



**CENTRUM**





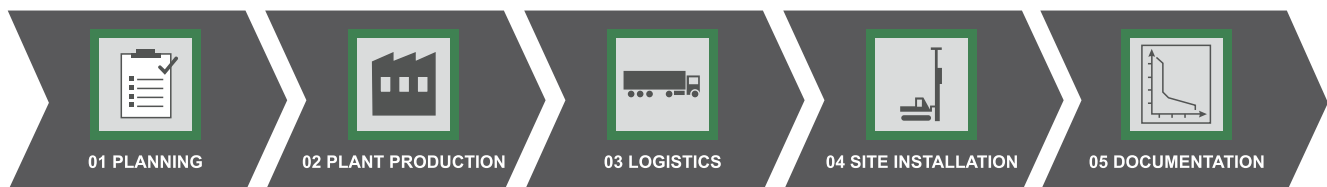
**CENTRUM**

A foundation is the basic structural element which connects the building directly to the ground and transmits loads from the building's structure to the load-bearing layers in the ground.

A function this important requires reliable, tested and proven solutions. We are a leading, most advanced Polish manufacturer of precast reinforced concrete piles and pile foundations for overhead contact line support structures.

As a member of the international corporate group Per Aarsleff Holding A/S, we exchange experience and knowledge with our group's European branches, striving for the continuous development and improvement of the quality of our precasts.

We implement projects based on our advanced system, the CPS (Centrum Pile System) which covers processes from concrete design to pre-casting, reinforcing steel manufacturing, a system of joining the elements, to distribution of finished products



We offer the highest quality precast reinforced concrete piles produced in accordance with the requirements of the PN-EN 12794+A1:2008 standard and pile foundations conformable with National Technical Assessment IK-KOT-2021/01302, Ed. 2.

We have a professional Manufacturing Plant Laboratory, equipped with modern inspection and testing equipment.

Audits performed by renowned scientific and technical bodies, as well as research carried out by our highly qualified personnel guarantee the highest level of quality assurance.

Our Certificates allow us to deliver products not only to the Polish market but also to the markets of Europe.

Our production capacity helps us to handle the largest construction projects.

We have a flexible warehouse system that lets us building stocks adapted to the current market needs.

The highest quality materials and inputs are provided by selected suppliers.





# Precast piles

**Pile sections :**

200x200 mm, 250x250 mm, 300x300 mm, 350x350 mm, 400x400 mm, 450x450 mm

Reference: PN-EN 12794+A1:2008, which implements the European standard EN 12794:2005+A1:2007

**Intended use:**

Precast foundation piles are reinforced concrete piles buried by percussive piling. They are used mainly for transmission of loads through deeper, stronger layers of soil and to prevent excessive or uneven settlement of the superstructure. Detailed technical requirements for reinforced concrete pile fabrication are defined separately for each project and stated in the detailed design, which includes.

**Product types:**

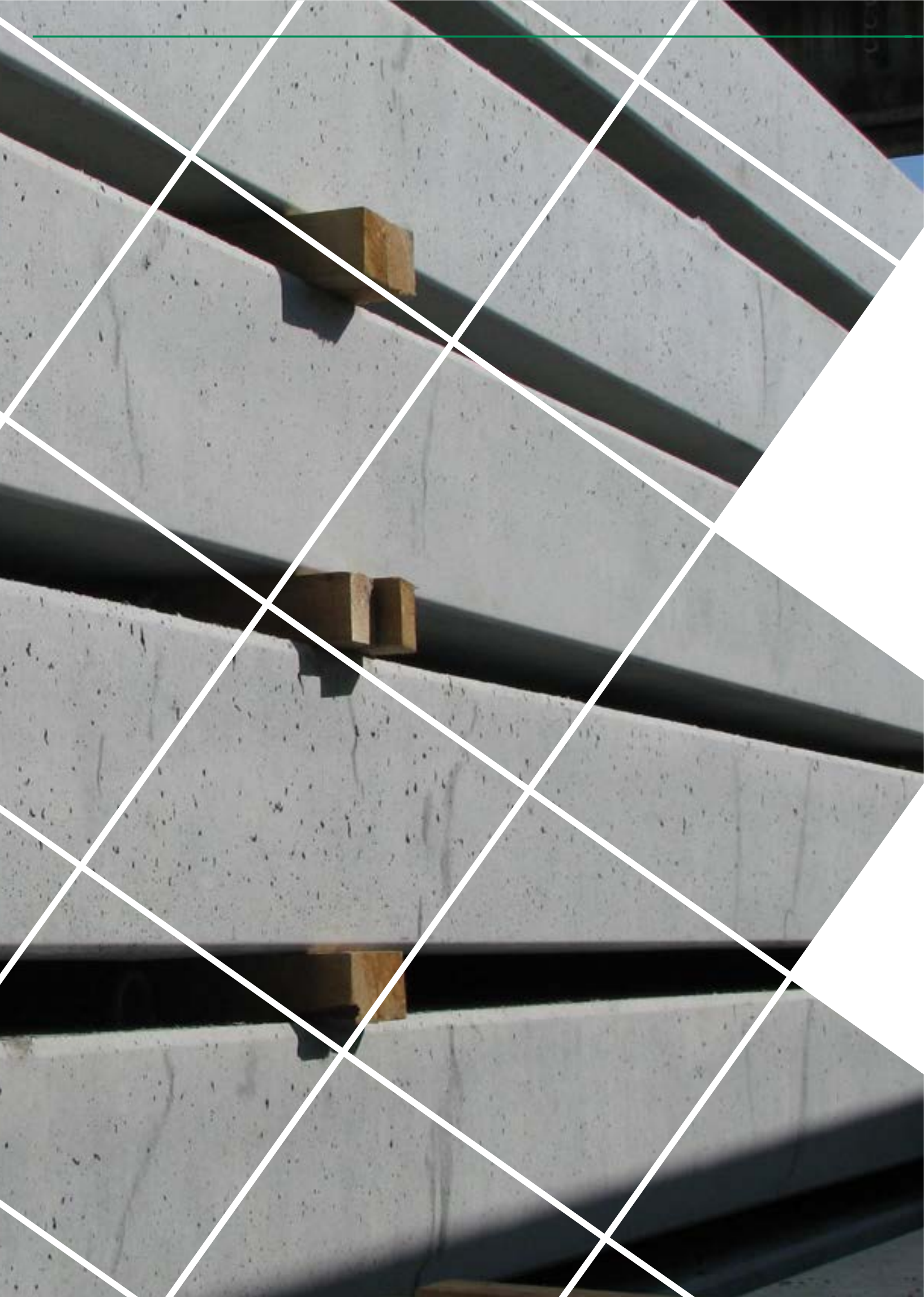
The reinforced concrete piles are available as single pieces with a length from 4.0 m to 15.0 m. The length can be increased liberally by attaching single piles using mechanical connectors. The modular length is 1.0 m.

**Product specifications:**

The precast piles are designed in compliance with the current technical specifications. Each pile has three parts: a head, shaft and base. The standard pile versions feature an identical design of the head and foot, unlike the shaft, from which they vary in reinforcement design and the stirrup spacing increment. The standard catalogue solutions provide for 12 mm thick longitudinal bars placed in the precast body corners and in a quantity of 4, 6, 8, 12, 16 or 20.

The production capacity allows us to fabricate reinforcement with larger diameters of the main reinforcement bars, in accordance with the provided technical documentation. The main reinforcement is made of reinforcing steel with a minimum yield strength of 500 MPa or higher.

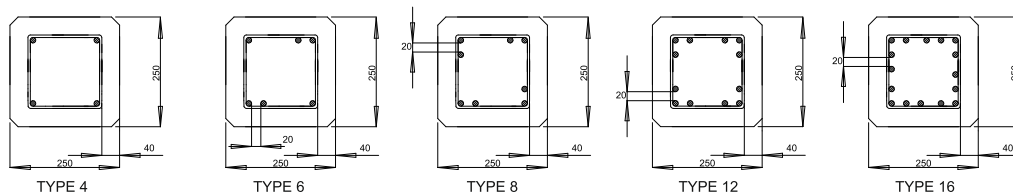
The concrete for precasting the products has the following performance: minimum compressive strength class C40/50, frost resistance F150, water resistance W8, absorbability < 5%; the concrete is designed and made in conformity with the recommendations for the specification of limit values of concrete composition for exposure classes X0, XC1, XC2, XC3, XC4, XS1, XS2, XS3, XD1, XD2, XD3, XF1, and XA1. If the environmental conditions suggest exposure classes XA2 and XA3, we use HSR-resistant cement for the concrete. If exposure classes XF2, XF3, or XF4 need to be complied with, our concrete is additionally processed by entraining air at an approximate ratio of 5%. Usually Portland cement class 42.5 or better is used for the concrete mix.



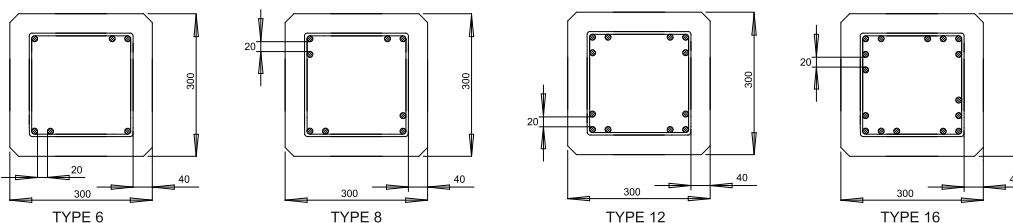


## STANDARD 12 MM DIA. BAR LAYOUT :

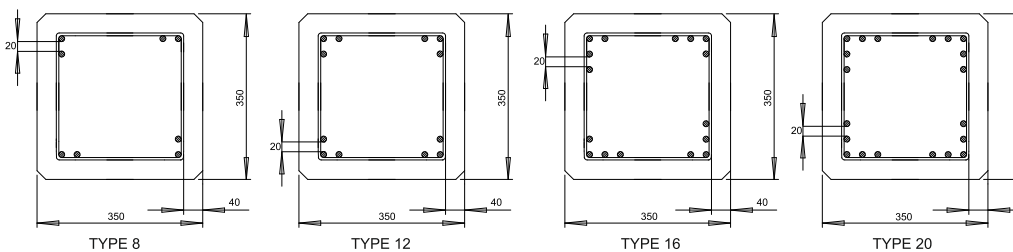
### 250x250 mm



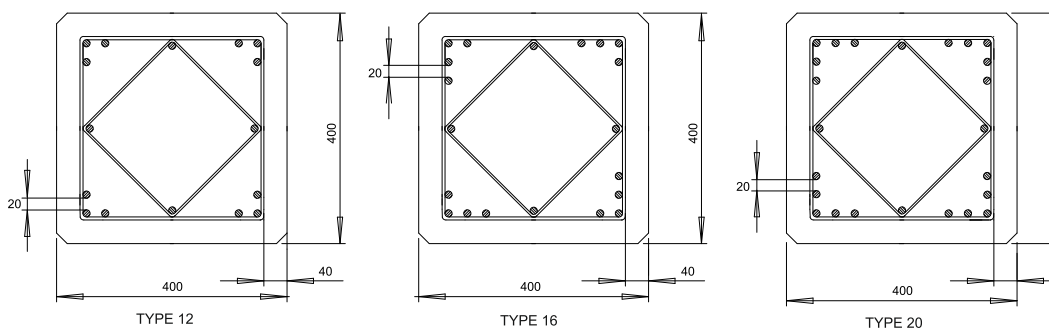
### 300x300 mm



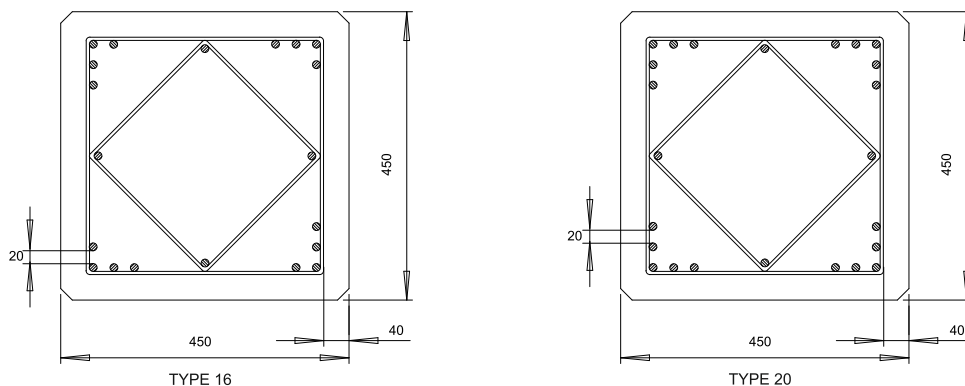
### 350x350 mm



### 400x400 mm



### 450x450 mm





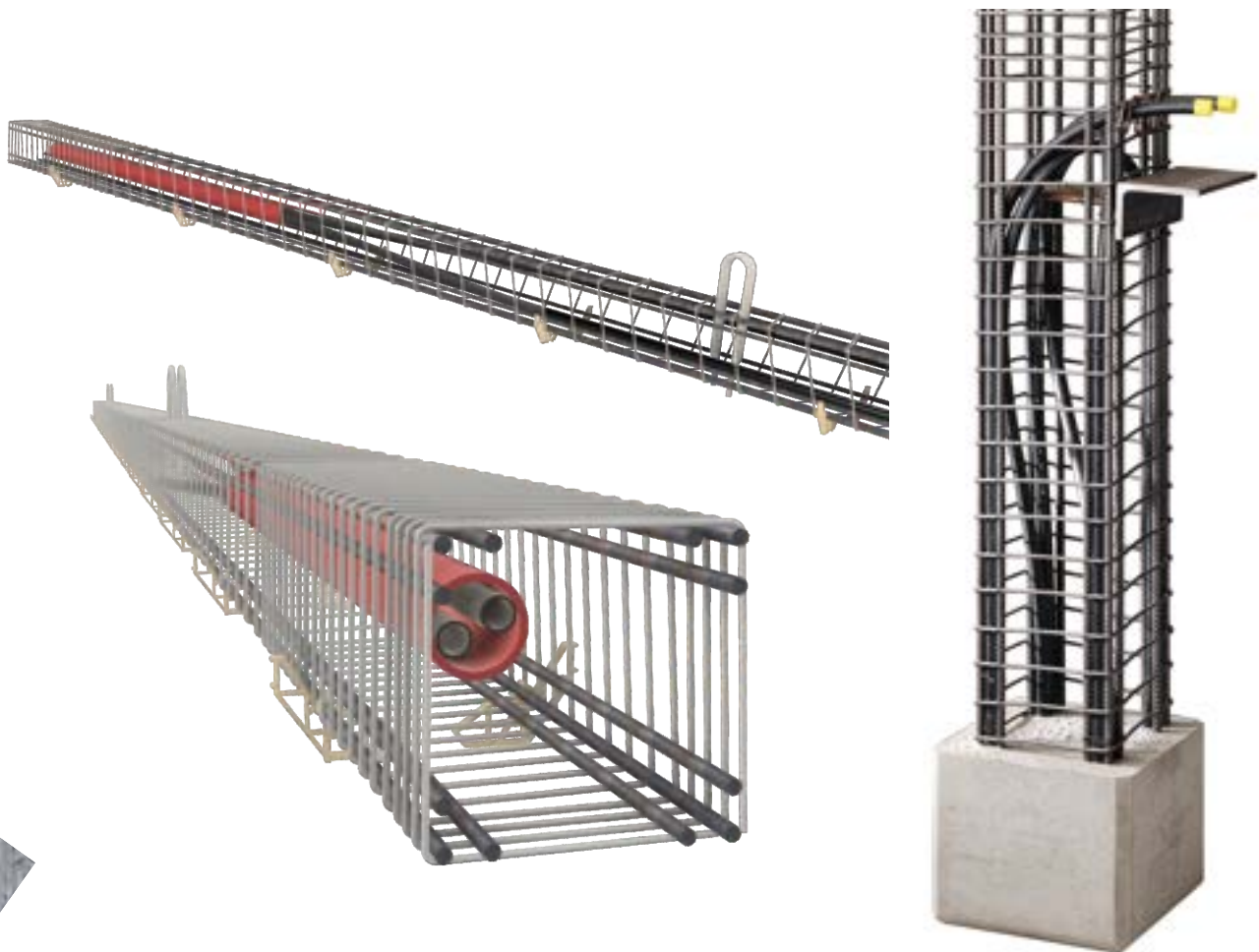


# Energy piles

An energy pile is a traditional precast concrete pile with embedded piping that contain a working medium. The circulation of the working medium results in absorption or release of energy from and into the ground. At the same time, the building foundation over the piles satisfies its main function, which is to stabilise the structure. This means double benefits for buildings where energy piles are used – in addition to static load-bearing capacity, the pile delivers energy which is generated in a sustainable way. The energy piles can replace or at least reduce the demand for traditional heating and cooling capacity, contributing to construction of buildings that are CO<sub>2</sub> emission neutral.

The energy piles are currently available in lengths of 7-18 meters. This means 12 to 34 metres of ground-source heating piping per pile. Unlike the traditional horizontal solution of ground heat/cold sources, in which ground heating pipes are buried approximately 1.5 meters deep, the heat of the ground from the energy piles is extracted vertically, through soil layers from 1 meter to 18 meters deep, where the temperature is stable throughout the year, within an approximate range of 8-10 centigrades.

Centrum Pali provides assistance and coordination in the design for a good and sustainable solution that is correctly specified to cover the energy demand of the planned project.







# Pile foundations

## PREFABRICED PILE FOUNDATIONS WITH FASTENING HARDWARE

### Pile type:

BI, BII, BIII, BIII L – pile foundations for overhead contact system poles, gantry poles, lattice columns with bracket arms spanning two-tracks, and other types of support structures.

BI-A, BII-A, BIII L-A – pile foundations for anchoring of overhead catenary system stays.

BII-S – pile foundations for installation of trackside signal masts

Reference: National Technical Assessment IK-KOT-2021/ 0130 0130, Ed. 2

### Intended use:

Pile foundations are used for installation of support structures for railway overhead contact systems. The heads of the pile foundations feature four threaded-bar foundation anchors connected to the main rebars by full-section friction welding. Traction poles are attached to the anchors. The installation (sinking) of pile foundations is done using rail or road-rail piling rigs.

We make pile foundations for contact system poles, as well as:

- anchor piles for overhead contact system stays;
- piles for trackside signal masts.

### The pile foundations are available in lengths from 2.5 m to 5.5 m in 0.5 m increments:

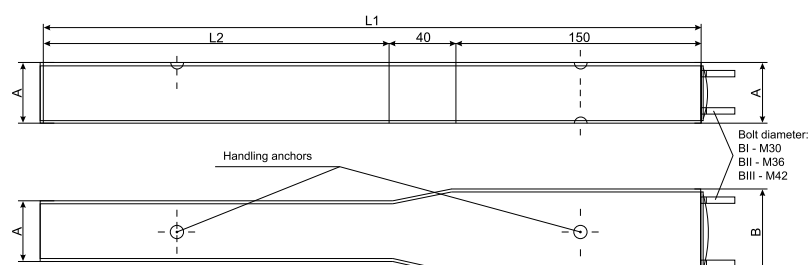
- length L1 from 250 cm to 550 cm
- length L2 from 60 cm to 360 cm

To produce pile foundations longer than 5.5 m, we make type BIII L and BIII L-A pile foundations with mechanical connectors

### Steel type:

- Class AIII-N for main bars
- Class AIII-N for cross bars

TYPE	L1 (cm)	L2 (cm)	A (cm)	B (cm)	Concrete class
BI pile	250-550	60-360	32	45	C 40/50
BII pile	250-550	60-360	36	52	C 40/50
BIII pile	250-550	60-360	40	58	C 40/50
BI-A pile	250-550	60-360	32	45	C 40/50
BIII-A pile	250-550	60-360	40	58	C 40/50
BII-S pile	250-550	60-360	36	52	C 40/50







# Mechanical pile joints

If longer foundation piles are necessary, Centrum Pali provides a solution: piles fitted with mechanical joints. The joints are embedded into the product during concrete precasting. The joints we use are among the most durable on the market and can transmit the highest loads. The joints conform with the requirements of the European Technical Assessment ETA-17/0714 (the products feature a CE marking).

## Class A pile joints

Class A joints which are compliant with PN-EN 12794+A1:2008, enable press-fit connection of individual pile segments, prevent water penetration and protect against corrosion factors. Ongoing technological progress and research have allowed the development of a new generation of Class A joints.

The basic application of mechanical pile joints is the assembly of individual structural elements (piles or pile segments), the original length of which is limited by the production capabilities. This effectively eliminates one of the most important limitations of precast products, allowing for much greater freedom in the implementation of all types of construction projects.

The advantages of mechanical pile joints include improved logistics of manufacturing, transport, and installation of precast piles.







## Rebar cages

A dedicated production line is operated to manufacture rebar cages, where a special-purpose machine plays the most important role. The whole process is fully automated with all parameters controlled.

The rebar steel for the rebar cages is sourced directly from the best European steel mills. It is required that the steel material complies with the specifications of Polish and European steel standards.









## Friction welding

This joining method is part of the production process of rebar cages intended for pile foundations installed under overhead contact system poles of all types.

In the process of joining stainless steel bolts with main reinforcement bars, we use the method of friction welding specified in PN-EN ISO 15620. The qualification of this technology (WPAR) was performed by the Welding Institute in Gliwice. A great advantage of this solution is that it can produce – within several seconds – a reliable, fully repeatable joint with very good quality and strength performance. The process consists in using the force of friction to heat up and plasticize the workpieces joined together, which in the final phase of the friction welding process – when the rotary motion stops – are upset by pressure.

The joints formed by friction welding have a stable, compact metallic structure in the entire cross-sectional area. Our friction welding machine is operating in an automatic cycle using digital control. Each welded joint is monitored for compliance with the Welding Process Specification (WPS). All processing data is saved and archived.

To provide additional welded joint inspection for duplex steel-based processing, we use dedicated industrial testing equipment on the processing line. It is a professional steel tensile tester for testing welded joints at specific force settings. This method eliminates the risk of defective welds.

This provides us with an all-round guarantee of mechanical performance of the welded joints and their full traceability. The tensile tester is class-1, certified and calibrated, so we are sure of 100% reliability of the results !



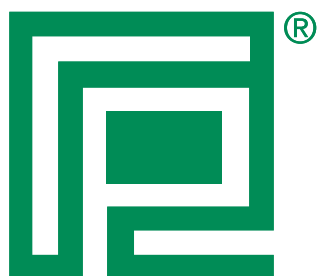


Our mission is to meet the requirements and needs of our customers by ensuring the highest quality and repeatability of manufactured products.

- Our potential enables immediate and flexible response;
- We source materials from proven and qualified suppliers;
- We continuously improve our quality management system;
- Our staff is open and professional.

A satisfied customer is the best endorsement for us.





# CENTRUM

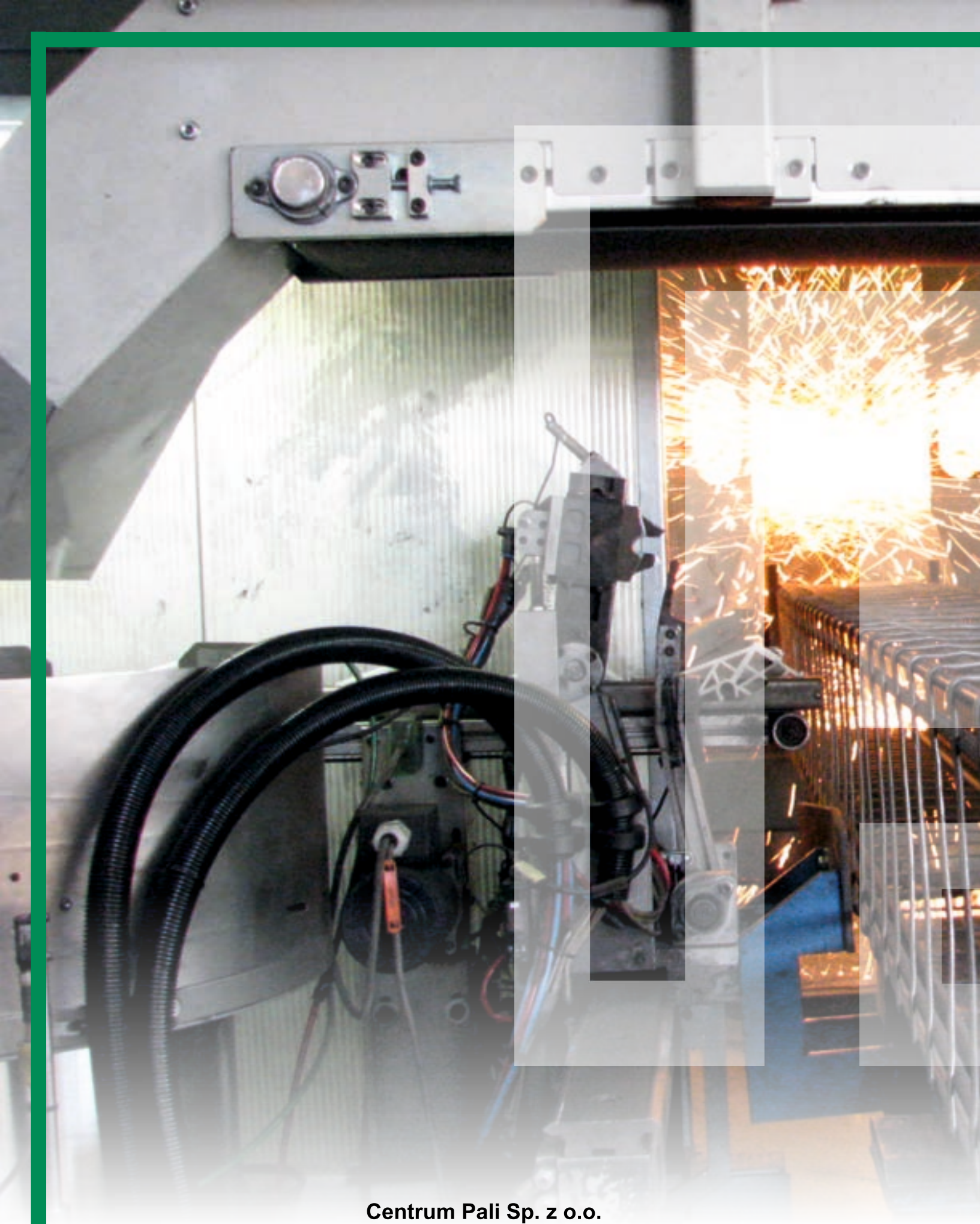
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