SKAPS INDUSTRIES

GEONETS AND GEOCOMPOSITES: QUALITY MANUAL

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571 Industrial Pkwy,Commerce, GA 30529
Ph: (706)-336-7000, Fax: (706)-336-7007, Email: contact@skaps.com
www.skaps.com

1. QUALITY MANIFEST

SKAPS Industries is committed to providing the highest level of quality products and services to our customers. Each employee of SKAPS is committed to highest quality that we will only supply products that meet or exceed the requirements and specifications of SKAPS and our customers. To do right for our customers we at SKAPS are committed to continual quality improvements in everything we do, dedicating ourselves to meeting the needs of our customers.

2. QUALITY OBJECTIVE AND SCOPE

The objective of this manual is to define and implement basic Manufacturing Quality Assurance (MQA) procedures necessary to ensure consistent quality production supply to customers. This manual applies to all operations at SKAPS; manufacturing, purchasing raw material, and shipping. This manual serves as the primary reference document within the company for all quality assurance related activities. It provides an overview of the Quality Assurance requirements and guide to other applicable documents.

3. QUALITY ASSURANCE MANAGEMENT SYSTEM

Quality Assurance Management System comprise of company President, Quality Department Manager, Quality Assurance Lab as well as manufacturing personnel. The combination of expertise and experience from these groups provides proper tools to maintain the highest level of quality and customer service in the industry.

- The President has executive responsibility for the Quality System and is responsible for creating an atmosphere where quality is the highest priority.
- The Quality Department has responsibility for ensuring that quality requirements are effectively established and maintained in accordance with appropriate regulations and for reporting to upper management.
- Each manager and supervisor are responsible for assuring that Quality Systems are followed in his or her area.
- Each employee is responsible for the quality of his or her work.

Two groups are dedicated to Quality System:

1. ***The Quality Assurance*** assists operating departments in the development of quality systems and implementing it faithfully and effectively. Quality Assurance has the responsibility to:

    - Identify and evaluate quality related issues.

- Recommend solutions to quality issues and verify that all issues have been resolved (corrective actions).
- Initiate action to prevent the occurrence of quality issues (preventive actions).
- Control non-conforming products until acceptable corrective action has been taken.
- Report to upper management on quality related issues.

2. ***The Quality Control*** inspects and test products at all stages of the manufacturing process, from raw materials to finished products. Quality Control functions are distributed throughout the company to ensure that testing and inspection are done effectively.

4. PRODUCT IDENTIFICATION AND DOCUMENTATION

A. ROLL LABELING:

Each roll of geonet and geocomposite is identified with roll labels, which include unique roll number, type of product, and size of roll (length, width and weight of roll). Quality Assurance maintains records of raw material and finished products.

B. APPROVAL PROCEDURE:

Samples are collected per customer specifications for testing. The Quality Assurance Lab tests these samples for SKAPS requirements and customer specifications for compliance. The Quality Assurance Lab approves these materials that they comply both requirements prior to shipment and maintain test records.

C. NON-CONFORMANCE:

Finished product that does not meet SKAPS standard requirements is given a roll number but is rejected and not placed into inventory. The material is marked as scrap and will not be utilized. Finished product that meets SKAPS standard requirements but does not meet customer specification is not allocated to that customer but is placed into inventory as SKAPS standard finished product.

D. DOCUMENTATION:

Test records are generated for each tested roll of geonet and geocomposite product. As per customer's requirement, individual certificates are generated certifying that each roll meets and or exceeds their specification. Copies of these certificates are kept in record system.

5. RECORDS RETENTION

SKAPS maintains reports and/or samples for all finished products. Records and/or samples are maintained according to SKAPS retention policy.

Material	Item	Years
Raw Materials	Resin Supplier Test Reports and Certifications	2
	SKAPS Resin Test Reports	2
Geonet & Geocomposite	Raw Test Data (in computer database)	5
	Quality Control Certificates (in computer database)	5
	Sample	5

6. TESTING CAPABILITIES

SKAPS maintains state of the art laboratory equipment suitable to perform tests listed in Appendix "A", "B", "C" and "D".
SKAPS has developed a strict and thorough Quality Assurance program that exceeds the majority of customer specifications. The testing program covers raw materials and finished goods. The laboratory equipment used by SKAPS is most modern equipment available and meets or exceeds the requirements of all the test standards used. Test frequencies and number of test specimen per sample are established based on statistical analysis and complexity of procedures.
In addition to routine testing, SKAPS laboratories are equipped to perform a wide variety of other tests as required for specific requests. Although the SKAPS laboratories are fully equipped and able to perform most routine tests, there are some tests that are more economically and efficiently performed by a dedicated testing facility.

7. MATERIAL QUALITY ASSURANCE

SKAPS has established strict specifications for all raw materials and finished products. Test results must fall within the acceptable limits of SKAPS and customer specifications.

A. RAW MATERIAL:

SKAPS mainly uses two types of raw materials; Natural Resin and Masterbatch in manufacturing of geonet products. Natural resin is the base material used to make geonet. It may contain stabilizers to prevent degradation from occurring during and after extrusion. Masterbatch is concentrated carbon black material used with the natural resin to produce geonet products. The natural resin and masterbatch are blended at the appropriate ratio at the manufacturing stage. The masterbatch may contain other additives depending upon the geonet product. SKAPS verifies the properties of each lot of raw material prior to their utilization.

When a Lot of Natural Resin is received, samples are taken and tested as outlined in Appendix "A". All test data are entered into computer database and checked for accuracy, consistency and compliance with SKAPS specifications. Test results for any Lot of Natural Resin do not meet SKAPS standard requirements are rejected and not used for production.

Copies of the supplier's Certificate of Analysis (COA) for each Lot of Natural Resin obtained and kept as a record.

B. GEONET PRODUCTS:

SKAPS Geonets products are produced from High Density Polyethylene (HDPE) for the purpose of environmental drainage control. The biaxial grid design of geonet provides high flow characteristics in both directions. All geonet rolls produced are subjected to test methods, and frequencies outlined in Appendix "B".

1. Sampling

A one foot by roll width sample is cut for quality assurance testing from each roll to be tested. An archive sample is cut from each tested roll then labeled and stored for future reference. Test frequencies and number of test specimen per sample are established based on statistical analysis of the available data and complexity of the test procedures.

2. Evaluation of Results

All data are entered into a computer database for calculation and comparison with order specifications. If finished roll does not meet the SKAPS standards and/or the customers' specifications, the manufacturing personnel are immediately notified in order for the appropriate adjustment to be made. Only finished roll meeting SKAPS standards and customer specifications will be approved for shipment.

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3. Reporting

A Quality Assurance Certificate is issued for every roll of finished product. This report identifies the standards on which the SKAPS approval is based along with the actual test results demonstrated by the product.

C. GEOTEXTILE PRODUCTS:

SKAPS Nonwoven division produces Civil and Environmental nonwoven geotextile that is needle-punched and made of 100% polypropylene staple fibers, which are formed into a random network for dimensional stability. All SKAPS geotextile products resist ultraviolet deterioration, rotting, biological degradation, naturally encountered basics and acids. Polypropylene is stable within a pH range of 2 to 13. Sampling, evaluation of results and reporting practices are same as for geonet products. For test methods and frequencies for geotextile products, please refer Appendix "C".

D. GEOCOMPOSITE PRODUCTS:

Geocomposite products are produced by heat bonding a geotextile to one or both sides of the geonet product. Sampling, evaluation of results and reporting practices are same as for geonet products. For test methods and frequencies for geocomposite products, please refer Appendix "D".

E. THIRD PARTY CONFORMANCE SAMPLING:

Some specifications require independent Quality Assurance and/or conformance testing. SKAPS can provide assistance with sampling of products and shipping to third party lab during production. By taking samples during production rather than on site, the customer can be assured that the samples are clean and available for conformance testing in a timely manner.

8. AMENDMENTS AND REVISIONS

This Manual will be revised by Quality Assurance as required. Whenever revisions occur, all holders of controlled copies will be distributed applicable revised pages, describing the changes.
Management reviews of operations are continuous and any problems indicated with the Quality Program or its implementation will be addressed and corrected as directed by Management.

Appendix "A" – Testing Methods and Frequencies for Raw Materials

Property	Test Method	Frequency of Test[1]
Density	ASTM D 1505	Once per rail car compartment
Melt Flow Index	ASTM D 1238 (190° C, 2.16 kg)	Once per rail car compartment
Carbon Black Content	ASTM D 4218	N/A
Carbon Black Dispersion	ASTM D 5596	N/A

Appendix "B" – Testing Methods and Frequencies for Geonet Products

Property	Test Method	Frequency of Test[1]
Thickness	ASTM D 5199	Per 50,000 sq. ft.
Carbon Black Content	ASTM D 4218	Per 50,000 sq. ft.
Tensile Strength	ASTM D 7179	Per 50,000 sq. ft.
Density	ASTM D 1505	Per Resin Lot
Transmissivity[2]	ASTM D 4716	Per 540,000 sq. ft.

Notes:

(1) These test frequencies represent the minimum testing performed. Test frequencies may be changed for project based on project specifications.

(2) Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 0.1 and a confining pressure of 10,000 psf between stainless steel plates after 15 minutes.

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Appendix "C" – Testing Methods and Frequencies for Geotextile Products

Property	Test Method	Frequency of Test[1]
Mass per Unit Area (Weight)	ASTM D 5261	Per 100,000 sq. ft.
Grab Tensile Strength	ASTM D 4632	Per 100,000 sq. ft.
Grab Elongation	ASTM D 4632	Per 100,000 sq. ft.
Tear Strength	ASTM D 3786	Per 100,000 sq. ft.
Puncture Resistance	ASTM D 4833	Per 100,000 sq. ft.
CBR Puncture	ASTM D 6241	Per 100,000 sq. ft.
Water Flow Rate	ASTM D 4491	Per 540,000 sq. ft.
Permittivity	ASTM D 4491	Per 540,000 sq. ft.
Apparent Opening Size (AOS)	ASTM D 4751	Per 540,000 sq. ft.

Appendix "D" – Testing Methods and Frequencies for Geocomposite Products

Property	Test Method	Frequency of Test[1]
Ply Adhesion	ASTM D 7005	Per 50,000 sq. ft.
Transmissivity[2]	ASTM D 4716	Per 540,000 sq. ft.

Notes:

(1) These test frequencies represent the minimum testing performed. Test frequencies may be changed on project based on project specifications.

(2) Transmissivity measured using water at 21 ± 2°C (70 ± 4°F) with a gradient of 0.1 and a confining pressure of 10,000 psf between stainless steel plates after 15 minutes.

END OF SECTION