



ICP PILES

HIGH PERFORMANCE
PRETENSIONED SPUN
**HIGH STRENGTH
CONCRETE PILES**

WE DELIVER

An  Company

Introduction



INDUSTRIAL CONCRETE PRODUCTS SDN BHD (ICP) is the first commercial manufacturer of PRETENSIONED SPUN CONCRETE PILES (ICP PC PILES) in Malaysia. Presently, ICP is the largest manufacturer in South East Asia. ICP Piles are circular hollow in cross-section and are manufactured in sizes ranging from diameter 250mm to 1,200mm with lengths varying from 6m to 46m in single piece. For large diameter piles, ICP has pile joining facility which is able to pre-join the piles up to 70m.

ICP Piles are exported to Brunei, Singapore, Bangladesh, Sri Lanka, the Middle East, Indonesia, Pakistan, Philippines, Vietnam, Myanmar, USA, Canada, New Zealand, Maldives and Samoa. ICP Piles are also supplied to numerous projects in Southern China from our plant in Jiangmen, China.

AREAS OF APPLICATION

- Bridges
 - Piled Embankments
 - Building Foundations
 - Marine Structures
 - Civil Engineering Works
 - Heavy Industries
- High rise, school and government projects.

PRODUCT ATTRIBUTES

- Steam curing enables faster production rate and delivery to project sites.
- Can be customized to suit project requirements.
- Spinning process results in more durable concrete with high resistance to corrosion.
- High strength concrete up to grade 100 enables piles to be driven through hard strata.
- Can be manufactured up to diameter 1200mm and a maximum single length of 46 metres. Big diameter piles can also be joined in factory up to the length of 70m.
- Environmental friendly installation by hydraulic jacking equipment which is free of noise, air pollution and vibration.
- Prestressed concrete provides higher bending moment capacity compared to conventional reinforced concrete piles.

LOCATION OF ICP FACTORIES IN MALAYSIA



General Specification



ICP PILES

STANDARDS

ICP PHC Piles comply with MS 1314:Part 4:2004 and also generally complies with JIS A 5337:1987. ICP PHC Piles are modified to suit BS 8004:1986 – Foundations and BS 8110:1997 – Structural Use of Concrete. Concrete complies with SS EN 206-1:2009 – Specification of Concrete.

MATERIALS

Aggregates – Coarse aggregates shall be 20mm granite. Fine aggregates shall be clean river sand or washed mining sand.

Cement – Portland cement complies with MS 522:2007.

Prestressing Steel – High frequency induction heat treated bars manufactured to JIS G 3137:1994 or equivalent.

Spiral Wire – Hard drawn wire.

CONCRETE STRENGTH

Minimum concrete cube strength:

at transfer of prestress	30N/mm ²
at 28 days – Grade 80 pile	80N/mm ²
– Grade 90 pile	90N/mm ²
– Grade 100 pile	100N/mm ²

JOINT

The joint is designed to have the same performance as the main body particularly in respect of bending strength. All ICP PHC Piles have steel extension plates for splicing.

LIFTING POINTS

For piles up to 12m length, piles shall be lifted by using steel hooks at both ends. For piles exceeding 12m, piles shall be lifted by wrapping wire ropes around the piles at the marked lifting points.

PILE SHOE

All ICP PHC Piles will be supplied either open ended, with a flat shoe or with an X-pointed shoe.

CURING

After casting, the piles are steam cured. When the concrete reaches the specified transfer strength, the piles are demoulded, marked and checked for quality. The piles can normally be transported and driven after three days from the date of casting, or when the cube strength reaches 70 N/mm².

IDENTIFICATION

All ICP PHC Piles have the typical markings as below:

Company's Initial
Malaysian Standard
Pile Size and Class
Date of Cast (yy/mm/dd)
Serial No & Factory Code
Pile Length and Type



ICP
MS1314: Part 4
60B800
130917
001L3
12E

Logo as Trademark

Other markings:

S – Starter (Flat Shoe/X-Pointed Shoe/
Rock Shoe/Pipe Shoe)

E – Extension

B8 – Class B, Grade 80

B9 – Class B, Grade 90

BX – Class B, Grade 100

STANDARD LENGTHS

ICP PHC Piles are available in lengths of 6m to 46m subject to certain limitations.

DELIVERY

ICP Standard Piles are normally available ex-stock. Custom made piles usually takes two to three weeks from date of confirmed order.

TECHNICAL DATA

Technical data of our standard piles are given in the tables on the next page. Please note that the axial loads represent the structural capacities of the piles. Actual working load depends on the soil conditions and the pile slenderness ratio. Appropriate reduction of axial loads should be applied for:

- a) marine structures;
- b) piles subjected to bending;
- c) high upstand;
- d) piles driven through very poor top stratum;
- e) raking piles, etc.

DEFINITIONS

ICP PHC Piles: High Performance Pretensioned Spun High Strength Concrete Piles

MS: Malaysian Standard

JIS: Japanese Industrial Standard

BS: British Standard

SS EN: Singapore Standard



CERTIFIED TO ISO 9001:2015
CERT. NO. : AR0122

Properties Of ICP Piles

STANDARD GRADE 80 PILES

CLASS A (EFFECTIVE PRESTRESS $\geq 4.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar		Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
350	60	6-12	142	8	-	54,664	3,533	32.9	54.1	104	5.3
400	65	6-12	178	8	-	68,408	5,106	42.7	61.8	132	4.3
450	70	6-12	217	10	-	83,566	7,113	60.4	86.9	161	4.5
500	80	6-12	274	12	-	105,558	9,888	82.3	115.9	204	4.3
600	90	6-12	375	-	12	144,199	16,586	148.8	222.5	276	5.0

CLASS B (EFFECTIVE PRESTRESS $\geq 5.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar			Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm	10.7mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	55	6-12	88	6	-	-	33,694	1,435	14.9	29.0	63	6.4
300	60	6-12	118	7	-	-	45,239	2,383	22.9	40.6	86	5.6
350	70	6-12	160	9	-	-	61,575	3,778	35.6	60.8	117	5.4
400	80	6-15	209	12	-	-	80,425	5,643	53.7	92.7	153	5.5
450	80	6-15	242	-	8	-	92,991	7,624	70.0	111.2	177	5.2
500	90	6-15	301	-	10	-	115,925	10,518	95.9	154.5	221	5.1
600	100	6-15	408	-	14	-	157,080	17,546	163.1	259.6	299	5.3
700	110	6-18	530	-	20	-	203,889	27,131	265.1	432.6	386	5.8
800	120	6-18	667	-	24	-	256,354	39,455	376.8	593.3	487	5.5
900	130	6-18	818	-	28	-	314,473	54,942	510.3	778.7	599	5.3
1000	140	6-18	983	-	-	24	378,248	74,056	688.9	1042.8	720	5.3
1200	150	6-18	1286	-	-	36	494,801	120,188	1198.5	1877.1	934	6.0

CLASS C (EFFECTIVE PRESTRESS $\geq 7.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar				Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm	10.7mm	12.6mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	55	6-12	88	7	-	-	-	33,694	1,443	16.2	33.8	63	7.2
300	60	6-12	118	10	-	-	-	45,239	2,416	28.0	57.9	84	7.6
350	70	6-15	160	-	8	-	-	61,575	3,826	43.0	86.5	114	7.2
400	80	6-15	209	-	12	-	-	80,425	5,748	69.7	148.3	147	8.1
450	80	6-15	242	-	12	-	-	92,991	7,734	86.9	166.9	173	7.2
500	90	6-18	301	-	15	-	-	115,925	10,670	120.3	231.7	215	7.3
600	100	6-30	408	-	20	-	-	157,080	17,761	196.4	365.0	292	7.0
700	110	6-46	530	-	-	20	-	203,889	27,498	320.6	608.3	376	7.6
800	120	6-46	667	-	-	24	-	256,354	39,966	454.7	834.3	475	7.4
900	130	6-46	818	-	-	28	-	314,473	55,622	617.7	1095.0	584	7.1
1000	140	6-46	983	-	-	36	-	378,248	75,188	864.5	1564.3	699	7.5
1200	150	6-36	1286	-	-	46	-	494,801	121,361	1378.6	2398.6	916	7.3
1000	140	6-46	983	-	-	-	34	378,248	76,247	961.1	2051.9	688	8.6
1200	150	6-36	1286	-	-	-	46	494,801	123,457	1583.1	3331.3	898	8.8

FORMULA FOR AXIAL LOAD

Based on BS 8004: 1986, the maximum allowable axial stress that may be applied to a pile acting as a short strut should be one quarter of specified works cube strength at 28 days less the prestress after losses.

$$N = f_{ca} \times A$$

$$= 1/4 (f_{cu} - f_{pe}) \times A$$

Where,

N = maximum allowable axial load
= cross section area of concrete f_{ca}

f_{ca} = permissible compressive strength of concrete

f_{cu} = specified compressive strength of concrete

f_{pe} = effective prestress in concrete



STANDARD GRADE 90 PILES

CLASS A (EFFECTIVE PRESTRESS $\geq 4.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar		Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
350	60	6-12	142	8	-	54,664	3,533	33.8	54.1	118	5.3
400	65	6-12	178	8	-	68,408	5,106	43.9	61.8	149	4.3
450	70	6-12	217	10	-	83,566	7,113	62.2	86.9	182	4.5
500	80	6-12	274	12	-	105,558	9,888	84.8	115.9	231	4.3
600	90	6-12	375	-	12	144,199	16,586	152.9	222.5	313	5.0

CLASS B (EFFECTIVE PRESTRESS $\geq 5.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar		Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	55	6-12	88	6	-	33,694	1,435	15.3	29.0	72	6.4
300	60	6-12	118	7	-	45,239	2,383	23.5	40.6	97	5.6
350	70	6-12	160	9	-	61,575	3,778	36.5	60.8	133	5.4
400	80	6-15	209	12	-	80,425	5,643	55.0	92.7	173	5.5
450	80	6-15	242	-	8	92,991	7,624	71.9	111.2	201	5.2
500	90	6-15	301	-	10	115,925	10,518	98.5	154.5	251	5.1
600	100	6-15	408	-	14	157,080	17,546	167.3	259.6	339	5.3

STANDARD GRADE 100 PILES

CLASS A (EFFECTIVE PRESTRESS $\geq 4.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar		Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
350	60	6-12	142	8	-	54,664	3,533	34.6	54.1	132	5.3
400	65	6-12	178	8	-	68,408	5,106	45.1	61.8	167	4.3
450	70	6-12	217	10	-	83,566	7,113	63.8	86.9	203	4.5
500	80	6-12	274	12	-	105,558	9,888	87.0	115.9	257	4.3
600	90	6-12	375	-	12	144,199	16,586	156.7	222.5	349	5.0

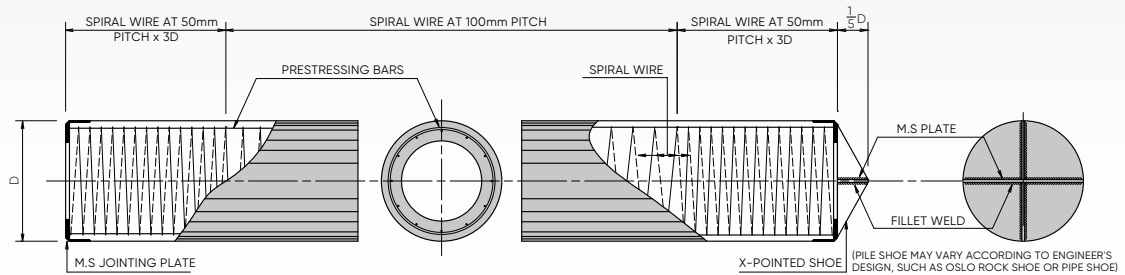
CLASS B (EFFECTIVE PRESTRESS $\geq 5.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar		Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	55	6-12	88	6	-	33,694	1,435	15.6	29.0	80	6.4
300	60	6-12	118	7	-	45,239	2,383	24.1	40.6	109	5.6
350	70	6-12	160	9	-	61,575	3,778	37.4	60.8	149	5.4
400	80	6-15	209	12	-	80,425	5,643	56.4	92.7	194	5.5
450	80	6-15	242	-	8	92,991	7,624	73.6	111.2	225	5.2
500	90	6-15	301	-	10	115,925	10,518	100.9	154.5	280	5.1
600	100	6-15	408	-	14	157,080	17,546	171.7	259.6	379	5.3

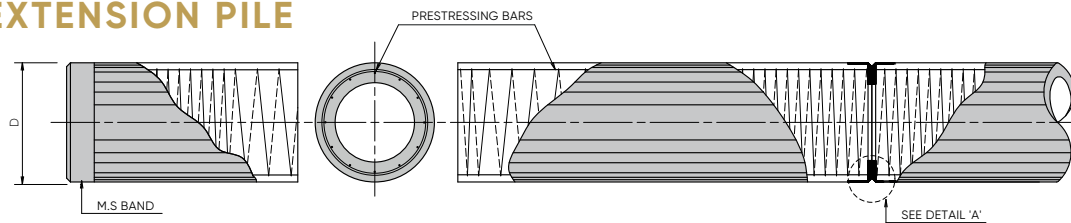
Sectional Details & Bonding Into Pile Cap

SECTIONAL DETAILS OF ICP PILES

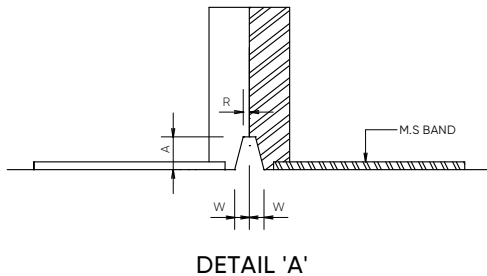
STARTER PILE



EXTENSION PILE



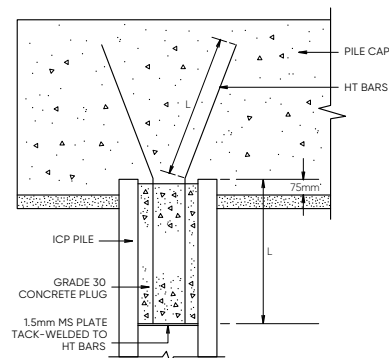
JOINT WELDING DETAILS



Dia Of Pile D mm	Throat Thickness A mm	W mm	Root R mm
250	8.5	4.0	2.0
300	8.5	4.0	2.0
350	8.5	4.0	2.0
400	10	4.5	2.0
450	10	4.5	2.0
500	12	5.0	2.0
600	12	5.0	2.0
700	14	6.0	2.0
800	14	6.0	2.0
900	14	6.0	2.0
1000	14	6.0	2.0
1200	14	6.0	2.0

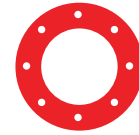
BONDING ICP PILES INTO PILE CAP

Dia Of Pile mm	HT Bars		
	Quantity nos	Dia. mm	L mm
250	4	12	500
300	4	12	500
350	5	12	550
400	5	12	700
450	5	16	800
500	6	16	900
600	8	16	1000
700	8	20	1200
800	8	20	1400
900	10	25	1500
1000	12	25	1500
1200	20	25	2000



As the PC bars are bonded with concrete, ICP Piles may be cut off at any point. The piles need not be stripped down to expose the bars and can be bonded to the pile cap as shown in the above sketch. If the piles are not subjected to tensile loads, the recommended H.T. bars are considered adequate.

Manufacturing Process



ICP PILES



1 CAGE MAKING/MOULD SETTING

PC bars in coil form are straightened and cut to correct lengths. The ends are warm-headed to form button heads. The bars are passed through the cage forming machine where spiral wire is automatically spot-welded at the correct spacings. End plates are fitted to the cage. The whole cage is then placed onto the bottom half mould.



2 STRESSING

The PC bars are stressed against the mould through a central shaft and stressing plate. The stressing is being carried out in a single operation. This ensures uniformity of stress in all the PC bars and hence straightness of the pile.



4 PILE SPINNING

The pile is then compacted by the centrifugal spinning machine. Spinning process squeezes out excess water, thus increases the concrete strength.



3 CONCRETE FEEDING

Concrete from the computerised batching plant is discharged into a feeding hopper. The concrete is then fed into the mould by pumping.*



5 STEAM CURING

The pile is sent to the steam tank for rapid curing process in order to achieve the required transfer strength for early demoulding.



6 DEMOULDING

After demoulding, final QC inspection is carried out according to the quality manual specification.

*Note: For open concrete feeding, concrete is fed into the mould before stressing.

Project Photos



ICP Piles have been used extensively as foundation piles for power stations, highrise buildings, civil engineering works, bridges, marine structures, harbours, schools, government projects, etc. The piles are widely used in local and overseas construction industry, namely Brunei, Singapore, Bangladesh, Sri Lanka, the Middle East, Indonesia, Pakistan, Philippines, Vietnam, Myanmar, USA, Canada, New Zealand, Maldives and Samoa.



OMA 1, Commercial cum Residential Complex, Vancouver, Canada



Shenhua Coal Terminal Port, Zuhai, China



Gardens By The Bay, Singapore



10 Mont Kiara, Mont Kiara, Kuala Lumpur, Malaysia



Phoenix Hotel, Forest City, Johor, Malaysia



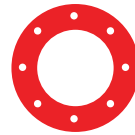
Temburong Bridge, Brunei



Park Green Condominium, SengKang East Ave, Singapore



One Kilometer Container Terminal, Chittagong Port, Bangladesh



ICP PILES



Saigon International Container Terminal, Vung Tau, Vietnam



Ahlone International Port Terminal Phase 2 & 3, Yangon, Myanmar



330 Third Street South Condominium, St. Petersburg, Florida, USA



2nd Penang Bridge, Penang, Malaysia



Tanjung Bin Power Plant, Johor, Malaysia



Aden Flour Mill Jetty, Aden, Yemen



Club Mediterranean, Maldives



Pengerang Project, Johor, Malaysia

Certificates



OTHER CERTIFICATES:

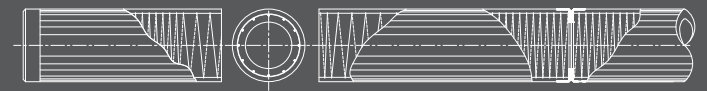
- OHSAS 18001
- ISO 14001: 2004
- ISO/IEC 17025: 2005



PILE

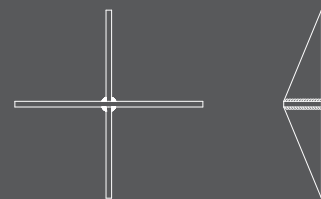


STARTER

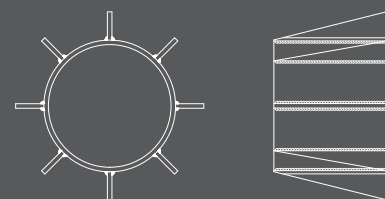


EXTENSION

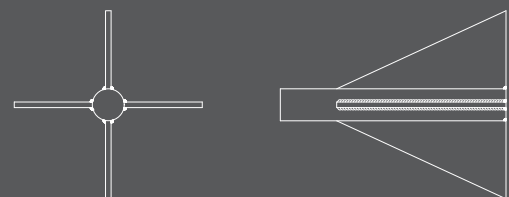
SHOES



X-POINTED SHOE



PIPE SHOE



ROCK SHOE



HIGH PERFORMANCE PRETENSIONED SPUN **HIGH STRENGTH CONCRETE PILES**



INDUSTRIAL CONCRETE PRODUCTS SDN BHD

(CO. NO. 32369-W)

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Tel: 604-296 1399 Fax: 604-296 1398 E-mail: icppg@ijm.com

PLANTS LOCATION

(MALAYSIA) . Jawi . Ipoh . Lumut . Klang . Kapar .
Nilai . Kuala Terengganu . Senai . Ulu Choh
(OVERSEAS) Jiangmen, China



ICP PILES

SPECIAL DESIGN

PILES

GRADE 80 PILES

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar		Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short Strut)	Effective Prestress
				7.1mm	9.0mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	60	6 - 12	93	6		35814	1470	14.8	29.0	68	6.0
300	70	6 - 12	132	7		50580	2506	22.8	40.6	97	5.0
350	80	6 - 12	176	9		67858	3950	35.4	60.8	130	4.9
400	90	6 - 15	228	12		87650	5872	53.5	92.7	167	5.0
	100	6 - 15	245	12		94248	6044	53.1	92.7	181	4.7
450	90	6 - 15	265		8	101788	7996	69.5	111.2	195	4.6
	100	6 - 15	286		8	109956	8292	69.5	111.2	212	4.3
	105	6 - 15	296		8	113804	8414	69.4	111.2	220	4.3
500	100	6 - 15	327		10	125664	10972	96.2	154.5	241	4.7
	110	6 - 15	350		10	134774	11341	96.2	154.5	260	4.4
	115	6 - 15	362		10	139094	11497	96.0	154.5	268	4.3
600	110	6 - 15	440		14	169332	18302	163.9	259.6	324	4.9
	120	6 - 15	470		14	180956	18945	164.2	259.6	348	4.6
	125	6 - 15	485		14	186532	19228	164.3	259.6	359	4.5

SPECIAL DESIGN

PILES

GRADE 90 PILES

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar		Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short Strut)	Effective Prestress
				7.1mm	9.0mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	60	6 - 12	93	6		35814	1470	15.2	29.0	77	6.0
300	70	6 - 12	132	7		50580	2506	23.4	40.6	110	5.0
350	80	6 - 12	176	9		67858	3950	36.4	60.8	147	4.9
400	90	6 - 15	228	12		87650	5872	54.9	92.7	190	5.0
	100	6 - 15	245	12		94248	6044	54.6	92.7	205	4.7
450	90	6 - 15	265		8	101788	7996	71.5	111.2	221	4.6
	100	6 - 15	286		8	109956	8292	71.5	111.2	240	4.3
	105	6 - 15	296		8	113804	8414	71.5	111.2	249	4.3
500	100	6 - 15	327		10	125664	10972	98.9	154.5	273	4.7
	110	6 - 15	350		10	134774	11341	98.9	154.5	294	4.4
	115	6 - 15	362		10	139094	11497	98.8	154.5	304	4.3
600	110	6 - 15	440		14	169332	18302	168.3	259.6	367	4.9
	120	6 - 15	470		14	180956	18945	168.9	259.6	394	4.6
	125	6 - 15	485		14	186532	19228	169.0	259.6	406	4.5

GRADE 100 PILES

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar		Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short Strut)	Effective Prestress
				7.1mm	9.0mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	60	6 - 12	93	6		35,814	1,470	15.5	29.0	86	6.1
300	70	6 - 12	132	7		50,580	2,506	24.0	40.6	122	5.1
350	80	6 - 12	176	9		67,858	3,950	37.3	60.8	164	4.9
400	90	6 - 15	228	12		87,650	5,872	56.3	92.7	212	5.1
	100	6 - 15	245	12		94,248	6,044	56.0	92.7	229	4.7
450	90	6 - 15	265		8	101,788	7,996	74.0	111.2	247	4.8
	100	6 - 15	286		8	109,956	8,292	74.1	111.2	268	4.4
	105	6 - 15	296		8	113,804	8,414	73.4	111.2	278	4.3
500	100	6 - 15	327		10	125,664	10,972	101.4	154.5	305	4.7
	110	6 - 15	350		10	134,774	11,341	101.5	154.5	328	4.5
	115	6 - 15	362		10	139,094	11,497	101.5	154.5	339	4.3
600	110	6 - 15	440		14	169,332	18,302	172.8	259.6	410	4.9
	120	6 - 15	470		14	180,956	18,945	173.5	259.6	440	4.7
	125	6 - 15	485		14	186,532	19,228	173.4	259.6	454	4.5



EURO CODE

GRADE 80 PILES

CLASS B (EFFECTIVE PRESTRESS $\geq 5.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar			Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm	10.7mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	55	6-12	88	6	-	-	33,694	1,435	16.5	29.8	66	6.4
300	60	6-12	118	7	-	-	45,239	2,383	25.1	42.1	88	5.6
350	70	6-12	160	9	-	-	61,575	3,778	38.1	63.1	120	5.3
400	80	6-15	209	12	-	-	80,425	5,643	56.6	96.0	157	5.4
450	80	6-15	242	-	8	-	92,991	7,624	72.0	117.2	181	5.1
500	90	6-15	301	-	10	-	115,925	10,518	97.7	162.4	226	5.1
600	100	6-15	408	-	14	-	157,080	17,546	159.5	274.4	306	5.3
700	110	6-18	530	-	20	-	203,889	27,131	261.0	459.2	398	5.8
800	120	6-18	667	-	24	-	256,354	39,455	370.1	631.6	500	5.6
900	130	6-18	818	-	28	-	314,473	54,942	501.5	830.9	613	5.3
1000	140	6-18	983	-	-	24	378,248	74,056	679.6	1121.6	736	5.4
1200	150	6-18	1286	-	-	36	494,801	120,188	1195.7	2033.2	965	6.1

CLASS C (EFFECTIVE PRESTRESS $\geq 7.0 \text{ N/mm}^2$)

Nominal Diameter	Nominal Thickness	Length	Nominal Weight	Prestressing Bar				Area of Concrete	Section Modulus	Bending Moment		Recommended Max Structural Axial Working Load (For a short strut)	Effective Prestress
				7.1mm	9.0mm	10.7mm	12.6mm			Cracking	Ultimate		
mm	mm	m	kg/m	no.	no.	no.	no.	mm ²	x1000 mm ³	kNm	kNm	ton	N/mm ²
250	55	6-12	88	7	-	-	-	33,694	1,443	18.1	34.8	66	7.4
300	60	6-12	118	10	-	-	-	45,239	2,416	31.0	60.2	88	7.8
350	70	6-12	160	-	8	-	-	61,575	3,826	46.9	90.4	120	7.5
400	80	6-15	209	-	12	-	-	80,425	5,748	75.6	154.6	157	8.6
450	80	6-15	242	-	12	-	-	92,991	7,734	91.7	175.8	181	7.5
500	90	6-18	301	-	15	-	-	115,925	10,670	125.0	243.6	226	7.5
600	100	6-30	408	-	20	-	-	157,080	17,761	199.9	392.0	306	7.4
700	110	6-46	530	-	-	20	-	203,889	27,498	327.2	649.9	398	8.1
800	120	6-46	667	-	-	24	-	256,354	39,966	462.5	893.8	500	7.8
900	130	6-46	818	-	-	28	-	314,473	55,622	624.5	1175.7	613	7.4
1000	140	6-46	983	-	-	36	-	378,248	75,188	882.0	1682.4	738	7.9
1200	150	6-36	1286	-	-	46	-	494,801	121,361	1404.6	2598.0	965	7.8