NATURAL STONE BOX

GABBIONI
GABION
GABIONEN
GABIONS

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Evaluation Report of ETA 22/0732 of 16/03/2023

GENERAL PART

Product family to which the construction product belongs	**PAC 20: STRUCTURAL METALLIC PRODUCTS AND ANCILLARIES.** **Weldmesh gabion boxes and mattresses**
This Evaluation Report contains:	**10 pages**

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INTRODUCTION

This Evaluation Report describes the results of the tests that have been carried out to assess the characteristics and performances of the gabion boxes GABBIONI . The tests were performed in accordance with the CPR Basic requirements for construction works (BWR) and with the methods specified in EAD (European Assessment Document) No. 200020-00-0102, related to "Weldmesh gabion boxes and mattresses" (EAD hereinafter).

A. DESCRIPTION OF THE PRODUCT AND INTENDED USE

See Sections 1 and 2 and Annexes A1-A11 of the related ETA.

B. ASSESSMENT PROCEDURE

1.1 MECHANICAL RESISTANCE AND STABILITY (BWR1)

1.1.1 WIRE DIAMETER D_w

The diameters of the wires have been determined according to EAD 200020-00-0102 Section 2.2.1. The steel wires taken from side panels and tie rods of the GABBIONI have been measured according to clause 4.1 of EN 10218-2 [1].

Table 1: Wire diameter of GABBIONI

Measurement	Gabion 1	Gabion 2	Tie rod 1	Tie rod 2
	D_w [mm]	D_w [mm]	D_w [mm]	D_w [mm]
1	4.80	5.76	5.76	6.77
2	4.81	5.80	5.76	6.76
3	4.79	5.75	5.75	6.78
4	4.80	5.80	5.76	6.78
5	4.80	5.74	5.75	6.76
6	4.80	5.75	5.75	6.76
7	4.80	5.76	5.76	6.76
8	4.81	5.79	5.76	6.77
9	4.80	5.77	5.76	6.76
10	4.80	5.79	5.76	6.76
Mean value	4.8	5.8	5.8	6.8

Tolerances on the diameters are in accordance with tolerance class T1 of Table 1 of EN 10218-2 (all diameters D_w).
In addition, measurements of wire diameters resulted from tests comply with the minimum diameter envisaged in EN 10223-8 clause 7.4

1.1.2 WIRE TENSILE STRENGTH f_t

The tensile strength of the steel wire in the different diameters for the wire mesh panels and tie rods of the GABBIONI has been determined according to EAD 200020-00-0102 Section 2.2.2, in accordance with clause 3 of EN 10218-1 [1]. Results for tensile strength are shown in the Table 2.

Table 2: Wire tensile strength of GABBIONI

Wire (galvanized) declared diameter (mm)		Tensile Load (kN)	Tensile strength f_t (N/mm^2)	Comparison of results with § 7.4 in EN 10223-8
4.8	Minimum	11.6	641	Test results in accordance with § 7.4 EN 10223-8
	Maximum	12.4	688	
	Mean	12.1	667	
5.8	Minimum	16.0	606	
	Maximum	16.3	616	
	Mean	16.1	609	
6.8	Minimum	26.9	741	
	Maximum	27.5	757	
	Mean	27.2	749	

The measured values of tensile strength of the wires comply with the minimum tensile strength value of 500 MPa envisaged in EN 10223-8 clause 7.4.

1.1.3 DIMENSIONS OF PRODUCT H, L, W, MESH SIZE M x N AND DIMENSIONS OF CONNECTION COMPONENTS

1.3.1.1 Dimensions of the gabion boxes H, L, W

The gabion boxes GABBIONI have been measured and dimensions H, L, W determined according to EAD 200020-00-0102 Section 2.2.3 (on the assembled gabions) [1]. The resulting dimensions are reported hereafter in Tables 3-4, in Table 3 for the wire of diameter 4.80 mm and in Table 4 for the wire of diameter 5.80 mm.

Table 3: Dimensions H, L, W of the gabion boxes GABBIONI (with wire Ø mm 4.80)

Gabion box in the variant with wire Ø mm 4.80				
Dimension	Start [mm]	Centre [mm]	End [mm]	Mean value [mm]
H	1015	1015	1015	1015
L	2010	2010	2010	2010
W	1010	1010	1010	1010

Table 4: Dimensions H, L, W of the gabion boxes GABBIONI (with wire Ø mm 5.80)

Gabion box in the variant with wire Ø mm 5.80				
Dimension	Start [mm]	Centre [mm]	End [mm]	Mean value [mm]
H	1015	1015	1015	1015
L	2010	2010	2010	2010
W	1010	1010	1010	1010

The measured product dimensions H, L, W fall within the permissible tolerance of ± 35 mm envisaged in EN 10223-8 clause 7.2.

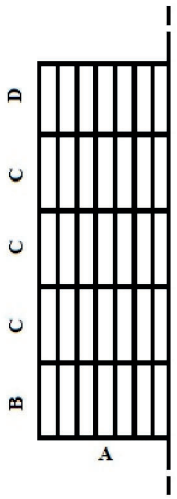
1.3.1.2 Mesh size M x N

The mesh sizes M x N of the different welded wire panels which make up the gabion boxes GABBIONI have been measured according to EAD 200020-00-0102 Section 2.2.3 [1]. Results are reported hereafter in Tables 5-6-7-8 in the following pages, referred to each panel type and to the wire diameters 4.8 mm and 5.8 mm.

The measured mesh sizes M x N fall within the permissible tolerance of ± 3.0 mm (for mesh dimensions in mm ≥ 50; < 200) envisaged in EN 10223-8 clause 7.3.

Results for: **Bottom panel**

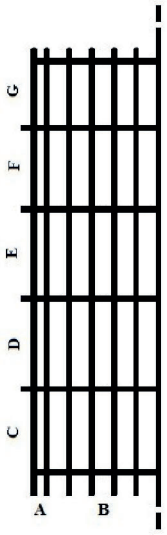
Table 5: Mesh size M x N of the bottom panels of the gabion boxes GABBIONI



Gabion 1 – wire diameter Ø 4.8 mm				
Measurement	Mesh size [mm]			
	A	B	C	D
1	49.75	189.72	200.14	183.50
2	49.89	189.68	200.13	183.54
3	49.80	189.65	200.13	183.52
4	49.84	189.66	200.11	183.51
5	49.85	189.71	201.08	183.53
6	49.88	189.70	200.06	183.56
Mean value	49.8	189.7	200.3	183.5
Gabion 2 - wire diameter Ø 5,8 mm				
Measurement	Mesh size [mm]			
	A	B	C	D
1	49.89	189.20	199.63	182.10
2	51.11	189.14	199.64	182.24
3	50.04	189.19	199.62	182.21
4	48.99	189.10	199.68	182.19
5	49.89	188.97	199.63	182.25
6	50.10	188.98	199.66	182.22
Mean value	50.0	189.1	199.6	182.2

Results for: **Top panel**

Table 6: Mesh size M x N of the top panels of the gabion boxes GABBIONI



Gabion 1 – wire diameter Ø 4.8 mm							
Measurement	Mesh size [mm]						
	A	B	C	D	E	F	G
1	27.74	49.88	175.46	198.63	195.33	183.18	166.50
2	27.71	49.94	175.53	198.80	195.32	183.31	166.37
3	27.74	50.17	175.48	198.68	195.27	183.25	166.30
4	27.93	50.05	175.38	198.55	195.30	183.24	166.53
5	28.05	49.81	175.34	198.56	195.32	183.25	166.32
6	27.84	50.18	175.36	198.62	195.32	183.27	166.30
Mean value	27.8	50.0	175.4	198.6	195.3	183.3	166.4
Gabion 2 – wire diameter Ø 5.8 mm							
Measurement	Mesh size [mm]						
	A	B	C	D	E	F	G
1	28.11	49.83	174.90	198.92	195.17	183.12	166.12
2	28.26	49.68	174.88	198.84	195.17	183.13	166.10
3	28.32	49.17	174.96	198.81	195.14	183.16	166.12
4	27.84	49.21	174.90	198.66	195.07	182.94	166.10
5	28.13	50.08	174.96	198.82	195.18	183.06	166.14
6	28.28	49.70	174.87	198.81	195.17	183.20	166.14
Mean value	28.2	49.6	174.9	198.8	195.2	183.1	166.1

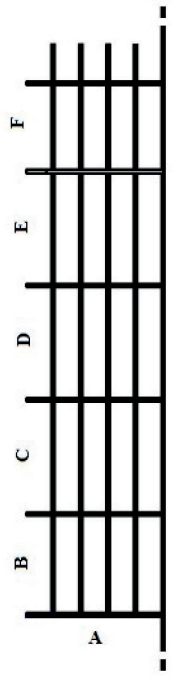
Results for: **Plain side panel**

Table 7: Mesh size M x N of the plain side panels of the gabion boxes GABBIONI

Gabion 1 – wire diameter Ø 4.8 mm							
Measurement	Mesh size [mm]						
	A	B	C	D	E	F	G
1	32.74	49.96	192.05	199.57	198.39	201.01	159.49
2	32.55	50.17	191.94	199.61	198.35	200.98	159.47
3	32.50	50.28	192.00	199.56	198.36	200.97	159.42
4	32.60	49.84	191.97	199.64	198.43	201.05	159.46
5	32.69	49.70	191.94	199.59	198.37	200.93	159.41
6	32.71	49.70	191.97	199.59	198.35	200.99	159.43
Mean value	32.6	49.9	192.0	199.6	198.4	201.0	159.4
Gabion 2 – wire diameter Ø 5.8 mm							
Measurement	Mesh size [mm]						
	A	B	C	D	E	F	G
1	32.20	50.01	191.63	199.80	198.15	200.96	159.24
2	32.72	48.81	191.59	199.75	198.20	200.87	159.23
3	32.77	49.90	191.56	199.89	198.15	200.93	159.22
4	32.70	49.55	191.60	199.78	198.11	200.95	159.30
5	33.02	50.00	191.64	199.95	198.16	200.92	159.27
6	32.53	50.10	191.57	199.79	198.17	200.85	159.25
Mean value	32.7	49.7	191.6	199.8	198.2	200.9	159.3

Results for: **Hooking side panel**

Table 8: Mesh size M x N of the hooking side panels of the gabion boxes GABBIONI



Gabion 1 – wire diameter Ø 4.8 mm						
Measurement	Mesh size [mm]					
	A	B	C	D	E	F
1	48.23	174.23	199.52	198.51	201.17	154.30
2	48.21	174.28	199.55	198.40	201.20	154.32
3	48.37	174.33	199.69	198.39	201.32	154.42
4	48.19	174.27	199.57	198.34	201.28	154.33
5	48.38	174.25	199.60	198.35	201.21	154.38
6	48.18	174.35	199.63	198.38	201.29	154.35
Mean value	48.3	174.3	199.6	198.4	201.2	154.4
Gabion 2 – wire diameter Ø 5.8 mm						
Measurement	Mesh size [mm]					
	A	B	C	D	E	F
1	47.77	174.23	199.61	198.03	201.25	154.27
2	48.27	174.20	199.55	198.06	201.28	154.24
3	48.20	174.17	199.59	198.00	201.28	154.20
4	48.03	174.20	199.67	197.96	201.21	154.26
5	48.20	174.20	199.65	198.00	201.21	154.25
6	48.10	174.21	199.58	198.03	201.21	154.20
Mean value	48.1	174.2	199.6	198.0	201.2	154.2

1.1.4 CORROSION PROTECTION: NON–FERROUS METALLIC COATING TYPE AND CLASS OF COATING MASS

The minimum coating mass of non-ferrous metallic Zinc/Aluminium alloy coating on wires of the gabion boxes GABBIONI in the different diameters Ø 4.80 mm – 5.80 mm – 6.80 mm, has been assessed according to Section 2.2.4a of EAD 200020-00-0102. The minimum coating mass has been verified in accordance with EN 10244-2 and the adherence wrapping test has been carried out in accordance with EN 10218-1. Test results have been compared with Table 2 of EN 10244-2 for Class A and with Figure 1 of EN 10244-2 for the quality of adherence of coating (wrapping test 0/5) [1]. Table 9 shows the test results for coating mass:

Table 9: Coating mass of non-ferrous metallic Zinc/Aluminium alloy coating of GABBIONI

Wire diameter	Sample	Diameter* [mm]	Mass[g/m^2]
4.80 mm	1	4.71	355.5
	2	4.71	356.0
	Mean		356
5.80 mm	1	5.66	299.0
	2	5.66	295.5
	Mean		297
6.80 mm	1	6.66	370.9
	2	6.66	334.9
	Mean		353

*Wire diameter after the removal of the metallic coating

The comparison of test results with Table 2 of EN 10244-2 confirmed that the wires of all diameters comply with mass requirements for class A for metallic coating Zn95/Al5. In addition, test results have been compared with Figure 1 of EN 10244-2 for the quality of adherence of the coating: the results for all diameters correspond to scale 1.

1.1.5 CORROSION PROTECTION: MASS OF HOT DIP GALVANIZED COATING

This performance ***is not applicable.***

1.1.6 ADDITIONAL CORROSION PROTECTION: ORGANIC COATING TYPE, COATING THICKNESS AND WIRE DIAMETER, COATING CONCENTRICITY

This performance ***is not applicable.***

1.1.7 WELD SHEAR STRENGTH

This performance ***has not been assessed.***

1.1.8 C-RING (OR SIMILAR FASTENER) RESISTANCE TO OPENING Fm

This performance ***is not applicable.***

1.1.9 TENSILE STRENGTH OF THE GABION INCLUDING CONNECTION

The tensile strength of the monolithic structure including connection devices, which gives the mechanical resistance of the gabion boxes GABBIONI has been determined according to EAD 200020-00-0102 Section 2.2.8 and in particular according to Annex C [1].
Tests have been performed on connected welded panels; in detail, the panel assembly subjected to test was the connection between plain side panel and hooking side panel. Test results, expressed as tensile resistance to opening of the connection between welded wire panels, and the type of failure, are given in Table 10 for the wire of diameter 4.80 mm and in Table 11 for the wire of diameter 5.80 mm.

Table 10: Tensile strength of the gabion GABBIONI including connection (gabion with wire Ø mm 4.80)

Connection between welded wire panels with wire Ø mm 4,80	Tensile strength [kN/m]	Type of failure
Test n. 1	12.89	Opening of hooks of hooking side panel
Test n. 2	10.92	
Test n. 3	12.38	
Mean value	12.1	

Table 11: Tensile strength of the gabions GABBIONI including connection (gabion with wire Ø mm 5.80)

Connection between welded wire panels with wire Ø mm 5.80	Tensile strength [kN/m]	Type of failure
Test n. 1	16.13	Opening of hooks of hooking side panel
Test n. 2	20.33	
Test n. 3	19.53	
Mean value	18.7	

1.1.10 DURABILITY IN ARTIFICIAL ATMOSPHERES: SULPHUR DIOXIDE TEST WITH GENERAL CONDENSATION OF MOISTURE, NEUTRAL SALT SPRAY TEST

The neutral salt spray test on mesh samples of the gabion boxes GABBIONI has been carried out according to EAD 200020-00-0102 Section 2.2.9.2 [2]. The mesh samples subjected to test were taken from both gabion box variants (with wire Ø mm 4.80 and with wire Ø mm 5.80). The number of hours of exposure after which the mesh samples did not show more than 5% of DBR (Dark Brown Rust) was: 2000 hours for both variants.

1.1.11 DURABILITY IN ARTIFICIAL ATMOSPHERES: UV RESISTANCE OF ORGANIC COATING MATERIAL

This performance ***is not applicable.***

1.2 SAFETY AND ACCESSIBILITY IN USE (BWR 4)

1.2.1 PROTECTION AGAINST INJURY

The gabion boxes GABBIONI assessed according to both technical documentation and real gabion structures, in accordance with EAD 200020-00-0102 Section 2.2.10, do not pose any obvious risk of injury rising from sharp edges of jut out wires.

1.3 PROTECTION AGAINST NOISE (BWR 5)

1.3.1 AIRBORNE SOUND INSULATION

This performance ***has not been assessed.***

1.3.2 SOUND ABSORPTION

This performance ***has not been assessed.***

C. AVAILABLE TEST REPORTS

[1] Test report No. 6775/RP/22, issuing date: 06/07/2022, Results of the experimental tests according to EAD 200020-00-0102 clauses 2.2.1, 2.2.2, 2.2.3, 2.2.4 and 2.2.8 performed on Gabbioni - ITC-CNR, Italy.

[2] Test Report No. 39, issuing date: 02/08/2021, Results of the durability test according to EAD 200020-00-0102 clause 2.2.9.2 performed on Gabbioni Ser.Ca. - Università Politecnica delle Marche, Italy.

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European Technical Assessment ETA 22/0732 of 16/03/2023

GENERAL PART

Product family to which the construction product belongs	**PAC 20: STRUCTURAL METALLIC PRODUCTS AND ANCILLARIES. Weldmesh gabion boxes and mattresses**
This European Technical Assessment contains:	**22 pages, including 17 annexes which form an integral part of this assessment**
This European Technical Assessment is issued in accordance with Regulation (EU) n° 305/2011, on the basis of	**EAD 200020-00-0102 – Weldmesh gabion boxes and mattresses**

SPECIFIC PARTS

1. TECHNICAL DESCRIPTION OF THE PRODUCT

The GABBIONI is a gabion box of variable sizes which consists of a structure composed by electro-welded metallic coated wire panels and structural tie rods positioned as in the drawings of the Manufacturer‘s assembly plan, summarized in Annexes A2-A7, to be filled with stones on the construction site. The gabion is a wire mesh container which, once filled with suitable stone, can constitute the modular unit of a permeable earth retaining structure and is used for earth retention and as a barrier against erosion.
This ETA deals with the gabion as a container (wires, wire mesh and panel assemblies) to be filled with suitable stone for the intended use in works and the gabion filling is outside its scope.
Panels which make up the gabion boxes are manufactured from steel wire which is 95% Zn/5% Al alloy coated before welding (before the panel production). The same steel wire is used for the production of tie rods. Tie rods, positioned between the bottom panel and side panels, and across opposite side panels both in the direction of width and in the direction of length, prevent localized deformations of the gabion.
For what concerns the wire diameter, the GABBIONI are produced in two different wire diameters, as far as wire panel meshes are concerned; tie rods are also produced in two different diameters depending on which is the diameter of the wire in the panels of the gabion where they are used. According to the diameter of the wire, gabions are produced in the following two variants, then:

- with wire Ø mm 5.80 for wire mesh panels and wires Ø mm 5.80 and Ø mm 6.80 for internal tie rods
- with wire Ø mm 4.80 for wire mesh panels and wire Ø mm 5.80 for internal tie rods.

The wire meshes the panels consist of, are characterized by a bending of ends (on either one, or three or four sides according to the panel type) which allows for the junction between panel and panel in order to build up the gabion box. The connections, of the type “looped ends” among the types of panel connections illustrated in EAD 200020-00-0102 in clause 1.1 are manually finished during the assembly of the gabion box with the aid of specific tools, according to the instructions from the Manufacturer (for the sequence of assembly phases see Annexes A2-A7 “Assembly plan”).

The product description, with reference to its components, is given in Annexes A1 (wire panels), A4 (tie rods) and A8-A11, which provide the drawings of the gabion boxes in the variable available dimensions and a detailed description, as for their geometry, of the elements they are composed of.

2. SPECIFICATION OF THE INTENDED USE IN ACCORDANCE WITH EUROPEAN ASSESSMENT DOCUMENT N° 200020-00-0102 (hereinafter EAD)

The gabion boxes named GABBIONI , filled with suitable stone, are intended to be used for earth retention, soil reinforcement, river training, erosion control and retaining structures in case of landslide.
The assumed working life for the intended use of the gabion boxes made from Zn/Al coated wires, according to the applicable EAD, is in accordance with EN 10223-8, Annex A, in relation to different corrosive categories of the environment when installed in the works, provided that the conditions for packaging, transport, storage, installation as well as appropriate use, maintenance and repair are met. The real working life may be, in normal use conditions, considerably longer without major degradation affecting the basic requirements for works[1]. The indications given on the working life cannot be interpreted as a guarantee given by the Manufacturer, but are to be regarded only as a means for

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

choosing the right products in relation to the expected economically reasonable working life of the works.

Concerning product packaging, transport and storage it is the responsibility of the Manufacturer to undertake the appropriate measures and to advise his clients on the transport and storage, as he considers necessary in order to reach the declared performances.
The information about installation is provided with the technical documentation from the Manufacturer and it is assumed that the product will be installed according to it or (in absence of such instructions) according to the usual practice of the building professionals.

3. PERFORMANCE OF THE PRODUCT AND REFERENCES TO THE METHODS USED FOR ITS ASSESSMENT

The tests for performance assessment of GABBIONI were carried out in compliance with EAD 200020-00-0102 according to the test methods reported herein, as well for what concerns sampling, conditioning and testing provisions.
The numbering (#) in the following tables corresponds to the numbering of Table 1 of clause 2.1 of EAD 200020-00-0102.

3.1 MECHANICAL RESISTANCE AND STABILITY (BWR 1)

#	Essential characteristic	Performance
1	Wire diameters D_w	4.8 mm – 5.8 mm – 6.8 mm
2	Wire tensile strength f_t	See Annex B1. Table B1
3	Dimensions of product H,L,W, mesh size M x N and connection components	See Annex B1. Table B2 and Annex B2. Table B3
4	Corrosion protection: non-ferrous metallic coating type Class of coating mass	The Zinc/Aluminium alloy coated steel wires are coated with: - wire Ø 4.8 mm: minimum 280 g/m^2 corresponding to class A in accordance with Table 2 of EN 10244-2; - wires Ø 5.8 and Ø 6.8 mm: minimum 290 g/m^2 corresponding to class A in accordance with Table 2 of EN 10244-2.
	Corrosion protection: mass of hot dip galvanized coating	**Not applicable.**
5	Additional corrosion protection: organic coating type Coating thickness and wire diameter Coating concentricity	**Not applicable.**
6	Weld shear strength	**No performance assessed.**
7	C-ring (or similar fastener) resistance to opening F_m	**Not applicable.**
8	Tensile strength of the gabion/mattress including connection	- Gabion with wire Ø mm 5.80 for wire mesh panels: 18.7 kN/m - Gabion with wire Ø mm 4.80 for wire mesh panels: 12.1 kN/m
9	Durability in artificial atmospheres: sulphur dioxide test with general condensation of moisture	**No performance assessed.**
	Durability in artificial atmospheres: neutral salt spray test	Exposure time in hours with surface DBR (Dark Brown Rust) ≤ 5% surface: 2000 hours
	Durability in artificial atmospheres: UV resistance of organic coating material	**Not applicable.**

3.2 SAFETY AND ACCESSIBILITY IN USE (BWR 4)

#	Essential characteristic	Performance
10	Protection against injury	The gabion does not pose any obvious risk of injury rising from sharp edges of jut out wires

3.3 PROTECTION AGAINST NOISE (BWR 5)

#	Essential characteristic	Performance
11	Airborne sound insulation	**No performance assessed.**
12	Sound absorption	**No performance assessed.**

4. ASSESSMENT AND VERIFICATION OF CONSTANCY OF PERFORMANCE (AVCP) SYSTEM APPLIED, WITH REFERENCE TO ITS LEGAL BASE

In accordance with the European Assessment Document EAD No. 200020-00-0102 the applicable European legal act is: **Decision 98/214/EC.**
The system(s) of assessment and verification of constancy of performance (AVCP) is: **2+.**

5. TECHNICAL DETAILS NECESSARY FOR THE IMPLEMENTATION OF THE AVCP SYSTEM, AS PROVIDED FOR IN EAD 200020-00-0102

Technical details necessary for the implementation of the AVCP system are laid down in the Control Plan deposited at STC.

Rome, 16/03/2023

IL PRESIDENTE
DEL CONSIGLIO SUPERIORE DEI LAVORI PUBBLICI
Ing. Massimo SESSA

MASSIMO
SESSA
MiMS
17.03.2023
18:08:03
GMT+01:00

MARIARCANGELA
RAMUNDO
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17.03.2023
16:16:12
GMT+00:00

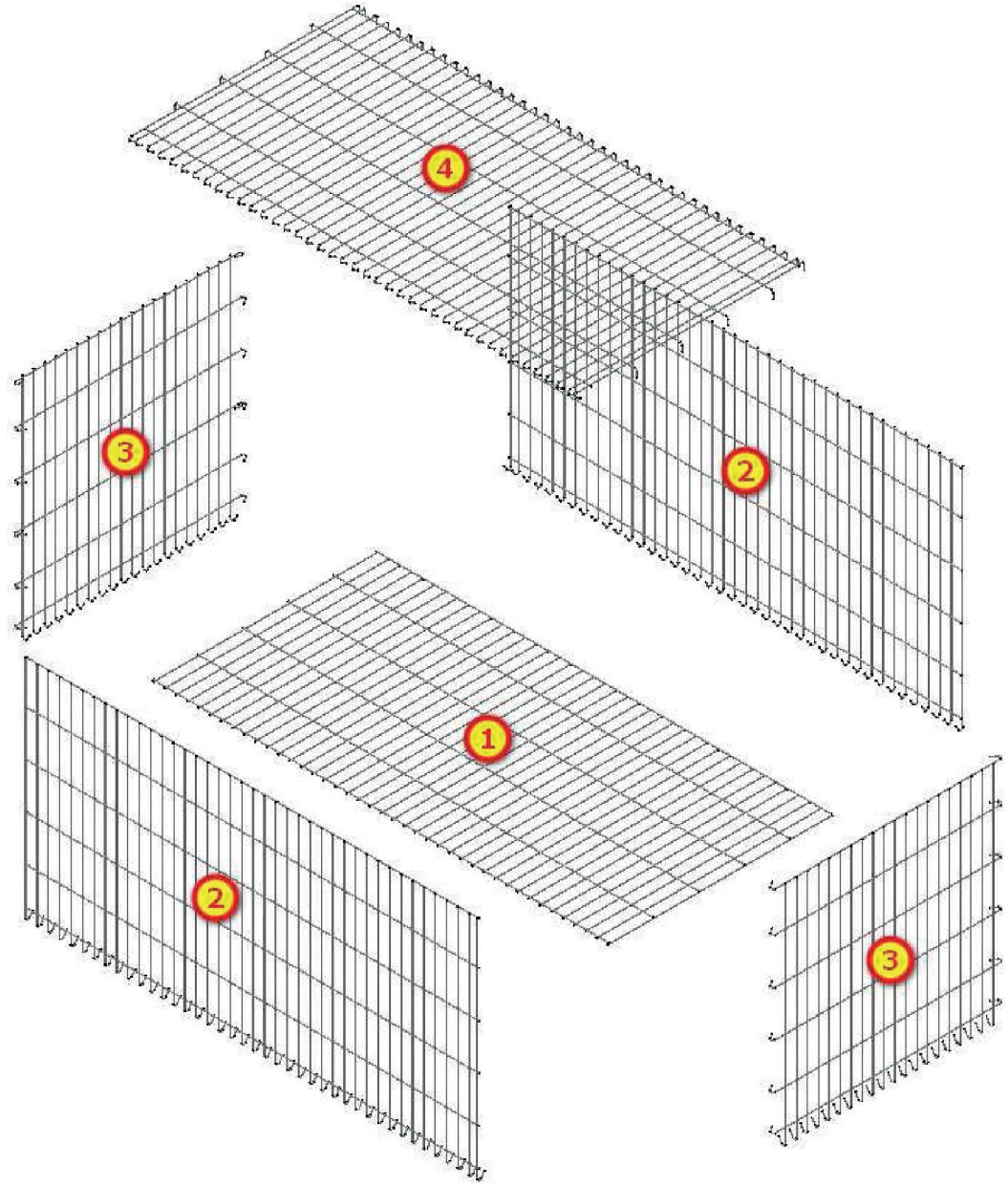
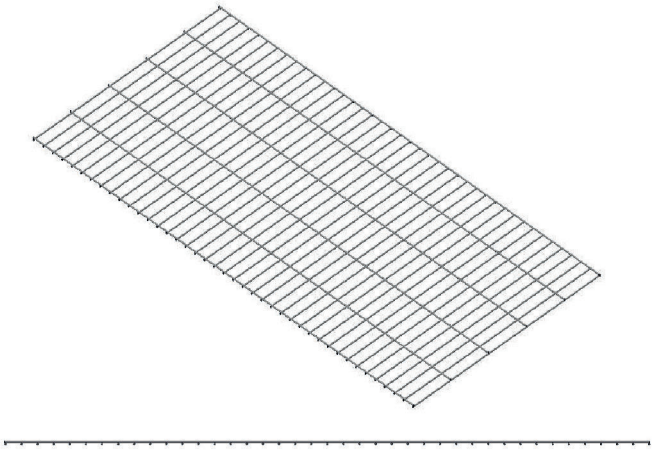


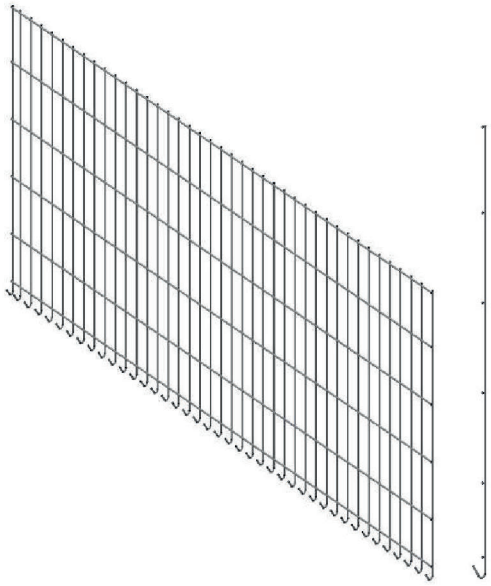
Figure A.1 – The mesh panels which make up the gabion box

1 Bottom panel
2 Plain side panel
3 Hooking side panel
4 Top panel

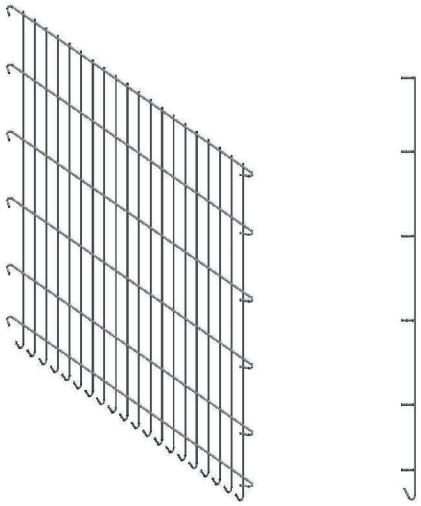
GABBIONI	**Annex A1/1** **of ETA N° 22/0732**
Product Description – Gabion box components: electro-welded wire mesh panels	



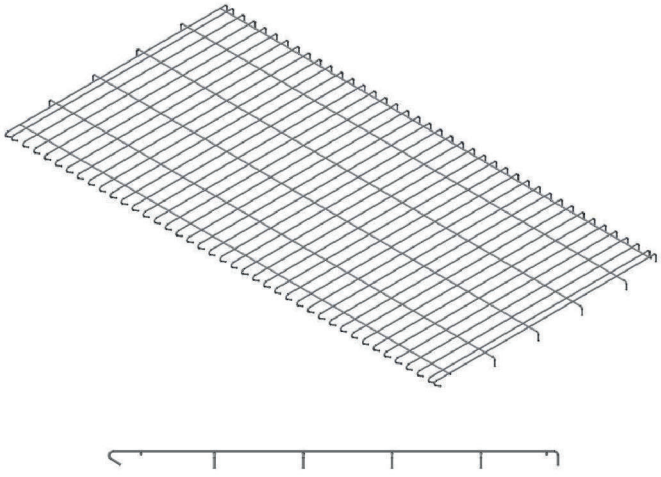
1 Bottom panel



2 Plain side panel



3 Hooking side panel



4 Top panel

Figure A.2 – Components of the gabion box (excluding tie rods)

GABBIONI	**Annex A1/2** **of ETA N° 22/0732**
Product Description – Gabion box components: electro-welded wire mesh panels	

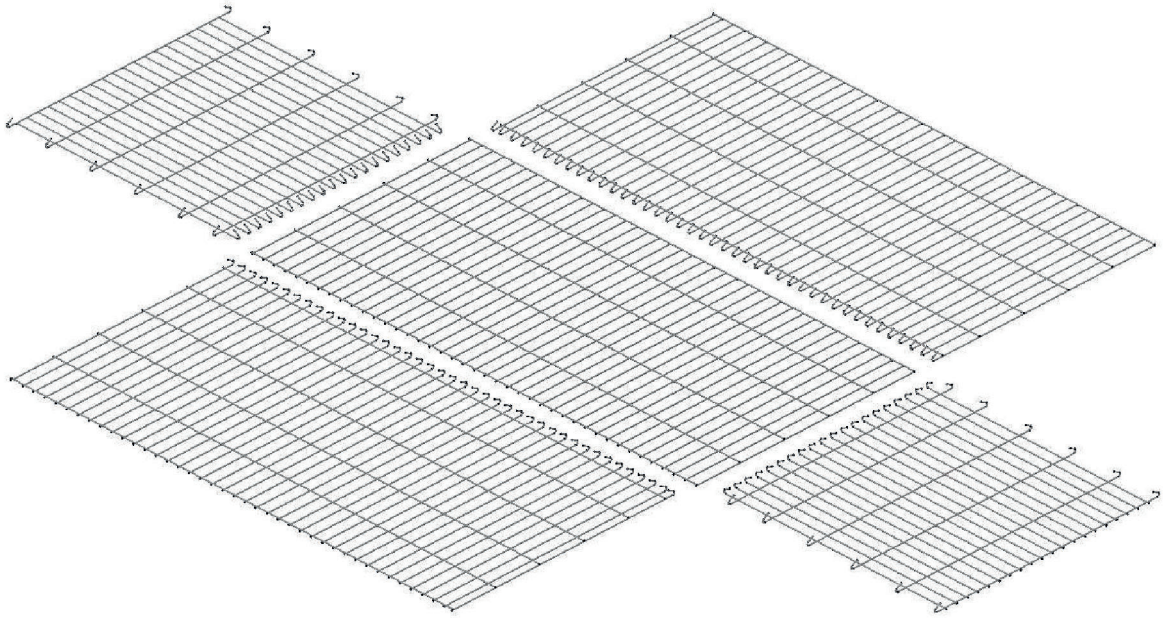


Figure A.3 – Step 1: position as in the drawing the panels which make up the gabion box, keeping the long wires of the bottom panel upwards (on the upper face of the panel)

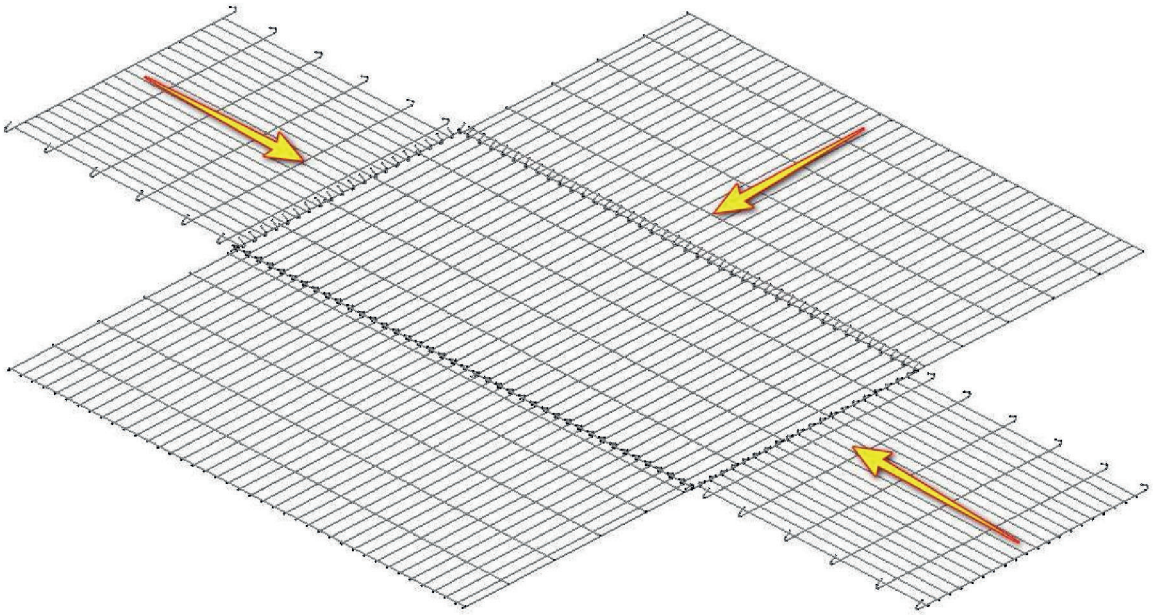


Figure A.4 – Step 2: connect one plain side panel with bottom panel

GABBIONI	**Annex A2** **of ETA N° 22/0732**
Product Description – Assembly plan: the assembly phases of the gabion box	

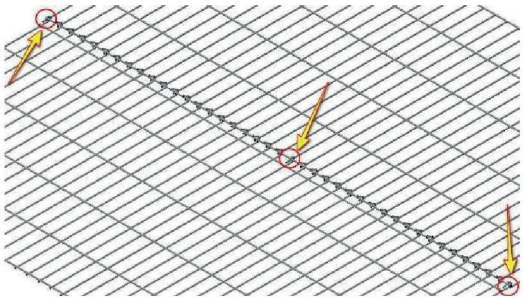


Figure A.5 – Step 3: with the help of a hammer close 2/3 hooks from the side panel onto the bottom panel and repeat the operations of steps 2 and 3 for the three side panels left

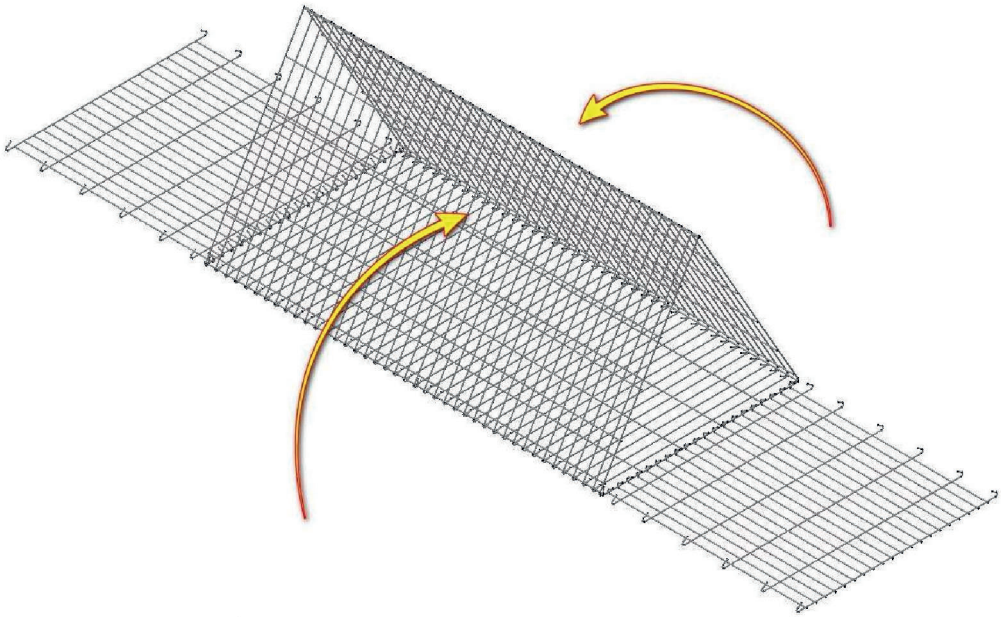


Figure A.6 – Step 4: lift the two plain side panels until they lean against each other

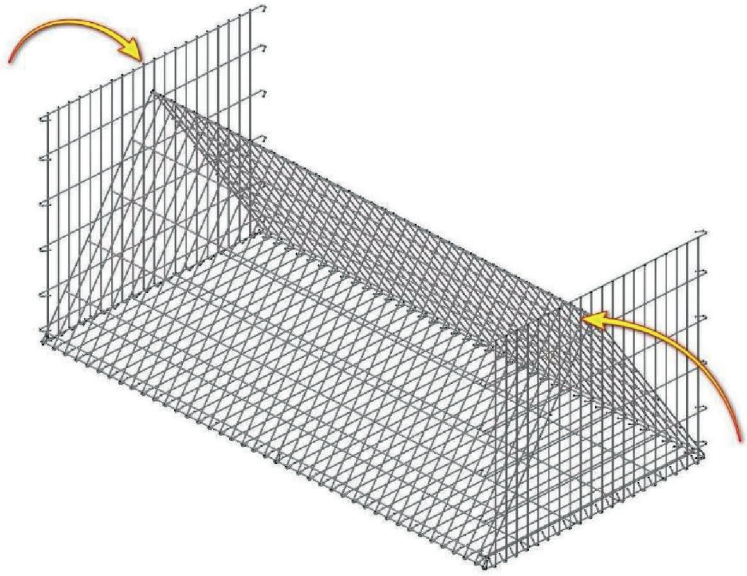


Figure A.7 – Step 5: lift the two hooking side panels

GABBIONI	**Annex A3** **of ETA N° 22/0732**
Product Description – Assembly plan: the assembly phases of the gabion box	

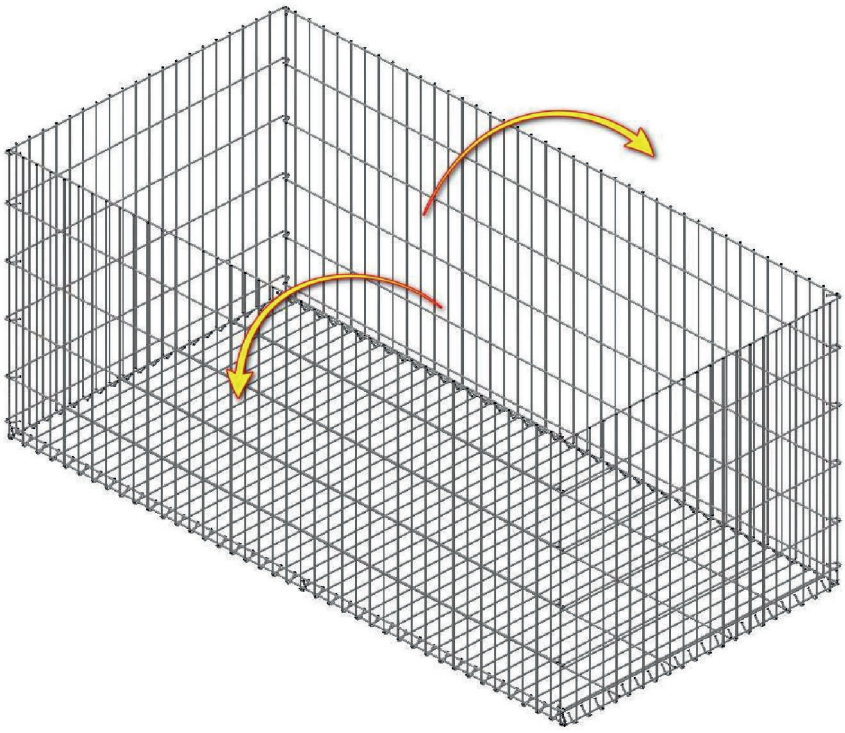


Figure A.8 – Step 6: open out the two plain side panels in order to let them slot into the hooking side panels

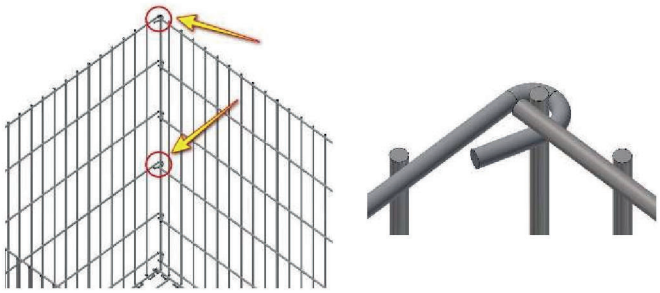


Figure A.9 – Step 7: by using the pliers close two hooks, the first and the fourth hook of each side panel

- 10 Tie rods Ø 6.80 mm, 100 cm length

- 4 Tie rods Ø 5.80 mm, 200 cm length

- 6 Tie rods Ø 5.80 mm, 60 cm length

Figure A.10 – Step 8: get the tie rods available in the prefixed number, diameter Ø and length

GABBIONI	**Annex A4** **of ETA N° 22/0732**
Product Description – Assembly plan: the assembly phases of the gabion box	

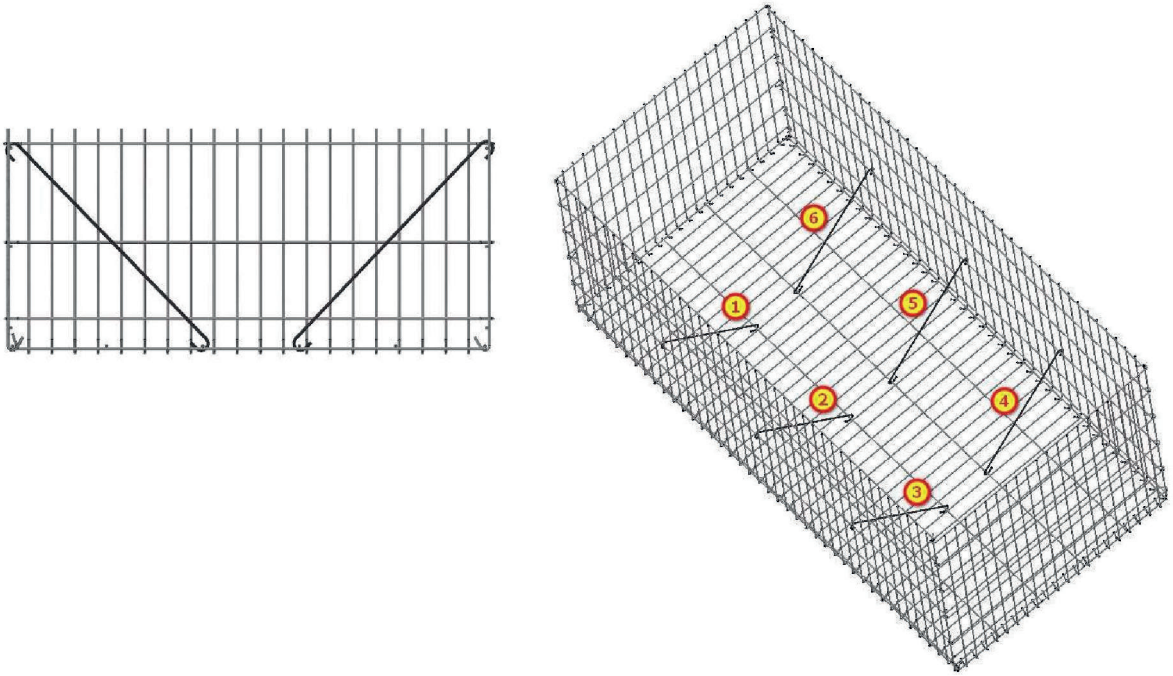


Figure A.11 – Step 9: insert 6 tie rods of cm 60 length between the plain side panel and the bottom panel (3 for each side panel)

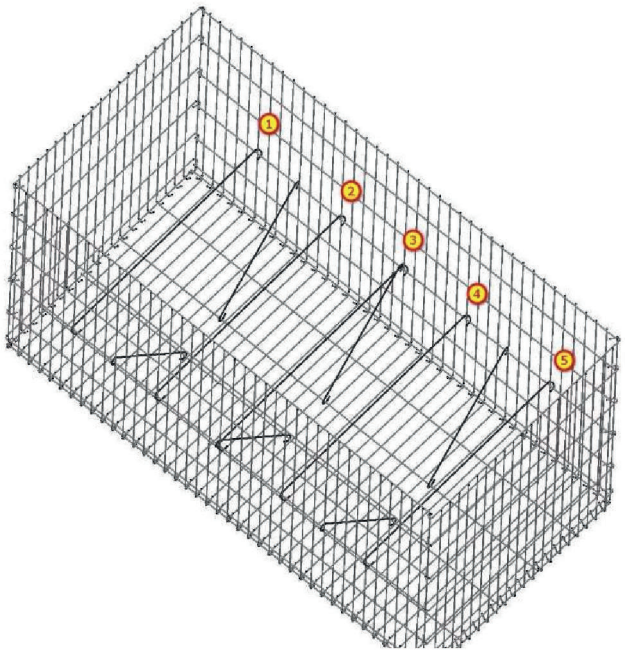
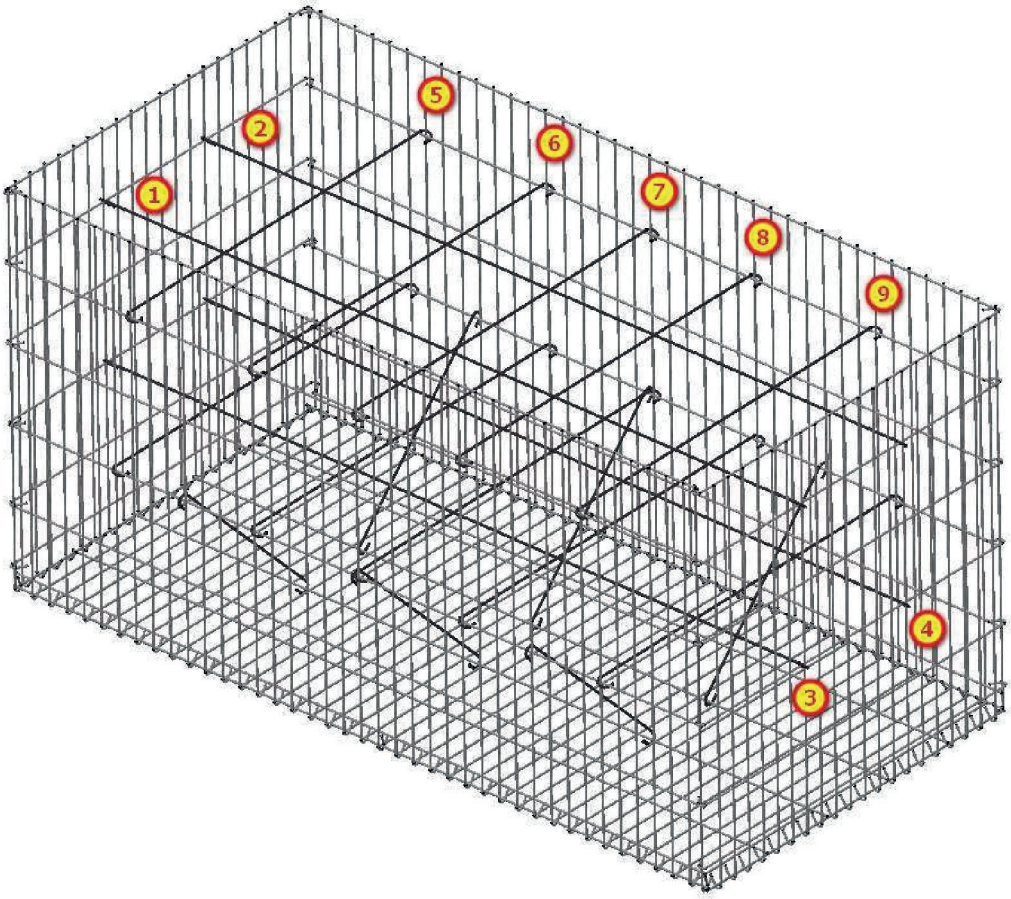


Figure A.12 – Step 10: insert 5 tie rods of cm 100 length as shown in the drawing

GABBIONI	**Annex A5** **of ETA N° 22/0732**
Product Description – Assembly plan: the assembly phases of the gabion box	



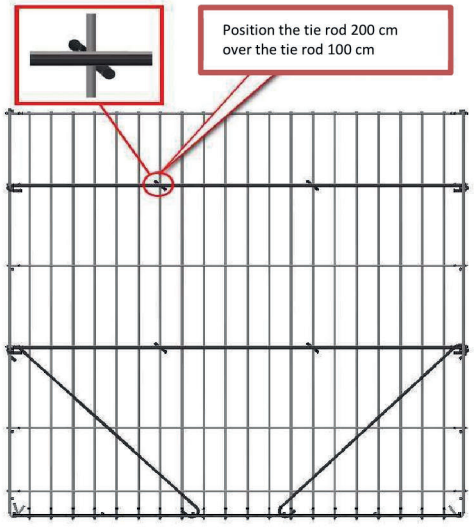


Figure A.13 – Step 11: insert the remaining tie rods, positioning the tie rods of L cm 200 over the tie rods of L cm 100

GABBIONI	**Annex A6** **of ETA N° 22/0732**
Product Description – Assembly plan: the assembly phases of the gabion box	

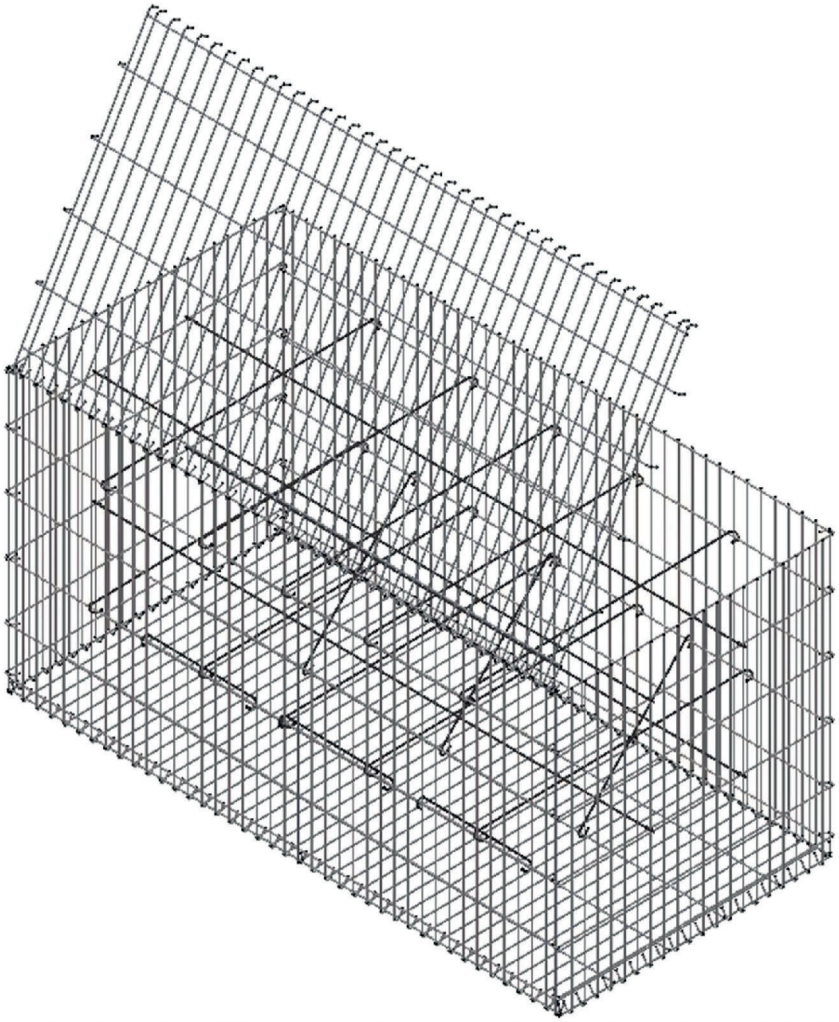


Figure A.14 – Step 12: after the gabion filling, secure the top panel to the plain side panel closing 2/3 hooks through the same procedure as in step3

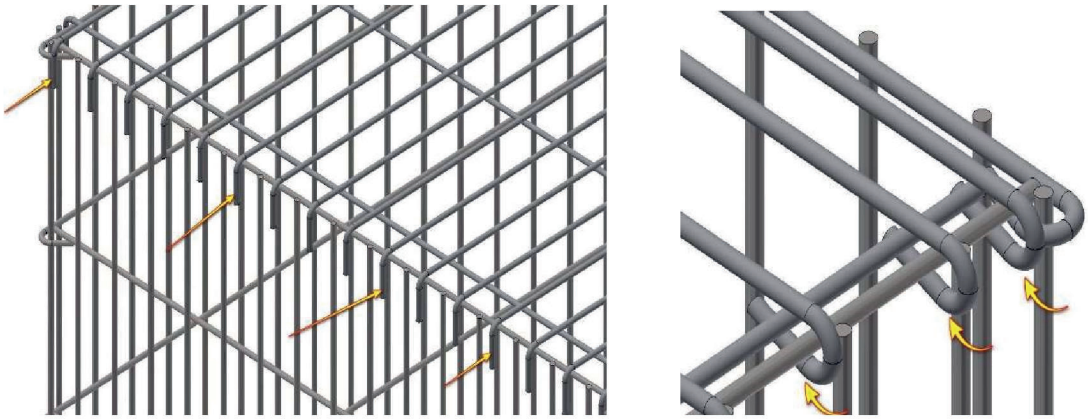
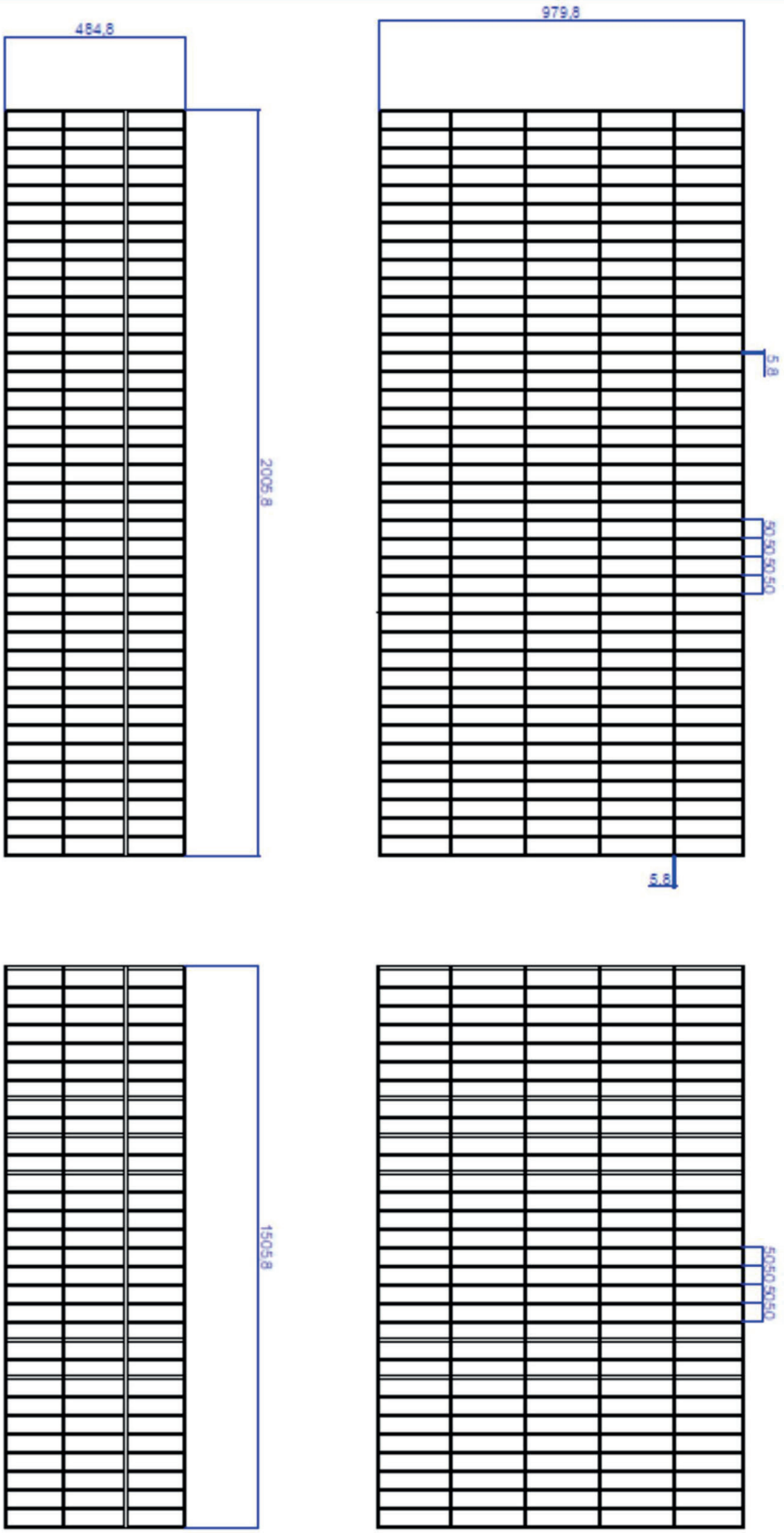


Figure A.15 – Step 13: bend inwards all the 90° laid hooks of the top panel

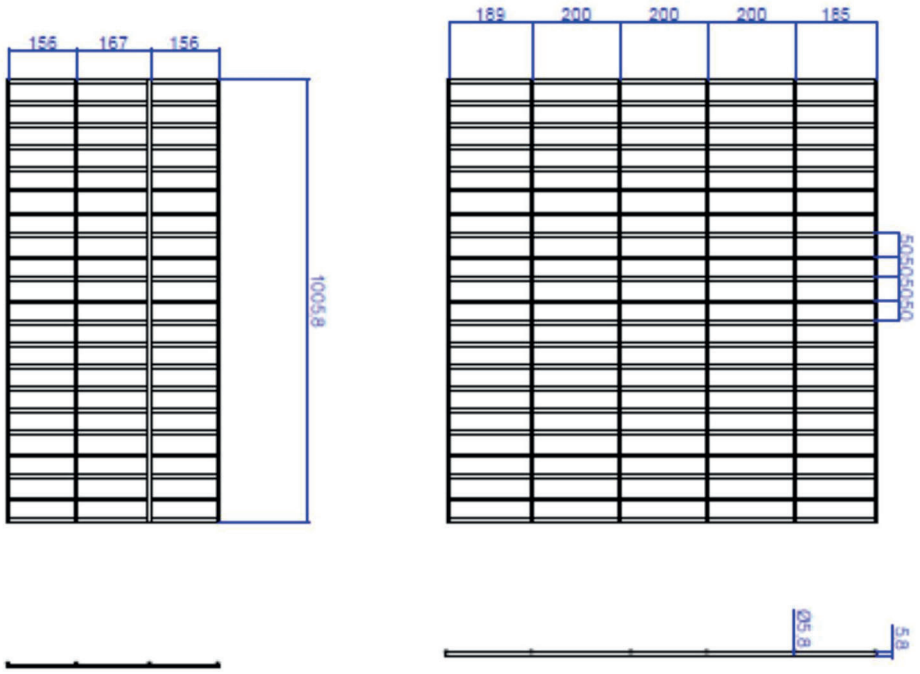
GABBIONI	**Annex A7** **of ETA N° 22/0732**
Product Description – Assembly plan: the assembly phases of the gabion box	



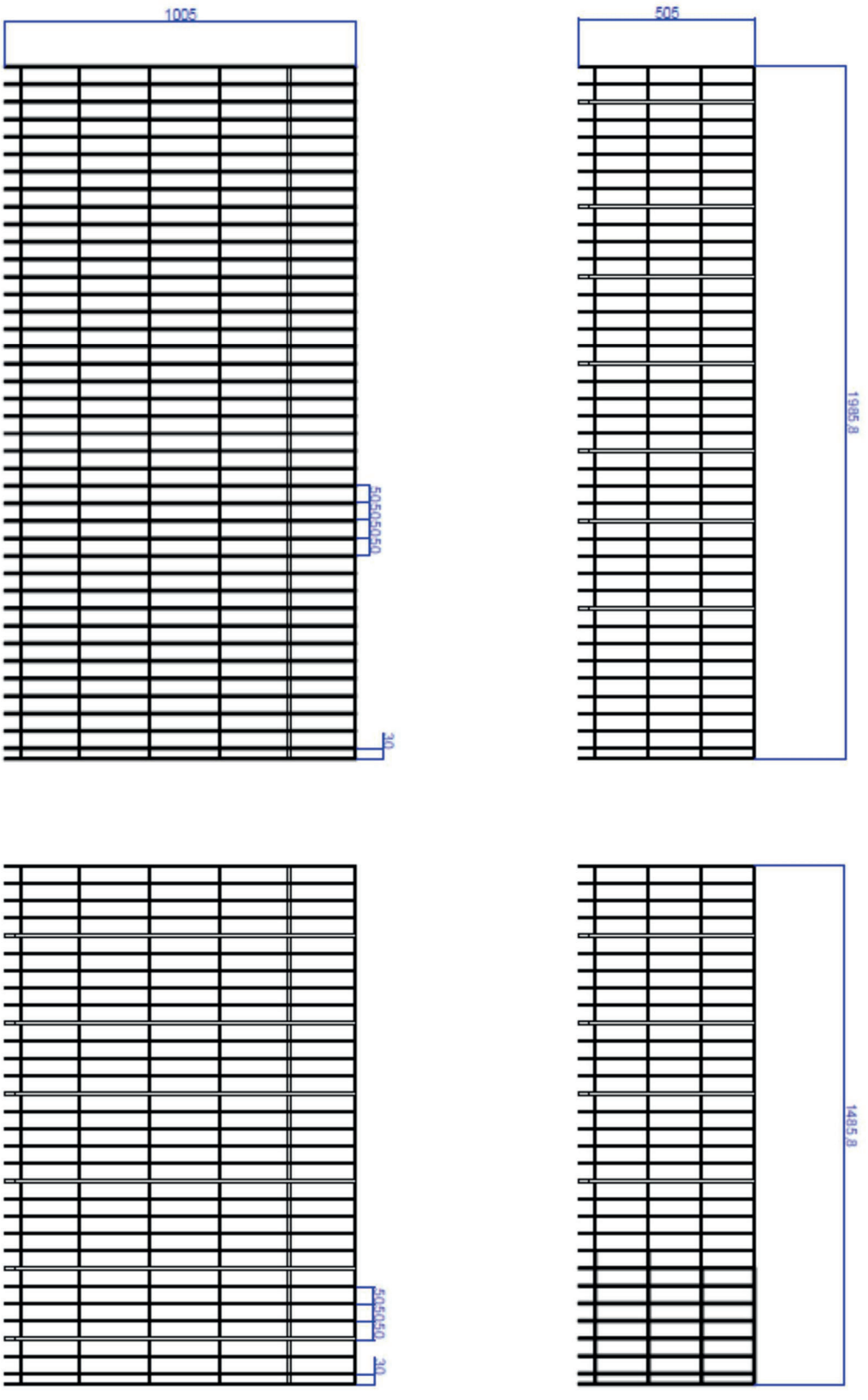
GABBIONI

Product Description – Gabion box components: bottom panels

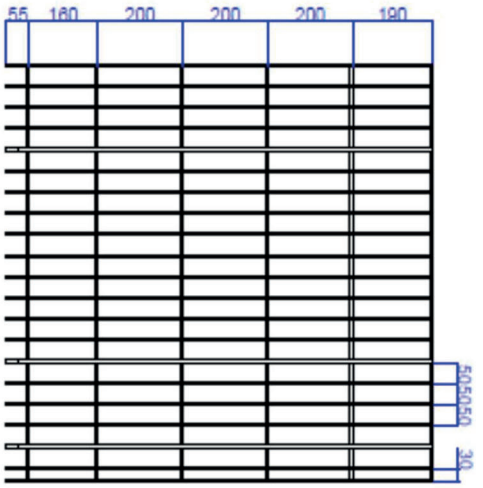
Annex A8/1
of ETA N° 22/0732

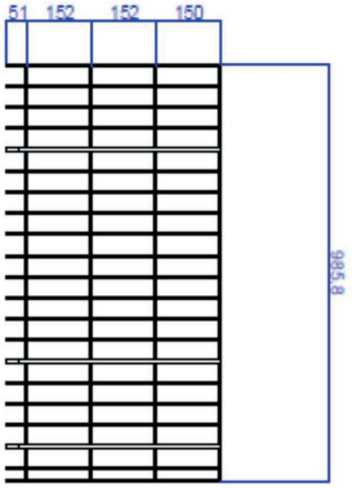


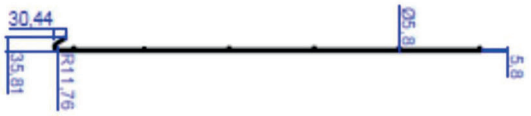
GABBIONI	Annex A8/2 of ETA N° 22/0732
Product Description – Gabion box components: bottom panels	



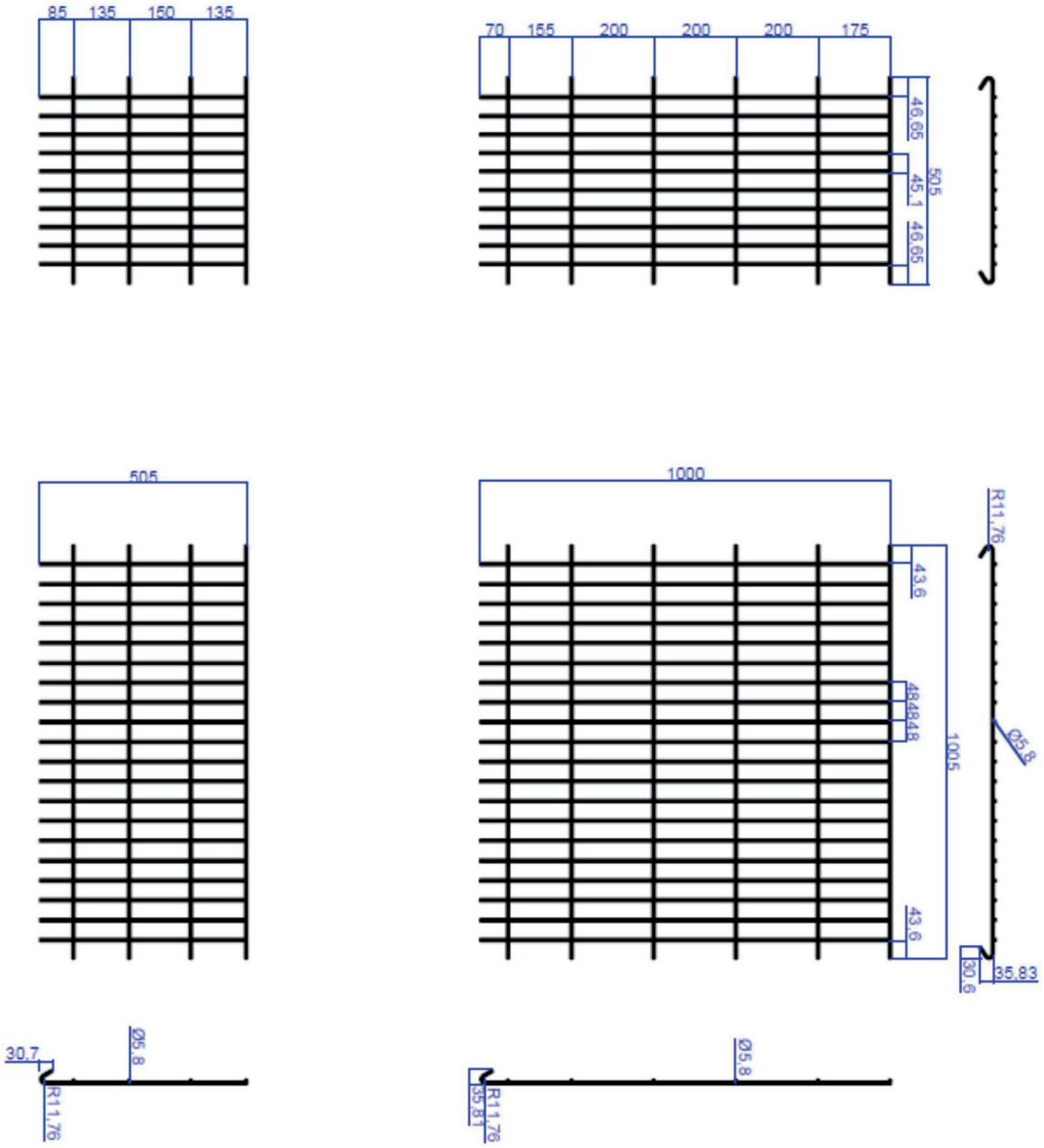
GABBIONI	**Annex A9/1** **of ETA N° 22/0732**
Product Description – Gabion box components: plain side panels	



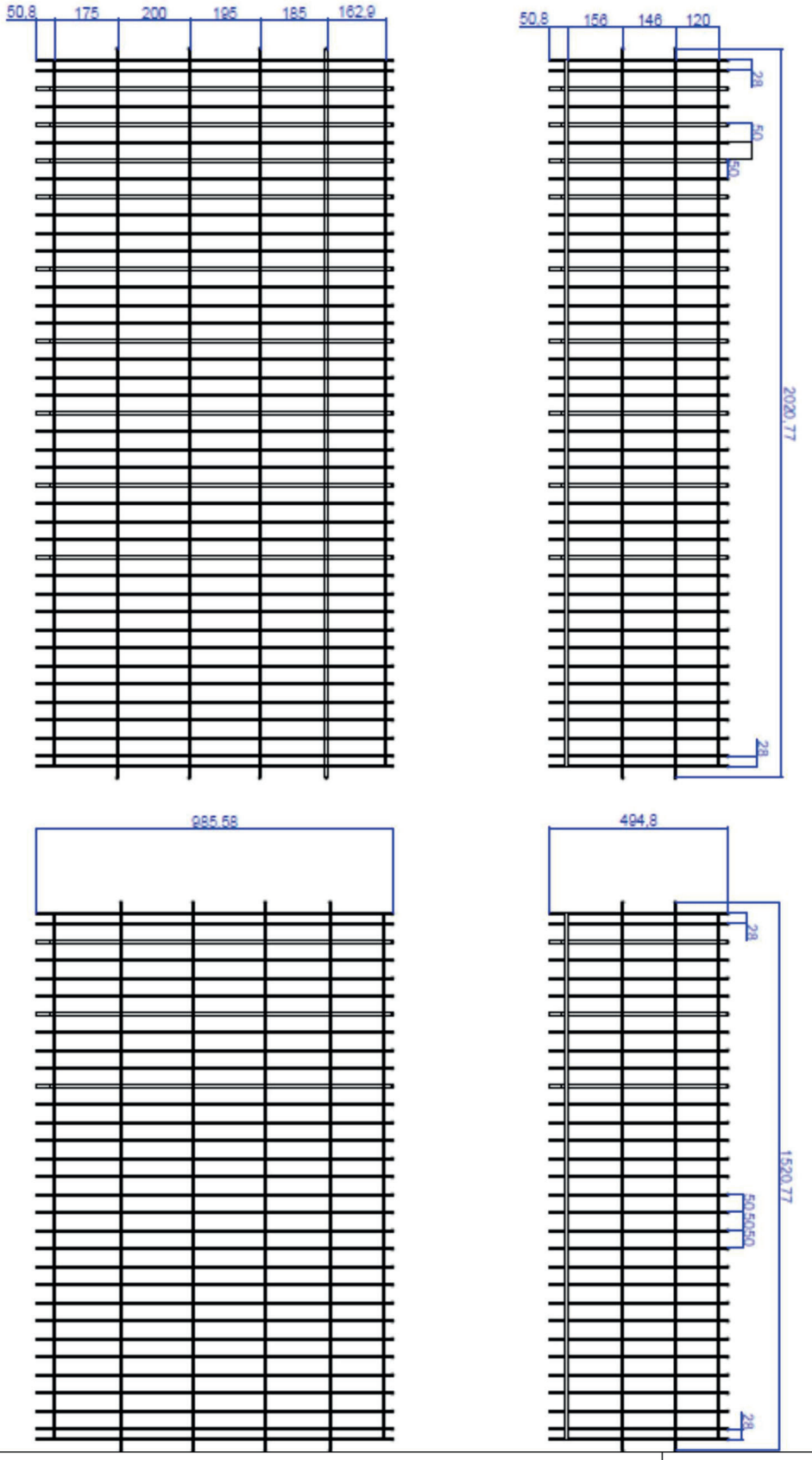




GABBIONI	Annex A9/2 of ETA N° 22/0732
Product Description – Gabion box components: plain side panels	



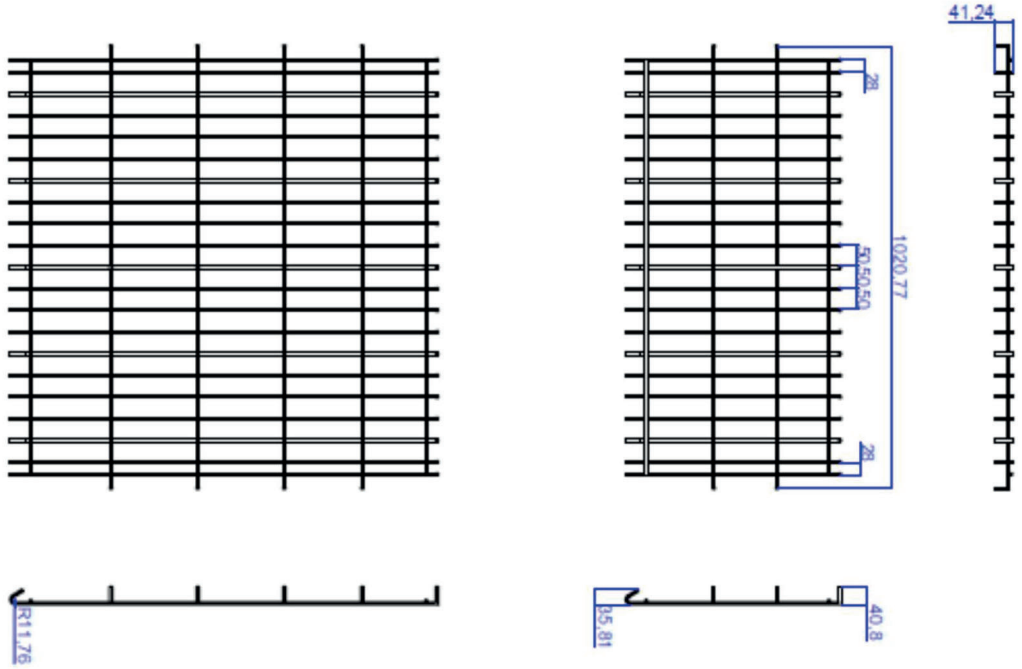
GABBIONI	Annex A10 of ETA N° 22/0732
Product Description – Gabion box components: hooking side panels	



GABBIONI

Product Description – Gabion box components: top panels

Annex A11/1
of ETA N° 22/0732



GABBIONI	Annex A11/2 of ETA N° 22/0732
Product Description – Gabion box components: top panels	

Table B1: Wire tensile strength f_t

Wire diameter [mm]	Wire tensile strength f_t (mean value from tests) [N/mm^2]	
4.8	667	Wire tensile strength > 500 N/mm^2 in accordance with clause 7.4 of EN 10223-8
5.8	609	
6.8	749	

Table B2: Dimensions of product

	Gabion nominal dimensions		
	[cm]	[cm]	[cm]
Code	H	L	W
TP2	50	100	50
TP3	100	100	50
TP4	100	150	50
TP5	100	100	100
TP6	100	150	100
TP7	100	200	100
TP8	100	200	50
TP9	50	200	50
TP10	50	150	50
TP11	50	150	100
TP12	50	200	100
TP13	50	100	100

GABBIONI	**Annex B1** **of ETA N° 22/0732**
Performances – Wire tensile strength, dimensions of product	

Table B3: Wire panels: mesh size M x N

Wire panel type/function	Mesh size M X N [mm x mm]
Bottom panel	50 x 156 50 x 167 50 x 185 50 x 189 50 x 200
Top panel	28 x 120 28 x 146 28 x 156 28 x 163 28 x 175 28 x 185 28 x 195 28 x 200 50 x 120 50 x 146 50 x 156 50 x 163 50 x 175 50 x 185 50 x 195 50 x 200
Plain side panel	30 x 150 30 x 152 30 x 160 30 x 190 30 x 200 50 x 150 50 x 152 50 x 160 50 x 190 50 x 200
Hooking side panel	48 x 135 48 x 150 48 x 155 48 x 175 48 x 200

GABBIONI	**Annex B2** **of ETA N° 22/0732**
Performances – Mesh size M x N	

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Membro di
EOTA
www.eota.eu

Valutazione Tecnica Europea ETA 22/0732 del 16/03/2023

PARTE GENERALE

Famiglia di prodotto alla quale appartiene il prodotto da costruzione	**PAC 20: PRODOTTI E ACCESSORI PER STRUTTURE METALLICHE. Gabbie e materassi in rete saldata**
Questa Valutazione Tecnica Europea contiene:	**22 pagine, inclusi 17 Allegati che costituiscono parte integrante di questa valutazione**
Questa Valutazione Tecnica Europea viene rilasciata in accordo col Regolamento (EU) n° 305/2011, sulla base di	**EAD 200020-00-0102 – Gabbie e materassi in rete saldata**

Questa Valutazione Tecnica Europea è rilasciata da STC in lingua italiana e inglese. Eventuali traduzioni in altre lingue devono corrispondere esattamente al documento originale rilasciato e devono essere identificate come tali. La comunicazione/trasmissione di questa Valutazione Tecnica Europea, inclusa la trasmissione elettronica, deve avvenire in versione integrale (ad eccezione di eventuali Allegati confidenziali). In ogni caso una parziale riproduzione può essere fatta con il consenso scritto di STC (TAB che rilascia). In questo caso la riproduzione parziale deve essere indicata come tale.

PARTI SPECIFICHE

1. DESCRIZIONE TECNICA DEL PRODOTTO

Il prodotto GABBIONI è un gabbione di dimensioni variabili che consiste in una struttura composta da pannelli in rete in filo elettrosaldata, con rivestimento metallico, e tiranti strutturali disposti come da disegni del piano di montaggio del produttore, sintetizzato negli allegati A2-A7, da riempire in cantiere con materiale lapideo. Il gabbione è un contenitore in rete in filo che, una volta riempito con pietrame idoneo, può costituire l'elemento modulare di una struttura permeabile di ritenzione terra ed è impiegato per il contenimento del terreno e come barriera anti-erosione.
Questa Valutazione Tecnica Europea ha come oggetto il gabbione come contenitore (fili, rete in filo e composizioni di pannelli) da riempire con pietrame idoneo per l'impiego previsto nelle opere e il riempimento del gabbione non rientra nel suo campo d'applicazione.
I pannelli che compongono i gabbioni sono fabbricati a partire da filo in acciaio rivestito in lega 95% Zn/ 5% Al prima della saldatura (prima della produzione del pannello). Lo stesso tipo di filo è utilizzato per la fabbricazione dei tiranti. I tiranti, posizionati tra il pannello di fondo e i pannelli laterali, e attraverso pannelli laterali opposti sia nella direzione della larghezza che nella direzione della lunghezza, impediscono deformazioni localizzate del gabbione.
Relativamente al diametro del filo, i GABBIONI sono prodotti con due diversi diametri di filo, per quanto riguarda i pannelli in rete; i tiranti sono anch'essi prodotti in due diversi diametri a seconda dei diametro del filo dei pannelli del gabbione nel quale sono impiegati. I gabbioni sono quindi prodotti nelle seguenti due varianti, secondo il diametro del filo:

- con filo Ø mm 5.80 per i pannelli in rete e fili Ø mm 5.80 e mm 6.80 per i tiranti interni
- con filo Ø mm 4.80 per i pannelli in rete e filo Ø mm 5.80 per i tiranti interni.

Le reti dei pannelli presentano una piegatura alle estremità (su uno, tre o quattro lati secondo il tipo di pannello) che permette l'aggancio dei pannelli tra di loro a comporre il gabbione. Le connessioni, del tipo "looped ends" tra i tipi di connessioni tra pannelli esemplificati nell'EAD 200020-00-0102 al paragrafo 1.1, sono completate manualmente al momento dell'assemblaggio del gabbione con l'ausilio di attrezzi specifici, secondo le istruzioni del produttore (per la sequenza delle fasi di montaggio si vedano gli Allegati A2-A7 "Piano di montaggio").

La descrizione del prodotto, con riferimento ai suoi componenti, è riportata negli Allegati A1 (pannelli in rete in filo), A4 (tiranti) e A8-A11, che mostrano i disegni dei gabbioni nelle diverse dimensioni disponibili e la descrizione dettagliata, per quanto attiene alla loro geometria, degli elementi che li compongono.

2. INDIVIDUAZIONE DELL'USO PREVISTO IN ACCORDO CON IL DOCUMENTO PER LA VALUTAZIONE EUROPEA N° 200020-00-0102 (EAD nel seguito)

I gabbioni denominati GABBIONI riempiti con materiale lapideo idoneo, sono destinati all'impiego per contenimento terra, rinforzo del terreno, realizzazione di argini di corsi d'acqua, barriere anti-erosione e strutture di ritenzione in caso di frane.
La vita utile presunta per l'uso previsto dei gabbioni, fabbricati da fili rivestiti in Zn/Al, secondo l'EAD applicabile, è in accordo con la EN 10223-8, Allegato A, in relazione alle diverse categorie di corrosione dell'ambiente quando installati nelle opere, a condizione che siano soddisfatte le condizioni per l'imballaggio, il trasporto, lo stoccaggio, l'installazione e l'uso, la manutenzione e la riparazione appropriati. La reale vita utile può essere, in normali condizioni d'utilizzo, considerevolmente più lunga senza significativo degrado che influisca sui requisiti di base delle opere[1]. Le indicazioni in merito alla vita utile non possono essere interpretate come una garanzia fornita dal produttore, ma devono essere

[1] La reale vita utile di un prodotto incorporato in determinate opere dipende dalle condizioni ambientali alle quali le opera sono soggette, ma anche dalle particolari condizioni di progetto, esecuzione, uso e manutenzione delle opere. Quindi, non si può escludere che in certi casi la reale vita utile del prodotto possa essere anche più breve di quella indicata sopra.

considerate solo come un mezzo per scegliere i giusti prodotti in relazione alla vita utile prevista, economicamente ragionevole, delle opere.

Per quanto riguarda l'imballaggio, il trasporto e l'immagazzinamento del prodotto, è responsabilità del produttore adottare le misure appropriate e consigliare i propri clienti sul trasporto e l'immagazzinamento, che ritiene necessari per raggiungere le prestazioni dichiarate.
Le informazioni sull'installazione sono fornite con la documentazione tecnica del produttore e si presume che il prodotto sarà installato in base ad essa o (in assenza di tali istruzioni) secondo la prassi abituale dei professionisti dell'edilizia.

3. PRESTAZIONI DEL PRODOTTO E RIFERIMENTO AI METODI USATI PER LA SUA VALUTAZIONE

Le prove per la valutazione delle prestazioni di GABBIONI sono state eseguite in accordo all'EAD 200020-00-0102 secondo i metodi di prova ivi riportati e le relative indicazioni per il campionamento, il condizionamento e le condizioni di prova.
La numerazione (#) nelle seguenti tabelle corrisponde alla numerazione della Tabella 1 al paragrafo 2.1 dell'EAD 200020-00-0102.

3.1 RESISTENZA MECCANICA E STABILITA' (BWR 1)

#	Caratteristica essenziale	Prestazione
1	Diametri del filo D_w	4.8 mm – 5.8 mm – 6.8 mm
2	Resistenza a trazione del filo f_t	Vedi Allegato B1. Tabella B1
3	Dimensioni del prodotto H,L,W, misure della maglia M x N e dei componenti di connessione	Vedi Allegato B1. Tabella B2 e Allegato B2. Tabella B3
4	Protezione dalla corrosione: tipologia con rivestimento metallico non ferroso Classe della massa del rivestimento	I fili in acciaio rivestito in lega Zinco/Alluminio sono rivestiti con: - filo Ø 4.8 mm: 280 g/m^2 minimo corrispondente alla classe A in accordo con la Tabella 2 della EN 10244-2; - fili Ø 5.8 and Ø 6.8 mm: 290 g/m^2 minimo corrispondente alla classe A in accordo con la Tabella 2 della EN 10244-2.
	Protezione dalla corrosione: massa del rivestimento zincato per immersione a caldo	**Non applicabile.**
5	Protezione aggiuntiva dalla corrosione: tipologia con rivestimento organico Spessore del rivestimento e diametro del filo Concentricità del rivestimento	**Non applicabile.**
6	Resistenza al taglio della saldatura	**Nessuna prestazione valutata.**
7	Resistenza all'apertura del C-ring (o di simile fissaggio)	**Non applicabile.**
8	Resistenza a trazione del gabbione/materasso inclusa connessione	- Gabbione con filo Ø mm 5.80 per i pannelli in rete in filo: 18.7 kN/m - Gabbione con filo Ø mm 4.80 per i pannelli in rete in filo: 12.1 kN/m
9	Durabilità in atmosfere artificiali: test col biossido di zolfo con condensazione generale dell'umidità	**Nessuna prestazione valutata.**
	Durabilità in atmosfere artificiali: test con spray salino neutro	Tempo di esposizione in ore con DBR (Dark Brown Rust) superficie ≤ 5% della superficie: 2000 ore
	Durabilità in atmosfere artificiali: resistenza agli UV del materiale di rivestimento organico	**Non applicabile.**

3.2 SICUREZZA E ACCESSIBILITA' NELL'USO (BWR 4)

#	Caratteristica essenziale	Prestazione
10	Protezione da lesioni	Il gabbione non crea alcun rischio evidente di lesioni originato da estremità acuminate di fili sporgenti

3.3 PROTEZIONE DAL RUMORE (BWR 5)

#	Caratteristica essenziale	Prestazione
11	Isolamento dal rumore aereo	**Nessuna prestazione valutata.**
12	Potere fonoassorbente	**Nessuna prestazione valutata.**

4. SISTEMA APPLICATO DI VALUTAZIONE E VERIFICA DELLA COSTANZA DI PRESTAZIONE (AVCP), CON RIFERIMENTO ALLE SUE BASI LEGISLATIVE

In accordo con il Documento per la Valutazione Europea N. 200020-00-0102 l'atto giuridico europeo applicabile è la **Decisione n. 98/214/EC**.
Il sistema di valutazione e verifica della costanza della prestazione (AVCP) è: **2+**.

5. DETTAGLI TECNICI NECESSARI PER L'IMPLEMENTAZIONE DEL SISTEMA AVCP, COME PREVISTI DALL' EAD 200020-00-0102

I dettagli tecnici necessari per l'implementazione del sistema AVCP sono definiti nel piano dei controlli, depositato presso STC.

Roma, 16/03/2023

IL PRESIDENTE
DEL CONSIGLIO SUPERIORE DEI LAVORI PUBBLICI
Ing. Massimo SESSA

MASSIMO SESSA
MiMS
17.03.2023
18:00:35
GMT+01:00

MARIARCANGELA
RAMUNDO
MiMS
17.03.2023
16:16:12
GMT+00:00

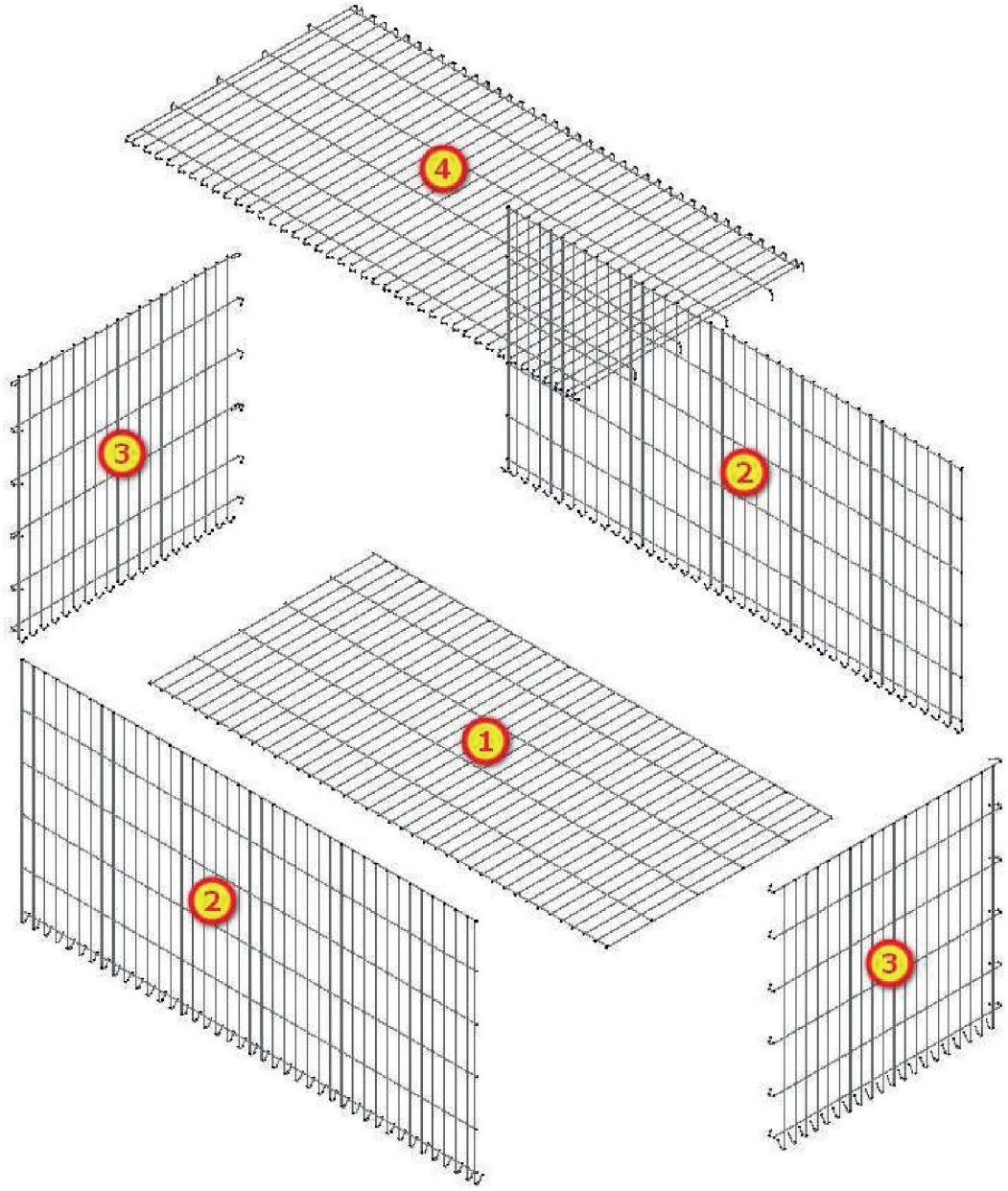
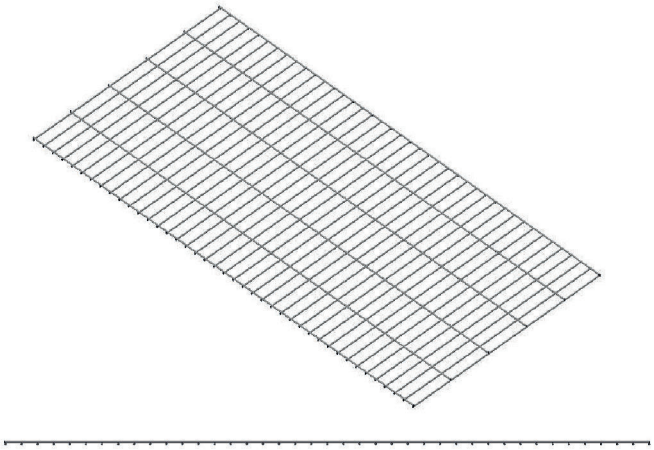


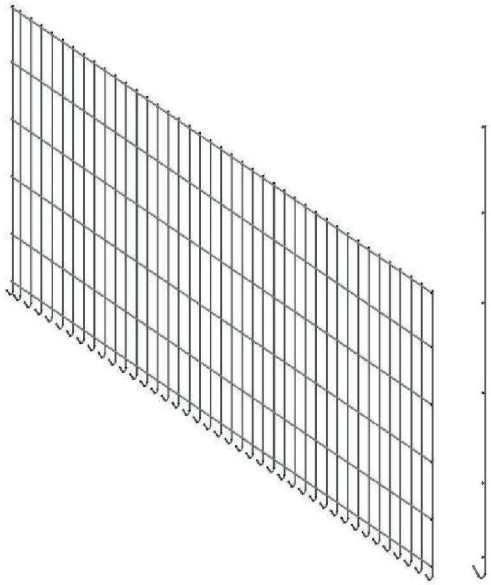
Figura A.1 – I pannelli in rete che compongono il gabbione

1 Pannello di fondo
2 Sponda liscia
3 Sponda ganci
4 Coperchio

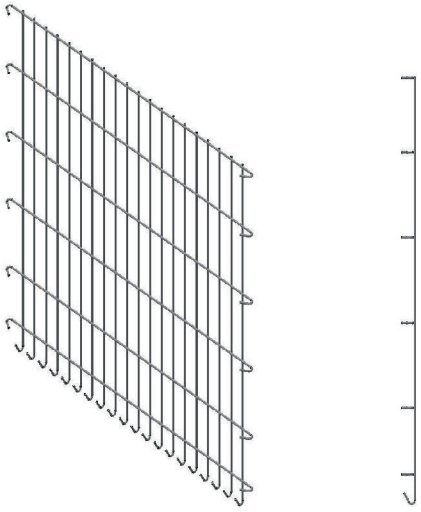
GABBIONI	**Allegato A1/1** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Componenti del gabbione: i pannelli in rete elettrosaldata	



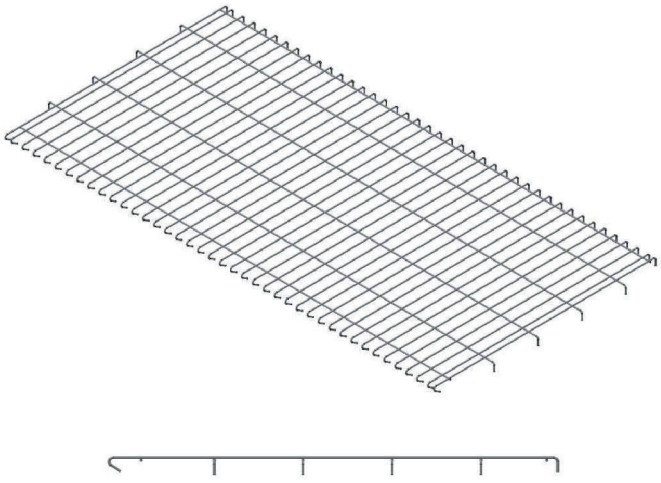
1 Pannello di fondo



2 Sponda liscia



3 Sponda ganci



4 Coperchio

Figura A.2 – I componenti del gabbione (esclusi i tiranti)

GABBIONI	**Allegato A1/2** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Componenti del gabbione: i pannelli in rete elettrosaldata	

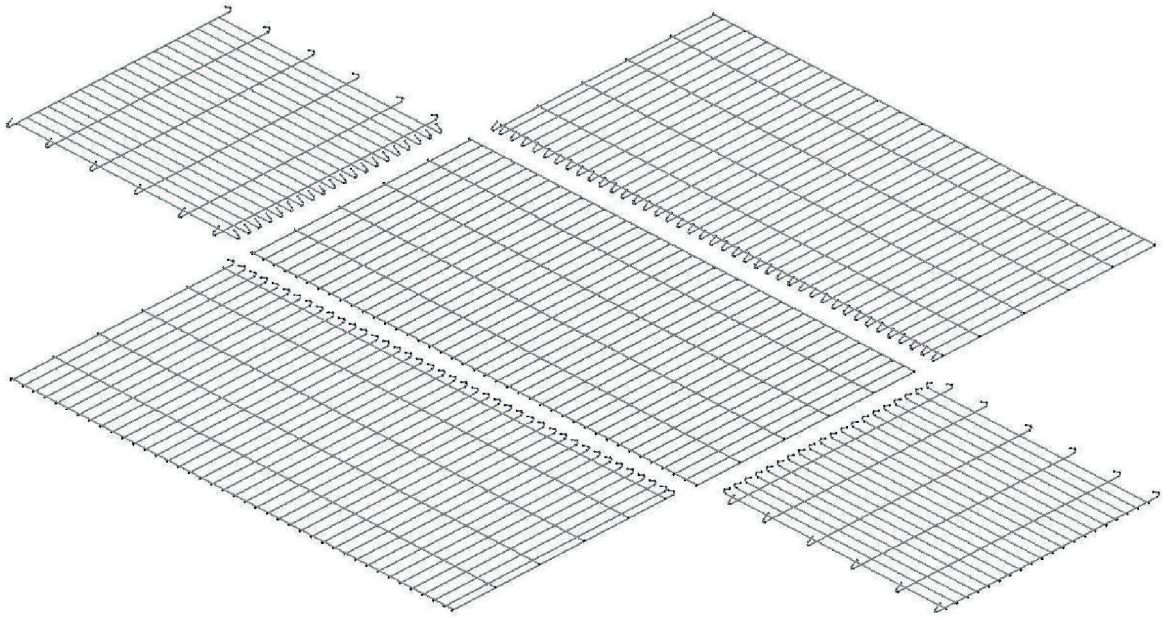


Figura A.3 – Fase 1: posizionare come da disegno i pannelli che compongono il gabbione, tenendo i fili lunghi del pannello di fondo nella parte superiore (sulla faccia superiore del pannello)

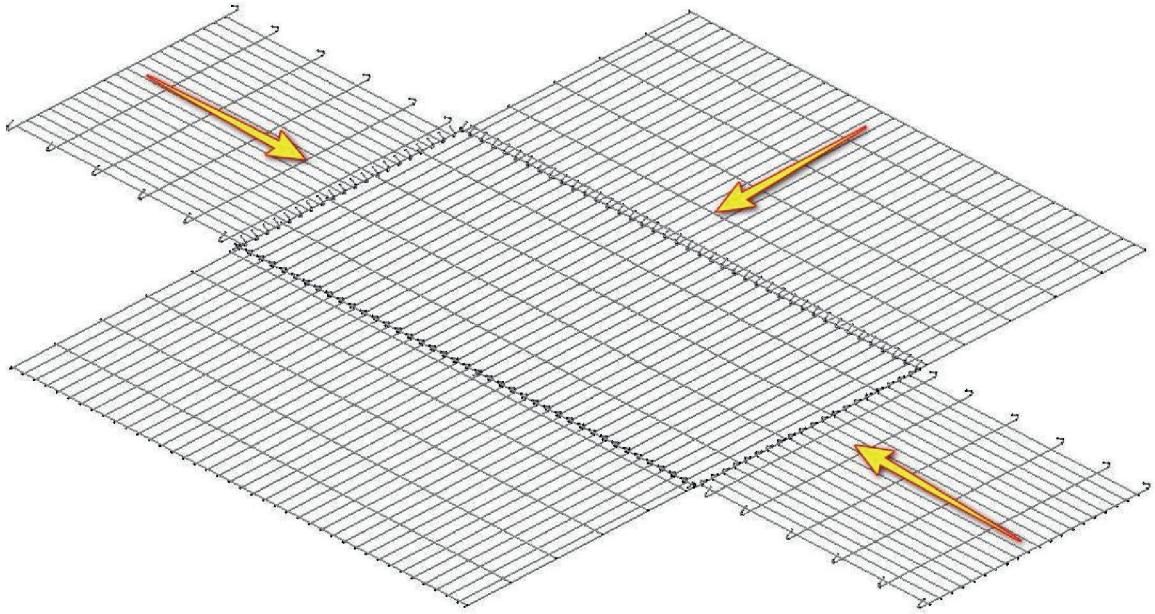


Figura A.4 – Fase 2: agganciare una sponda liscia al pannello di fondo

GABBIONI	**Allegato A2** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Piano di montaggio: le fasi di assemblaggio del gabbione	

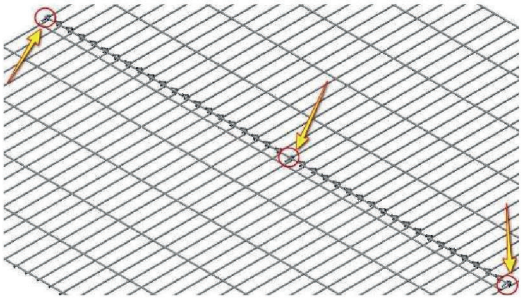


Figura A.5 – Fase 3: aiutarsi con un martello per chiudere 2/3 ganci dalla sponda sul pannello di fondo e ripetere le operazioni delle fasi 2 e 3 per le altre tre sponde

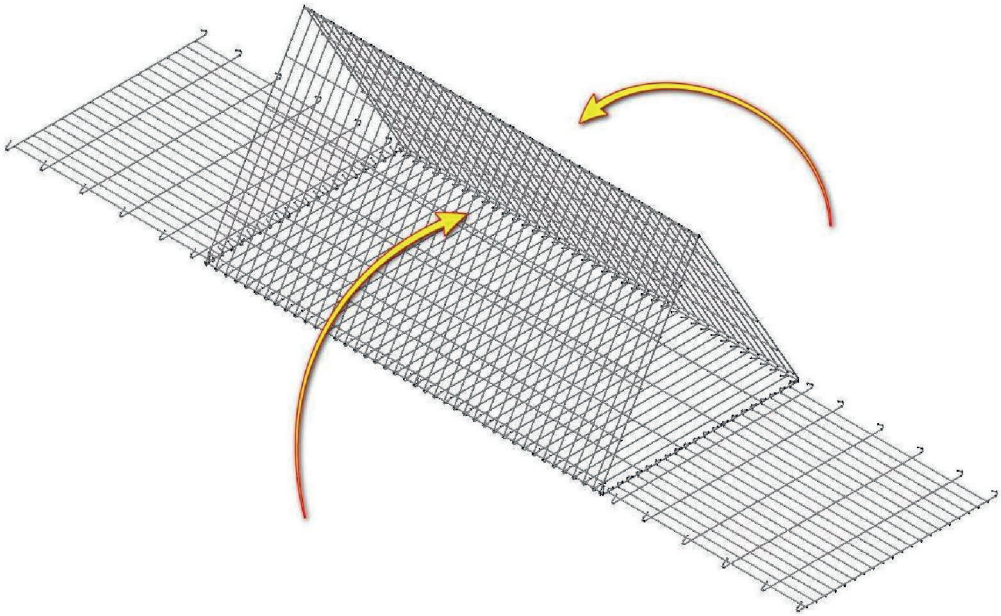


Figura A.6 – Fase 4: sollevare le due sponde lisce fino a farle appoggiare l'una all'altra

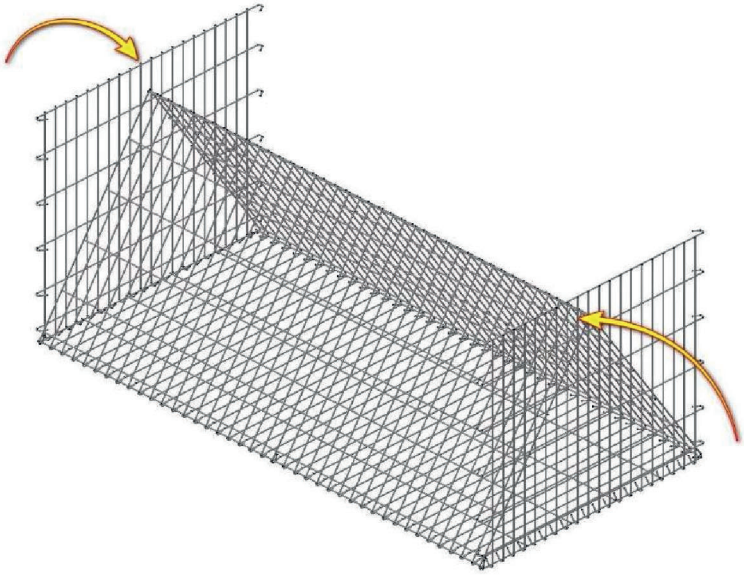


Figura A.7 – Fase 5: sollevare le due sponde con i ganci

GABBIONI	**Allegato A3** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Piano di montaggio: le fasi di assemblaggio del gabbione	

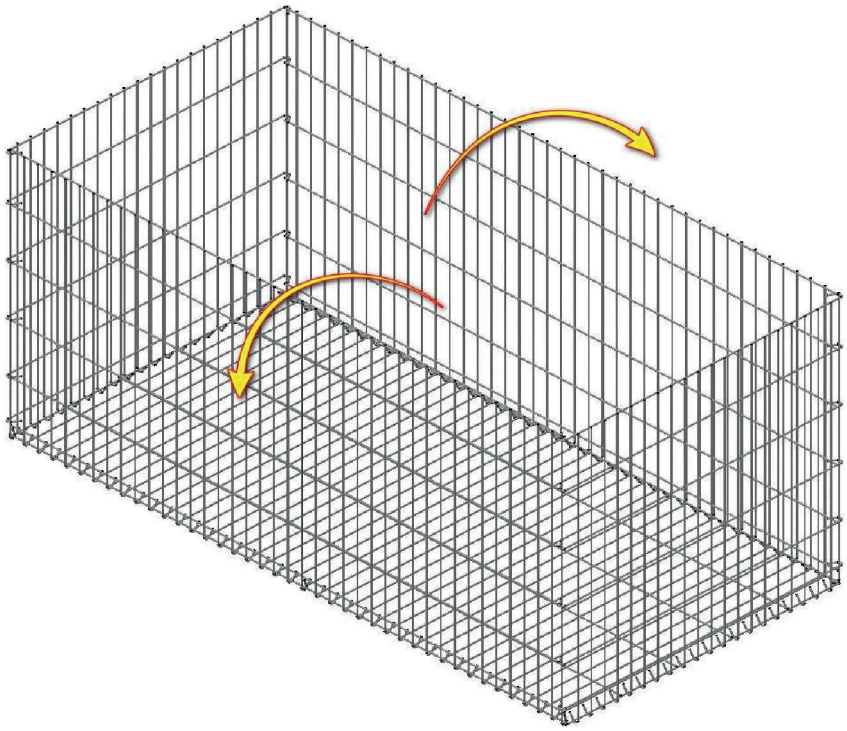


Figura A.8 – Fase 6: aprire le due sponde lisce così da farle incastrare nelle sponde ganci

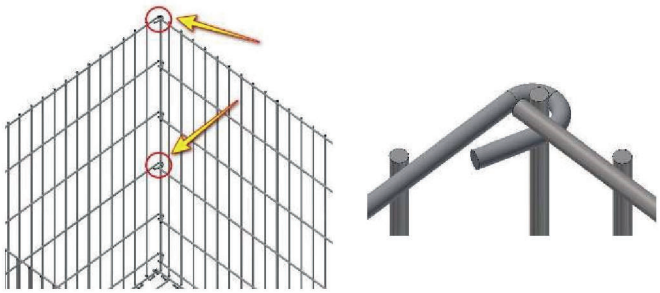


Figura A.9 – Fase 7: utilizzando una pinza chiudere due ganci, il primo e il quarto gancio di ogni sponda

- 10 Tiranti Ø 6.80 mm, lunghezza 100 cm

- 4 Tiranti Ø 5.80 mm, lunghezza 200 cm

- 6 Tiranti Ø 5.80 mm, lunghezza 60 cm

Figura A.10 – Fase 8: preparare i tiranti nel numero, diametro Ø e lunghezza definiti

GABBIONI	**Allegato A4** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Piano di montaggio: le fasi di assemblaggio del gabbione	

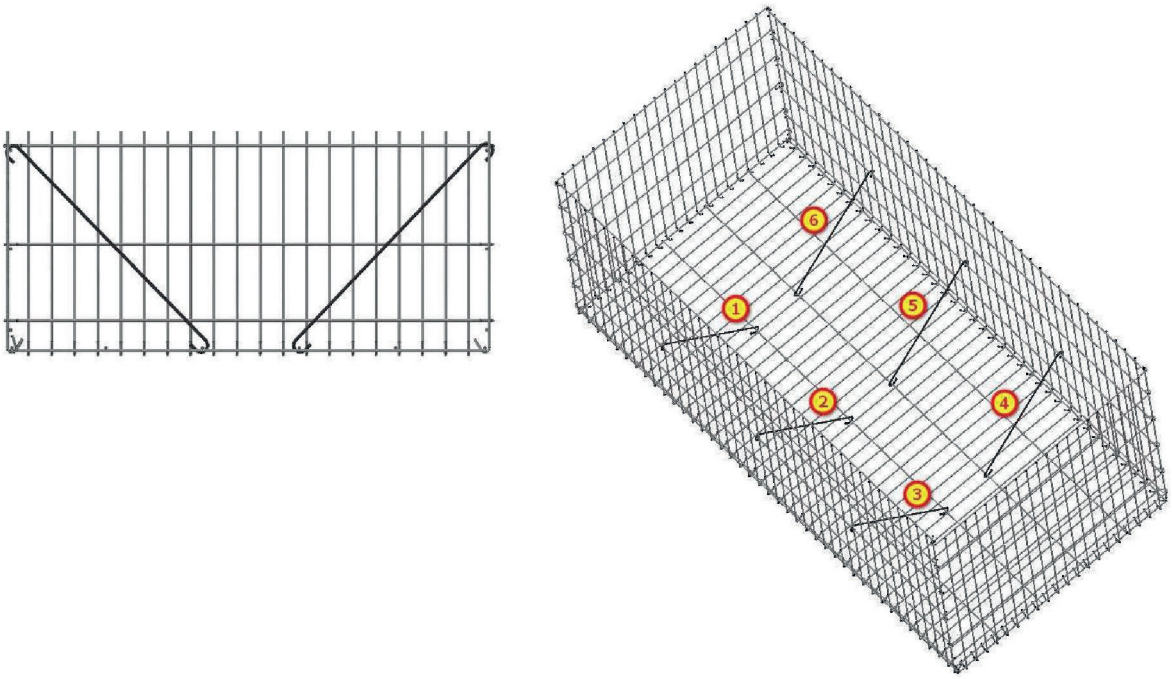


Figura A.11 – Fase 9: inserire i 6 tiranti di lunghezza cm 60 tra la sponda liscia e il pannello di fondo (3 per sponda)

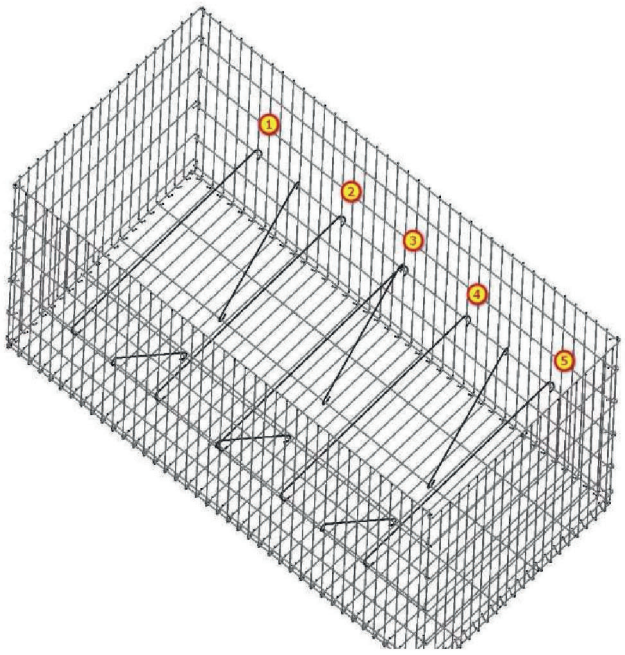
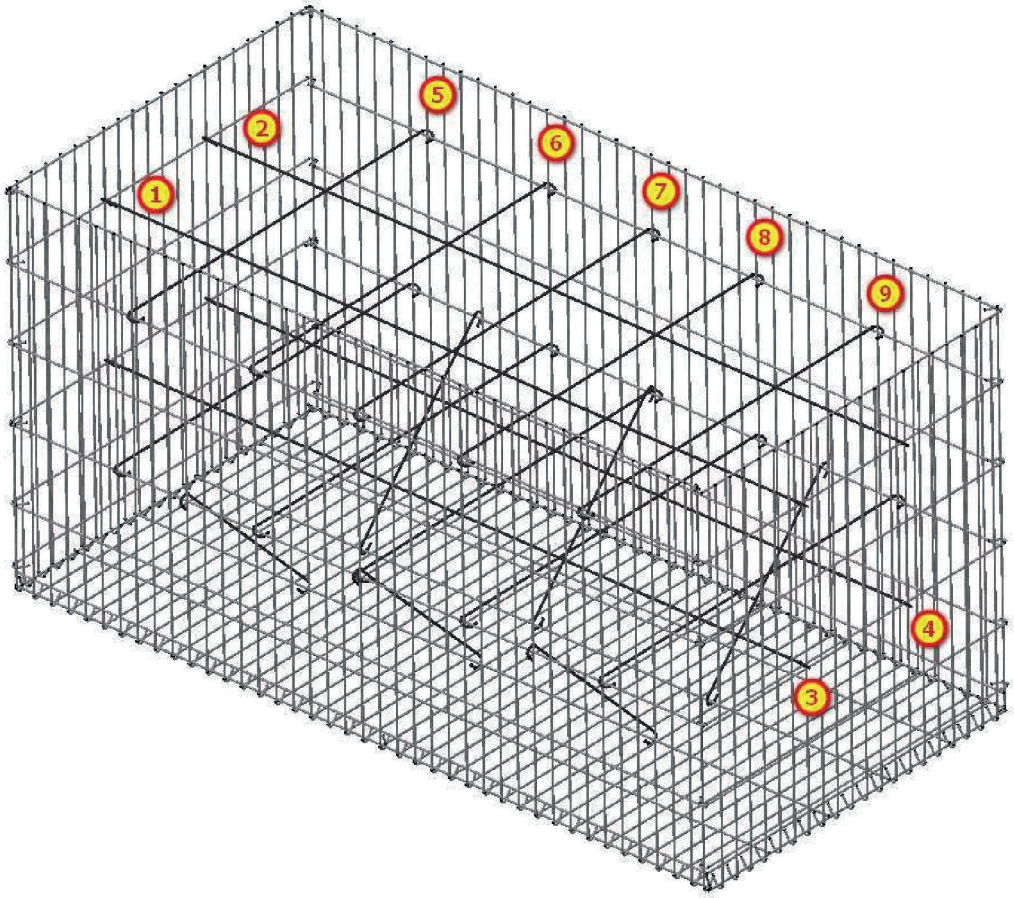


Figura A.12 – Fase 10: inserire 5 tiranti di lunghezza cm 100 come indicato in figura

GABBIONI	**Allegato A5** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Piano di montaggio: le fasi di assemblaggio del gabbione	



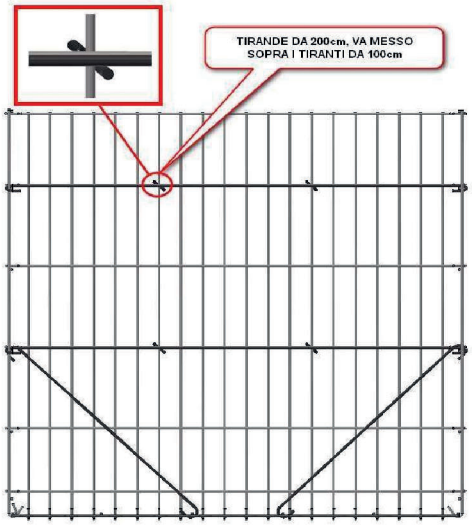


Figura A.13 – Fase 11: inserire i restanti tiranti, posizionando i tiranti di L cm 200 sopra quelli di L cm 100

GABBIONI	**Allegato A6** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Piano di montaggio: le fasi di assemblaggio del gabbione	

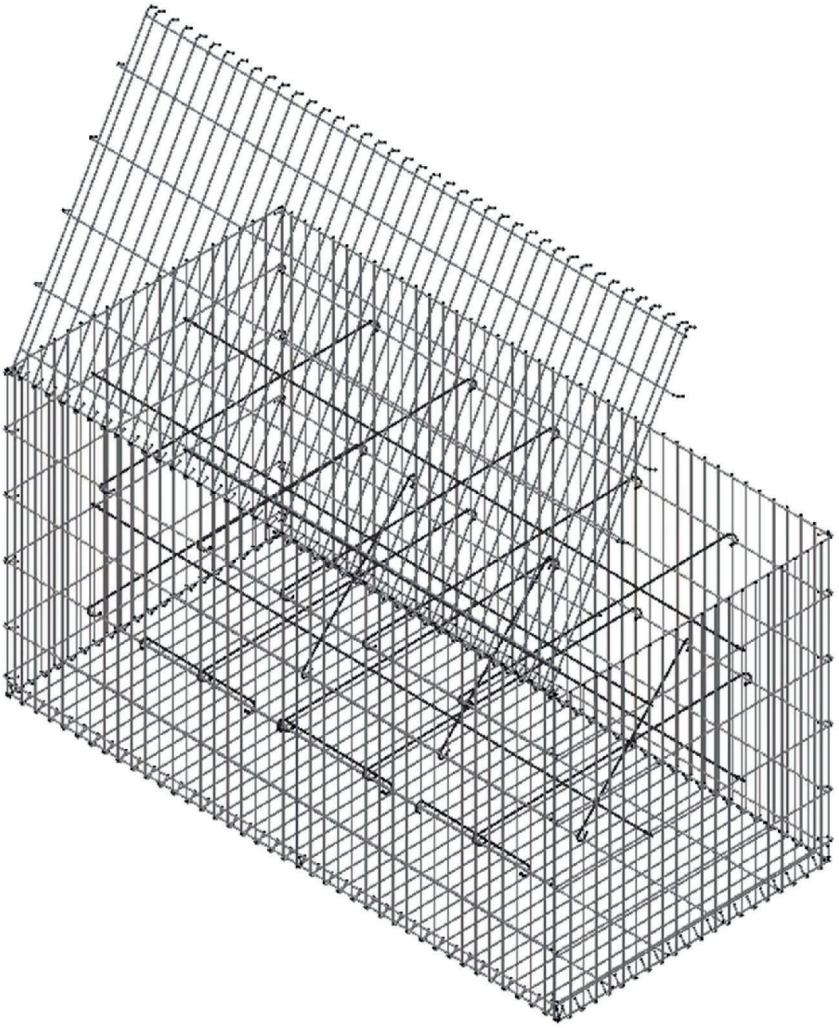


Figura A.14 – Fase 12: dopo il riempimento del gabbione agganciare il coperchio alla sponda liscia chiudendo 2/3 ganci con la stessa procedura della fase 3

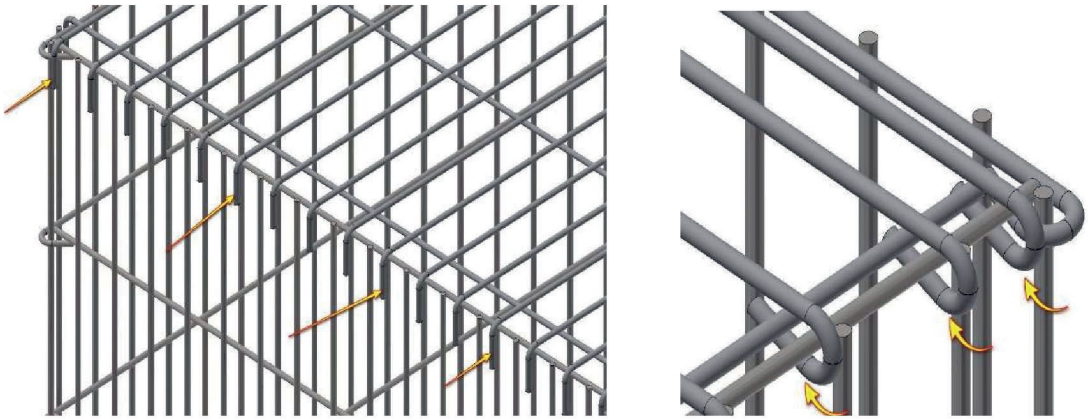
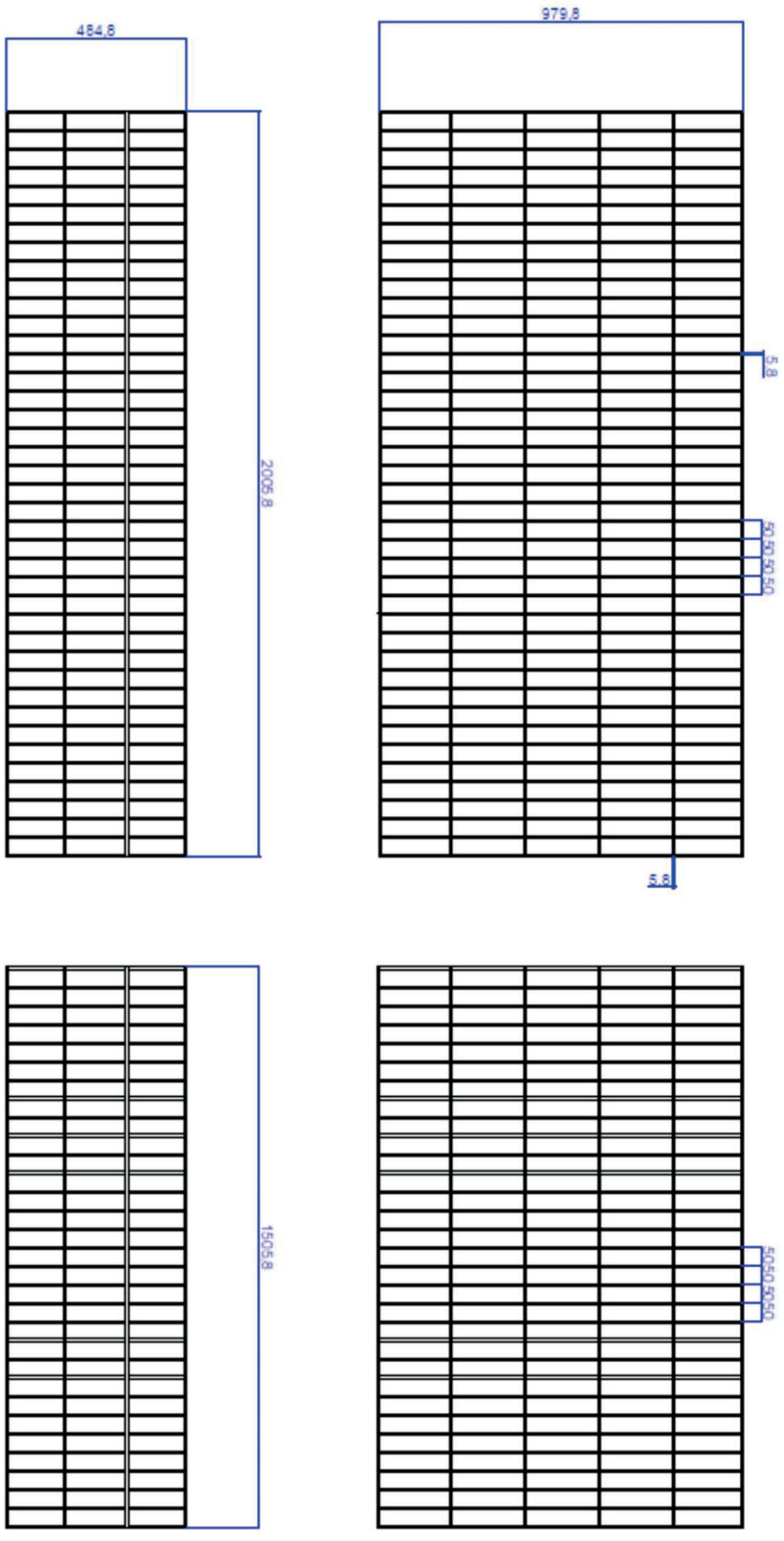
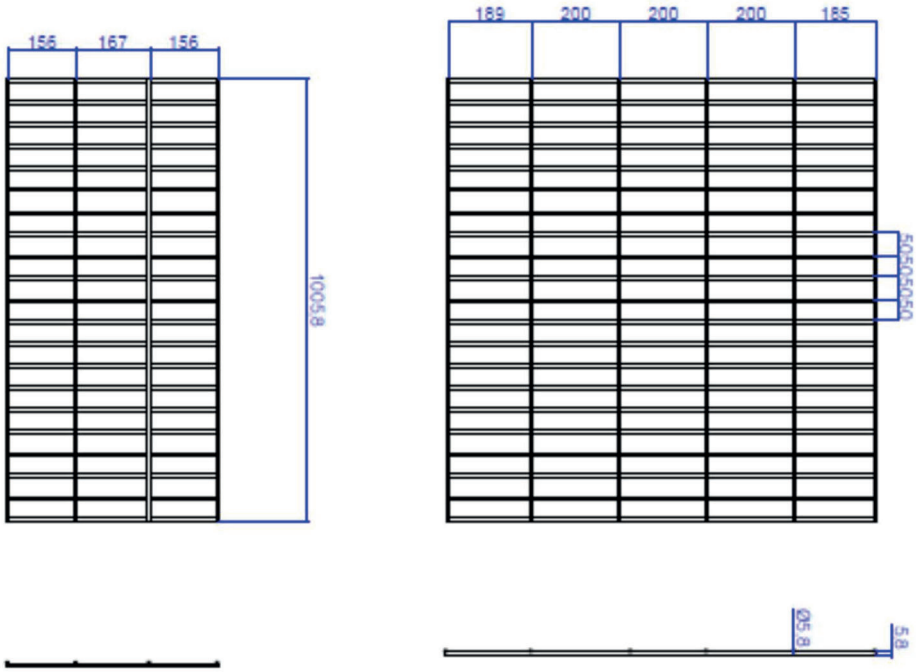


Figura A.15 – Fase 13: piegare verso l'interno tutti i ganci a 90° del coperchio

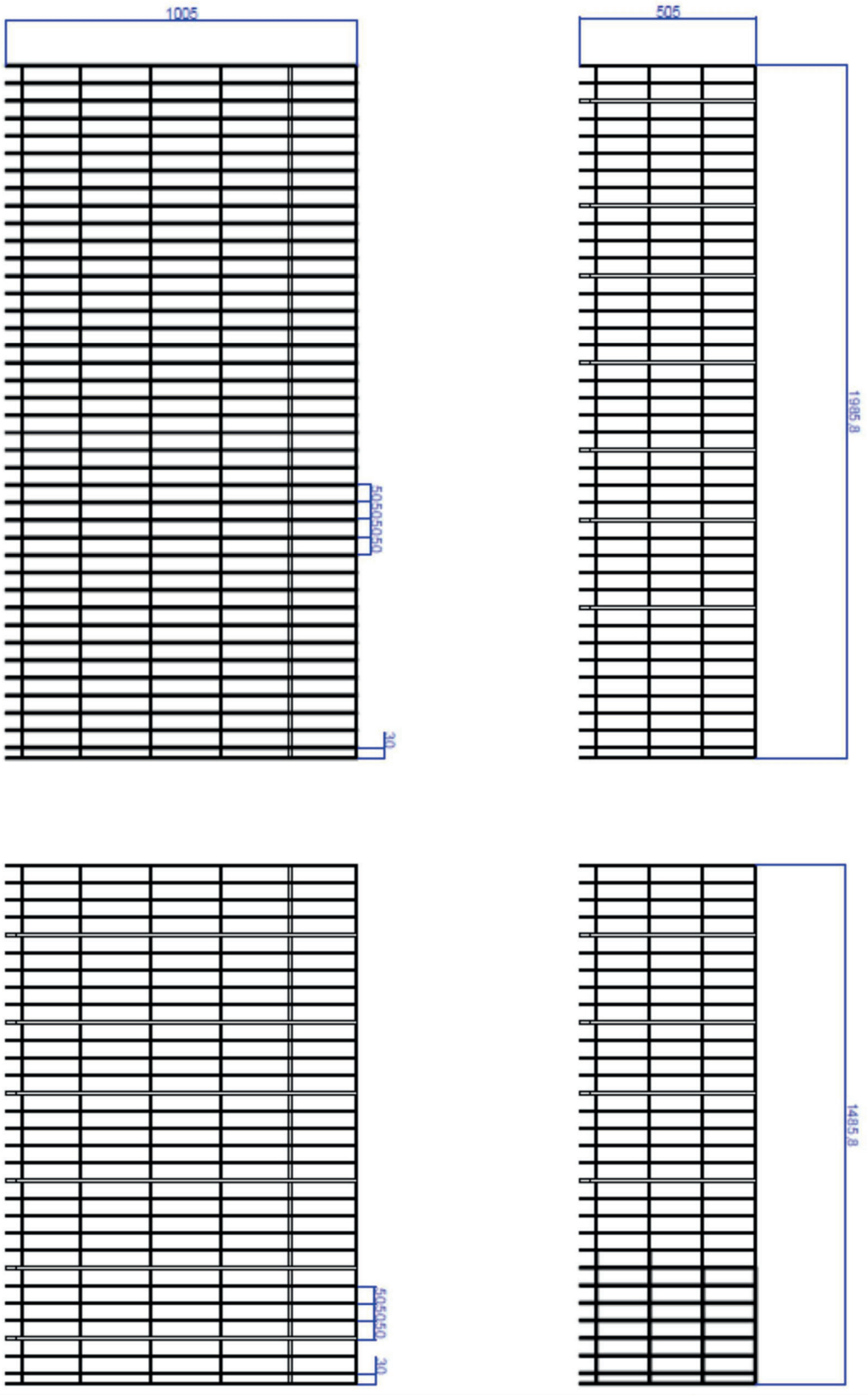
GABBIONI	**Allegato A7** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Piano di montaggio: le fasi di assemblaggio del gabbione	



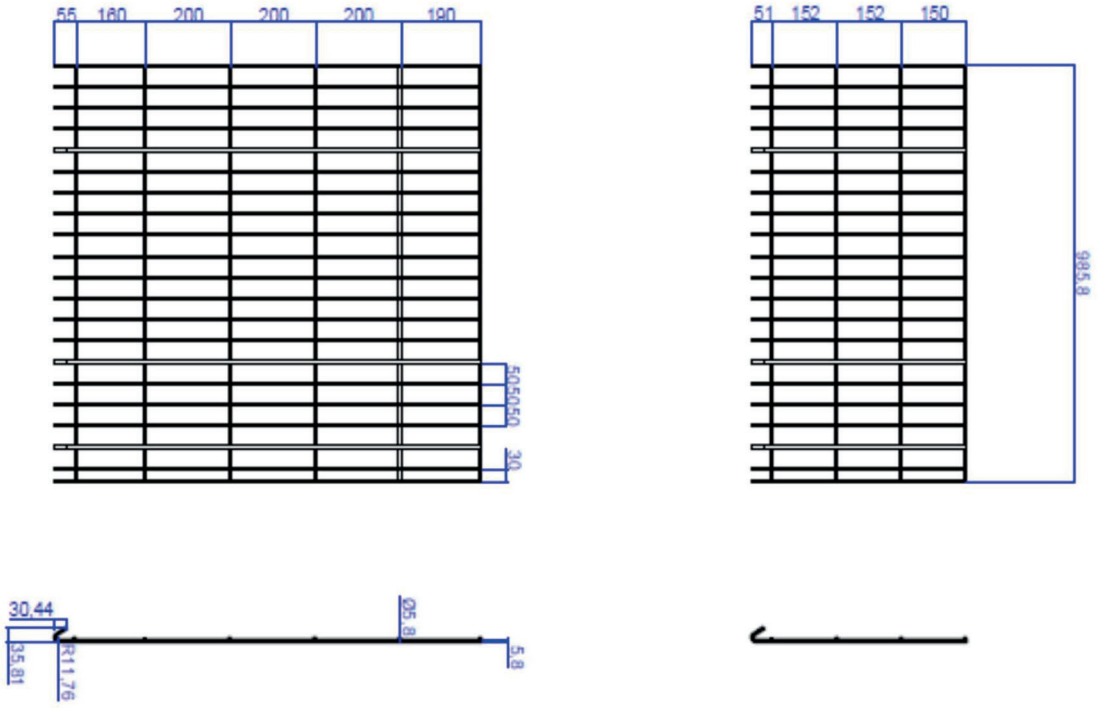
GABBIONI	**Allegato A8/1** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Componenti del gabbione: pannelli di fondo	



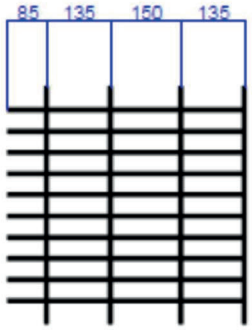
GABBIONI	Allegato A8/2 dell'ETA N° 22/0732
Descrizione del Prodotto – Componenti del gabbione: pannelli di fondo	

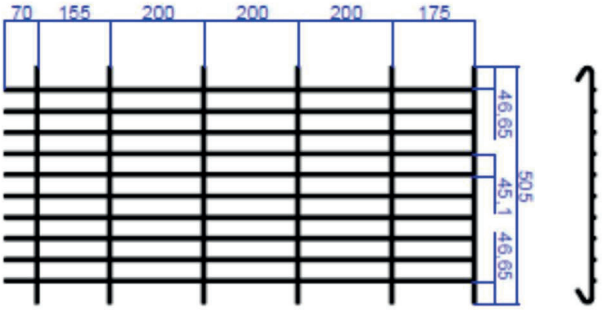


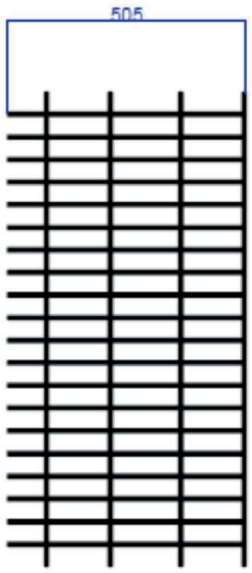
GABBIONI	**Allegato A9/1** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Componenti del gabbione: sponde lisce	

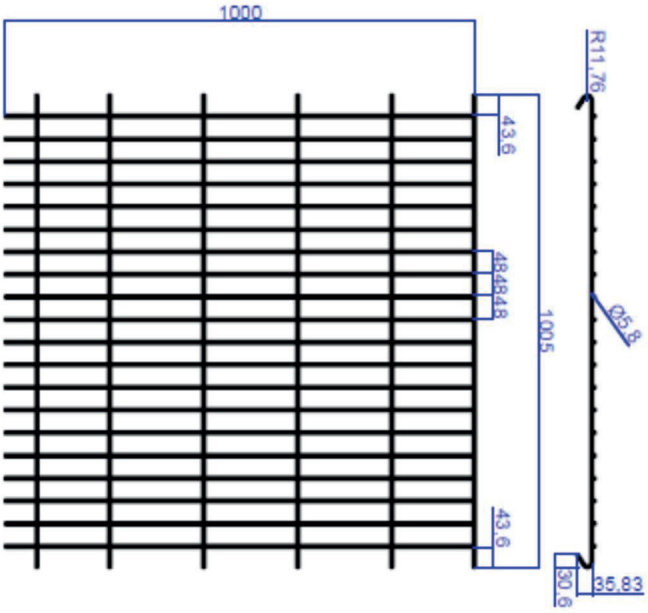


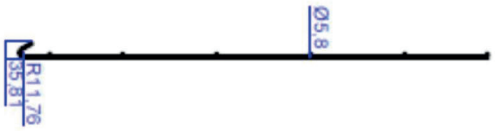
GABBIONI	Allegato A9/2 dell'ETA N° 22/0732
Descrizione del Prodotto – Componenti del gabbione: sponde lisce	



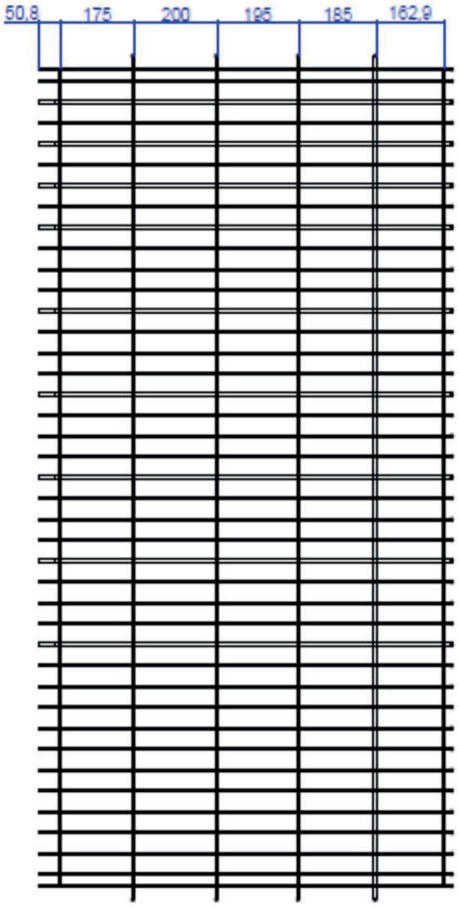


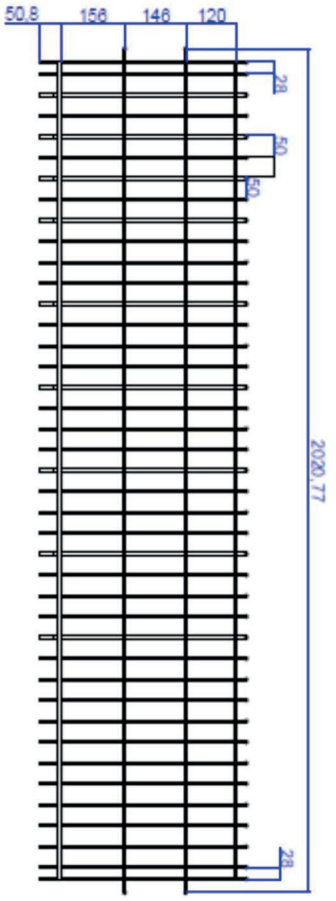


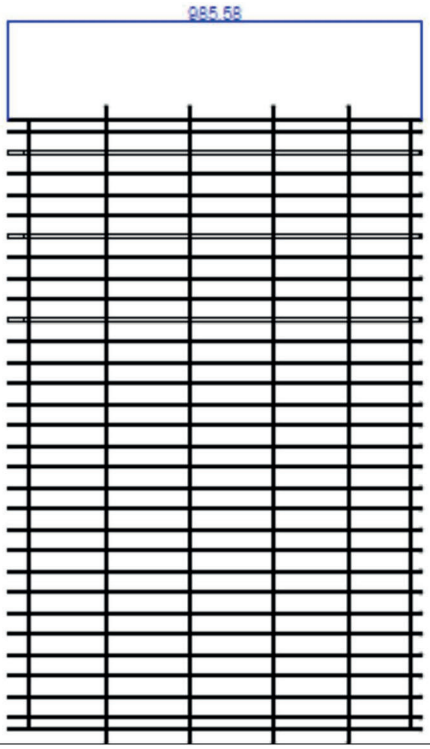


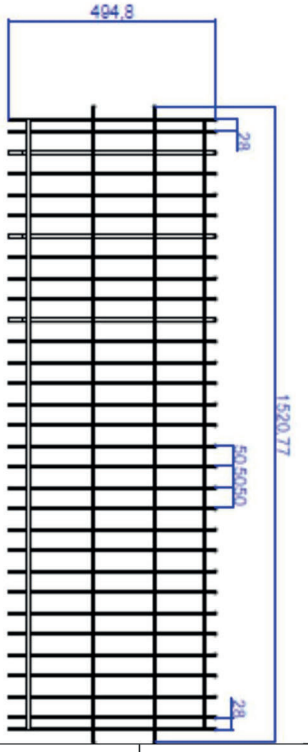


GABBIONI	**Allegato A10** **dell'ETA N° 22/0732**
Descrizione del Prodotto – Componenti del gabbione: sponde ganci	





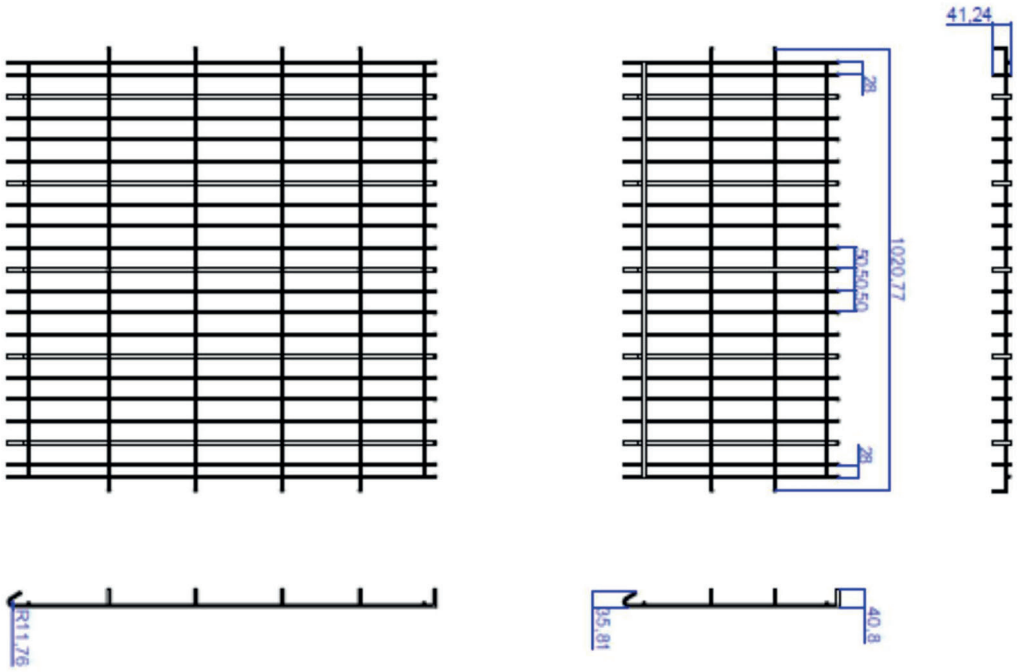




GABBIONI

Descrizione del Prodotto – Componenti del gabbione: coperchi

Allegato A11/1
dell'ETA N° 22/0732



GABBIONI	Allegato A11/2 dell'ETA N° 22/0732
Descrizione del Prodotto – Componenti del gabbione: coperchi	

Tabella B1: Resistenza a trazione del filo f_t

Diametro del filo [mm]	Resistenza a trazione del filo f_t (valore medio da test) [N/mm^2]	
4.8	667	Resistenza a trazione del filo >500 N/mm^2 in accordo con il paragrafo 7.4 della EN 10223-8
5.8	609	
6.8	749	

Tabella B2: Dimensioni del prodotto

	Dimensioni nominali dei gabbioni		
	[cm]	[cm]	[cm]
Codice	H	L	W
TP2	50	100	50
TP3	100	100	50
TP4	100	150	50
TP5	100	100	100
TP6	100	150	100
TP7	100	200	100
TP8	100	200	50
TP9	50	200	50
TP10	50	150	50
TP11	50	150	100
TP12	50	200	100
TP13	50	100	100

GABBIONI	**Allegato B1** **dell'ETA N° 22/0732**
Prestazioni – Resistenza a trazione del filo, dimensioni del prodotto	

Tabella B3: Pannelli in filo: misure della maglia M x N

Tipo di pannello in filo/funzione	Misure della maglia M X N [mm x mm]
Pannello di fondo	50 x 156 50 x 167 50 x 185 50 x 189 50 x 200
Coperchio	28 x 120 28 x 146 28 x 156 28 x 163 28 x 175 28 x 185 28 x 195 28 x 200 50 x 120 50 x 146 50 x 156 50 x 163 50 x 175 50 x 185 50 x 195 50 x 200
Sponda liscia	30 x 150 30 x 152 30 x 160 30 x 190 30 x 200 50 x 150 50 x 152 50 x 160 50 x 190 50 x 200
Sponda ganci	48 x 135 48 x 150 48 x 155 48 x 175 48 x 200

GABBIONI	**Allegato B2** **dell'ETA N° 22/0732**
Prestazioni – Misure della maglia M x N	