

Screw pile



Economical and safe on any building site.

As a technology leader we are your competent partner in consulting, planning and construction for the areas of foundation work, reinforcements, waterproofing and remediation in challenging ground conditions. Our experts support you economically and safely with our own experienced specialist teams in all phases of your construction project.

Consulting

At the beginning of a project, you need a vision and a competent partner. Our employees respond to your wishes, provide personal advice and dedicate themselves to your project with an individual needs analysis. We pay particular attention to sustainability aspects such as CO₂ reduction and environmentally friendly processes.

We will find the best solution for you. As a full-service provider, we can offer all technical processes of foundation engineering on a neutral basis. You will get clarity about the requirements, the technical possibilities and the associated economic aspects. This is how we create a reliable basis for making decisions.

Design and engineering

Whether for draft or approval planning – we will manage the entire planning process of your project. By optimising technical details and costs, we create a sound basis for the calculation.

We present alternatives and special proposals and attach particular importance to sustainability. We use 3D visualisations to develop practice-oriented and buildable solutions and to present complex details in an understandable way. We support sustainable certification, and you gain security in planning and feasibility. Deadlines and costs are always transparent for you.

Building

After the detailed tender with a schedule and interface list has been commissioned, our experienced skilled staff will successfully implement your construction project with their own special equipment.

Careful work preparation and execution planning are secured at the start of construction. Quality assurance is guaranteed by our extensive measurement technology. Our certified quality management ensures clear, uniform processes according to LEAN management as well as a professional, on-time execution.

Thanks to the wide range of our technical possibilities, we can adapt quickly and without delay to the individual conditions on the construction site at any time. This is how we guarantee a timely handover.

Fixed, competent contact staff members accompany you from the idea stage all the way through to completion. With our expertise, effective and targeted communication, we support and relieve you throughout the entire execution.



Adjusting a reinforcement cage for the atlas pile

Screw pile

As a leading provider of pile foundations, we offer various foundation methods individually tailored to your construction project from a single source and therefore always provide the technically and economically optimal solution for your project.

Low noise and vibration-free

We offer screw piles, also known as full displacement drilled piles (VVB), as Atlas or Fundex piles. These pile systems are manufactured with low noise levels and are therefore often used in urban areas to avoid disturbing residents with unnecessary construction noise. Due to the vibration-free design, these pile systems are also well suited for use directly next to sensitive structures.

Environmentally friendly and cost-effective

Full soil displacement improves the subsoil and eliminates the need to extract soil material. This saves transport and disposal costs. The screw pile has proven itself many times over, especially in construction projects on contaminated sites. In addition, the screw pile can be used as an energy pile.

Fast and economical

The short set-up times, the fast pile production and the comparatively high load-bearing capacity of the screw piles lead to increased cost efficiency and a reduced construction time. The installation process and

the control of the required resistances enable the pile lengths to be well adapted to changing soil layers. Pile lengths of up to 30 m are possible.

Benefits

- Characteristic pile resistances R_k up to 4,000 kN
- Full ground displacement
- High pile skin friction (Atlas)
- Comparatively high pile tip resistance (Fundex)
- Very good resistance-settlement behaviour
- Vibration-free
- Low noise

Technical data

Diameter Atlas \varnothing 41/51, 46/56, 51/61 cm
Fundex \varnothing 38/45, 44/56 cm

Charact. Pile resistances R_k

Atlas up to 4.000 kN, depending on the soil
Fundex up to 3.000 kN, depending on the soil

Devices Atlas- or Fundex drilling rig

porr.de/en/special-civil-engineering

Screw pile basics

Safe implementation

We always work with our own special equipment and appropriate skilled personnel. Our strength: At every stage of the project, we adapt to the individual conditions on the construction sites. Our many years of experience and a wide range of technical possibilities always enable safe and successful implementation.

Atlas pile

A steel tube with an interchangeable cutting head is pressed into the soil in a rotating motion. The soil is laterally displaced or compacted by the cutting head. The cutting head is sealed watertight with a lost foot tip.

The cutting head and tube are screwed into the ground without vibration by means of a rotary drive and simultaneous contact pressure. The applied torque is measured when screwing in and compared with the subsoil information, e.g., drilling profiles or sounding diagrams. Once the required pile embedment has been achieved, the screwing process is completed, and the reinforcement cage is inserted. The tube and the reservoir are then filled with concrete.

The tube and cutting head are unscrewed again in reverse. In the process, the tip of the foot is released and the cutting head forms the thread-like pile. With its large static overpressure, the concrete column in the tube and reservoir immediately fills the released cavity with concrete. This creates a helical, approximately 5 cm thick concrete bulge in the ground around the pile shaft. The tip remains in the subsoil as the pile foot. Atlas piles can be installed vertically or at an inclination of up to 4:1.

Design

The design and manufacture of the Screw Pile are carried out in accordance with Eurocode 7 as well as the national standards DIN 1054, DIN EN 12 699 and according to the recommendations of the "Piles" working group (EA-piles).

Fundex pile

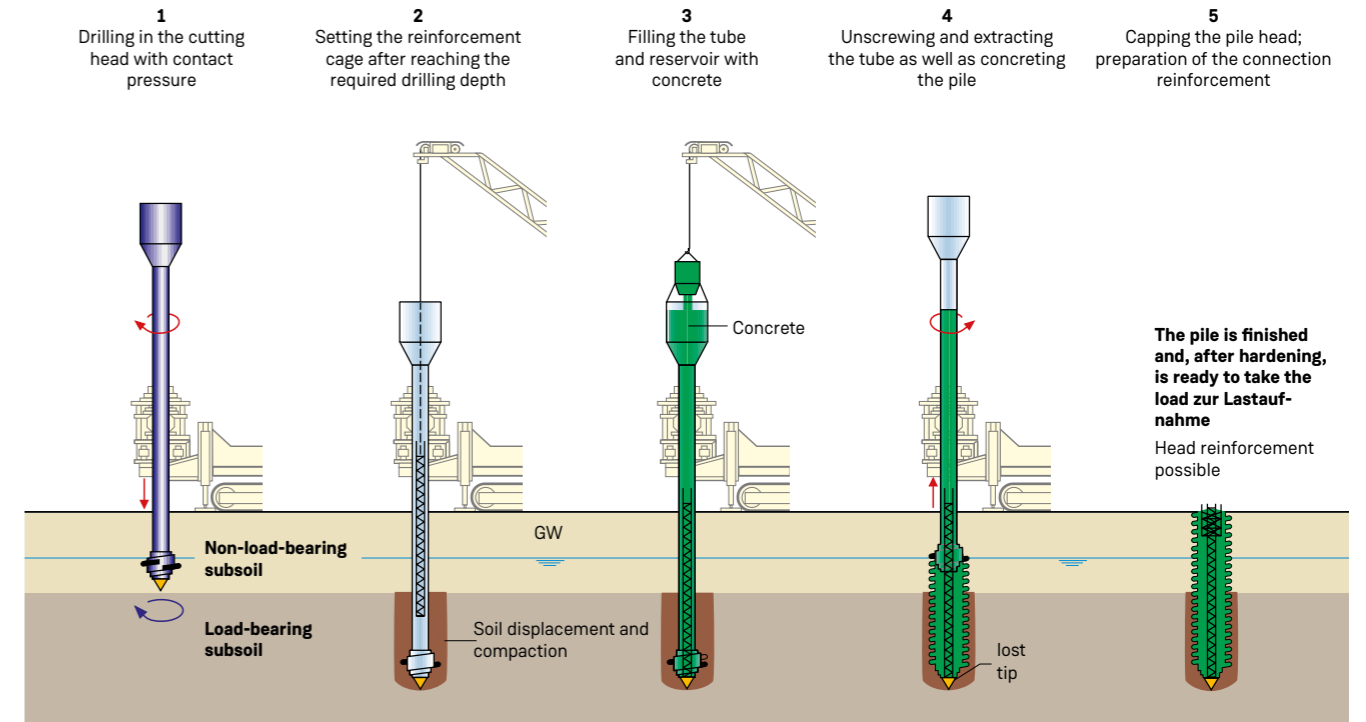
A thick-walled steel tube, sealed watertight by a helical foot tip, is pressed into the ground in a rotating motion. The tip displaces the soil laterally and compacts the soil around the pile.

When the pile is driven in, the applied torque is measured and compared with drilling profiles and sounding diagrams. Once the target depth has been reached the reinforcement cage is inserted. The tube is then filled with concrete.

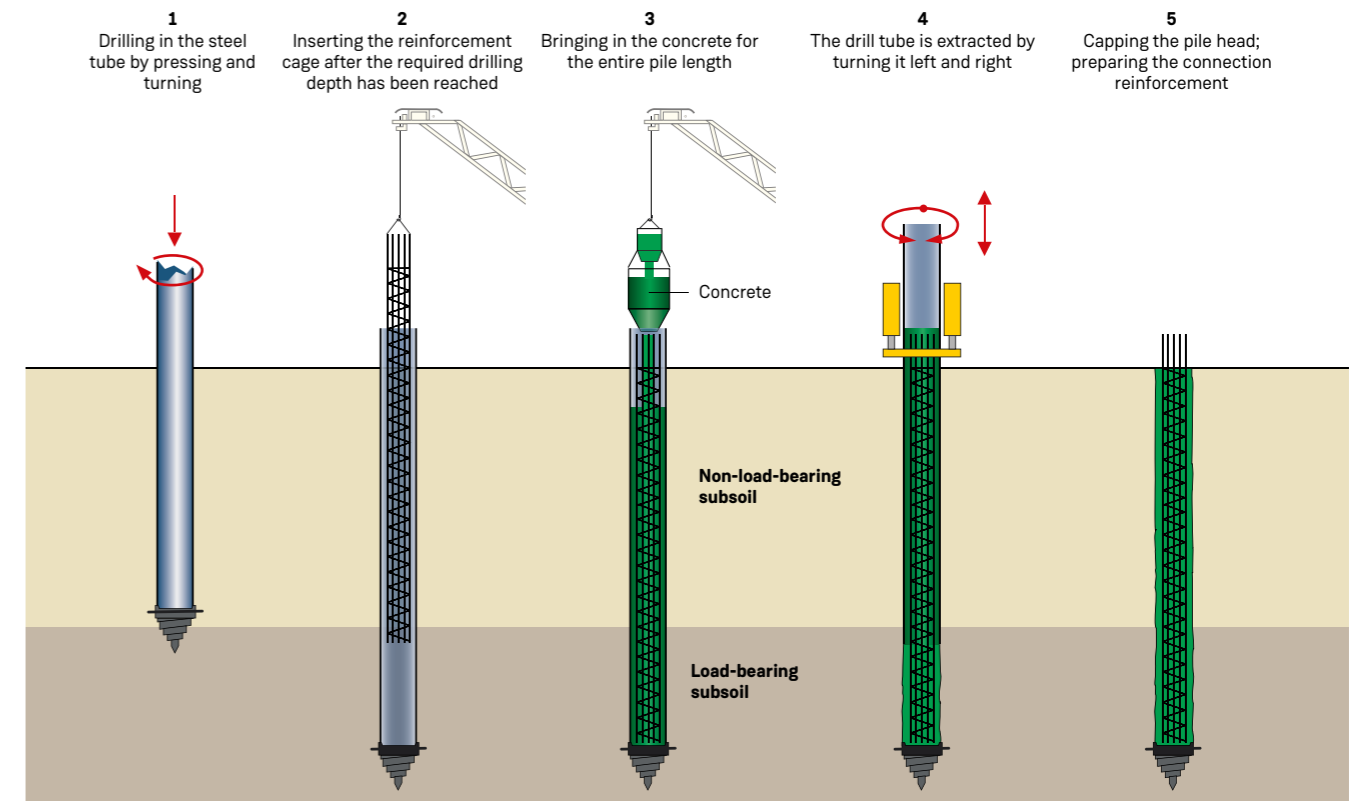
By extracting the drill tube turning it to the left and the right, concrete emerges from the underside of the pipe. The result is the smooth shaft of the Fundex pile. The tip remains in the subsoil as the pile foot. Fundex piles can be installed vertically or at an inclination of up to 4:1.

Screw pile basics

Manufacturing process of the Atlas pile



Manufacturing process of the Fundex pile



Quality assurance for more safety

Safe procedure through high expertise

The execution of screw piles requires procedural instructions that are individually tailored to the requirements of the respective measure. In addition to specialist knowledge and experience, it also depends on the machine operator's instincts. The screwing and unscrewing or extracting of the jacking pipe is a sensitive process in which it is important to optimally adjust the production parameters in order to achieve the desired pile resistance.

Construction requirements

For quality assurance during construction, the requirements of the European and national standards must be observed. The design and manufacture of screw piles is carried out in accordance with Eurocode 7 and the national standards DIN 1054, DIN EN 12699 and EA piles, the recommendations of the "Piles" working group. Self-monitoring and documentation of the construction are regulated in the manufacturing standards..

Constant monitoring

PORR Spezialtiefbau work according to the DIN EN ISO 9001 quality management system and are compliant with the requirements regularly monitored by internal and external audits. In addition, we are registered in the official directory of prequalified construction companies with the PQ association and are prequalified by the Deutsche Bahn in the category of special foundation engineering for foundations/piles.

Static pile load test

The basic requirements for test loads on piles are contained in the EC 7-1 handbook, DIN EN 12 699 and EA piles. The static test load provides clear and accurate data for all soil types. Concrete values for vertical and horizontal loads, as well as for compressive and tensile loads, are determined using measurement technology. The engineers record peak pressure and casing friction. Cyclic and long-term loads are carried out.

Dynamic pile test loading

According to the EC 7-1 handbook, the vertical compression pile resistances can also be determined based on dynamic pile test loads under certain conditions. This is a measurement method with time-dependent measurement of force and movement at the pile head during an impact impulse. The results are often interpreted very differently, so that often no clear result is obtained compared to the evaluation of a static test load.

Pile integrity checks for more safety

The integrity measurement serves to control the pile quality and geometry after production. A common method is the non-destructive "low-strain" test, also known as the hammer impact method. The integrity measurement serves to control the pile quality and geometry after production. A common method is the non-destructive "low-strain" test, also known as the hammer impact method. Testing with a gauge, sensor and hand hammer is inexpensive and quick. The "cross-hole" method, which is used for testing with ultrasound, is also a non-destructive method.



Static pile load test

Building: custom-fit applications

Screw piles are produced with low noise and vibration. They are therefore particularly suitable for projects in urban areas. Due to the vibration-free design, these pile systems are also well suited for use directly next to sensitive structures.

Screw piles are also suitable for contaminated soils, as they do not extract soil. A design as an energy pile is possible in order to also use the screw pile geothermally.

We use screw piles as deep foundation elements for all types of structures. These include, among other things:

- Residential and commercial buildings
- Office buildings
- Hotels
- Logistics centres
- Industrial buildings
- Next to sensitive structures
- Retrofitting foundations in existing buildings



Production of Atlas piles in Oldenburg

Atlas pile

The typical feature of the finished Atlas pile is the screw-like shaft. After reaching the desired depth, the tube and cutting head are turned out backwards. In the process, the foot tip loosens and the cutting head forms the thread-like pile. The concrete column in the tube and container immediately fills the released cavity with its large static overpressure.

This creates a helical, approximately 5 cm thick concrete bulge in the around the pile shaft. This property means that the Atlas pile has a high pile skin friction and therefore accounts for a large proportion of the pile resistance.

Technical data

Characteristic pile resistances R_k compressive load

Pile – Ø	in non-cohesive soils	in semi-sold cohesive soils
	cm	kN
41/51	3.000	1.800
46/56	4.000	2.200
51/61	on request	2.600

The loads and pipe diameters must be adapted to the respective soil conditions. We will be happy to consult with you on this.



Exposed Atlas piles before capping

Fundex pile

Compared to the Atlas pile, no cutting head is used in the manufacture of the Fundex pile. The pile is driven in only by means of a helical foot tip. Once the desired depth is reached, the tube is pulled by turning it to the left and right. This creates the smooth shaft of the Fundex pile. The load is mainly transferred via peak pressure resistance.

Which screw pile system makes more technical and economic sense depends on the size of the project, the subsoil, the loads and other factors. Our expert teams will be happy to advise you.

Technical data

Characteristic pile resistances R_k compressive load

Pile – Ø	in non-cohesive soils
	cm
38/45	2.000
44/56	3.000

The loads and pipe diameters must be adapted to the respective soil conditions. We will be happy to consult with you on this.



Making Fundex piles in Wangerland

Use in contaminated soil

Ecological: 60-degree foot tip

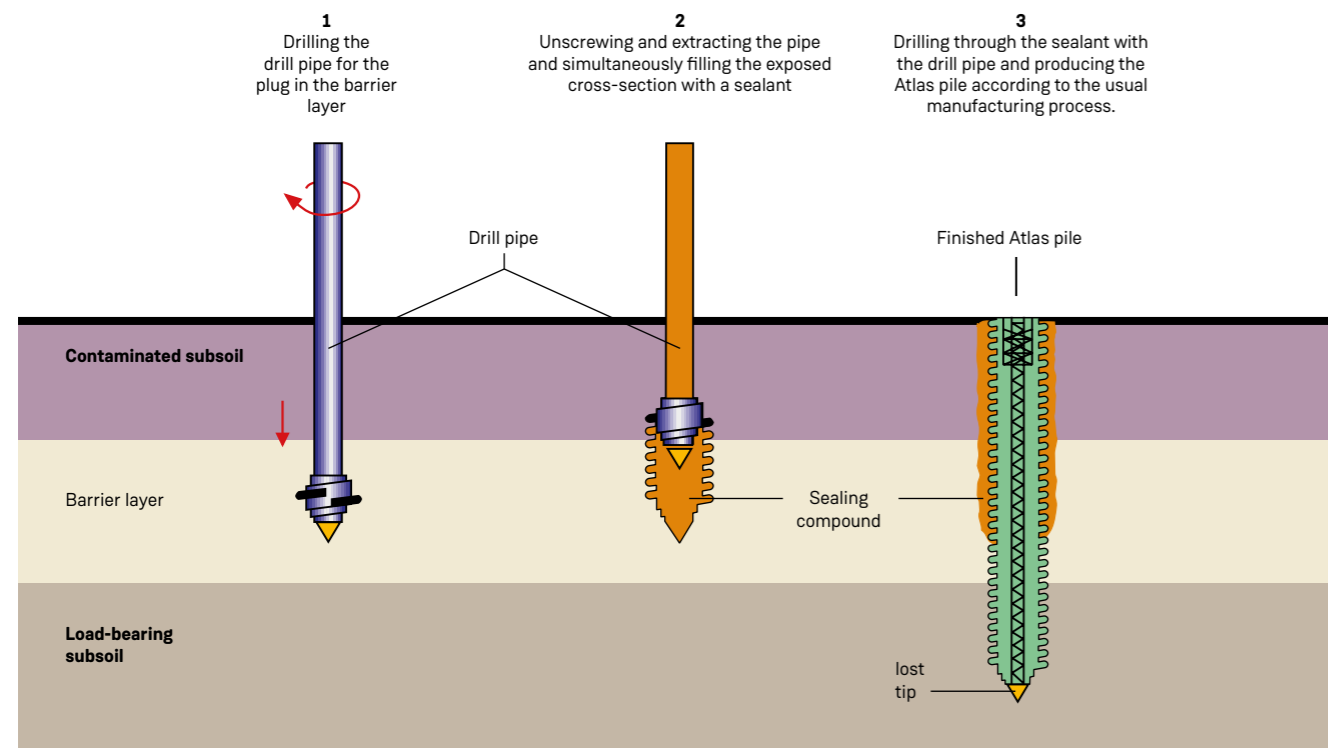
Due to the full ground displacement, the pile system is also well suited for contaminated sites. A 60-degree foot tip is used when drilling through the contaminated layer to avoid the spread of pollutants during pile construction. Alternatively, a seal plug is used to prevent the transport of pollutants into deeper layers.

Safe: Sealing plug

In the case of pile foundations that pass through contaminated soil layers, it must be ensured that no pollutants are transported from the contaminated area into other soil layers or into the groundwater, either during or after pile installation.

This can be prevented either by installing special sealing plugs in the area of the contaminated soil layer through which the piles are subsequently constructed, or by using pile systems in which no annular space is created around the pile body even during construction.

Manufacturing process with a sealing plug



Building in existing structures: Your individual solution

Our promise of being economical and safe on any building site also applies to challenging conditions in existing buildings. We also install Atlas piles in buildings with limited height and space conditions. To carry out the work, a working height of at least 9.50 m is required. The minimum distance to an existing building is 80 cm.

If less space is available, there are other pile systems that can be used as alternatives.

Thanks to their vibration-free design, screw piles are also well suited for use directly next to sensitive structures.



Vibration-free execution with Atlas piles next to railway tracks.



Due to the limited working height, the drill pipes are inserted in several shots and the reinforcement cages are rammed several times.



Production of Atlas piles in Hanover

Sample BoQ: Individual service

We will provide you with a construction project-related bill of quantities with invoicing per piece or running metre of pile. Here is an example of a tender text (excerpt).

Please do not hesitate to contact us.

OZ	Performance specification	Quantity	Unit price in EUR	Total amount in EUR
1.	Full displacement drilled piles, Atlas system			
1.10.	Construction site set-up and clearing of all the equipment required for the execution of the work. Setting-up and clearing, incl. all costs such as freight, [...] will be charged per drilling rig used.	1 piece	0,00	0,00
1.20.	Technical processing Preparation of a verifiable pile static analysis on the basis of on-site pile load investigations, including pile plan and incorporation of inspection notes by the building authorities.	1 piece	0,00	0,00
1.30.	Stake-out operation on construction site Arrival and departure of the measuring team, setting up of the equipment, and preparation of the stake out.	1 piece	0,00	0,00
1.40.	Staking out the starting points Acceptance of the main axes provided by the customer, staking out the pile attachment points.	100 pieces	0,00	0,00
1.50.	Full displacement drilled piles System Atlas, D = 46/56 cm Full displacement drilled piles Atlas system, with circumferential concrete helix, in accordance with DIN EN 12699, vibration-free and low-noise. Characteristic pile resistance R_{p}: compression: $R_k \leq 4,000$ kN, tension: $R_k = 0$ kN Horizontal: < 3 % of min. V-load [...] Invoicing is per piece of manufactured pile.	100 pieces	0,00	0,00
1.60.	Deployment of the crosscut team Arrival and departure of the cutting team, setting up of the equipment. Execution of the cross-cutting work in a single operation.	3 pieces	0,00	0,00
1.70.	Capping the piles, D = 46/56 cm Piles to be capped at height after on-site installation of the sub-concrete (clean layer), expose connecting reinforcement [...]	100 pieces	0,00	0,00
1.80.	Faulty drilling as a result of encountering obstacles in the subsoil. Aborting the drilling if there is no further drilling progress and then unscrewing the drill pipe and filling the drill hole. Additional services above and beyond this (loss of concrete, loss of reinforcement, wear/breakage of the drilling tool) are to be paid at cost. [...] Billing shall be from the point of drilling to the bottom of the faulty drill hole.	Metre	0,00	0,00
1.90.	Fixed costs per faulty drill hole Includes: – 1 lost drill bit – Measuring the pile installation point	piece	0,00	0,00
1.100.	Equipment standstill Downtime for the drilling rig incl. operating personnel for reasons for which the Contractor is not responsible.	Hours	0,00	0,00

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