DELIVERING **GLOBAL ENGINEERED SOLUTIONS** SINCE 1986

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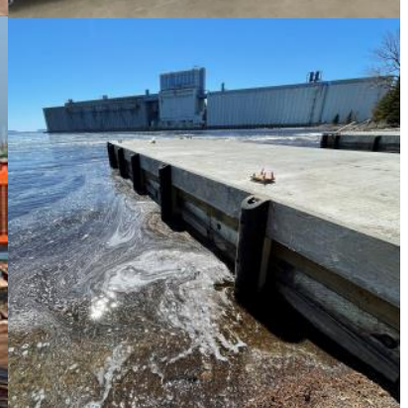

An Affiliate Of:

ESC GROUP

MARUBENI ITOCHU STEEL

ESC GROUP (MIDDLE EAST) GENERAL BRIEF

2023 Edition

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ESC Group

ABOUT ESC

Further to simply supplying products we at ESC take a different approach to piling which is tailored to the customers' requirements. ESC believes that just supplying a product is insufficient and we strive to provide a level of support that is beyond customer expectations. This support ranges from general advice on the Client's options to full engineering support and design. ESC has amongst its divisions expertise in marine equipment, corrosion, trench safety and structural steel fabrication.

ESC products are produced & designed in accordance with the latest international standards as well as ISO 9000 Quality Management Systems. Other specific standards depending on the client's needs can be applied on request.

ESC has designed and supplied its products to projects in every continent of the world, including Antarctica. In the last decade, ESC has successfully diversified into structural steel fabrication, synthetic sheet piling, cathodic protection, mooring bollards and marine fender systems to provide complete engineered solutions.

The Middle East construction sector has been one of the most prosperous in the Middle East over the last 10 years. ESC Group (Middle East) was formed to effectively service the Middle East construction industry.

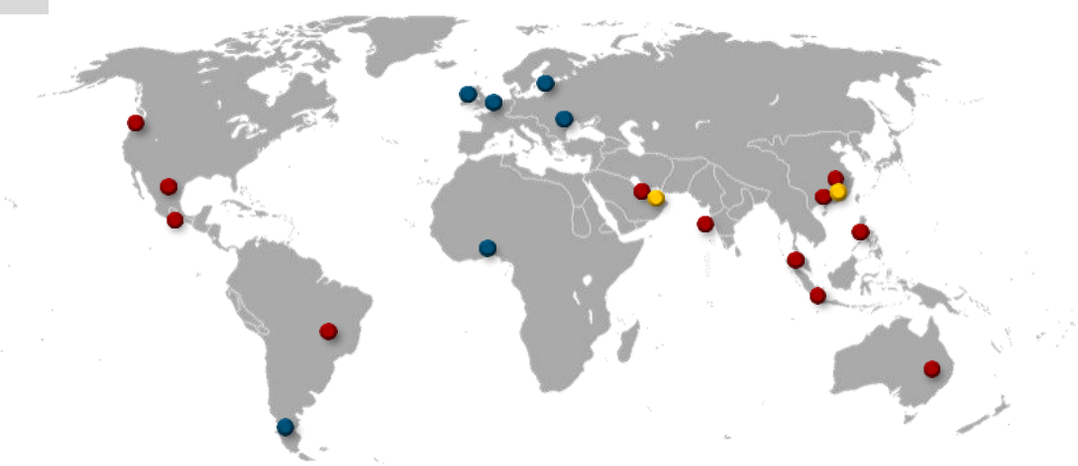
Kevin Ashdown

Managing Director

ESC Group (Middle East)

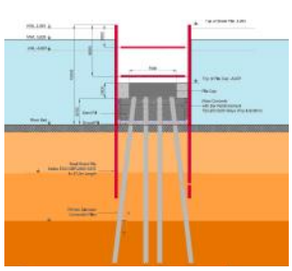
ESC GLOBAL LOCATIONS

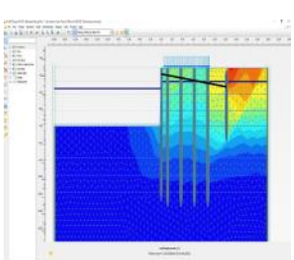
ESC Group operates with a strategic network of manufacturing, offices and agents to effectively serve its global client base.



ENGINEERING CAPABILITIES

ESC's engineering team provides a responsive service covering various disciplines: from geotechnical engineering, civil engineering, manufacturing engineering and materials engineering. Situated in offices at all continents around the world, with a tight-knit communication network, ESC has grown a highly technical team. The experience range of each ESC engineer varies between 1 year all the way up to over 50 years. Technical qualifications include Professional engineers, quality control and project management certification. ESC maintains up-to-date cutting edge software alongside internal and external training.





ESC is adept at conforming to various international design standards, covering European, American and other regional codes. On top of this, ESC is able to conform to client and project specific standards.

As part of its ISO certification, ESC ensures that all documentation is of a globally respected standard. ESC invests in Research & Development all the way from inception to the present. With over 20 global patents, ESC prides itself on developing it's internal technology and contributing to the overall civil engineering industry.

INSTALLATION

CAPABILITIES

ABU DHABI AIRPORT SHORING, UAE

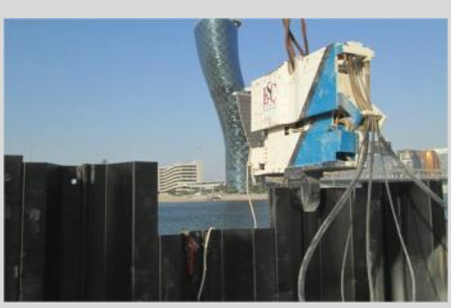
ESC UAE as part of the ESC Global Group was established in 2007 as a manufacturing, design and construction piling company. It has established itself as the central information hub for ESC Group for piling installation works with it's wealth of knowledge and experience in the field.

ESC UAE have been involved in various infrastructure works and offer a comprehensive range of piling solutions from design, supply and execution of temporary as well as permanent retention works.

The construction team together with the design engineers are well experienced to handle variable ground conditions to adopt suitable installation techniques and methods. These projects include road tunnels, pipelines, NDRC pits, manholes, jetties and others. ESC also have the experience in working both on-shore and off-shore environments.

To meet all kinds of piling requirements, ESC have the fleet of necessary equipment and manpower resources plus the large stock of sheet piles and shoring materials for carrying out the construction works in line with ESC's commitment and compliance to the International Standard for Quality Management System (ISO 9001:2015), Environmental Management System (ISO 14001:2015) and the Occupational Health and Safety Management System (OSHAS 18001:2007), to ensure continuous client satisfaction.

ESC as a result can quickly mobilise supervisors or entire teams & equipment to sites globally if the project scope warrants it.



STEEL SHEET PILES

U PROFILE SHEET PILES

THE MOST COMMMONLY USED U SHEET PILES

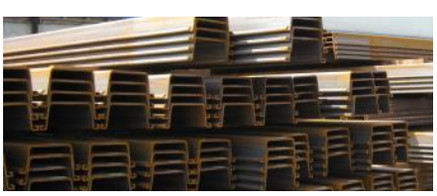
HOT ROLLED U SERIES

Type II, III, IV, V_L, V_{IL}

Type IIw to HRU30-600

HRU25-750

Section	Width (w) mm	Height (h) mm	Thickness Flange (t_f) mm	Thickness Web (t_w) mm	Cross Sectional Area cm²/m	Weight Per Pile kg/m	Weight Per Wall kg/m²	Elastic Section Modulus cm³/m	Moment of Inertia cm⁴/m	Coating Area (both sides per pile) m²/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 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 II_w	600	260	10.3	-	131.2	61.8	103.0	**1,000**	13,000	1.77
Type III_w	600	360	13.4	-	173.2	81.6	136.0	**1,800**	32,400	1.90
Type IV_w	600	420	18.0	-	225.5	106.0	177.0	**2,700**	56,700	1.99
Type VI_L	500	450	27.6	-	305.7	120.0	240.0	**3,820**	86,000	1.82



Section	Width (w) mm	Height (h) mm	Thickness Flange (t_f) mm	Thickness Web (t_w) mm	Cross Sectional Area cm²/m	Weight Per Pile kg/m	Weight Per Wall kg/m²	Elastic Section Modulus cm³/m	Moment of Inertia cm⁴/m	Coating Area (both sides per pile excluding inside of the) m²/m
HRU601-600	600	310	7.5	6.4	98.3	46.3	77.2	**744**	11,530	1.60
HRU602-600	600	310	8.2	8.0	113.3	53.4	89.0	**830**	12,870	1.60
HRU603-600	600	310	9.7	8.2	138.3	64.8	108.0	**1200**	18,600	1.69
HRU607-600	600	452	19.0	10.6	241.7	114.0	190.0	**3200**	72,320	1.91
HRU16-600	600	430	10.2	8.4	154.2	72.6	121.0	**1670**	35,950	1.74
HRU18-600	600	430	11.2	9.0	163.3	76.9	128.2	**1800**	38,650	1.74
HRU19-600	600	430	12.2	9.5	172.3	81.1	135.2	**1920**	41,320	1.74
HRU20-600	600	450	11.1	9.0	173.9	81.9	136.5	**2060**	46,380	1.80
HRU22-600	600	450	12.1	9.5	182.9	86.1	143.6	**2200**	49,460	1.80
HRU23-600	600	450	13.1	10.0	192.0	90.4	150.7	**2335**	52,510	1.80
HRU26-600	600	452	14.2	9.7	206.8	97.4	162.3	**2680**	60,580	1.86
HRU28-600	600	454	15.2	10.1	216.1	101.8	169.6	**2840**	64,460	1.86
HRU30-600	600	456	16.2	10.5	225.6	106.2	177.1	**3000**	68,380	1.86
HRU25-750	750	450	14.5	10.2	188.0	110.4	147.2	**2500**	56,240	2.06

HOT ROLLED NS-SP SERIES

NS-SP

Section	Width (w) mm	Height (h) mm	Thickness Flange (t_f) mm	Thickness Web (t_w) mm	Cross Sectional Area cm²/m	Weight Per Pile kg/m	Weight Per Wall kg/m²	Elastic Section Modulus cm³/m	Moment of Inertia cm⁴/m
NS-SP-10H	900	230	10.8	-	122.2	86.4	96.0	902	10,500
NS-SP-25H	900	300	13.2	-	160.4	113.0	126.0	1,610	24,400
NS-SP-45H	900	368	15.0	-	207.8	147.0	163.0	2,450	45,000
NS-SP-50H	900	370	17.0	-	236.3	167.0	186.0	2,760	51,100

HOT ROLLED FL SERIES

FL

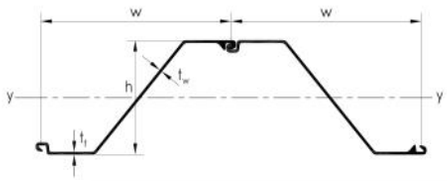
Section	Width (w) mm	Height (h) mm	Thickness (t) mm	Cross Sectional cm²/m	Weight Per Pile kg/m	Weight Per Wall kg/m²	Elastic Section cm³/m	Moment of Inertia cm⁴/m	Coating Area (both sides per pile) m²/m
FL1	500	45	9.5	157.2	61.7	123.4	89	396	1.39
FL2	500	47	12.7	196.7	77.2	154.4	121	570	1.41

STEEL SHEET PILES

Z PROFILE SHEET PILES

HIGHLY EFFICIENT HOT ROLLED Z SHEET PILES WITH A LARSSEN INTERLOCK

HOT ROLLED ESC-HRZ SERIES



Section	Width (w)	Height (h)	Thickness Flange (t_f)	Thickness Web (t_w)	Cross Sectional Area	Weight Per Pile	Weight Per Wall	Elastic Section Modulus	Moment of Inertia	Coating Area* (both sides per pile)
	mm	mm	mm	mm	cm²/m	kg/m	kg/m²	cm³/m	cm⁴/m	m²/m
ESC-HRZ12-770	770	344	8.5	8.5	93.0	72.8	94.5	1,250	21,500	1.96
ESC-HRZ13-770	770	344	9.0	9.0	97.4	76.2	99	1,300	22,430	1.96
ESC-HRZ14-770	770	345	9.5	9.5	101.8	79.6	103.4	1,360	23,370	1.96
ESC-HRZ17-700	700	420	8.5	8.5	93.0	73.3	104.7	1,740	36,430	1.97
ESC-HRZ18-700	700	421	9.0	9.0	97.4	76.7	109.6	1,810	38,000	1.97
ESC-HRZ19-700	700	421	9.5	9.5	101.8	80.2	114.6	1,880	39,580	1.97
ESC-HRZ20-700	700	422	10.0	10.0	106.2	83.7	119.5	1,950	41,160	1.97
ESC-HRZ24-700	700	459	11.2	11.2	122.1	95.8	136.9	2,440	55,950	2.05
ESC-HRZ26-700	700	460	12.2	12.2	131.2	103.0	147.1	2,600	59,840	2.05
ESC-HRZ27-700	700	461	12.7	12.7	135.5	106.4	152	2,680	61,640	2.05
ESC-HRZ28-700	700	461	13.2	13.2	140.3	110.1	157.3	2,760	63,740	2.05
ESC-HRZ36-700	700	499	15.0	11.2	151.3	118.7	169.6	3,600	89,750	2.18
ESC-HRZ38-700	700	500	16.0	12.2	161.2	126.5	180.7	3,800	94,980	2.18
ESC-HRZ40-700	700	501	17.0	13.2	171.1	134.3	191.8	4,000	100,220	2.18
ESC-HRZ42-700	700	499	18.0	14.0	182.1	143.0	204.2	4,230	105,540	2.17
ESC-HRZ44-700	700	500	19.0	15.0	192.0	150.7	215.3	4,440	110,940	2.17
ESC-HRZ46-700	700	501	20.0	16.0	201.9	158.5	226.5	4,640	116,160	2.17
ESC-HRZ48-700	700	503	22.0	15.0	203.0	159.3	227.6	4,790	120,470	2.17
ESC-HRZ50-700	700	504	23.0	16.0	212.4	166.7	238.2	4,970	125,360	2.17
ESC-HRZ52-700	700	505	24.0	17.0	222.1	174.3	249	5,160	130,400	2.17

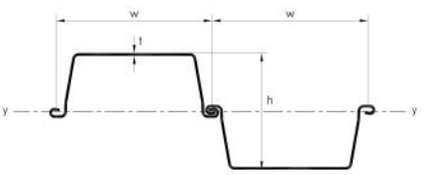
*excludes internal section of interlock

STEEL SHEET PILES

U PROFILE SHEET PILES

A REUSABLE AND ECONOMIC ALTERNATIVE TO HOT ROLLED U SHEET PILES

COLD ROLLED ESC-CRU SERIES



Section	Width (w)	Height (h)	Thickness (t)	Cross Sectional	Weight Per Pile	Weight Per Wall	Elastic Section	Moment of Inertia	Coating Area (both sides per pile)
	mm	mm	mm	cm²/m	kg/m	kg/m²	cm³/m	cm⁴/m	m²/m
ESC-CRU5-600	600	150	9.5	119.0	56.40	**94.0**	**510**	3,825	1.52
ESC-CRU7-600	600	340	6.0	98.1	46.20	**77.0**	**745**	12,665	1.96
ESC-CRU8-600	600	325	7.0	110.0	51.80	**86.3**	**825**	13,406	1.89
ESC-CRU11-600	600	360	8.0	131.6	62.00	**103.3**	**1,110**	19,980	1.98
ESC-CRU12-600	600	310	9.0	137.6	64.80	**108.0**	**1,200**	18,600	1.84
ESC-CRU12-700	700	440	7.5	123.0	67.60	**96.6**	**1,210**	26,620	2.30
ESC-CRU12-450	450	360	10.0	184.0	65.00	**144.4**	**1,250**	22,482	1.66
ESC-CRU12-600	600	200	7.5	77.8	61.07	**101.8**	**1,257**	25,143	2.08
ESC-CRU13-600	600	200	8.0	83.0	65.14	**108.6**	**1,337**	26,745	2.08
ESC-CRU15-600	600	200	9.0	93.4	73.28	**122.1**	**1,496**	29,921	2.08
ESC-CRU15-675	675	420	8.5	142.0	75.90	**112.0**	**1,520**	31,920	2.26
ESC-CRU16-400	400	290	11.5	203.8	64.00	**160.0**	**1,565**	22,693	1.42
ESC-CRU16-600	600	200	10.0	103.7	81.42	**135.7**	**1,653**	33,061	2.08
ESC-CRU17-500	500	420	12.0	224.0	88.00	**176.0**	**1,660**	34,860	1.87
ESC-CRU17-750	750	430	9.5	151.0	89.10	**119.0**	**1,670**	35,905	2.39
ESC-CRU18-750	750	460	9.0	150.3	88.50	**118.0**	**1,780**	40,940	2.51
ESC-CRU18-600	600	430	9.5	165.4	77.90	**129.8**	**1,800**	38,700	2.09
ESC-CRU20-750	750	460	10.0	164.4	96.80	**129.0**	**2,005**	46,115	2.47
ESC-CRU20-650	650	250	10.0	121.0	94.99	**146.1**	**2,029**	50,732	2.43
ESC-CRU20-650	650	540	8.0	150.1	76.60	**117.8**	**2,075**	56,025	2.44
ESC-CRU21-750	750	500	10.0	169.3	99.70	**133.0**	**2,080**	49,920	2.47
ESC-CRU22-600	600	500	10.0	186.6	87.90	**146.5**	**2,200**	55,000	2.24
ESC-CRU22-650	650	250	11.0	133.1	104.50	**160.8**	**2,222**	55,553	2.43
ESC-CRU23-750	750	480	10.5	173.4	102.10	**136.1**	**2,275**	54,600	2.48
ESC-CRU23-650	650	270	9.0	109.5	86.00	**132.3**	**2,295**	61,954	2.44
ESC-CRU23-700	700	270	9.0	114.0	89.52	**127.9**	**2,299**	62,060	2.54
ESC-CRU23-750	750	270	9.0	118.5	93.05	**124.1**	**2,302**	62,153	2.64
ESC-CRU24-650	650	250	12.0	145.2	114.00	**175.4**	**2,413**	60,331	2.43
ESC-CRU25-750	750	470	11.5	188.2	110.80	**147.7**	**2,500**	58,750	2.46

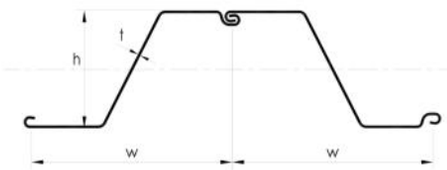
*excludes internal section of interlock

STEEL SHEET PILES

Z PROFILE SHEET PILES

HIGHLY EFFICIENT HOT ROLLED Z SHEET PILES WITH A LARSSEN INTERLOCK

COLD ROLLED ESC-CRZ SERIES



Section	Width (w)	Height (h)	Thickness Flange (t_f)	Thickness Web (t_w)	Cross Sectional Area	Weight Per Pile	Weight Per Wall	Elastic Section Modulus	Moment of Inertia	Coating Area (both sides per pile)
	mm	mm	mm	mm	cm²/m	kg/m	kg/m²	cm³/m	cm⁴/m	m²/m
ESC-CRZ12-700	700	440	6.0	6.0	89.9	49.52	**70.6**	**1,187**	26,124	2.11
ESC-CRZ13-670	670	303	9.5	9.5	139.0	73.10	**109.1**	**1,305**	19,776	1.98
ESC-CRZ13-770	770	344	8.5	8.5	120.4	72.75	**94.5**	**1,311**	22,747	2.20
ESC-CRZ14-670	670	304	10.5	10.5	154.9	81.49	**121.6**	**1,391**	21,148	2.00
ESC-CRZ14-650	650	320	8.0	8.0	125.7	64.11	**98.6**	**1,402**	22,431	2.06
ESC-CRZ14-770	770	345	10.0	10.0	138.5	83.74	**108.8**	**1,417**	24,443	2.15
ESC-CRZ15-750	750	469.5	7.75	7.75	112.5	66.25	**88.34**	**1,523**	35,753	2.19
ESC-CRZ16-700	700	470	7.0	7.0	110.4	60.68	**86.7**	**1,604**	37,684	2.22
ESC-CRZ17-700	700	420	8.5	8.5	132.1	72.57	**103.7**	**1,729**	36,439	2.19
ESC-CRZ18-630	630	380	9.5	9.5	152.1	75.24	**119.4**	**1,797**	34,135	2.04
ESC-CRZ18-700	700	420	9.0	9.0	139.3	76.55	**109.4**	**1,822**	38,480	2.19
ESC-CRZ18-630N	630	450	8.0	8.0	132.7	65.63	**104.2**	**1,839**	41,388	2.11
ESC-CRZ18-800	800	500	8.5	8.5	127.2	79.90	**99.8**	**1,858**	46,474	2.39
ESC-CRZ19-700	700	421	9.5	9.5	146.3	80.37	**114.8**	**1,870**	39,419	2.18
ESC-CRZ20-700	700	421	10.0	10.0	153.6	84.41	**120.6**	**1,946**	40,954	2.17
ESC-CRZ20-800	800	479	9.5	9.5	141.2	89.30	**111.6**	**2,053**	49,108	2.42
ESC-CRZ22-800	800	480	10.0	10.0	149.6	94.00	**117.5**	**2,167**	52,000	2.42
ESC-CRZ22-700	700	449	9.0	9.0	149.8	82.33	**117.6**	**2,250**	50,509	2.35
ESC-CRZ23-800	800	530	9.5	9.5	147.1	92.40	**115.5**	**2,332**	61,811	2.48
ESC-CRZ24-700	700	459	11.2	11.2	177.9	97.75	**139.6**	**2,442**	56,036	2.25
ESC-CRZ25-630	630	480	10.5	10.5	180.5	89.29	**141.7**	**2,515**	60,360	2.19
ESC-CRZ25-800	800	520	10.5	10.5	163.3	102.60	**128.0**	**2,501**	65,060	2.49
ESC-CRZ26-700	700	460	12.2	12.2	194.2	106.70	**152.4**	**2,602**	59,838	2.25
ESC-CRZ27-700	700	520	10.5	10.5	176.2	96.84	**138.4**	**2,695**	70,166	2.37
ESC-CRZ27-800	800	520	11.5	11.5	176.1	110.60	**138.2**	**2,670**	69,419	2.45
ESC-CRZ28-700	700	461	13.2	13.2	212.3	116.66	**166.7**	**2,765**	63,741	2.28
ESC-CRZ28-700-12mm	700	499	12.0	12.0	195.4	107.36	**153.4**	**2,801**	69,896	2.31
ESC-CRZ28-750	750	560	10.0	10.0	165.4	97.40	**129.8**	**2,813**	78,780	2.48
ESC-CRZ29-700	700	540	10.5	10.5	181.5	99.76	**142.5**	**2,959**	79,892	2.44
ESC-CRZ30-750	750	550	11.5	11.5	187.8	110.60	**147.4**	**3,006**	82,673	2.45
ESC-CRZ32-675	675	476	11.0	11.0	204.4	108.30	**160.4**	**3,279**	78,044	2.53
ESC-CRZ32-750	750	560	12.0	12.0	197.2	116.10	**154.8**	**3,202**	89,690	2.47
ESC-CRZ33-675	675	485	12.0	12.0	211.7	112.15	**166.2**	**3,292**	79,837	2.41
ESC-CRZ35-700	700	540	12.2	12.2	213.9	117.53	**167.9**	**3,567**	96,309	2.48
ESC-CRZ36-700	700	540	12.2	12.2	215.0	118.13	**168.8**	**3,609**	97,444	2.49
ESC-CRZ37-700	700	499	13.5	13.5	238.2	130.91	**187.0**	**3,728**	93,020	2.50
ESC-CRZ38-700	700	560	13.0	13.0	231.3	127.14	**181.6**	**3,868**	108,291	2.68
ESC-CRZ40-700	700	580	13.0	13.0	234.9	129.09	**184.4**	**4,015**	112,427	2.58
ESC-CRZ44-700	700	580	14.0	14.0	258.3	141.95	**202.8**	**4,443**	128,841	2.61
ESC-CRZ46-700N	700	580	14.5	14.5	268.2	147.35	**210.5**	**4,623**	134,076	2.62
ESC-CRZ48-700	700	590	15.0	15.0	284.4	156.27	**223.2**	**4,832**	142,846	2.68
ESC-CRZ48-585-14.5mm	580	540	14.5	14.5	305.5	139.10	**239.8**	**4,838**	130,760	2.47
ESC-CRZ50-580-14.0mm	580	580	14.0	14.0	294.6	134.13	**231.3**	**5,037**	140,004	2.47
ESC-CRZ50-580	580	580	16.0	16.0	322.3	146.74	**253.0**	**5,023**	145,657	2.37

*excludes internal section of interlock

STEEL PIPE PILES & COMBINED WALL SYSTEMS

PRODUCT LINE

PIPE FORMING CAPABILITIES

S: Spiral Submerged Arc Welded (SSAW) Pipe
L: Longitudinal Submerged Arc Welded (LSAW) Pipe

OD (mm)	Thickness (mm)															
	6	7	8	9	10	12	14	16	18	20	22	25	30	40	50	60
400	S	S	S	L,S	L,S	L,S	L,S	L	L	L	L	L	L	L	L	
450	S	S	S	L,S	L,S	L,S	L,S	L,S	L	L	L	L	L	L	L	
500	S	S	S	L,S	L,S	L,S	L,S	L,S	L	L	L	L	L	L	L	L
600	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L	L	L
700	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L	L	L
800	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
900	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
1,000	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
1,200	S	S	S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
1,400				L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
1,500				S	S	L,S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
1,600						S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
1,800						S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
2,000						S	L,S	L,S	L,S	L,S	L,S	L,S	L	L	L	L
2,200							L	L,S	L,S	L,S	L,S	L,S	L	L	L	L
2,500							L	L,S	L,S	L,S	L,S	L,S	L	L	L	L
3,000								S	L,S	L,S	L,S	L,S	L	L	L	L

PRODUCTION STANDARDS

Standard	Description
API 5L	Specification of Line Pipe
ASTM 252	Standard Specification for Welded and
BS EN 10219	Cold Formed Welded Structural Hollow Sections of non-alloy and fine grain steels.
ISO 3183	Steel Pipe for Pipeline Transportation
GB/T 9711	Steel Pipe for Pipeline Transportation

STEEL GRADES

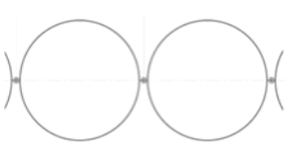
Standard	Description
EN10219-1	S235JRH , S275JOH, S355JOH, S420MH, S460MH
API5L	X42, X46, X52, X56, X60, X65, X70
Others	Available on Request, contact ESC for further information

COMBINED WALL & PIPE-PIPE SYSTEMS

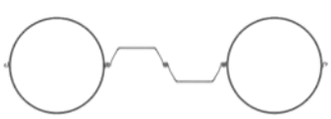
A King Pile Combination Wall System consists of Steel Pipe Piles or H Piles that withstand most of the loading and Infill Sheet Piles that transmit pressure loads to the King Piles.

The King Piles serve two purposes from a structural standpoint, the first being as a retaining member that resists horizontal hydrostatic and earth pressures. The second purpose is to act as a bearing pile, resisting vertical loads. King Pile Combination Walls are generally utilised when a standard series of sheet piles do not have the strength to resist the required design loads. Integration with Tie Back Systems and other anchorages is simple and ESC can offer the full configuration as part of its piling solution package. Frequently infill sheet piles are not required to be the same length as the King piles – typically between 60 to 100% of the King Pile length.

Pipe-Pipe System



Pipe-2U System

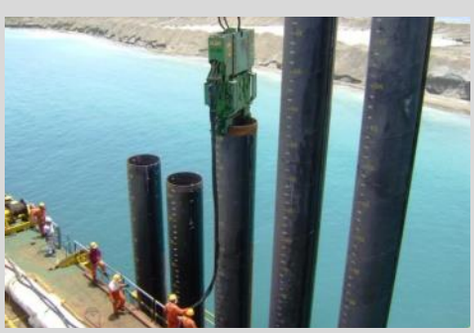


Pipe-2Z Combined Wall

H-2Z System

Standard Connector Series (Others Available)

2H-2Z System

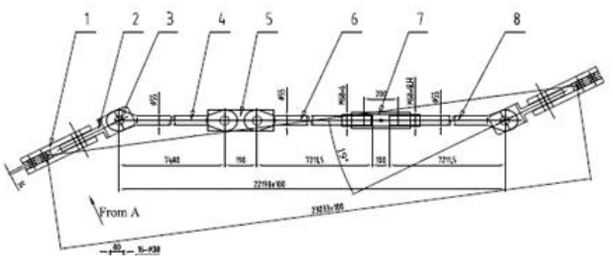


CORROSION PROTECTION, ANCHORING & SEALING SOLUTIONS

SERVICE & PRODUCT LINE

TIE ROD SYSTEMS

ESC is proud to offer a full suite of options for designing, fabricating and supplying full Tie Rod System Assemblies at competitive delivery schedules. Provided in this catalogue are the standard sizes for the typical components. On top of this is the flexibility to provide a wide range of steel grades. Project specific requirements can also be catered for such as corrosion protection combinations, high forces, extreme lengths and large expected settlements.



CORROSION PROTECTION COATING

ESC is committed to providing high quality Corrosion Protection Coating Systems that prevent corrosion and extend the life of steel structures: whether it be sheet piles, combined walls, tie rod systems or steel structure fabrications. Typical systems include: Coal Tar Epoxy, Glass Flake Epoxy and Hot Dip Galvanizing.

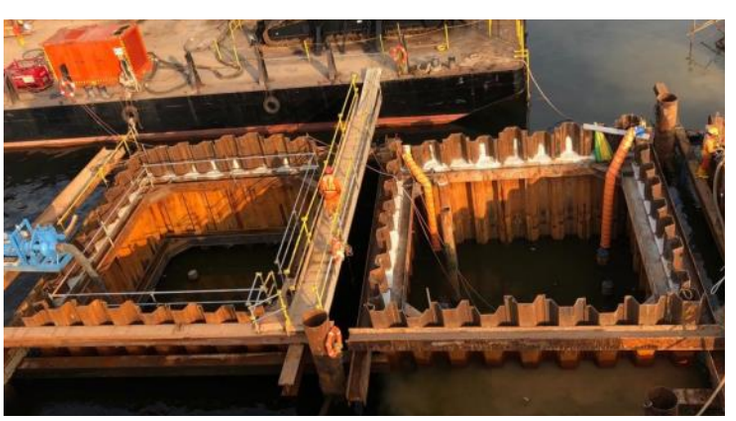
CATHODIC PROTECTION SYSTEM

Cathodic Protection involves electrically connecting a sacrificial element that preferentially corrodes instead of the sheet pile or steel structure. Sacrificial elements are typically constituted of an alloy of aluminium, magnesium and zinc depending of the water conditions. It may be used as a supplementary form of corrosion protection on top of the corrosion coating system. ESC can offer it's experience in the design, specification and integration of a Cathodic Protection System for submerged Sheet Piles.

CONNECTOR SEALANT

ESC's DPS-500 sealant is a hydrophilic polyurethane which has effective application for sheet pile interlocks. It has a high expansion coefficient with over 400% volume increase.

It is a one component system making it easy to handle and apply. It is both lightweight with good surface adhesion which allows easy application even in confined spaces. It can be applied in virtually all weather conditions. It has been extensively used in both freshwater and seawater environments and swells to about 200% volume in 24 hours or less and over 300% volume within 48-72 hours of immersion.



TRENCH SAFETY SOLUTIONS

PRODUCT LINE

FEATURES

- ✓ Design and manufactured in accordance with EN 13331—1 and EN 13331- 2.
- ✓ 3rd party product certificates available for all products.
- ✓ Heavy duty robust design.
- ✓ Flat pack delivery .
- ✓ Fixed or adjustable struts available in any required length .
- ✓ Custom box sizes are available.

SAFETY

- ✓ Soil pressure must be assessed by qualified professional engineer.
- ✓ Assembly as per ESC procedures

Recommended maximum depth 5.6m.

STANDARD TRENCH BOX

Top Box

Base Box

MANHOLE BOX

ADJUSTABLE BOX

COMMON SIZES

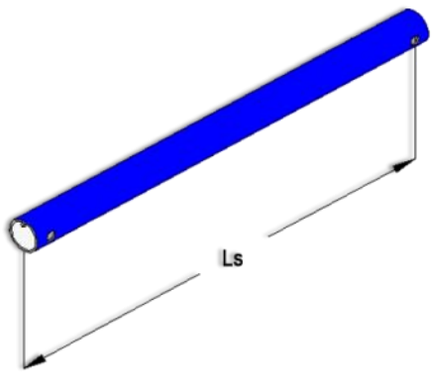
		STANDARD TRENCH BOX		MANHOLE BOX				ADJUSTABLE BOX			
		Top Box	Base Box	Top Box		Base Box		Top Box	Base Box		
	Unit	TT40/10/16	TB40/10/24	MT 25/10/16	MT 35/10/16	MB 25/10/24	MB 35/10/24	TTV 40/10/16	TBV 40/10/24		
Box Length L	(m)	4.0	4.0	2.5	3.5	4.0	4.0	4.0	4.0		
Box Height H	(m)	1.6	2.4	1.6	1.6	2.4	2.4	1.6	2.4		
Panel Thickness T	(mm)	100	100	100	100	100	100	100	100		
Clear Height h_c	(m)	-	1.47	-	-	1.47	1.47	-	1.47	1.09	0.70
Clear Length CL	(m)	3.6	3.6	2.2	3.2	2.2	3.2	3.6	3.6		
Safe Working Load	(kPa)	40	40	40	40	40	40	458	40	44	48
Panel Weight	(kg)	702	1007	864	1117	1007	1324	783	1100		

* Standard Trench Box Base and top box in 3.0m and 3.5m length available. Custom boxes available on request.

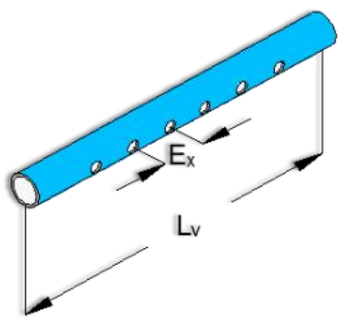
STRUTS

FIXED LENGTH STRUTS—SN SERIES		
Model	Length Ls (mm)	Weight (per strut) (kg)
SN 50	500	15.5
SN 60	600	18.6
SN 80	800	24.8
SN 100	1000	31.0
SN 120	1200	37.2
SN 160	1600	49.6
SN 180	1800	55.7
SN 200	2000	61.9
SN 220	2200	68.1
SN 250	2500	77.4
SN 300	3000	92.9
SN 350	3500	108.4
SN 400	4000	123.9

SN SERIES



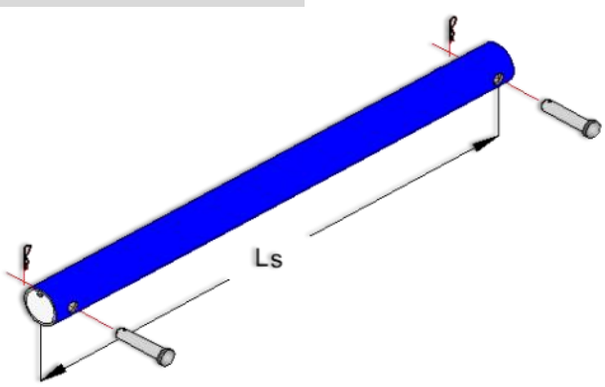
SI SERIES



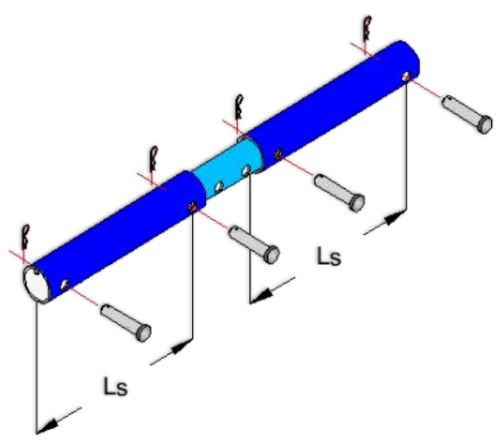
VARIABLE LENGTH STRUTS—SI SERIES						
Model	Length Lv (mm)	Extension Length Ex				Weight (per strut) (kg)
		MIN (mm)	MAX (mm)	Increments (nos)	Increment Length (mm)	
SI 70	700	0	300	2	150	15.6
SI 120	1200	0	600	4	150	26.8
SI 160	1600	0	800	4	200	35.7
SI 200	2000	0	1200	6	200	44.6

SOLUTIONS

SOLUTION 1 Fixed Strut



SOLUTION 2 Extendable Strut

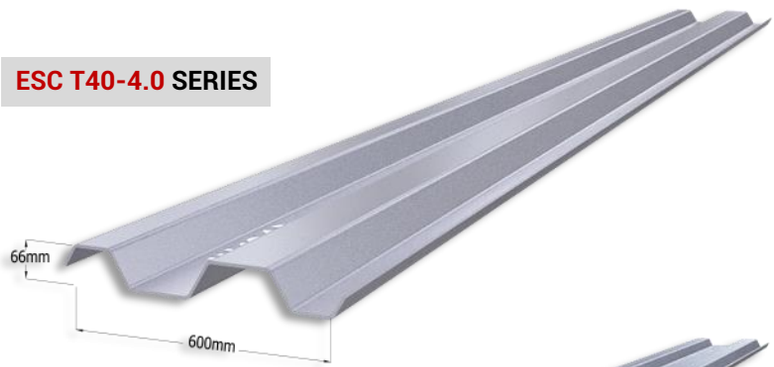


VARIABLE LENGTH STRUT COMBINATIONS						
SN Strut	SI Strut	Extension Length Ex				Weight (per strut) (kg)
		MIN (mm)	MAX (mm)	Increments (nos)	Increment Length (mm)	
SN 50	SI 70	1000	1300	2	150	46.6
SN 60	SI 70	1200	1500	2	150	52.8
SN 80	SI 120	1600	2200	4	150	76.4
SN 100	SI 160	2000	2800	4	200	97.7
SN 120	SI 200	2400	3600	6	200	119.0

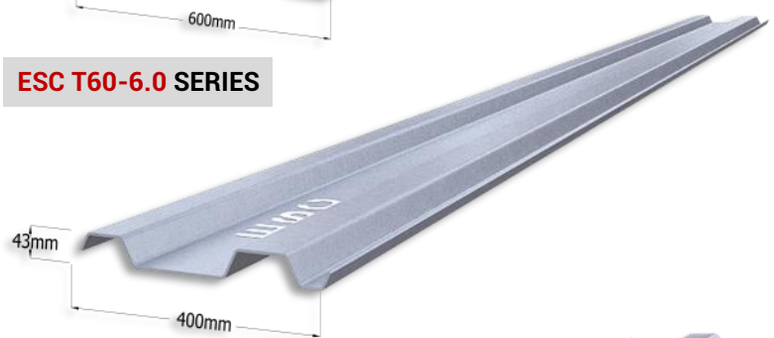
TRENCH SHEETS

PRODUCT LINE

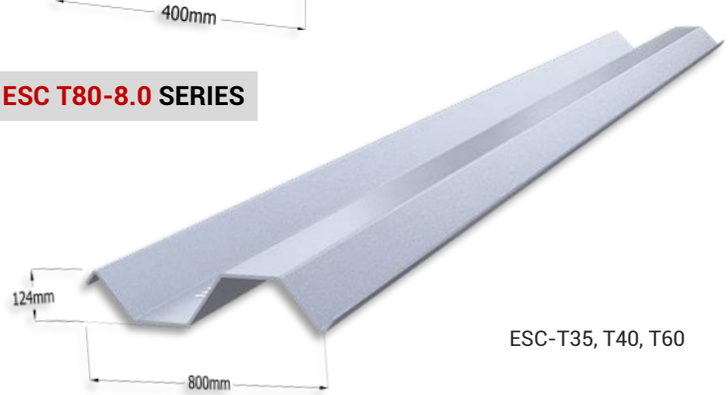
ESC T40-4.0 SERIES



ESC T60-6.0 SERIES



ESC T80-8.0 SERIES

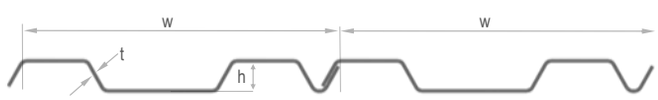


ESC Trench sheet products offer a highly efficient retention system for shallow excavations. ESC trench sheet can be used to support earth banks for the safety of construction workers, and are ideal for reinforcement of waterway banks and services trenches. The strength, speed and flexibility of light trench sheets makes it ideal for all forms of temporary and permanent works. The trench piles also offer good durability and ease of installation and extraction allows sustainable construction.

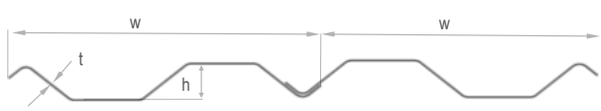
ORDER OPTIONS

Steel Grades	✓ Q235B, Q345B ✓ S235, S275JR, S355JR ✓ ASTM A572 Gr42, Gr50 ✓ Others available on request
Length	12.0m maximum Any project specific length
Delivery Options	✓ Lifting Hole ✓ By container or Break Bulk

ESC-T35, T40, T60



ESC-T80



Section	Width (w) mm	Height (h) mm	Thickness (t) mm	Weight Per Pile kg/m	Weight Per Wall kg/m²	Elastic Section Modulus cm³	Elastic Section Modulus cm³/m
ESC-T35-3.5	330	35	3.5	10.99	**33.30**	14.95	**45.29**
ESC-T35-3.7	330	35	3.7	11.62	**35.21**	15.70	**47.59**
ESC-T35-4.0	330	35	4.0	12.56	**38.06**	16.85	**51.07**
ESC-T35-5.0	330	36	5.0	15.70	**47.58**	20.63	**62.50**
ESC-T35-6.0	330	37	6.0	18.84	**57.09**	23.73	**71.91**
ESC-T40-3.5	400	43	3.5	13.74	**34.34**	21.98	**54.94**
ESC-T40-3.7	400	43	3.7	14.53	**36.31**	23.14	**57.86**
ESC-T40-4.0	400	43	4.0	15.70	**39.25**	24.85	**62.14**
ESC-T40-5.0	400	44	5.0	19.63	**49.06**	30.41	**76.03**
ESC-T40-6.0	400	45	6.0	23.55	**58.88**	35.77	**89.42**
ESC-T60-6.0	600	66	6.0	35.33	**58.88**	84.24	**140.40**
ESC-T60-8.0	600	68	8.0	47.10	**78.50**	108.59	**180.99**
ESC-T80-4.0	800	120	4.0	31.40	**39.25**	123.57	**154.47**
ESC-T80-6.0	800	122	6.0	47.10	**58.88**	179.30	**224.13**
ESC-T80-8.0	800	124	8.0	62.80	**78.50**	236.72	**295.90**

Trench Sheets of other sizes and specifications are available on request.

STEEL STRUCTURES

CAPABILITIES

ESC Group has been in operation for over 25 years. ESC Group diversified its business over the last 8 years to fabricating and supplying steel structures for various industries. ESC is committed to delivering timely fabrication of steel structures and components to client specifications, standards and delivery requirements.

ESC caters to multiple industries and types of steel structures:

- ✓ Bridge Structures
- ✓ Pre-Engineered Buildings
- ✓ Oil & Gas Industry
- ✓ Marine & Offshore Industry
- ✓ Rail & Energy Industry
- ✓ Mining Industry
- ✓ Materials Handling Structures
- ✓ Process Equipment

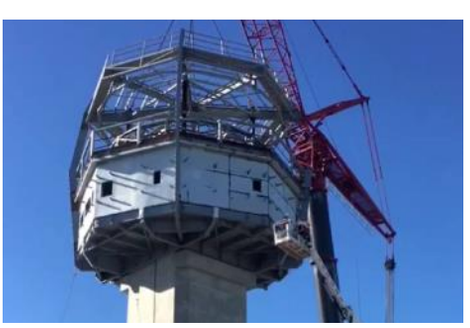
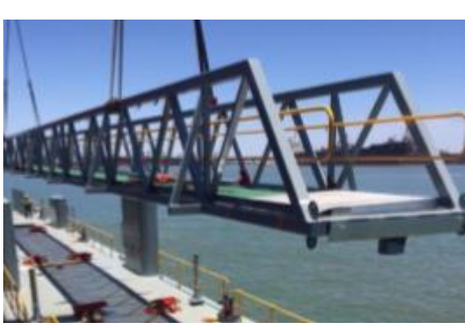
ROADS & INFRASTRUCTURE

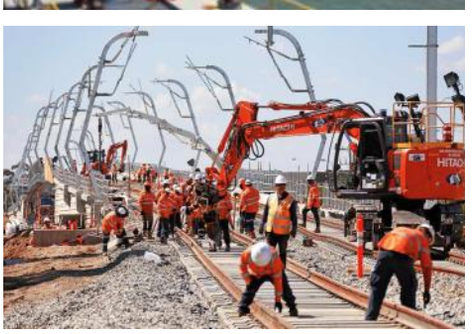


PORT & OFFSHORE STRUCTURES



PREFABRICATED & HEAVY STRUCTURES



ESC VINYL SHEET PILES

PRODUCT LINE

ESC Vinyl Sheet Piles also known as PVC Sheet Pile are a modern alternative for your project. It offers a lower cost that steel, wood or concrete alternatives. ESC Vinyl Sheet Pile is a strong, light-weight, UV and impact resistant product. The product is inert does not rust, corrode or crack. ESC Vinyl Sheet Pile retains its structural integrity for decades.

50+ year design life - Due to its superior corrosion resistance, ESC Vinyl Sheet Piles can be installed with the confidence of structural integrity and appearance even after 50 years

Cost Efficiency - both from installation and long term cost savings due to superior corrosion resistance and lower price per unit metre material

UV Resistance - The PVC material is engineered with special compounds for resistance to the harmful ultraviolet rays

No toxic coatings - No coatings are required, which may be detrimental to the environment

Not Affected by Marine Borers - Small mollusks or crustaceans in the ocean can cause devastating effects over a period of time to traditional timber piling. Vinyl Sheet Piling offers an attractive alternative that is unaffected by these organisms.

Easy Installation - Compared to steel sheet piles, vinyl sheet piles can be up to 40 times lighter per square meter making it much easier to handle. Driving can also be completed under certain conditions by pressing down with an excavator or a compact vibrohammer.

COMPARISON TO OTHER MATERIALS

	Vinyl (PVC)	Steel	Concrete	Wood
Cost	Low	High	Medium	Low
Weight	Light	Heavy	Very Heavy	Medium
Resistance to Corrosion	High	Low	N/A	N/A
Resistance to Chemicals & Sea Water Environment	High	Low	High	Low
Resistance to Cracking & Spalling	High	High	Medium	N/A
Environmentally Friendly	Yes	Yes	No	No
Aesthetics	High	Low	Medium	Medium
Installation	Easy*	Easy	Difficult	Moderate
Design Flexibility	High	High	Moderate	High

STANDARD PROFILES

ESC-VU25 & ESC-VU40

ESC-VU610-9.0

ESC-VZ80 & ESC-VZ437-10.5

MATERIAL STANDARDS

	ASTM	ISO	Min. Value/ Range
Density		ISO 1183-3	1400-1480kg/m^3
Flexural Strength	ASTM D790	ISO 178	66MPa
Shore Durometer		ISO 868	75 Shore AD
Modulus of Elasticity	ASTM D638	ISO 178/527-2	2.62GPa
Tensile Strength	ASTM D638		44MPa
Izod Impact Strength	ASTM D256		9kJ/m^2
Charpy Impact Strength		ISO 179-1	30kJ/m^2
Vicat Softening Temp.	ASTM D648	ISO 306	77˚C

Section	Pile O/A Width	Effective Width	Height	Thickness	Elastic Section Modulus	Moment of Inertia	Allowable Bending Moment
	mm	mm	mm	mm	cm^3/m	cm^4/m	kNm/m
ESC-VU25	512	500	160	6.0	502	4,013	10.3
ESC-VU40	614	600	230	7.5	920	10,574	18.8
ESC-VU610-9.0	628	610	230	9.0	1,085	12,478	23.8
ESC-VZ80	520	500	250	10.0	1,396	17,448	28.6
ESC-VZ437-10.5	458	437	256	10.5	1,480	19,300	33.3

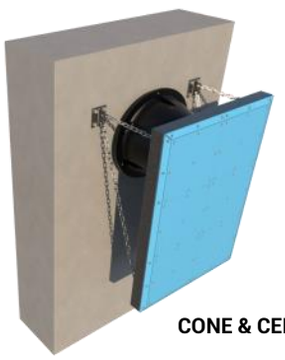
MARINE FENDERS & MOORING BOLLARDS

PRODUCT LINE

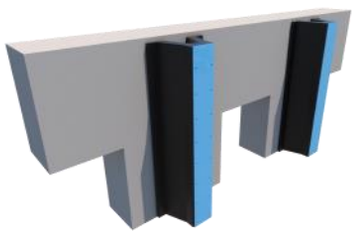
MARINE FENDERS

Marine Rubber Fenders are critical for the energy absorption of a berthing vessel into the berth structure. A single tanker can be over 500 tons so safe energy absorption in worst case scenarios is paramount. The marine fenders primary job is to protect the berthing structure without damaging the vessel hull for all potential vessel types, sizes and approach scenarios. ESC offers a full range of fender options to compliment its marine steel piling products.

ESC has strategic partnerships with PIANC registered manufacturers with over 20 years of experience delivering marine fender system solutions to Asia, North America, Central & South America, Europe and Middle East. ESC's global network provides an end-to-end solution that is customized to project requirements providing detailed support in close proximity to its valuable clients.



CONE & CELL FENDER SYSTEMS



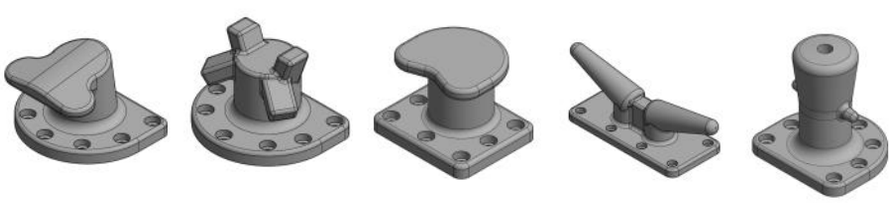
ARCH FENDER SYSTEMS

CYLINDRICAL FENDER SYSTEMS

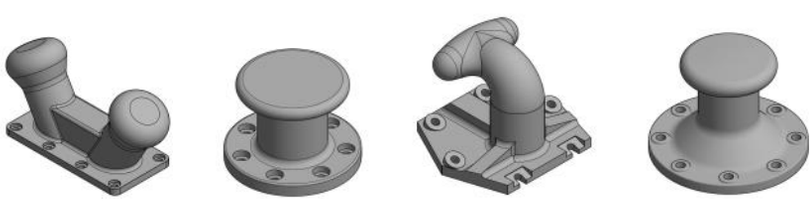
MOORING BOLLARDS

Marine mooring bollards provide a simple yet efficient method for fulfilling mooring requirements to allow safe securing of vessels next to jetties, wharves, berths and dolphins in ports and harbours. ESC can offer a wide range of cast iron or steel bollards in various sizes, grades and capacities.

ESC bollards are designed and manufactured in accordance to various international standards such as BS 6349 pt 4 and PIANC guidelines. Bollards are safety critical components and ESC strives to provide bollards with superior service life and resistance to physical and corrosive environments.



T-HEAD T-HORN KIDNEY CLEAT SINGLE BITT



DOUBLE BITT PILLAR T-HEAD PILLAR

Section	Rating (Tons)															
	5	10	15	20	25	30	35	50	70	75	80	100	150	200	250	300
T-Head		■	■		■	■		■			■	■	■	■	■	■
T-Horn			■			■		■			■	■	■	■	■	
Kidney			■			■		■			■	■	■	■		
Cleat			■	■	■	■	■									
Double Bitt				■		■		■		■		■	■	■		
Single Bitt			■			■		■		■		■	■	■		
Pillar		■	■			■		■		■		■	■	■		
T-Head PPA Design	■	■	■		■		■	■	■			■	■	■		
Pillar PPA Design			■		■	■	■	■	■			■	■	■		

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