DEPARTMENT *of* INFRASTRUCTURE, ENERGY *and* RESOURCES, TASMANIA

BRIDGEWORKS SPECIFICATION

B51 - GABION BOXES AND MATTRESSES April 2003

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B51.1 SCOPE

This Specification sets out the requirements for the supply and installation of gabion boxes and mattresses as specified or as shown on the Drawings.

B51.2 REFERENCES

The following standards are referred to in this specification.

A.S 1141 Methods for sampling and testing of aggregates

A.S. 1289 Methods of testing soils for engineering purposes

A.S. 2758 Aggregates and rock for engineering purposes

BS 1052./ 1980 Specification for mild steel wire for general engineering purposes

BS 10244-2 Steel wire and wire product zinc coatings

BS 2782-104A, 150B Methods of testing plastics

ASTM test methods: D117-73, D412-75, D792-66, D1203-67, D1242-56, D2240-75, D2287-78.

B51.3 WIRE

B51.3.1 General

All wire used in the fabrication of the gabion boxes and mattresses and in the wiring operations during construction shall have a tensile strength not less than 390 MPa and conform to BS 1052./ 1980 Specification for mild steel wire for general engineering purposes.

B51.3.2 Selvedges

All edges of the gabion boxes, mattresses, diaphragms and end panels shall be selvedged with a core wire diameter not less than 20% greater than that of the mesh wire.

The selvedging shall be such that the mesh will not unravel and such that the strength of the connection between the selvedge wire and the mesh is equal to or greater than the breaking strength of the mesh.

B51.3.3 Binding and Connecting wire

The diameter of the wire core shall not be less than 2.2 mm for gabion boxes and 2.0 mm for mattresses.

B51.4 ZINC COATING

All wire used in the fabrication of the gabion boxes and mattresses and in the wiring operations during construction shall be zinc coated to BS 10244-2 Steel wire and wire product zinc coatings. The minimum weight of the zinc coating shall be as follows:

DIAMETER OF WIRE (mm)	WEIGHT OF COATING (g/sq m)
4.40 & 3.90	290
3.40 & 3.00	275
2.70 & 2.40	260
2.20 & 2.00	240

The adhesion of the zinc coating shall be such that when the wire is wrapped six turns around a mandrel of four times the diameter of the wire, it shall not flake or crack to such an extent that any zinc can be removed by rubbing with bare fingers.

B51.5 MESH

The mesh shall be hexagonal woven mesh with the joints formed by twisting each pair of wires through two full turns.

The wire core diameter for gabion boxes shall not be less than 2.5 mm, and the wire core diameter for mattresses shall be not less than 2.0 mm.

The nominal size of the mesh shall be 60 mm, being the distance between the axes of two adjacent twisted joints.

The wire mesh shall have sufficient elasticity to permit elongation of the mesh equivalent to a minimum of 10% of the length of the section of mesh under test without reducing the diameter or tensile strength of the individual wires.

B51.6 PVC COATING

B51.6.1 PVC Wire Coating

All wire used in the fabrication and wiring operations for the gabion boxes and mattresses shall have extruded onto it, after zinc coating, a coating of polyvinyl chloride (PVC). The coating shall have an average thickness of not less than 0.55 mm and nowhere shall be less than 0.40mm thickness. It shall be capable of resisting deleterious effects of natural water exposure and immersion in salt water and shall not show any material difference in its initial characteristics in accordance with the testing requirements specified.

B51.6.2 PVC Characteristics

Initial characteristics are as follows:

(a) SPECIFIC GRAVITY

Shall be 1.30 to 1.35 in accordance with ASTM D792-66(79).

(b) DUROMETER HARDNESS

Shall be 50 to 60 Shore D in accordance with ASTM D2240-75 (1SO 868-1978).

(c) VOLATILE LOSS

At 105°C for 24 hours - shall not be greater than 2%.

At 105°C for 240 hours - shall not be greater than 6% in accordance with ASTM D1203-67 (74) (1SO 176-1976) and ASTM D2287-78.

(d) TENSILE STRENGTH

Shall not be less than 21 MPa in accordance with ASTM D412-75.

(e) ELONGATION

Shall not be less than 200% and not greater than 280% in accordance with ASTM D412-75.

(f) MODULUS OF ELASTICITY AT 100% ELONGATION

Shall not be less than 19 MPa in accordance with ASTM D412-75.

(g) RESISTANCE TO ABRASION

The loss of weight shall not be greater than 0.19 g in accordance with ASTM D1242-56 (75).

(h) BRITTLENESS TEMPERATURE

Cold bend temperature shall not be greater than - 30°C in accordance with BS 2782 - 104A (1970).

Cold flex temperature shall not be greater than 15°C in accordance with BS 2782-150B (1976).

(i) CREEPING CORROSION

Maximum penetration of corrosion of the wire core from a square cut end shall not be greater than 25 mm when the specimen has been immersed for 2000 hours in a 50% solution of HCI (Hydrochloric Acid 12Be).

B51.6.3 Testing

Variation of the initial characteristics will be permitted, as specified below, when the specimen meets the requirements of the following tests:

(a) SALT SPRAY TEST

According to ASTM D117-73 (79). Period of test 1500 hours.

(b) EXPOSURE TO ULTRA-VIOLET LIGHT

According to ASTM D1203-67 (74) (150 176-1976) and ASTM D2287-78. Period of test 2000 hours at 63°C.

(c) EXPOSURE TO HIGH TEMPERATURE

According to ASTM D1203-67 (74) (150 176-1976) and ASTM D2287-78. Period of test 240 hours at 105°C.

B51.6.4 Test Results

After the above tests have been performed, the PVC coating shall exhibit the following properties.

(a) Appearance

The coating shall not crack, blister or split and shall not show any pronounced change in colour.

(b) Specific Gravity

Shall not change more than 6% of its initial value.

(c) Durometer Hardness

Shall not change more than 10% of its initial value.

(d) Tensile Strength

Shall not change more than 25% of its initial value.

(e) Elongation

Shall not change more than 25% of its initial value.

(f) Modulus of Elasticity

Shall not change more than 25% of its initial value.

(g) Resistance to Abrasion

Shall not change more than 10% of its initial value.

(h) Brittleness Temperature

Cold bend temperature shall not be greater than -20°C.

Cold flex temperature shall not be greater than 18°C.

B51.7 FABRICATION

The gabion boxes and mattresses shall be constructed from zinc and PVC coated steel mesh. Each gabion box and mattress shall be divided by diaphragms into cells whose length shall not be greater than the width of the gabion plus 100 millimetres.

B51.8 INSTALLATION

Installation of gabion boxes and mattresses shall be undertaken in strict accordance with the manufacturer's instructions with all details included in the Contract Management Plan.

Geofabric, class A, shall be placed under all gabion boxes and mattresses.

B51.9 TOLERANCES

Wire diameter (BS 1052.80)	± 2.5%
Weight of gabions	± 5%
Mesh nominal size	± 15%

Dimensions

Width	± 5%
Height	± 5%
Length	± 3%

B51.10 FILLING

B51.10.1 General

Rock for filling gabion boxes and mattresses shall comply with the requirements of AS 2758 and shall be hard durable stone of low porosity having an interlocking texture with few discernible defects.

B51.10.2 Grading

Rock filling for the gabion boxes shall comply with the following grading:

Sieve Size (mm)	Percentage Passing
200	80 - 100
150	0 - 40
75	0 - 10
9.5	< 2

Rock filling for the mattresses shall comply with the following grading:

Sieve Size (mm)	Percentage Passing
150	100
75	0 - 40
9.5	< 2

B51.10.3 Durability

B51.10.3.1 Wet Strength and Wet/Dry Strength Variation

Strengths shall be determined in accordance with AS 1141.22 and comply with the following:

Minimum wet strength	100 kN
Maximum wet/dry strength variation	35 kN

B51.10.3.2 Los Angeles Value

The Los Angeles value when determined in accordance with AS 1141.23 shall not exceed 35.

B51.10.3.3 Sodium Sulphate Soundness

The weighted average loss, when determined in accordance with AS 1141.24, shall not exceed 6%.

B51.11 BACKFILLING BEHIND GABION BOXES

B51.11.1 Material

Backfilling shall comprise compacted gravel or crushed rock, free from organic matter and clay lumps, conforming with the following grading:

Sieve Size (mm)	Percentage Passing
200	100
75	80 - 100
0.075	0 - 15

B51.11.2 Compaction

Backfilling shall be placed and compacted in layers not exceeding 200 mm thickness.

Backfilling shall be compacted to a density not less than 95% of the maximum dry density ratio determined for the in situ material using Standard Compaction in accordance with AS 1289 E1.1.

Material directly above gabion boxes shall be placed without compaction as shown on the Drawings.

B51.12 PAYMENT

Payment for the construction of gabion boxes and mattresses shall be at the items as listed in the Schedule of Rates.

Payment shall include the provision of all plant, labour and materials required for access, preparation of the area, supply and placement of geofabric, gabion boxes, mattresses, wire, rock and backfill material and the disposal of any debris.