



Certified Properties

BENTOMAT® ST CERTIFIED PROPERTIES

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY ft ² (m ²)	REQUIRED VALUES
Bentonite Swell Index ¹	ASTM D 5890	1 per 50 tonnes	24 ml/2g min.
Bentonite Fluid Loss ¹	ASTM D 5891	1 per 50 tonnes	18 ml max.
Bentonite Mass/Area ²	ASTM D 5993	40,000 ft ² (4,000 m ²)	0.75 lb/ft ² (3.6 kg/m ²) min
GCL Grab Strength ³	ASTM D 4632 ASTM D 6768	200,000 ft ² (20,000 m ²)	90 lbs (400 N) MARV 22.5 lbs/in (40 N/cm) MARV
GCL Peel Strength ³	ASTM D 4632 ASTM D 6496	40,000 ft ² (4,000 m ²)	15 lbs (65 N) min 2.5 lbs/in (4.4 N/cm) min
GCL Index Flux ⁴	ASTM D 5887	Weekly	1 x 10 ⁻⁸ m ³ /m ² /sec max
GCL Hydraulic Conductivity ⁴	ASTM D 5887	Weekly	5 x 10 ⁻⁹ cm/sec max
GCL Hydrated Internal Shear Strength ⁵	ASTM D 5321 ASTM D 6243	Periodic	500 psf (24 kPa) typ @ 200 psf 6,500 psf (311 kPa) typ @ 10,800 psf

Bentomat ST is a reinforced GCL consisting of a layer of sodium bentonite between a woven and a nonwoven geotextiles, which are needlepunched together.

Notes

¹ Bentonite property tests performed at a bentonite processing facility before shipment to CETCO's GCL production facilities.

² Bentonite mass/area reported at 0 percent moisture content.

³ All tensile strength and peel strength testing is performed in the machine direction using 4 inch grips per modified ASTM D 4632. Results are reported as minimum average roll values unless otherwise indicated. Upon request, tensile strength can be reported per ASTM D 6768 and peel strength can be reported per ASTM D 6496.

⁴ Index flux and permeability testing with deaired distilled/deionized water at 80 psi (551kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Reported value is equivalent to 925 gal/acre/day. This flux value is equivalent to a permeability of 5x10⁻⁹ cm/sec for typical GCL thickness. Actual flux values vary with field condition pressures. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.

⁵ Peak values measured at 200 psf (10 kPa) and 10,800 psf (517 kPa) normal stress for a specimen hydrated for 48 hours. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

CETCO has developed an edge enhancement system that eliminates the need to use additional granular sodium bentonite within the overlap area of the seams. We call this edge enhancement, SuperGroove™, and it comes standard on both longitudinal edges of Bentomat® ST. It should be noted that SuperGroove™ does not appear on the end-of-roll overlaps and recommend the continued use of supplemental bentonite for all end-of-roll seams.



1500 W. Shure Drive Arlington Heights, IL 60004 USA 800.527.9948 Fax 847.577.5571
For the most up-to-date information please visit our website, www.cetco.com
A wholly owned subsidiary of AMCOL International

SHOP DRAWING REVIEW

The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

THIS DRAWING HAS BEEN REVIEWED FOR CONFORMANCE WITH THE GENERAL DESIGN CONCEPT ONLY. SUCH REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR ERRORS OR OMISSIONS OR OF MEETING THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

<input checked="" type="checkbox"/>	NO COMMENT	Submission No. <u>1</u>
<input type="checkbox"/>	SEE COMMENTS	Project No. <u>05-439</u>
<input type="checkbox"/>	AMEND & RESUBMIT	By <u>JL</u>
		Date <u>06/08/21</u>

DILLON CONSULTING LIMITED

KUDLIK CONSTRUCTION LTD
Verified by: Rene Deziel

Revised 09/04
TR 401-BMST

BENTOFIX®**Thermal Lock "NSL" Geosynthetic Clay Liner****• Technical Bulletin •**

Bentofix Thermal Lock "NSL" is a needlepunch reinforced GCL comprised of a uniform layer of granular sodium bentonite encapsulated between a slit-film woven and a virgin staple fiber nonwoven geotextile. The needlepunched fibers are thermally fused to the woven geotextile to enhance the reinforcing bond.

GEOTEXTILE PROPERTIES	TEST METHOD	MINIMUM TEST FREQUENCY	VALUE - ENGLISH -	VALUE - SI -
Cap Nonwoven Mass/Unit Area	ASTM D 5261	1/200,000 sq. ft (1/20,000 sq. m)	6.0 oz./yd ² MARV	200 g / m ² MARV
Woven Scrim Mass/Unit Area	ASTM D 5261	1/200,000 sq. ft (1/20,000 sq. m)	3.1 oz./yd ² MARV	105 g / m ² MARV

BENTONITE PROPERTIES				
Swell Index	ASTM D 5890	1/100,000 lbs. (50,000 kg)	24 ml / 2g min.	24 ml / 2g min.
Moisture Content	ASTM D 4643	1/100,000 lbs. (50,000 kg)	12 % max.	12 % max.
Fluid Loss	ASTM D 5891	1/100,000 lbs. (50,000 kg)	18 ml max.	18 ml max.

FINISHED GCL PROPERTIES				
Bentonite Mass Per Unit Area ¹	ASTM D 5993	1/40,000 sq. ft (1/4,000 sq. m)	0.75 lb. / sq. ft MARV	3.66 kg / m ² MARV
Grab Strength ²	ASTM D 4632	1/40,000 sq. ft (1/4,000 sq. m)	95 lbs MARV	422 N MARV
Peel Strength ³	ASTM D 4632	1/40,000 sq. ft (1/4,000 sq. m)	15 lbs. min.	66 N
Permeability ⁴	ASTM D 5084	1/100,000 sq. ft (1/10,000 sq. m)	5 x 10 ⁻⁹ cm/sec max	5 x 10 ⁻⁹ cm/sec max
Index Flux ⁴	ASTM D 5887	1/Week	1 x 10 ⁻⁶ m ³ /m ² /sec max	1 x 10 ⁻⁶ m ³ /m ² /sec max
Internal Shear Strength ⁵	ASTM D 6243	Periodic	500 psf Typical	24 kPa Typical

DIMENSIONS				
Width x Length	nominal	Every Roll	15.5 x 150 ft	4.7 x 45.72 m
Area per Roll	nominal	Every Roll	2325 ft ²	216 m ²
Packaged Weight	typical	Every Roll	2600 lbs	1179 kg

1. Oven-dried measurement. Equates to 1.0 lbs when indexed to a 12% moisture content.
2. Measured at maximum peak, in weakest principal direction.
3. Modified to use a 4 inch wide grip. The maximum peak of five specimens averaged.
4. De-Aired Tap Water @ 5 psi maximum effective confining stress and 2 psi head.
5. Typical peak value for specimen hydrated for 24 hr. and sheared under a 2000 psf normal stress.

NEDELIK CONSTRUCTION LLC

Verified by: Rene Deziel

Information regarding the physical properties of Bentofix Thermal Lock products, including the information contained in this specification sheet, is, to the best of our knowledge, information and belief, representative of Bentofix Thermal Lock products. All information, data, suggestions, opinions and recommendations are offered without guarantee or warranty of any kind. The final determination as to the appropriateness or suitability of any Bentofix product in any particular application rests with the user and is the user's sole responsibility. All rights are reserved to alter, change or modify the Bentofix products and product specifications at any time without notice. Please check with your sales or technical representative to assure that specifications are current. Bentofix is a registered trademark of Naue Fasertechnik, GmbH. (June 2002 Bentofix NSL)

SHOP DRAWING REVIEW

THIS DRAWING HAS BEEN REVIEWED FOR CONFORMANCE WITH THE GENERAL DESIGN CONCEPT ONLY. SUCH REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR ERRORS OR OMISSIONS OR OF MEETING THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

Submission No.

NO COMMENT

Project No.

SEE COMMENTS

By

AMEND & RESUBMIT

Date

AMEND & RESUBMIT

Date

AMEND & RESUBMIT

Bentofix Technologies, Inc.

23 Truman Road
Barrie, Ontario L4N 6E7 Canada
Phone 705-725-1938 Fax 705-725-8860

PACKING LIST

Ship To Kudlick Construction 1781 Route de L'aeroport Ancienne-Lorette, QC CA. Solmax-Textel		Date Shipped 6/22/2006 Customer Order # BH-06-23/06 Project # Bill of Lading 18035		
Transport Co. Huronia		Trailer # Joyal		
QUANTITY	DESCRIPTION AND SIZE	WEIGHT		NO. OF PIECES
3,200.00 lb	Granular Bentonite Style Gran Size: 50lb			64 Bag(s)
6,042.36 SqMt	Bentofix Material Style NSL Size: 45.72m x 4.72m			28 Roll(s)
		TOTAL: 70343	LBS	

Bentofix Barrie ONT
Time in 11:00 AM
Time out 5:25 PM
TOTAL : 6:25 hrs
Attente de 4heures

Kudlik Construction
Time in : 6 h 00 AM
Time out : 10 h 45 AM
Attente —
TOTAL 4h 45 min

KUDLIK CONSTRUCTION LTD
Verified by: Rene Deziel

SHOP DRAWING REVIEW	
THIS DRAWING HAS BEEN REVIEWED FOR CONFORMANCE WITH THE GENERAL DESIGN CONCEPT ONLY. SUCH REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR ERRORS OR OMISSIONS OR OF MEETING THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.	
NO COMMENT	Submission No. 1
SEE COMMENTS	Project No. 05-4319
AMEND & RESUBMIT	By JX
	Date 08/06/21
DILLON CONSULTING-LIMITED	

BENTOFIX TECHNOLOGIES INC.

Shipment Contents

6/22/2006
Page 1 of 1

BOL #: 18035

Shipment Date: 6/22/2006

<u>Lot #</u>	<u>Roll #</u>	<u>Length</u> (m)	<u>Width</u> (m)
16062113	69716	45.72	4.72
	69717	45.72	4.72
	69718	45.72	4.72
	69719	45.72	4.72
	69720	45.72	4.72
	69721	45.72	4.72
	69722	45.72	4.72
	69723	45.72	4.72
	69724	45.72	4.72
	69725	45.72	4.72
	69726	45.72	4.72
	69727	45.72	4.72
	69728	45.72	4.72
	69730	45.72	4.72
	69731	45.72	4.72
	69732	45.72	4.72
	69733	45.72	4.72
	69734	45.72	4.72
	69735	45.72	4.72
	69736	45.72	4.72
	69737	45.72	4.72
	69738	45.72	4.72
	69739	45.72	4.72

Lot Total 1,051.56 m

26061503	54995	45.72	4.72
	54996	45.72	4.72
	54997	45.72	4.72
	54998	45.72	4.72
	54999	45.72	4.72

Lot Total 228.60 m

Grand Total 1,280.16 m

SHIPPING INFORMATION

NO. #	BH062306	# of Rolls	28
Trucking Co.	Huronin	# of Bags	64
Trailer Name & #	Joyal	Other	
Net Wgt.	69,223	Invoice #	14031
Gross Wgt.	70,343	Sq. Ft.	604236

SHOP DRAWING REVIEW

THIS DRAWING HAS BEEN REVIEWED FOR CONFORMANCE WITH THE GENERAL DESIGN CONCEPT ONLY. SUCH REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR ERRORS OR OMISSIONS OR OF MEETING THE REQUIREMENTS OF THE CONTRACT DOCUMENTS.

<input checked="" type="checkbox"/>	NO COMMENT	Submission No. 1
<input type="checkbox"/>	SEE COMMENTS	Project No. 05-4319
<input type="checkbox"/>	AMEND & RESUBMIT	By J
		Date 06/08/21

DILLON CONSULTING LIMITED

KUDLIK CONSTRUCTION LTD
Verified by: Rene Deziel

ISSUED AT SHIPPER'S REQUEST

received, subject to the classifications and tariffs in effect on the date of issue of this Original Bill of Lading, or, received subject to the Rules for the Carriage of Express and Non-Carload Freight Traffic and Tariffs in effect on the date of issue of this Original shipping contract (Bill of Lading), goods described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said Company agrees to carry to its usual place of delivery at said destination, if by road, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said goods over all or any portion of said route to destination, and as to each party at any time interested in all or any of said goods, that every service to be performed hereunder shall be subject to all the terms and conditions (which are hereby incorporated by reference and have the same force and effect as if the same were severally, fully and specifically set forth herein).

provided by the Board of Transport Commissioners for Canada by General Order No. T-5 dated February 1, 1965 set forth in the Canadian Freight Classification and also available at all railway agency stations and freight offices upon request, when said goods are carried by a rail carrier; or
 of the bill of lading of the water carrier as provided in its tariff of Rules and Regulations when said goods are carried by a water carrier; or
 of the bill of lading set forth in or prescribed by the relevant tariffs, classification, statutes and regulations pertaining to motor carrier's services when said goods are carried by a motor carrier; or
 of the bill of lading form prescribed by O.C. 986-79 - 4 April 1979, when said goods originating in Quebec are to be carried by a motor carrier;
 or approved by the The Board of Transport Commissioners for Canada by General Order No. T-43, set forth in the Rules for the Carriage of Express and Non-Carload Freight Traffic and also available at all express and railway agency stations and express and freight offices upon request, when said goods are carried by a rail carrier and which are agreed to by the shipper and accepted for himself and his assigns.

NAME OF CARRIER	POINT OF ORIGIN	DATE	CARRIER'S NO.
Huronion	BARRIE, ONTARIO, CANADA	6/22/2006	
CONSIGNEE	SHIPPER		
Kudlick Construction	Solmax-Texel	BENTOFIX TECHNOLOGIES, INC.	
CONSIGNEE STREET ADDRESS	MAIL ADDRESS (NOT FOR PURPOSES OF DELIVERY)		
1781 Route de L'aéroport			
DESTINATION (CITY-TOWN)			
Ancienne-Lorette, QC	CA.		

ROUTE	CAR INITIAL	CAR NO. TRAILER NO. CONTAINER NO.	Joyal	IF CHARGES ARE TO BE PREPAID, WRITE OR STAMP HERE
PIECES / PACKAGES	DESCRIPTION OF ARTICLES AND SPECIAL MARKS	WEIGHT (Subject to Correction)	RATE	TO BE PREPAID COLLECT
CUSTOMER	ORDER NBR. Order #: BH-06-23/06	Project #:		RECEIVED \$
	Invoice #: 14031	CSR: BH		TO APPLY IN PREPAYMENT OF THE CHARGES ON THE PROPERTY DESCRIBED HEREON.
Roll(s)	Bentofix Material	70343	lbs	AGENT OR CASHIER
64 Bag(s)	Granular Bentonite			FOR CARRIER'S USE CHARGES
SITE CONTACT:				ADVANCE AND/OR BEYOND \$
Paul-Andre Pelletier (418) 871-3368				MISC. \$
CALL 24 HOURS PRIOR TO DELIVERY TO SCHEDULE UNLOADING				BASIC \$
ALL FLATBED LOADS MUST BE TARPED				PIECE \$
				VALUE \$
				TOTAL \$

Special agreement between consignor and carrier, please advise here.

To Be Delivered Monday, June 26, 2006

FOR MOTOR CARRIER SERVICE

DECLARED VALUATION

Maximum liability of \$4.41/Kg (\$2.00/lb) calculated on the total weight of the shipment unless declared valuation states otherwise.

\$

NOTICE OF CLAIM

a) No carrier is liable for loss, damage or delay to any goods carried under the Bill of Lading unless notice thereof setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or, in the case of failure to make delivery, within nine (9) months from the date of shipment.

b) The final statement of the claim must be filed with nine (9) months from the date of shipment together with a copy of the paid freight bill.

WHERE REQUIRED BY THE TARIFF, SHIPPER MUST SHOW DIMENSIONS OF SHIPMENT.

28 Roll(s)	45.72m x 4.72m			70343 LB	NO. XL PCS/PKGS
5015					
BENTOFIX TECHNOLOGIES, INC.					
PER					
23 Truman Road Barrie, Ontario Canada L4M 6E7					
PERMANENT POST OFFICE ADDRESS OF SHIPPER					
SHIPPER'S NO.					
018035					