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EUROPEAN TECHNICAL ASSESSMENT



UBAtc Assessment Operator: COPRO Z.1 Researchpark, Kranenberg 190 B-1731 ZELLIK (Asse) www.copro.eu – info@copro.eu



Technical Assessment Body issuing the European Technical Assessment: UBAtc. UBAtc has been designated according to Article 29 of Regulation (EU) No 305/2011 and is member of EOTA (European Organisation for Technical Assessment)

Trade name of the construction product:

Product family to which the construction product belongs:

Manufacturer and manufacturing plant:

Website:

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

This European Technical Assessment contains:

Double Twisted steel wire mesh Reinforced or not with Ropes

Road construction products

Link Middle East Ltd. / Link Middle East Ind. LLC P.O. Box 16846, Plot no. 174-181 & 140-151, Al Hamra Ind. Area, Ras Al Khaimah Plot no. B34B04A, Jabel Ali Free zone, Dubai, United Arab Emirates.

www.linkmiddleeast.com

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European Organisation for Technical Assessment

Union belge pour l'Agrément technique de la Construction asbl

Head Office: Rue du Lombard 42 1000 Bruxelles Offices: Kleine Kloosterstraat 23 1932 Sint-Stevens-Woluwe

VAT BE 0820.344.539 - RLP Brussels

Tel.: +32 (0)27164412 info@butgb-ubatc.be www.butgb-ubatc.be

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- 1 This European Technical Assessment is issued by UBAtc (Union belge pour l'Agrément technique de la construction, i.e. Belgian Union for technical Approval in construction), in accordance with:
 - Regulation (EU) N° 305/2011¹ of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC
 - Commission Implementing Regulation (EU) N° 1062/2013² of 30 October 2013 on the format of the European Technical Assessment for construction products
 - European Assessment Document (EAD) 230008-00-0106.
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- 14 This European Technical Assessment was first issued by UBAtc on 2023-04-18.

¹ OJEU, L 88 of 2011/04/04

Technical Provisions

1 Technical Description of Product

Double twisted steel wire mesh reinforced or not with ropes (see figure 1 and 2) are produced from components:

- Non-ferrous metallic coated wires,
- Non-ferrous metallic coated wire with organic coating extruded onto the metallic coated wire,
- Non-ferrous metallic coated steel wire ropes and non-ferrous metallic coated wire,
- Non-ferrous metallic coated steel wire ropes and non-ferrous metallic coated wire with organic coating extruded onto the metallic coated rope and wire

And connection components of mesh:

- Lacing wires, lacing rings, clips and lap-links to connect the mesh together.

Double twisted mesh reinforced or not with ropes during the production, is produced in rolls.



Figure 1 – Shape and connection of double twisted wire mesh and double twisted wire mesh reinforced with ropes connected: a) and d) by lacing wire, b) by lacing rings or clips, c) by lacing lap links.



Figure 2 – Double twisted wire mesh reinforced with ropes.

The connection of double twisted wire meshes together is performed using lacing wires, lacing rings or lacing clips an lacing lap links (see figure 1).

The nominal mesh sizes and tolerances are mentioned in table 1.

Table 1 – Nominal mesh sizes and tolerances

Mesh type	м	Tolerance (Table 2, EN 10223-3)
	(mm)	(mm)
6 x 8	60	-0/+8
8 x 10	80	-0/+10
10 x 12	100	- 4/+12

The characteristics of the wires and their tolerances are mentioned in table 2.

The dimensions of double twisted mesh reinforced or not with ropes are given in table 3

The organic coating characteristics are shown in Table 4.

The organic coating type and thickness on wire is in accordance with Table 2. The minimum concentricity of organic coating is 60%.

The organic coating must be insured: no cracks (no visible underlying steel wire) in organic coating within the double twist region occur at 50 % of the mean value of tensile strength of the mesh.

For the mesh wire characteristics, see Table 5

The characteristic tensile strengths pk of meshes following EN 10223-3 clause 9, are given in table 6a and table 6b.

The characteristic value of punching resistance and deflection of meshes is determined following annex B in ISO 17746, are given in table 6a and table 6b.

		Diam	eter	Minimum mass of	
Connection	Coating type	Non-ferrous metallic coating (Table 1 - EN 10218-2)	Organic coating (Table 2 – EN 10218-2)	Zinc aluminium alloy coating (Class A, Table 2 - EN 10244-2)	Tensile strength Ft (Cl. 5.2 - EN 10223-3)
		(mm)	(mm)	(g/m²)	(MPa)
	Zinc Alloy	2,20 ± 0,06	3,20 ± 0,20	230	
	Zn95%/Al5% +	2,70 ± 0,06	3,70 ± 0,20	245	
Mesh Wire	or Zn90%/Al10% + MM	3,00 ± 0,07	4,00 ± 0,20	255	
	Zinc Alloy	2,70 ± 0,06	3,70 ± 0,20	245	
	Zn95%/Al5% +	3,40 ± 0,07	4,40 ± 0,20	265	
Selvedge wire	or Zn90%/AI10% + MM	3,90 ± 0,07	4,90 ± 0,20	275	250 550
Lacing wire	Zinc Alloy Zn95%/Al5% + MM or Zn90%/Al10% + MM	2,20 ± 0,06	3,20 ± 0,20	230	330-330
C-ring	Zinc Alloy Zn95%/Al5% + MM or Zn90%/Al10% + MM	3,00 ± 0,07	-	255	

Table 2 – Characteristics of wires and their tolerances

Table 3 – Dimensions of double twisted mesh

Length (L)	Width (W)
10m, 20 m, 25 m, 50 m or 100 m	2 m to 4 m
± 5% (Cl. 6.3 - EN 10223-3)	± 5% (Cl. 6.3 - EN 10223-3)

Table 4 – Properties of organic coating materials

	PVC – EN 10245-2	PA6 - EN 10245-5
Density	≤ 1,5 g/cm ³	≤ 1,15 g/cm ³
Hardness	Min 38 Shore D	Max 82 Shore D
Tensile strength	Min. 17 MPa	Min. 30 MPa
Elongation at break	Min. 200 %	Min. 200 %

Table 5 – Characteristics of mesh wires and wire o	diameters
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		Wire					
Mesh type	Coating Type	Diameter mesh wire	Diameter mesh wire + organic coating	Diameter selvedge wire	Diameter selvedge wire + organic coating	Diameter lacing wire	Diameter lacing wire + organic coating
		(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
4,40		2,20	3,20	2,70	3,70		
0X0	Zinc Alloy 7n95%/Al5% +	2,70	3,70	3,40	4,40		
8v10	MM	2,70	3,70	3,40	4,40	2 20	3 20
0010	Or	3,00	4,00	3,90	4,90	2,20	5,20
10,410	2090%/AIT0% +	2,70	3,70	3,40	4,40		
TUXTZ		3,00	4,00	3,90	4,40		

Table 6a – Characteristic value of tensile strength, punching resistance and deflection of mesh for Zinc/Aluminium alloy (Zn95%/AI5% or Zn90%/AI10%) coated wires

Mesh type	Wire diameter	Tensile strength	Punching resistance	Deflection
	(mm)	(kN/m) (Avg. *)	(kN) (Avg. *)	(mm) (Avg. *)
/ × 9	Mesh 2.20 Selvedge 2.70	37.18	38.83	523
0 X 0	Mesh 2.70 Selvedge 3.40	55.01	60.58	503
8 × 10	Mesh 2.70 Selvedge 3.40	54.83	50.15	513
0 X 10	Mesh 3.00 Selvedge 3.90	63.53	67.74	532
10 × 10	Mesh 2.70 Selvedge 3.40	71.90	39.26	503
10 X 12	Mesh 3.00 Selvedge 3.90	77.79	48.78	518

Table 6b – Characteristic value of tensile strength, punching resistance and deflection of mesh for Zinc/Aluminium alloy + PVC or PA6 coated mesh

Mesh type	Wire diameter+ PVC or PA6 coated	Tensile strength	Punching resistance	Deflection
	(mm)	(kN/m) (Avg. *)	(kN) (Avg. *)	(mm) (Avg. *)
4 1 9	Mesh 2.20/3.20 Selvedge 2.70/3.70	37.18	47.72	593
0 X 0	Mesh 2.70/3.70 Selvedge 3.40/4.40	55.01	74.20	593
8 x 10	Mesh 2.70/3.70 Selvedge 3.40/4.40	54.83	52.47	572
	Mesh 3.00/4.00 Selvedge 3.90/4.90	63.53	78.89	600
10 - 10	Mesh 2.70/3.70 Selvedge 3.40/4.40	71.90	55.36	633
10 X 12	Mesh 3.00/4.00 Selvedge 3.90/4.90	77.79	53.33	567

Note : * Tolerance +/-10% on given average values shall be considered

2 Specification of the intended use in accordance with the applicable EAD

Double twisted steel wire mesh reinforced or not with ropes are intended to be used for:

- retaining of unstable slopes
- controlling and preventing rockfall
- loose debris flow
- soil nailing system
- erosion control system
- rockfall protection netting rolls
- gabion
- hydraulic structures use
- along roads, highways and railways.

The assumed working life of double twisted steel wire mesh reinforced or not with ropes with Zinc/Aluminium alloy coating for the intended use is 25 years for corrosivity category C2 and 10 years for corrosivity category C3 (for corrosivity category see EN ISO 9223) when installed in the works, provided that the steel wire meshes are subject to appropriate installation and use. These provisions are based upon the current state of the art and the available knowledge and experience. The assessment and verification methods shall be appropriate with regard to the assumed working life and taking into account the intended use conditions, considerably without major degradation affecting the basic requirements for works.

3 Performance of the Product and References to the Methods Used for its Assessment

3.1	Overview		
BWR	EAD Clause No.	Essential Characteristic	Assessment of Characteristic
1		Mechanical Resistance and Stability	
	2.2.1	Mesh Designation and Mesh Size	See ETA Section 4.1
	2.2.2	Wire diameter	See ETA Section 4.2
	2.2.3	Wire tensile strength and elongation	See ETA Section 4.3
-	2.2.4	Rope characteristics: - diameter - designation - wire tensile strength grade - breaking force	Not relevant
	2.2.5	Dimensions of product and Connection components	See ETA Section 4.4
-	2.2.6	Corrosion protection: non-ferrous metallic coating, type and class of coating mass	See ETA Section 4.5
	2.2.7	Additional corrosion protection - organic coating: type coating thickness and wire diameter coating concentricity coating integrity	See ETA Section 4.6
	2.2.8	Tensile resistance of mesh	See ETA Section 4.7
-	2.2.9	Punching resistance and Deflection of mesh	See ETA Section 4.8
	2.2.10	 Durability: Sulphur dioxide test with general condensation of moisture of Zn/Al alloy coated mesh samples Neutral salt spray test with general condensation of moisture of Zn/Al alloy coated mesh samples UV resistance of organic coating material 	See ETA Section 4.9
2		Safety in Case of Fire	Not relevant
3		Hygiene, Health & the Environment	Not relevant
4		Safety and Accessibility in Use	Not relevant
5		Protection against Noise	Not relevant
6		Energy Economy & Heat Retention	Not relevant
7		Sustainable Use of Natural Resources	Not relevant

4 Mechanical Resistance and Stability

4.1 Mesh Designation and Size

The mesh sizes and tolerances of the hexagonal woven mesh gabions supplied by LME are given in **Table 1**. The mesh sizes have been examined in accordance with EN 10223-3.

4.2 Wire diameter

Wire diameters are given in **Table 2**. Wire tolerances shall be in accordance with EN 10218-2 and EN 10223-3. Tolerances on diameter for Zn/Al alloy coated wires shall be in accordance with EN 10218-2, Table 1, Tolerance Class T1.

4.3 Wire tensile strength and elongation

The tensile strength of the wires used in the hexagonal woven mesh gabions is in the range 350 N/mm² to 550 N/mm² (Steel Grade 1.0304). The minimum elongation is 8% on a gauge length of 250 mm. The tensile strength shall be measured in accordance with EN 10218-2.

4.4 Dimensions of product and Connection components

The dimensions of gabion boxes and mattresses are defined in terms of their length (L) and width (W).

Typical standard sizes for double twisted mesh reinforced or not with ropes are given in **Table 3**. Other sizes may be provided to meet specific project requirements

4.5 Corrosion protection: non-ferrous metallic coating

The Zn/Al alloy coating mass has been verified in accordance with EN 10244-1 and conforms to the requirements of EN 10244-2, Class A, as given in Table 2

4.6 Additional corrosion protection - organic coating

Wire diameters with organic coating are given in Table 2.

Tolerances on diameter for Zn/Al alloy coated wires with organic coating shall be in accordance with EN 10218-2, Table 2.

The minimum concentricity of organic coating is 60%.

The organic coating must be insured, because: no cracks (no visible underlying steel wire) in organic coating within the double twist region occur at 50 % of the mean value of tensile strength of the mesh.

The properties of the organic coating material are given in $\ensuremath{\textit{Table 4}}$

4.7 Tensile resistance of mesh

The tensile strength of double twisted wire mesh is determined by testing to EN 10223-3. The permissible characteristic tensile strength values for the range of mesh sizes and wire diameters manufactured are given in Table 6a and table 6b.

4.8 Punching resistance and deflection of mesh

The punching resistance and deflection of mesh is determined by testing to annex B in ISO 17746. The permissible characteristic values for the range of mesh sizes and wire diameters manufactured are given in Table 6a and table 6b.

4.9 Durability

4.9.1 Sulphur Dioxide Test with General Condensation of Moisture of Zn/Al Alloy Coated Mesh Samples

Sulphur dioxide tests with discontinuous exposure on panel fragment samples shall be carried out according to EN ISO 6988.

Zinc Alloy (Zn95%/Al5%Zn or Zn90%/Al10%) coated productsamples shall not show more than 5% DBR (Dark Brown Rust) after 56 cycles of discontinuous exposure.

4.9.2 Neutral Salt Spray Test with General Condensation of Moisture of Zn/Al Alloy Coated Mesh Samples

Verification and assessment of the durability of Zinc Alloy (Zn95%/Al5%Zn or Zn90%/Al10%) coated wire shall be made according to EN ISO 9227. For the range of double twisted steel wire mesh reinforced or not with ropes covered by this ETA, the durability against salt-spray is minimum 2000 hours.

4.9.3 Durability Tests on Organic Coating Material

Verification shall be carried out according clause 2.2.10.3 of EAD 230008-00-0106. The average relationship of initial and retained tensile strength and elongation is < 25%.

5 Assessment & Verification of Constancy of Performance

5.1 AVCP System

In accordance with Regulation (EU) N° 305/2011, Article 65, Directive 89/106/EEC is repealed, but references to the repealed Directive shall be construed as references to the Regulation.

According to Decision 1998/214/EC³ of the European Commission of 21/01/1999, amended by the Commission Decision 2001/596/EC⁴, the System(s) of Assessment and Verification of Constancy of Performance (see Annex V of Regulation (EU) No. 305/2011) given in **Table 7** applies.

Table 7: System of Assessment and Verification of Constancy of Performance

Product	Intended Use	AVCP System
Road Construction Products	Civil engineering works	1

The System of Attestation and Verification of Constancy of Performance referred to above is defined in Annex V of Regulation (EU) No. 305/2011.

4 OJEU, L 209, 2.8.2001

³ OJEU, L 80, 18.3.1998

6 Technical Details necessary for the Implementation of the AVCP System, as foreseen in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at COPRO.

6.1 Tasks for the Manufacturer

6.1.1 Assessment of the performance of the Product

For assessment of the performance of the product the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary assessment of the performance of the product has to be agreed between the manufacturer and the Notified Bodies involved.

6.1.2 Factory Production Control (FPC)

The manufacturer has a factory production control system (FPC) and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of policies, procedures and work instructions. This FPC system ensures that the product is in conformity with this European Technical Assessment.

The manufacturer shall only use raw materials or components that are supplied with the relevant inspection documents as laid down in the Control Plan⁵. All incoming raw materials shall be subject to inspection, verification, controls and tests (as applicable) by the manufacturer.

The Control Plan which is part of the technical documentation of this European Technical Assessment includes details of the extent, nature and frequency of testing and controls to be performed within the FPC system and has been agreed between the approval holder and COPRO. Any changes to the FPC or the product shall only be made following approval by COPRO.

The results of FPC are recorded and evaluated. These records include but are not limited to:

- Product specification and designation, basic materials and components
- Type(s) of Control testing
- Date of manufacture of the product and date of testing of the product or basic material and components;
- Result of control and testing and, if appropriate, comparison with requirements;
- Signature of the person responsible for FPC

These records shall be presented to COPRO upon request.

6.2 Tasks of Notified Bodies

6.2.1 Initial Inspection of Factory and of Factory Production Control

The Notified Body shall ascertain that, in accordance with the Control Plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the product according to the specifications mentioned in Section 1, as well as in Section 4 in this European Technical Assessment.

6.2.2 Continuous Surveillance

The Notified Body shall visit the Production Unit/Factory at least once a year for regular inspection. It shall be verified that the system of factory production control and the specified manufacturing process is maintained in accordance with this European Technical Assessment and the Control Plan.

Continuous surveillance and assessment of factory production control shall be performed according to the Control Plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to COPRO. In cases where the provisions of this European Technical Assessment and the prescribed test plan are no longer fulfilled, the conformity certificate shall be withdrawn.

⁵ The Control Plan has been deposited at COPRO and is only made available to the Approved Bodies involved in the AVCP procedure

Bibliography

EAD 230008-00-01	06 Double Twisted steel wire mesh Reinforced or not with Ropes
EN 10204	Metallic products. Types of inspection documents
EN 10218-1	Steel wire and wire products. General. Part 1: Test methods
EN 10218-2	Steel wire and wire products. General. Part 2: Wire dimensions and tolerances
EN 10223-3	Steel wire and wire products for fencing and netting. Part 3: Hexagonal steel wire mesh products for civil engineering purposes
EN 10244-1	Steel wire and wire products. Non-ferrous metallic coatings on steel wire. Part 1: General principles
EN 10244-2	Steel wire and wire products. Non-ferrous metallic coatings on steel wire. Part 2: Zinc or zinc alloy coatings
EN 10245-1	Steel wire and wire products. Organic coatings on steel wire. Part 1: General rules
EN 10245-2	Steel wire and wire products. Organic coatings on steel wire. Part 2: PVC finished wire
EN 10245-5	Steel wire and wire products. Organic coatings on steel wire. Part 5: Polyamide coated wire
EN 10264-1	Steel wire and wire products. Steel wire for ropes. Part 1: General requirements
EN 10264-2	Steel wire and wire products. Steel wire for ropes. Part 2: Cold drawn non alloy steel wire for ropes for general applications
EN ISO 9223	Corrosion of metals and alloys. Corrosivity of atmospheres. Classification, determination and estimation
ISO 17746	Steel wire rope net panels and rolls – Definitions and specifications

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