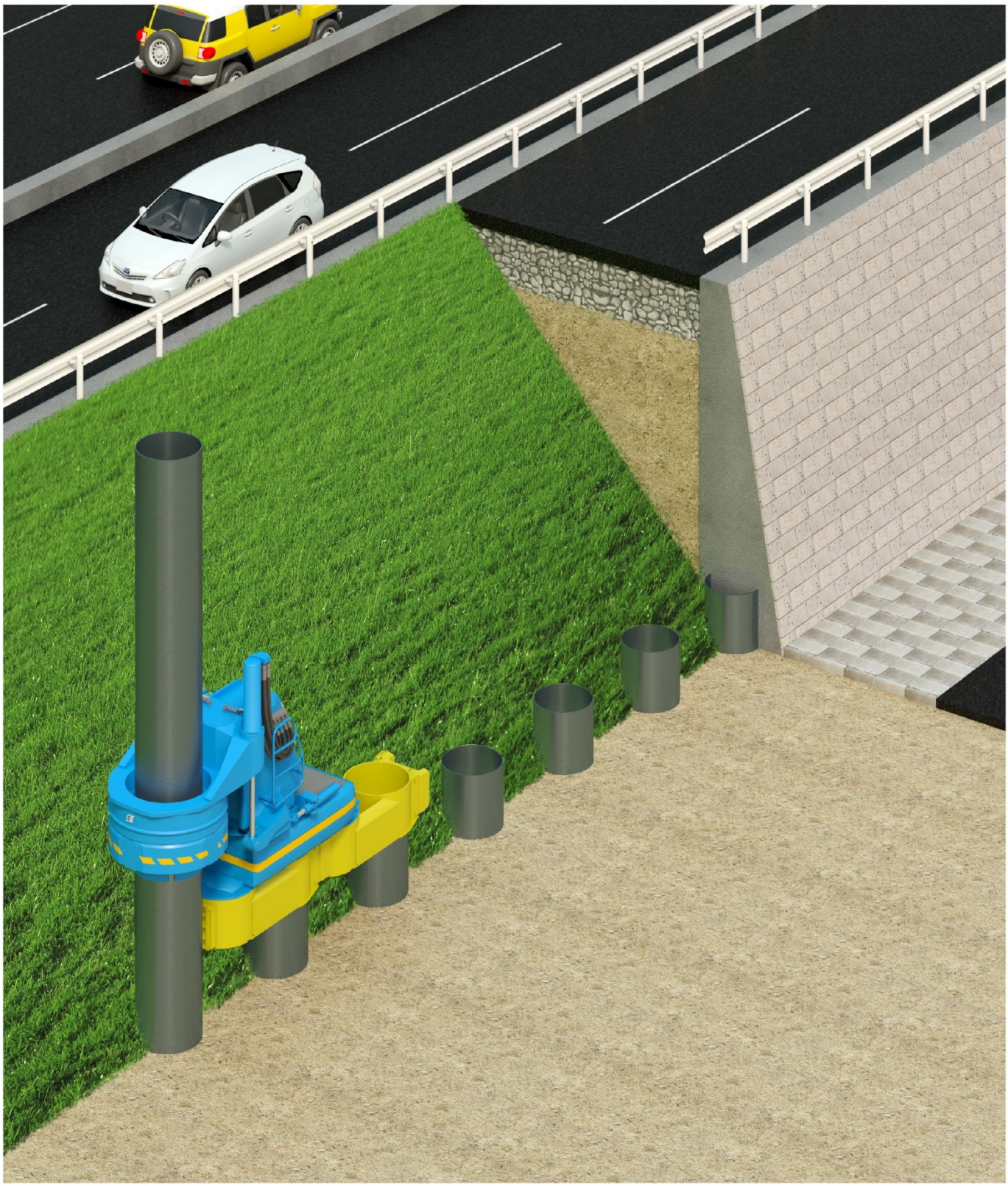
TUBULAR KING PILE FOUNDATION

- Robust and Resilient Foundation System with High Cost Efficiency -

Vol.2 Construction



GIKEN

Table of Contents

Chapter 1 Introduction

The purpose of this document is to provide practical guidelines for the construction of the Tubular King Pile Foundation.

The intended audience for this document is engineers and construction specialists involved in the design, construction, and contracting of foundation elements for infrastructures.

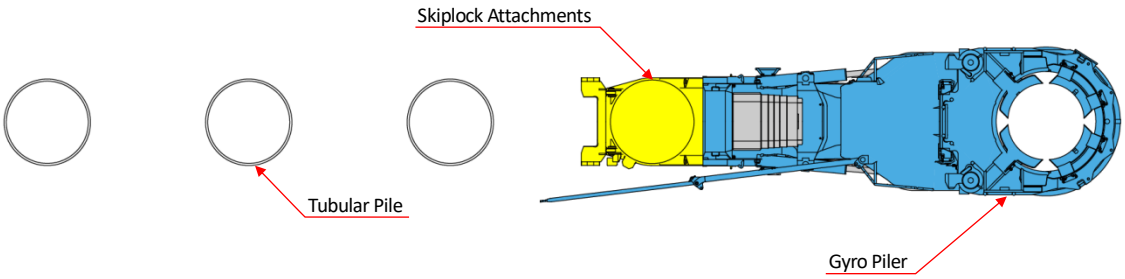
The press-in piling method is commonly used worldwide because of its very quiet operation, ultralow vibration, and flexibility of sizes to suit different wall properties and subsoil conditions.

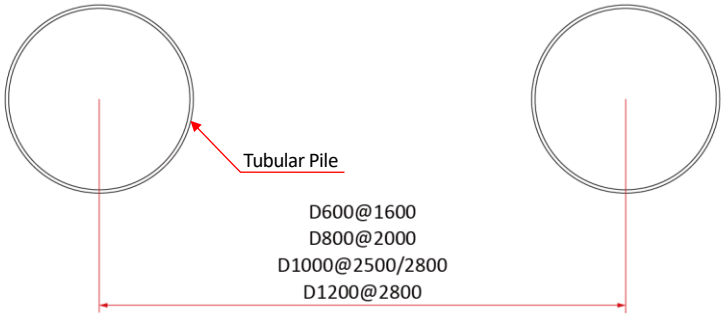
The main attributes of the Tubular King Pile Foundation are efficiency of physical wall properties and versatility. The Tubular King Pile Foundation comprises steel tubular piles as the primary foundation element and incorporating additional upper wall elements on top of the steel tubular piles. The efficiencies of physical foundation properties can be optimized in view of the flexibility of pile size and the spacing of tubular piles for the ground conditions and the form of the loading. The Tubular King Pile Foundation is installed by the press-in method and pile penetration force is monitored and recorded throughout the piling operation. This thorough monitoring and recording system alleviates concerns of quality control, as well as providing a comprehensive quality control method for a performance-based contracting process.

This document provides a description of construction equipment and procedures of the Tubular King Pile Foundation.

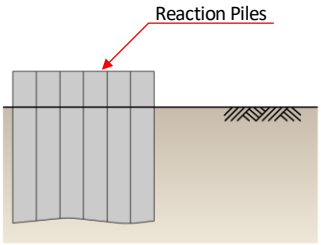
Chapter 2 Standard Procedure

2-1 Overall Procedure



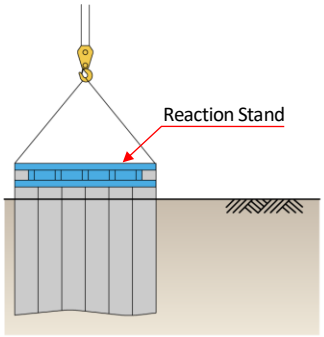


2-2 Initial Piling

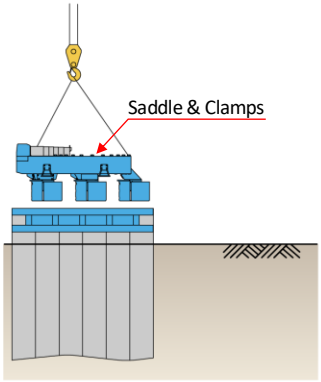


1.Installing of sheet piles as reaction piles

Note: The sheet pile length for initial reaction force is determined by site conditions

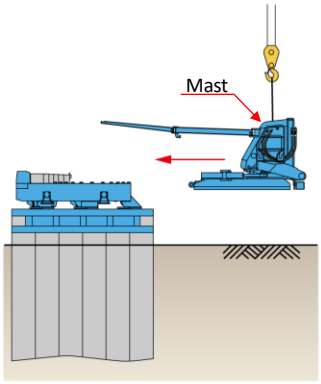


2.Fixing of Reaction Stand to reaction piles by bolts and welds



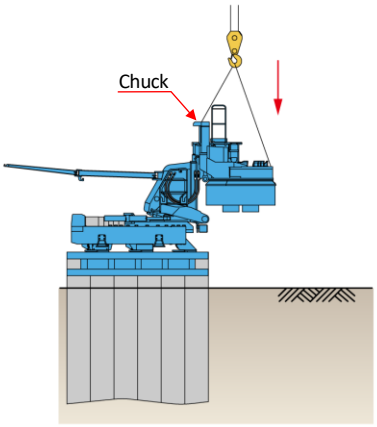
3.Fixing of Saddle & Clamps to Reaction Stand

(F301-G1000)	(F401-G1200)
Saddle & Clamps:	Saddle & Clamps:
4.25 ton (Ø 600mm)	10.25 ton (Ø 800mm)
4.90 ton (Ø 800mm)	11.00 ton (Ø 1000mm)
5.45 ton (Ø 1000mm)	11.00 ton (Ø 1200mm)



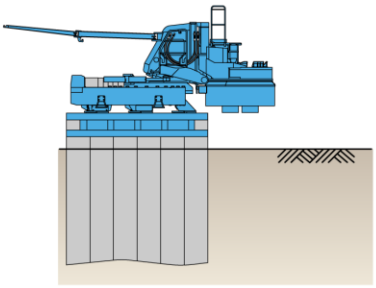
4.Fixing of Mast to Saddle

(F301-G1000)	(F401-G1200)
Mast:4.20ton	Mast:8.80ton



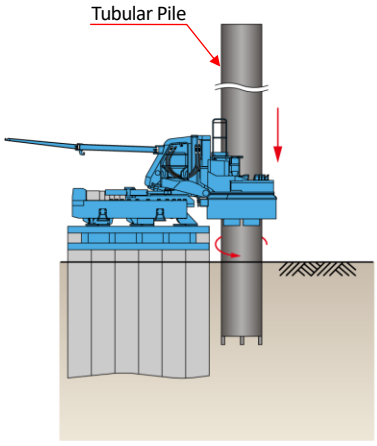
5.Fixing of Chuck to Mast

(F301-G1000)	(F401-G1200)
Chuck:	Chuck:
7.55 ton (Ø 600mm)	12.80 ton (Ø 800mm)
7.50 ton (Ø 800mm)	12.80 ton (Ø 1000mm)
7.55 ton (Ø 1000mm)	13.20 ton (Ø 1200mm)

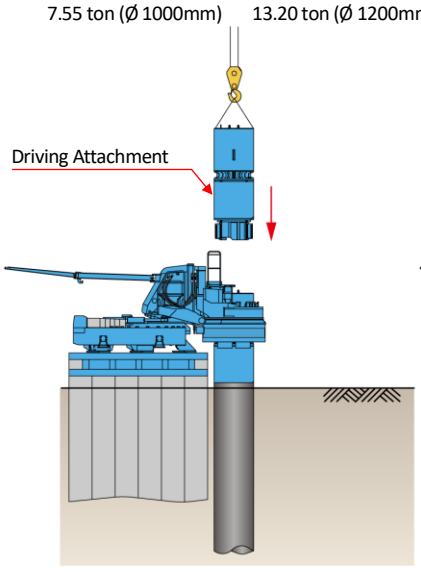


6.Completion of assembly of Gyro Piler

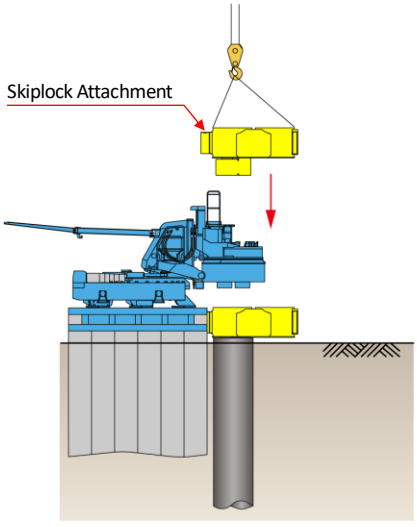
(F301-G1000)	(F401-G1200)
Total mass:	Total Mass:
16.00 ton (Ø 600mm)	31.85 ton (Ø 800mm)
16.60 ton (Ø 800mm)	32.60 ton (Ø 1000mm)
17.20 ton (Ø 1000mm)	33.60 ton (Ø 1200mm)



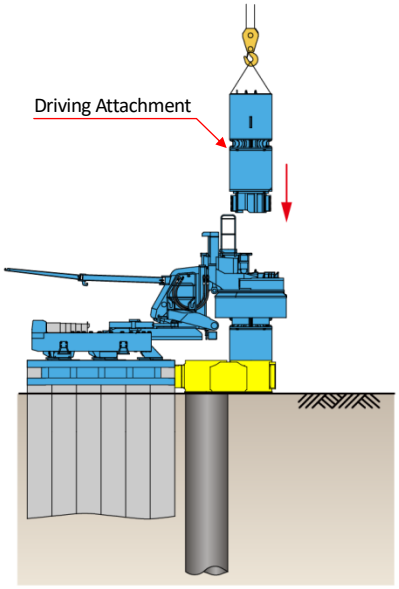
7.Installing of tubular pile



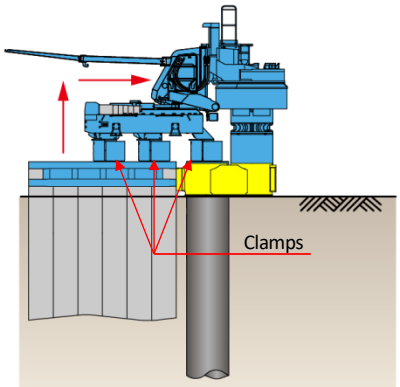
8.Pitching of Driving Attachment onto top of pile and installing pile to prescribed depth



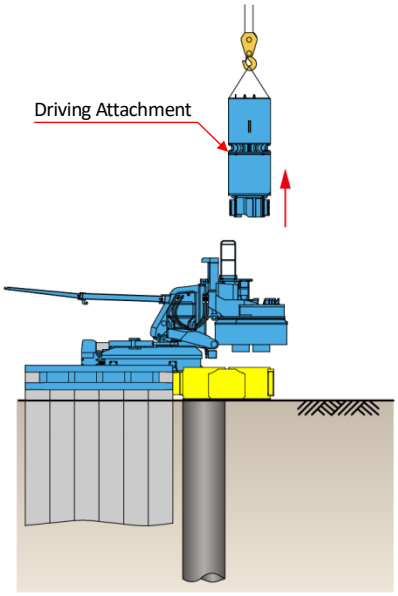
9.Fixing of Skiplock Attachment onto installed pile



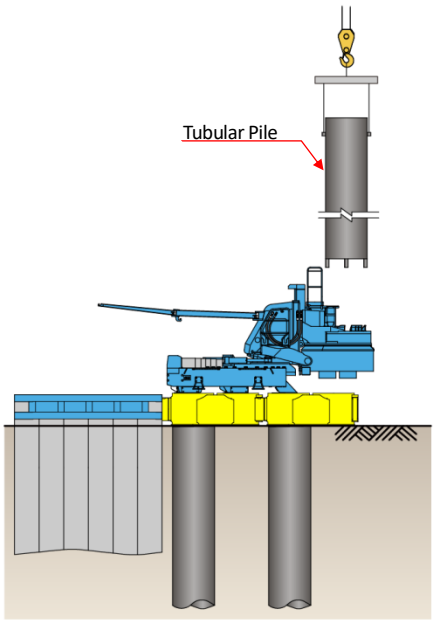
10.Pitching of Driving Attachment onto Skiplock Attachment



11.eleasing of Clamps and raising machine body
12.Moving of machine body



13.Lowering of machine body and gripping Skiplock Attachment and Reaction Stand

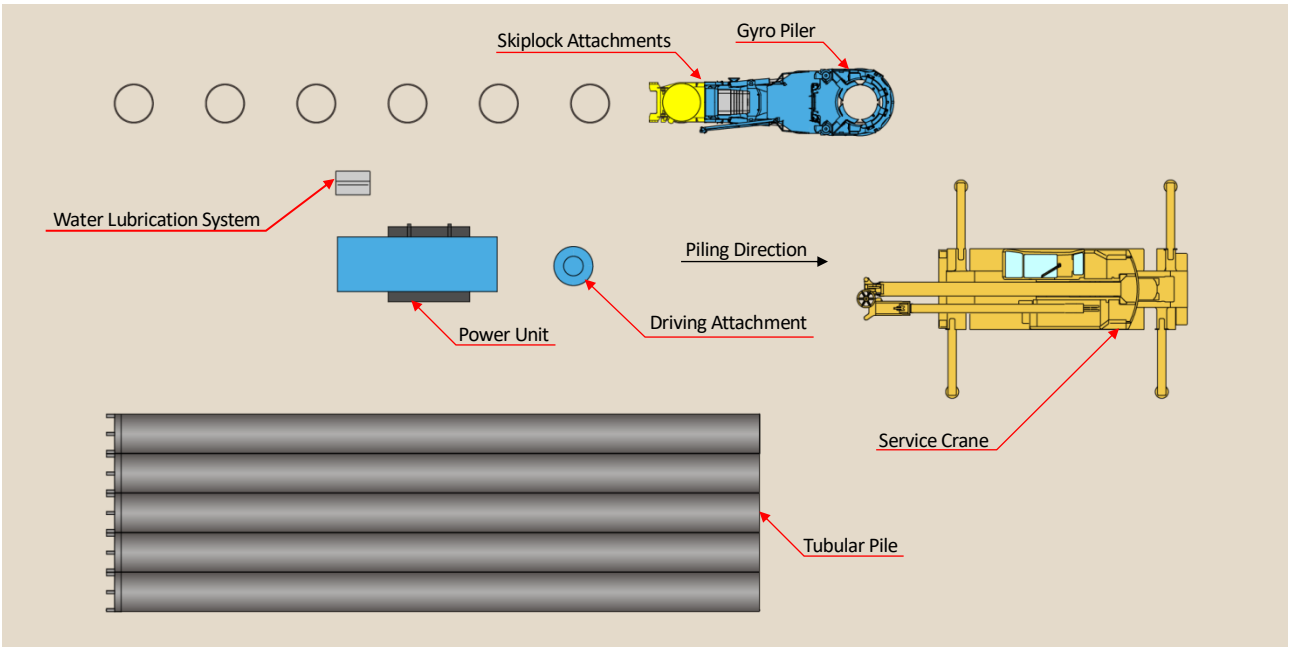


14.Repeat 7-13 until completion (Removing Reaction stand and reaction pile after all clamp gripped Skiplock Attachment)

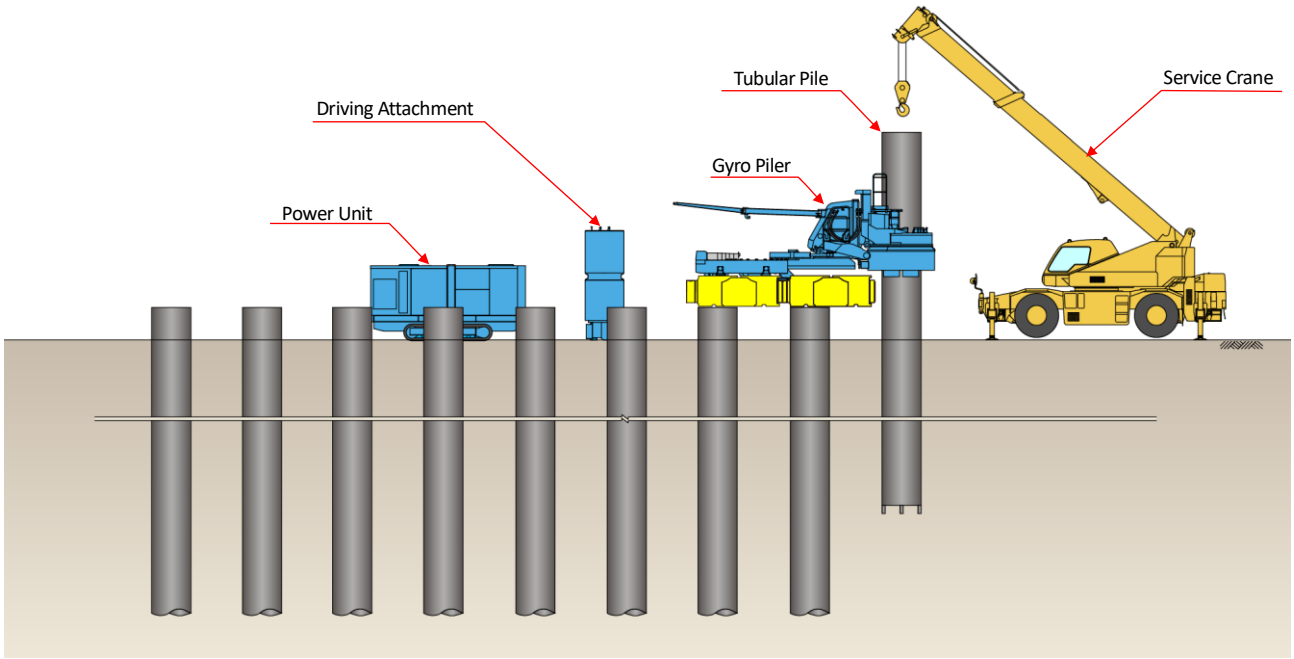
N.B.
Removing of Reaction Stand and reaction piles after Gyro Piler can operate sololy on installed piles

Chapter 3 Work Layout

3-1 Standard Operation (Above Ground)

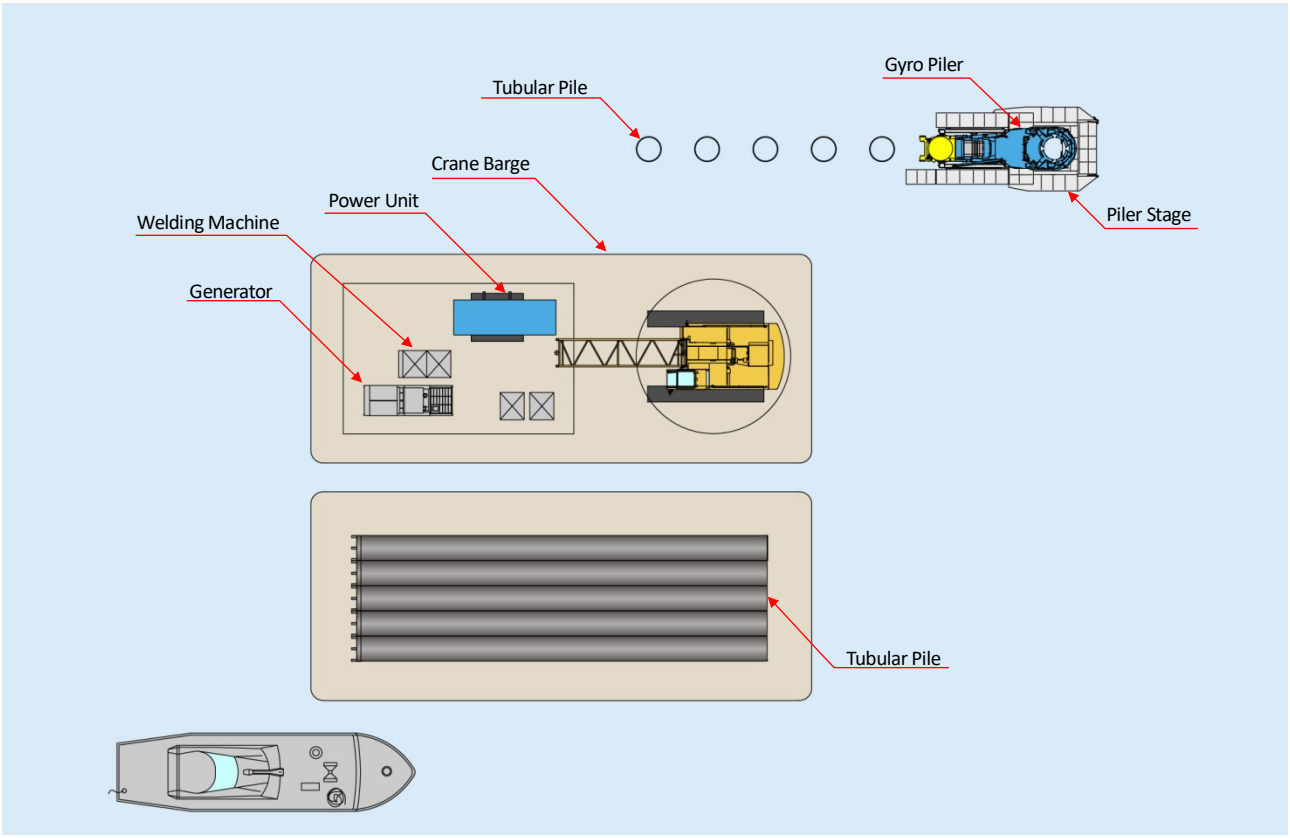


Plan View

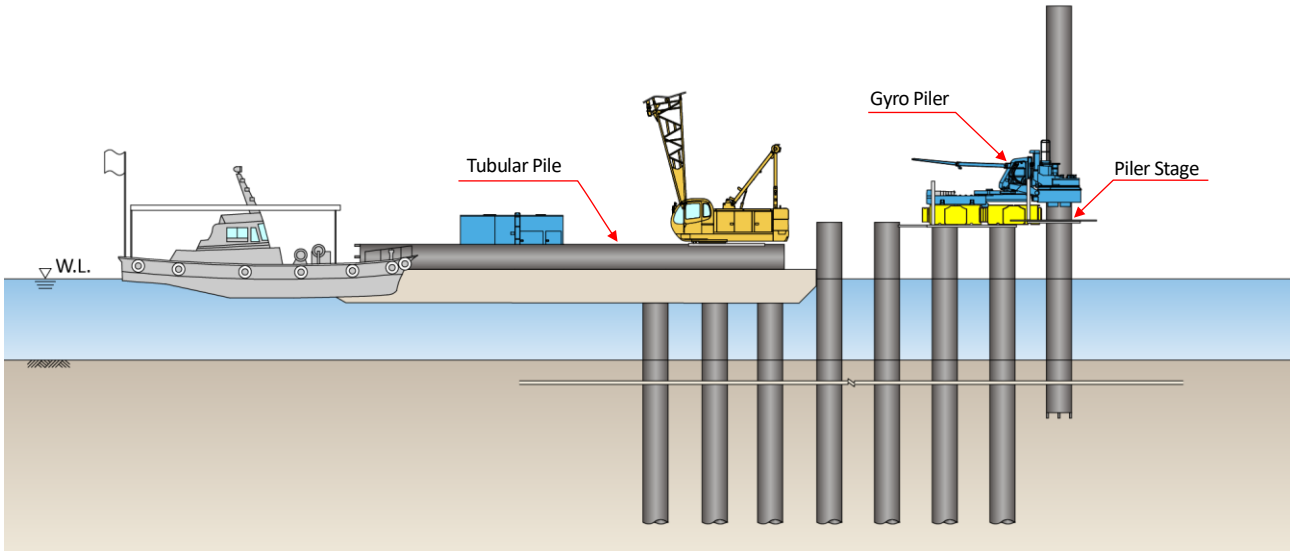


Sectional View

3-2 Standard Operation (Above Water)

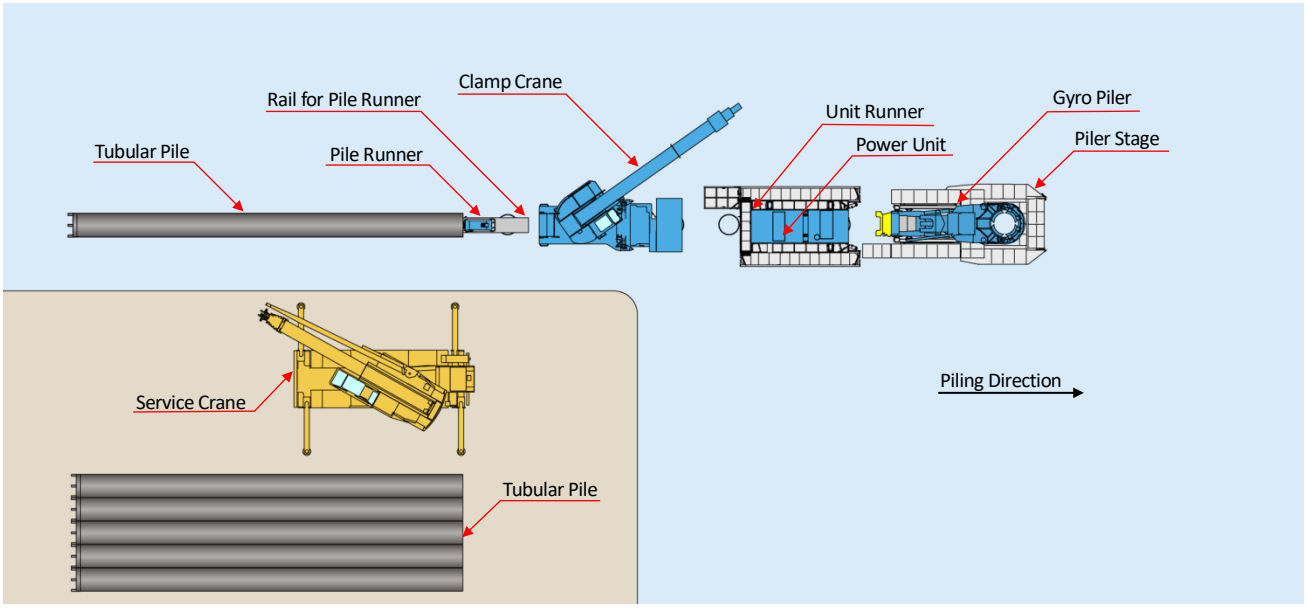


Plan View

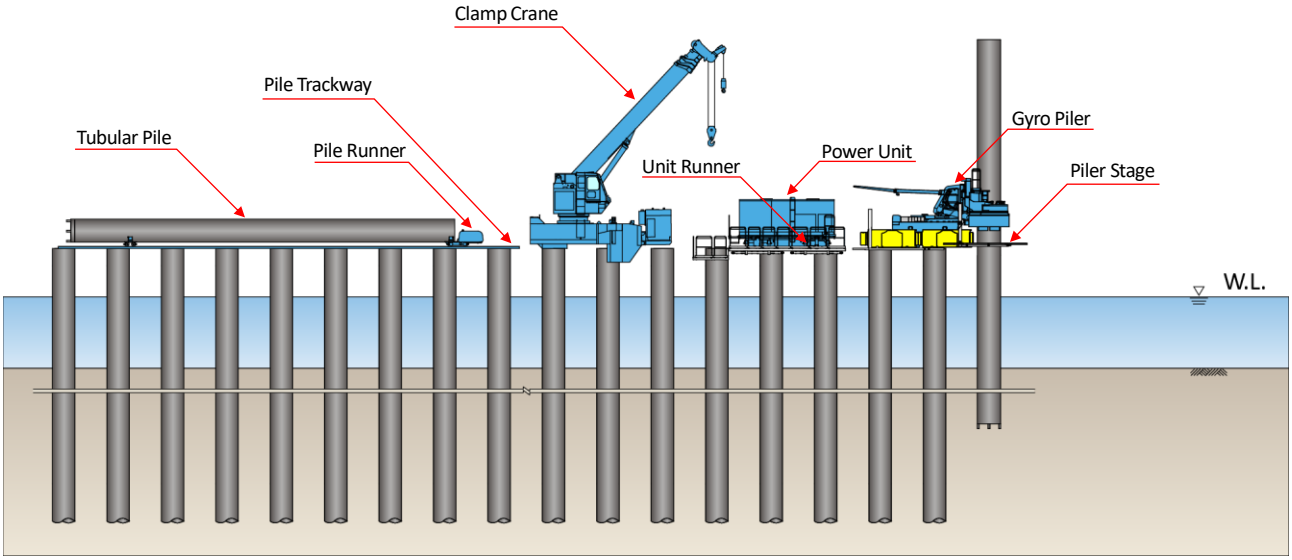


Sectional View

3-3 GRB Operation (Non-staging Method)



Plan View

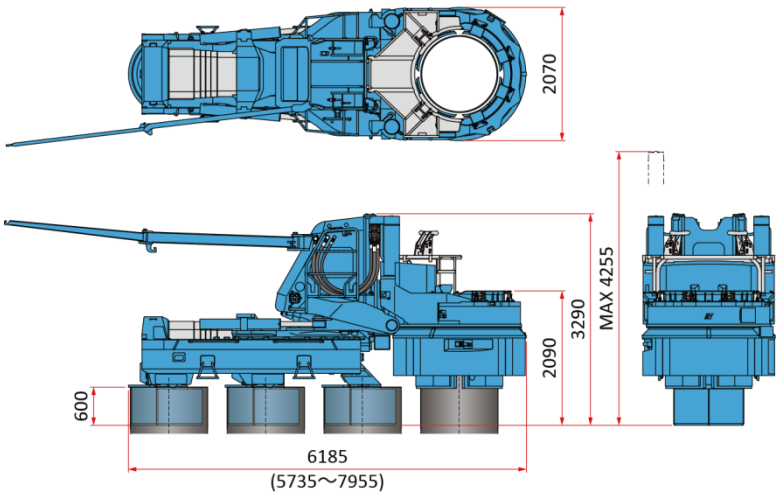


Sectional View

Chapter 4 Machine Specification

4-1 Machine Specification F301-G1000

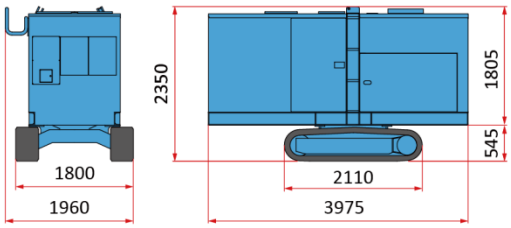
4-1-1 Gyro Piler



SILENT PILER		F301-G1000
Applicable sheet piles	Tubular Pile Ø600, 800, 1000 mm	
Max. Press-in Force	with Chuck Rotation*	700 kN
	without Chuck Rotation	800 kN
Max. Extraction Force	with Chuck Rotation*	850 kN
	without Chuck Rotation	850 kN
Chuck Rotation Torque	600kN·m	
Chuck Rotation Velocity	MAX 10.0 min^{-1}	
Stroke	850 mm	
Press-in Speed	1.0 ~ 4.3 m/min	
Extraction Speed	1.4 ~ 8.7 m/min	
Applicable Pile Spacing	for 600mm	650 ~ 900 mm
	for 800mm	850 ~ 1200 mm
	for 1000mm	1050 ~ 1270 mm
Control System	Radio Control	
Mass	for 800mm	16000 kg
	for 1000mm	16600 kg
	for 1200mm	17200 kg

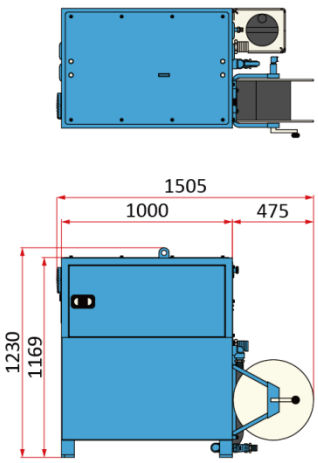
* An external power source is required for Chuck rotation
(200V - 50/60 Hz, 220V - 60Hz, Min. 30KVA, 3 phases)

4-1-2 Power Unit EU 300J4



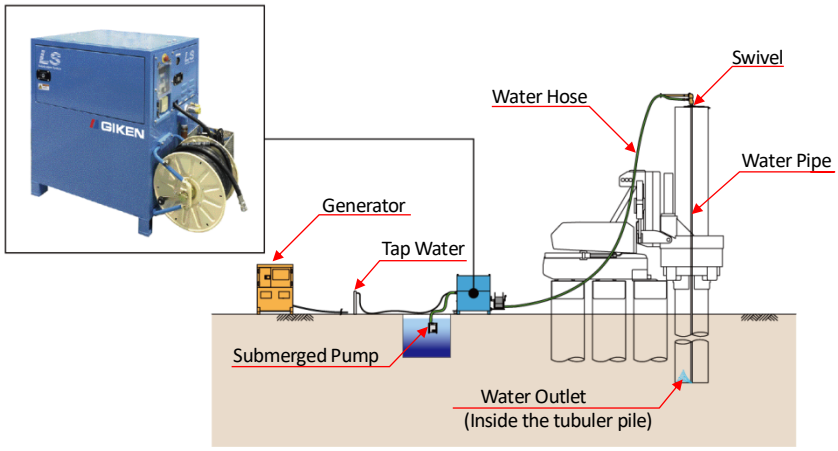
Power Unit		
Power Source		Diesel Engine
Rated Output	Power Mode	237 kW (322 ps) / 1800 min^{-1}
	Eco Mode	211 kW (287 ps) / 1600 min^{-1}
	Super Eco Mode	184 kW (250 ps) / 1400 min^{-1}
Fuel Tank Capacity		500 L
Hydraulic Reservoir		Piler Eco Oil 490 L
Urea Additive Tank Capacity		38 L
Moving Speed		1.4 km / h
Mass		6500 kg (with 20m Hose)

4-1-3 Water Lubrication System OP114A



Lubrication System	OP114A
Input Voltage (3 phases)	AC200V, 50 / 60 Hz, 24 KVA or more
Water Pump Discharge Rate	Max. 60 L / min
Water Pump Discharge Pressure	Max. 6 MPa
Outer Tank Capacity (W×D×H)	1505 × 755 × 1230 mm
Water Tank Capacity	300 L
Mass (without water)	410 kg

*The above specifications are subject to alteration without prior notice.

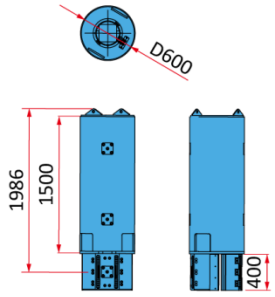


*Water Supply by Tap Water or Submerged Pump

4-1-4 Driving Attachment

Driving Attachment AM81

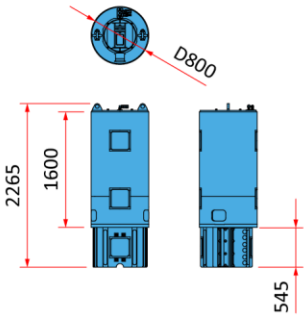
D600mm Form



Driving Attachment	AM81
Mass	1100 kg

Driving Attachment AM69A

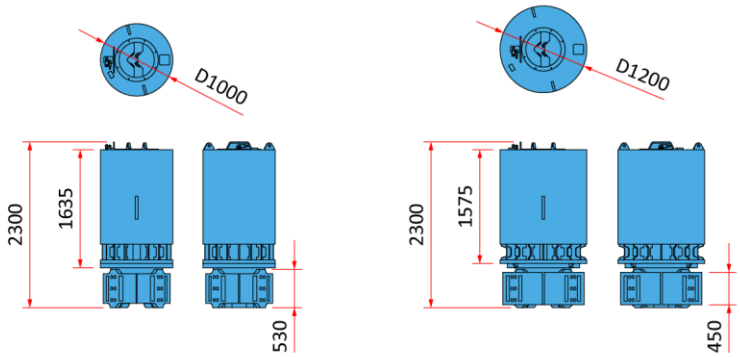
D800mm Form



Driving Attachment	AM69A
Mass	2000 kg

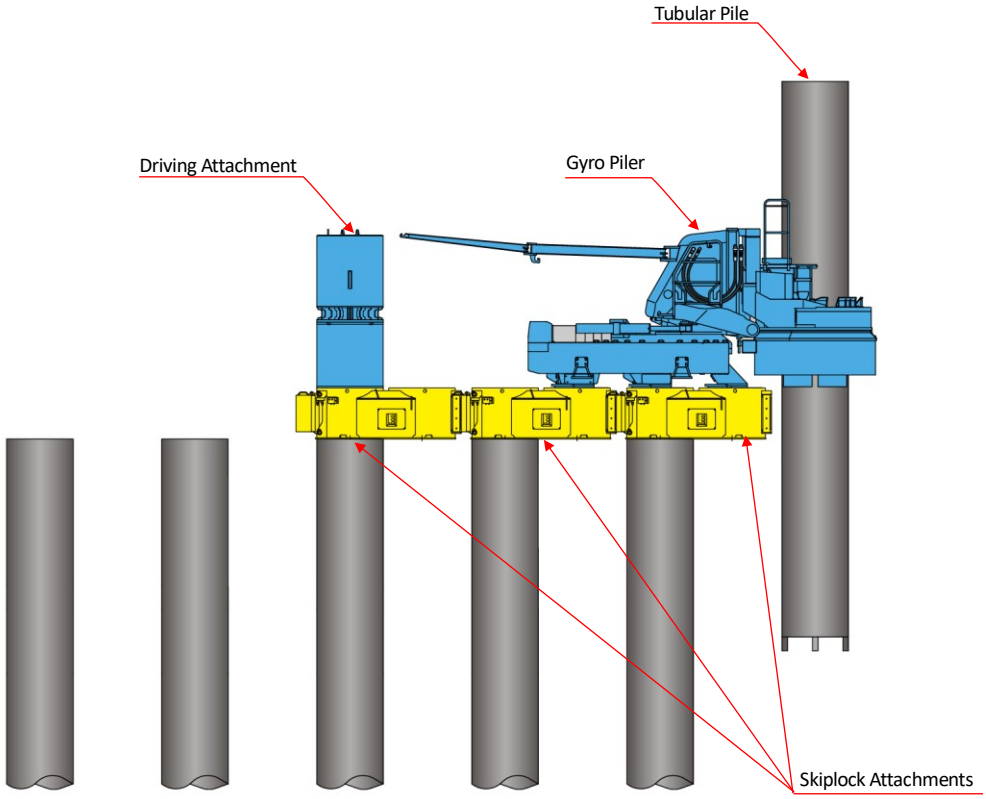
Driving Attachment AM105

D1000mm Form

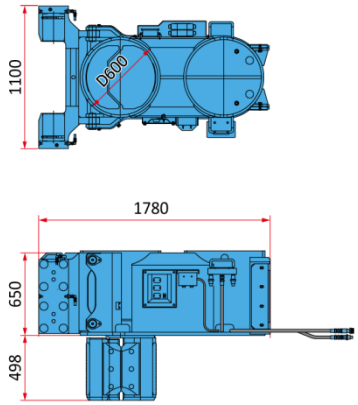


Driving Attachment	AM105
Mass	3300 kg (D1000mm Form)
	4500 kg (D1200mm Form)

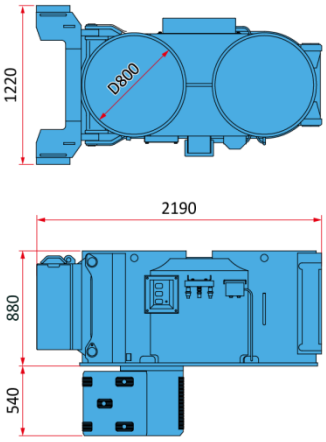
4-1-5 Skiplock attachment



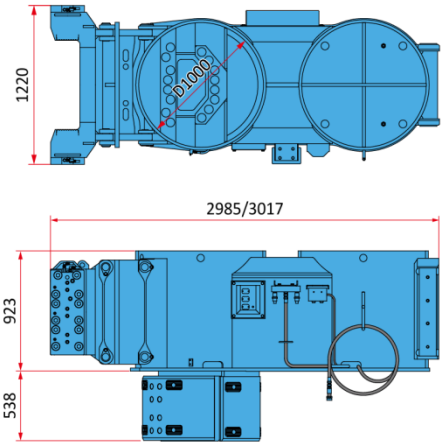
Skiplock Attachment AM162



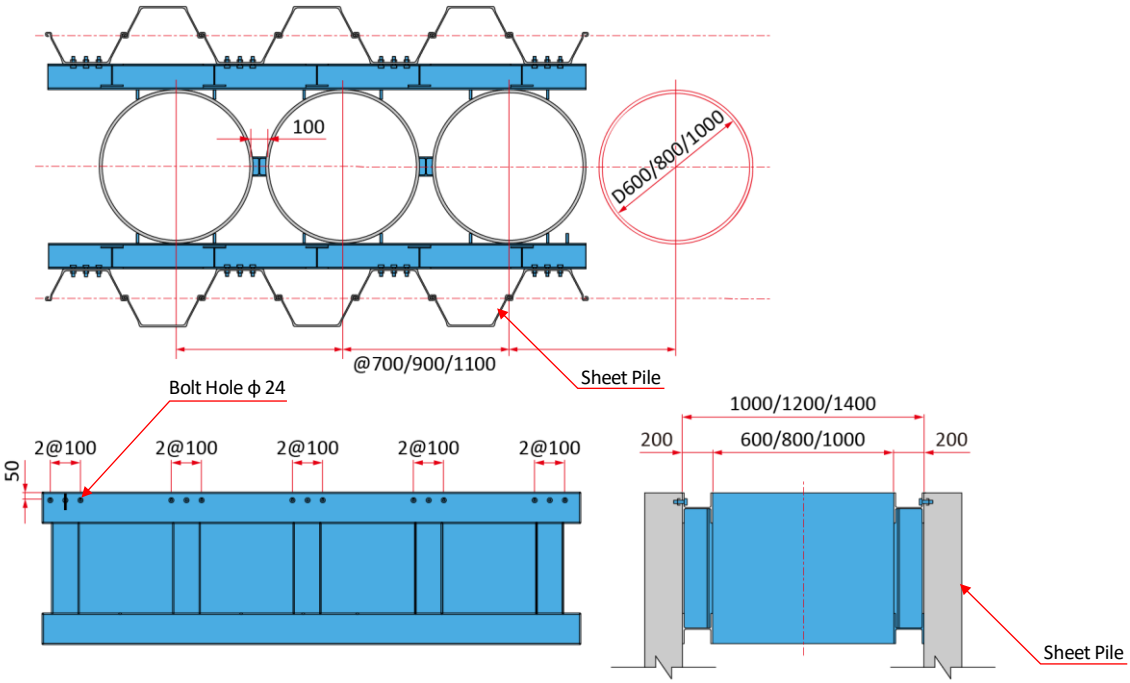
Skiplock Attachment AM153



Skiplock Attachment AM163

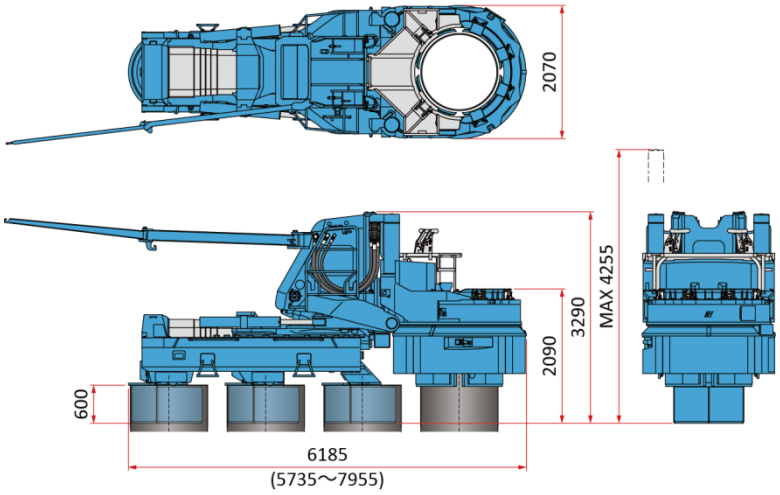


4-1-6 Reaction Stand



4-2 Machine Specification F401-G1200

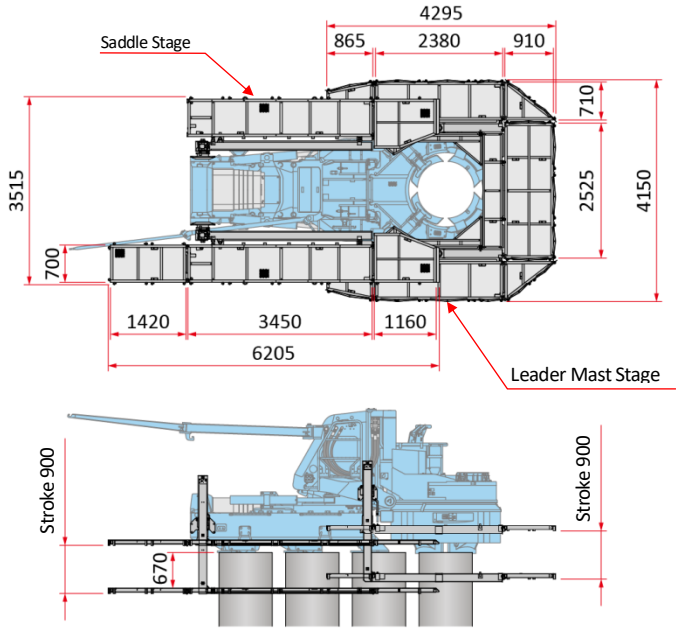
4-2-1 Gyro Piler



SILENT PILER		F401-G1200
Applicable sheet piles		Tubular Pile Ø800, 1000, 1200 mm Tubular Sheet Pile Ø800, 1000 mm*1
Max. Press-in Force	with Chuck Rotation*	1500 kN
	without Chuck Rotation	2000 kN
Max. Extraction Force	with Chuck Rotation*	1600 kN
	without Chuck Rotation	2200 kN
Chuck Rotation Torque		900kN·m (Emergency use up to 1050kN·m)
Chuck Rotation Velocity		MAX 10.0 min^{-1}
Stroke		1000 mm
Press-in Speed		0.7 ~ 4.9 m/min
Extraction Speed		0.7 ~ 3.5 m/min
Applicable Pile Spacing	for 800mm	850 ~ 1320 mm
	for 1000mm	1050 ~ 1320 mm
	for 1200mm	1250 ~ 1505 mm
Control System		Radio Control
Mass	for 800mm	31850 kg
	for 1000mm	32600 kg
	for 1200mm	33600 kg

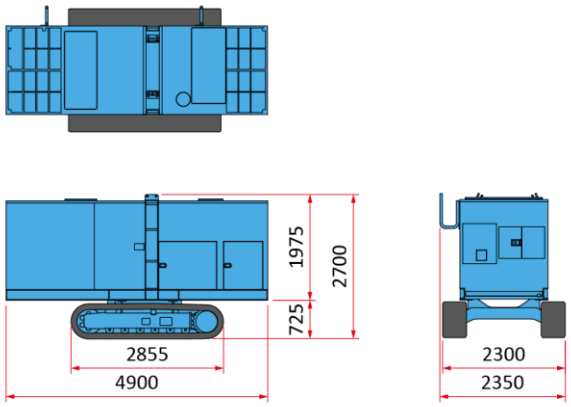
* An external power source is required for Chuck rotation
(200V - 50/60 Hz, 220V - 60Hz, Min. 30KVA, 3 phases)

4-2-2 Piler Stage ST48



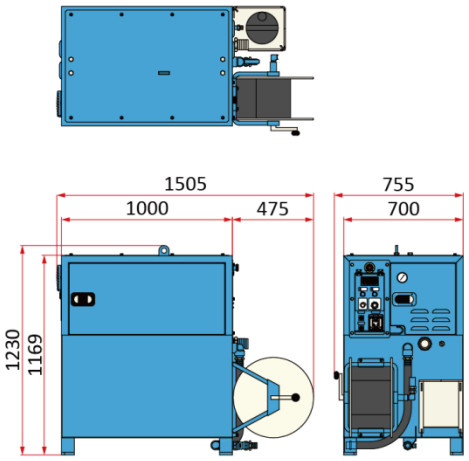
Piler Stage		ST48
Load Capacity	Leader Mast Stage	550 kg (When set both sides) 300 kg (When set one side only)
	Saddle Stage	300 kg
Mass		2035 kg

4-2-3 Power Unit EU 500C3



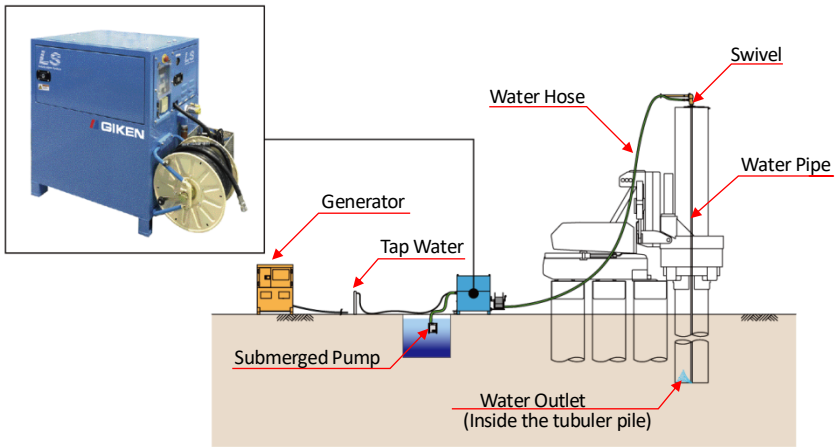
Power Unit		EU500C3
Power Source		Diesel Engine
Rated Output	Power Mode	377 kW (513 ps) / 1800 min^{-1}
	Eco Mode	335 kW (456 ps) / 1600 min^{-1}
	Super Eco Mode	293 kW (399 ps) / 1400 min^{-1}
Fuel Tank Capacity		850 L
Hydraulic Reservoir		Piler ECO Oil 660 L
Moving Speed		1.4 km/h
Mass		10950 kg (with 30m Hose)

4-2-4 Water Lubrication System OP114A



Lubrication System	OP114A
Input Voltage (3 phases)	AC200V, 50 / 60 Hz, 24 KVA or more
Water Pump Discharge Rate	Max. 60 L / min
Water Pump Discharge Pressure	Max. 6 MPa
Outer Tank Capacity (W×D×H)	1505 × 755 × 1230 mm
Water Tank Capacity	300 L
Mass (without water)	410 kg

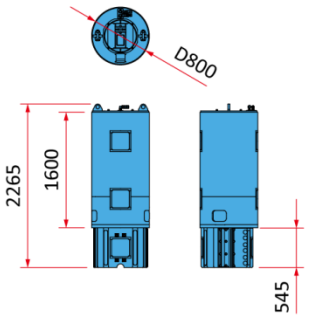
*The above specifications are subject to alteration without prior notice.



*Water Supply by Tap Water or Submerged Pump

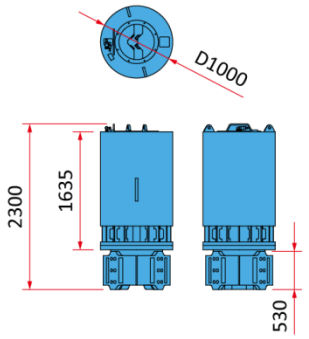
4-2-5 Driving Attachment

Driving Attachment AM69A
D800mm Form



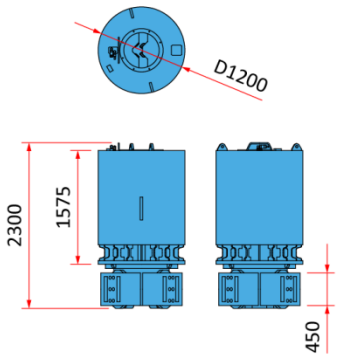
Driving Attachment	AM69A
Mass	2000 kg

Driving Attachment AM105
D1000mm Form



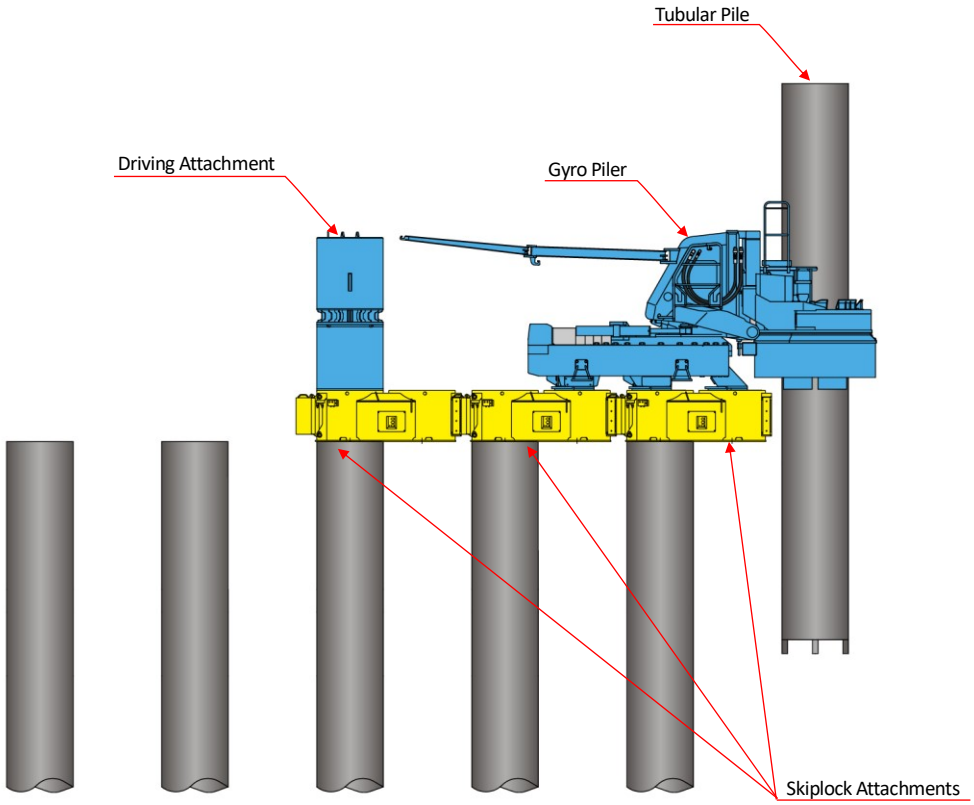
Driving Attachment	AM105
Mass	3300 kg (D1000mm Form)

D1200mm Form

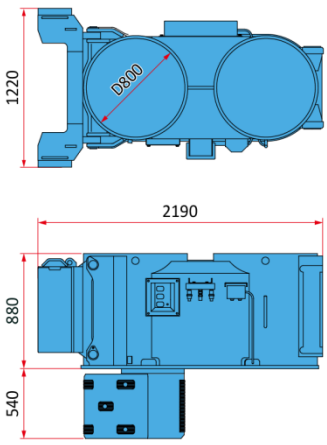


Driving Attachment	AM105
Mass	4500 kg (D1200mm Form)

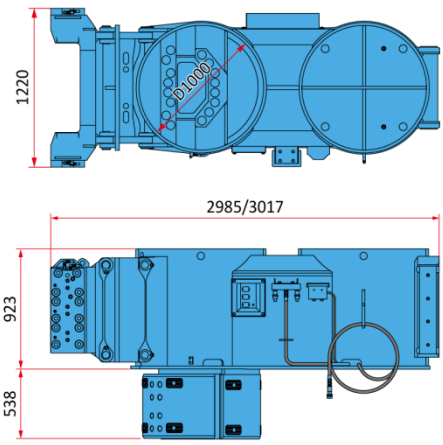
4-2-6 Skiplock attachment



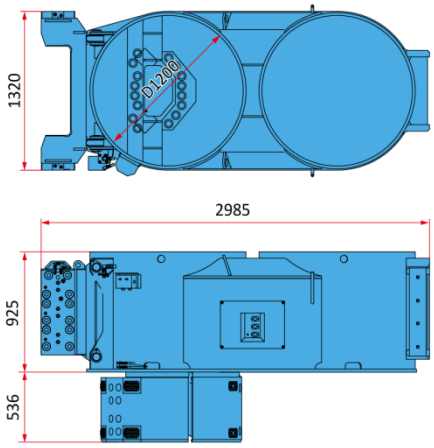
Skiplock Attachment AM153



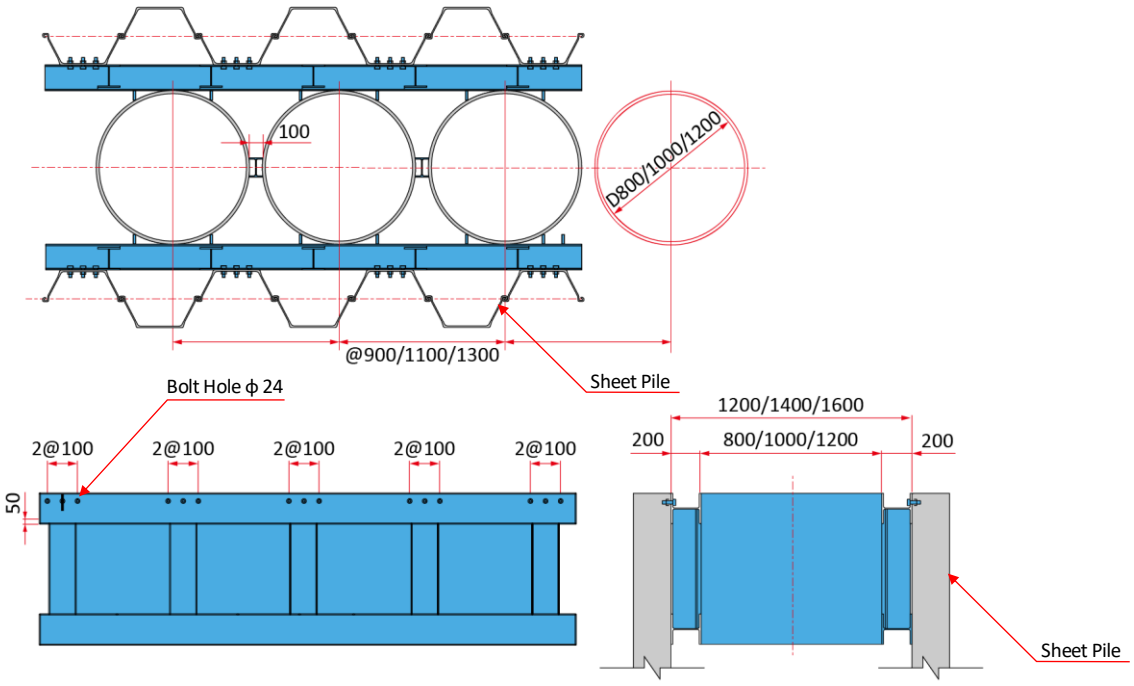
Skiplock Attachment AM163



Skiplock Attachment AM157



4-2-7 Reaction Stand



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