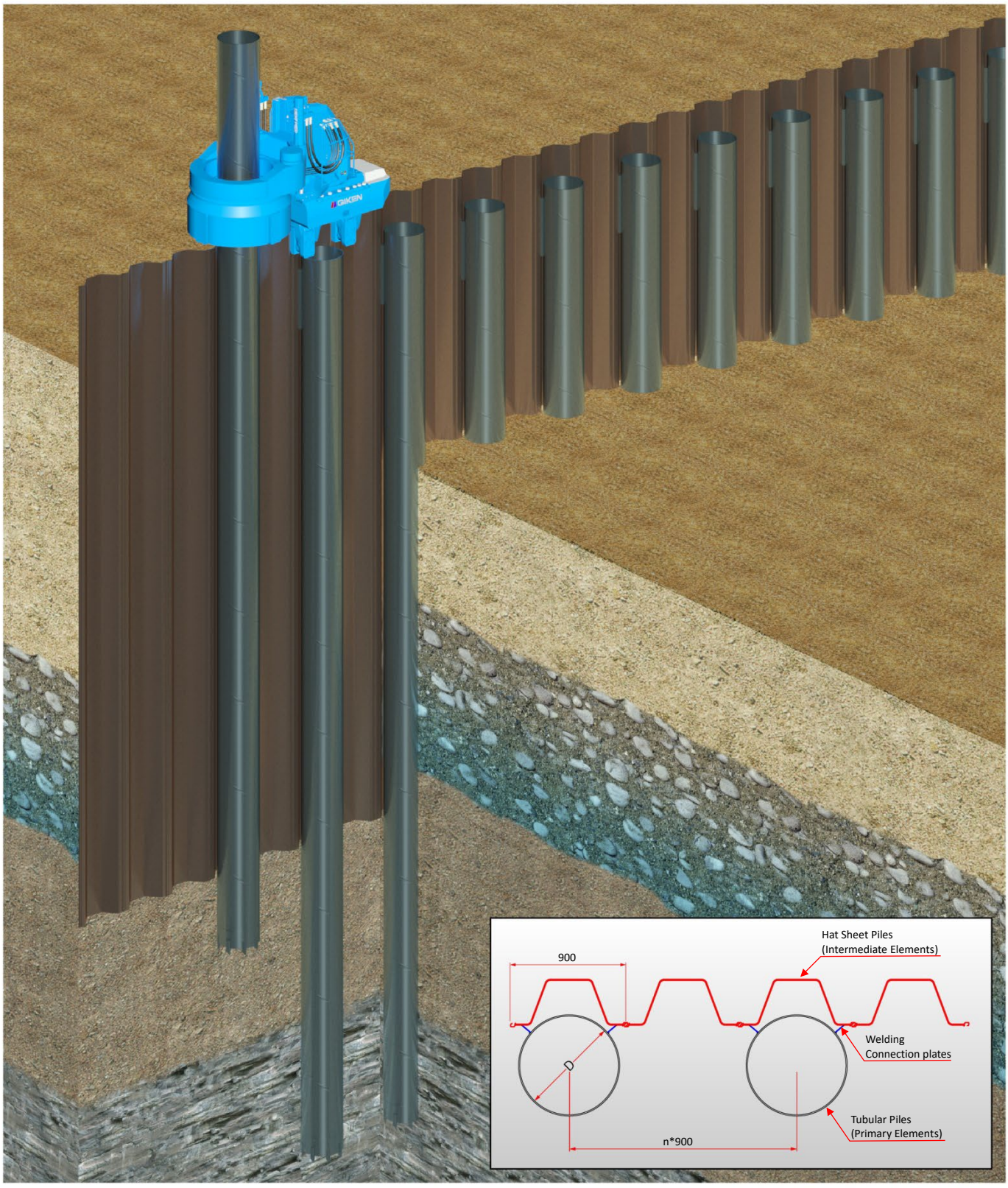
COMBI-GYRO WALL SYSTEM

- High Modulus Steel Combined Wall -

Ver. Tube / Hat Wall Vol.2 Construction



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Chapter 1 Introduction

The purpose of this document is to provide practical guidelines for the construction of the Combi-Gyro Wall.

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, ultra low vibration, and flexibility of sizes to suit different wall properties and subsoil conditions.

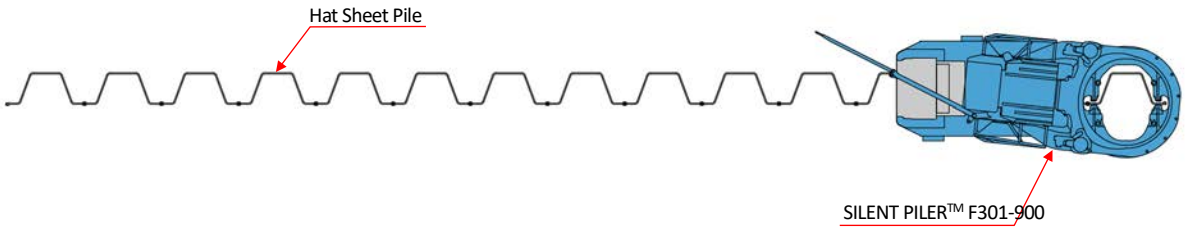
The main attributes of the Combi-Gyro Wall are efficiency of physical wall properties and reusability. The Combi-Gyro Wall comprises steel tubular piles as the primary element and steel sheet piles as the secondary element. The efficiencies of physical wall properties can be optimised in view of the flexibility of pile size and the spacing of tubular piles for the ground conditions and the form of the loading. The Combi-Gyro Wall 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 Combi-Gyro Wall.

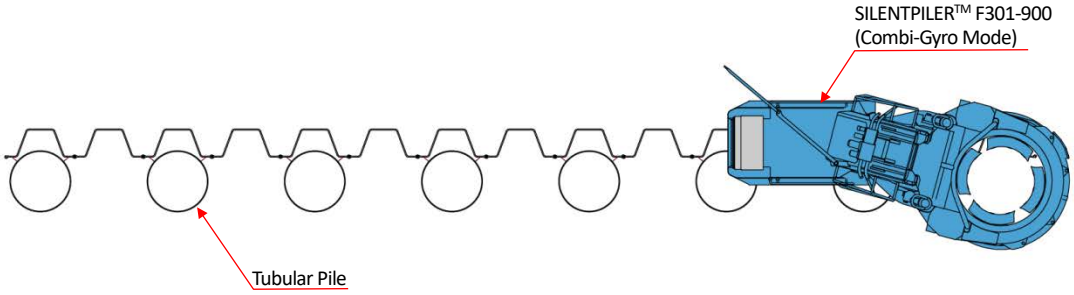
Chapter 2 Standard Procedure

2-1 Overall Procedure

2-1-1 Installation of Sheet Piles



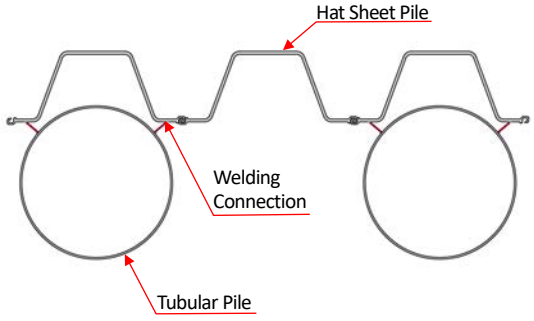
2-1-2 Installation of Tubular Piles



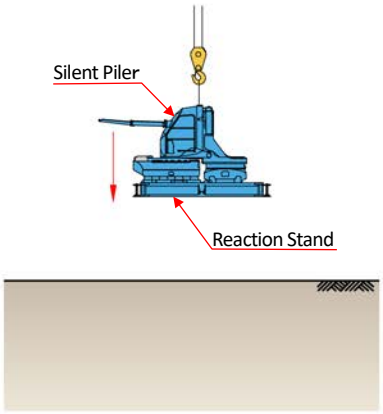
Note: In order to secure the stability of the SILENT PILER™ during the installation of tubular piles, the reaction piles i.e. sheet piles gripped by the SILENT PILER™, must have sufficient lateral and vertivcal stability against the tubular pile installation resistance. Check with the manufacturer of the press-in piling machine or a specialist piling contractor, when necessary, whether the following aspects are adequate.

1) Type of Hat sheet piles
2) Embedded depth and exposed height of Hat sheet piles
3) Specification for welding of Hat sheet piles and tubular piles

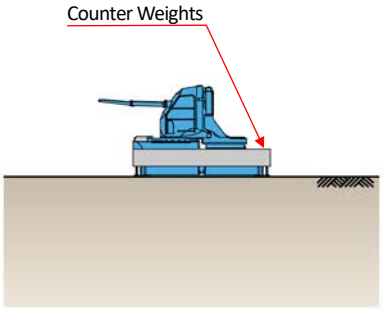
2-1-3 Joining Tubular Piles and Sheet Piles by Welding



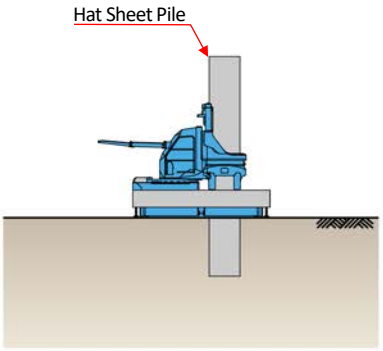
2-2 Initial Piling (Sheet Pile)



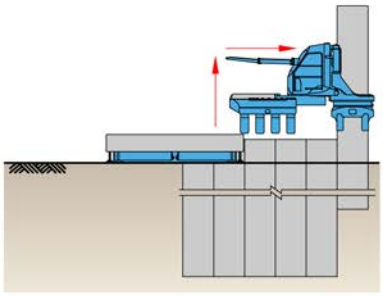
1.Setting of SILENT PILER™ and Reaction Stand on level ground



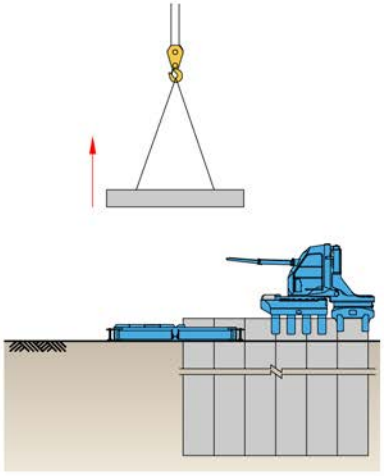
2. Loading of counter weights



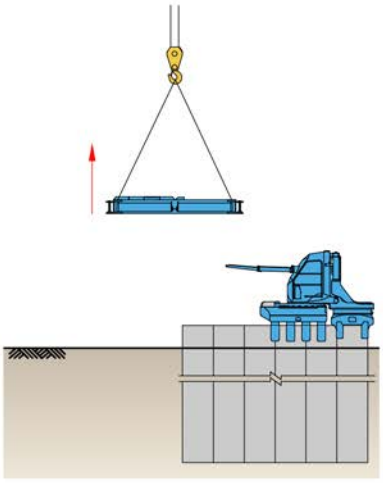
3. Pitching and installing of first pile



4.Installing of piles until SILENT PILER™ can operate solely on reaction piles

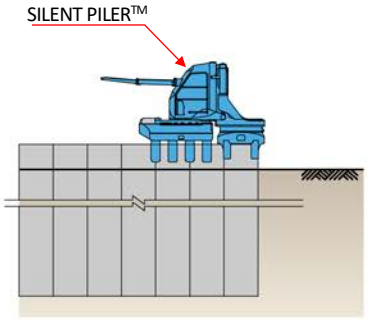


5. Removing of counter weights

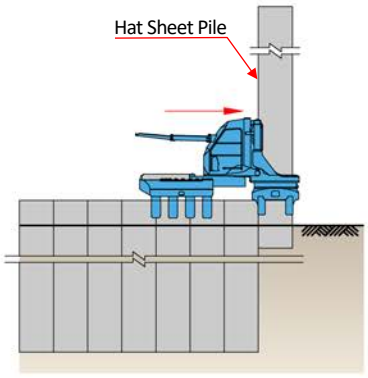


8.Removing of Reaction Stand and initial piling is completed

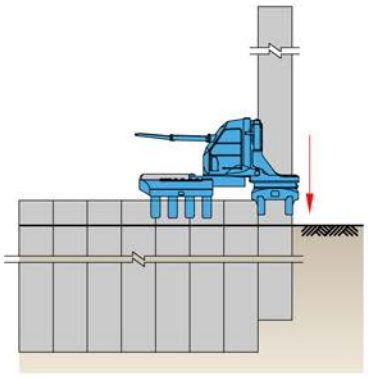
2-3 Installation Working Procedure (Sheet Pile)



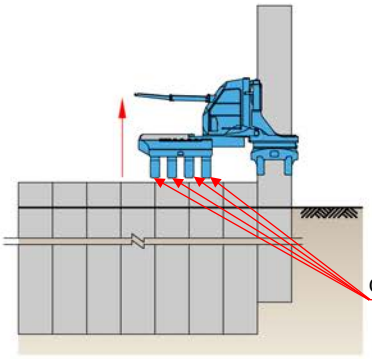
1.Installing of pile to prescribed depth



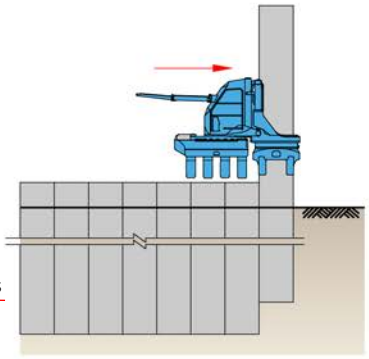
2.Pitching and installation of next pile



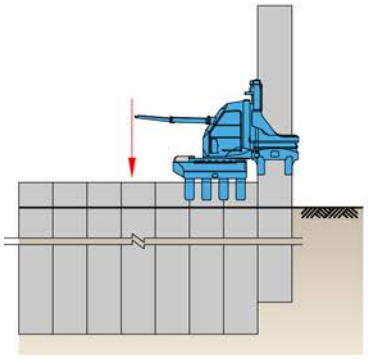
3.Installing of pile until the pile has sufficient bearing capacity



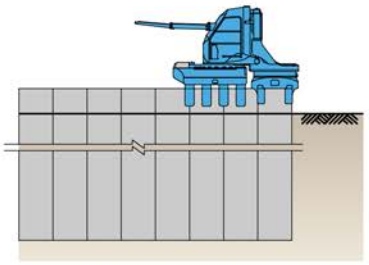
4.Releasing of clamps and raising machine body



5.Moving of machine body forward

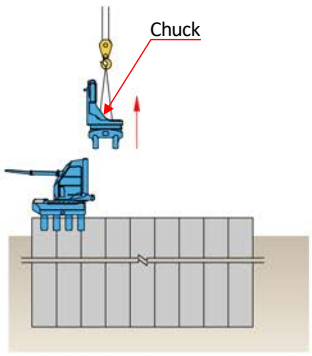


6.Lowering of machine body and gripping reaction piles

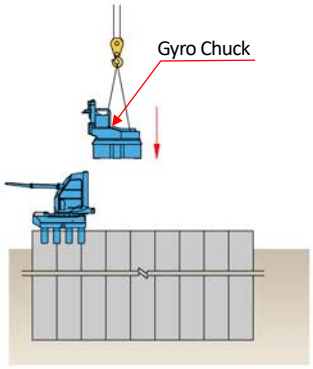


7. Completion of pile installation

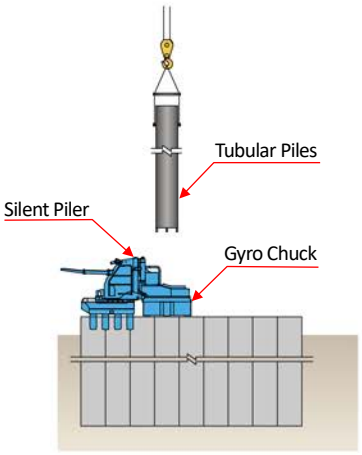
2-4 Installation Working Procedure (Tubular Pile)



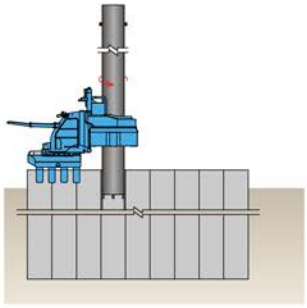
1.Dismantling of Chuck from Mast



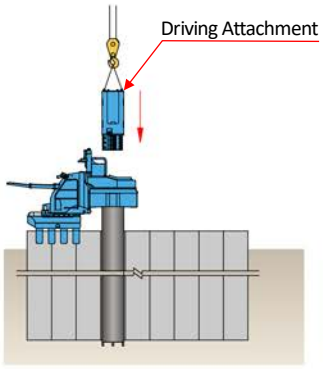
2.Fixing of Gyro Chuck to Mast



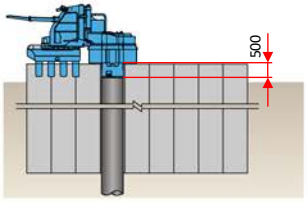
3.Pitching of tubular pile into Chuck



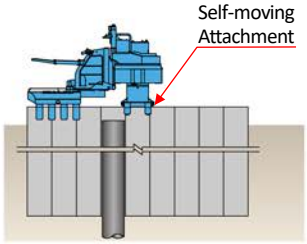
4.Installing of pile until top of pile reaches Chuck level



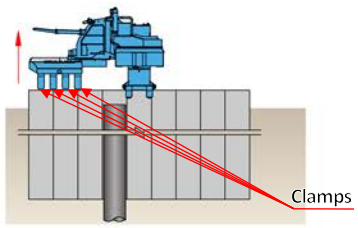
5. Pitching of Driving Attachment into top of pile and installing pile to prescribed depth



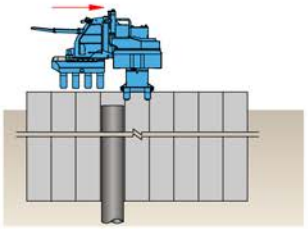
6. Pitching of Driving Attachment onto top of pile and installing pile to prescribed depth



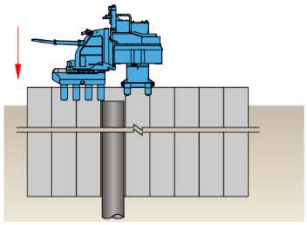
7.Pitching of Self-moving Attachment onto top of sheet pile located directly ahead of installed tubular pile



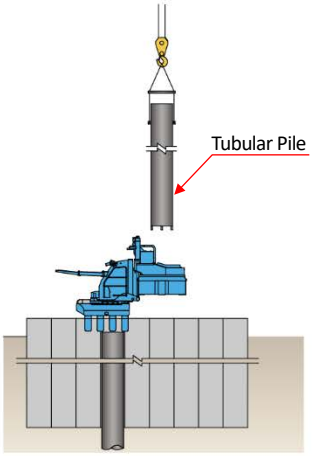
8. Fixing of Driving Attachment to Self-moving Attachment. Releasing of Clamps and raising machine body



9. Moving of machine body forward

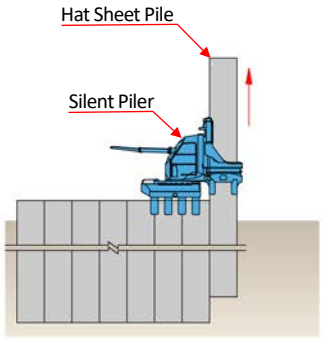


10.Lowering of machine body and gripping reaction piles
Repeat self-moving until next desired tublar pile installation position

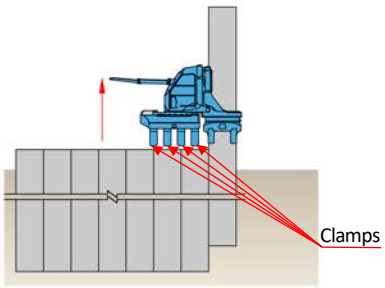


11.Repeat tublar pile installation and Self-moving until completion

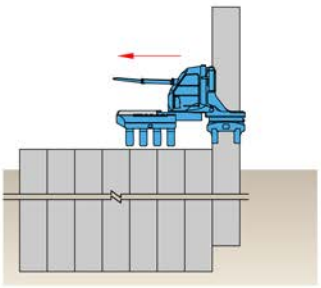
2-5 Extraction Working Procedure (Sheet Pile)



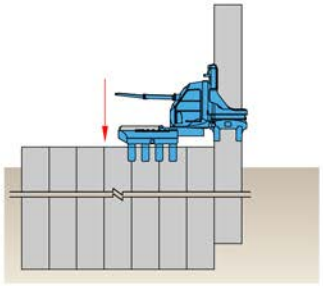
1.Partial extraction of sheet pile with SILENT PILER™



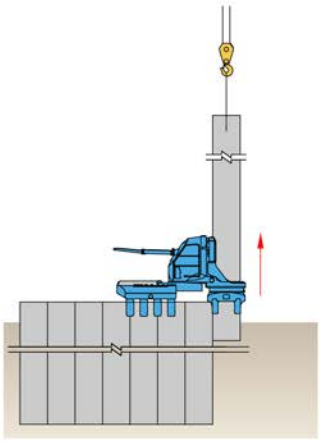
2.Releasing of Clamps and raising machine body



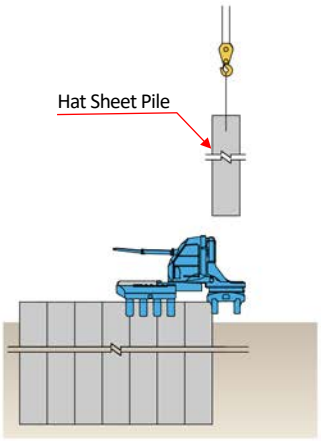
3.Moving of machine body rearward



4.Lowering of machine body and gripping reaction piles

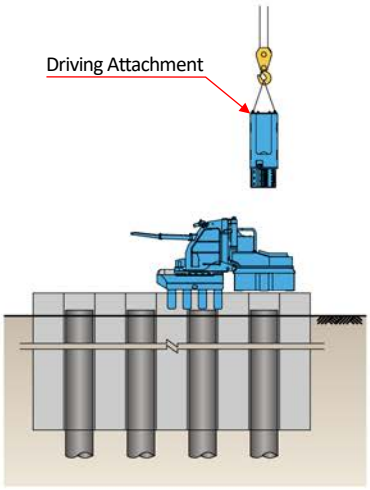


5.Completion of pile extraction

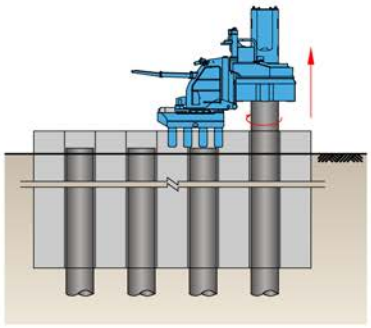


6.Handling and stacking of sheet pile
Repeat 1 to 6 until completion

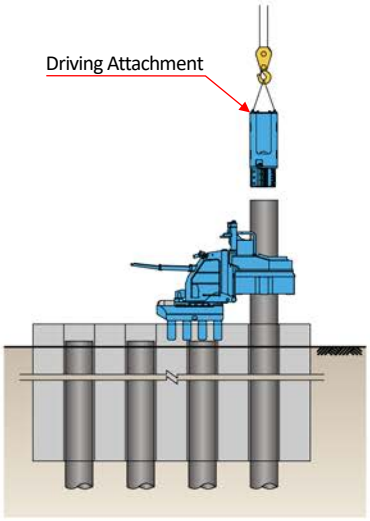
2-6 Extraction Working Procedure (Tubular Pile)



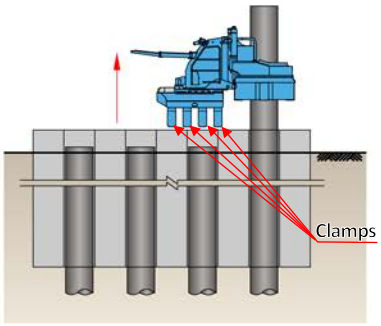
1.Pitching of Driving Attachment into tubular pile



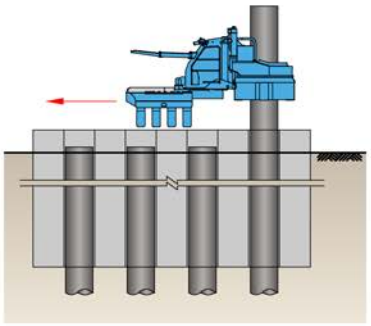
2.Partial extraction of tubular pile with Driving Attachment



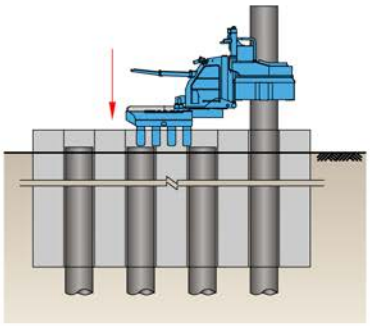
3.Removing of Driving Attachment



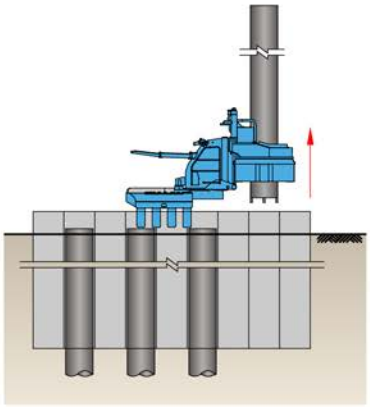
4.Releasing of Clamps and raising machine body



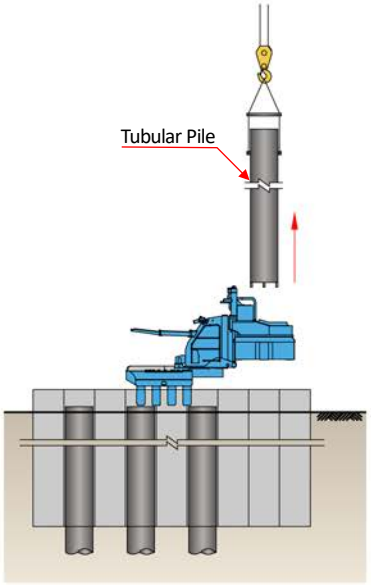
5.Moving of machine body rearward



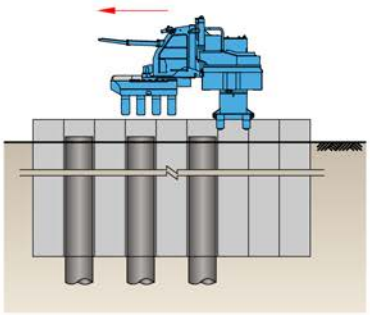
6.Lowering of machine body and gripping Reaction piles



7.Completeion of pile extraction



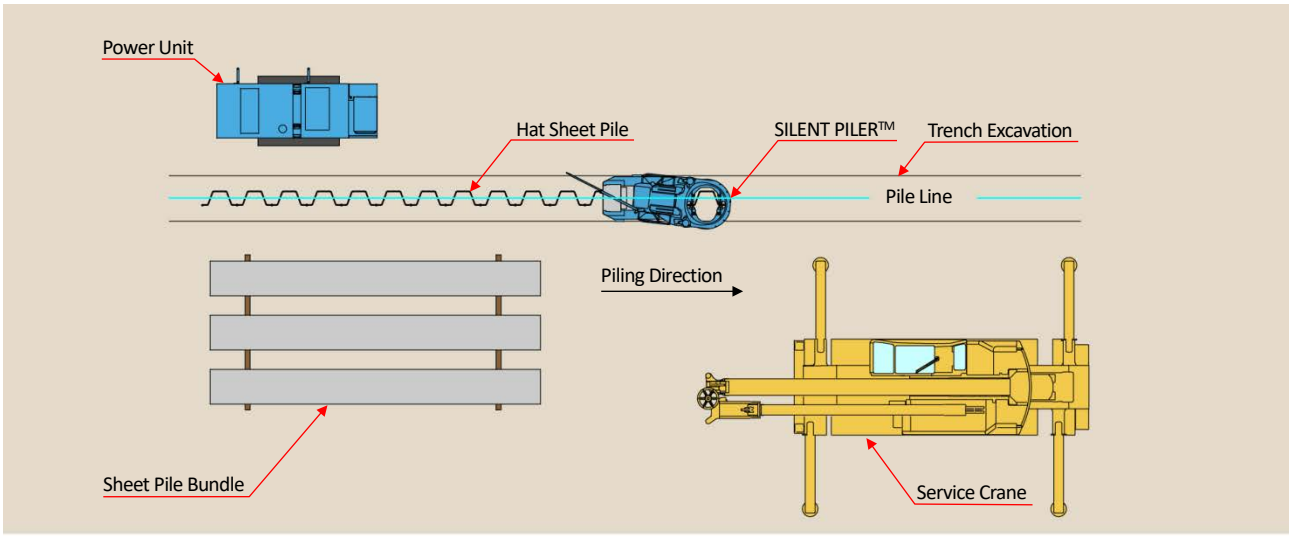
8.Handling and stacking of tubular pile



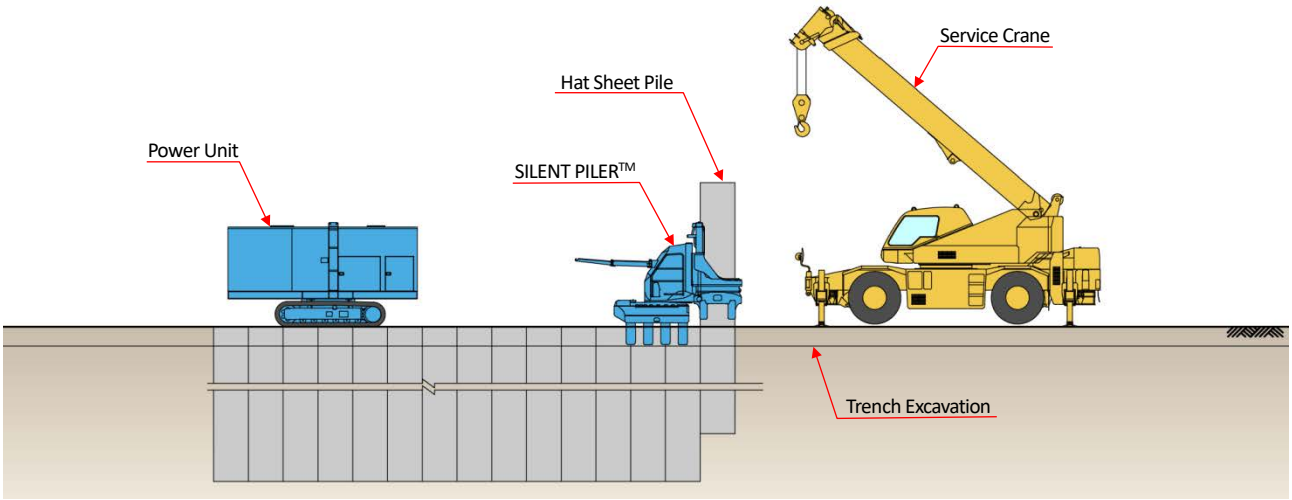
9. Moving of machine body until next pile position
Repeat pile extraction and Self-moving until completion

Chapter 3 Work Layout

3-1 Standard Operation of Sheet Piling (Above Ground)

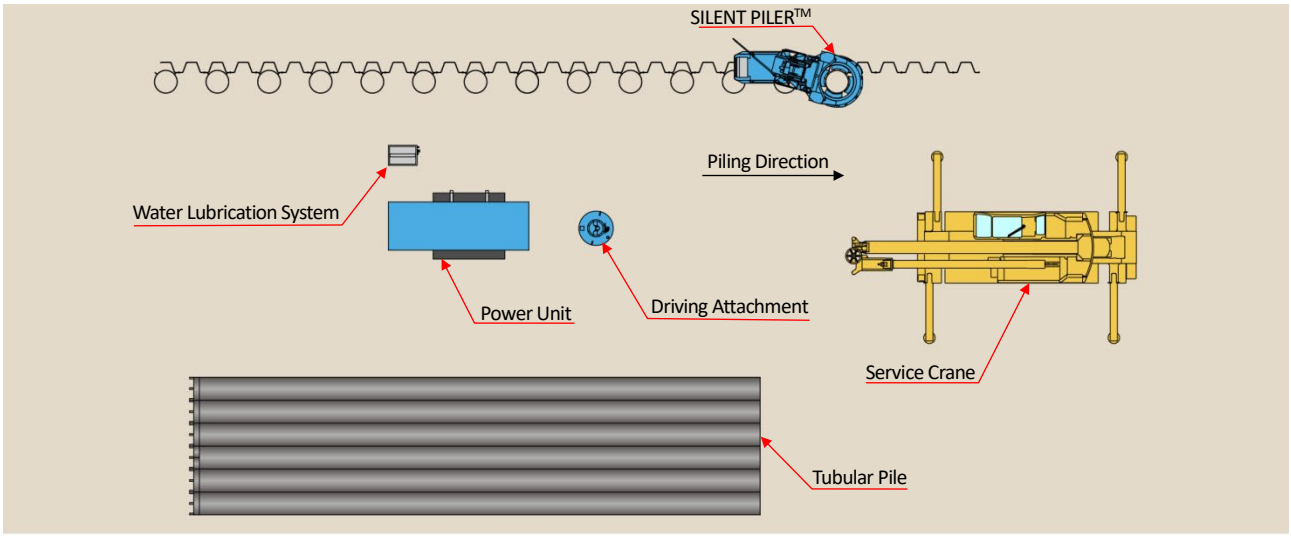


Plan View

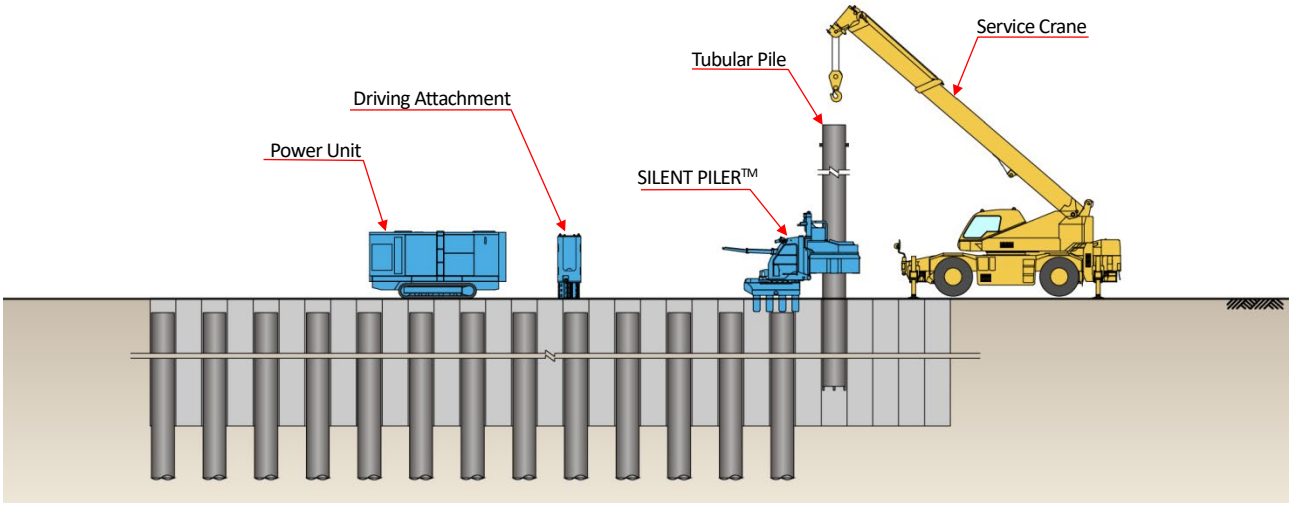


Sectional View

3-2 Standard Operation of Tubular Piling (Above Ground)

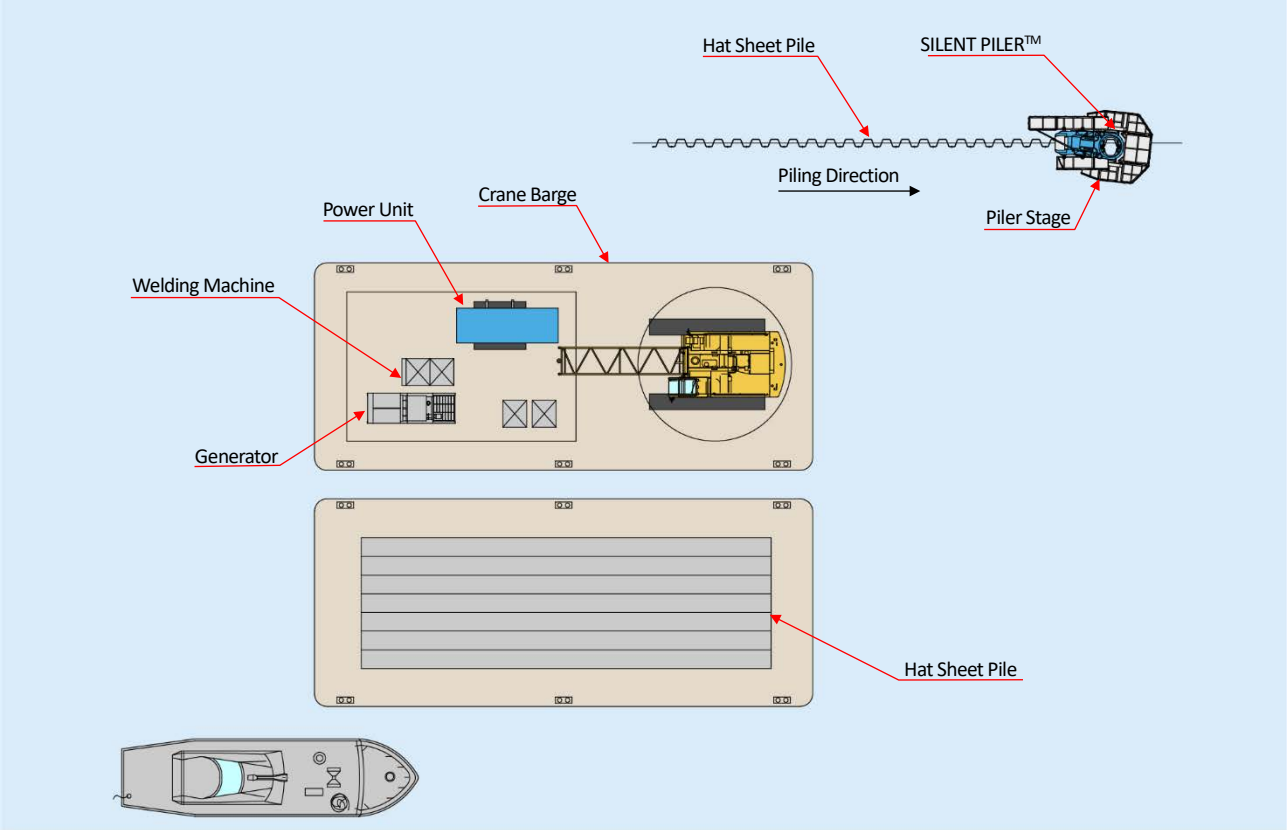


Plan View

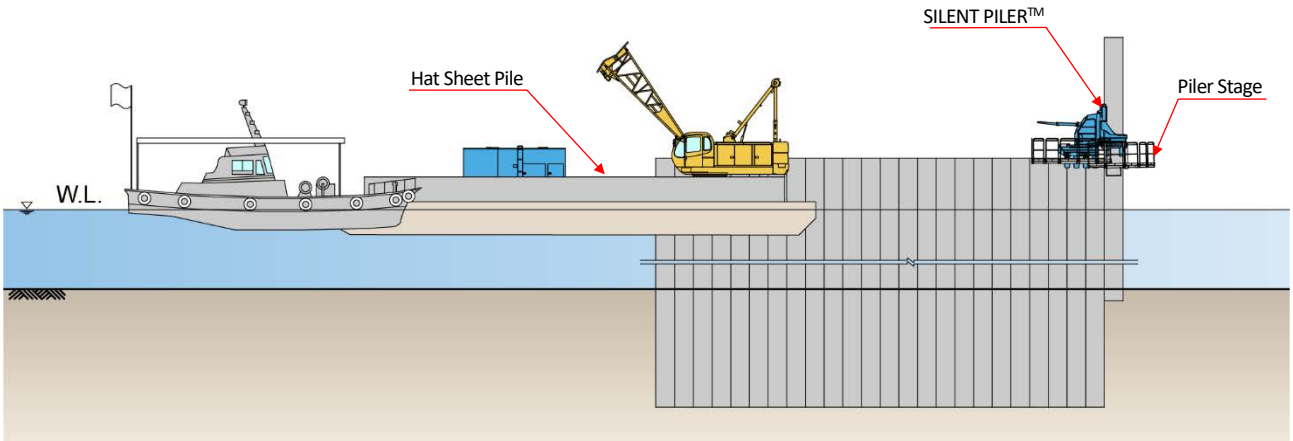


Sectional View

3-3 Standard Operation of Sheet Piling (Above Water)

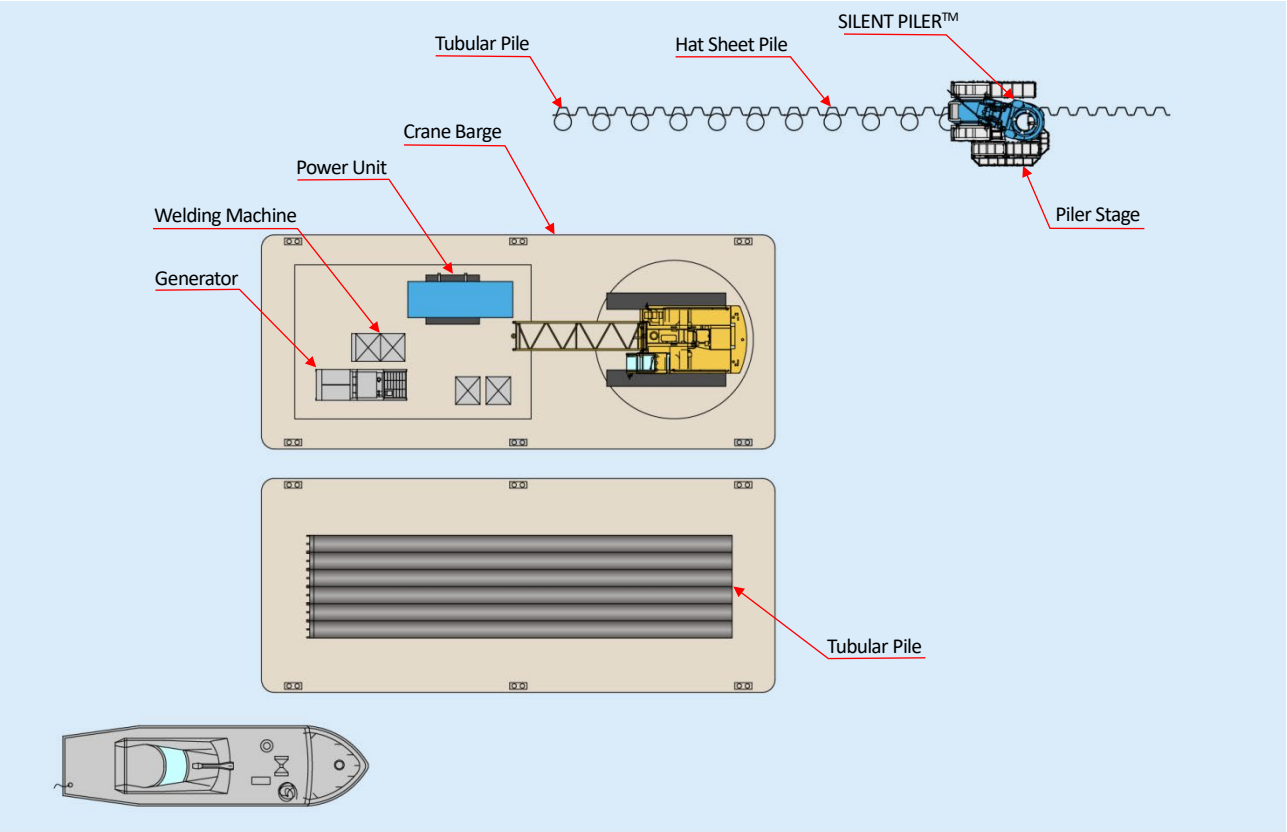


Plan View

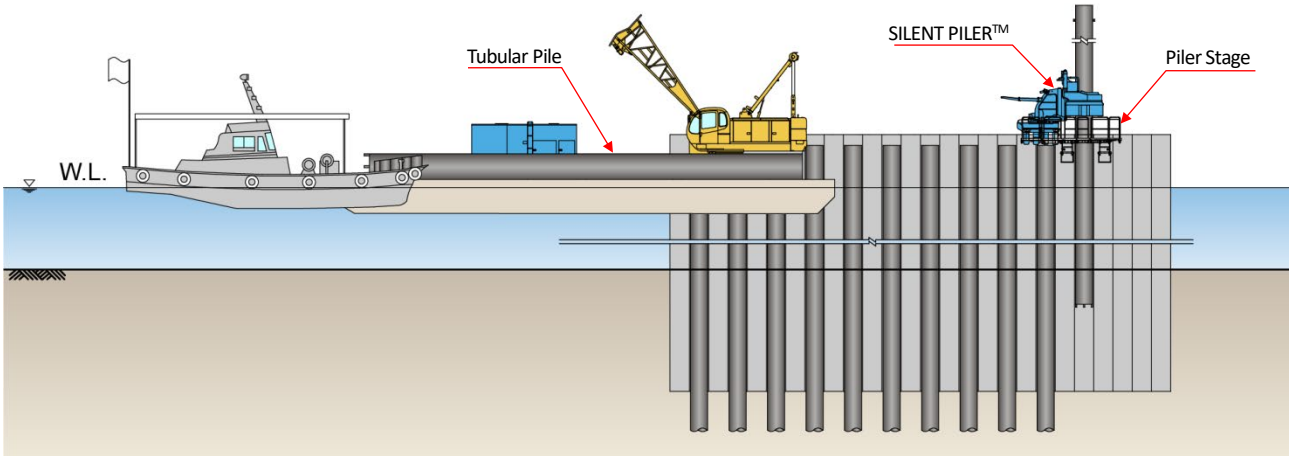


Sectional View

3-4 Standard Operation of Tubular Piling (Above Water)

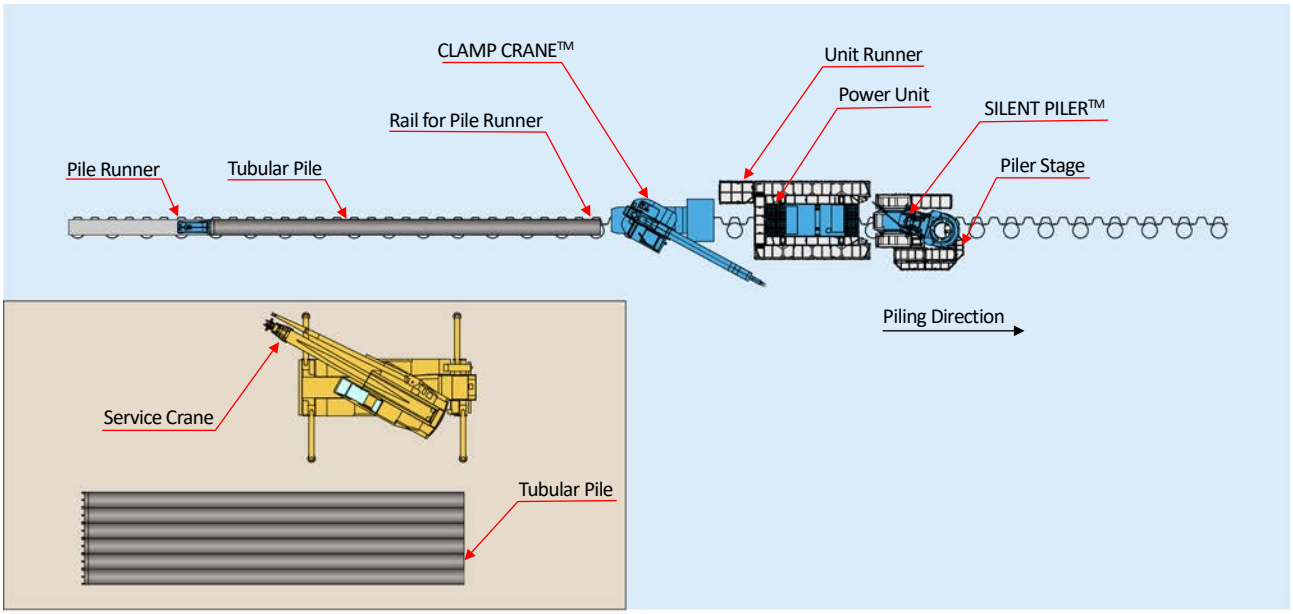


Plan View

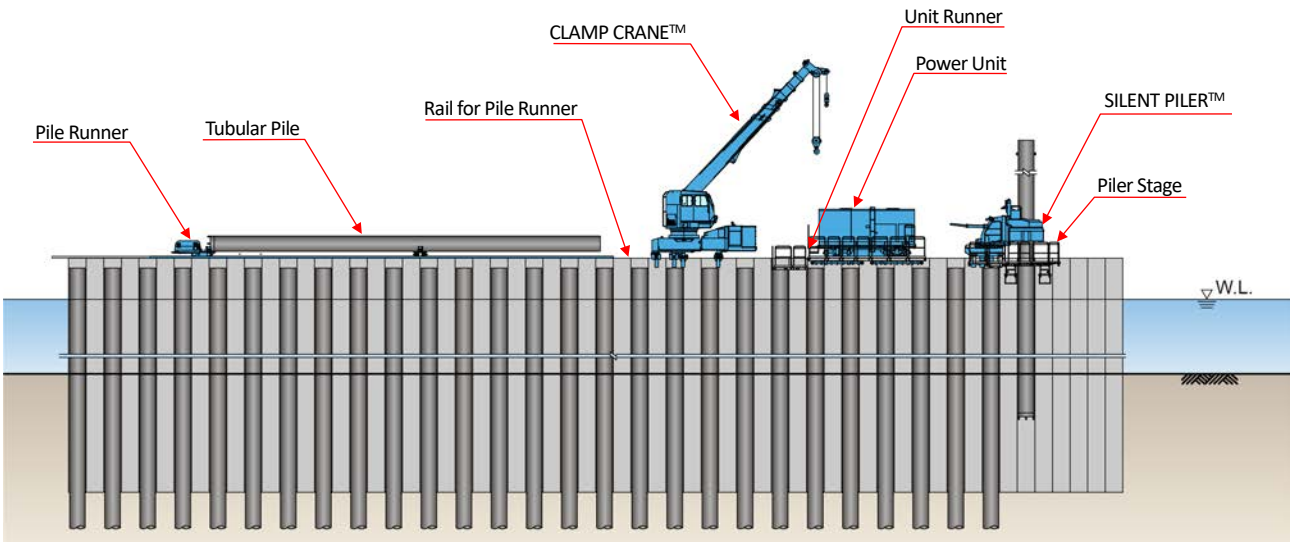


Sectional View

3-5 GRB Operation (Non-staging Method)



Plan View

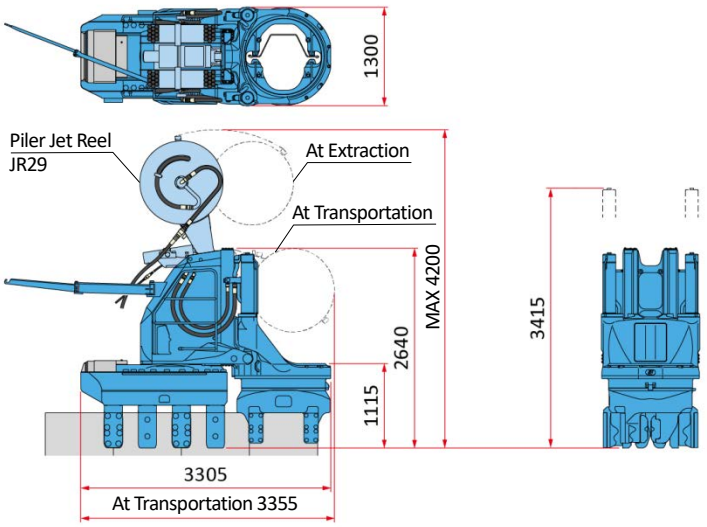


Sectional View

Chapter 4 Machine Specification

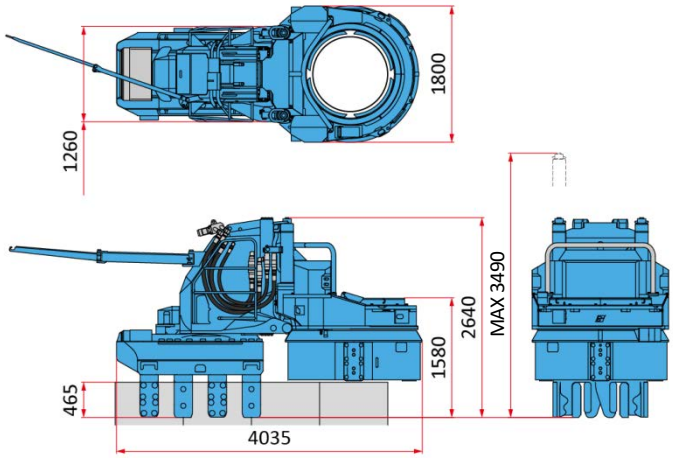
4-1 Machine Specification (for Sheet Piling)

4-1-1 SILENT PILER™ F301-900



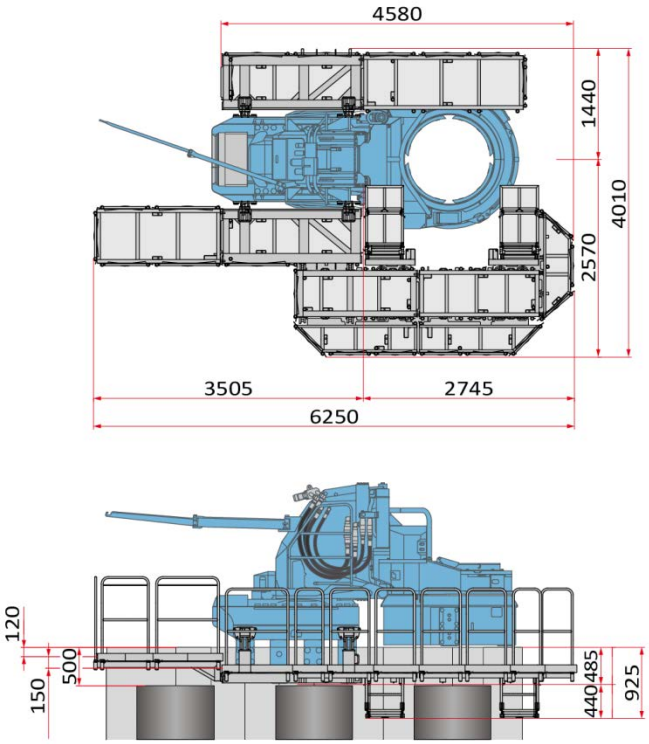
SILENT PILER™		F301-900
Applicable Sheet Piles		Hat Sheet Pile (900mm wide) (10H,25H,45H,50H)
Max. Press-in Force		800kN(Super Crush Mode)
		1000kN(Standard / WJ Mode)
Max. Extraction Force		900kN(Super Crush Mode)
		1200kN(Standard / WJ Mode)
Stroke		850 mm
Press-in Speed		2.0 ~ 43.5 m/min
Extraction Speed		1.5 ~ 32.3 m/min
Control System		Radio Control
Mass	Super Crush Mode (Main Body & Hose Reel)	14880 kg
	Water Jetting Mode (Main Body & Piler Jet Reel)	12250 kg
	Standard Mode (Main Body)	11000 kg

4-1-2 SILENT PILER™ F301-900 (Combi-Gyro Mode)



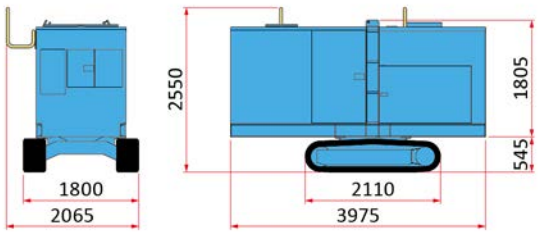
SILENT PILER™		F301-900 (Combi -Gyro Mode)
Applicable Sheet Piles	Chuck	Tubular Pile Ø600,800,1000mm
	Clamp	Hat Sheet Pile (900mm wide) (10H,25H,45H,50H)
Max. Press-in Force		800kN
Max. Extraction Force		850kN
Chuck Rotation Torque		600kN·m
Chuck Rotation Velocity		$10min^{-1}$
Stroke		850mm
Control System		Radio Control
Mass		15700kg

4-1-3 Piler Stage ST51



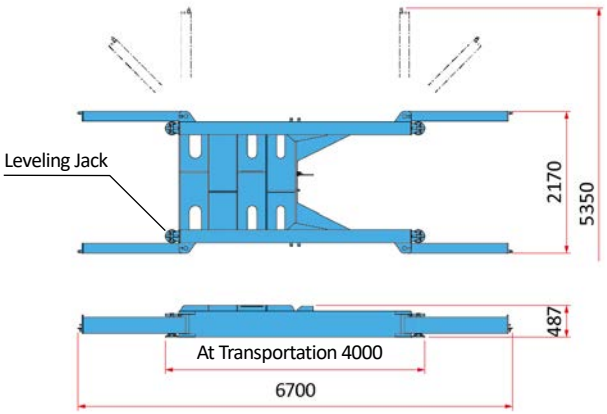
Piler Stage		ST51
Load Capacity	300kg (When set both sides)	
	200kg (When set one side only)	
Mass	1270kg	

4-1-4 Power Unit EU300I3



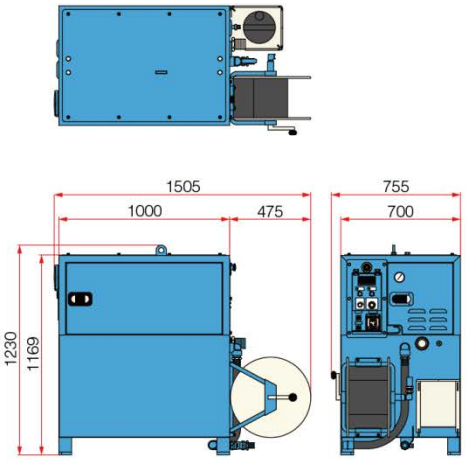
Power Unit		EU300I3
Power Source		Diesel Engine
Rated Output	Power Mode	230 kW (313 ps) / 1800 min^{-1}
	Eco Mode	204 kW (278 ps) / 1600 min^{-1}
	Super Eco Mode	179 kW (243 ps) / 1400 min^{-1}
Fuel Tank Capacity		500 L
Hydraulic Reservoir		Piler ECO Oil 490 L
Moving Speed		1.4 km / h
Mass		6800 kg (with 30m Hose)

4-1-5 Reaction Stand

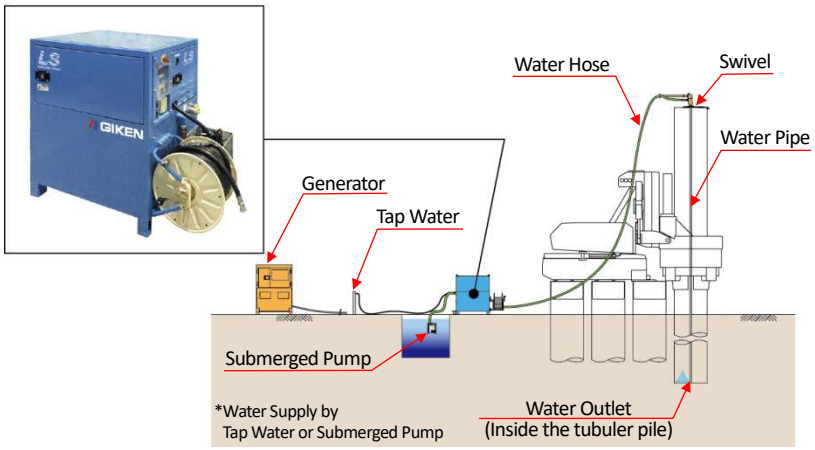


Reaction Stand (with Leveling Jack)	
Mass	2000kg

4-1-6 Water Lubrication System OP114A



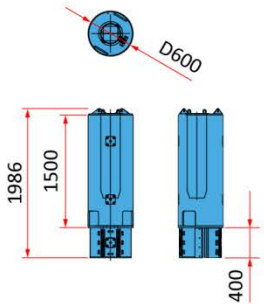
Lubrication System	OP114A
Input Voltage (3 phases)	AC200V, 50 / 60 Hz, 24 KVA or more
Water Pump Discharge Rate	Max.60L / min
Water Pump Discharge Pressure	Max.6MPa
Outer Tank Capacity (W×D×H)	1505 × 755 × 1230
Water Tank Capacity	300 L
Mass (without water)	410 kg



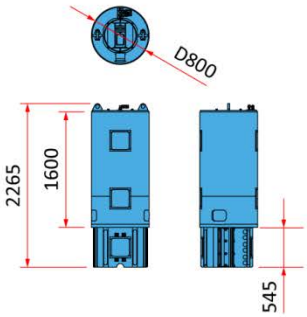
4-1-7 Driving Attachment

Driving Attachment AM69A

D600mm Form



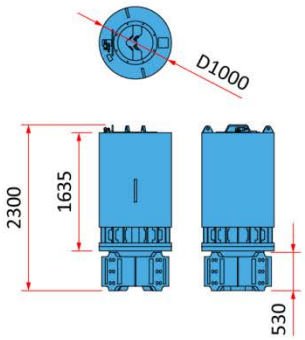
D800mm Form



Driving Attachment	AM69A
Applicable Closure Pile (Equal Angle Section)	200 × 200 × t20 - 25
	250 × 250 × t20 - 25
Mass	1100 kg (D600mm Form)
	2000 kg (D800mm Form)

Driving Attachment AM105

D1000mm Form



Driving Attachment	AM105
Applicable Closure Pile (Equal Angle Section)	200 × 200 × t20 - 25
	250 × 250 × t20 - 25
Mass	3300 kg (D1000mm Form)

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2) With regard to a feasibility study and the selection of a suitable press-in mode for the Combi-Gyro Wall, they shall be determined based on pile profiles, penetration depth of piles and soil conditions. In the planning of particular projects, it is suggested that the decision maker asks the manufacturer of the press-in piling machine or a specialist piling contractor to make the decision.
3) The specifications of the press-in piling machine and applicable pile profiles may be changed without prior notice. Check these with the manufacturer of the press-in piling machine or a specialist piling contractor, when necessary.

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