

VII.WASTE RELATED APPLICATIONS

This section covers several applications where geotextiles are used in landfill construction. This can include both new cell construction, or cell capping or closure.

The following specifications are included:

- Geomembrane protection
- Separation/filtration over a drainage layer
- Landfill daily cover

These guideline specifications are developed with consideration given to EPA, both State and Federal, guideline documentation, and that gained from experiences in landfill design and construction.

Read each description to determine which most closely parallels the application or site conditions you are anticipating on your project. The corresponding description and specification addresses the geotextile requirements, from material selection to installation necessary to perform the geotextile intended function.

Each specification is written to select a geotextile that will serve one or more of the following functions of:

- Installation survivability
- Separation of dissimilar materials
- Filtration
- Area coverage
- Protection

These specifications make certain design assumptions, as outlined in the sections which follow. If you have questions, or your application does not fit into one of these categories, contact the LINQ Geotextile QA Line (1-800-543-9966) for assistance.

VII. WASTE RELATED - PROTECTION

A1. GEOMEMBRANE PROTECTION - DESCRIPTION

- Subgrade conditions: - Subgrade is prepared and proofrolled.
- Overburden fill: -Drainage aggregate
 -Waste
 -Ore
- Geotextile Function: -Geomembrane protection
- Placement: -Can be above or below the geomembrane
- Traffic conditions: -No traffic shall be run directly on top of the
 geotextile
 -A minimum of 12 inches of cover material if
 traffic will occur
- Examples: -New cell construction
 -Heap leach field protection
 -Piggybacked cell construction
 -Ponds or lagoons geomembrane lined

WASTE RELATED - PROTECTION

SECTION 27xxx

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Product specification, installation and method of payment for geotextile used for geomembrane protection.

1.02 RELATED SECTIONS

A. Section 02207 - Subgrade Preparation.

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

The measurement for payment excludes the geotextile used for overlapping as well as fabric used for seam overlaps.

Geotextile to be measured to the nearest square foot of surface area actually covered in accordance with the plans or as required by the engineer.

The accepted pay quantities for geotextiles will be paid for at the contract price per square foot of Geotextile installed.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Square foot of geotextile	Square foot

1.04 SUBMITTALS

A. Certificate of compliance: The contractor shall submit to the engineer a certificate of compliance which shall include the following information:

- Full product name by trademark and style number
- Geotextile polymer type(s),
- Geotextile physical properties,

B. The manufacturer shall maintain test records of the production of this lot of material. These records shall be made available to the Engineer upon request.

If more than one style or product code number has been produced under the same product name, the style, or product code number of the geotextile to be approved must be specifically identified. The certificate of compliance shall be attested to by a person having legal authority to bind the company.

C. At the owners option samples: Sample(s) of the geotextile shall be submitted for source approval. Each sample shall have minimum dimensions of 1.5 yards by the full roll width of the geotextile.

The geotextile machine direction shall be marked clearly on each sample submitted for testing. The machine direction is defined as the roll or length direction.

D Seams: At the Engineers option, when sewn seams are to be used, at least one sewn sample, with a minimum of 2 yards of seam length per sample and with a minimum of 18 inches of geotextile width on each side of the seam shall also be submitted.

1.05 QUALITY CONTROL TESTING

A. Samples may be randomly taken by the Engineer at the job site to confirm that the geotextile meets the property values specified. Sampling shall be in accordance with ASTM D4354.

B. If sampling is performed, approval will be based on testing of samples from each lot. A "lot" shall be defined for the purposes of this specification as all geotextile rolls within the consignment (i.e., all rolls sent to the project site) which were manufactured at the same manufacturing plant, have the same product name, and have the same style, merge, or product code number.

C. All geotextile which has defects, deterioration, or damage, as determined by the Engineer, may be rejected. All rejected geotextile shall be replaced at no cost to the owner.

1.05 ACCEPTANCE REQUIREMENTS

Acceptance/rejection of geotextiles shall be determined in accordance with ASTM D4759 "Standard Practice for Determining the Specification Conformance of Geosynthetics."

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

Fibers used in the manufacture of geotextiles, shall consist of long chain polymers composed of at least 95% by weight of polypropylenes. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other. These materials shall conform to the properties found in Section 2.02. Thread used for factory or field sewing shall be of contrasting color composed of polypropylene, polyester, polyamids or polyaramids.

2.02 GEOTEXTILE PHYSICAL PROPERTIES

A. Geotextile property values should be expressed in terms of "Minimum Average Roll Values" and should be compared directly to the corresponding specification values. The minimum average property value of any roll within a shipment or lot of geotextile rolls shall meet or exceed the values required below.

<u>Property</u>	<u>Test Method</u>	<u>Property Value</u>
Grab Tensile (lbs) (Weakest principal dir)	ASTM D4632	270
Elongation (%)	ASTM D4632	50%
Trapezoid Tear (lbs)	ASTM D4533	90
Puncture (lbs)	ASTM D4833	90
U V Stability (% Strength retained)	ASTM D4355 500 hrs exposure	70%
AOS (US Sieve#)	ASTM D4751	80

Product shall be LINQ 250EX or approved equivalent.

2.03 SHIPMENT

A. Packaging: Each roll of geotextile shall be packaged individually in a suitable sheet, wrapper or container to protect the geotextile from damage due to ultraviolet light and moisture during normal storage and handling.

B. Labelling: Each roll shall be identified by a tag or label securely affixed to the outside of the roll on one end. Identification shall be in accordance with ASTM D 4873.

C. Storage: The geotextile shall be stored to protect it from sunlight or other site damage. Storage shall be in accordance with ASTM D 4873.

PART 3 EXECUTION

Geotextile shall be installed in accordance with the project drawings and this specification. In the event of a discrepancy between the specification and the drawings, the drawings shall govern.

1. Surface preparation: If geotextile is to be placed upon prepared subgrade, the surface upon which the geotextile is to be placed shall be proofrolled and inspected by the engineer prior to geotextile placement. All stones or protrusions greater than 1-1/2 inch shall be removed.

2. Slope placement: When placed upon a slope, the roll shall be anchored or fixed at the top of the slope and rolled downslope in a controlled manner. No seams shall be allowed across the roll width in midslope.

3. Overlaps: Overlaps shall be a minimum of 18 inches, unless otherwise specified. Care shall be taken to assure the minimum overlap along the entire roll length.

4. Overlying soil placement: When waste, soil cover or drainage material stone is to be placed on top of the geotextile, care shall be taken to not allow equipment directly on the fabric. A minimum of 6 inches of soil cover shall be placed before equipment is allowed. This thickness shall be increased at the engineers option when soil is highly angular or contains debris.

VII. WASTE RELATED - SEPARATION/FILTRATION

B1. SEPARATION/FILTRATION - DESCRIPTION

Soil or waste type:	-All waste or soils including CL, CLML, SC, -(Care to be taken when gap graded soils are present, or soils consisting of uniform fine silts)
Drainage layer :	-Rounded stone no greater than 2 inches -angular stone no greater than 1 inch -Open graded with little or no fines -Drainage nets or cores
Backfilling:	-Maximum drop height of less than one foot
Compaction:	-Compaction equipment is lightweight, or is not utilized
Examples:	-Leak detection drains -Leachate collection drains -Pond liner drainage layers

WASTE SEPARATION/FILTRATION

SECTION 027***

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Product specifications, installation and method of payment for geotextile for filtration and separation applications.

1.02 RELATED SECTIONS

A. Section 02207 - Aggregate materials.

B. Section 01410 - Testing fill compaction.

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

Applications measurement shall be made by the square foot of material installed or as required by the Engineer.

The measurement for payment excludes the geotextile used for overlapping.

The accepted pay quantities for geotextiles will be paid for at the contract price per square foot of geotextile installed.

Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
square foot of drainage geotextile	Square foot

1.04 SUBMITTALS

A. Certificate of compliance: The contractor shall submit to the engineer a certificate of compliance which shall include the following information:

- Full product name by trademark and style number
- Geotextile polymer type(s),
- Geotextile physical properties,

B. The manufacturer shall maintain test records of the production of this lot of material. These records shall be made available to the Engineer upon request.

If more than one style or product code number has been produced under the same product name, the style, or product code number of the geotextile to be approved must be specifically identified. The certificate of compliance shall be attested to by a person having legal authority to bind the company.

C. Samples: At the engineers option sample(s) of the geotextile shall be submitted for source approval. Each sample shall have minimum dimensions of 1.5 yards by the full roll width of the geotextile.

The geotextile machine direction shall be marked clearly on each sample submitted for testing. The machine direction is defined as the roll length direction.

D Seams: At the Engineers option, if sewn seams are to be used at least one sewn sample, with a minimum of 2 yards of seam length per sample and with a minimum of 18 inches of geotextile width on each side of the seam shall also be submitted.

1.05 QUALITY CONTROL TESTING

A. Samples may be randomly taken by the Engineer at the job site to confirm that the geotextile meets the property values specified. Sampling shall be in accordance with ASTM D4354.

B. If sampling is performed, approval will be based on testing of samples from each lot. A "lot" shall be defined for the purposes of this specification as all geotextile rolls within the consignment (i.e., all rolls sent to the project site) which were manufactured at the same manufacturing plant, have the same product name, and have the same style, merge, or product code number.

C. All geotextile which has defects, deterioration, or damage, as determined by the Engineer, may be rejected. All rejected geotextile shall be replaced at no cost to the owner.

1.05 ACCEPTANCE REQUIREMENTS

Acceptance/rejection of geotextiles shall be determined in accordance with ASTM D4759 "Standard Practice for Determining the Specification Conformance of Geosynthetics."

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

Fibers used in the manufacture of geotextiles, shall consist of long chain polymers composed of at least 95% by weight of polypropylenes. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other. These materials shall conform to the properties found in Section 2.02. Thread used for factory or field sewing shall be of contrasting color composed of polypropylene, polyester, polyamids, or polyaramids.

2.02 GEOTEXTILE PHYSICAL PROPERTIES

A. Geotextile shall meet or exceed the following “Minimum Average Roll Values”. The minimum average property value of any roll within a shipment or lot of geotextile rolls shall meet or exceed the values required below.

<u>Property</u>	<u>Test Method</u>	<u>Property Value</u>
Grab Tensile (lbs) (Weakest principal dir)	ASTM D4632	120
Elongation (%)	ASTM D4632	50
Trapezoid Tear (lbs)	ASTM D4533	40
Puncture (lbs)	ASTM D4833	40
U V Stability (% Strength retained)	ASTM D4355 150 hrs exposure	70
Permittivity (sec ⁻¹)	ASTM D4491	.7
AOS (US Sieve#)	ASTM D4751	70

Product shall be LINQ 140EX or approved equivalent.

2.03 SHIPMENT

A. Packaging: Each roll of geotextile shall be packaged individually in a suitable sheet, wrapper or container to protect the geotextile from damage due to ultraviolet light and moisture during normal storage and handling.

B. Labelling: Each roll shall be identified by a tag or label securely affixed to the outside of the roll on one end. Identification shall be in accordance with ASTM D 4873.

C. Storage: The geotextile shall be stored so as not to expose it to sunlight, or to damage. Storage shall be in accordance with ASTM D 4873.

PART 3 EXECUTION

Geotextile shall be installed in accordance with the project drawings and this specification. In the event of a discrepancy between the specification and the drawings, the drawings shall govern.

3.1 INSTALLATION

1. Surface preparation: If geotextile is to be placed upon prepared subgrade, the surface upon which the geotextile is to be placed shall be proofrolled and inspected by the engineer prior to geotextile placement. All stones or protrusions greater than 1-1/2 inch shall be removed.

2. Slope placement: When placed upon a slope, the roll shall be anchored or fixed at the top of the slope and rolled downslope in a controlled manner. No seams shall be allowed across the roll width in midslope.

3. Overlaps: Overlaps shall be a minimum of 12 inches, unless otherwise specified. Care shall be taken to assure the minimum overlap along the entire roll length.

4. Overlying soil placement: When waste, soil cover or drainage material stone is to be placed on top of the geotextile, care shall be taken to not allow equipment directly on the geotextile. A minimum of 6 inches of soil cover shall be placed before equipment is allowed. This thickness shall be increased at the engineers option when soil is highly angular or contains debris.

5. Care should be taken to place the Geotextile tightly against the soil so no void spaces occur behind or under the geotextile. Also, folds or wrinkles shall be avoided.

END OF SECTION

VII. WASTE RELATED - COVER

C1. LANDFILL DAILY COVER - DESCRIPTION

Daily covers are utilized for control of landfill odors, blowing litter, disease vectors and scavenging. They are applied at the end of each day of landfill operation, and generally consist of a 6 inch soil cover.

This section describes the specification for landfill daily covers. It has been demonstrated that geotextile daily covers can be used to replace soil covers. They provide a much lower cost, easier to install alternative to soil covers.

The primary functional requirements for fabric daily covers are:

- Low odor permeability
- Durability during placement and removal
- Low water absorption
- Ease of fabrication and handling

For additional details regarding panel fabrication sizes and weights contact LINQ at 1-800-543-9966.

LANDFILL DAILY COVER

SECTION ****

PART 1 GENERAL

1.01 SECTION INCLUDES

Product specifications and method of payment for landfill daily cover.

1.02 UNIT PRICE - MEASUREMENT AND PAYMENT

MEASUREMENT

a) Daily cover panels will be measured along the perimeter dimensions in a fully laid out position or as required by the Owner.

PAYMENT

a) The accepted quantities of daily cover shall be paid for per individual panel.

b) Payment will be made under:

<u>Payment Item</u>	<u>Pay Unit</u>
Daily cover panel	Per panel

1.04 SUBMITTALS

A Certificate of compliance shall be submitted which shall include the following information:

- Full product name by trademark and style number
- Fabric polymer type(s)
- Fabric physical properties

B. The manufacturer shall maintain test records of the production of this lot of material. These records shall be made available to the purchaser upon request.

If more than one style or product code number has been produced under the same product name, the style, or product code number of the panel fabric to be approved must be specifically identified. The Manufacturers certificate shall be attested to by a person having legal authority to bind the company.

1.05 QUALITY CONTROL TESTING

A. Samples may be randomly taken to confirm that the panel fabric meets the property values specified.

1.06 ACCEPTANCE REQUIREMENTS

Acceptance/rejection of geotextiles shall be determined in accordance with ASTM D4759 "Standard Practice for Determining the Specification Conformance of Geosynthetics."

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Panel shall consist of long chain polymers composed of at least 95% by weight of polypropylenes. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages. These materials shall conform to the properties found in Section 2.02.

B. Thread used for factory or field sewing shall be of contrasting color composed of polypropylene, polyester, polyamids, or polyaramids.

2.02 PANEL PHYSICAL PROPERTIES

A. Panel property values should be expressed in terms of "Minimum or Maximum Average Roll Values" as designated and should be compared directly to the corresponding specification values. The minimum average property value of any roll within a shipment or lot shall meet or exceed the values required in the specification.

<u>Property</u>	<u>Test Method</u>	<u>Property Value</u>
Min. Grab Tensile (lbs)	ASTM D4632	240
Min. Seam Tensile (lbs)	ASTM D4632	210
Min. Elongation (%)	ASTM D4632	60
Max. Air Permeability (cfm/sqft)	ASTM D737	100
Min. Trapezoid Tear (lbs)	ASTM D4533	90
Max. Water Absorptive capacity (%)	ASTM D1117	50
Min. U V Stability (% Strength retained)	ASTM D4355 500 hrs exposure	70
Max. AOS (mm diam.)	ASTM D4751	.11

2.03 SHIPMENT

A. Packaging: Each daily cover panel shall be packaged individually on a suitable pallet or other container to protect it from damage due to ultraviolet light and moisture during normal storage and handling.

B. Labelling: Each panel shall be identified by a tag or label securely affixed to the outside of one end.