



Geosynthetic Clay Liners



MANUFACTURING QUALITY MANAGEMENT MANUAL

Kaytech ATLANTIS

 **KAYTECH**
ENGINEERED FABRICS



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DEFINITION OF TERMS

MARV – Minimum Average Roll Value is the value specified by the manufacturer whereby all the measured average results for rolls sampled to the appropriate test methods must be greater than the specified MARV.

MaxARV-Maximum Average Roll Value is the value specified by the manufacturer whereby all the measured average results for rolls sampled to the appropriate test methods must be less than the specified MaxARV.

Certifying to MARV - Field conformance to the MARV specification can be established by specimens that are taken from samples according to the appropriate

test methods. The measured values of these specimens must be averaged for each roll and the minimum of the roll specimen averages must not be less than the MARV specified.

MQA - Manufacturing Quality Assurance - a planned system of activities that provides assurance that the materials were constructed as specified in the certification documents and contract specifications.

MQC - Manufacturing Quality Control - a planned system of inspections that is used to directly monitor and control the manufacture of a material which is factory originated.

This manual contains proprietary information belonging to Kaymac (Pty) Ltd trading as Kaytech. This information is intended to provide a summary of standard quality procedures practiced by Kaytech's Manufacturing facility in Atlantis, Western Cape, South Africa. These procedures apply to Geosynthetic Clay Liners (GCLs) only.

Kaytech reserves the right to make technical modifications to its products without notice.

The information given in Kaytech's documentation is, to the best of our knowledge, true and correct. However, new research results and practical experience can make revisions necessary. No guarantee or liability can be drawn from the information mentioned herein. Furthermore, it is not Kaytech's intention to violate patents or licenses.

We suggest you maintain contact with the relevant Kaytech representative to confirm the validity of this version at future dates.

1. INTRODUCTION

Kaytech has been providing the local and international civil engineering, building and mining sectors with geosynthetic solutions since 1971.

Kaytech's ISO 9001 accredited production facility is situated in Atlantis in the Western Cape, South Africa, where it manufactures:

- Nonwoven continuous filament needle punched polyester **bidim**® grade geotextiles
- Warpknit high tenacity polyester composite **RockGrid**® geogrids and glass fibre composite **SealGrid**® geogrids
- **Envirofix**® Needlepunched Geosynthetic Clay Liners (GCLs)
- **EnviroTex**™ Specialist polyester and polypropylene staple fibre geotextiles

Kaytech, with its highly experienced and professional technical sales and marketing team, offers comprehensive technical and design support for a wide range of geosynthetic products both locally and internationally.

For more than 40 years Kaytech has been pioneering and developing geosynthetic products and applications for use in:

- Drainage and Filtration
- Separation and Reinforcement
- Road Maintenance and Rehabilitation
- Water and Waste Containment
- Erosion Protection
- Hydraulic Construction
- Liner Protection
- Waterproofing

Kaytech is supported by an independent dedicated geosynthetics laboratory, Geosynthetic Laboratory, which has the most advanced geosynthetic testing equipment in Africa and is SANAS accredited for a number of geosynthetic specific tests under the EN ISO/IEC 17025 international standard for accredited laboratories.

Kaytech has established strong links with a global network of reputable geosynthetic suppliers in Europe, Australia, UK, USA, Canada, South America, India and South East Asia.

Kaytech is proud of its long-standing reputation of being market leaders and values its commitment to service excellence and innovation.

MISSION STATEMENT:

Kaytech Geosynthetic Solutions strives to be the No.1 choice in geosynthetics and aims to achieve the highest possible standards in Service, Innovation and Education. Together, as a committed team we will build a high performance profitable organization supplying top quality products supported by cutting-edge technology and service excellence.

Kaytech is a Corporate Member of the International Geosynthetics Society (IGS).

Kaytech is a Founding Benefactor Member of the Geosynthetic Interest Group of South Africa (GIGSA), the local chapter of the IGS.

ALWAYS A BETTER SOLUTION!

CERTIFICATION

“CERTIFICATION IS AN ONGOING PROCESS THAT ENCOURAGES CONTINUOUS IMPROVEMENT, AND SUPPORTS THE ACHIEVEMENT OF GOALS AND OBJECTIVES”



2. THE ISO 9001 STANDARD

The latest ISO 9001 places emphasis on “management commitment” (leadership), “continual improvement” and “customer satisfaction”. This standard also offers a modern framework to develop and implement practical ways to help Kaytech Atlantis achieve quality outcomes. The “process approach” means less emphasis on manuals and paperwork, and more attention to product or service improvement, increased staff effectiveness and enhanced customer satisfaction.

Certification of the quality management system gives customers’ confidence that the system is working efficiently and meeting international standards of

excellence. It also provides an independent verification that an effective quality system is in place.

Certification involves an independent evaluation of production (or service) processes. The assessment also covers methods for measuring quality and the identification of any deficiencies that are causing error or waste.

The combination of excellent process control, verification accuracy and the strength of the ISO standard means Kaytech Atlantis can assure its clients of “Quality” in every aspect of its business.

3. QUALITY POLICY - KAYTECH ATLANTIS

The management of Kaytech Atlantis, confirm our commitment to being a World class technical textile manufacturer and supplier, striving to continually improve in all aspects of our business, with the view to, without exception, exceed our customer’s expectations. As a powerful tool to obtain our goals and measure our performance, we are committed to maintain the Quality Management System in accordance with SABS ISO 9001.

Kaytech Atlantis, without exception, will:

- Integrate the quality system within all other management systems
- Continuously improve in all aspects of our business
- Develop equal opportunities for all employees
- Optimise the use of all resources
- Provide a healthy and safe working environment
- Communicate policy and objectives to all employees
- Ensure easy access to policy documentation to all employees
- Apply sound environmental preservation principles
- Ensure optimum return to all stake holders, i.e. Shareholders, employees & community



4. OVERVIEW OF KAYTECH MANUFACTURING QUALITY MANAGEMENT (QM)

4.1 OBJECTIVE

Top management shall ensure that quality objectives, including those needed to meet requirements for products, are established at relevant functions and levels within the organization. The quality objectives shall be measurable and consistent with the quality policy and ensure the consistent production of quality products to the customer.

4.2 SCOPE

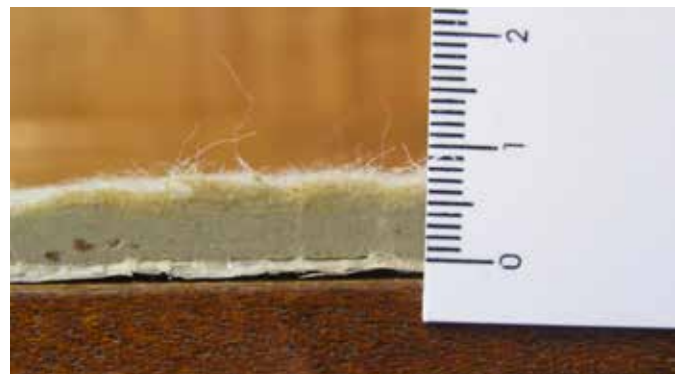
In order to meet the quality objective Kaytech, Atlantis, is committed to consistently providing product that meets customer and applicable statutory and regulatory requirements. Kaytech aims to enhance customer satisfaction through the effective application of the system, including processes for continual improvement of the system, as well as the assurance of conformity to customer and applicable statutory and regulatory requirements.

4.3 MANAGEMENT COMMITMENT

Kaytech, Atlantis, Quality Management System has the full support of senior management so as to ensure that only products meeting both Kaytech's and the customer's requirements, are released for shipment.

4.4 RESPONSIBILITY

The production heads are directly responsible for monitoring, testing and providing feedback to the quality management system to ensure the production to the specified quality.



5. QUALITY CONTROL (QC)

5.1 INTRODUCTION TO GCL QUALITY CONTROL

Quality control is an ongoing system of monitoring and testing materials as they are delivered and manufactured. The quality control programme is essential to manufacturing and is followed closely by all individuals involved.

Kaytech Atlantis WILL REJECT ANY SHIPMENT OF PRODUCT THAT DOES NOT MEET OUR SPECIFICATIONS.



5.2 QC LABORATORY CAPABILITY

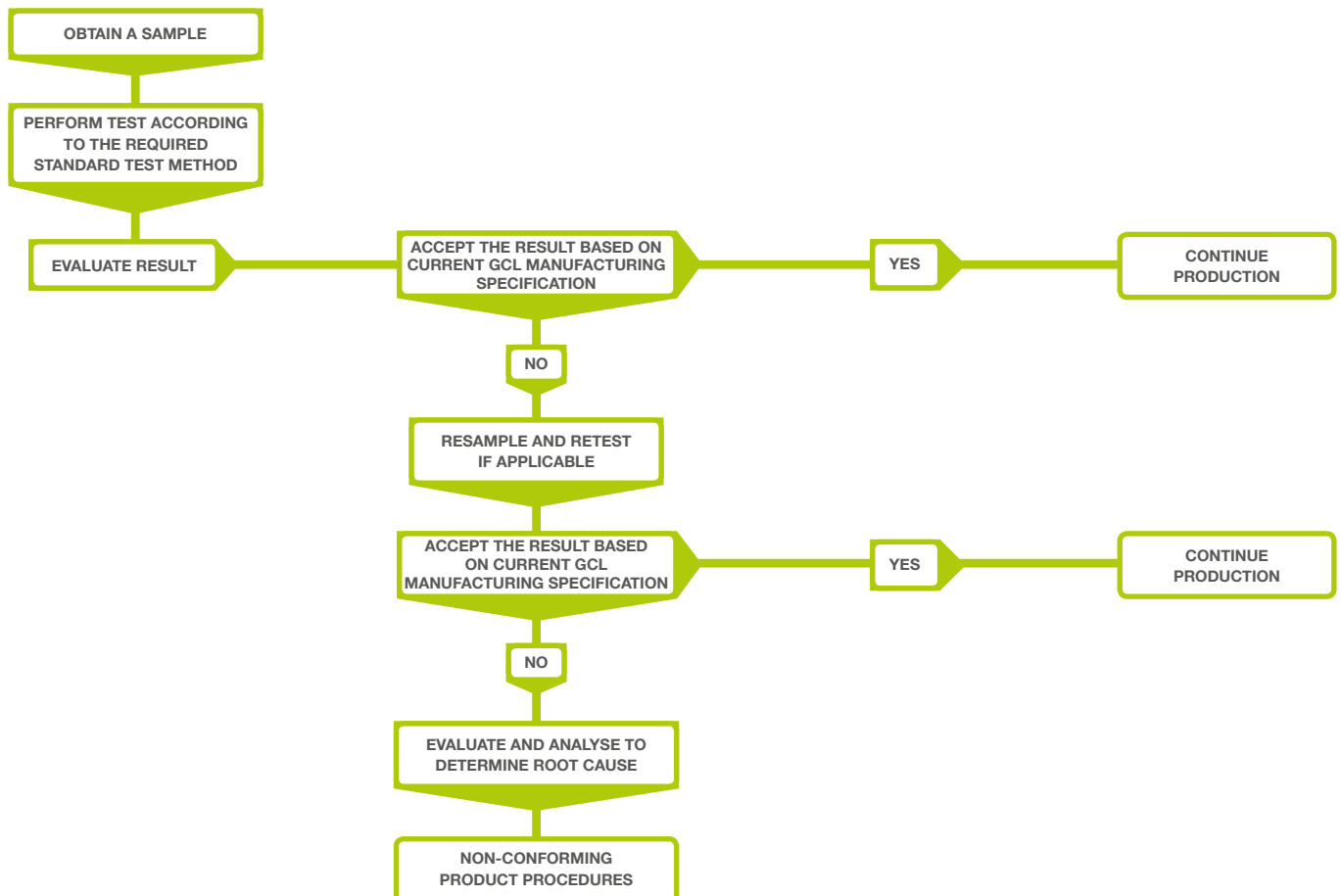
Kaytech Atlantis has the capabilities to perform a range of tests on technical fabrics and geosynthetic composites. The equipment enabling us to run these tests include: UTS Universal Testing Machine, Flexible Wall Permiometer, Thickness Vernier Caliper, Static Puncture Tester (CBR), Convection Oven for Moisture Testing, set of fine mesh sieves for Particle Size Distribution (PSD) testing, Swell Index Tester, electronic scales, and other laboratory and textile equipment. All testing machines are calibrated in accordance to quality management requirements. We also complete routine product conformance testing in external laboratories. This testing backs and verifies the information presented in our technical data.



5.3 QC SPECIFICATION AND TESTING

Kaytech has established strict specifications for all raw materials and finished products. Test results must fall within pre-defined acceptable limits. Failing this the raw materials and or finished product will be rejected.

5.4 QC DECISION PROCESS



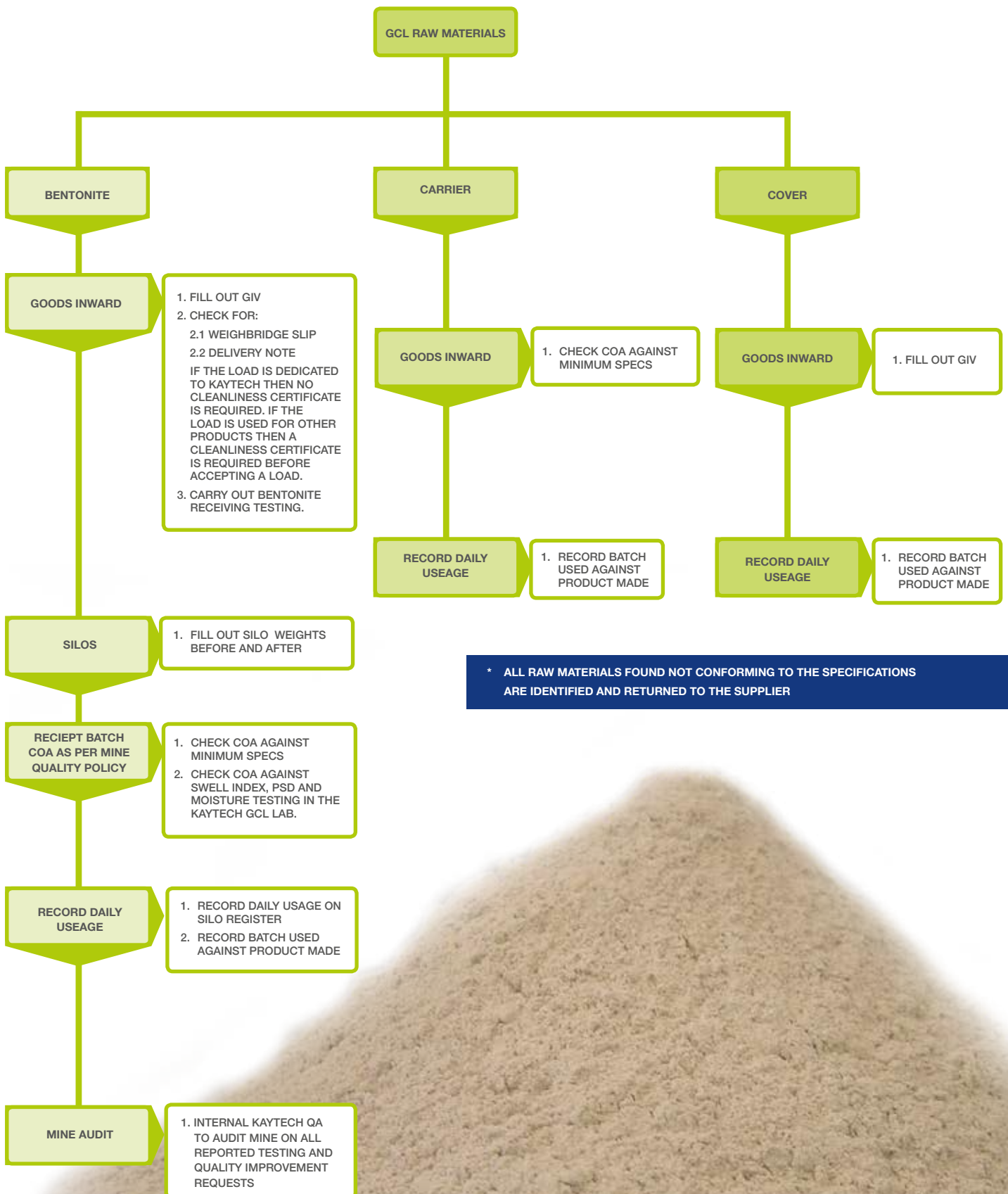
5.5 RAW MATERIALS

Kaytech uses three product related raw materials.

These are: - Bentonite, Woven Polypropylene Tape and Nonwoven Polypropylene Staple Fibre.

- 5.5.1** The Quality of Bentonite is controlled by purchasing from an ISO 9001 accredited supplier. This supplier is internally audited by Kaytech according to a pre-determined regime. Each batch of bentonite is tested against specification and is supplied with a Certificate of Analysis (COA). Bentonite is transported in batches, by an approved supplier, to Kaytech, Atlantis. The bentonite will only be offloaded if accompanied by a certificate of cleanliness. This certificate ensures there is no possibility of contamination. Bentonite is stored at Kaytech in silos that are mounted on load cells. The load cells ensure the accurate traceability of various batches of bentonite that are used in the final product. Kaytech tests each batch for Swell Index, Moisture Content and particle size distribution in the production laboratory before processing.
- 5.5.2** The Nonwoven Polypropylene staple fibre textile for the top cover is manufactured by Kaytech, Atlantis, and is subject to a strict testing system. Each roll received by the GCL plant, is recorded by roll number and weight. Additional testing is performed by the GCL laboratory in accordance with required specifications.
- 5.5.3** The Polypropylene Woven tape for the carrier is received only from approved suppliers who manufacture in accordance with required specifications. Certificates of Analysis are provided with each batch received. Additional testing is performed by the GCL laboratory in accordance with required specifications.

THE GCL PRODUCTION QUALITY TEST



5.6 MANUFACTURING QUALITY CONTROL

Kaytech prides itself in a strict and thorough quality CONTROL program for all our GCL products.

5.6.1 IN-PROCESS MANUFACTURING QUALITY CONTROL (TABLE E SECTION 6)

After assuring the quality of raw materials is of the highest standard, quality control of the finished product continues during the manufacturing process. The manufacturing line is equipped with modern monitoring devices that provide validation that the physical properties of the materials being produced are conforming to specification. The GCL production line is equipped with automated unwinder guides, automated perforation monitoring, automated broken needle removal and metal detection. In addition to the specified testing regime production validation testing is carried out in order to validate the production process so that the product remains within acceptable tolerances. This ensures both continued conformity of finished GCL and fulfils Kaytech's commitment to continuous improvement and economical manufacturing.

5.6.1.1 TRAY TEST MAIN SCATTER

Testing of the main scatter process is carried out by means of an internal production tray test. This test reports the effective range of scatter over the full width of the product in increments of less than 0.01m². This ensures an even distribution of bentonite over the entire width of the finished product.

5.6.1.2 TRAY TEST EDGE SCATTER

Testing of the edge scatter process is carried out by means of an internal production tray test which ensures that the bentonite being scattered on the edge overlap is within specification.

5.6.1.3 GCL MASS PER UNIT AREA (MPU) TESTING

Samples of finished GCL are cut across the full width of the finished GCL and weighed in accordance with an internal production test. This ensures that the distribution of bentonite is within minimum and maximum production specifications.

5.6.1.4 ROLL LENGTH VALIDATION

Roll length validation, by means of a calibrated manual length counter, is regularly carried out in order to ensure that the roll lengths are always within specification.

5.6.1.5 VISUAL PEEL TEST

Regular visual inspection is carried out on the appearance of thermally locked polypropylene fibres. This is carried out under a specially lighted inspection area, on the production line.

5.6.1.6 PEEL TESTING OF THE EDGE 300MM

In addition to peel testing in accordance with ASTM test method and required frequency, regular peel strength of the edge 300mm overlap area is tested in order to ensure the product is within specification.



5.6.2 GCL SPECIFIED TESTS QUALITY CONTROL

In accordance with industry, GRI GCL3 and European CE certification requirements, there are a number of minimum quality requirements that GCLs need to conform to in order to ensure their suitability in their application. These requirements vary depending on the application and grade of GCL required. The standard test methods remain the same and a brief description of each test method carried out by Kaytech on all Envirofix GCL is as follows:

5.6.2.1 TOTAL MASS PER UNIT AREA OF GCL

ASTM D5993 is the standard test method used to determine the total mass per unit area of a sample of finished GCL. The reported value should be the dry mass which requires drying as laid out in the test method for a set period of time until equilibrium is reached.

5.6.2.2 BENTONITE MASS PER UNIT AREA

ASTM D5993 is the standard test method used to determine the Bentonite component mass per unit area. The dry mass of the clay can be found by simply subtracting the manufacturers reported nominal mass of the geosynthetic components from the total mass of the dry GCL.

5.6.2.3 GRAB STRENGTH

ASTM D4632 is an index test which provides a procedure for determining the breaking load (grab strength) and elongation (grab elongation) of the finished GCL.

5.6.2.4 STRIP TENSILE TEST

ASTM D6768 is the standard test method used to determine the tensile strength of the finished GCL. EN ISO 10319 is a European standard test method for wide width tensile strength test method used to determine the tensile strength in both the machine and cross machine direction.

5.6.2.5 CBR PLUNGER STRENGTH TEST

EN ISO 12236 is the European standard method for determining the puncture resistance by measuring the force required to push a dimensioned flat ended plunger through a GCL.

5.6.2.6 INTERNAL HYDRATED SHEAR STRENGTH

ASTM D6243 is the standard test method for determining the internal hydrated shear resistance of a GCL under a constant rate of displacement or constant stress.

5.6.2.7 PEEL STRENGTH

ASTM D6496 is the standard test method for determining the average bonded strength between the top and bottom geotextile layers of a GCL.



5.6.2.8 K-VALUE HYDRAULIC CONDUCTIVITY

ASTM D5887 is the standard test method for measuring index flux through saturated GCLs using a flexible wall permeameter. Index flux through a specimen of GCL is measured in $\text{m}^3/\text{m}^2/\text{s}$ and then using the measured specimen thickness and water head pressure the hydraulic conductivity is calculated. In addition to the standard test and in accordance to GRI GCL3 Kaytech periodically tests permeability after permeation with a 0.1 M calcium chloride solution as per the standard test method ASTM D6766.

5.6.2.9 EDGE OVERLAP INDEX FLUX

Testing on the edge overlap is carried out using a large scale flow rate test box. The flow rate of the edge overlap is compared to a baseline sample of GCL tested in the same large scale flow rate test box in order to determine any preferential flow in the edge overlap area.

5.6.2.10 SWELL INDEX

ASTM D5890 is the standard test method used for measuring the swell index across every batch of bentonite received and approved for manufacture. This test method covers an index method that enables the evaluation of swelling properties of bentonite.

5.6.2.11 FLUID LOSS

ASTM 5891 is the standard test method used for measuring the fluid loss across every batch of bentonite received and approved for manufacture. Fluid loss is an index measure of Bentonite usefulness for permeability reduction in GCLs.

5.6.2.12 CARRIER SPLICE TENSILE TESTING

The carrier splice tensile test is an in house Kaytech test that verifies that the strength over a carrier geotextile splice in the finished GCL is at least stronger than the standard product. This test rig is purpose built to accommodate long specimens and can test specimens up to 1.5m in length up to 90% elongation.

5.6.2.13 OXIDATION RESISTANCE TESTING

EN ISO 13438 is the European standard test method for determining the oxidation resistance of the geotextile components of the GCL. The test measures the percentage loss in strength after accelerated exposure to high temperature.



5.7 CONTROL OF NON-CONFORMING PRODUCT

SCOPE

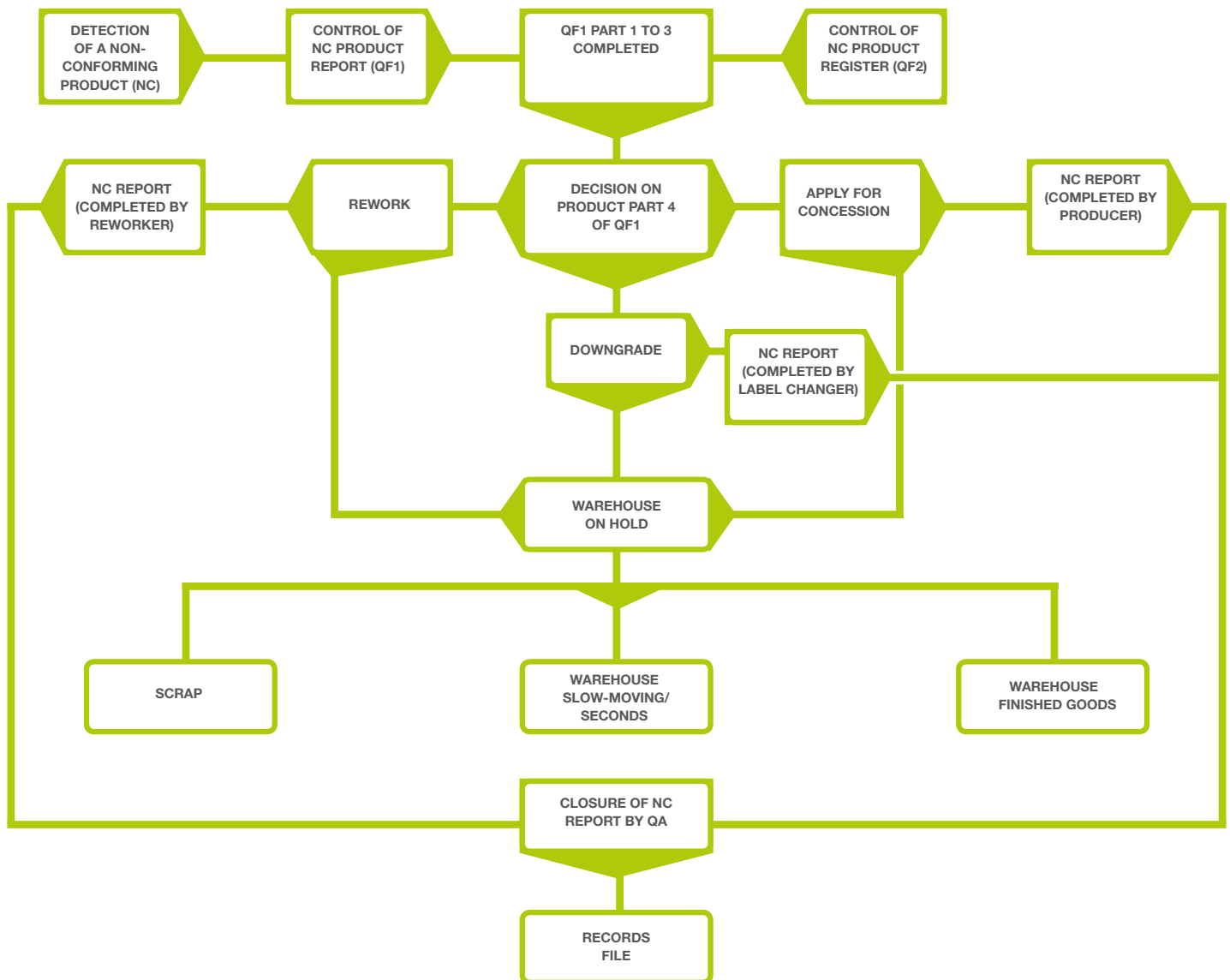
To document the control of Non-conforming product on the GCL Line

RESPONSIBILITY

GCL Operator/ Supervisor

PROCESS

In order to identify product that conforms and product that does not conform to the required product specifications the Process Flow Diagram (PFD) is followed:



6. QUALITY CONTROL TEST SUMMARIES

STAPLE FIBRE FOR TOP COVER VERIFICATION TESTING

Test	Units Of Measure	Test Standard Method Description	Standard Frequency Of Testing	Supplier &/or Production Test
Fibre Thickness (Lineal Density)	dtex	T.M.3	Per Shipment	Supplier
Fibre Tenacity	cN/tex	EN ISO 5079	As Above	Supplier
Fibre Elongation	%	EN ISO 5079	As Above	Supplier
Crimp Level	Crimp Peaks/3cm	T.M.2	As Above	Supplier
Staple Length	mm	length check	As Above	Supplier
Spin Finish Level	%	Rapid Wira Methanol extraction	As Above	Supplier

TABLE A

PRE-PRODUCTION TOP COVER VERIFICATION TESTING

Test	Units Of Measure	Test Standard Method Description	Standard Frequency Of Testing	Supplier &/or Production Test
Mass Per Unit Area	g/m ²	ASTM D5261	1/6 000m ²	Production & Supplier
Oxidation Resistance	% loss in strength	EN ISO 13438	Annually	Production & Supplier

TABLE B

BENTONITE VERIFICATION TESTING

Test	Units Of Measure	Test Standard Method Description	Standard Frequency Of Testing	Supplier &/or Production Test
Dry Screen Analysis	% passing μ m	Internal Production	1/33 000kg	Production & Supplier
% Moisture	%	ASTM D5993	As Above	Production & Supplier
Swell Index	ml/2g	ASTM D5890	As Above	Production & Supplier
Fluid Loss	ml	ASTM D5891	As Above	Supplier

TABLE C

WOVEN TAPE CARRIER VERIFICATION TESTING

Test	Units Of Measure	Test Standard Method Description	Standard Frequency Of Testing	Supplier &/or Production Test
Mass Per Unit Area	g/m ²	ASTM D5261	1/4 000m ²	Production & Supplier
Tensile Test MD/CD	kN/m	EN ISO 10319	1/10 000m ²	Supplier
% Elongation	%	EN ISO 10319	As Above	Supplier
Oxidation Resistance	% loss in strength	EN ISO 13438	Annually	Production & Supplier

TABLE D

IN PROCESS PRODUCTION CHECKS

Test	Units Of Measure	Test Standard Method Description	Standard Frequency Of Testing	Supplier &/or Production Test
Main Scatter Tray Test	g/m ²	Internal Procedure	1/Setup	Production
Edge Scatter Tray Test	g/m ²	Internal Procedure	1/250 Rolls	Production
Roll Weight	kg	Internal Procedure	1/Roll	Production
Light Box	Observation	Internal Procedure	Continuous	Production
Needle Detection	Auto Detector	Internal Procedure	Continuous	Production

TABLE E

END PRODUCT CONFORMANCE TESTING

Test	Units Of Measure	Test Standard Method Description	Standard Frequency Of Testing	Compliance, Supplier &/or Production Test
Total Mass Per Unit Area	g/m ²	ASTM D5993	1/4 000m ²	Production Test
Bentonite Mass Per Unit Area	g/m ²	ASTM D5993	1/4 000m ²	Production Test
Strip Tensile Strength (MD)	kN/m	ASTM D6768	1/20 000m ²	Production Test
Wide Width Tensile Strength (MD/CD)	kN/m	EN ISO 10319	1/order	Production Test
Grab Breaking Load (MD/CD)	N	ASTM D4632	1/4 000m ²	Production Test
CBR Plunger Strength	N	EN ISO 12236	1/20 000m ²	Production Test
Internal Hydrated Shear Strength	kPa	ASTM D6243	Periodic	Compliance
Peel Strength	N/m	ASTM D6496	1/4 000m ²	Production
K – Value Hydraulic Conductivity	m/s	ASTM D5887	1/25 000m ²	Production Test
Edge Overlap Index Flux	m ³ /m ² /s	Large Scale Flow Rate Test	Periodically	Compliance
Swell Index	ml/2g	ASTM D5890	1/33 000kg	Production Test
Fluid Loss	ml	ASTM D5891	As Above	Supplier Test
Carrier Splice Tensile Testing	kN	Kaytech Internal Tensile Test	1/month	Production Test

TABLE F

7. PRODUCT IDENTIFICATION AND DOCUMENTATION

7.1 ROLL NUMBERING

Each roll of GCL is assigned a unique roll number in the following format YYMM0000. The roll number is recorded on the conformance certificate label and attached to each roll (Appendix 1 – QF 160 label). The Laboratory Analyst records the roll numbers against raw materials used. Further Roll identification is printed on the GCL at a minimum of 5 meter intervals and includes the date, time of manufacture and product code.

7.2 APPROVAL PROCEDURE

The Results for each tested roll of product is checked against the product specifications for compliance. The Laboratory Analyst approves rolls that meet these specifications. (see COA Appendix 4)

7.3 NON-CONFORMANCE

Product that does not conform to the product specification, will be placed on hold in a designated area and will only be supplied under dispensation to a lower specification in the event the lower specification is met. (refer 5.7)

7.4 DOCUMENTATION

Records are kept of all internal and third party testing carried out in the Kaytech laboratories and elsewhere. All records are retained for a minimum period of 10 years.



SLING LABEL BACK

WLL : 600 Kg		
SF : 7:1		
Material : Polyester		
Length : 1.220 m		
Type : Endless Round		
Trace Code :		
M=1	M=0.8	M=2
		
Straight lift	Choked Lift	Basket Hitch

SLING LABEL FRONT

8. PACKAGING & HANDLING



Envirofix® is packaged to ensure that the product remains in prime condition until it reaches the installer. The cores are only supplied by approved suppliers who meet the minimum SANS 61386:24 specification for electrical HDPE ducting. This ensures a core strength that withstands a stack up to 5 rolls high. The plastic wrapping is 200 micron, heavy duty LDPE, UV stabilized, printed tube wrapping. The heavy duty wrapping reduces the chances of tearing and subsequently reduces the chance of any water ingress to the GCL. Each roll is supplied with lifting slings secured to the roll which allow the end user the ability to handle **Envirofix®** rolls with due care on site. (see label detail above)

APPENDIX 1

EnviroFIX X		CONFORMANCE CERT		QF 160
FINISHED GOODS CODE BCL			ROLL LENGTH m	
VARIANT CODE BCL				
ROLL No.			GROSS WT IN kg	
WIDTH m	PIECE LENGTH m +		No. OF PIECES m	
Nominal mass per unit area: g/m ² (EN 14196)				
Main polymer: PP				
Bentonite: sodium bentonite				
Product description (EN ISO 10318): clay geosynthetic barrier (GBRC)				
This material is processed to the Quality Standards of KAYTECH Atlantis, a SABS/ISO 9001:2008 certified company and conforms to our set specifications.				
Signed:		Date:		
				

LENGTH OF SECOND
PIECE TO BE
UNROLLED ON SITE

LENGTH OF FIRST
PIECE TO BE
UNROLLED ON SITE



X800 – GREEN HASH
X1000 – BLUE HASH
X2000 – RED HASH
X3000 – YELLOW HASH



APPENDIX 2

SABS

Certificate of Registration

This is to certify that the Quality Management System of

**KAYMAC (PTY) LTD
ATLANTIS, CAPE TOWN**

*has been assessed and found to
satisfy the requirements of*

**ISO 9001:2008
QUALITY MANAGEMENT SYSTEMS - REQUIREMENTS**

in respect of

**THE DESIGN, DEVELOPMENT AND MANUFACTURING OF NON-WOVEN AND KNITTED
GEOTEXTILES, NON-WOVEN AND KNITTED INDUSTRIAL PRODUCTS, GEOSYNTHETIC CLAY
LINERS AND OTHER GEOSYNTHETIC PRODUCTS WHICH INCLUDE PRODUCTS FOR:**

- EROSION CONTROL
- FILTRATION AND DRAINAGE
- HYDRAULIC CONSTRUCTION
- REINFORCEMENT
- ROAD MAINTENANCE/REHABILITATION
- SEPARATION
- WATER AND WASTE CONTAINMENT

NO EXCLUSIONS

This certificate, including the schedule which forms an integral part thereof:

- is issued without alteration;
- is identified by the applicable registration number;
- is subject to any condition or limitation contained therein;
- is valid subject to ongoing compliance with certification requirements;
- bears the embossed SABS Commercial seal. In the absence of the seal, the certificate and the schedule shall be invalid; and
- the certificate may be authenticated by referring to the register of "Certified Clients" on the SABS Commercial website (www.sabs.co.za)

Registration Number **LS 1176**

Effective Date **15 February 2017**

Expiry Date **15 September 2018**

Date of Original Registration **08 December 1993**

Chief Executive Officer *B. Mchlonakulu*

SABS COMMERCIAL SOC Ltd
121 Sturgeson Rd, Durbanville, Western Cape
7600, South Africa

A-00000526

036-01

APPENDIX 3

ZERTIFIKAT



Certification Body  1213
SKZ – TeConA GmbH
Friedrich-Bergius-Ring 22
97076 Würzburg / Germany

Certificate of Conformity of the Factory Production Control 1213-CPR-4772

In compliance with Regulation 305/2011/EU of the European Parliament and of the Council of 9 March 2011 (the Construction Products Regulation or CPR), this certificate applies to the construction product(s)

**Envirofix® X800, Envirofix® X1000,
Envirofix® X2000, Envirofix® X3000**

Clay geosynthetic barrier (woven and nonwoven layers; raw material: PP; clay: sodium bentonite), needle punched
used for the function: B

produced by or for

Kaytech Engineered Fabrics

3 Pieter Van Eck Street
Atlantis 7349
South Africa

and produced in the manufacturing plant(s)

Atlantis

This certificate attests that all provisions concerning the assessment and verification of constancy of performance described in Annex ZA of the standard(s)

**EN 13361:2013; EN 13362:2013;
EN 13491:2013; EN 13492:2013;
EN 13493:2013; EN 15382:2013**

under system 2+ are applied and that

**the factory production control fulfils
all the prescribed requirements set out above.**

This certificate was first issued on 2010-04-15 and will remain valid as long as the test methods and/or factory production control requirements included in the harmonised standard, used to assess the performance of the declared characteristics, do not change, and the product, and the manufacturing conditions in the plant are not modified significantly.

Würzburg, 23 May 2014




i. V.

Dipl.-Ing. Helmut Zanzinger
Certification Body

enviroFIX [®]				KAYTECH [®] ENGINEERED FABRICS				Certificate of Analysis				EN ISO 10319			
Product Specifications		Standard		ASTM D5261		30Min Vacuum Oven at 160°C		ASTM D5993		ASTM D5993		ASTM D5993		ASTM D5993	
Grade	Product Code (Stock Code) (Description) (KID)	Date (yy/mm/dd)	ID (Test No)	Cover (g/m²)	Carrier Composite (g/m²)	Bentonite Moisture (%)	Bentonite Moisture (%)	ASTM D5993	ASTM D5993	ASTM D5993	ASTM D5993	ASTM D5993	ASTM D5993	ASTM D5993	ASTM D5993
										</					