Master Specification
Part ST-RE-C3

Supply and Installation of Gabions, Reno Mattresses and Mesh Panels

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Contents

ST-RE-C3 Supply and Installation of Gabions, Reno Mattresses and Mesh Panels

1 General

a) This Master Specification Part sets out the requirements for the supply and installation of Mattresses, including:

i) the rock fill requirements, as set out in section 2;

ii) the requirements for wire properties, as set out in section 3;

iii) the excavation and backfill requirements, as set out in section 4;

iv) the requirements for installation, as set out in section 5;

v) the requirements for placement of rock fill, as set out in section 6;

vi) the geotextile requirements, as set out in section 7;

vii) the tolerance requirements, as set out in section 8;

viii) the requirements for test procedures, as set out in section 9;

ix) the Hold Point requirements, as set out in section 10; and

x) the verification and testing requirements, as set out in section 11.

b) The supply and installation of Mattresses must comply with the Reference Documents, including:

i) AS 1141.11.1 Methods for sampling and testing aggregates, Method 11.1: Particle size distribution - Sieving method;

ii) AS 1141.23 Methods for sampling and testing aggregates, Method 23: Los Angeles value;

iii) AS 1141.25 Methods for sampling and testing aggregates, Method 25: Degradation factor;

iv) AS 1289.3.6.1 Methods of testing soils for engineering purposes, Method 3.6.1: Soil classification tests - Determination of the particle size distribution of a soil - Standard method of analysis by sieving;

v) AS 2758.4 Aggregates and rock for engineering purposes, Part 4: Aggregate for gabion baskets and wire mattresses;

vi) AS 3706.4 Geotextiles - Methods of test, Method 4: Determination of burst strength - California bearing ratio (CBR) - Plunger method;

vii) AS/NZS 4680 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles; and

viii) Department Test Procedures (available from: https://dit.sa.gov.au/standards/test_procedures).

c) Gabions, reno mattresses and mesh panels, are collectively referred to as “Mattresses” in this Master Specification Part.

d) Mattresses must be have properties to ensure durability and performance which matches or exceeds the required Design Life, and must be installed at the locations detailed in the Design Documentation.

e) Gabions must be of a woven, double twist 80 mm x 100 mm hexagonal mesh.

f) Reno mattresses and mesh panels must be of woven, double twist, 60 mm x 80 mm hexagonal mesh.

g) Mesh wire must be galvanized in accordance with AS/NZS 4680 Hot-dip galvanized (zinc) coatings on fabricated ferrous articles, or PVC coated.

2 Rock fill

a) The rock fill used must be quarried stone and must be in accordance with Table ST-RE-C3 2-1.

b) Rock fill must be igneous and exhibit a massive structure (i.e. dense, clean, hard and free from Defects, cracks, seams, cleavage planes, weathering, degradation and pervasive chemical alteration that will affect rock durability).

c) The Contractor may submit alternative rock types to the Principal, which may be considered by the Principal on a case by case basis, which will constitute a **Hold Point**. The use of any alternative rock types must not occur until this Hold Point is released.

d) Square aperture sieves conforming to the Department's Test Procedure TP 134 Particle size distribution - Standard method of analysis by sieving, must be used for the determination of grading for particle sizes 75 mm and finer.

e) Grading of particle sizes greater than 75 mm must be determined by linear measurement in accordance with section 11 for Los Angeles value and degradation factor requirements.

Table ST-RE-C3 2-1 Aggregate dimensions(1)

Type	Aggregate dimensions
Gabions	The minimum rock size must be 100 mm and the maximum rock size must be 250 mm
Reno mattresses	The minimum rock size must be 75 mm and the maximum rock size must be two-thirds the thickness of the reno mattress, or 250 mm, whichever is lesser

Table notes:
(1) The Contractor must comply with AS 2758.4 Aggregates and rock for engineering purposes, Part 4: Aggregate for gabion baskets and wire mattresses, including the desirability to ensure mechanical interlocking between rocks and the rock supplied must have a range of sizes and a degree of angularity.

3 Wire properties

The minimum wire diameters must be in accordance with Table ST-RE-C3 3-1.

Table ST-RE-C3 3-1 Minimum wire diameters

Type	Minimum wire diameter
Gabions	2.5 mm
Mattresses	2.0 mm
Mesh panels	2.5 mm
Selvedges	3.4 mm
Lacing wire	2.2 mm

4 Excavation and backfill

a) Excavation must be carried out to the extent necessary to allow placement of the Mattresses to the final levels and shape detailed in the Design Documentation.

b) After placement of Mattresses, the excavation must be backfilled using material placed in layers of depth not greater than 200 mm loose thickness and compacted as specified in the Design Documentation.

c) Compaction within 1 m of the rear of the gabions must be achieved using hand operated vibrating plate compactors.

d) Backfill must conform to the following:

i) the maximum particle size must be 75 mm;

ii) not more than 15% must be finer than 75 µm;

iii) the pH must be between 6 and 12;

iv) the resistivity must be more than 5,000 ohm.cm or between 1,000 and 5,000 ohm.cm where the concentration of chloride is less than 200 ppm and sulphate content is less than 1,000 ppm; and

v) a full range of particle sizes (well graded) must be present.

e) Inspection of the excavation prior to the placement of the Mattress, will constitute a **Hold Point**. Placement of geotextile and mattress baskets must not occur until this Hold Point has been released.

5 Installation

a) Before placing Mattresses, the surface on which they are to be placed must be shaped, compacted and have geotextile placed in accordance with the Design Documentation.

b) Geotextile must be placed and joined in accordance with the manufacturer's instructions.

c) Mattresses must be formed and installed in accordance with the manufacturer's instructions.

d) All wiring must be done as a continuous operation, not with individual twists at intervals.

e) Tightness of the mesh and wiring is essential at all times.

f) The Contractor must cut or fold Mattresses where required to achieve the configuration and dimensions detailed in the Design Documentation where manufactured units do not comply.

g) Any Mattresses which are cut must be fixed so that they have the same integral strength as the uncut Mattresses.

h) Inspection of placed geotextile and mattress baskets prior to rock filling, will constitute a **Hold Point**. Placement of rock filling must not occur until this Hold Point has been released.

6 Placement of rock fill

a) The placement of rock fill must be carried out to the manufacturer's instructions and in a manner that will avoid damage to the Mattresses.

b) Rock filling must be firmly packed into the Mattresses.

c) Some hand placing of stone will be required to achieve suitable packing.

7 Geotextile

a) A non-woven geotextile must be provided under reno mattresses, and under and behind gabions to prevent fines migration, in accordance with RD-EW-S1 “Supply of Geotextiles”.

b) The Contractor must conduct a visual inspection for geotextile rolls in accordance with RD-EW-S1 “Supply of Geotextiles”.

c) Geotextiles must have the following properties:

i) CBR burst strength ≥2,500 N (in accordance with AS 3706.4 Geotextiles - Methods of test, Method 4: Determination of burst strength - California bearing ratio (CBR) - Plunger method); and

ii) G rating ≥1,900.

8 Tolerances

Tolerances for the final placement of Mattresses must be as follows:

a) horizontal placement ±40 mm; and

b) vertical placement ±40 mm.

9 Test procedures

The Contractor must use the test procedures in accordance with the Reference Documents, including in accordance with Table ST-RE-C3 9-1 (available from: https://dit.sa.gov.au/standards/test_procedures) to verify conformance with the Contract Documents.

Table ST-RE-C3 9-1 Test procedures

Test procedure	Test
AS 1289.3.6.1 Methods of testing soils for engineering purposes, Method 3.6.1: Soil classification tests - Determination of the particle size distribution of a soil - Standard method of analysis by sieving	Grading
AS 1141.23 Methods for sampling and testing aggregates, Method 23: Los Angeles value	Los Angeles value
AS 1141.25 Methods for sampling and testing aggregates, Method 25: Degradation factor	Degradation factor
AS 1141.11.1 Methods for sampling and testing aggregates, Method 11.1: Particle size distribution - Sieving method	Grading

10 Hold Points

Table ST-RE-C3 10-1 details the review period or notification period, and type (documentation or construction quality) for each Hold Point referred to in this Master Specification Part.

Table ST-RE-C3 10-1 Hold Points

Section reference	Hold Point	Documentation or construction quality	Review period or notification period
2c)	Alternative rock types	Documentation	10 Business Days review
4e)	Inspection of excavation	Construction quality	24 hours notification
5h)	Inspection of placed geotextile and mattress baskets	Construction quality	24 hours notification

11 Verification requirements and records

The Contractor must provide written verification as part of the Quality Management Records that the requirements set out in Table ST-RE-C3 11-1 have been complied with.

Table ST-RE-C3 11-1 Verification requirements and records

Section reference	Subject	Property	Test procedure	Test frequency	Acceptance limits
2	Rock fill	Grading	AS 1141.11.1 Methods for sampling and testing aggregates, Method 11.1: Particle size distribution - Sieving method	One test per 50 m^3	In accordance with section 2
		Los Angeles value	AS 1141.23 Methods for sampling and testing aggregates, Method 23: Los Angeles value; using laboratory crushed aggregate, conforming to AS 1141.23 Methods for sampling and testing aggregates, Method 23: Los Angeles value grading A	One test per 50 m^3	Not more than 30%
		Degradation factor	AS 1141.25 Methods for sampling and testing aggregates, Method 25: Degradation factor	One test per 50 m^3	Not less than 30%
4d)	Backfill	Particle size	AS 1289.3.6.1 Methods of testing soils for engineering purposes, Method 3.6.1: Soil classification tests - Determination of the particle size distribution of a soil - Standard method of analysis by sieving	One test per 1,000 t (minimum of 3 tests)	a) Maximum ≤75 mm b) Not more than 15% finer than 75 µm c) Full range of particle sizes must be present
		pH	N/A	One test per 1,000 t (minimum of 3 tests)	pH between 6 and 12
		Resistivity	N/A	One test per 1,000 t (minimum of 3 tests)	More than 5,000 ohm.cm or between 1,000 and 5,000 ohm.cm
		Sulphate	N/A	One test per 1,000 t (minimum of 3 tests)	Less than 1,000 ppm
		Chloride	N/A	One test per 1,000 t (minimum of 3 tests)	Less than 200 ppm