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Member of



## European Technical Assessment

**ETA 16/0290  
of 26/06/2018**

(English language translation, the original version in Czech language)

### I General Part

**Technical Assessment Body  
issuing the ETA and designated  
according to Article 29 of the  
Regulation (EU) No 305/2011:**

Technical and Test Institute for Construction Prague

**Trade name of the construction  
product  
Product family to which the  
construction product belongs**

Betafence Weldmesh® Gabions

Product area code: 20 Structural Metallic Products and Ancillaries

**Manufacturer**

**Betafence Belgium NV**  
Blokkestraat 34B  
8550 Zwevegem  
Belgium  
[www.betafence.com](http://www.betafence.com)

**Manufacturing plant(s)**

**Betafence Deutschland GmbH**  
Dülkener Str. 200  
41366 Schwalmatal  
Germany

**Betafence Sp. z o.o.**  
Ul. Debowa 4  
47-246 Kotlarnia  
Poland

**Betafence Italia S.p.A.**  
Contrada Salinello 59  
64018 Tortoreto  
Italy

**Betafence Ltd.**  
Shepcote Lane  
S91TY Sheffield  
United Kingdom

**This European Technical  
Assessment contains**

14 pages including 3 Annexes which form an integral part of this assessment.

Annex C contains confidential information and is/are not included in the European Technical Assessment when that assessment is publicly disseminated

**This European Technical  
Assessment is issued in  
accordance with regulation (EU)  
No 305/2011, on the basis of**

European Assessment Document  
EAD 200020-00-0102 Weldmesh gabion boxes and mattresses

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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## *II Specific part*

### **1. Technical description of the product**

#### **1.1 Definition of products**

The subject of this European Technical Assessment (ETA) are gabion products made of welded wire mesh. Gabions are filled on site with coarse armourstone, however filling the gabion is outside the scope of this ETA. Only the characteristics of the wires and meshes are subject of this document.

This ETA covers the following gabion products:

- Welded gabions and gabion mattresses produced from metallic-coated welded wire fabric and organic coating, and metallic-coated wire for spiral binders, stiffeners, lacing wire, locking pins and rings. Spiral binders, stiffeners, joining pins and rings can be made from stainless steel wire.

The metallic-coated wire, used for welded gabions mesh, spiral binders, stiffeners, lacing wire, locking pins and rings are normally coated before fabrication and has a layer that consists of zinc-aluminium alloy. This alloy can be in three qualitative levels- Zincalu<sup>®</sup> (Zn95/Al5), Zincalu<sup>®</sup> Ultra (Zn95/Al5) and Zincalu<sup>®</sup> 10 (Zn90/Al10). The metallic-coated mesh may be polyvinylchloride (PVC) coated after fabrication. The C-rings are made of stainless steel wire. The spiral binders, stiffeners and joining pins may be from stainless steel wire as well.

Gabion is wire fabric container, uniformly partitioned (gabion with or without diaphragms, multiple cell gabion), of variable size, interconnected with other similar containers. Gabion mattress is a type of gabion with relatively small height in relation to the lateral dimensions. Stiffener is a steel wire used for support by forming a diagonal brace across the corners or a front-to-back brace, inside of the gabion container. Lacing wire, rings, joining pins and spiral binders are used to assemble and interconnected empty gabion units, and to close and secure stone-filled units.

The standard dimensions of boxes, mesh sizes and wire diameters are given in Annexes A and B.

### **2. Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)**

#### **2.1 Intended use**

Weldmesh gabion boxes and mattresses are intended to be used for: earth retention, river training, erosion control, fascia systems, architectural claddings, free-standing walls, sound barriers and noise mitigation works.

The assumed working life of the weldmesh gabion boxes and mattresses for the intended use is in accordance with EN 10223-8, Annex A, in relation to different wire coating and corrosive categories of environment when installed in the works.

The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works <sup>1</sup>.

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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.

## **2.2 Manufacturing**

The European Technical Assessment is issued for the Betafence Weldmesh® Gabions on the basis of agreed data/information, deposited with the Technical and Test Institute for Construction Prague, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, shall be notified to the Technical and Test Institute for Construction Prague before the changes are introduced. The Technical and Test Institute for Construction Prague will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

## **2.3 Design and installation**

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.

## **2.4 Packaging, transport and storage**

The information on packaging, transport and storage is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer(s) to ensure that this information is made known to the concerned people.

## **2.5 Use, maintenance and repair**

The maintenance of Betafence Weldmesh® Gabions includes inspections on site, taking into account the following aspects:

- Regarding metallic components: Presence of corrosion or water accumulation
- Necessary repairs should be done rapidly, using the same components and following the repair instructions given by ETA holder

The information on use, maintenance and repair is given in the manufacturer's technical documentation. It is the responsibility of the manufacturer(s) to ensure that this information is made known to the concerned people.

### 3. Performance of the product and references to the methods used for its assessment

The performances of the Betafence Weldmesh® Gabions are summarized in Table 1.

Table 3.1: Performance of the product

BWR	Essential characteristic	Reference to the methods used for assessment	Performance		
1	Wire diameter	EAD 200020-00-0102, Cl. 2.2.1	$D_w$ [mm] Table 3.2		
	Wire tensile strength	EAD 200020-00-0102, Cl. 2.2.2	$f_t =$ [N/mm <sup>2</sup> ] Table 3.3		
	Mesh size	EAD 200020-00-0102, Cl. 2.2.3	$M \times N$ [mm] $H, L, W$ [mm] Specific dimensions [mm] Table 3.4		
	Dimensions of: - product - connection components				
	Corrosion protection: non-ferrous metallic coating: - Type - Class of coating mass - Mass of hot dip galvanized coating	EAD 200020-00-0102, Cl. 2.2.4	Zincalu® Zn95/Al5 Class A [g/m <sup>2</sup> ] Table 3.5	Zincalu® Ultra Zn95/Al5 Class A [g/m <sup>2</sup> ] Table 3.6	Zincalu® 10 Zn90/Al10 Class A [g/m <sup>2</sup> ] Table 3.7
	Additional corrosion protection: organic coating: - type - coating thickness and wire diameter - coating concentricity - coating integrity	EAD 200020-00-0102, Cl. 2.2.5	PVC > 0,2 mm Table 3.8 and 3.9 No Performance Assessed No Performance Assessed		
	Weld shear strength	EAD 200020-00-0102, Cl. 2.2.6	Description Table 3.10, 3.11, 3.12, 3.13		
	C-ring (or similar fastener) resistance to opening	EAD 200020-00-0102, Cl. 2.2.7	$F_m$ min. 2.0 kN Table 3.14, 3.15		
	Tensile strength of gabion/mattress including connection	EAD 200020-00-0102, Cl. 2.2.8	level [kN/m] Table 3.16		
	Durability in artificial atmospheres: - Neutral salt spray test  - Sulphur dioxide test with general condensation of moisture  - UV resistance of organic coating material	EAD 200020-00-0102, Cl. 2.2.9	Exposure time with surface $DBR \leq 5\%$ surface [hours] Table 3.17  No Performance Assessed  No Performance Assessed		
4	Protection against injury	EAD 200020-00-0102, Cl. 2.2.10	Table 3.18		
5	Airborne sound insulation	EAD 200020-00-0102, Cl. 2.2.11	No Performance Assessed		
	Sound absorption	EAD 200020-00-0102, Cl. 2.2.12	No Performance Assessed		

## Basic Works Requirement 1: Mechanical resistance and stability

Table 3.2: Wire diameter  $D_w$

Wire diameter $D_w$ [mm]							
Type of wire	Measured values					Average value	Tolerance T1 (EN 10218-2, Table 1)
Wire Ø 2,45 mm	2,43	2,44	2,46	2,45	2,44	<b>2,44</b>	2,45 ± 0,060
Wire Ø 2,70 mm	2,71	2,70	2,71	-	-	<b>2,71</b>	2,70 ± 0,060
Wire Ø 2,95 mm	2,93	2,95	2,92	2,95	2,92	<b>2,94</b>	2,95 ± 0,070
Wire Ø 3,00 mm	3,02	3,03	3,02	3,01	3,03	<b>3,02</b>	3,00 ± 0,070
Wire Ø 3,50 mm	3,47	3,52	3,48	3,50	3,49	<b>3,49</b>	3,50 ± 0,070
Wire Ø 3,96 mm	3,96	3,95	3,94	3,95	3,95	<b>3,95</b>	3,96 ± 0,070
Wire Ø 4,00 mm	4,00	3,99	4,00	4,00	3,99	<b>4,00</b>	4,00 ± 0,070
Wire Ø 4,50 mm	4,50	4,46	4,46	4,47	4,45	<b>4,46</b>	4,50 ± 0,080
Wire Ø 4,95 mm	4,95	4,96	4,93	4,93	4,95	<b>4,95</b>	4,95 ± 0,080
Wire Ø 5,00 mm	4,97	5,01	4,99	4,98	5,00	<b>4,99</b>	5,00 ± 0,080
Wire Ø 5,95 mm	5,95	5,98	6,00	5,97	5,99	<b>5,98</b>	5,95 ± 0,090

Table 3.3: Wire tensile strength  $f_t$

Wire tensile strength $f_t$ [N/mm <sup>2</sup> ]						
Type of wire	Measured values					Average value
Wire Ø 2,95 mm	638	636	657	638	659	<b>646</b>
Wire Ø 3,50 mm	664	631	630	629	596	<b>630</b>
Wire Ø 4,00 mm	653	644	637	637	600	<b>634</b>
Wire Ø 4,50 mm	614	596	611	632	634	<b>617</b>
Wire Ø 5,00 mm	680	644	665	657	652	<b>660</b>
Wire Ø 5,95 mm	586	609	598	618	610	<b>604</b>

Table 3.4: Product dimensions and mesh size

Type of mesh	Dimensions of mesh size $M \times N$ [mm]						Dimensions of products $H, L, W$ [mm]		
	Mesh size 100x100 mm		Mesh size 50x100 mm		Mesh size 76,2x76,2 mm (3"x3")		Mesh size 100x100 mm, panel 500x1000x500 mm		
Dimension	M	N	M	N	M	N	H	L	W
1	99,3	101,0	49,8	100,2	77,4	76,4	503	1004	503
2	100,4	99,3	49,8	99,7	76,5	75,2	504	1003	503
3	100,4	98,4	49,8	99,4	76,4	76,3	503	1003	503
Average value	100,0	99,6	49,8	99,7	76,8	76,0	503	1003	503

Table 3.5: Corrosion protection of non-ferrous metallic coating Zincalu®

Zincalu® coating mass [g/m <sup>2</sup> ]									
Type of wire	Class of coating mass (EN 10244-2, Table 2)	Coating mass [g/m <sup>2</sup> ] (EN 10244-2, Table 2)		Measured values					Average value
Wire Ø 4,5 mm	Class A	min. 280	192	438	253	426	415	<b>320</b>	
			214	381	301	261	360		
			213	236	309	432	300		
			206	238	507	256	465		

Table 3.6: Corrosion protection of non-ferrous metallic coating Zincalu® Ultra

Zincalu® Ultra coating mass [g/m <sup>2</sup> ]									
Type of wire	Class of coating mass (EN 10244-2, Table 2)	Coating mass [g/m <sup>2</sup> ]	Measured values					Average value	
Wire Ø 2,95 mm	Class A	min. 350	387	394	357	394	364	379	
Wire Ø 3,50 mm			375	391	409	389	404		394
Wire Ø 4,50 mm			408	418	406	427	420		
Wire Ø 5,95 mm			368	371	357	415	394		381

Table 3.7: Corrosion protection of non-ferrous metallic coating Zincalu® 10

Zincalu® 10 coating mass [g/m <sup>2</sup> ]								
Type of wire	Class of coating mass (EN 10244-2, Table 2)	Coating mass [g/m <sup>2</sup> ] (EN 10244-2, Table 2)	Measured values					Average value
Wire Ø 4,50 mm	Class A	min. 280	286	283	292	291	290	304
			291	281	350	335	330	
			318	281	296	309	358	
			288	284	297	315	-	

Table 3.8: Additional corrosion protection: PVC coating

PVC coating thickness [mm]								
Type of wire	Measured values of wire without PVC coating			Measured values of wire with PVC coating				
Wire Ø 2,7/3,2 mm	2,71	2,70	2,71	3,58	3,54	3,58	3,51	3,54
Average value	2,71			3,55				
Thickness of PVC coating	0,42							

Table 3.9: Tensile strength and nominal strain of PVC foil

PVC coating										
	Tensile strength [MPa]					Nominal strain [%]				
Longitudinal direction	22,1	22,5	21,9	22,3	22,2	109	105	102	98	114
Average value	22,2					106				
Transversal direction	18,6	17,8	20,2	20,1	17,3	141	145	184	170	125
Average value	18,8					153				

Table 3.10: Weld shear strength

Mesh size 100 x 100 mm, wire diameter 4,5 mm			
Test Number	Average value of maximal breaking force of wire F <sub>w</sub> [kN]	Measured values of maximal breaking force of sample with weld F <sub>s</sub> [kN]	F <sub>s</sub> / F <sub>w</sub> [%]
1	9,67	7,71	79,7
2		6,90	71,4
3		7,21	74,6
4		7,57	78,3
5		6,99	72,3
6		7,58	78,4
Average value		7,33	75,8

EN 10223-8, Cl. 7.5: The average shear strength of four welds selected randomly from one panel shall not be less than 75 % of breaking load of the wire (maximum force during tensile load) with no single shear strength of weld below 50%.

Table 3.11: Weld shear strength

Mesh size 50 x 100 mm, wire diameter 4,0 mm			
Test Number	Average value of maximal breaking force of wire $F_w$ [kN]	Measured values of maximal breaking force of sample with weld $F_s$ [kN]	$F_s/ F_w$ [%]
1	7,52	5,70	75,8
2		5,70	75,8
3		5,76	76,6
Average value		5,72	76,1
EN 10223-8, Cl. 7.5: The average shear strength of four welds selected randomly from one panel shall not be less than 75 % of breaking load of the wire (maximum force during tensile load) with no single shear strength of weld below 50%.			

Table 3.12: Weld shear strength

Mesh size 50 x 100 mm, wire diameter 3,5 mm			
Test Number	Average value of maximal breaking force of wire $F_w$ [kN]	Measured values of maximal breaking force of sample with weld $F_s$ [kN]	$F_s/ F_w$ [%]
1	6,05	4,60	76,0
2		4,60	76,0
3		4,60	76,0
Average value		4,60	76,0
EN 10223-8, Cl. 7.5: The average shear strength of four welds selected randomly from one panel shall not be less than 75 % of breaking load of the wire (maximum force during tensile load) with no single shear strength of weld below 50%.			

Table 3.13: Weld shear strength

Mesh size 76,2 x 76,2 mm, wire diameter 3,0 mm			
Test Number	Average value of maximal breaking force of wire $F_w$ [kN]	Measured values of maximal breaking force of sample with weld $F_s$ [kN]	$F_s/ F_w$ [%]
1	3,49	2,65	75,9
2		2,70	77,4
3		2,62	75,1
Average value		2,66	76,1
EN 10223-8, Cl. 7.5: The average shear strength of four welds selected randomly from one panel shall not be less than 75 % of breaking load of the wire (maximum force during tensile load) with no single shear strength of weld below 50%.			

Table 3.14: C-ring resistance to opening

C-ring resistance to opening [kN]								
	Measured values of resistance to opening							Average value
Ø 2,50 mm	Not Performance Assessed							
Ø 3,00 mm	2,03	2,16	1,97	1,98	1,80	2,06	2,06	2,01

Table 3.15: Dimensions of C-ring

C-ring diameter 3 mm, length 44 mm								
Type of wire	Measured values							Average value
Diameter	3,02	3,03	3,02	3,01	3,03	3,02	3,00	3,02
Length of open C-ring	44,4	44,4	44,4	44,3	44,4	44,3	44,3	44,4
Length of closed C-ring	19,5	19,4	19,4	19,4	19,3	19,4	19,3	19,4

Table 3.16: Tensile strength of gabion/mattress including connection components (spiral binder)

Mesh size 100x100 mm, wire diameter 4,5 mm, spiral binder 25/1016/100/4,5 mm	
Test Number	Tensile strength of gabions including connections [kN/m]
1	21,0
2	21,3
3	21,1
4	21,4
5	21,1

Mesh size 100x100 mm, wire diameter 4,5 mm, spiral binder 25/1016/100/4,5 mm	
Test Number	Tensile strength of gabions including connections [kN/m]
Average value	21,2
Characteristic value of tensile resistance [kN/m]	20,8 <sup>1)</sup>
<sup>1)</sup> Wire breaking near the weld.	

Table 3.17: Durability – Neutral salt spray test

Type of coating	Zincalu® (Zn95/Al5)
Wire diameter [mm]	4,5
Number of hours of exposure after which each mesh and connection component do not show more than 5 % of DBR	2000

#### Basic Works Requirement 4: Safety and accessibility in use

Table 3.18: Protection against injury

Mesh size 100x100 mm, wire diameter 4,5 mm
The gabion is without sharp edges of jut out wires, that could pose risk of injury caused.

#### 4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to the European Commission decision 1998/214/EC <sup>2</sup>, the AVCP system 2+ (further described in Annex V to Regulation (EU) No 305/2011 as amended) applies.

#### 5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

##### 5.1 Tasks and responsibilities of the manufacturer

At the manufacturing plant the manufacturer has implemented and continuously maintains a factory production control system. All elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. The factory production system ensures that the performances of Betafence Weldmesh® Gabions is in conformity with the European Technical Assessment. Technical details necessary for implementation of the AVCP system are laid down in the control plan deposited in TZÚS.

The manufacturer is responsible for preparing the declaration of performance. When all criteria of the assessment and verification of constancy of performances including certification are met, the manufacturer shall issue a declaration of performance.

##### 5.2 Tasks and responsibilities of the notified body

The corner stones of the actions to be undertaken by the notified body in the procedure of assessment and verification of constancy of performance for Betafence Weldmesh® Gabions are laid down in Table 5.1.

<sup>2</sup> Official Journal of the European Communities L 80 of 18 March 1998, p. 46.



Table 5.1: Control plan for notified body

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	Ascertain that, in accordance with the prescribed test plan, the factory, in particular personnel and equipment, and the factory production control, are suitable to ensure a continuously and orderly manufacturing the product with the specifications given in the specific parts as well as in the annexes of the European Technical Assessment.	--	Laid down in control plan	--	1
<b>Continuing surveillance, assessment and evaluation of factory production control</b>					
2	Verifying that the system of factory production control and the specified manufacturing process are maintained, taking account of the prescribed test plan.	--	Laid down in control plan	--	1/year

Issued in Prague on 26.06.2018



Head of the Technical Assessment Body

## **6. List of annexes of European Technical Assessment 16/0290**

Annex A: Types of welded wire meshes: mesh size and dimensions of box

Annex B: Types of connection components: dimensions of the connection components

Annex C: Quality control of components of gabion boxes and mattresses manufactured by suppliers or holder

Total Annexes: 3 pages

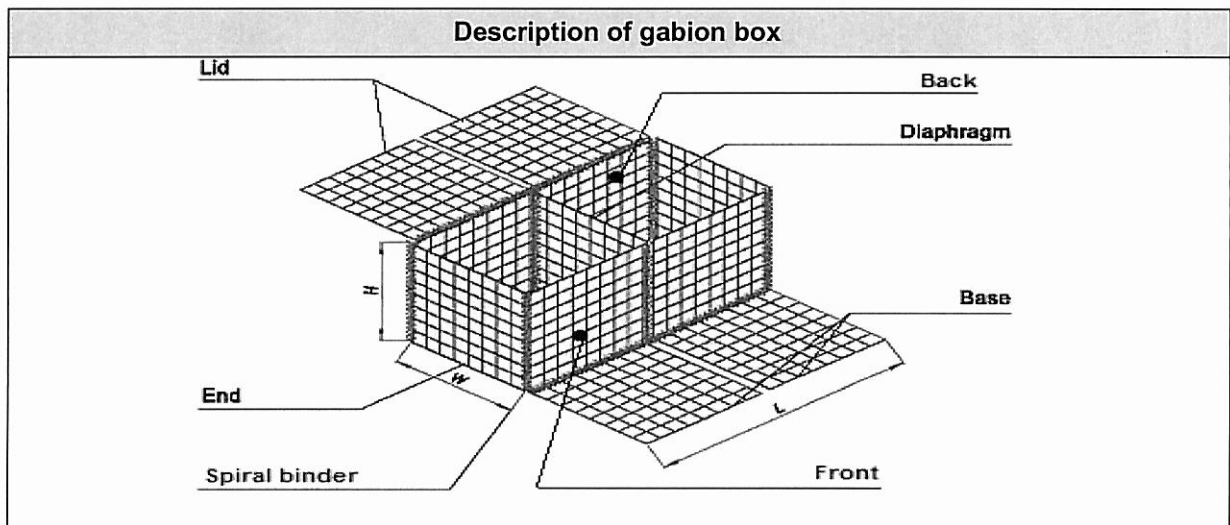
**Annex A of the ETA 16/0290**

**Types of welded wire meshes: mesh size and dimensions of box**

Nominal mesh sizes and nominal dimensions of the box according to specification of manufacturer

Type of mesh	Nominal mesh size [mm]		Nominal diameter [mm]	Nominal dimensions of the box [mm]		
	M	N		H	L	W
50 x 50 mm	50	50	2,70 3,00 3,50 3,96 4,00 4,50 4,95 5,00 5,95	300 500 1000	500 1000 1500 2000	500 750 1000
75 x 25 mm	75	25		300 500 1000	500 1000 1500 2000	500 750 1000
75 x 75 mm	75	75		300 500 1000	500 1000 1500 2000	500 750 1000
50 x 100 mm 100 x 50 mm	50 100	100 50		300 500 1000	500 1000 1500 2000	500 750 1000
100 x 100 mm	100	100		300 500 1000	500 1000 1500 2000	500 750 1000
3'' x 3''	3''	3''		300 500 1000	500 1000 1500 2000	500 750 1000
Tolerances	< 50: ± 2,0 mm (EN 10223-8, Cl. 7.3) ≥ 50 to < 200: ± 3,0 mm (EN 10223-8, Cl. 7.3)			± 35 mm (EN 10223-8, Cl. 7.2)		

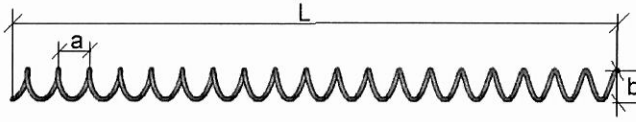
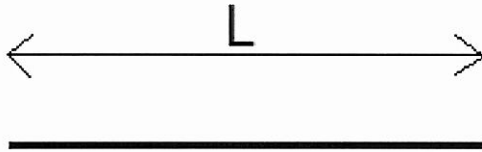
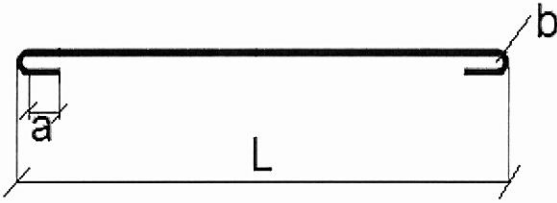
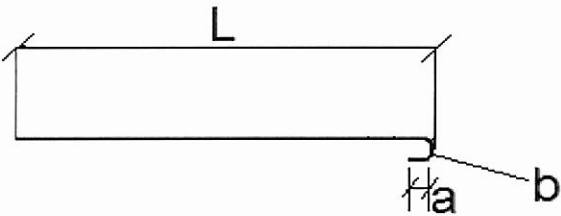
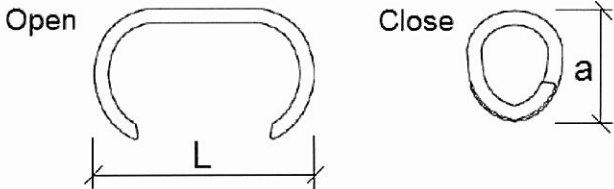
Other mesh sizes and dimensions of boxes are possible in accordance with project design requirements.



**Annex B of the ETA 16/0290**

**Types of connection components: dimensions of the connection components**

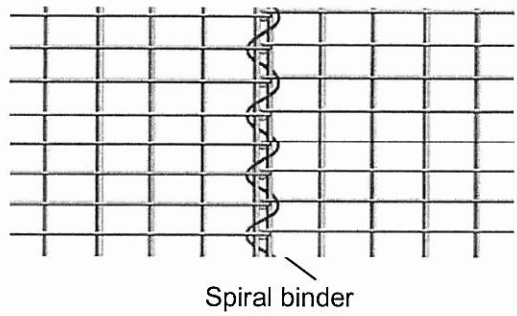
Nominal dimensions of connection components according to specification of manufacturer

Type of connecting component		Nominal dimensions [mm]			
		Ø	a	b	L
	Spiral binder (helicals)	2,95	25,4	Internal diameter	330.2
		3,00			482.6
		3,50			787.4
		4,00			1016
		4,50			
		4,95			
		5,00			
	Lacing wire	2,45	-	-	coil
	Bracing tie (stiffener)	2,95	30	R6	225
		3,00			250
		3,50			278
		4,00			325
		4,50			405
		4,95			458
		5,00			474
	500				
	750				
	1000				
	Joining pins	2,95	20	R13	450
		3,00			500
		4,00			750
					975
	1000				
	C - rings	2,50	19	-	44
		3,00			20

Tolerances according to Manufacturer's technical files

Other dimensions of connection components are possible in accordance with project design requirements.

Connection of welded grids



**Annex C of the ETA 16/0290**

**Quality control of components of gabion boxes and mattresses manufactured by suppliers or holder**

This confidential information is not included in the ETA when that assessment is publicly available.