



SPECIFICATION FOR GEOTEXTILES AS BASAL REINFORCEMENT

1.0 GENERAL

The geotextile adopted as basal reinforcement shall meet or exceed the following requirements in full. Product not meeting these requirements shall not be accepted.

A representative sample of the geotextile proposed to be used by the contractor shall be submitted together with the appropriate product information, technical data sheets, and certificates of quality together with the tender documents for consideration as part of the tender evaluation.

Prior to installation of geotextile, the supplier shall submit a material sample with minimum area of 5.2 m² (full width x length) sample of material proposed for approval of the engineer. The sample will be retained for comparative testing against materials randomly sampled from the site in accordance with the quality assurance requirements of this specification. Material delivered to site not conforming to the specification and quality standard of the retained representative sample will be rejected from the site.

2.0 PHYSICAL PROPERTY

The reinforcing geotextile shall consist of high tenacity and high quality polyester yarn. The manufacturing process shall be warp knitting and weft insertion to form a dimensional stable geotextile providing the design tensile reinforcement capacity in one principal direction. The manufacturer shall certify compliance with this requirement.

The geotextile shall have high resistance against hydrolysis after 10000 hours of immersion in water. The geotextile shall also have chemical resistance with pH tolerance of 2 – 9. The manufacturer shall provide independent test results to verify the quality of the geotextile supplied.

3.0 MECHANICAL AND HYDRAULIC PROPERTIES

The geotextile manufacturer shall provide a Quality Statement and independent certification from an ISO Accredited Test Laboratory that the geotextile delivered to site meet or exceed the following requirements in full. Geotextile not meeting the required technical values shall be rejected.

Property	Test Standard	Unit	Type 1	Type 2	Type 3	Type 4	Type 5	Type 6
Minimum characteristic short term tensile strength (main direction)	ASTM D4595-86 / ISO 10319	kN/m	100	200	300	400	600	800
Maximum elongation at characteristic short term tensile strength (main direction)	ASTM D4595-86 / ISO 10319	%	10	10	10	10	10	10

Minimum characteristic short term tensile strength (secondary direction)	ASTM D4595-86 / ISO 10319	kN/m	50	50	50	50	50	50
Maximum elongation at characteristic short term tensile strength (secondary direction)	ASTM D4595-86 / ISO 10319	%	10	10	10	10	10	10
Maximum creep at 50% of ultimate load after 2 years	ASTM D5262-92	%	1	1	1	1	1	1
Minimum creep limited strength (>120 years)	ISO 13431	kN/m	60	121	181	242	363	484
Minimum long term design strength (> 120 years)		kN/m	50	100	150	200	300	400
Forms of supply								
Width (minimum)		m	5.2	5.2	5.2	5.2	5.2	5.2
Length (minimum)		m	100	100	50	50	50	50

Geotextile delivered to site, under the discretion of engineers, may be tested at an accredited independent geosynthetics testing laboratory (according to the test standards given in the Specification). The technical values tested must be within the variance given below:

Mechanical properties tolerance range - 10% of average value
 confidence level - 95%

The geotextile manufacturer shall be ISO 9001 certified and that the technical values published must be verified by Third Party Quality Assurance according to test standards approved by the Engineer. Certificate of compliance must be provided to substantiate this requirement.

4.0 GEOTEXTILE QUALITY ASSURANCE REQUIREMENTS

The quality of geotextile supplied to site shall be verified by the provision of the following information, documentation and QA/QC testing:

The supplier shall submit to the contractor, a Statement of Quality certifying that materials to be delivered to site meet or exceed the specified requirements. Submission must also include appropriate product literature, independent test certificates, and other documentation supporting the technical evaluation of the products.

To facilitate site quality assurance, each roll of geotextile delivered to site shall be clearly labeled with brand name, grade, date of manufacture and production batch number. Geotextile not meeting this requirement shall be rejected from site.

Geotextile delivered to site shall be sampled for testing at an ISO/IEC 17025 and GAI- LAP accredited laboratory with suitable equipments to conduct QC/QA tests according to the

specified standards. The contractor shall ensure the credential of such laboratory by proof of certified accreditation from the laboratory and shall be liable for the expense of testing. The contractor shall stipulate the laboratory proposed for testing together with the submission of product samples, product grade, batch and lot number.

The manufacturer shall provide documentation supporting the performance of their product in relation to the following partial factors of safety as the basis for design:

- a. Creep (>120 years) ≤ 1.55
- b. Installation damage under construction conditions ≤ 1.10
- c. Environmental effects such as pH, etc ≤ 1.10
- d. Material ≤ 1.00

Greater values for the abovementioned partial factors of safety are subjected to the Engineer's approval.

5.0 PROJECT REFERENCE

The supplier shall provide project reference in Asia indicating successful application of geotextile of at least 50,000m² of geotextile for similar projects.

6.0 INSTALLATION

The supplier shall provide a method statement detailing installation procedures for the Engineer's approval. The installation of the geotextile shall be in accordance with the approved method statement.

6.1 Transportation and Storage

During transportation and storage, geotextile shall be wrapped in heavy paper or similar heavy duty protection covering. Geotextile shall be protected from sunlight, mud, dirt, dust, debris and other detrimental substances during transportation and on site storage. Geotextile not meeting the abovementioned requirements or damaged during transportation and storage shall be rejected and replaced at the contractor's own cost.

6.2 Backfill Material

The source of backfilled material shall be approved by the Engineer. The contractor shall at his own expense carry out particle size distribution tests, plasticity tests, laboratory compaction tests, direct shear box tests and other relevant tests as requested by the Engineer.

6.3 Laying of Geotextile

The contractor shall unwrap and unroll the geotextile only after the site clearing and approved by the Engineer. The geotextile shall be laid in the direction as per the drawings or as directed by the Engineer. Once the geotextile is in position, the fill material shall be placed by end tipping. The contractor is to ensure that carrying trucks or heavy machineries stay off the geotextile during the filling process. The thickness of the first layer of fill shall not exceed 300mm or as directed by the Engineer and shall extend over the full width of the geotextile.

The first layer of fill material shall be spread, levelled and compacted using suitable lightweight plants approved by the Engineer. The contractor shall take all necessary precautions to prevent the ripping of the geotextile during the placement of the fill material. The contractor shall not roll out more geotextile than he can fill in the same day.

6.4 Joints

Joints using either overlap or stitched are only allowed in secondary direction. No joints in the primary direction are allowed. The overlap length of geotextile in the secondary direction shall not be less than 0.5m. Alternatively, the adjacent geotextile can be sewn using a double chain stitch sewing machine in the form of a double J seam with a minimum of 3 stitches per 25mm with a minimum overlapped of 50mm. The sewing thread used shall be of high tenacity polyester with a breaking load of not less than 200N.



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