



SKAPS INDUSTRIES

DROP-IN SPECIFICATIONS

SKAPS GEOTEXTILE SUBSURFACE DRAINAGE

@Copyright 2016 SKAPS Industries

The following drop-in specification is a sample guideline to be customized by the engineer for preparing site-specific specification. This information is provided for reference purposes only and is not intended as a warranty or guarantee. SKAPS assumes no liability in connection with the use of this information.

Please visit www.skaps.com for the latest product specifications.



1. GENERAL

1.1 SECTION INCLUDES

- A. This section is applicable to placing a geotextile against soil to allow for long-term passage of water into a subsurface drain system while retaining the in-situ soil.
- B. The primary function of the geotextile is filtration. Geotextile filtration properties are a function of the in-situ soil gradation, plasticity, and hydraulic conditions.

1.2 UNIT PRICES

- A. Method of Measurement: By the square meter (or square yard as indicated in contract documents) including seams, overlaps, and wastage.
- B. Basis of Payment: By the square meter (or square yard - as indicated in contract documents) installed.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO) "Standard Specification for Geotextile Specification for Highway Applications" Designation M 288-06
- B. American Society for Testing and Materials (ASTM):
 - 1. D 123 – Standard Terminology Relating to Geotextiles
 - 2. D 276 – Standard Test Method for Identification of Fibers in Textiles
 - 3. D 4354 - Practice for Sampling of Geosynthetics for Testing.
 - 4. D 4355 - Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).
 - 5. D 4439 - Terminology for Geotextiles.
 - 6. D 4491 - Test Methods for Water Permeability of Geotextiles by Permittivity.
 - 7. D 4533 - Test Method for Index Trapezoid Tearing Strength of Geotextiles.
 - 8. D 4632 - Test Method for Grab Breaking Load and Elongation of Geotextiles.
 - 9. D 4759 - Practice for Determining the Specification Conformance of Geosynthetics.
 - 10. D 4751 - Test Method for Determining Apparent Opening Size of a Geotextile.
 - 11. D 4873 - Guide for Identification, Storage, and Handling of Geotextiles.



1.3 **DEFINITIONS**

- A. *Maximum Average Roll Value (MaxARV)*: Property value calculated as typical plus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will be below the value reported.
- B. *Minimum Average Roll Value (MARV)*: Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will exceed value reported.
- C. *Typical Roll Value*: Property value calculated from average or mean obtained from test data

1.4 **SUBMITTALS**

A. **CERTIFICATION:**

1. Prior to material delivery to project site, the contractor shall provide the engineer with a written certification or manufacturers quality control data which displays that the geotextile meets or exceeds minimum average roll values (MARV) specified herein.
2. The contractor shall submit, if required by the engineer, manufacturer's quality control manual for the geotextile to be delivered to the site.
3. The Manufacturer shall demonstrate transparency of their manufacturing process by showing traceability of the product from origin of raw material through finished good.
4. The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request.
5. The manufacturer's certificate shall state that the furnished geotextile meets MARV requirements of the specification as evaluated under the manufacturer's quality control program. The certificate shall be attested to by a person having legal authority to bind the Manufacturer.
6. Manufacturing Quality Control (MQC) test results shall be provided upon request.



1.5 DELIVERY, STORAGE, AND HANDLING

- A. Geotextile labeling, shipment and storage shall follow ASTM D 4873.
- B. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.
- C. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.
- D. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.
- E. The protective wrapping shall be maintained during periods of shipment and storage. If the wrapping is damaged prior to installation, the outer wrap of geotextile material must be discarded before installation.
- F. During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: Site construction damage, extended exposure to ultraviolet (UV) radiation, precipitation, chemicals that are strong acids or strong bases, flames, sparks, temperatures in excess of 71 deg C (160 deg F) and any other environmental condition that might damage the geotextile.

2. PRODUCTS

2.1 MANUFACTURERS

- A. All rolls of the geotextile shall be identified with permanent marking on the roll or packaging, with the manufacturers name, product identification, roll number and roll dimensions.

2.2 General Requirements

- A. The geotextile construction shall be a nonwoven, staple fiber, needle punched, polypropylene geotextile; the fibers are needled together to form a stable network that retains dimensional stability relative to each other.
- B. The geotextile should be resistant to UV degradation and biological and chemical environments normally encountered in soils.
- C. The geotextile should meet the following Minimum Average Roll Values (MARV) for nonwoven geotextile:



Table 1 – Required Properties, Test Methods and Values for SKAPS Nonwoven Geotextiles Used For Subsurface Drainage

Property	Test Method ASTM	Units	Use Type 1 where installation stresses are severe, i.e. very coarse, sharp, angular aggregate is used, and the depth of trench is greater than 3 meters (10 ft).	
			GT110	GT180
Grab Tensile Strength	D 4632	lbs (kN)	250 (1.112)	205 (0.911)
Elongation	D 4632	%	50	50
Trapezoidal Tear	D 4533	lbs (kN)	100 (0.444)	85 (0.378)
CBR Puncture	D 6241	lbs (kN)	700 (3.113)	535 (2.370)
Apparent Opening Size	D 4751	U.S Sieve (mm)	100 (0.150)	80 (0.180)
Permittivity	D 4491	sec ⁻¹	1.20	1.35
Water Flow Rate	D 4491	gpm/ft ² (l/min/m ²)	80 (3251)	90 (3657)
UV Resistance	D 4355	%/hrs	70/500	



Property	Test Method ASTM	Units	Use Type II where installation stresses are not as severe as in Type I applications, i.e. semi-angular aggregate, and depth of trench is less than 3 meters (10 ft) and greater than 1.5 meters (5 ft).	
			GT170	GT160
Grab Tensile Strength	D 4632	lbs (kN)	180 (0.800)	160 (0.711)
Elongation	D 4632	%	50	50
Trapezoidal Tear	D 4533	lbs (kN)	75 (0.333)	60 (0.267)
CBR Puncture	D 6241	lbs (kN)	475 (2.113)	410 (1.823)
Apparent Opening Size	D 4751	U.S Sieve (mm)	70 (0.212)	70 (0.212)
Permittivity	D 4491	sec ⁻¹	1.40	1.50
Water Flow Rate	D 4491	gpm/ft ² (l/min/m ²)	100 (4074)	110 (4480)
UV Resistance	D 4355	%/hrs	70/500	

Property	Test Method ASTM	Units	Use Type III where installation stresses are not as severe as in Type II applications, i.e. rounded aggregate, and depth of trench is less than 1.5 meters (5 ft).
			GT142
Grab Tensile Strength	D 4632	lbs (kN)	120 (0.533)
Elongation	D 4632	%	50
Trapezoidal Tear	D 4533	lbs (kN)	50 (0.222)
CBR Puncture	D 6241	lbs (kN)	340 (1.512)
Apparent Opening Size	D 4751	U.S Sieve (mm)	70 (0.212)
Permittivity	D 4491	sec ⁻¹	1.70
Water Flow Rate	D 4491	gpm/ft ² (l/min/m ²)	120 (4885)
UV Resistance	D 4355	%/hrs	70/500



2.3 GEOTEXTILE QUALITY ASSURANCE

A. Product Marking

1. Labels should be affixed to the exterior of the packaged roll to include:
 - a) Name of source manufacturing facility
 - b) Geotextile product name as listed with AASHTO/NTPEP
 - c) AASHTO M288 class (es) that product meets d) Date of manufacture

B. Quality Control Testing

1. All supplied geotextiles shall be tested for quality control in in-house testing facilities as per required standard
2. All supplied geotextiles shall include certificates of analysis for all specified properties
3. Geotextile properties, other than Ultraviolet Stability shall be tested by NTPEP to verify conformance with this specification
4. Testing laboratories shall be compliant and certified to the ISO 9001:2008 quality system standard

C. Manufacturing Facilities

1. The source manufacturing facility for supplied geotextiles shall maintain audited compliance through AASHTO representative auditors for Quality Management System Processes for:
 - a) Organization and Organizational Policies
 - b) Product Marking and Labeling
 - c) Manufacturing Process and Documentation Control
 - d) Quality Control of Raw Materials
 - e) Quality Control Inspection, Measurement, and Testing for Geotextile Products
 - f) Quality Control Personnel – Training and Competency Evaluation
 - g) Statistical Analysis of Test Results
 - h) Resolution of Non-Conforming Product of Test Results
 - i) Retention of Test Results and Product Traceability
 - j) Quality Control Testing Facilities



- k) Marking, Storage, Shipping, and Handling of Finished Geotextile
 - l) Internal Quality Audits of Each Plant Producing Product
2. Source manufacturing facilities shall be compliant and certified to the ISO 9001:2008 quality system standard

3. EXECUTION

3.1 PREPARATION

- A. Trench excavation shall be completed in accordance with details of the project plans.
- B. In all instances excavation shall be performed in such a way so as to prevent large voids from occurring in the sides and bottom of the trench.

3.2 INSTALLATION

- A. In the placement of the geotextile for drainage applications, the geotextile shall be placed loosely with no wrinkles or folds, and with no void spaces between the geotextile and the ground surface. Successive sheets of geotextiles shall be overlapped a minimum of 300 mm (12 in), with the upstream sheet overlapping the downstream sheet.
- B. In trenches equal to or greater than 300 mm (12 in) in width, after placing the drainage aggregate the geotextile shall be folded over the top of the backfill material in a manner to produce a minimum overlap of 300 mm (12 in). In trenches less than 300 mm (12 in), but greater than 100 mm (4 in) wide, the overlap shall be equal to the width of the trench. Where the trench is less than 100 mm (4 in) the geotextile overlap shall be sewn or otherwise bonded. All seams shall be subject to the approval of the Engineer.
- C. Should the geotextile be damaged during installation or drainage aggregate placement, a geotextile patch shall be placed over the damaged area extending beyond the damaged area a distance of 300 mm (12 in), or the specified seam overlap, whichever is greater.



- D. Placement of drainage aggregate should proceed immediately following placement of the geotextile. The geotextile should be covered with a minimum of 300 mm (12 in) of loosely placed aggregate prior to compaction. If a perforated collector pipe is to be installed in the trench, a bedding layer of drainage aggregate should be placed below the pipe, with the remainder of the aggregate placed to the minimum required construction depth.
- E. The aggregate should be compacted with vibratory equipment to a minimum of 95 percent Standard AASHTO T99 density.

3.3 **PROTECTION**

- A. Atmospheric exposure of the geotextile to the elements following lay down shall be limited to 14 days to prevent damage.

END OF SECTION