

EUROPEAN ASSESSMENT DOCUMENT

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WIRE RING CONNECTION PRODUCTS

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1 SCOPE OF THE EAD

1.1 Description of the construction product

The wire ring connection products are ring (or similar shape) products made of steel wire with non-ferrous metallic coating or of stainless steel (for some example, see Figure 1) used to connect the woven and/or welded wire meshes, gabion panels or gabions together.

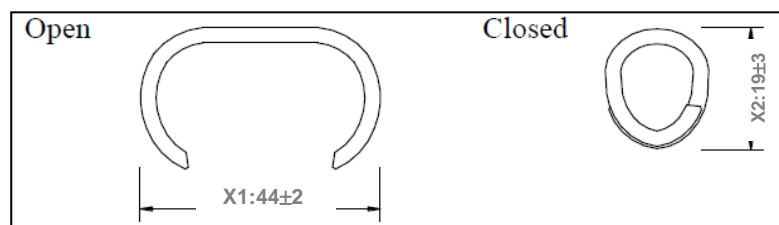


Figure 1 – Example of wire ring connection product

The connections with ring connection products are executed by hand or by pneumatic stapler. The units to be connected are put tightly together so that the edge wires are in contact with the edge wires of both adjacent walls. For example, see Figure 2 (connection of hexagonal double twisted wire mesh panels with wire ring connection products).

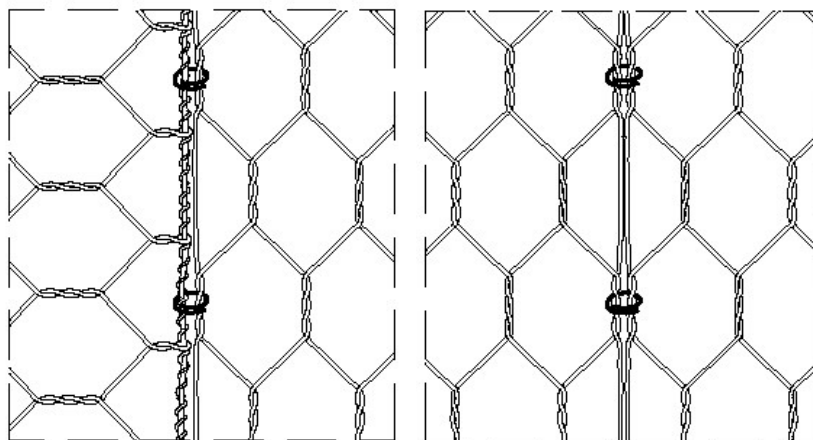


Figure 2 – Connection using wire ring connection product

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. These instructions shall contain recommendation for design about appropriate use and assessment of product regarding aggressiveness of environment in which the work is to be executed.

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)

The wire ring connection products are used to connect the gabion products (woven or welded) and wire mesh products.

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 wire ring connection products for the intended use of 25 years when installed in the works provided that the wire ring connection product is subject to appropriate installation. 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

No specific terms are needed.

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 wire ring connection products 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 (level, class, description)
Basic Works Requirement 1: Mechanical resistance and stability			
1	Dimensions and ranges	2.2.1	(mm)
2	Characteristic resistance to opening and partial safety factor	2.2.2	F_k (kN) γ_V
3	Durability: Non-ferrous metallic coating type and mass Steel grade for stainless steel wire	2.2.3	description

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

2.2.1 Dimensions and ranges (in mm)

The product typical dimensions (for informative values see Figure 1) according to the manufacturer's technical file shall be measured at least on three samples for each type of product.

The average values and range of measurements of typical dimensions shall be given in ETA.

2.2.2 Characteristic resistance to opening F_k (in kN)

The characteristic 5%-fractile of resistance to opening given in the ETA shall be measured in a test series and calculated according to D.7.2, EN 1990 for normal distribution and known coefficient of variation and value of k_n depending on the number of test series. The characteristic value F_k (in kN) at least from five results ($F_{\text{test},i}$) shall be calculated when tested according Annex A.

The partial safety factor of connection product $\gamma_V = F_d / F_k$ shall be calculated for consequences class CC2 (Table B.1 in EN 1990), reliability class RC2 ($\beta = 3,8$, Table B.2 in EN 1990), when the design resistance F_d is calculated according to Table D.2 in EN 1990 using $k_{d,n}$ for known coefficient of variation.

Note - For design value of conversion factor $\eta_d = 1,0$ can be applied, because no influence of volume, temperature, humidity, etc. is relevant.

The characteristic resistance and partial safety factor shall be given in ETA.

2.2.3 Durability

The type and mass of non-ferrous metallic coating (informative types are: Zn, Zn/95/Al5, Zn90/Al10) according to EN 10244-2 shall be given in ETA.

If wire made from stainless steel is used, the stainless steel grade according to the relevant standard shall be 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 [1998/214/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	
Factory production control (FPC)						
Manufacturer`s production						
1	Product: Dimensions and tolerances	2.2.1	Manufacturer`s technical file	1 sample / type	1 / day	
	Resistance to opening	2.2.4	For all test results (characteristic values $\bar{F}_{k,FPC}$ calculated from FPC tests) from the whole period of surveillance the following requirement shall be met: $F_k \leq \bar{F}_{k,FPC}$	5 samples / type	1 / year	
Factory production control (FPC)						
Incoming product						
2	Wire chemical composition: For each product	Manufacturer`s technical file	Manufacturer`s technical file	Inspection certificate of supplier, type 3.1 EN 10204	Every shipment	
3	Metallic coated wire: Outer diameter	cl. 4.1 in EN 10218-2		Manufacturer`s technical file	Inspection certificate of supplier, type 3.1 EN 10204 In addition 1 / each diameter	Every shipment
	Adhesion	cl. 6 in EN 10218-1 and manufacturer`s technical file				
	Visual	Manufacturer`s technical file				
	Coating mass	Manufacturer`s technical file				
4	Wire mechanical characteristics: Tensile strength	cl. 3 in EN 10218-1		Inspection certificate of supplier, type 3.1 EN 10204 In addition 1 / each diameter	Every shipment Every shipment	

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 wire ring connection products are laid down in Table 3.

Table 3 – Control plan for the notified body; cornerstones

No	Subject/type of control <i>(product, raw/constituent material, component -indicating characteristic concerned)</i>	Test or control method <i>(refer to 2.2)</i>	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 wire ring connection products.	-	Laid down in control plan	-	1
Continuing 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	-	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 1990: 2002+A1+AC Eurocode 0: Basis of Structural Design

EN 10204	Metallic products. Types of inspection documents
EN 10218-1	Steel wire and wire products. General. Part 1: Test methods
EN 10218-2	Steel wire and wire products. General. Part 2: Wire dimensions and tolerances
EN 10223-3	Steel wire and wire products for fencing and netting. Part 3: Hexagonal steel wire mesh products for civil engineering purposes
EN 10223-8	Steel wire and wire products for fencing and netting - Part 8: Welded mesh gabion products
EN 10244-1	Steel wire and wire products. Non-ferrous metallic coatings on steel wire. Part 1: General principles
EN 10244-2	Steel wire and wire products. Non-ferrous metallic coatings on steel wire. Part 2: Zinc or zinc alloy coatings
EN 10088-1	Stainless steels - Part 1: List of stainless steels
EN 10088-3	Stainless steels - Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes

ANNEX A – RESISTANCE TO OPENING OF WIRE RING CONNECTION PRODUCT, TEST METHOD

A.1 Scope

The aim of this test is to show the pull-apart resistance of C-ring (or similar) fastener used to assemble gabion units.

A.2 Test Specimen

The test specimen is the closed wire ring connection component itself.

A.3 Test equipment

The traction machine shall be in accordance with the requirements of EN ISO 7500-1 and shall be at least of Class 1. The testing apparatus shall be able to memorize or record the maximum force resulting opening staples.

A.4 Test Conditions

A.4.1 Method of sample fixing

The specimen shall be maintained by suitable means such as yokes, shackles or other mounting for the tensile test. The equipment shall keep the test sample so that the load is applied along the longitudinal axis of the wire ring connection sample through the closure.

A.4.2 Test procedure

Speed of application of the load is 5 mm/min with an uncertainty of less than 5 %, until the complete opening of the tested connection sample.

A.4.3 Number of samples

For determination of the characteristic resistance to opening at least 5 samples for each type of wire ring connection products shall be tested.

A.4.4 Determination of the resistance to opening

The opening load (resistance to opening) is considered to be a maximum load achieved during the test i.e. the force corresponding to the maximum recorded and stored value by the testing apparatus fitted to the testing machine value or the maximum value on force – opening diagram recorded.

A.5 Test report

The test report shall include at least the following information:

- Name of the laboratory and the name of the operator who performed the tests;
- The characteristics of the testing machine and its calibration certificate;
- Identification of the tested connection component (supplier and material nature of the surface treatment, dimensions, etc.);
- The date of test and results (minimum number of opening loads $F_{test,i}$ ($i = 1$ to 5), average value (m_x) and standard deviation (s_x) of the results with appropriate, observations to justify the results, force – opening diagram – if relevant).