	123.4	7.1	10.7	8.9
UB 305 x 127 x 42	41.9	307.2	124.3	8.0	12.1	8.9
UB 305 x 127 x 48	48.1	311.0	125.3	9.0	14.0	8.9
UB 305 x 165 x 40	40.3	303.4	165.0	6.0	10.2	8.9
UB 305 x 165 x 46	46.1	306.6	165.7	6.7	11.8	8.9
UB 305 x 165 x 54	54.0	310.4	166.9	7.9	13.7	8.9
UB 356 x 127 x 33	33.1	349.0	125.4	6.0	8.5	10.2
UB 356 x 127 x 39	39.1	353.4	126.0	6.6	10.7	10.2
UB 356 x 171 x 45	45.0	351.4	171.1	7.0	9.7	10.2
UB 356 x 171 x 51	51.0	355.0	171.5	7.4	11.5	10.2
UB 356 x 171 x 57	57.0	358.0	172.2	8.1	13.0	10.2
UB 356 x 171 x 67	67.1	363.4	173.2	9.1	15.7	10.2
UB 406 x 140 x 39	39.0	398.0	141.8	6.4	8.6	10.2
UB 406 x 140 x 46	46.0	403.2	142.2	6.8	11.2	10.2
UB 406 x 178 x 54	54.1	402.6	177.7	7.7	10.9	10.2
UB 406 x 178 x 60	60.1	406.4	177.9	7.9	12.8	10.2
UB 406 x 178 x 67	67.1	409.4	178.8	8.8	14.3	10.2
UB 406 x 178 x 74	74.2	412.8	179.5	9.5	16.0	10.2
UB 457 x 152 x 52	52.3	449.8	152.4	7.6	10.9	10.2
UB 457 x 152 x 60	59.8	454.6	152.9	8.1	13.3	10.2
UB 457 x 152 x 67	67.2	458.0	153.8	9.0	15.0	10.2
UB 457 x 152 x 74	74.2	462.0	154.4	9.6	17.0	10.2
UB 457 x 152 x 82	82.1	465.8	155.3	10.5	18.9	10.2
UB 457 x 191 x 67	67.1	453.4	189.9	8.5	12.7	10.2
UB 457 x 191 x 74	74.3	457.0	190.4	9.0	14.5	10.2
UB 457 x 191 x 82	82.0	460.0	191.3	9.9	16.0	10.2
UB 457 x 191 x 89	89.3	463.4	191.9	10.5	17.7	10.2
UB 457 x 191 x 98	98.3	467.2	192.8	11.4	19.6	10.2
UB 533 x 210 x 82	82.2	528.3	208.8	9.6	13.2	12.7
UB 533 x 210 x 92	92.1	533.1	209.3	10.1	15.6	12.7
UB 533 x 210 x 101	101.0	536.7	210.0	10.8	17.4	12.7
UB 533 x 210 x 109	109.0	539.5	210.8	11.6	18.8	12.7
UB 533 x 210 x 122	122.0	544.5	211.9	12.7	21.3	12.7
UB 610 x 229 x 101	101.2	602.6	208.6	10.5	14.8	12.7
UB 610 x 229 x 113	113.0	607.6	207.6	11.1	17.3	12.7
UB 610 x 229 x 125	125.1	612.2	207.2	11.9	19.6	12.7
UB 610 x 229 x 140	139.9	617.2	207.2	13.1	22.1	12.7
UB 610 x 305 x 149	149.1	612.4	305.8	11.8	19.7	16.5
UB 610 x 305 x 179	179.0	620.2	305.8	14.1	23.6	16.5
UB 610 x 305 x 238	238.1	635.8	305.8	18.4	31.4	16.5
UB 686 x 254 x 125	125.2	677.9	254.0	11.7	16.2	15.2



# STEEL SECTIONS **BS** STANDARD

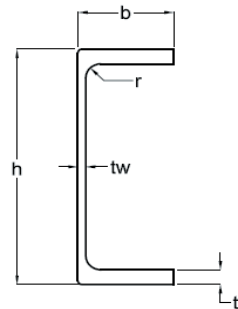
## UC Universal Columns As per BS4-1:2005

Product		Dimensions				
Designation	Mass per meter (G) kg/m	Web height (h) mm	Flange width (b) mm	Web thickness (t <sub>w</sub> ) mm	Flange thickness (t <sub>f</sub> ) mm	Root radius (r) mm
UC 203 x 203 x 46	46.1	203.2	203.6	7.2	11.0	10.2
UC 203 x 203 x 52	52.0	206.2	204.3	7.9	12.5	10.2
UC 203 x 203 x 60	60.0	209.6	205.8	9.4	14.2	10.2
UC 203 x 203 x 71	71.0	215.8	206.4	10.0	17.3	10.2
UC 203 x 203 x 86	86.1	222.2	209.1	12.7	20.5	10.2
UC 254 x 254 x 73	73.1	254.1	254.6	8.6	14.2	12.7
UC 254 x 254 x 89	88.9	260.3	256.3	10.3	17.3	12.7
UC 254 x 254 x 107	107.1	266.7	258.8	12.8	20.5	12.7
UC 254 x 254 x 132	132.0	276.3	261.3	15.3	25.3	12.7
UC 254 x 254 x 167	167.1	289.1	265.2	19.2	31.7	12.7
UC 305 x 305 x 97	96.9	307.9	305.3	9.9	15.4	15.2
UC 305 x 305 x 118	117.9	314.5	307.4	12.0	18.7	15.2
UC 305 x 305 x 137	136.9	320.5	309.2	13.8	21.7	15.2
UC 305 x 305 x 158	158.1	327.1	311.2	15.8	25.0	15.2
UC 305 x 305 x 198	198.1	339.9	314.5	19.1	31.4	15.2
UC 305 x 305 x 240	240.0	352.5	318.4	23.0	37.7	15.2
UC 305 x 305 x 283	282.9	365.3	322.2	26.8	44.1	15.2
UC 356 x 368 x 129	129.0	355.6	368.6	10.4	17.5	15.2
UC 356 x 368 x 153	152.9	362.0	370.5	12.3	20.7	15.2
UC 356 x 368 x 177	177.0	368.2	372.6	14.4	23.8	15.2
UC 356 x 368 x 202	201.9	374.6	374.7	16.5	27.0	15.2
UC 356 x 406 x 235	235.1	381.0	394.8	18.4	30.2	15.2
UC 356 x 406 x 287	287.1	393.6	399.0	22.6	36.5	15.2
UC 356 x 406 x 340	339.9	406.4	403.0	26.6	42.9	15.2
UC 356 x 406 x 393	393.0	419.0	407.0	30.6	49.2	15.2
UC 356 x 406 x 467	467.0	436.6	412.2	35.8	58.0	15.2
UC 356 x 406 x 551	551.0	455.6	418.5	42.1	67.5	15.2
UC 356 x 406 x 634	633.9	474.6	424.0	47.6	77.0	15.2



## PFC Parallel Flange Channels As per BS4-1:2005

Product		Dimensions				
Designation	Mass per meter (G) kg/m	Web height (h) mm	Flange width (b) mm	Web thickness (t <sub>w</sub> ) mm	Flange thickness (t <sub>f</sub> ) mm	Root radius (r) mm
PFC 200 x 75 x 23	23.4	200	75	6.0	12.5	12
PFC 300 x 100 x 46	45.5	300	100	9.0	16.5	15
PFC 380 x 100 x 54	54.0	380	100	9.5	17.5	15
PFC 430 x 100 x 64	64.4	430	100	11.0	19.0	15



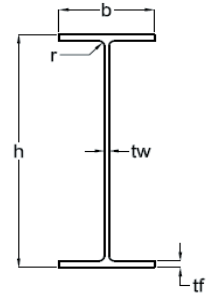




## STEEL SECTIONS **ASTM** STANDARD

### W sections

Product		Dimensions				
Designation	Mass per meter (G) kg/m	Web height (h) mm	Flange width (b) mm	Web thickness (t <sub>w</sub> ) mm	Flange thickness (t <sub>f</sub> ) mm	Root radius (r) mm
W 610 x 178 x 82	82.00	599.00	178.00	10.00	12.80	13.00
W 610 x 178 x 92	92.00	603.00	179.00	10.90	15.00	13.00
W 610 x 229 x 101	101.00	603.00	228.00	10.50	14.90	13.00
W 610 x 229 x 113	113.00	608.00	228.00	11.20	17.30	13.00
W 610 x 229 x 125	125.00	612.00	229.00	11.90	19.60	13.00
W 610 x 229 x 140	140.00	617.00	230.00	13.10	22.20	13.00
W 610 x 229 x 153	153.00	623.00	229.00	14.00	24.90	13.00
W 610 x 324 x 155	155.00	611.00	324.00	12.70	19.00	13.00
W 610 x 324 x 174	174.00	616.00	325.00	14.00	21.60	13.00
W 610 x 324 x 195	195.00	622.00	327.00	15.40	24.40	13.00
W 610 x 324 x 217	217.00	628.00	328.00	16.50	27.70	13.00
W 610 x 324 x 241	241.00	635.00	329.00	17.90	31.00	13.00
W 610 x 324 x 262	262.00	641.00	327.00	19.00	34.00	13.00
W 610 x 324 x 285	285.00	647.00	329.00	20.60	37.10	13.00
W 610 x 324 x 341	341.00	661.00	333.00	24.40	43.90	13.00
W 686 x 254 x 125	125.00	678.00	253.00	11.70	16.30	15.00
W 686 x 254 x 140	140.00	684.00	254.00	12.40	18.90	15.00
W 686 x 254 x 152	152.00	688.00	254.00	13.10	21.10	15.00
W 686 x 254 x 170	170.00	693.00	256.00	14.50	23.60	15.00



# STEEL SECTIONS **ASTM** STANDARD

## W sections

Product		Dimensions				
Designation	Mass per meter (G) kg/m	Web height (h) mm	Flange width (b) mm	Web thickness (t <sub>w</sub> ) mm	Flange thickness (t <sub>f</sub> ) mm	Root radius (r) mm
W 686 x 254 x 192	192.00	702.00	254.00	15.50	27.90	15.00
W 762 x 267 x 147	147.00	753.00	265.00	13.20	17.00	17.00
W 762 x 267 x 161	161.00	758.00	266.00	13.80	19.30	17.00
W 762 x 267 x 173	173.00	762.00	267.00	14.40	21.60	17.00
W 762 x 267 x 185	185.00	766.00	267.00	14.90	23.60	17.00
W 762 x 267 x 196	196.00	770.00	268.00	15.60	25.40	17.00
W 762 x 267 x 220	220.00	779.00	266.00	16.50	30.00	17.00
W 838 x 292 x 176	176.00	835.00	292.00	14.00	18.80	18.00
W 838 x 292 x 193	193.00	840.00	292.00	14.70	21.70	18.00
W 838 x 292 x 210	210.00	846.00	293.00	15.40	24.40	18.00
W 838 x 292 x 226	226.00	851.00	294.00	16.10	26.80	18.00
W 838 x 292 x 251	251.00	859.00	292.00	17.00	31.00	18.00
W 914 x 305 x 201	201.00	903.00	304.00	15.20	20.10	19.00
W 914 x 305 x 223	223.00	911.00	304.00	15.90	23.90	19.00
W 914 x 305 x 238	238.00	915.00	305.00	16.50	25.90	19.00
W 914 x 305 x 253	253.00	919.00	306.00	17.30	27.90	19.00
W 914 x 305 x 271	271.00	923.00	307.00	18.40	30.00	19.00
W 914 x 305 x 289	289.00	927.00	308.00	19.40	32.00	19.00
W 914 x 305 x 313	313.00	932.00	309.00	21.10	34.50	19.00
W 914 x 419 x 342	342.00	912.00	418.00	19.30	32.00	24.00
W 914 x 419 x 365	365.00	916.00	417.00	20.30	34.30	24.00
W 914 x 419 x 387	387.00	921.00	420.00	21.30	36.60	24.00
W 914 x 419 x 417	417.00	928.00	422.00	22.50	39.90	24.00
W 914 x 419 x 446	446.00	933.00	423.00	24.00	42.70	24.00
W 914 x 419 x 488	488.00	942.00	422.00	25.90	47.00	24.00
W 914 x 419 x 344	344.00	927.00	418.00	19.30	32.00	19.00
W 914 x 419 x 36	368.00	931.00	419.00	20.30	34.30	19.00
W 914 x 419 x 390	390.00	936.00	420.00	21.30	36.60	19.00
W 914 x 419 x 419	420.00	943.00	422.00	22.50	39.90	19.00
W 914 x 419 x 449	449.00	948.00	423.00	24.00	42.70	19.00
W 914 x 419 x 491	491.00	957.00	422.00	25.90	47.00	19.00
W 1016 x 305 x 222	222.00	970.00	300.00	16.00	21.10	30.00
W 1016 x 305 x 249	249.00	980.00	300.00	16.50	26.00	30.00
W 1016 x 305 x 272	272.00	990.00	300.00	16.50	31.00	30.00
W 1016 x 305 x 314	314.00	1000.00	19.10	35.90	9.30	30.00
W 1016 x 305 x 350	350.00	1008.00	302.00	21.10	40.00	30.00
W 1016 x 305 x 393	393.00	1016.00	303.00	24.40	43.90	30.00
W 1016 x 305 x 415	415.00	1020.00	304.00	26.00	46.00	30.00
W 1016 x 305 x 438	438.00	1026.00	305.00	26.90	49.00	30.00
W 1016 x 305 x 486	486.00	1036.00	308.00	30.00	54.10	30.00



## COLD FORMED SHEET PILES (CUSTOM MADE)

### ADVANTAGES:

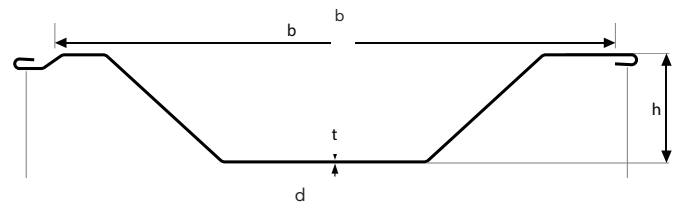
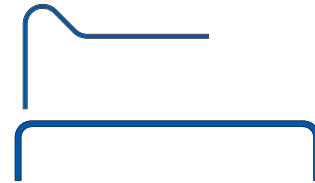
- **Larger effective width = fewer interlock seals**
- **Less material = lower weight per m<sup>2</sup>**
- **Suitable for smaller series**
- **Short delivery times**
- **Alternative to tropical hardwood**

Cold rolled or cold-formed sheet piling is produced to order for our customers. The dimensions, weight and technical specifications of this sheet piling exactly match the values laid down in the building specifications.

Available in thicknesses up to 10 mm and lengths up to 18.000 mm. Below shows you the comparison between hot rolled sheet piles and our IBO cold-formed sheet piles in different thicknesses.

Our Omega Profiles are developed by certified engineers whereby your requirements are the basis. We will develop the most advantageously Profile with the required Modulus of Section. Your requirements regarding steelgrade, thickness, width, height will be considered. On demand you will receive a special profile which is specially developed for your Project.

On request we can make the required cover profile.





# TRENCH SHEETS

- Light to Medium weight piling profile
- Tailor made profiles and sizes upon request
- Designed to achieve a required weight to strength ratio, providing a safe working environment where normal sheet piling is not possible due to utilizes & services in and around the shoring area.
- Apt for Shallow excavations of large areas, where water table is deep.
- Easy to handle and install on site.
- Ideal for use with small walers and braces especially for pipe line trenches and man holes
- Flexible and apt suitable for temporary works.

*Meever India has a dedicated sales team and engineering professionals able to find the best and most efficient solution to provide support throughout your projects. We design and specify the sheets in accordance with the relevant standards and guidance documents which suits your project requirements. We ensure solutions that are cost-effective and tailored to your project. Solutions that are characterized by fast, on-time deliveries and guaranteed high quality standard product and services.*



## TRENCH SHEETS MANUFACTURING

Meever India Trench Sheets are available in a wide range of profiles and lengths are specified to support the vertical faces of most small to medium sized trenches and excavations.

Meever India Trench sheets are manufactured in Musaffah, Abu Dhabi, UAE in a variety of steel grades to BS EN 10.249 and are produced in different, length, width and thickness based on ISO 9001:2008 Quality Management System. Unless explicitly requested, our trench sheets are currently being supplied without pitching hole, but are available upon request and to be provided as standard at one end of the sheet.

We can handle large orders, but you can also place smaller orders easier as no order is taken "lightly". Our highest degree of service and commitment goes into fulfilling every order, regardless of size.

## TRENCH SHEET CONSTRUCTION SERVICE

Meever India have a wealth of experience in the construction industry. With our technical and operational team delivering projects safely in compliance with ISO 14.001 and OSHAS 18.001 (Health, Safety and Environmental System), on time completion of projects within budget for multitude of clients, Meever India are capable of meeting and exceeding any of your trench sheet expectations.

Meever India provides full range of services including, design, engineering, planning and construction shoring services and ensure installation and extractions of trench sheets conform to any demand of your projects. Our approach is to work in close contact with our Clients and engage key personnel to create best fit solutions on a project by project basis to enable us to remain the leading trench sheet piling specialist.



## BRACING SYSTEMS



Meever series Brace is a modular system designed & engineered to maintain excavation integrity, it allows flexibility on site and saves time and money. Most importantly it provides a safe working environment.

### Meever Series is

- The first of its kind, with removable hydraulic rams so the brace is not under hydraulic load
- Easy to install
- Versatile on site
- Time and money saving
- Easy fast assembly

0.5mtr, 1mtr, 2mtr, 3mtr & 6mtr Modules, Meever Series fits together with a full shear capacity joint, secured with one pin. This simple, easy assembly requires minimal training, saving time on site layout.

### Reduced Weight

The brace is lighter than conventional method of steel pipe strutting, therefore smaller machines can be used on site.

### Over-dig Allowance

The Meever series hydraulic unit extends up to 700mm, allowing an overall overlap of up to 200mm. This means that if over-digging occurs, the hydraulic unit can extend 200mm to cover the gap between the modules, creating dig flexibility and convenience on site.

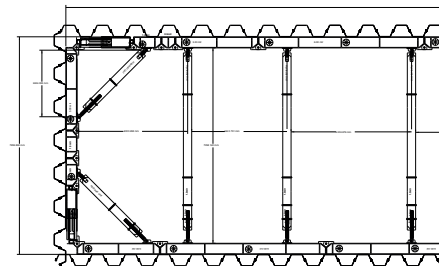
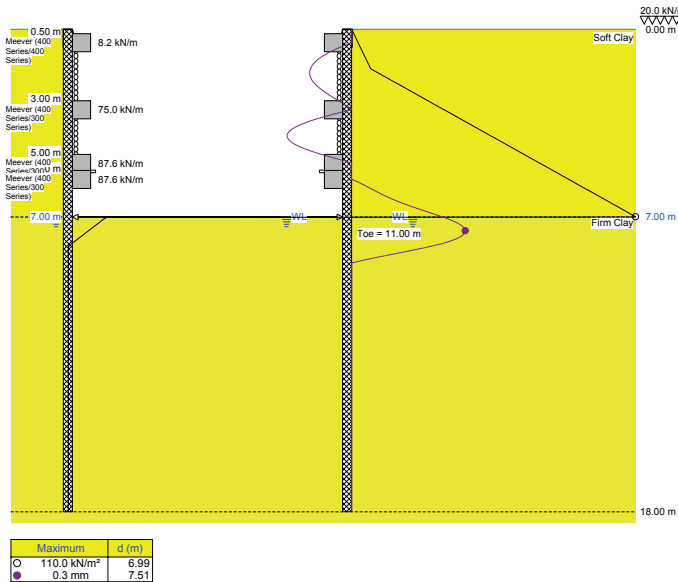
### Safe Cross Bracing

Cross brace connections points have been designed into the modules. This allows a positive connection between the module and the cross brace.

The speed of installation & extraction can be 30-40% faster than conventional welding of beams and struts, with 50% less labour required.

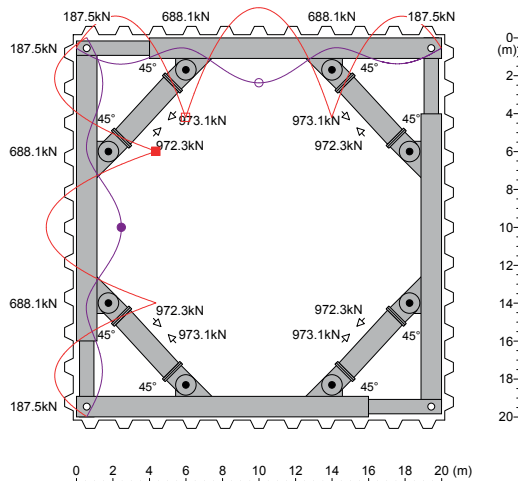


# BRACING SYSTEMS



	x (m)	R (kN)	M (kNm)
L = 20.00 m	0.00	187.5	0.0
400 Series:	6.00	688.1	442.3
E = 2.1E+08 kN/m²	14.00	688.1	442.3
I = 60180.0 cm⁴	20.00	187.5	0.0
M <sub>x</sub> = 1504.7 kNm			
	Maximum		x (m)
Bending Moment (kNm)	442.3	5.98	
Shear Force (kN)	351.7	5.97	
Deflection (mm)	9.0	10.00	

	x (m)	R (kN)	M (kNm)
B = 20.00 m	0.00	187.5	0.0
300 Series:	6.00	688.1	442.3
E = 2.1E+08 kN/m²	14.00	688.1	442.3
I = 25170.0 cm⁴	20.00	187.5	0.0
M <sub>x</sub> = 595.0 kNm			
	Maximum		x (m)
Bending Moment (kNm)	442.3	5.98	
Shear Force (kN)	351.7	5.97	
Deflection (mm)	21.4	10.00	



- Meever Series Brace can be used in conjunction with all Steel Sheet Piles U & Z Type, trench sheet.
- Meever Series is not restricted to size or shape it can be versatile in every aspect.
- Meever & Meever offer a preliminary design outlining the sheets and the amount of bracing needed to secure your excavations.





## TIE ROD SYSTEMS

### OUR SYSTEMS

#### Hollow bar system

Meever hollow bar systems are fully threaded and produced of high strength structural steel. Because of their composition and controlled fabrication, these steels have high yield strength, good impact strength and excellent weldability. The systems are selfdrilling, very suitable for drilling with percussion and also for high torque drilling without percussion and fast to install.

Our systems are made of hot rolled thick walled tubes in the steel grade S460NH and, our special steel, GM600. Both steel grades are produced according EN 10210-1 "Hot finished structural hollow sections of non alloy and fine grain steels" and have, thanks to their cleanliness and fine grain size, excellent capacity to the short time simultaneously dynamic loads (torque, frequent percussion impact, bending moments) during drilling as long term load and durability. When using a suitable drillhead in combination with sufficient drilling capacity these systems can be installed in every soil condition without serious problems.

Both anchoring systems fulfill the requirement of design according to the European standards:

- + EN 1537 Execution of special geotechnical works (Ground Anchors)
- + EN 14199 Execution of special geotechnical works (Micropiles)
- + EN 14490 Execution of special geotechnical works (Soil nailing)

The systems are suitable for both temporary and permanent applications. Corrosion protection can be realized by:

- + Sacrificial corrosion (design principal)
- + Galvanizing according to EN-ISO 1461
- + Duplex coating according to EN 15773

We offer a full scale stock of components as:

- + Couplings (with middle stop and controlled energy transmission)
- + Nuts (flat or conical)
- + Drill bits (different diameters and design, hardened and versions with carbide inserts)
- + Plates (standard and special designs)

Our large stock gives our clients the possibility to act fast. In consultation different sections, unit length and drill bits can be produced.

# TIE ROD SYSTEMS

## Bar systems

Our bar systems are fully threaded and produced of high strength structural steel. Because of their composition and controlled fabrication, these steels have high yield strength, good impact strength and excellent weldability.

The systems are made of hot rolled massive bars in the steel grade S355, S530 and S600.

All anchoring system fulfills the requirements of design following the European Standards:

- + EN 1537 Execution of special geotechnical works (Ground Anchors)
- + EN 14199 Execution of special geotechnical works (Micropiles)
- + EN 14490 Execution of special geotechnical works (Soil nailing)

The systems are suitable for both temporary and permanent applications. Corrosion protection can be realized by:

- + Sacrificial corrosion (design principal)
- + Double corrosion protection (sheeting in combination with grout cover)

We offer components as:

- + Couplings
- + Spacers
- + Nuts (flat or conical)
- + Plates (standard and special designs)

In consultation different sections can be produced.

## FIELD OF APPLICATION

Our systems can be used for the following applications:

### Civil engineering

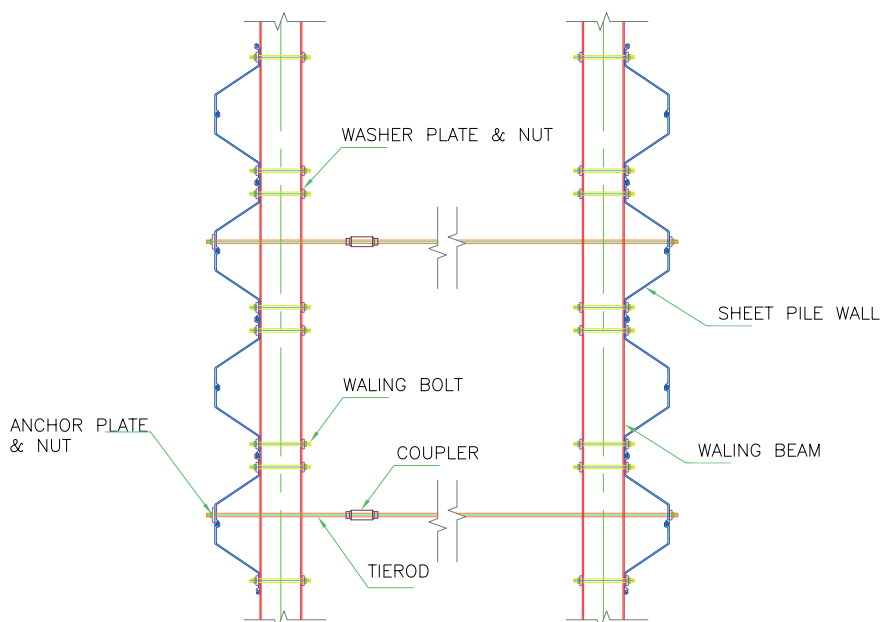
- + Reinforcement of excavation pits, retaining walls (sheet piles, combi-walls, qua walls, etc.)
- + Micro piles

### Pile foundations

- + Foundations of pylons, masts and wind mills
- + Injection works

### Underground mining and tunneling

- + Stabilization of portals, trenches
- + Rock bolting
- + Injection works





## RENTAL AND SALE - BUYBACK SERVICES

### Rental of sheet piles

Meever has a large inventory and several stocking locations with new and used sheet piles available for rent.

Meever maintains the rental fleet in the best possible condition and pays special attention to the sheet pile interlocks that need to be clean and straight every time we ship to our customers.

In case a monthly rental doesn't seem the right choice because the temporary construction stays in place for a relatively long time, we offer the option to purchase the sheet piles from us and we will buy them back after you finish the project for an agreed upon price. In combination with sheet piles we also provide pipes and structural steel for temporary applications. Meever is dedicated to making your rental with us a positive experience.

### Rental of piling equipment

Meever has experience with projects, contractors and equipment suppliers all over the world. We share our knowledge and contact in the field of equipment rentals with our clients and try to point them in the right direction whenever we can. Please ask us for information when you are looking to rent or vibratory or impact hammers, drilling rigs, cranes, hammer power packs and crane trestles.

### ABI MOBILRAM-system (UAE only)

Based on site experience ABI has re-designed the ABI MOBILRAM for even higher performance and safety. The new improved version features a stronger mast with even greater usable length. As option a docking system is available which allows the operator to change tools by a push of a button. Further new is a so called CAN-BUS control system with touch screen computer control panel. All control related joy sticks and elements are ergonomically designed and positioned for smooth operation. The engines fulfil the latest environmental standards.

With a large choice of attachments the telescopic leader masts can cover nearly all areas of special civil engineering from pile driving, drilling to pressing and up to impact pile driving.

### Multifunctional

If the machine is equipped with a vibrator all kinds of pile elements (steel sheet piles, lightweight sections, trench sheeting, beams, steel plates, etc.) can be driven or extracted. Among other things, an auger drive is used to drill or mix foundation and shoring piles.

With a Hydro-Press-System steel sheet pile sections can also be statically pressed into the ground at very low vibrations. And with a diesel hammer or hydraulic impact hammer the pile elements are impact driven into the ground.

The leader mast is the key component on the ABI MOBILRAM-System which guides all attachments for common and extraordinary pile driving, extracting, augering and static pressing operations. Usable pile or auger length up to 25 m are available through the model range.

### Low set up times

The set up times of an ABI MOBILRAM are very low with less than 30 minutes. To bring the unit back in transport configuration takes not longer. It is done in a one step operation. Vibrators and all other attachments are connected and disconnected quick and safe by the docking system.

### High Mobility

The ABI MOBILRAM can be transported on a low-loading truck. For the transport position the leader mast is folded down to the rear. The transport width can be reduced using telescopic under carriage.



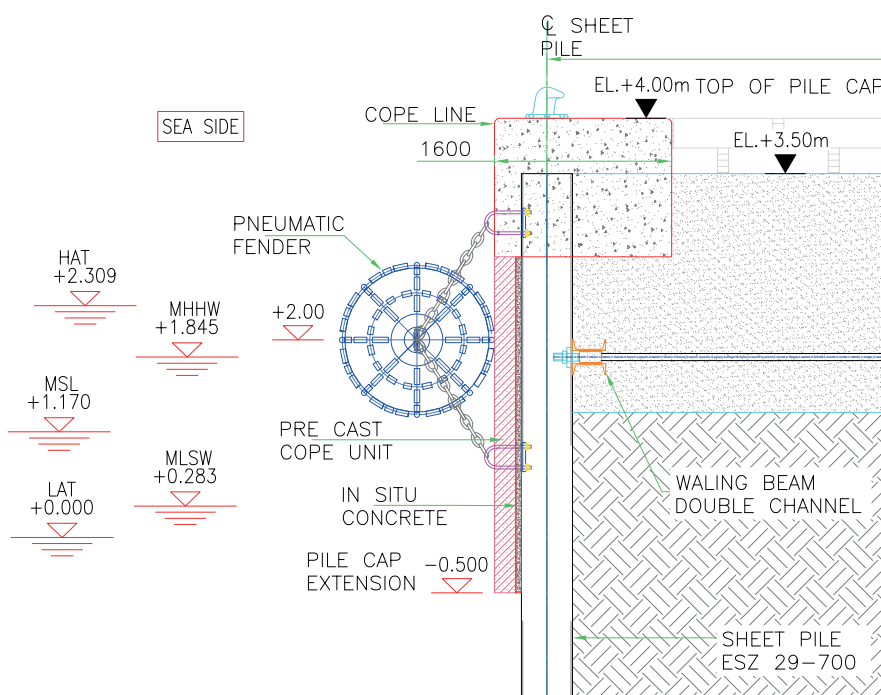
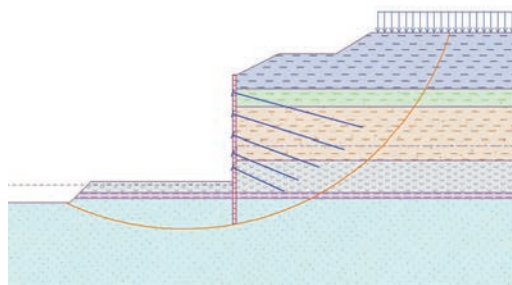
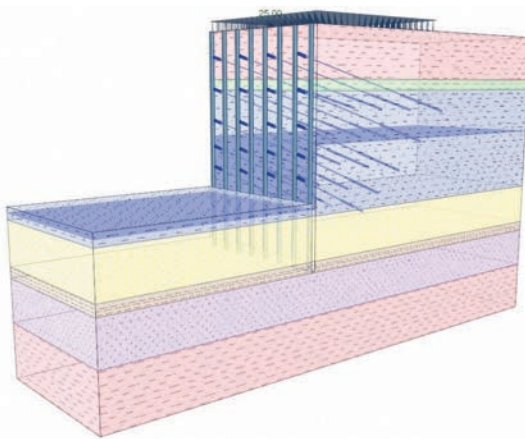
# PROJECT ENGINEERING

We consider ourselves a project partner and long term relationships with clients are a top priority. Our engineering department offers support with project design and value engineering and will provide cost efficient (alternate) designs and assistance to sell the concept to the project owner.

By designing and/or redesigning we are able to provide cost efficient solutions which are a benefit to all parties involved.

## Engineering and design services

- Geotechnical Analysis
- Structural Analysis
- Full Retaining Wall Detailed Design - Plaxis, ReWard, DC pit, Geo 5 and Wall app
- Sheet Pile and Combi Wall Design
- Fabrication Shop Drawings
- Detailed Project reports for major projects
- Project Management
- FEM Analysis methods
- Case Studies of problematic structures





## OUR SERVICES

### Fabrication

Meever provides offsite fabrication services. Cutting holes, welding studs, assembling double C-walrs, pairing sheet piles, splicing piles, attaching top or tip protectors prior to delivery to your jobsite. We will work with you to save time and money on the jobsite. Our engineering department can also help (re)designing fabrication for economy and increased productivity. We offer welding in accordance with AWS, ASMI or other welding standards.

### Blasting and painting

Meever provides a one stop solution for blasting and protective coating works for all structural steel from its well-equipped and controlled work shop in Abu Dhabi, from normal red oxide primers to marine based corrosive resistant paint systems. Meever works with all major paint suppliers to deliver an apt coating system and ensure that the final product meets its client requirement. Our major equipment is as follows.

- High pressure water Washing to clean the piles if required.
- Auto blasting by using mix of steel grit & steel shot with Sa 3.0 cleanliness standard.
- Auto blast unit easy transport to all locations.
- Manual Blasting using Grit / Garnet for small quantities & custom-made sections.
- Paint storage containers
- Airless spray-painting machines
- Auto painting machines for painting large areas
- All other conventional painting applications like brushes and roller.

All our blasting and painting works can be confirmed to all international standards like NACE, SSPC, ISO & ASTM.

All personals involved in blasting and protective coating works are experienced and trained time by time by major paint manufactures and experts in order to educate on trending techniques and to achieve better results.

### Galvanizing

Hot dip galvanizing is the process of coating with a layer of zinc alloy in a bath of molten zinc at temperature around 450 °C. As ISO 1461, ASTM A123, and EN10240, the galvanizing process has its own built-in means of quality control because zinc does not react with an unclean steel surface. So Surface Preparation is a critical step.

### Galvanizing process

- Degreasing** A hot alkali solution, mild acidic bath removes organic contaminants such as dirt, paint markings, grease, and oil from the metal surface.
- Pickling** A dilute solution by heated sulfuric acid or ambient hydrochloric acid, removes mill scale and iron oxides (rust) from the steel surface.
- Fluxing** A zinc ammonium chloride solution, removes any remaining oxides and deposits a protective layer prior to dip steel in bath.

According to ISO 1461, zinc coating thickness follows below form: Steel items are completely immersed in a bath of molten zinc. The bath chemistry is specified by ASTM B6, and requires at least 98% pure zinc, to form series of bonded zinc-iron alloy layers.

Steel thickness mm	Local coating thickness (minimum) $\mu\text{m}$	Average coating thickness (minimum) $\mu\text{m}$	Average coating mass (minimum) $\text{g/m}^2$
Steel >6	70	85	610
3 < steel $\leq$ 6	55	70	505
1.5 $\leq$ steel $\leq$ 3	45	55	395
steel <1.5	35	45	325



## OUR SERVICES

### Sealant

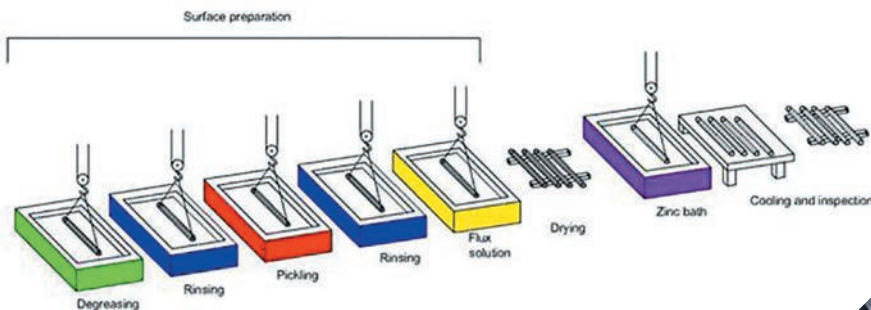
Meever offers supply and application of sealant for sheet pile interlocks. The sealant can be applied prior to delivery (at mill or Meever yard) or at project site upon customers request.

### Interlock sealant

With any sheet pile project where potential water leakage through the wall presents a problem, sealing the interlocks may be required. We can seal or weld the middle interlock of a pair which gives a 100% water tight seal. This solution is ideal when sheet piles are already paired and applying a sealant in the middle interlock is complicated.

The other option is to apply interlock sealant which drastically decreased the chance of water leaking through the interlocks. It can be used with all types of hot rolled and cold formed sheet piling interlocks.

- Bituminous sealant is a rubbery black substance that is heated to make it more fluid and easy to install in the sheet pile interlocks. When it cools down it stays in place and creates a good seal between the sheet pile interlocks. Examples of bituminous sealants are Pertex S or Wadit
- Hydrophilic Sealants have the ability to swell up to multiple times its original volume when it's in contact with water and it will seal off the locks. It can be applied before delivery to the jobsite but this sealant is also very easy to install in the field. Field installation increases the effectiveness of the sealant. Examples of hydrophilic sealants are SwellSeal and Adeka.







## QUALITY POLICY AND ENVIRONMENTAL POLICY

"REDUCING CONTINUOUSLY THE ENVIRONMENTAL IMPACT OF OUR OPERATIONS AND PRODUCTS."

### ENVIRONMENTAL POLICY

Meever strives and aims to achieve and maintain a management level in the scope of environmental protection. Our main focus is reducing continuously the environmental impact of our operations and products through the adoption of sustainable practices. Environmental performance is monitored and audited in meeting our level of policy objectives. Please contact us for more information and a brief description about our specific environmental goals and measurements.

### QUALITY POLICY

MEEVER INDIA is committed to provide superior quality products and services that meet applicable regulatory, statutory, and customer requirements by adhering to a quality management system that benefits our customers, employees and shareholders.

To meet our commitment, we must:

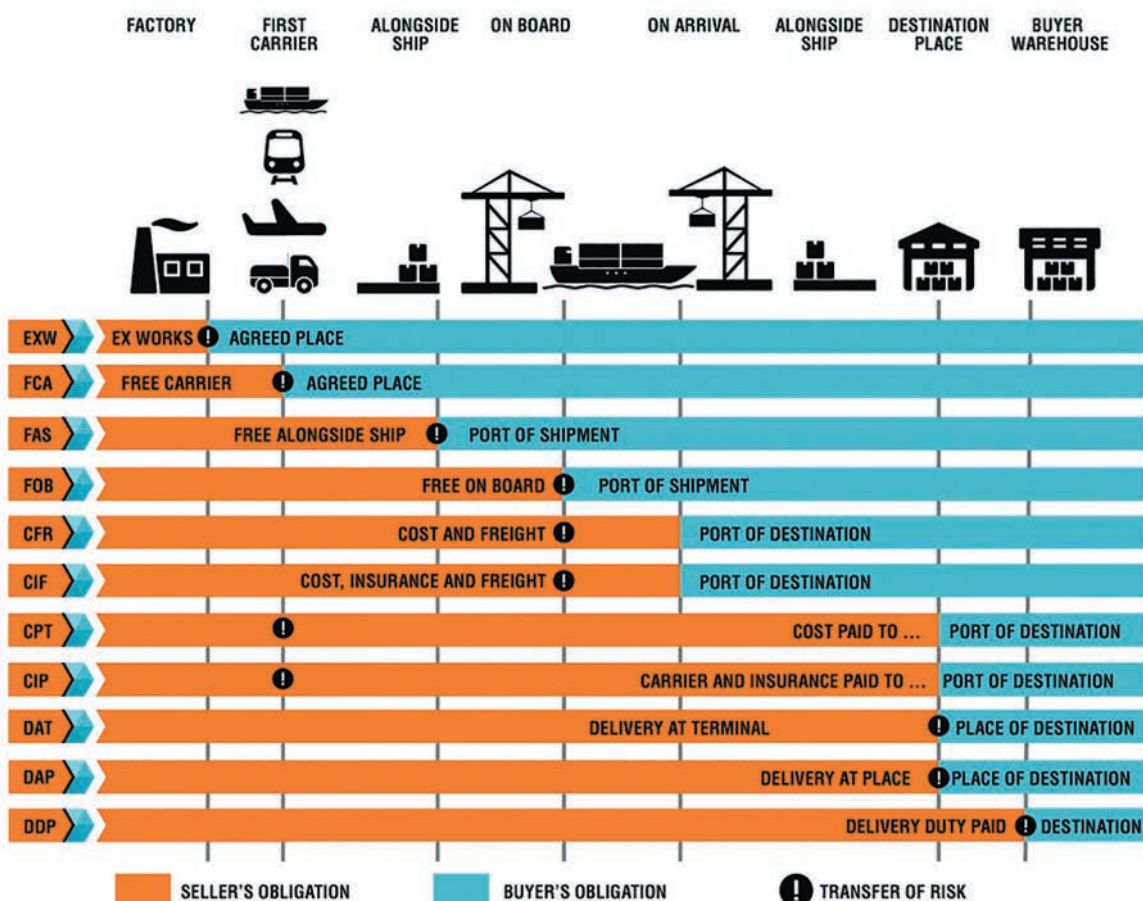
- Value our Customers through open communication, timely responses and continual improvement.
- Appreciate and foster an environment of trust, integrity, challenge and reward that attracts and retains the best employees in all positions throughout the company.
- Leverage efficient technology applied to all business processes in order to maintain a competitive advantage.
- Understand that our ultimate purpose is customer satisfaction.
- Ensure that our Quality Management System serves our customers needs.
- To empower all staff to understand the key characteristics of each and every new product before serial production commences.



# LOGISTICS SERVICES AND INCOTERMS

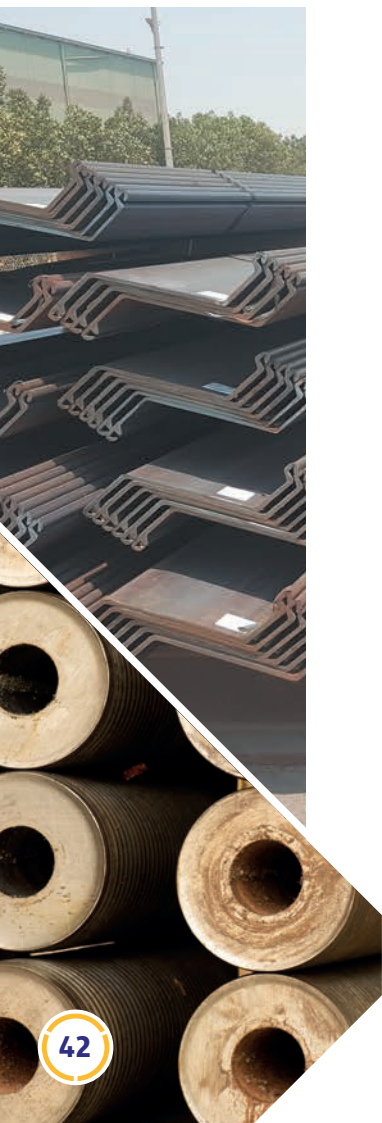
Meever offers a wide range of logistic services, road transportation and sea freight by containers and break bulk. From Meever stock yards and mills locations materials can be directly delivered to ports, warehouses and project sites. Meever can execute (on behalf of customers) all required port clearances, import services and domestic transportation.

## INCOTERMS® 2010



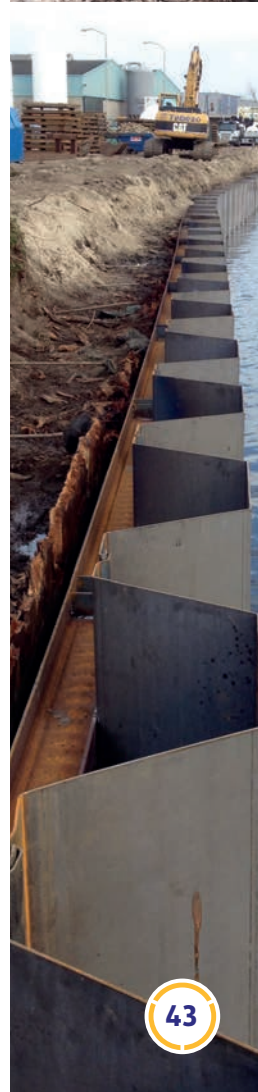


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## NOTES

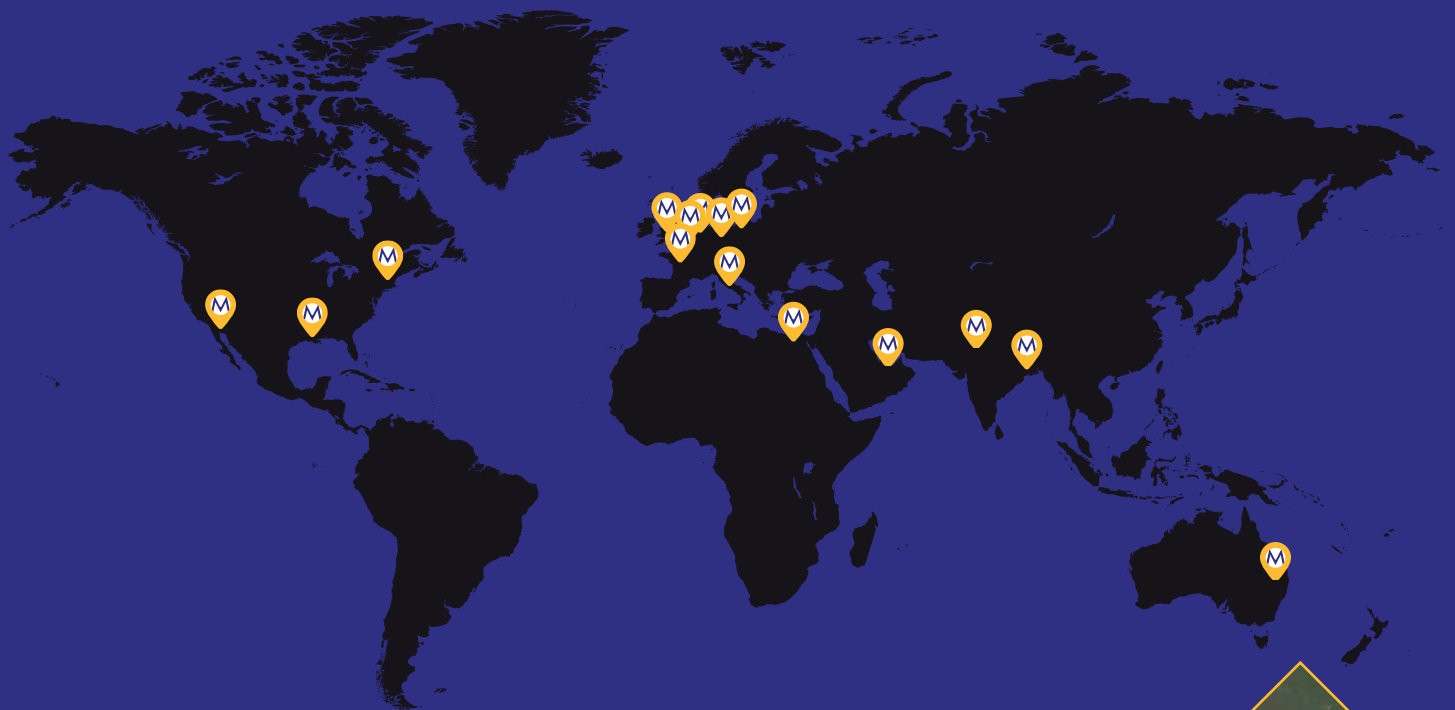




**MEEVER INDIA**



## MEEVER GLOBAL OFFICES AND STOCK LOCATIONS



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