R 2008-1

OKA

PRECAST CONCRETE PILES

(67634-M)

Conform To MS 1314 : 2004

OKA Reinforced Concrete Square Piles

Design and Code of Practices

The design and manufacture of OKA reinforced concrete piles is in accordance with :

MS 1314:2004	"Malaysian Standard for Precast Concrete Piles"
BS 8004:1986	"British Standard Code of Practice for Foundation"
BS 8110:Pt 1:1985	"British Standard on Structural Use of Concrete - Code of Practice for Design and Construction".

Materials Specifications

Concrete	Characteristic cube strength shall be 45 N/mm² ; Water /Cement Ratio <0.45
Cement	Ordinary Portland Cement to MS 522
Aggregates	MS 29
Reinforcement	MS 144 and MS 146

Design Criteria

The piles are designed and manufactured to withstand loads or stresses due to lifting, stacking, transport, handling, pitching and driving at site.

MAIN LONGITUDINAL REINFORCEMENT is designed for lifting, handling and pitching. It is also been taken into consideration for contributing to the axial load capacity :

For OKA Class "MS" Pile,

Small Piles up to 175mm	Minimum 1.0% steel content by volume
Piles 200mm & above	Minimum 0.8% steel content by volume

LATERAL REINFORCEMENT in the form of links is provided to prevent shattering or splitting of pile during driving :

All Piles	Minimum 0.6% steel content by volume (at pile head/toe)
	Minimum 0.2% steel content by volume (at pile body)

Handling & Pitching

OKA piles are designed to resist bending moment due to single point or two points lifting/pitching.

Pile Shoes

OKA piles come with FIVE alternative type of pile shoes. The type of pile shoe selected depend on driving and soil conditions.

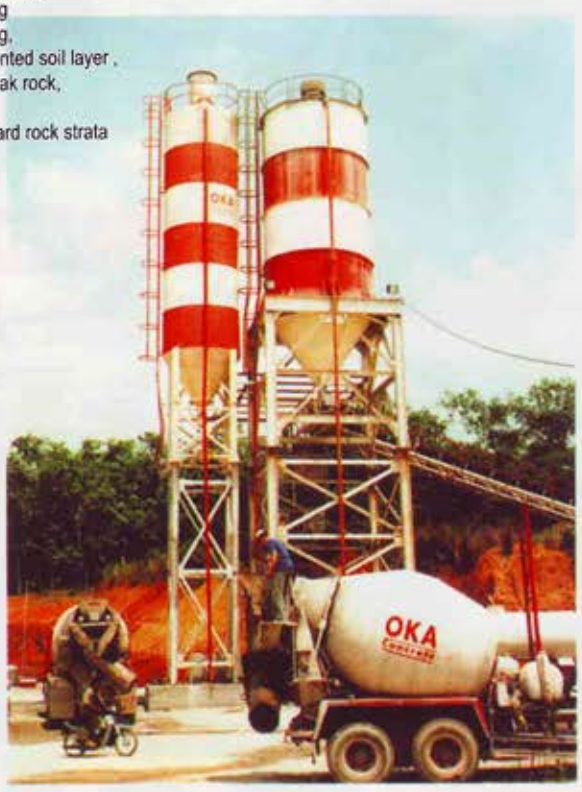
(FLAT SHOE)

Type N	Normal Flat Shoe (Flat-ended MS Plate)	.....	easy to medium hard driving

(POINTED SHOES)

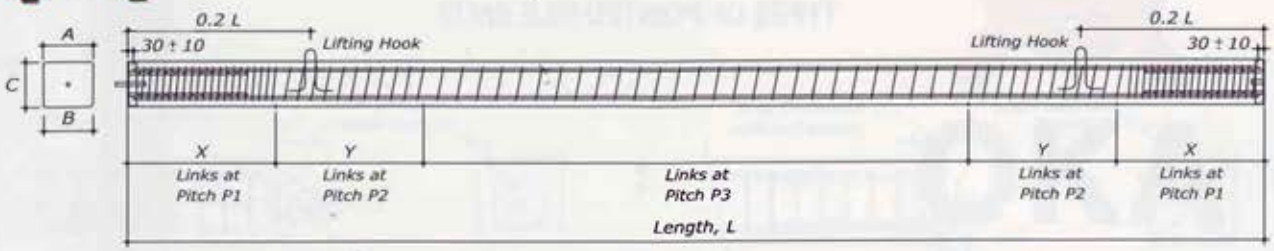
Type 1	X-Pointed Shoe	.....	moderate to hard driving
Type 2	Fabricated Pointed Shoe	.....	normal hard driving
Type 3	Cast-iron Pointed Shoe	.....	normal hard driving, to penetrate cemented soil layer , pile seating on weak rock,
Type 4	Rock Shoe ("Oslo Point")	.....	hard driving and piles seating on hard rock strata

RC Piles at OKA factory.



OKA readymix concrete plant.

OKA REINFORCED CONCRETE SQUARE PILES



Pile Dimensions and Details

Pile Nominal Size A x C	Pile Length L	Maximum Structural Load	Recommended Axial Working Load	Pile Dimensions			Main Reinforcement	Links					
				A	B	C		Wire Size	P1	X	P2	Y	P3
(mm x mm)	(M)	(ton)	(ton)	(mm)	(mm)	(mm)	(No/Dia)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
OKA Class "MS" Piles (Conform To MS1314 : 2004)													
150 X 150	6,3	32	25	153	147	150	4 T 9	4.5	45	450	45 - 75	450	75
175 X 175	6,3	44	35	178	172	175	4 T 10	4.5	40	525	40 - 87	525	87
200 X 200	9,6,3	58	45	203	197	200	4 T 12	5.0	45	600	45 - 100	600	100
225 X 225	9,6,3	71	57	228	222	225	4 T 12	5.0	42	675	42 - 112	675	112
250 X 250	9,6,3	89	75	253	247	250	8 T 10	5.5	40	750	40 - 125	750	125
250 X 250	12	92	75	253	247	250	4 T 16	5.5	40	750	40 - 125	750	125
275 X 275	9,6,3	105	85	278	272	275	8 T 10	5.5	41	825	41 - 117	825	117
275 X 275	12	108	85	278	272	275	4 T 16	5.5	41	825	41 - 117	825	117
300 X 300	12,9,6,3	126	105	303	297	300	4 T 16	6.0	43	900	43 - 135	900	135
325 X 325	12,9,6,3	148	120	328	322	325	8 T 12	6.0	42	975	42 - 131	975	131
350 X 350	12,9,6,3	172	145	353	347	350	4 T 16 + 4 T 10	6.0	40	1050	40 - 120	1050	120
375 X 375	12,9,6,3	198	160	378	372	375	4 T 20	6.5	45	1125	45 - 136	1125	136
400 X 400	12,9,6,3	227	190	403	397	400	4 T 20 + 4 T 10	6.5	44	1200	44 - 133	1200	133
450 X 450	12,9,6,3	282	230	453	447	450	4 T 20 + 4 T 12	6.5	41	1350	41 - 120	1350	120
OKA Class "C" Piles													
150 X 150	6,3	32	25	153	147	150	4 T 9	4.5	45	450	45 - 75	450	75
175 X 175	6,3	43	35	178	172	175	4 T 9	4.5	40	525	40 - 87	525	87
200 X 200	6,3	55	45	203	197	200	4 T 10	5.0	45	600	45 - 100	600	100

Type N Normal Flat Shoe Details

Pile Nominal Size A x C	Joint Plate Thickness	Centering Bar Diameter	Anchorage Bars	
			No / Dia	Length
(mm x mm)	(mm)	(mm)		
OKA Class "MS" Flat Shoe				
150 X 150	6	12	4 T 9	315
175 X 175	6	12	4 T 10	350
200 X 200	9	16	4 T 12	384
225 X 225	9	16	4 T 12	384
250 X 250	9	16	4 T 16	512
275 X 275	9	20	4 T 16	512
300 X 300	9	20	4 T 16	512
325 X 325	9	20	4 T 20	640
350 X 350	12	20	4 T 20	640
375 X 375	12	20	4 T 20	640
400 X 400	12	20	4 T 25	800
450 X 450	12	20	4 T 25	800
OKA Class "C" Flat Shoe				
150 X 150	4.5	12	4 T 9	300
175 X 175	4.5	12	4 T 9	300
200 X 200	6	16	4 T 10	350

CAPACITY OF PILE

The maximum allowable structural working load (Safe Working Load) of the pile is calculated in accordance with BS 8004.

$$\text{Max. Structural Working Load} = \frac{fcu \times Ac}{3.65} + fsc \times Asc$$

fcu — *Characteristic cube strength of concrete at 28 days = 45 N/mm²*

Ac — *Area of concrete*

fsc — *175 N/mm² for High Yield Reinforcement*

Asc — *Area of steel*

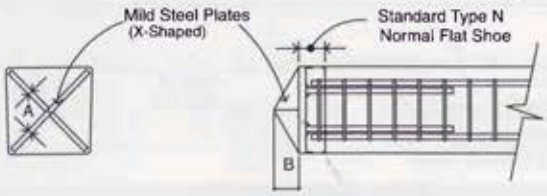
Notes :

1. *OKA Class "MS" piles are designed and manufactured in accordance with MS 1314:2004.*
2. *OKA Class "C" piles are designed and manufactured in accordance with BS 8004.*
3. *Concrete used shall be grade 45 with characteristic cube strength of 45 N/mm² at 28 days.*
4. *The above structural loads are for reference only. Actual structural loads are also dependent on other factors especially ground conditions.*

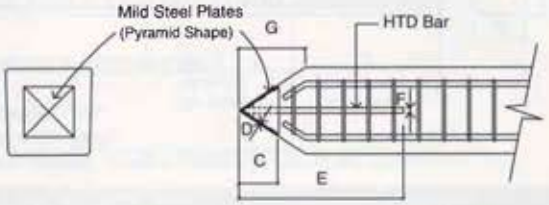
In view of continual review and improvement, OKA reserves the right to change the above specification without notice. Please check with us when you place your orders.

OKA REINFORCED CONCRETE SQUARE PILES

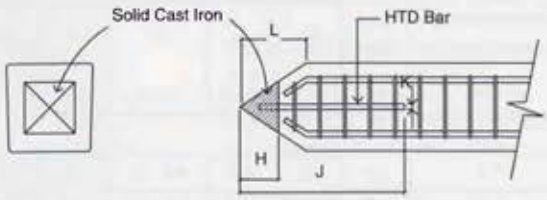
TYPES OF POINTED PILE SHOE



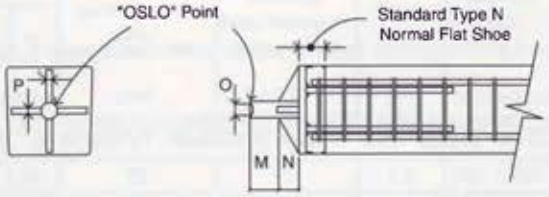
(Pointed Shoe) Type 1 - X-Pointed Shoe



(Pointed Shoe) Type 2 - Fabricated Pointed Shoe



(Pointed Shoe) Type 3 - Cast-iron Pointed Shoe



(Pointed Shoe) Type 4 Rock Shoe ("OSLO Point")

Pile Nominal Size	TYPES OF POINTED PILE SHOE															
	Type 1 X-Pointed Shoe		Type 2 Fabricated Pointed Shoe					Type 3 Cast-iron Pointed Shoe				Type 4 Rock Shoe ("Oslo Point")			
	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	H (mm)	J (mm)	K (mm)	L (mm)	M (mm)	N (mm)	O (mm)	P (mm)
150x150	**6**	**45**	**100**	**6**	**500**	**16**	**150**	**100**	**600**	**20**	**150**	**45**	**45**	**20**	**20**
175x175	6	50	100	6	500	16	175	100	600	20	175	50	50	20	20
200x200	**6**	**60**	**100**	**6**	**500**	**16**	**200**	**150**	**600**	**20**	**200**	**60**	**60**	**20**	**20**
225x225	8	65	150	8	500	16	225	150	600	20	225	65	65	50	20
250x250	**8**	**75**	**150**	**8**	**500**	**16**	**250**	**150**	**600**	**20**	**250**	**75**	**75**	**50**	**20**
275x275	8	80	150	8	500	16	275	150	600	20	275	80	80	50	20
300x300	**8**	**85**	**150**	**8**	**500**	**16**	**300**	**150**	**600**	**20**	**300**	**85**	**85**	**50**	**20**
325x325	8	95	150	8	500	16	325	150	600	20	325	95	95	50	20
350x350	**8**	**100**	**150**	**8**	**500**	**16**	**350**	**150**	**600**	**20**	**350**	**100**	**100**	**50**	**20**
375x375	8	110	150	8	500	16	375	150	600	20	375	110	110	50	20
400x400	**8**	**115**	**150**	**8**	**500**	**16**	**400**	**150**	**600**	**20**	**400**	**115**	**115**	**50**	**20**

Quality Control

Quality Control of all materials and components in pile manufacturing is an essential part of the Oka piling system.

To achieve this, regular testing is carried out and maintained in accordance with Oka's specifications, relevant British Standard Codes of Practices and Malaysian standard. Results are recorded graphically to ensure trends can be recognised early and for ease of reference each pile carries an identification number.
Among the many test carried out are:

- Test on concrete cubes for compressive strength.
- Checks on finished piles for straightness, cross-section, alignment of joint and fittings.
- Slump test on concrete batches.
- Test on aggregate samples for grading and silt content.
- Stringent checks on reinforcement cages for steel quality, spacing and stirrups pitch.