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Evaluation Report of

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GENERAL PART

Trade name of the construction product

Product family to which the construction product belongs

Manufacturer

Manufacturing plant

This Evaluation Report contains:

GABBIONI SER.CA.

**PAC 20: STRUCTURAL METALLIC
PRODUCTS AND ANCILLARIES.**
Weldmesh gabion boxes and mattresses

Ser.Ca. S.r.l.
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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 SER.CA. introduced by Ser.Ca. S.r.l., Via A. Pacinotti, 6-8-10 – I - 25034 Orzinuovi (BS) – ITALY. 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 SER.CA. have been measured according to clause 4.1 of EN 10218-2 [1].

Table 1: Wire diameter of GABBIONI SER.CA.

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 SER.CA. 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 SER.CA.

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 SER.CA. 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 SER.CA. (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 SER.CA. (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.

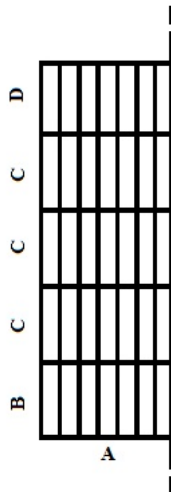
1.3.1.2 Mesh size M x N

The mesh sizes M x N of the different welded wire panels which make up the gabion boxes GABBIONI SER.CA. 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 SER.CA.



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 SER.CA.

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 SER.CA.

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 SER.CA.

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 SER.CA., 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 SER.CA.

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 F_m

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 SER.CA., 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 SER.CA. 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 SER.CA. 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 SER.CA. 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 SER.CA., 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 Ser.Ca. - 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.