



## EUROPEAN ASSESSMENT DOCUMENT

EAD 200043-01-0103

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# PILE PIPES MADE OF DUCTILE IRON

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This European Assessment Document (EAD) has been developed taking into account up-to-date technical and scientific knowledge at the time of issue and is published in accordance with the relevant provisions of Regulation (EU) No 305/2011 as a basis for the preparation and issuing of European Technical Assessments (ETA).

## Contents

<b>1</b>	<b>Scope of the EAD</b> .....	<b>4</b>
1.1	Description of the construction product	4
1.2	Information on the intended use(s) of the construction product	4
1.2.1	Intended use(s).....	4
1.2.2	Working life/Durability.....	4
<b>2</b>	<b>Essential characteristics and relevant assessment methods and criteria</b> .....	<b>6</b>
2.1	Essential characteristics of the product	6
2.2	Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product	6
2.2.1	Internal load bearing capacity .....	6
2.2.2	Resistance to corrosion .....	7
2.2.3	Reaction to fire .....	7
<b>3</b>	<b>Assessment and verification of constancy of performance</b> .....	<b>8</b>
3.1	System(s) of assessment and verification of constancy of performance to be applied	8
3.2	Tasks of the manufacturer	8
3.3	Tasks of the notified body	9
<b>4</b>	<b>Reference documents</b> .....	<b>10</b>

# 1 SCOPE OF THE EAD

## 1.1 Description of the construction product

Pile pipes are ductile iron tubular pipes (spheroidal graphite cast iron) with spigot ends and with or without conical pile sockets, which are joined together to a flexible choice of pile length. The pile socket and the spigot end form those parts of the pipe which ensure a proper and easily connection of pipes for pile units. When driven they form a rigid connection with resistance to compressive forces.

Pile pipes are manufactured in standard lengths, external diameters and wall thickness to be defined in the European Technical Assessment.

Amendment of EAD 200043-00-0103 is due to additional types of pile pipes to be included, a re-arrangement of the structure of the EAD and related assessment methods, whereas references to related Eurocodes have been introduced, where relevant.

Pile pipes are a component of completed piles.

The product is not covered by a harmonised European standard (hEN). Products according to this EAD are not fully covered by EAD 200043-00-0103 due to limitation of standard length and types of pipes with different geometry in EAD 200043-00-0103. In addition, references to relevant Eurocodes have been introduced in this EAD where relevant. In comparison to the EAD 200043-00-0103, in this EAD the following clauses have been changed: 1.1 (to apply the EAD for a more general approach; consequently Annex B has been deleted), 1.2, 2.2.1, 2.2.2, 2.2.3, 3.2 and 3.3. Clause 3.4 has been deleted as Clause 3.4.1 is already covered by Clause 2.2.1 and Clause 3.4.2 has been included in Table 2 in Clause 3.2. Consequently, Annex A has been deleted.

Concerning product packaging, transport, storage, maintenance, replacement and repair it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport, storage, maintenance, replacement and repair of the product as he considers necessary.

It is assumed that the product will be installed according to the manufacturer's instructions or (in absence of such instructions) according to the usual practice of the building professionals.

Relevant manufacturer's stipulations having influence on the performance of the product covered by this European Assessment Document shall be considered for the determination of the performance and detailed in the ETA.

## 1.2 Information on the intended use(s) of the construction product

### 1.2.1 Intended use(s)

Pile pipes are used for foundation of buildings, for foundation of civil engineering works, etc. Pile pipes are predominantly used in order to carry axial forces.

Due to the resilient properties of ductile iron, the product may be used down to temperatures -20°C.

Pile pipes are used in soils with or without groundwater as defined in EN 1993-5, Clause 4.4.

### 1.2.2 Working life/Durability

The assessment methods included or referred to in this EAD have been written based on the manufacturer's request to take into account a working life of the pile pipes made of ductile iron for the intended use to be stated in the European Technical Assessment in terms of years depending on the corrosion resistance assessed according to EN 1993-5 and defined in Clause 2.2.2 in this EAD, when installed in the works. These provisions are based upon the current state of the art and the available knowledge and experience.

When assessing the product the intended use as foreseen by the manufacturer shall be taken into account. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works<sup>1</sup>.

The indications given as to the working life of the construction product cannot be interpreted as a guarantee neither given by the product manufacturer or his representative nor by EOTA when drafting this EAD nor by the Technical Assessment Body issuing an ETA based on this EAD, but are regarded only as a means for expressing the expected economically reasonable working life of the product.

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<sup>1</sup> The real working life of a product incorporated in a specific works depends on the environmental conditions to which that works is subject, as well as on the particular conditions of the design, execution, use and maintenance of that works. Therefore, it cannot be excluded that in certain cases the real working life of the product may also be shorter than referred to above.

## 2 ESSENTIAL CHARACTERISTICS AND RELEVANT ASSESSMENT METHODS AND CRITERIA

### 2.1 Essential characteristics of the product

Table 1 shows how the performance of pile pipes made of ductile iron is assessed in relation to the essential characteristics.

**Table 1 Essential characteristics of the product and methods and criteria for assessing the performance of the product in relation to those essential characteristics**

No	Essential characteristic	Assessment method	Type of expression of product performance
<b>Basic Works Requirement 1: Mechanical resistance and stability</b>			
1	Internal load bearing capacity	clause 2.2.1	level
2	Resistance to corrosion	clause 2.2.2	level
<b>Basic Works Requirement 2: Safety in case of fire</b>			
3	Reaction to fire	clause 2.2.3	class

### 2.2 Methods and criteria for assessing the performance of the product in relation to essential characteristics of the product

#### 2.2.1 Internal load bearing capacity

Pile pipes made of ductile iron shall have adequate resistance and safety against structural collapse and damage disproportionate to the original cause. The internal load bearing capacity is expressed by means of the maximum permissible axial load bearing capacity of the pile pipe.

The maximum permissible axial load bearing capacity of the pile pipe shall be calculated in equivalence to EN 1993-1-1, EN 1994-1-1 and EN 1993-5 and shall be stated for each type and for each wall thickness in the ETA, based on the following material properties:

- Tensile Strength
- Breaking elongation
- Brinell hardness
- Yield strength  $R_p 0,2 \%$
- Charpy notch energy (V-notch) at a temperature of  $-20^\circ\text{C}$
- Chemical composition

Whereas the material properties tensile strength, breaking elongation, Brinell hardness and yield strength  $R_p 0,2 \%$  of ductile iron shall be assessed according to EN 545. The Charpy notch energy (V-notch) at a temperature of  $-20^\circ\text{C}$  shall be tested according to EN ISO 148-1. The chemical composition shall be determined by Optical Emission Spectroscopy.

The safety coefficient values used for the assessment shall be stated in the ETA.

### **2.2.2 Resistance to corrosion**

Reduced internal load bearing capacity in consideration of thickness losses due to corrosion shall be calculated for each type and for each wall thickness in equivalence to EN 1993-5, Clause 4.4.

### **2.2.3 Reaction to fire**

The pile pipes made of ductile iron are considered to satisfy the requirements for performance class A1 of the characteristic reaction to fire in accordance with the EC Decision 96/603/EC (as amended) and Commission Delegated Regulation (EU) No 2016/364 without the need for testing on the basis of it fulfilling the conditions set out in that Decision and its intended use being covered by that Decision.

### 3 ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE

#### 3.1 System(s) of assessment and verification of constancy of performance to be applied

For the products covered by this EAD the applicable European legal act is: Decision 98/214/EC

The system is: 2+

#### 3.2 Tasks of the manufacturer

The cornerstones of the actions to be undertaken by the manufacturer of the product in the procedure of assessment and verification of constancy of performance are laid down in Table 2.

**Table 2 Control plan for the manufacturer; cornerstones**

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
<b>Factory production control (FPC)</b> [including testing of samples taken at the factory in accordance with a prescribed test plan]					
1	Determination of material properties	Clause 2.2.1 in this EAD	Compliance to material properties as defined in the control plan	According to the prescribed control plan	
2	Check of dimensions (as far as relevant for the type of product) <ul style="list-style-type: none"> <li>- External/internal diameter</li> <li>- socket and spigot end</li> <li>- wall thickness</li> <li>- pile pipe length</li> <li>- straightness</li> <li>- Dimensions of sockets/spigot ends/pile pipe shaft</li> <li>- Internal diameter</li> <li>- Conus and its length</li> </ul>	EN 545	Compliance to dimensions as defined in the control plan	According to the prescribed control plan	



### 3.3 Tasks of the notified body

The cornerstones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for pile pipes made of ductile iron are laid down in Table 3.

**Table 3 Control plan for the notified body; cornerstones**

No	Subject/type of control	Test or control method	Criteria, if any	Minimum number of samples	Minimum frequency of control
<b>Initial inspection of the manufacturing plant and of factory production control</b>					
1	The notified body shall ascertain that, in accordance with the control plan, the manufacturing plant, in particular personnel and equipment, and the factory production control are suitable to ensure a continuous and orderly manufacturing of the pile pipes with the specifications given in quality control agreement.				
<b>Continuous surveillance, assessment and evaluation of factory production control</b>					
2	The notified body shall visit the factory at least once a year for routine inspections. It shall verify that the system of factory quality control and the specified manufacturing processes are maintained, taking into account the prescribed control plan.				

## 4 REFERENCE DOCUMENTS

As far as no edition date is given in the list of standards thereafter, the standard in its current version at the time of issuing the European Technical Assessment, is of relevance.

EN 545	Ductile iron pipes, fittings, accessories and their joints for water pipelines - Requirements and test methods
EN 1993-1-1	Eurocode 3: Design of steel structures — Part 1-1: General rules and rules for buildings
EN 1993-5	Eurocode 3 — Design of steel structures — Part 5: Piling
EN 1994-1-1	Eurocode 4: Design of composite steel and concrete structures — Part 1-1: General rules and rules for buildings
EN ISO 148-1	Metallic materials - Charpy pendulum impact test - Part 1: Test method