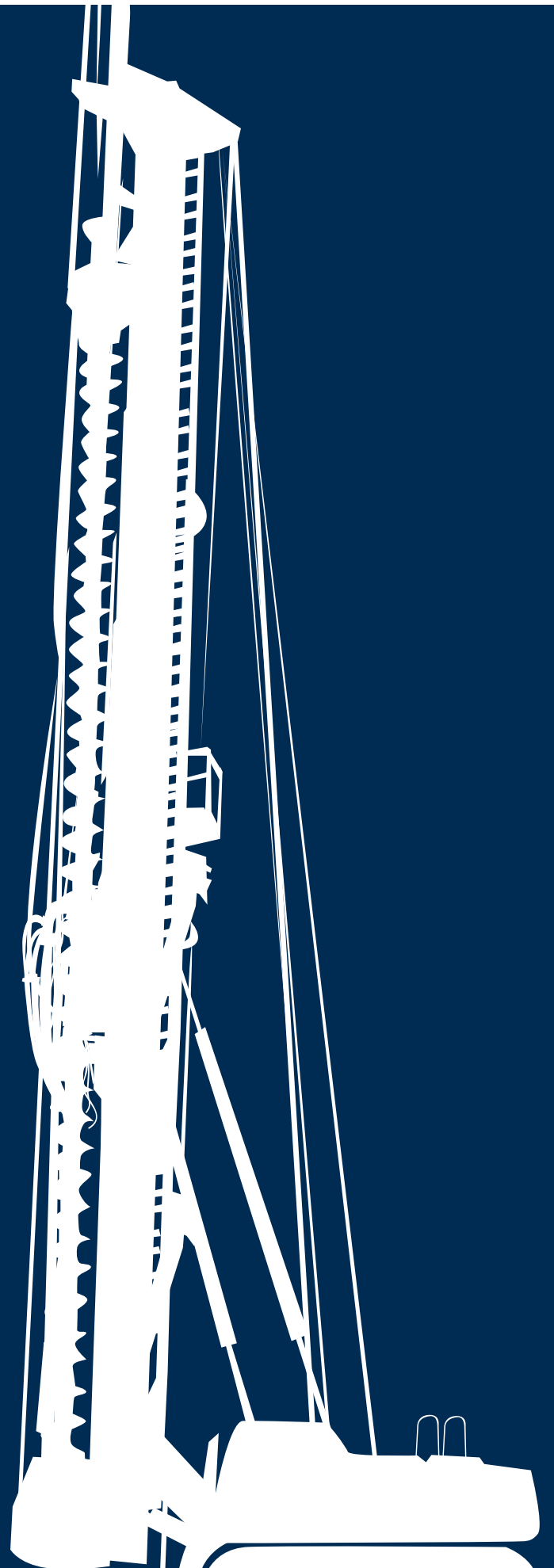


C.F.A.

CONTINUOUS FLIGHT AUGER PILES



The CFA piles - drilled by continuous flight auger system - combine the advantages of the driven piles with the versatility of the bored piles.

The drilling method allows to excavate in a wide variety of soils, dry or water-logged, loose or cohesive, and also to penetrate through low capacity, soft rock formations such as loamy clays, limestones and sandstone, etc.

No shocks or vibrations are induced when the system is performed; in addition the equipment is fully sound - proofed, as per law requirements, making CFA the most convenient piling method for construction in town centres.

The execution of the pile with almost of the soil allows to work close to the existing structures. Besides, no bentonite mud is needed for the excavation, which means that provision and space for the side plant are reduced, there is no danger of bentonite contamination and, consequently, all problems connected to the disposal of the excavated materials are simplified. The reduced volume of soil brought up to surface by the flight auger means less amount of excavated material which has to be transported to the disposal point.

The range of diameters from 40 to 140 cm and depths up to 33 m, allows to overcome problems connected to the project and execution of the pilings.

Soilmec experience gained in approximately 30 years in the execution of CFA pile, enables to operate the system even in difficult grounds, thanks to the use of different teeth and augers.

Drilling method

Drilling is performed by an helicoidal steel plate welded to a central hollow stem which is provided at the lower part with teeth to help penetration through the ground. A disposable cap, fitted as plug at the end of the stem, prevents entering of the soil when the auger string is driven down. The ground is partially pressed sideways by the auger penetration, which results in a compaction of the soil all around the shaft.

The equipment generally consists of a flanged or tubular type leader - depending length on pile depth - and of a crawler unit on which the leader is mounted.

Alternatively, the auger system is operated by self-erecting fully hydraulic rigs type R-Series and CM-Series that SOILMEC has especially designed for the CFA pile.

Taralog recording unit located on board of SOILMEC drilling rig recorded diagrams

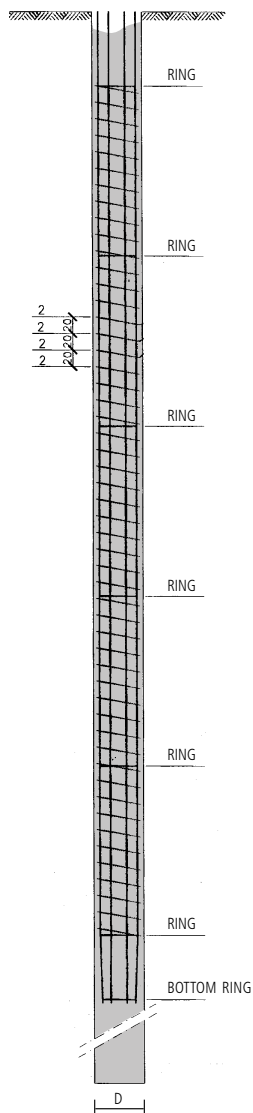


Main Equipment

Model	max nominal diameter mm	max nominal depth m	max nominal torque kNm	drilling speed rpm	max engine power kW	nominal extraction force kN	max operating weight t
CM-50	900	25,0	100	41	153	510	38
CM-70	1000	28,0	154	25	220	680	61
CM-700	1000	29,0	165	26	250	680	75
CM-120	1300	30,5	305	27	400	1160	120
CM-1200	1400	33,5	305	27	400	1160	140
R-210 CFA	750	15,3	100	43	116	280	26
R-312/200 CFA	750	19,0	130	42	153	380	35
R-416 CFA	1000	20,5	160	25	230	500	50
R-516 HD CFA	1000	21,0	180	30	230	520	53
R-620 CFA	1000	22,0	200	34	260	600	61
R-625 CFA	1200	25,5	240	30	300	732	70
R-725 CFA	1200	24,0	240	38	300	800	80
R-825 CFA	1200	27,0	240	28	300	732	85
R-930 CFA	1200	28,5	305	27	400	1160	120
R-1240 CFA	1200	25,5	469	19	400	1160	140

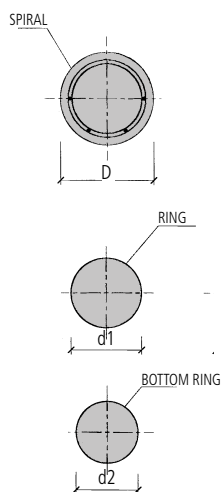
(*) 18 m with 406 mm diam. rotary

Casting of the pile



Concrete

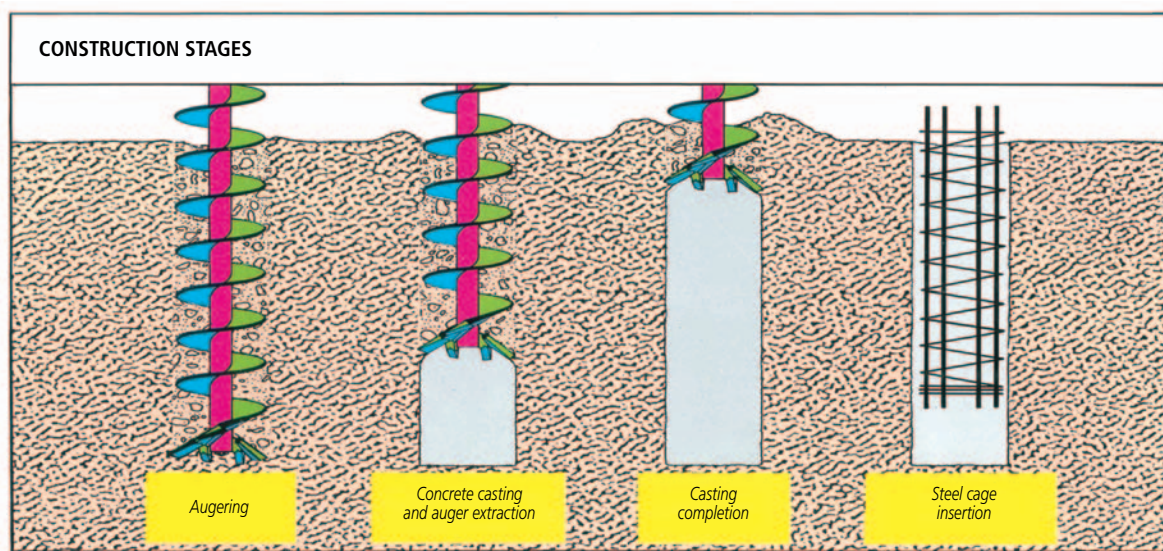
Reinforcement



The concrete is cast through the auger hollow stem by means of a proper concrete pump.

The pump is connected through a hose (4" to 6" diam.) to a feed swivel fitted on the rotary head. When the required depth is reached, concrete is pumped through the string stem and the auger is lifted; the concrete gradually fills the voids left by the auger which is then extracted without being rotated or, just slowly, in the same driving direction.

The integrity of the pile is assured by a constant control of the pressure on the concrete column by means of proper transducers fitted on the equipment.



Continuous Flight Auger

SOILMEC MODEL	AUGER	CENTRAL STEM	
	Diameter (mm)	Outer diam. (mm)	Inner passage (mm)
HD 4	350÷800	140	100
HD 5	450÷1000	160	125

The concrete used for the CFA pile is generally prepared with aggregates of fine round gravel (max size 15 mm) and sand ranging from 0.4 to 0.5 mm in size. The cement contents vary from 350 to 450 kg/m³ with water/cement ratio equal to 0.45 approximately. The slump should be maintained between 190 and 210 mm. Occasionally the use of fluidizing additives may be suggested.

The method of construction of the CFA pile requires the cage to be inserted when casting is completed.

Pile diameter mm.	Suggested cage		Spiral		Diam. of ring bar	Cage dimension	
	Number of bars	Diam. (mm)	Diam. of bar (mm)	Pitch (mm)		d1 (mm)	d2 (mm)
400	6	18	8	20	ø 14	200	150
450	6	18	8	20	ø 14	250	200
500	6	18	8	20	ø 14	300	250
600	6	18	8	20	ø 16	400	350
700	6	20	8	20	ø 16	500	450
800	8	20	8	20	ø 16	600	550
900	8	24	10	20	ø 20	700	650
1000	10	24	10	20	ø 20	800	750
1200	12	24	10	20	ø 20	1000	950

CM-50

CONTINUOUS FLIGHT AUGER PILES

On the basis of the experience gained with the series CM-45, 46 and 48 the new rig CM-50 represent the last development of the equipment series with continuous auger.

The equipment, which is assembled on a Soilmec base, has been designed in order to perform:

- **Continuous flight auger piles**
- **D.T.H.**

The features qualifying the new CM-50 series are:

- completely self-erecting system
- modern instrumentation
- reliability and safety at the job site
- quick installation
- extendible tracks
- easy manoeuvrability
- low transport costs
- high production

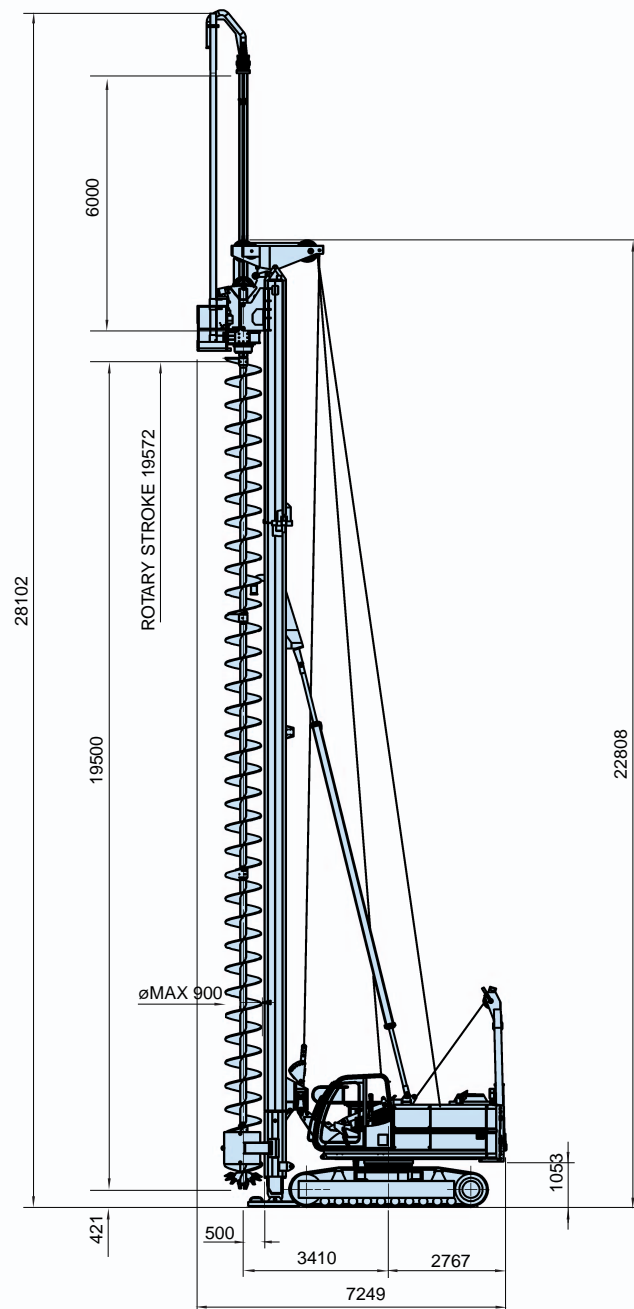
OPTIONAL

- Track shoes 700 mm or 900 mm wide.
- Grids for the cab front protection.
- Air conditioning or heating system for the cab.
- Two-axle electronic inclinometer in the cab.
- Electronic power pack for the control of the extraction pull; it is provided with visual and sound alarms in case of fortuitous overloading.
- Side ladder on mast complete with parachute.
- 4" or 5" concrete pipework on the mast, supplied with insulation, upon request, in case of tropical climates.
- Auger cleaner.
- Power take off for the VTH-1 vibrator to carry out the cage driving.

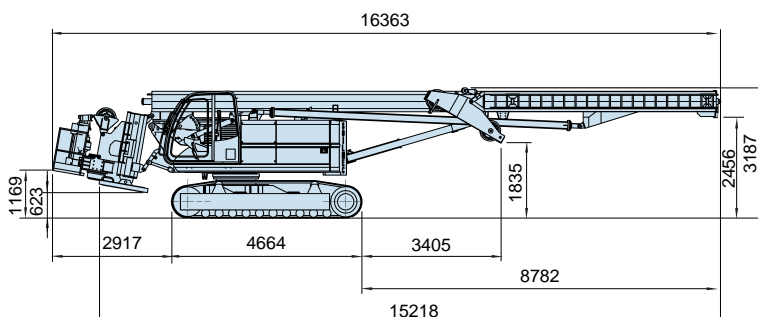
DRILLING PERFORMANCES				
Max. pile depth	m	19 (+ 6 extension)		
Max. pile depth w. auger cleaner	m	17,5 (+ 6 extension)		
Max. pile diameter	mm	900		
Max. extraction force	kN	510		
UNDERCARRIAGE				
Overall length	mm	4660		
Track shoe width	mm	700	900	
Overall width (opened tracks)	mm	4000	4200	
Overall width (closed tracks)	mm	2500	2900	
Ground pressure	MPa	0.07	0.05	
DIESEL ENGINE				
Make / Model	Cummins QSB5.9C			
Max. power	kW (HP)	153 (205) @ 2200 rpm		
HIDRAULIC PUMPS				
Theoretical delivery	lt/min	❶ 320	❷ 35	❸ 23 ❹ 23
Working pressure	bar	300	250	160 50
MAIN WINCH				
Max. nominal pull	kN	102		
Nominal rope speed	m/min	70		
Rope diam.	mm	19		
SERVICE WINCH				
Max. nominal pull	kN	37		
1 st layer nominal rope speed	m/min	37		
Rope diam.	mm	16		
ROTARY TABLE		VARIABLE MOTOR WITH AXIAL PISTONS		
Max. torque	kNm	86 @ 11,2 rpm		
Max drilling speed	rpm	41		
Max. nominal extraction pull	kN	510		
DIMENSIONS AND WEIGHT				
Transport width (with 700 mm shoes)	mm	2500 (2900 with 900 mm shoes)		
Transport height	mm	3190		
Operating weight	ton	39		
Transport weight	ton	33,5		

CM-50

CONTINUOUS FLIGHT AUGER PILES



Transport Condition - Standard version



CM-70

CONTINUOUS FLIGHT AUGER PILES

The newly designed CM-70, is the evolution of the already existing equipment dedicated to CFA drilling technique. The upper structure of the CM-70 is mounted on SOILMEC base carrier and has been designed to perform:

- C.F.A. bored piles
- Piles bored with
- Down-the-Hole-Hammer (D.T.H.)

Its outstanding features are:

- Completely self-erecting
- Up-to-date instrumentation
- High reliability and safety in the job-site
- Quick installation
- Extendable tracks from 2.5 to 3.9 m.
- Easy manoeuvrability
- Low transport costs
- High production
- Reduced transport dimensions

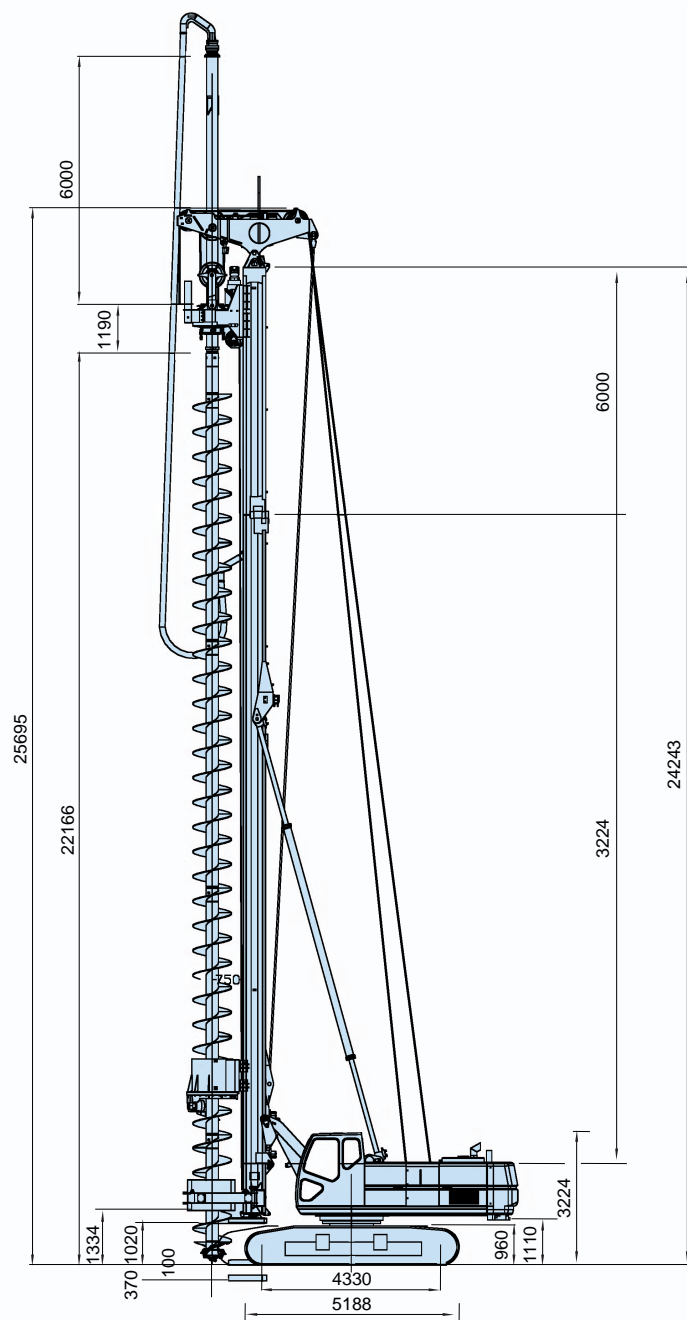
OPTIONALS

- Pre-arrangement for double rotary (C.S.P.).
- Crawler track undercarriage extendable from 2.5 (2.7) m. to 3.9 (4.1) m.
- Pull-down winch (9 ton).
- Grids for front cab protection.
- Air conditioning or heating system for the cab.
- Two-axle electronic inclinometer in the cab Electronic power pack to control the extraction pull; it is provided with visual and sound alarm in case of overloading.
- Ladder on mast complete with parachute
- 4" or 5" concrete pipework on the mast, supplied with insulation, upon request, for tropical climates
- Auger cleaner (Ø 1000 mm max.)
- VTH-1 vibrator power take off for cage driving

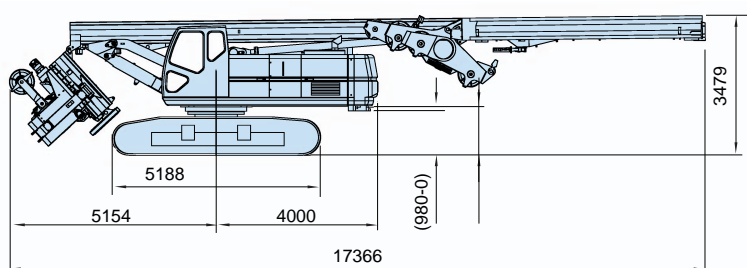
DRILLING PERFORMANCES		
Max. pile depth	m	22 (+ 6 Extension)
Max. pile depth (w/ auger cleaner)	m	27
Max. pile diameter	mm	1000
Max extraction force	kN	680
UNDERCARRIAGE		
Overall length	mm	5190
Track shoe width	mm	700 (opt. 900)
Overall width (opened tracks)	mm	3900 (opt. 4100)
Overall width (closed tracks)	mm	2500 (opt. 2700)
Ground pressure	Mpa	0,085 (opt. 0,080)
DIESEL ENGINE		
Make / Model		Cummins 6CTA A8.3
Power rating	kW (HP)	220 (300) @ 2200 rpm
HYDRAULIC PUMPS		
Main pumps	lt/min	2 x 214
Delivery of auxiliary pumps	lt/min	30 + 70
Max working pressure	MPa	32,5
MAIN WINCH		
Nominal line pull	kN	170
1st layer nominal rope speed	m/min	71
Rope diameter	mm	24
SERVICE WINCH		
1st layer nominal line pull	kN	80
1st layer nominal rope speed	m/min	56
Rope diameter	mm	19
ROTARY TABLE		
Nominal torque	kNm	156 @ 9,2 rpm
Drilling speeds	n°	3
Maximum drilling speed	rpm	25
DIMENSIONS AND WEIGHT		
Transport width	mm	2500 (opt. 2700)
Transport height	mm	3340
Operating weight	ton	55
Minimum transport weight (counterweight removed)	ton	48

CM-70

CONTINUOUS FLIGHT AUGER PILES



Transport Condition - Standard version



CM-700

CONTINUOUS FLIGHT AUGER PILES

Following the recent upgrades in CFA technology SOILMEC introduces now the hydraulic drilling rig CM-700. This new model, installed on CATERPILLAR base, has been designed to perform:

- **CFA bored**
- **D.T.H.**

Main characteristics of CM-700 are as follows:

- Completely self-erecting
- Working radius of 360°
- Expandable tracks from 3,1 m to 4,45 m
- CATERPILLAR base
- Self-lifting counterweight

The new CM-700 is able to drill not only between the crawlers, but also on both sides, along a complete circumference, having a working radius of 360°.

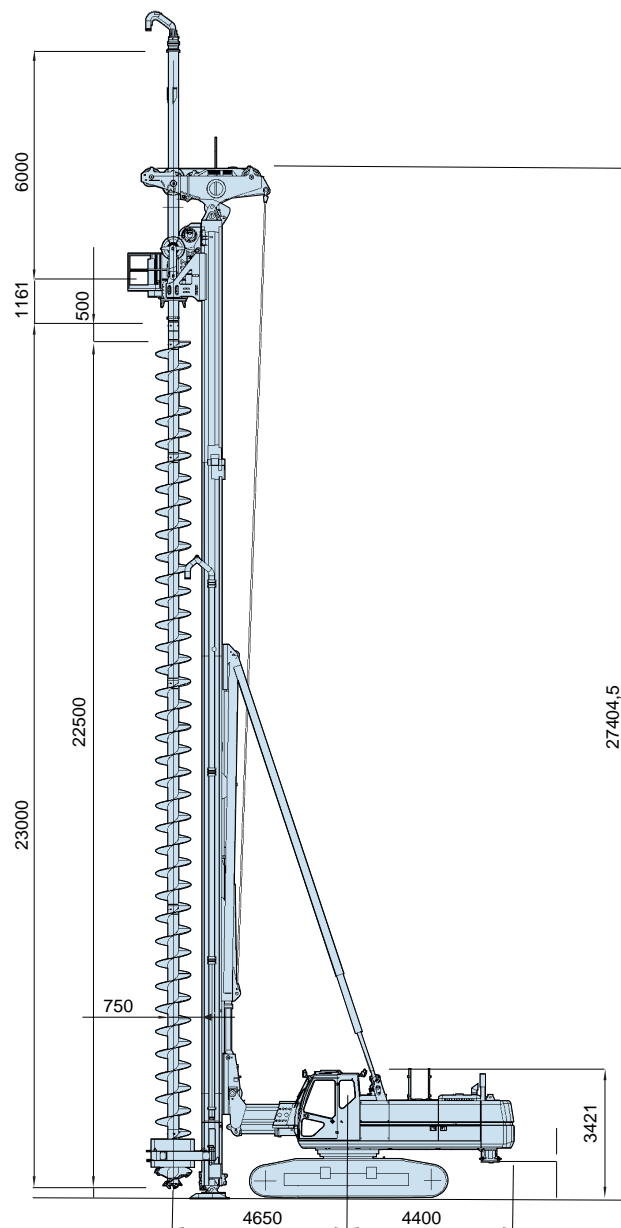
OPTIONALS

- Pre-arrangement for double rotary (C.S.P.).
- Pull-down winch (12 ton).
- Grids for front cab protection.
- Air conditioning or heating system for the cabin.
- Two-axle electronic inclinometer in the cabin.
- Electronic power pack to control the extraction force; it is provided with visual and sound alarm in case of overloading.
- Ladder on mast complete with parachute.
- 4" or 5" concrete pipework on the mast, supplied with insulation, upon request, for tropical climates
- Auger cleaner (ø 1000 mm max.).
- VTH-1 vibrator power take off for cage driving.

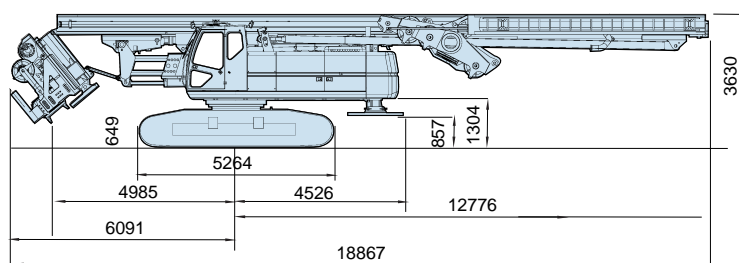
DRILLING PERFORMANCES		
Max. pile diameter	mm	1000
Max. pile depth	m	23 (+ 6 extension)
Max. pile depth (w/ auger cleaner)	m	27,5
Max extraction force	kN	680
Pull - down winch (optional)	ton	12
Auger cleaner max. diameter	mm	1000
UNDERCARRIAGE		
Overall length	mm	5250
Track shoe width	mm	750
Overall width (opened tracks)	mm	4450
Overall width (closed tracks)	mm	3100
Ground pressure	Mpa	0,098
DIESEL ENGINE		
Make / Model	Caterpillar C 9	
Power rating	kW (HP)	250 (335) @ 2200 rpm
HYDRAULIC PUMPS		
Main pumps	lt/min	2 x 220
Max working pressure	MPa	32,5
MAIN WINCH		
Type SW 170		
1st layer nominal line pull	kN	170
1st layer nominal rope speed	m/min	71
Rope diameter	mm	24
SERVICE WINCH		
Type SW 90		
1st layer nominal line pull	kN	80
1st layer nominal rope speed	m/min	56
Rope diameter	mm	19
ROTARY TABLE		
Nominal torque	kNm	172 @ 7,7 rpm
Maximum drilling speed	rpm	25
DIMENSIONS AND WEIGHT		
Transport width	mm	3100
Transport height	mm	3630
Operating weight	ton	75
Minimum transport weight (Counterweight & rotary removed)	ton	50

CM-700

CONTINUOUS FLIGHT AUGER PILES



Transport Condition - Standard version



CM-120

CONTINUOUS FLIGHT AUGER PILES

Self-erecting drilling rig **dedicated to large diameter CFA and CSP pile drilling.**

- A new rig to increase the production capacity in CFA classical technology by drastically reducing the time dedicated to rig up and rig down even for large piles over 1m diameter.
- A new rig to replace D.W. by cased secant piles executed with high production rate with secured vertical alignment through casing use.

Once more, after the CM-48, CM-50 and the CM-70, with the introduction of the new CM-120, SOILMEC extends the present limits of C.F.A. application field allowing the use of self-erecting rig to very large diameter drilling.

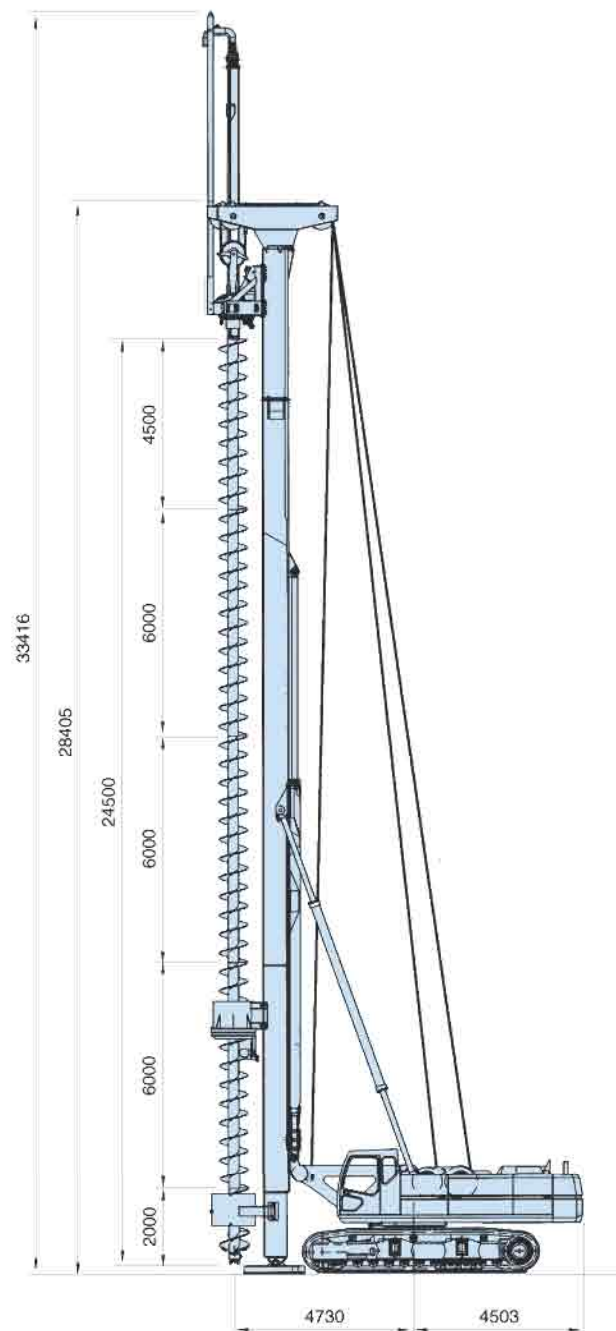
Infact the CM-120 is the unique machine on the market offering the combination of huge drilling capacities, easy transport and self-erection. No service crane is necessary to mount the machine. To reach the highest production level, more than 300 BHP are available at the rotary for high speed drilling with 300 kNm maximum torque. In addition, 116 t extraction force are available to reach 30,5 m depth.

For secant piles, the CM-120 is fitted with a lower casing rotary driver able to develop 360 kNm. It is completed by 32 t capacity crowd winch. Even for big secant pile diameters as 1000 mm, the new rig is able to double or triple the daily production reached by conventional equipment.

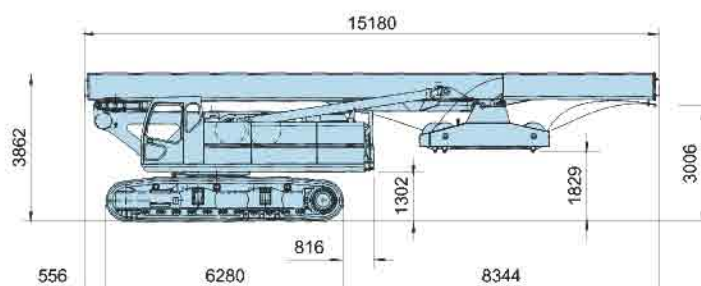
DRILLING PERFORMANCES		
Max. pile diameter	mm	1400
Max. pile depth	m	24,5+6 (extension)
Max. pile depth (with auger cleaner)	m	29
Auger cleaner max. diameter	mm	1200
BASE CARRIER		
Overall length	mm	5000
Track shoe width	mm	900
Overall width (opened tracks)	mm	4700
Overall width (closed tracks)	mm	2500
Ground pressure	MPa	0,070
DIESEL ENGINE		
Make / Model		Deutz BF8M1015C
Power rating	kW (HP)	400 (544) @ 2100 rpm
HYDRAULIC PUMPS		
Main pumps	lt/min	2x380
Max working pressure	MPa	35
MAIN WINCH		
Type SW 290		
1st layer nominal line pull	kN	290
1st layer nominal rope speed	m/min	50/80
Rope diameter	mm	30
SERVICE WINCH		
Type SW 140		
1st layer nominal line pull	kN	140
1st layer nominal rope speed	m/min	60/120
Rope diameter	mm	26
ROTARY TABLE		
Nominal torque	kNm	300 @ 9,5 rpm
Maximum drilling speed	rpm	25
DIMENSIONS AND WEIGHT		
Operating weight	ton	5000
Transport width	mm	105
Transport height	mm	3862
Transport weight (crawlers, counterweight and rotary removed)	ton	53

CM-120

CONTINUOUS FLIGHT AUGER PILES



Transport Condition - Standard version



CM-1200

CONTINUOUS FLIGHT AUGER PILES

Self-erecting drilling rig dedicated to large diameter CFA.

- A new rig to increase the production capacity in CFA classical technology by drastically reducing the time dedicated to rig up and rig down even for large piles over 1m diameter.

- Thanks to its capacity to drill not only between the crawlers, but also on both sides, having a working radius of 230°, reduces travelling time between piles, increasing daily production.

Once more, after CM-48, CM-70 and CM-120, with the introduction of the new CM-1200 SOILMEC extends the present limits of CFA applications allowing the use of self-erecting rigs for heavy weight equipment also.

Infact the CM-1200 combines huge drilling capacities, easy transport and self-erection.

CM-1200 is specially designed to have a working radius of 230°. In this way CM-1200 is able to drill inside small areas and corners that would not be reachable with similar CFA rigs.

The powerful rotary allows to reach high daily productions.

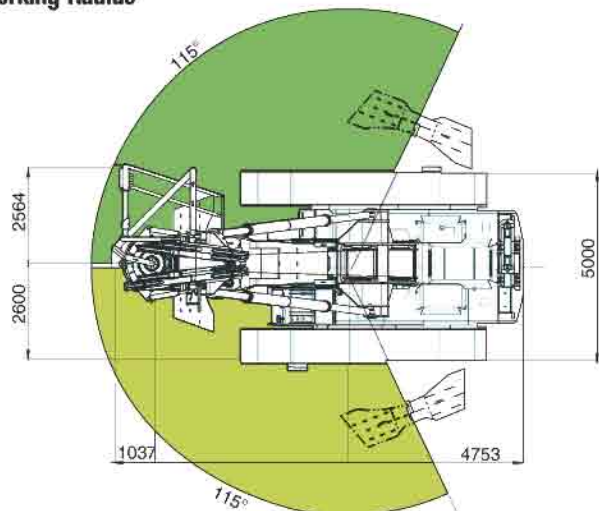
In addition the new mast can drill up to 33,5 m (with 6 m CFA extension).

DRILLING PERFORMANCES		
Max. auger diameter	mm	1400
Max. pile depth	m	33,5
Max. pile depth (with auger cleaner)	m	32
Max. auger string length	m	27,5
Auger cleaner max. diameter	mm	1200
Extraction pull	kN	1140
Pull-down winch (optional)	ton	20
BASE CARRIER		
Overall length	mm	7954
Track shoe width	mm	900
Overall width (opened tracks)	mm	5000
Overall width (closed tracks)	mm	3450
DIESEL ENGINE		
Make / Model		Deutz BF8M1015C
Power rating	kW (HP)	400 (544) @ 2100 rpm
HYDRAULIC PUMPS		
Main pumps	lt/min	2 x 380
Max working pressure	MPa	35
MAIN WINCH		
Type SW 290		
1st layer nominal line pull	kN	290
1st layer nominal rope speed	m/min	82
Rope diameter	mm	30
SERVICE WINCH		
Type SW 140.1		
1st layer nominal line pull	kN	140
1st layer nominal rope speed	m/min	62
Rope diameter	mm	26
ROTARY TABLE		
Nominal torque	kNm	300 @ 9,5 rpm
Maximum drilling speed	rpm	25
DIMENSIONS AND WEIGHT		
Transport width (crawlers removed)	mm	3450 (3000)
Transport height (crawlers removed)	mm	4170 (3740)
Transport weight (crawlers removed)	ton	107 (79)
Operating weight	ton	140

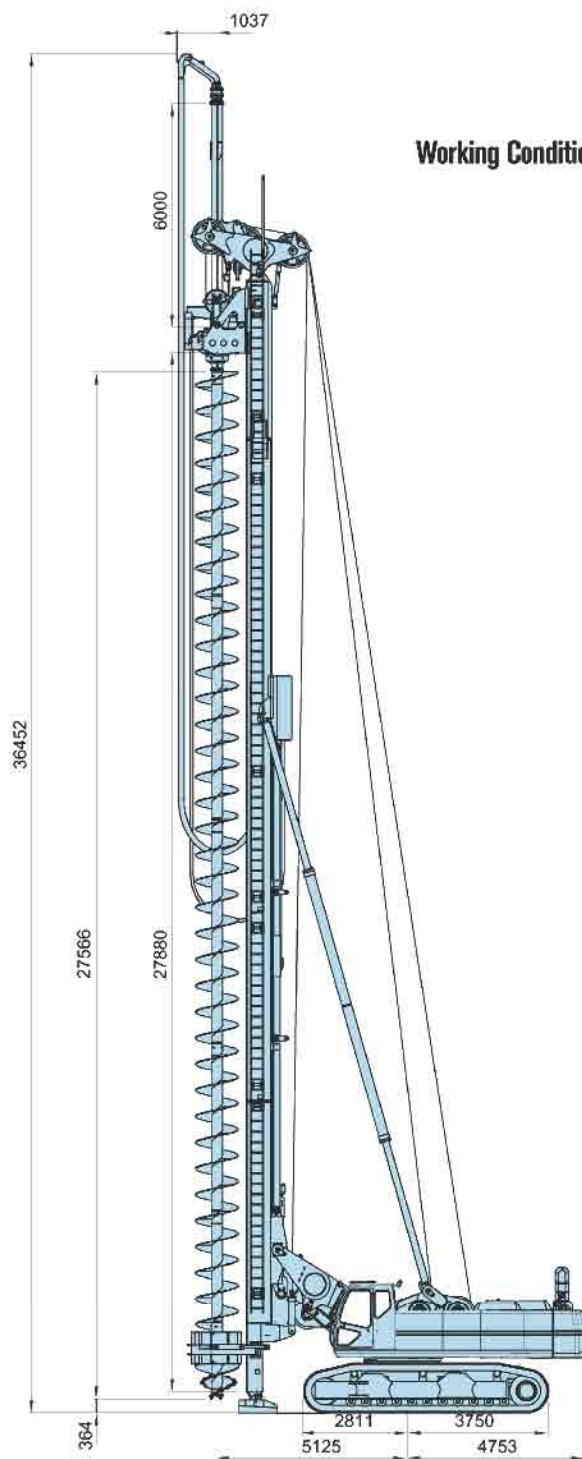
CM-1200

CONTINUOUS FLIGHT AUGER PILES

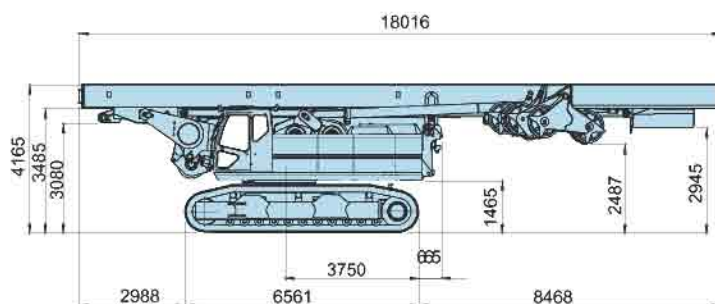
Working Radius



Working Conditions



Transport Condition - Standard version



CONCRETE PUMPS

ROTARY RIG



After a few years of a valuable technical cooperation between SOILMEC S.p.A. and MECBO S.r.l., it has been designed, realized and successfully tested a revolutionary idea for concrete pumps, particularly suitable to be used in continuous flight auger drilling operations.

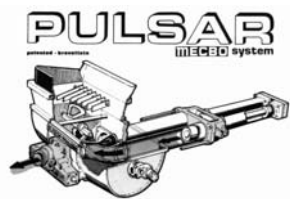
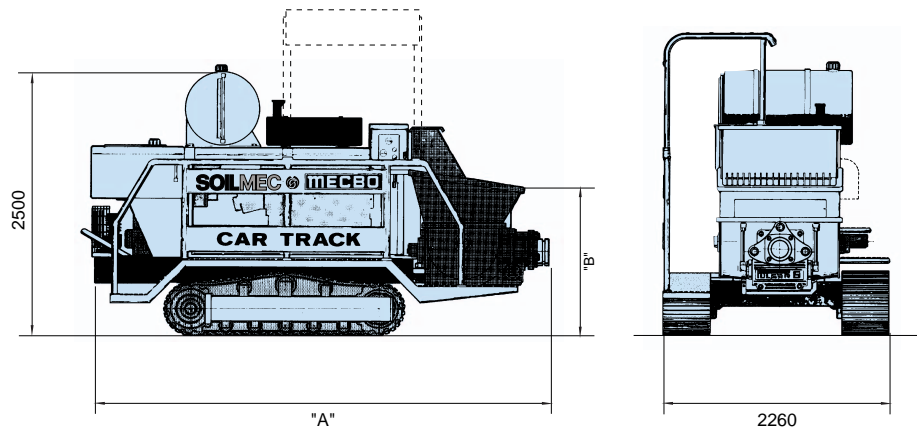
Self-propelled and crawler mounted pumping units have been specifically manufactured; one of the outstanding feature is that they can work closely to the hydraulic rotary rigs, C.F.A. version. This special type of pump incorporates a concrete pipe cleaner air compressor to be used after piling execution and a water tank for its own cleaning. Experts in this field, well understand the remarkable economic advantages of this pump compared to traditional concrete ones, without air compressors and water tanks.

Brands such as DEUTZ and CUMMINS' diesel engines, IDROMATIK-REXROTH hydraulic system, BERCO's crawler tracks, SIEMENS electrical systems and the steel abrasion resistance of the materials, have been chosen because of their high performances allowing high reliability and efficiency.

Last but not least, the so-called "PULSAR SYSTEM" patented by MECBO to actuate the "S" shape-valve; it saves up to 40 % energy compared to traditional piston pump systems.

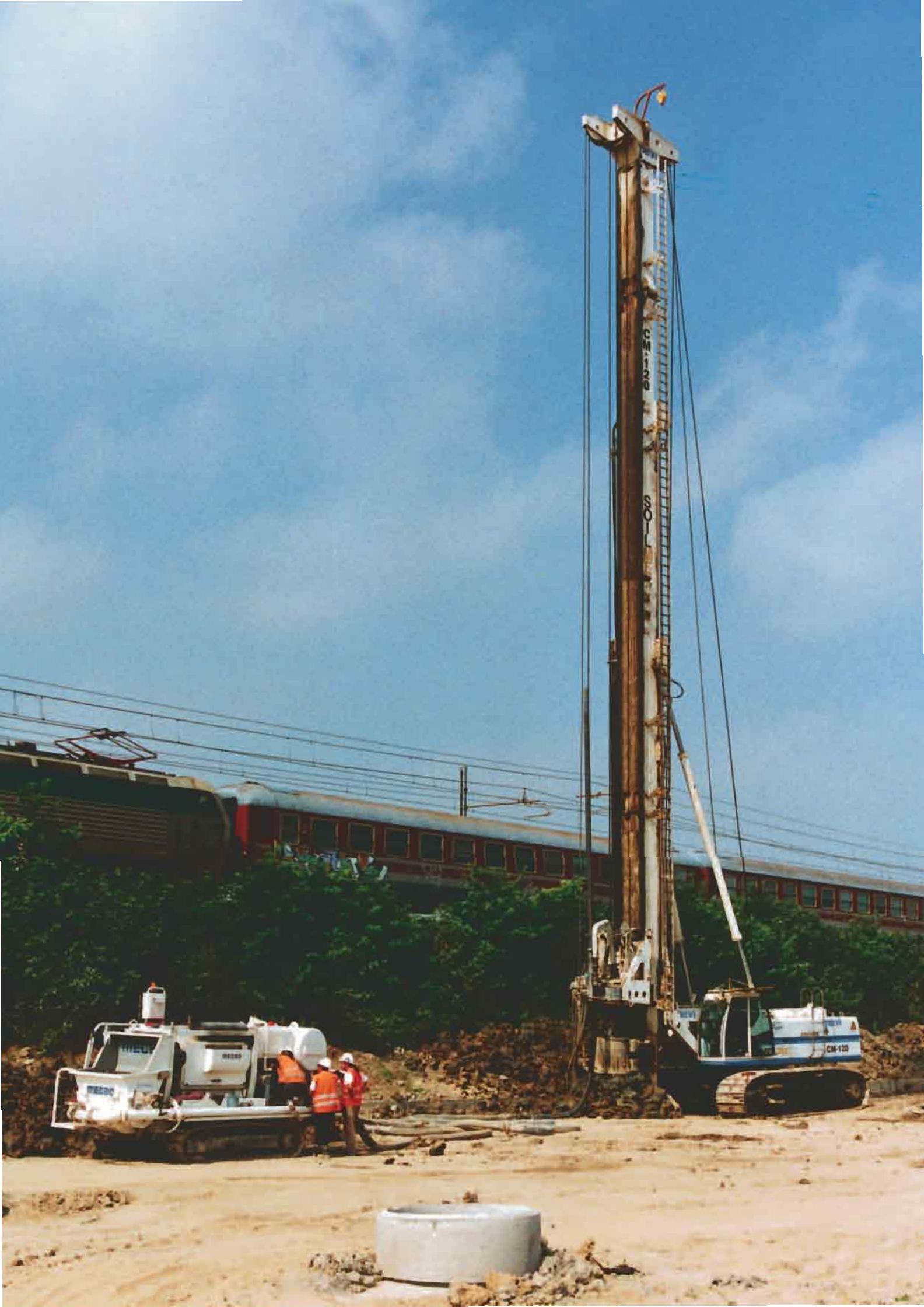
Several tests, carried out at Job Sites, have shown the validity of the equipment and with pride we affirm that SOILMEC has made a step further on the concreting technique in C.F.A. version.

On this respect a wide range of concrete pumps has been developed together with MECBO to satisfy the C.F.A. market requests.



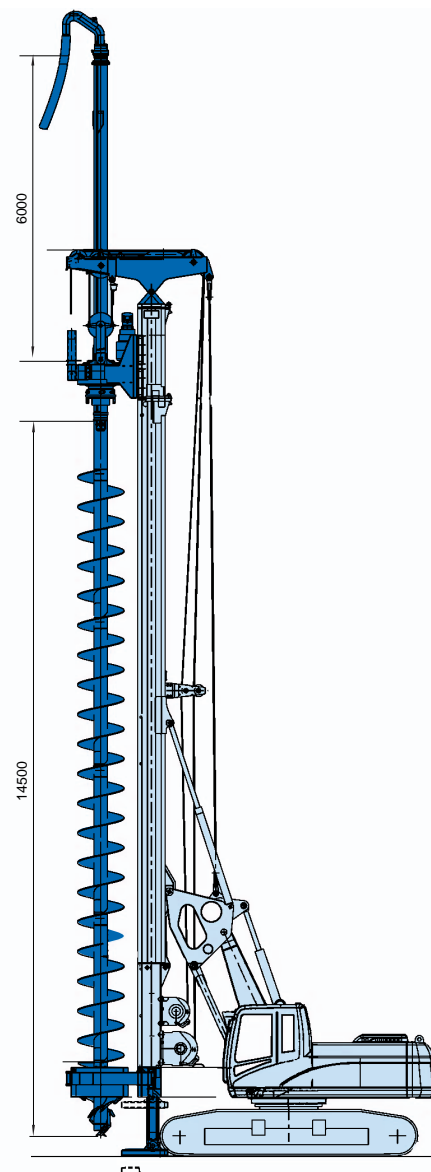
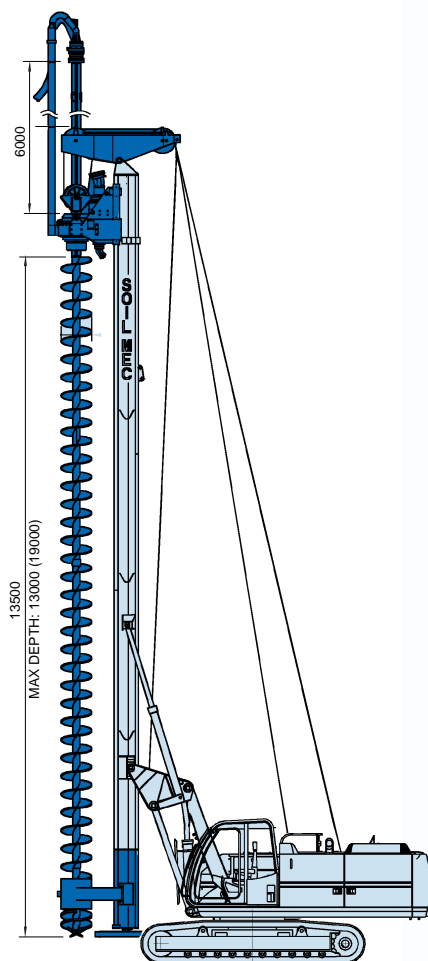
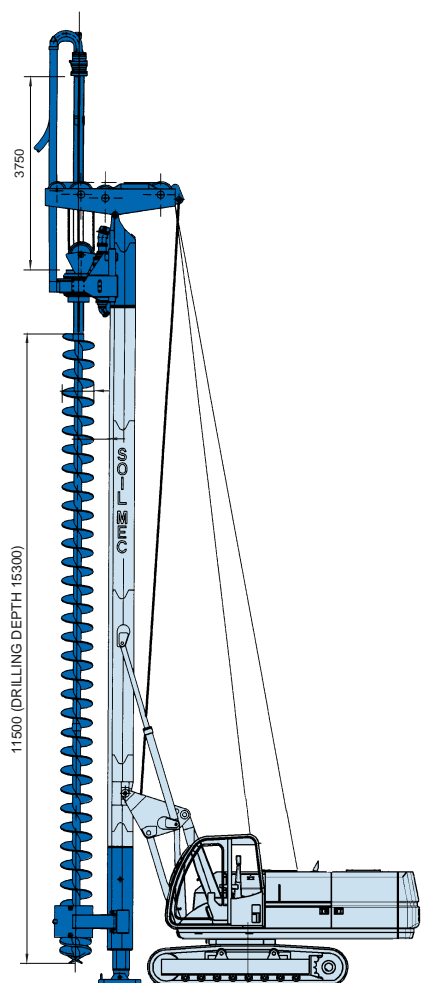
The PULSAR system allows the movement of the "S" valve by a special device, driven by a tangential movement equipment to avoid the change of pressure that is present on pistons pumping system. This system saves of 30-40% of energy compared to the other systems.

Make / Model		P4.65	P6.80	P6.90	P6.100	P6.120
Nominal power	HP	120	150	180	180	180
Engine	type	F6L 912	BF6L 913	BF6L 913C	BF6L 913C	BF6L 913C
Cylinders diameter	mm	180	200	200	200	200
Cylinders stroke	mm	1400	1400	1600	1800	2000
Hopper capacity	lt.	400	450	450	450	450
Cycles per minute	n°	30	30	30	30	32
Delivery	mc/h	64	79	90	101	120
Gate pressure	BAR	50	50	50	50	50
Air compressor output	lt/m'	1050	1050	1050	1270	1270
Air compressor pressure	BAR	10	10	10	10	10
Gate diameter	mm	125 (5")	5" ÷ 6"	5" ÷ 6"	5" ÷ 6"	5" ÷ 6"
Pump weight	kg	6500	7000	7200	7800	8000
Dimensions	A	4700	4700	5100	5500	5900
	B	1300	1300	1400	1400	1400



R-SERIES

C.F.A. ROTARY RIG



R-210 CFA

		<i>line pull 2nd layer</i>	<i>line pull 4th layer</i>
Max depth.	m	10,5	15,3
Max diameter	mm	750	750
Extracting force	kN	140	280
Machine weight	t	24,3	26

R-312/200 CFA

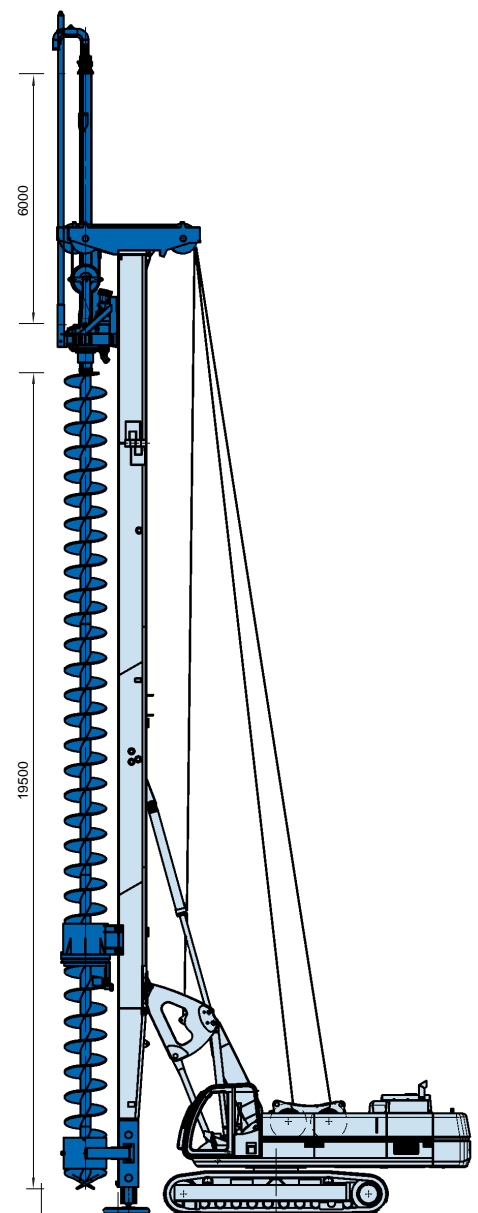
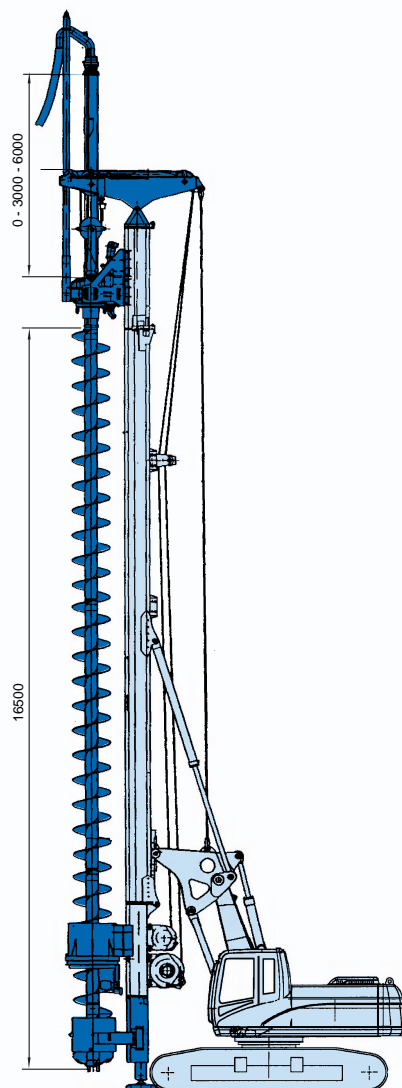
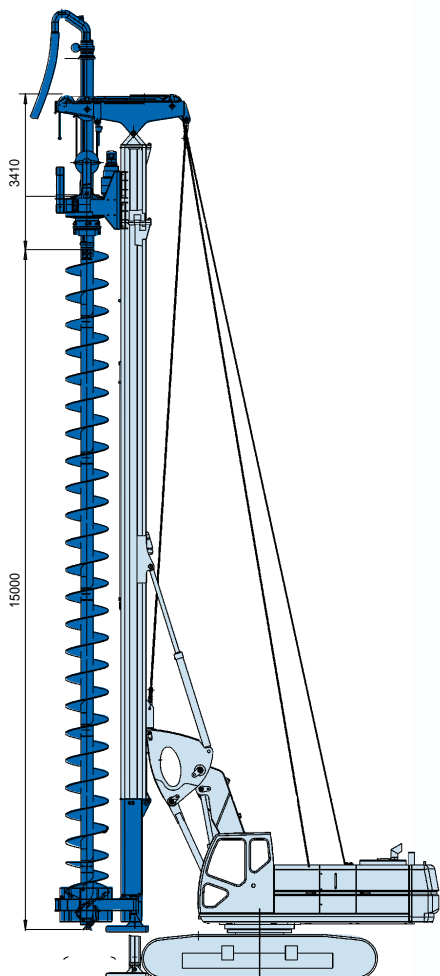
Max depth.	m	19
Max diameter	mm	750
Extracting force	kN	380
Machine weight	t	35

R-416 CFA

Max depth.	m	20,5
Max diameter	mm	1000
Extracting force	kN	500
Machine weight	t	48

R-SERIES

C.F.A. ROTARY RIG



R-516 HD CFA

Max depth.	m	21
Max diameter	mm	1000
Extracting force	kN	520
Machine weight	t	54

R-620 CFA

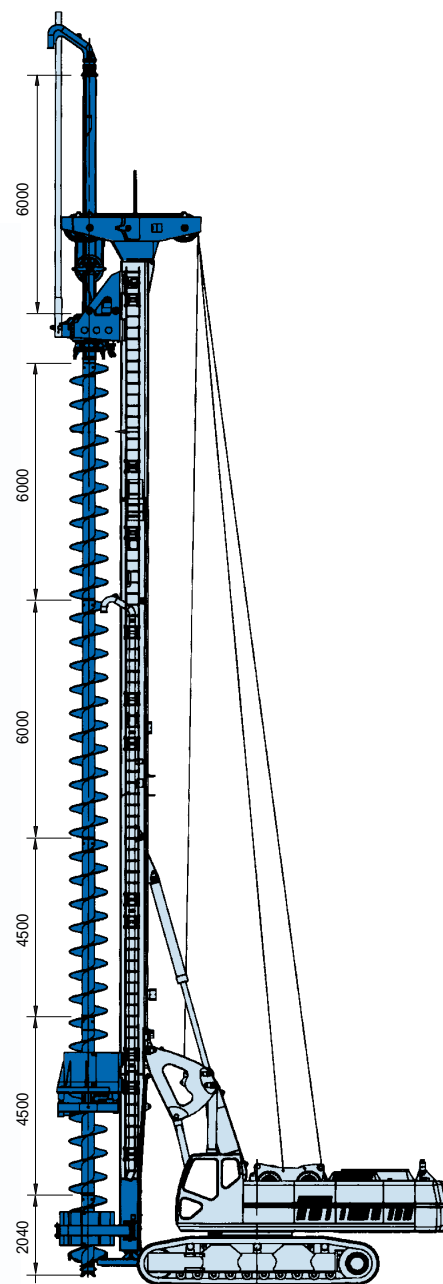
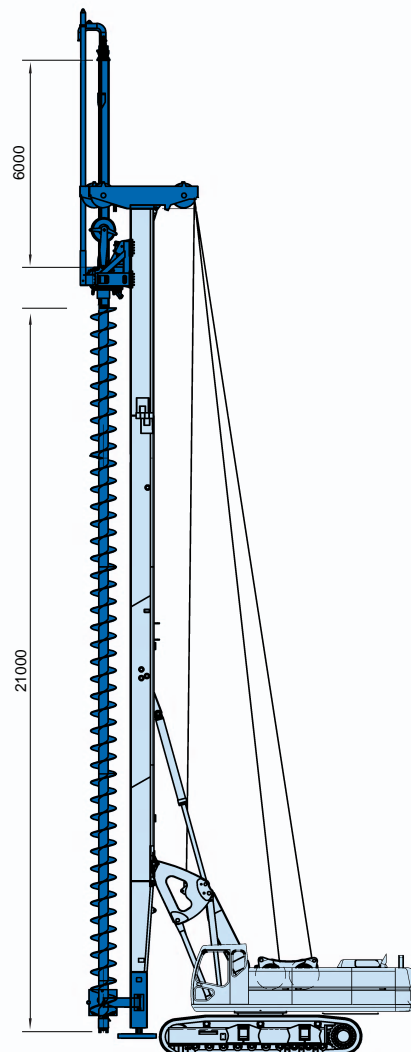
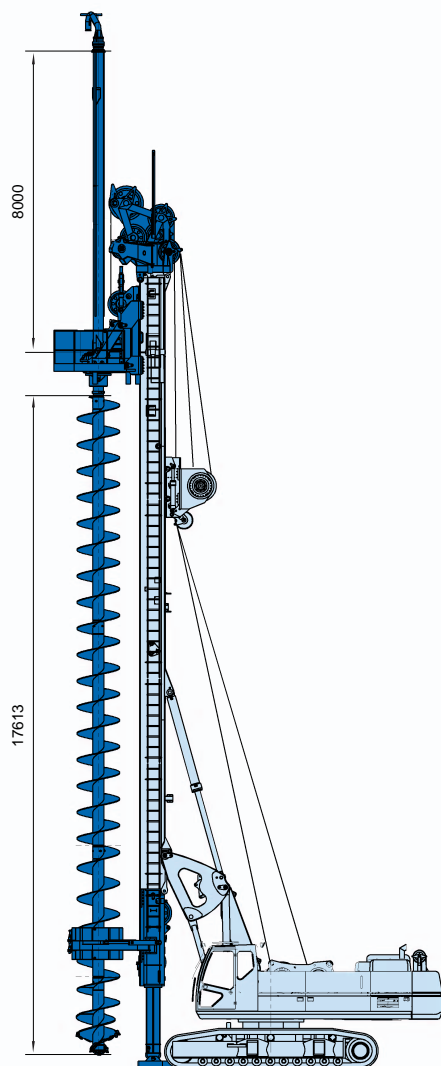
Max depth.	m	22,5
Max diameter	mm	1000
Extracting force	kN	600
Machine weight	t	63

R-625 CFA

Max depth.	m	25,5
Max diameter	mm	1200
Extracting force	kN	732
Machine weight	t	70

R-SERIES

C.F.A. ROTARY RIG



R-725 CFA

Max depth.	m	24
Max diameter	mm	1200
Extracting force	kN	800
Machine weight	t	80

R-825 CFA

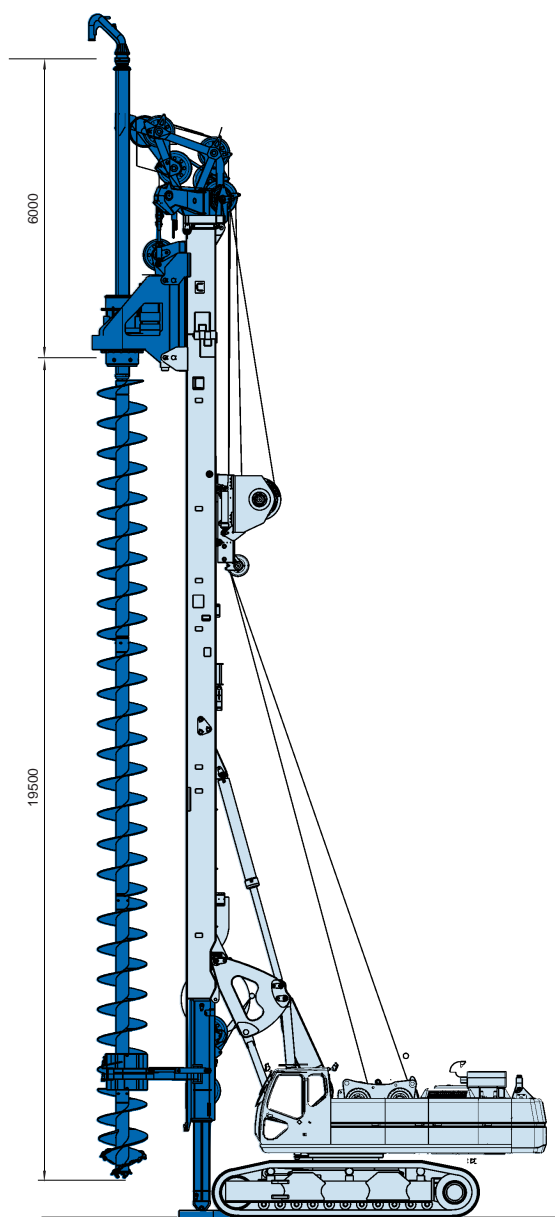
Max depth.	m	27
Max diameter	mm	1200
Extracting force	kN	732
Machine weight	t	80÷85

R-930 CFA

Max depth.	m	28,6
Max diameter	mm	1200
Extracting force	kN	1160
Machine weight	t	95

R-SERIES

C.F.A. ROTARY RIG



R-1240 CFA

Max depth.	m	23,5
Max diameter	mm	1200
Extracting force	kN	1060
Machine weight	t	140



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