



EUROPEAN ASSESSMENT DOCUMENT

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ELEVATOR LIFTING DEVICE

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1 SCOPE OF THE EAD

1.1 Description of the construction product

The EAD covers the assessment of pre-installed elevator lifting device embedded in normal weight concrete according to EN 206-1 and anchored by bonding and mechanical interlock.

The product consists of a threaded steel rod, a chain link made of steel and a plastic housing. The threaded rod is bent about 20° at the middle.

Alternatively the product consists of an internal threaded socket or threaded rod, a plastic housing and a wire loop respectively a ring eye bold with chain link. The interlock in the concrete may be activated by a hexagonal bolt or nut and a washer.

The products are assembled as shown in Annex A. The plastic housing is equipped with a plastic cover that is removed when the product is embedded and the chain link respectively the wire loop is going to be used. The plastic housing is intended to facilitate proper embedment in the concrete and is not meant to carry any load.

The product is not covered by a harmonised European standard (hEN).

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 of the construction product

1.2.1 Intended use

The product is intended to be cast into the roof of an elevator shaft, to transfer the load from the elevator car to the concrete slab during the elevator installation, see Figure 2 of Annex A. It can be used for precast and cast in situ slabs. Typically, three elevator lifting devices are embedded in each slab.

The elevator lifting device is placed into a slab made of compacted reinforced or unreinforced normal weight concrete without fibres with strength classes in the range C20/25 to C50/60 all in accordance with EN 206.

A wire, or similar, can be attached to the chain link when the product is fully cast in and the plastic cover has been removed, see Figure 3 of Annex A.

One lifting device takes the full load of the elevator car. The lifting device is intended for mainly tensile loads where only small angular deviations are allowed. The lifting device is intended to carry mainly static or quasi-static loads.

This EAD covers elevator lifting devices with steel components:

- made of galvanized steel subjected to dry internal environment (category C1 acc. to EN ISO 12944-2, table 1) only
- made of stainless steel subjected to environmental conditions acc. to EN 1993-1-4, table A.1 dependent on the corrosion resistant class (CRC - depending on the material number, see EN 1993-1-4, table A.3)

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 elevator lifting device for the intended use of 50 years 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 works¹.

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.

1.3 Specific terms used in this EAD

The specific terms used in this EAD are given in Annex A.

¹ 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 the elevator lifting device is assessed in relation to the essential characteristics.

Table 2.1 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
Basic Works Requirement 2: Safety in case of fire			
1	Reaction to fire	2.2.1	class
Basic Works Requirement 4: Safety and accessibility in use			
2	Load bearing capacity	2.2.2	F_{RK} [kN]
3	Minimum edge distances and spacing	2.2.2	c_{min} , s_{min} , h_{min} [mm]

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

2.2.1 Reaction to fire

The elevator lifting device shall be tested, using the test method(s) relevant for the corresponding reaction to fire class, in order to be classified according to EN 13501-1.

The metallic parts 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) 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.

2.2.2 Load bearing capacity

The load bearing capacity F_{RK} of the elevator lifting device shall be determined by testing by Annex B. The load bearing capacity F_{RK} is defined as the ultimate failure load of the system (concrete failure or steel failure).

The tests shall be performed in concrete of strength class specified by the manufacturer, at minimum C20/25 and at most C50/60 according to EN 206. Install a single elevator lifting device at minimum edge distance c_{min} in a test member with a minimum thickness h_{min} . The minimum edge distance c_{min} and the minimum thickness of member h_{min} are specified by the manufacturer. The minimum spacing s_{min} stated in the ETA is: $s_{min} = 2 c_{min}$

The evaluation of the test result should follow the procedures given in EN 1990, Annex D. The characteristic capacity is defined as the 5 %-fractile of the ultimate loads measured in a test series at a confidence level of 75 %. In general, a normal distribution and an unknown standard deviation of the population should be assumed.

The relevant information on base material used in tests (concrete strength class, reinforcement) is given in the ETA.

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 97/161/EC.

The system(s) is (are): 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 3.1.

Table 3.1 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
Factory production control (FPC)					
1	Check of incoming materials	Inspection certificate "type 3.1" according to EN 10204	Laid down in control plan	1	Each material batch
2	Check of coating	Measurement of coating thickness		3	Each manufacturing batch
3	Check of dimensions of components	Check of dimensions		3	
4	Check of strength of components	Tensile testing		3	

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 elevator lifting devices are laid down in Table 3.2.

Table 3.2 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
Initial inspection of the manufacturing plant and of factory production control					
1	Ascertain that the factory production control with the staff and equipment are suitable to ensure a continuous and orderly manufacturing of the elevator lifting device. In particular it shall be checked if all tasks given in Table 3.1.were performed.	Laid down in control plan	Laid down in control plan	Laid down in control plan	1
Continuous surveillance, assessment and evaluation of factory production control					
2	Verifying that the system of factory production control and the specified automated manufacturing process are maintained taking account of the control plan.	Laid down in control plan	Laid down in control plan	Laid down in control plan	1 / year

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 206	Concrete - Specification, performance, production and conformity
EN 1990	Eurocode - Basis of structural design
EN 1992-1-1	Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings
EN 10204	Metallic products - Types of inspection documents
EN 13501-1	Fire classification of construction products and building elements - Part 1: classification using data from reaction to fire tests
EN 1993-1-4	Eurocode 3 – Design of steel structures – Part 1-4: General rules – Supplementary rules for stainless steels
EOTA Technical Report TR 048	Details of tests for post-installed fasteners in concrete

ANNEX A DESCRIPTION OF THE PRODUCT

Example 1:

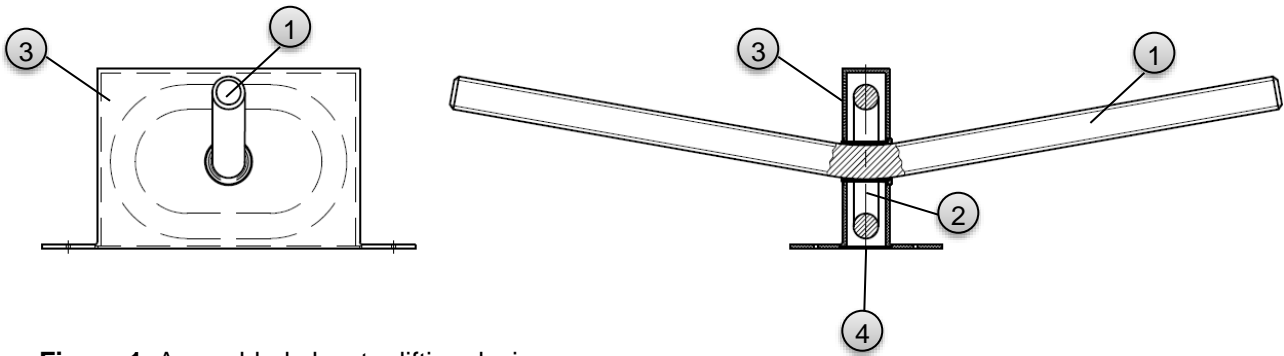


Figure 1. Assembled elevator lifting device.

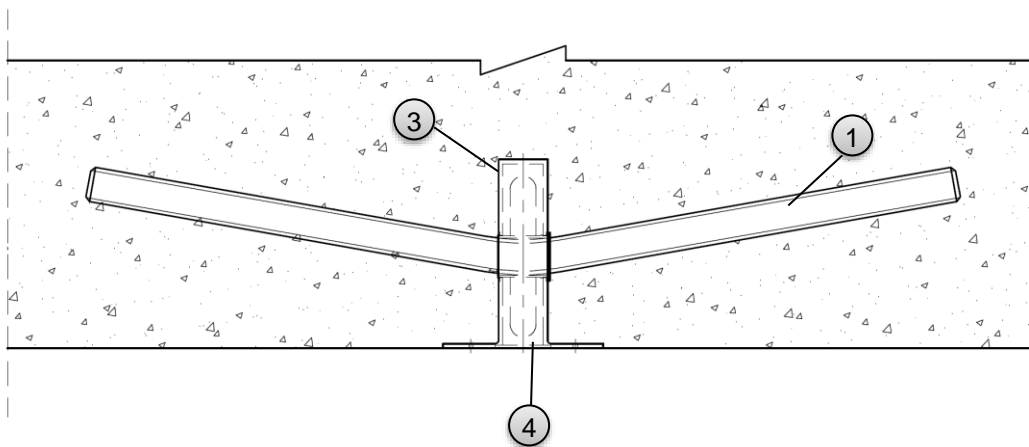


Figure 2. Fully cast in elevator lifting device.

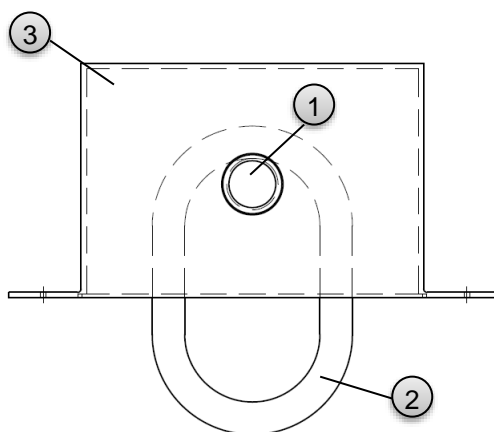


Figure 3. Precipitated chain link.

Legend:

- 1. Threaded steel rod
- 2. Chain link
- 3. Plastic housing
- 4. Plastic cover

Example 2 (different types):

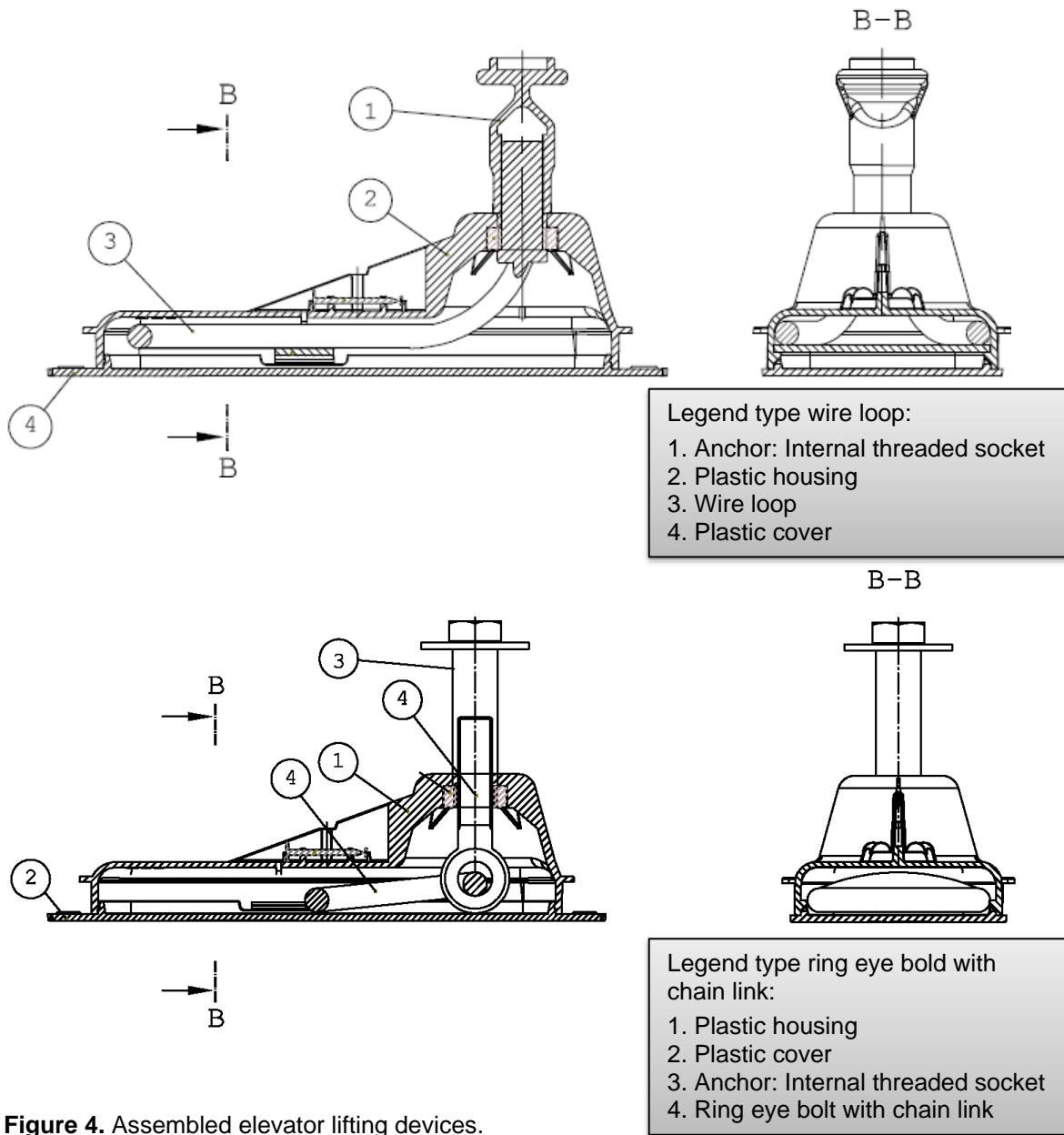


Figure 4. Assembled elevator lifting devices.

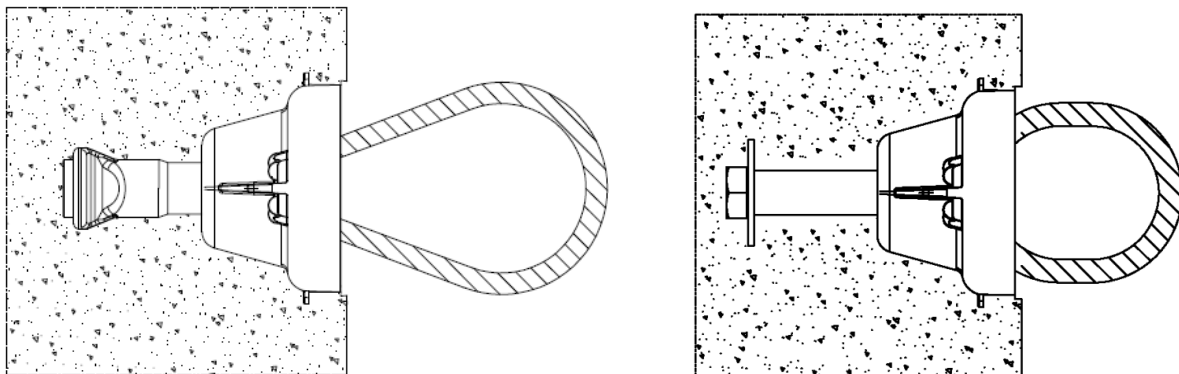


Figure 5. Fully cast in elevator lifting devices.

ANNEX B METHOD FOR TESTING OF ELEVATOR LIFTING DEVICE

Test specimen

The size of the surrounding concrete for the manufactured test specimens shall be adjusted so that the failure of the actual elevator lifting device can occur without being affected by the test rig. This can be considered satisfied if the length and width measurements are at least as large as the actual elevator lifting device plus 4 times the concrete thickness in each direction.

The thickness of the concrete member shall be the minimum allowable thickness h_{\min} specified by the manufacturer. In cases where reinforcement is specified around the elevator lifting device, this should also be included in the manufactured test specimen. The selected concrete quality in the casting of the test object shall be the lowest recommended quality and optimized so that the strength is as close as possible to the characteristic value of the concrete strength class.

Testing shall be performed on at least three specimens.

At the same time as the test specimens are cast, three additional cubes shall be cast and be stored under the same conditions as the test specimens.

Testing

The testing should normally be performed about 28 days after production.

During the testing, any connection between the test rig and the specimen shall be placed outside of the area where potential failure can occur. The connections are preferably placed at a distance of at least 1 x the concrete thickness from the actual elevator lifting device for the product according to Example 1 respectively 4 times the effective embedment depth h_{ef} for the product according to Example 2.

The test specimen is loaded with a continuously increasing load so that the failure is achieved after about two minutes. The elevator lifting device's deformation is measured relative to the concrete surface. A test of the concrete's compressive strength at the time of testing shall also be performed.

An example for the test setup is shown in EOTA Technical Report TR 048, 3.1.3.

Results and Evaluation

The report presents the maximum achieved load as well as a graph of the force-deformation relationship. The report shall even include a description of the test object as well as the compressive strength of the concrete at the time of the test. If the tests resulted in a fracture of the concrete, the failure load shall be adjusted to take into account any overcapacity of the tested concrete compared with the nominal concrete:

$$F_{u,c} = F_{u,t} \cdot \left(\frac{f_c}{f_{c,t}} \right)^{0,5} \quad \text{with} \quad \frac{f_c}{f_{c,t}} \leq 1,0$$

$F_{u,c}$ = Failure load converted to nominal concrete strength

$F_{u,t}$ = Failure load observed in the tests

f_c = Concrete compressive strength of the concrete class

$f_{c,t}$ = Concrete compressive strength of the test member

The elevator lifting device's steel grade shall also be reported. Information for this item can be obtained either by reviewing an inspection certificate 3.1 according to EN 10204 from the manufacturer or by performing tensile testing of rods from the same batch as the tested item.