TERRAMESH SYSTEM
Double twisted steel wire mesh soil reinforcement with high abrasion resistant (Polimac®) coated wire

____ applicable to European Countries only

PART 1 – PRODUCT

1.1 DESCRIPTION
Double twisted steel wire mesh soil reinforcement units with vertical stone facing (Terramesh System) shall be manufactured in compliance with BS EN 10223-3, with Zn-Al alloy and a High Abrasion Resistant (Polimac® or equivalent) polymer coated steel wire. Units are manufactured in compliance with The Construction Products (Amendment etc.)(EU Exit) Regulations 2020 on the basis of UKAD 200026-00-0102 “Steel mesh systems for reinforced fill” and UKTA-0836-22/0022.

[For Republic of Ireland: The units are manufactured in accordance with Construction Product Regulation CPR 305/2011, and have a CE marking in compliance with EAD 200026-00-0102.]

The management and production system of the supplier shall be certified in compliance with ISO 9001.

All listed performances must be verifiable on laboratory test reports conducted by independent research institutes, the relevant documentation shall be submitted to the supervisor for the acceptance of the material.

1.2 FUNCTIONAL CHARACTERISTICS
The nominal tensile strength of the steel wire mesh shall be 50 kN/m, in accordance with BS EN 10223-3.
The maximum wire mesh punching resistance of the steel wire mesh shall not be lower than 65 kN, in accordance with UNI 11437 and ISO 17746.
The 120 years long-term tensile strength (LTDS) for soil pH levels in the range of 3-13 will be different depending on the fill material used as reported in the table below:

Fill material	Maximum particle size (mm)	LTDS [kNm^{-1}]
Silt and Clay	<0,06	45,8
Sands	<2	45,8
Sandy gravels	<9,5	43,6
Coarse gravels	<38	39,8
Crushed stones	<200	37,5

The values of the reduction coefficients will be provided by the manufacturer but will have to be validated by a third-party accredited certification institution (e.g. BBA, British Board of Agreement or NTPEP): the relevant accreditation shall be submitted to the supervisor for the acceptance of the material.

Minimum requirements of Stiffness EA and Strain ε at yielding at specific soil confinement pressures:

Embedded mesh tensile test (BS EN 13738 or ASTM D6706) at soil confinement pressures of:	Stiffness EA at characteristic yielding not smaller than (≥):	Strain ε at characteristic yielding not bigger than (≤):
35 kPa	750 kN/m	6.2%
75 kPa	1100 kN/m	4.3%
150 kPa	1650 kN/m	3.1%

1.3 MATERIALS
The double twisted steel wire mesh shall be manufactured with hexagonal 8x10 mesh type (BS EN 10223-3, Table 2), woven with a drawn steel wire core of 2.70 mm in diameter, with a minimum quantity of 245 g/m^2 of Zn-Al metallic coated alloy, in accordance with ISO 7989-2 and BS EN 10244-2, Table 2, Class A.
The double twisted steel wire mesh shall be resistant to outwearing accelerated ageing when subject to test in a Sulphur dioxide environment (ISO 22497): after 28 cycles of discontinuous test, the mesh shall not show more than 5% of DBR (Dark Brown Rust).
The metallic coated wire core shall be protected with a high abrasion-resistant polymer coating (Polimac® or equivalent) with a nominal thickness of 0.5 mm, resulting in a nominal overall diameter of 3.70 mm.

1.4 POLYMER COATING

The polymer coating shall comply with the following requirements:

- Long-term durability: service life greater than 125 years at 25 °C
- Outwearing accelerated ageing in salt spray (ISO 9227): after 20,000 hours of exposure, the mesh shall not show more than 5% of DBR (Dark Brown Rust).
- Abrasion resistance in wet conditions (ISO 22182): after 40,000 abrading cycles the weight loss shall not be greater than 3%
- Abrasion resistance in dry conditions (ASTM A975): after 400 cycles the polymer coating shall not expose the metal wire.
- Resistance to UV radiation (ISO 4892-3, type 1A): after 2,500 hours of exposure to QUV-A the tensile strength and elongation at break of the base compound shall not change more than 25% from the initial test results.
- Brittleness temperature: lower than −35°C (ASTM D746).
- Corrosion spread test (ASTM A975): after 2,500 hours immersion of the wire sample in a HCl solution the maximum corrosion length shall be less than a mesh repetition.

1.5 LACING

Stainless steel rings shall be used for fastening operations and shall have the following characteristics:

- Diameter: 3.00 mm
- Tensile strength > 1,550 MPa
- Pull-apart strength > 2.0 kN

1.6 ENVIRONMENTAL AND SUSTAINABILITY PROPERTIES

1.6.1 Environmental Product Declaration

The soil reinforcement (Terramesh® System) units shall have a Type III Environmental Product Declaration (EPD) registered and certified in accordance with ISO 14025 and BS EN 15804, to evaluate the environmental impact and give the possibility to calculate the Life Cycle Assessment (LCA) of the designed technical solution.
Such sustainability performances/requirements have to be reported in the Type III EPD certificate; certifications of not authorized body or self-certificates issued by the manufacturer, are not allowed.
The value shall be declared, as per Table 1, in terms of Global Warming Potential (GWP 100 years) and expressed in *kg CO2-Equiv./kg*.

Table 1 – Environmental and sustainability properties

Global Warming Potential (GWP 100 years)	ISO 14025 BS EN 15804	certified numeric value	[kg CO2-Equiv./kg]

1.6.2 Environmental Harmlessness

The polymer coated steel wires shall be tested to ensure their Environmental Harmlessness according to the following procedures:

- Synthetic Precipitation Leaching Procedure (SPLP) preparation as per EPA 1312 and Metals in Water by ICPMS (low level) as per EPA 6020B in which the presence or not of 31 different metals shall be analysed using atomic spectroscopy.
  The results shall be in compliance with: (a) Water Framework Directive 2000/60/EC; (b) CCME Water Quality Guidelines for the Protection of Aquatic Life, Freshwater; (c) U.S. EPA National Recommended Water Quality Criteria (Aquatic Life, Freshwater), 2006.
- PFAS test in water by SPE/LCMS as per EPA 537.1 in which the presence or not of 28 different PFAS shall be analysed, showing that the polymer coated steel wires are PFAS free. Resulting in a concentration lower than 2 ng/L of PFOS and PFOA and < 4 ng/L for other PFAS.
- ELUATE Tests on the environmental safeness, conducted as per M GEOK E:2016, shall ensure that the polymer coating is not critical for the environment.
- Smoke toxicity tests conducted as per ISO 5659-2 and EN 17084 shall ensure a Gases Conventional Index of Toxicity after 8 minutes sampling CIT_G (8) < 0.10 and a HCl concentration < 36 ppm

PART 2 – EXECUTION

The product's conformity shall be certified by a third-party Notified Body, according to the The Construction Products (Amendment etc.)(EU Exit) Regulations 2020, which shall assess the quality control process at the supplier's production facility.

[For Republic of Ireland: The product's conformity shall be certified by a third-party notified Body, according to CPR 305/2011, which shall assess the quality control process at the supplier's production facility. Prior to the installation, and on each consignment of gabion units to the job site, the contractor shall provide the Supervisory Body with the relevant documentation (Declaration of Performance, D.o.P.) in original form, where product and supplier names, quantities and destination are specified.]

Soil reinforcement units shall be opened, unfolded and pressed out to their original shape. Front, back, and end panels shall be lifted to a vertical position. Once units are assembled and the foundation has been prepared, levelled and graded, pre-assembled units shall be placed in position empty and fastened to adjacent units to form a continuously connected, monolithic structural unit. All connections shall be in accordance with BS EN 10223-3.

The stone fill material used to fill the front section of the soil reinforcement unit shall be provided in the proper sizes and quality. Rocks shall be hard, angular to round, durable and of such quality that they shall not disintegrate on exposure to water or weathering during the life of the structure. Care shall be taken to ensure that the polymer coating is not damaged. After each 300 mm layer of rock is placed into the cell, sufficient hand manipulation of rock shall be performed to minimize voids and achieve a maximum density of rock in the gabion. Rocks in exposed vertical faces shall be hand-placed to reduce voids on the outer face. Rock shall be overfilled to approximately 25-40 mm to allow for natural settlement.

Once the rock-filled section is complete, a geotextile filter shall be placed behind the facing section and the soil backfilling operations may start. Compaction within 1.5 m from the face shall be performed with a light compactor, to prevent excessive vibration into the rock-filled section. Soil shall be placed in 300 mm layers and be compacted to the required level. The soil material shall be of good quality, free draining, granular or selected. The recommended soil gradation is between 0.02- and 6-mm. Compaction shall be performed to 95% of standard Proctor, by using conventional compaction equipment.