



# EMECA

WORLD'S FINEST PILING  
COMPONENTS

## EMECA PILE JOINT USER GUIDE



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## 1 GENERAL

### 1.1 INTRODUCTION

This manual describes the engineering and manufacturing principles of Emeca pile joints, along with casting and user instructions. User instructions also include general facts about pile joints and other piling products. Pile joint features and capacities are described separately in the documents made for pile joints.

### 1.2 EMECA OY

Emeca Oy is a Finnish family company that manufactures piling components. The company is established in 2001. Main products are pile joints and rock points for reinforced concrete piles. Our product range also includes other piling components and tools for both casting and assembly.

The products are manufactured in the highly automated production facilities in the small town of Köyliö, Finland, where the company's entire professional staff work. Alongside product manufacturing we participate in engineering collaboration with customers. In addition to standard products we deliver customized products that are specified for the working conditions and environment of the customer.



*Picture 1. Emeca Oy production facilities in Köyliö, Finland*

## 2 PILE JOINT



*Picture 2. Emeca pile joints cast in concrete piles*

### 2.1 PURPOSE OF USE

Pile joints are used when it is not possible to cast or transport reinforced concrete piles of the length required on the site. In practice reinforced concrete piles are often joined. Reinforced concrete piles that exceed 15 m are almost always joined on the worksite. With Emeca pile joints joining on the worksite can be done quickly and with high quality.

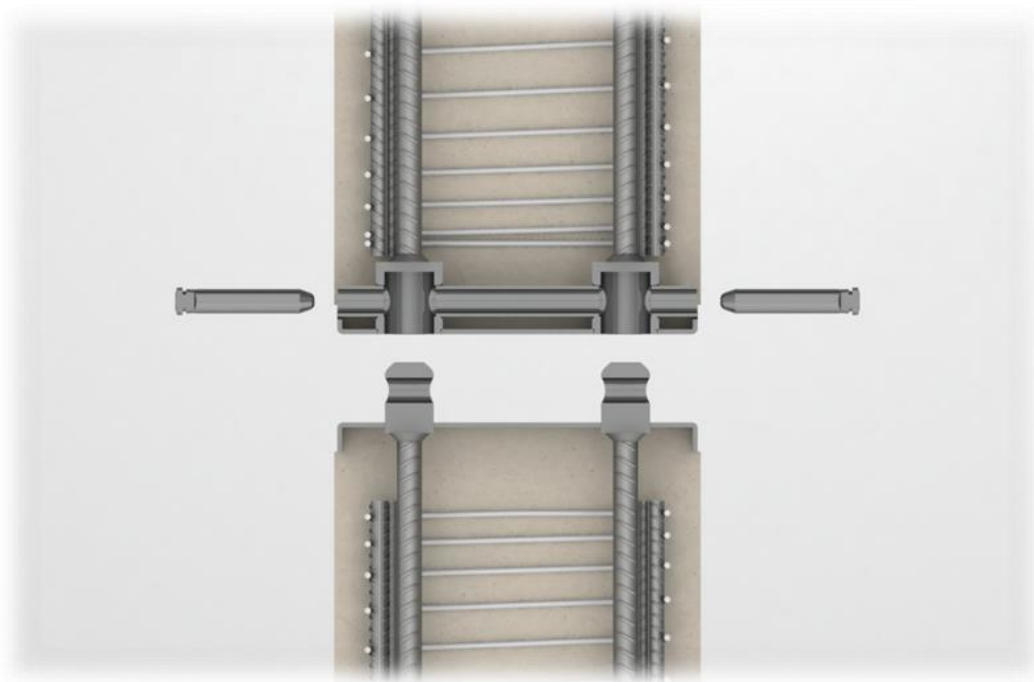
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## 2.2 FUNCTION PRINCIPLE

Pile joints are engineered so that they transmit all loads from one pile section to the other without impairing the capacity of the pile. The pile joint must also be simple, reliable, and easy to use.

All the parts of the pile joint are welded together in Emeca production facilities. In the pile factory, the pile joints are cast in the mold together with the pile reinforcements. The cast concrete anchors the pile joint to the reinforcements of the pile and forms a reliable connection.

On the work site the pile sections are joined by hammering locking pins to the locking parts of the pile joints. The locking pins ensure a simple and easy locking of the joint, which reliably transfers all normal forces and bending forces from one pile section to another.



*Picture 3. Pile joint connectors*

## 3 ENGINEERING AND MANUFACTURING

### 3.1 STANDARDS

Emeca-pile joints are engineered and manufactured in accordance with valid standards and regulations.

Standards used in engineering:

*EN 1992-1-1:2015 Eurocode 2: Design of concrete structures*

*EN 1993-1-8:2005 Eurocode 3: Design of steel structures*

*EN 12699:2015 Execution of special geotechnical work - Displacement piles*

*EN 12794:2008 Precast concrete products - Foundation piles*

### 3.2 CORROSION

According to Swedish Transport Administration, Trafikverket, technical document *TRVK Bro 11 (TRV 2011:085)*, the corrosion in the pile joint locking parts is 0.2 mm per 120 years. Corrosion between the bottom plates is 1.0 mm per 120 years. These reductions have been taken into account in the calculations of the pile joints.

### 3.3 MANUFACTURING

Pile joints are manufactured in highly automated robotic cells managed by professional trained personnel. Products are manufactured from certified high-grade steel.

Assembly is made by robotic welding in automated production cells. Welding is carried out according to standard *EN ISO 17660-1:2006 Welding, Welding of reinforcing steel, Part 1: Load-bearing welded joints*.

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### 3.4 QUALITY CONTROL

The production of pile joints requires continuous quality control. Besides internal quality control system, Emeca has an indefinite quality control contract with Eurofins Expert Services Oy, which is accredited by the national body FINAS.

Material certificates are required for the materials used in pile joints. The material used in the products can be tracked, if necessary, with the batch numbering.

The quality of the robot welds is visually monitored in every product. Tensile tests are also made regularly to ensure the performance of the welds.

### 3.5 MARKING


Every manufactured pile joint has a label, like in picture 4. The label shows manufacturer, name and type of the product, batch number, product code and specifier, manufacturing date, quality control organization and contract number.



Picture 4. Product label

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A label, like in picture 5, is attached to all pallets. The label shows manufacturer, product name, product code and specifier, quality control organization and contract number, quantity of products, weight of the pallet, pallet number, packing date and order information.

Tilausno	Lähetä	Pvm
<b>3301/1</b>	<b>3427</b>	<b>22.6.2020</b>
Nimike	Rev:	
<b>Jatkos Emeca 300-177 F1T</b>		
Eurofins Expert Services Oy Lv. sop. VTT-A-00105-10	<b>F1T</b>	
Tuotenro	Määrä/kolli	
<b>130001</b>	<b>40 kpl</b>	
Bruttopaino	Kollinro	
<b>455kg</b>	<b>1 / 10</b>	
Viitteenne	Til.nronne	
Vastaanottaja		
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Picture 5. Pallet label

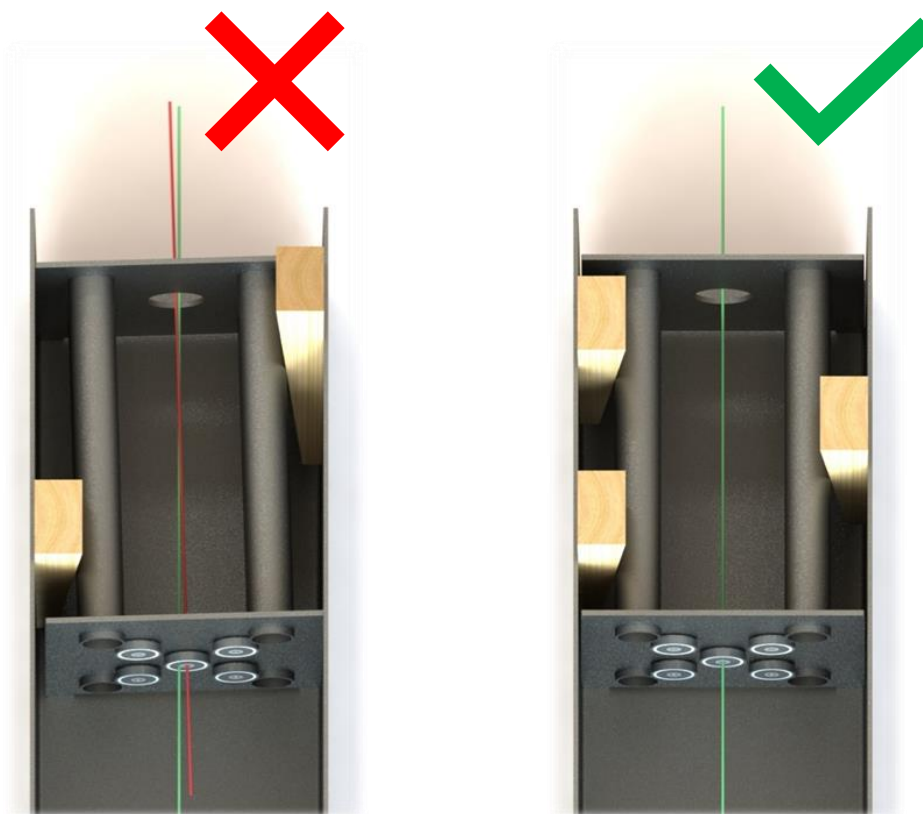


## 4 CASTING INSTRUCTIONS FOR THE PILE FACTORY

### 4.1 CASTING OF THE PILE JOINTS

Pile joints are cast to the pile in the same mold with the pile reinforcements. To achieve high-quality results, it is important to ensure that the pile joint is in line with the mold and pile head during casting.

The rebars of the pile joint are pushed inside the pile reinforcement. The pile joint is then fastened to casting guide which ensures correct positioning of the pile joint during the casting process. The casting guide is wedged into the mold to ensure that it is in line with the mold.

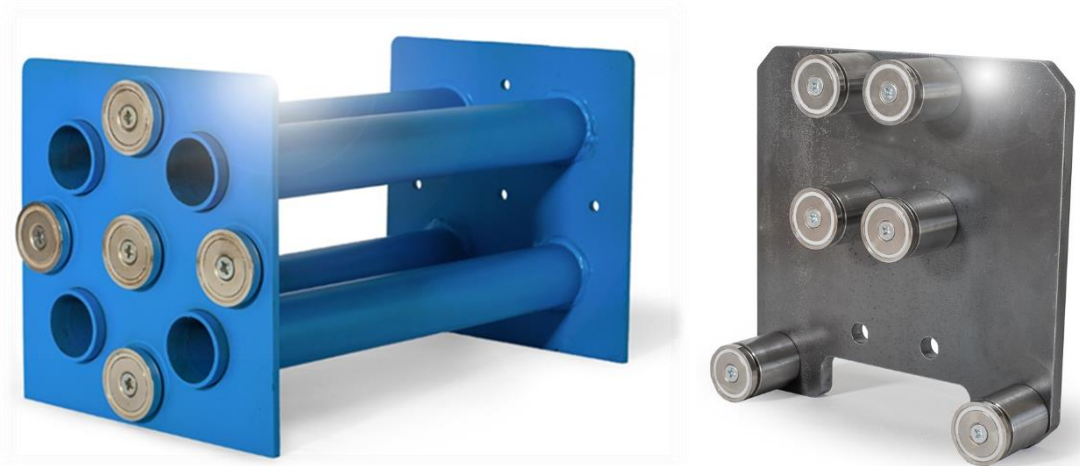


*Picture 6. Proper wedging of the casting guide to mold*

## 4.2 CASTING GUIDE FOR PILE JOINT

The easiest and most reliable way to achieve high-quality results is to use Emeca casting guides. Pile joint is fastened to the casting guide which ensures a high-quality result by keeping the pile joint in correct position throughout the casting process.

There are various types of Emeca casting guides for different customer needs. Usually casting guides are tailor-made to fit customer's production environment. Some pile joint casting guides can also be used as casting guides for rock points and pile shoes.

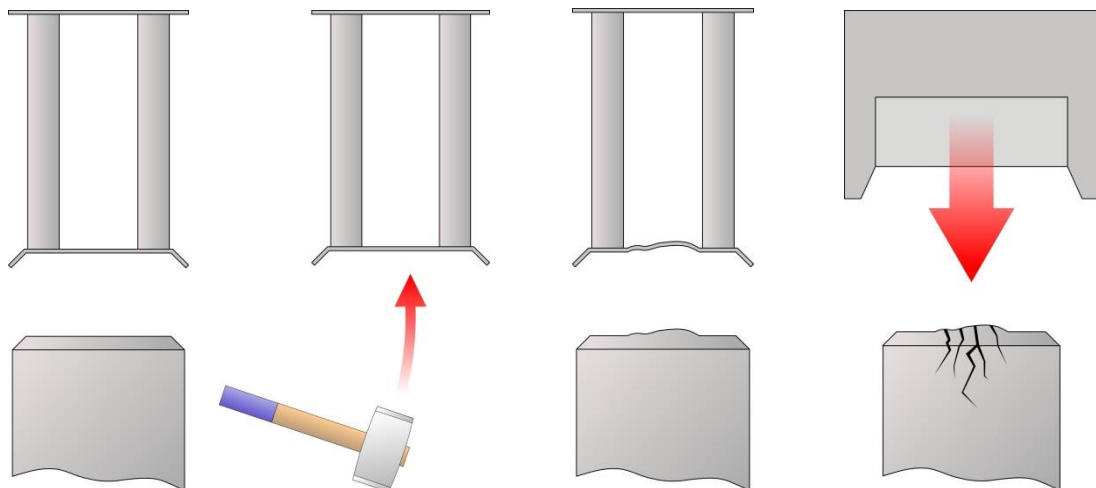


*Picture 7. Magnetic casting guide and compact casting guide*

### 4.3 CASTING MOLD FOR PILE HEAD

Casting mold for pile head is used to ensure desired form of the pile head. The casting mold for pile head forms bevels on the sides of the pile head and ensures that the pile top is flat.

The casting surface of the mold should be lubricated with form oil to prevent concrete sticking to mold surface. If concrete sticks to the mold it must not be removed by hammering because there is a risk that the mold surface will be damaged.

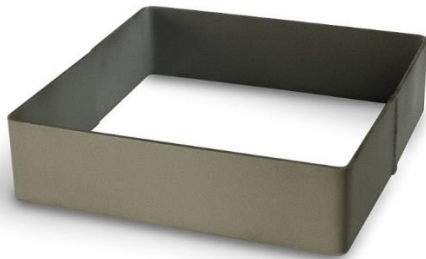


*Picture 8. Hammering of the casting mold may result in damaging of the pile*

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## 4.4 CRACK RING

Emeca crack ring is used to ensure that the pile top withstands large loads during pile driving without breaking. With crack ring you can prevent damage to the pile top that could lead to rejecting of the whole pile. Therefore, crack ring is a cheap insurance for successful piling work. Emeca recommends installing a crack ring to every pile.



*Picture 9. Crack ring for the pile top*

## 4.5 DEMOLDING

Jointed pile is lifted from the mold by the help of lifting hooks that are cast to the surface of the pile. Be careful when lifting the pile out of the mold so that the pile end in the casting guide is not bruised and the pile remains undamaged.



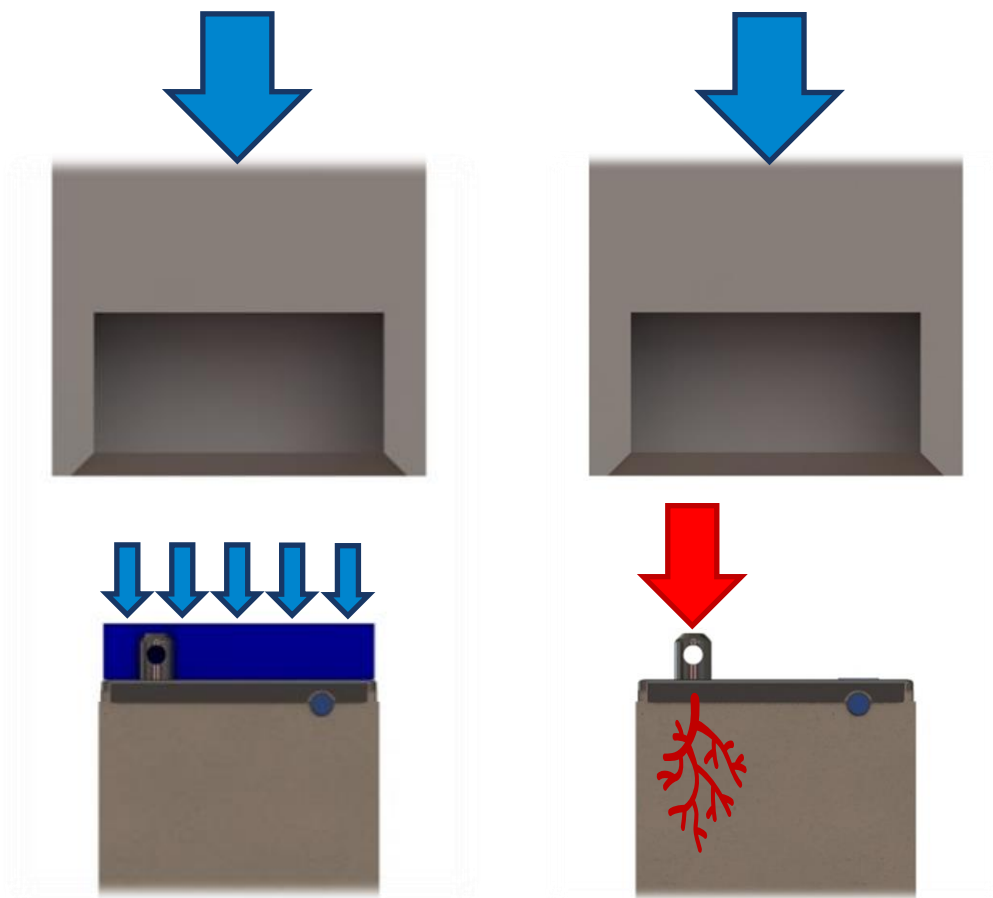
*Picture 10. Lifting jointed piles from the mold*

## 5 PILING AND JOINING ON SITE

The piling work is carried out according to local piling instructions. Jointed piles are driven to the ground using Emeca driving plate. Driving is continued until about a meter from the top of the pile is left above ground. The pile joints protection plugs are then removed and locking parts are cleaned if necessary.

The upper pile is then lifted to a vertical position. The upper pile joint is also cleaned, and the protection plugs are removed from the locking parts. The upper pile is aligned with the bottom pile. The top pile can be driven lightly before locking pins are installed.

Drive the locking pins with a sledgehammer until they are flush with the surface of the pile. Be careful not to damage the pile when hammering locking pins. Alternatively, locking pins can be pressed with a pressing tool manufactured by Emeca.

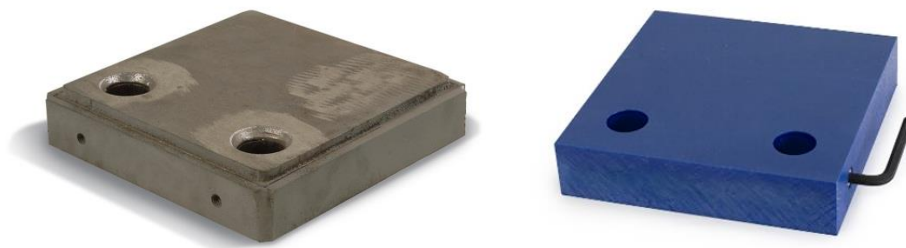


Picture 11. Driving plate must be used when driving jointed pile

## 5.1 DRIVING PLATES

It is necessary to use Emeca driving plates when driving a jointed pile. Driving plates are available in two different models. Driving plate made of nylon is light but cannot withstand a large number of impact blows. Alsi-driving plate is heavier but can withstand more impacts and greater loads.

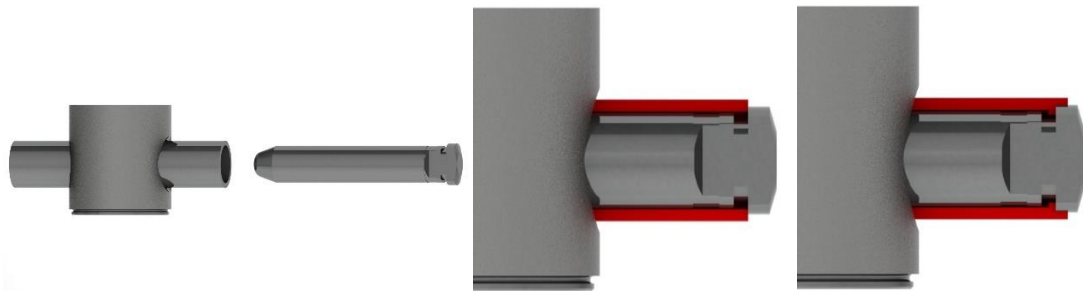
Nylon is a good choice when the lower piles and mid-section piles can be driven to the ground easily, and greater impact loads occur only during the final strikes. When piling in friction soil, the lower and mid-section piles are also exposed to larger impact forces. With friction piles, Alsi-plate is your choice as it can withstand the heat up and constant larger impact loads better than the nylon plate.



*Picture 12. Alsi and Nylon driving plates*

## 5.2 EMECA SLS-LOCKING PIN

The Emeca SLS locking pin is equipped with a fixed locking mechanism. Once the locking pin is driven flush with the surface of the pile, it locks automatically and can no longer come out of the pile under any circumstances. The locking mechanism does not contain any loose parts, so when using the Emeca SLS pin, you can always be 100% sure of the locking.



Picture 13. Locking mechanism of Emeca SLS-pin

## 5.3 EMECA X-PRESS LOCKING PIN PRESS

Emeca has developed a tool that is used to press locking pins to the pile joint. When using Emeca X-Press, you can forget the traditional hammering of locking pins which always has a risk of damaging the pile and the possibility for accidents. The X-Press is connected to the boom of the piling rig with a wire and it is powered by the hydraulic system of the piling rig.

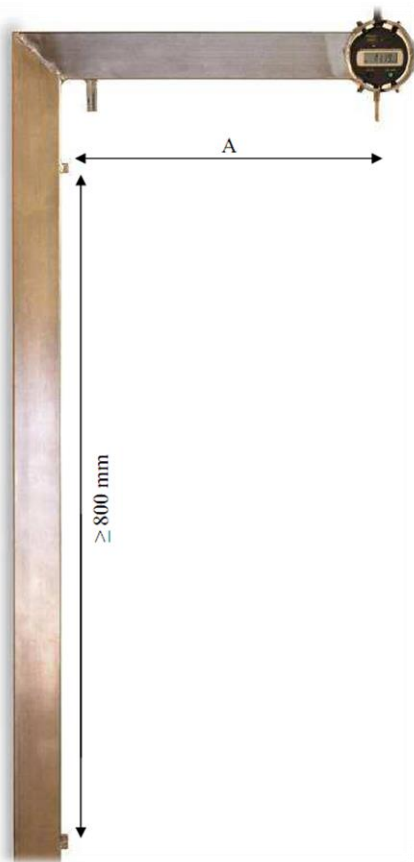


Picture 14. Emeca X-Press

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## 5.4 MEASURING PERPENDICULARITY OF THE PILE TOP AND THE PILE JOINT

Perpendicularity of the pile joint against the pile axis is important for the durability and functioning of the pile and pile joints. Measuring the perpendicularity of a jointed pile top is described in the Annex E of the standard EN 12794:2005+A1:2007.



Picture 15. Angular measuring device

Table 1. Size chart for different piles

Pile	A	Length
235x235	225 mm	≥800 mm
270x270		
250x250	240 mm	≥800 mm
300x300		
350x350	340 mm	≥800 mm
400x400		



Picture 16. Dial indicator of the measuring device