APPENDIX III

IN-LINE PLASTICS, LC

FIELD INSTALLATION

QUALITY ASSURANCE MANUAL

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1.1.0 INTRODUCTION

1.1.1. Purpose

Quality assurance refers to means and actions employed by In-Line Plastics, LC (ILP) to assure conformity of the lining system installation with the Quality Assurance Plan, drawings and specifications.

This manual addresses the quality assurance of the installation of flexible membrane liners and other geosynthetic products used by ILP in waste disposal landfills, surface impoundments or other installations as specified by the owner and/or Engineer. This manual is a general guide and not site specific and delineates In-Line's quality procedures and standards for installation.

Commonly use geosynthetic components of a lining system is being discussed in this manual. This includes polyethylene geomembranes, geotextiles, geonets and geocomposites. This manual can be a useful guide in delineating the quality assurance procedures and requirements for the installation of all the above geosynthetic products. The site specific QA depends on job specifications and site conditions.

This manual does not address the quality assurance of soils, except in cases where soil placement may have an influence on the geosynthetics.

1.1.2. Scope of Quality Assurance

The scope of this manual includes the quality assurance applicable to shipment, handling, and installation of all geosynthetics. In particular, full time quality assurance of the installation of geomembranes and the installation of other geosynthetics is essential. (See exhibit A for QA Chart)

This manual does not address design guidelines, installation specifications, or selection of geomembranes or other geosynthetics (which includes compatibility between geosynthetic and contained material).

1.2.0 Construction Meetings

1.2.1 Progress Meetings

It is recommended an informal daily installation Progress Meeting be held among appropriate parties to discuss current progress.

1.3.0 Delivery, Storage, and handling

Membrane delivered to the site shall be unloaded prior to In-Line crew arrival and stored with a minimum of handling. Each roll will be uniquely labeled.

Inventory shall be taken at the time of delivery. As the membrane is unloaded, it shall be inspected for damage. Any damage will be noted and repaired per specification. The "inventory Report" form will be used as material is delivered. Any shortages shall be noted as missing items ordered.

Membrane material shall be handled with equipment that will not damage the membrane.
The storage area required shall be reasonably flat and well drained. The surface shall be free of sharp rocks or other objects that may damage the membrane.

The storage area must be as close as practical to the work area in order to minimize on site handling. The storage area must also be secure to prevent vandalism and theft and must be such that the membrane is not likely to be damaged by passing vehicles.

1.4.0 Equipment

1.4.1 Welding Equipment

Two practical types of welding equipment can be utilized: Wedge, and Extrusion.

A. Wedge Welding

For panel seaming with varying subgrade, the contractor shall provide automated welding equipment. The equipment shall be capable of measuring the temperature at the wedge and monitoring the automated equipment to assure it maintains a consistent pressure to achieve a passing field weld.

The power source shall be capable of providing constant voltage under a combined-line load.

B. Extrusion Welding

For extrusion welding, the contractor shall provide a field extrusion welder capable of adhering a continuous bead between the panels with a nominal width of one inch. Extrusion welders shall have a fixed preheat nozzle attached to the front of the extrusion welder.

1.4.2 Generators

Typically, a 6.5 kW or larger generator will be used at the work area and electrical extension cords will be used to power the welding equipment.

1.4.3 Miscellaneous Equipment

Small tools will include hook blade utility knives, scissors with rounded points, hand leister, grinders, and silicone or rubber rollers.

2.1.0 GEOMEMBRANE INSTALLATION

2.1.1 Earthwork

A. Surface Preparation
The Earthwork Contractor shall be responsible for preparing the subgrade according to the project specifications and the following minimum industry subgrade standard necessary to properly install the liner.

A.1 The surface to be lined has been prepared so as to be free of irregularities, protrusions, vegetation, excessive water, loose soil or abrupt changes in grade.

A.2 The supporting surface does not contain stones or other matter of such composition, shape or size which may be damaging to the geomembrane and

A.3 There are no excessively soft surface areas

Under no circumstances shall the installer deploy any geomembrane in areas not acceptable within these guidelines. A completed surface acceptance from shall be provided to the customer specifically indicating the areas accepted for geomembrane

installation during each day's activities. This form shall be provided after installation activities within that area. If at any time during the installation of the geosynthetic lining system the prepared subgrade deteriorates, becomes damaged, or in any way is determine unacceptable by the Site Supervisor, all liner installation work shall stop in those areas and the condition of those areas brought to the attention of the appropriate party.

B. Anchor Trench

The anchor trenches shall be constructed by the Earthwork Contractor to the lines, widths and depths as shown on the drawings and specifications. This task should be performed prior to the geomembrane deployment. Pile excavated dirt away from the area to be lined.

The edges where the geosynthetics enter the trench should be free of irregularities, protrusions, etc. to avoid potential damage to the material. Backfilling of the anchor trench shall be the responsibility of the of the Earthwork Contractor in accordance with specifications. Backfilling should occur when the geosynthetic material is at its most contracted state to avoid potential bridging problems. Care must be taken to avoid damaging the geosynthetics during backfilling.

2.2.0 Geomembrane Deployment

The site supervisor, in conjunction with the customer shall agree upon the following issues. If any adverse situation or disagreement exists, the site supervisor shall delay deployment until issues are resolved.

2.2.1 Installation

The Site Supervisor shall proceed with deployment provided that:

- Deployment equipment does not damage the subgrade
- Personnel who are in contact with the liner do not smoke, wear damaging (non-soft sole) shoes or engage in other activities which risk damage to the liner

2.2.2 Use of a low ground pressure, rubber-tired all terrain vehicle (i.e. ATV) is allowed on the geosynthetic surface, provided proper care is taken to avoid damage and excessive traffic

2.2.3 Field panel placement installation sequence should take into account site drainage, wind direction, subgrade surface, access to the site, and production schedule of the project. Field panels should be seamed as soon as possible after deployment and all deployed material shall be marked with appropriate identification.

2.2.4 Visual Inspection

The Site Supervisor and/or the QA Technician and the designated Independent Inspector shall visually inspect each panel, as soon as possible after deployment, for damage or areas needing repair. Areas shall be marked for repair.

2.3.0 Field Seaming

Field seaming involves the bonding of adjacent panels using thermal methods.

2.3.1 Seam Layout

In general, seams shall be oriented parallel to the direction of maximum slope, i.e. oriented along, not across, the slope. In corners and odd-shaped geometric locations, the number of seams should be minimized. No horizontal seams should occur on a panel less the five lineal feet from the toe of the slope. On slopes of less that 10% (6L: 1H), this rule

shall not apply. A cross slope seam may be utilized provided the panel ends are cut at an angle of approximately 45%.

A seam is considered a separate entity if it is the principal attachment that joins two or more panels. Repairs are not considered seams in this context.

A numbering system using adjacent panel numbers shall identify each seam.

2.3.2 Seaming Equipment and Products

Approved processes for field seaming and repairing are extrusion welding and fusion welding. All welding equipment shall have accurate temperature monitoring devices to insure proper measurement of the welder temperatures.

A. Fusion Process

This process shall be used for seaming panels together and is not generally used for patching or detailed work. The apparatus shall be of hot wedge type and is commonly equipped with a "split wedge" to allow air pressure seam testing.

Fusion welding equipment shall be self-propelled devices and shall be equipped with functioning wedge temperature and seaming speed controllers to assure proper control by the Welding Technician.

B. Extrusion Process

This process shall be used primarily for repairs, patching, and special detail fabrication. This method is also useful to connect new panels to previously installed liner that does not have an exposed edge capable of being fusion welded.

The extrusion welding apparatus (hand welder) shall be equipped with temperature monitoring devices.

2.3.3. Seam Preparation

The Welding Technician shall verify that prior to seaming the seam area is free of moisture, dust, sand, or debris of any nature; the seam is properly heat tacked and abraded when extrusion welding; and seams are performed to minimize "fishmouths".

2.3.4 Trial Seams (Trial Welds)

Prior to production seaming, trial seams shall be made and accepted using project specified criteria. Trial seams shall be made on appropriate sized pieces of identical or equivalent geomembrane material to verify that seaming conditions and procedures are adequate. Each trial seam sample shall be assigned a number and the test results recorded in the appropriate log.

- Trial seams shall be performed for each welder to be used and by each operator of extrusion welders, and by the primary operator of each fusion welder.
- A passing trial seam shall be made prior to the beginning of each seaming period. Typically this is at the start of the day and after lunch break.
- Fusion welded trial seam samples shall be approximately six feet long by one foot wide with the seam centered lengthwise. For extrusion welding, the trial seam sample size shall be approximately three feet long by one foot wide with the seam centered lengthwise.

2.3.5 Panel Seams (Production Seaming)

Upon Acceptance of the trial seams, work may begin on deployed panels. All seams shall be non-destructively tested. Each completed seam shall be labeled with pertinent information.

2.3.6 Non-Destructively Seam Testing.

ILP will only non-destructively test field seams for their full length using an air pressure test or a vacuum test, if required by Engineer's specifications. The purpose of non-destructively tests is to demonstrate the leak resistance of the seam.

The Site Supervisor shall schedule all non-destructively testing operations in order to ensure prompt demonstration of weld quality and the orderly progress of the project.

The QA Technician shall instruct the testing personnel regarding marking of repairs needed, leaks and sign-off marks on seam and repairs.

a) Vacuum Testing

Vacuum testing is routinely performed on extrusion welds and can be performed on the fusion welds. The equipment shall consist of a vacuum box assembly with a vacuum gauge, a pumping device, and a soap solution.

The following procedure shall be followed:

- Wet a section of the seam with the soap solution. The seam section must be longer that the vacuum box.
- Place the vacuum box over the wetted area and apply body weight to form a seal between the gasket and the liner.
- Evacuate air to create a negative pressure of approximately 3 to 5 psig.
- Observe the seam through the viewing window for pressure of soap bubbles emitting from the seam.
- If no bubbles are observed, reposition the box on the next wetted area for testing with slight overlap.
- If bubbles are detected, this indicates a leak in the seam, mark the area of the leak for repair and retest.

b) Air Pressure Testing

Air pressure testing is performed on seams made by a double-seam fusion welding apparatus.

The equipment shall be comprised of the following:

- An air pump, or air tank, capable of producing a minimum air pressure of 25 psig in the seam channel
- A sharp hollow needle to insert air into the air channel of the seam
- A hot air gun or other heating device to seal the ends of the air channel

The following procedures shall be followed:

- Seal both ends of the air channel of the seam to be tested.
- Insert the needle into the air chamber at either end of the seam to be tested.
- Pressurize the air channel to minimum of 15 psi. Allow the pressure to stabilize, and if necessary, re-pressurize to 15 psi and note the pressure.
- With a minimum pressure of 15 psi stabilized in the air channel, the time of day should be noted.
- After approximately 5minutes, the air pressure should be read again.
- If the difference between the two readings is more than 4 psi, the seam needs to be retested
- Upon completion of the air pressure test, the seam shall be marked and points requiring repair identified.

c) Procedures for Air Pressure Test Failure
Should the seam fail the air pressure test, the following procedure shall be followed:

- Reposition the apparatus and retest the same section
- While the seam air-channel is under pressure, traverse the length of the seam and listen for the leak
- While the seam air-channel is under pressure, apply a soapy solution to the seam edge (do not trim excess material from edge of seam) and observe for bubbles formed by escaping air
- Re-test the seam in progressively smaller increments, until the area of leakage is identified
- Repair the identified leak area by extrusion welding the excess material at the edge of the seam and then vacuum test
- In areas where the air channel is closed and the integrity of the weld is not suspect, vacuum testing is acceptable

2.3.7 Destructive Seam Testing
Destructive seam testing will only be performed at selected locations, if required by Engineer's specifications. The purpose of these tests is to evaluate bonded seam strength testing shall be performed as work progresses.

a) Location and Frequency
The frequency of sample removal is commonly no more that one sample per 500 lineal feet of seam. The sample can be taken at the end of a seam to avoid a repair.

b) Size of Samples
A sample segment twelve inches by twelve inches shall be cut with the seam centered lengthwise. Additional segments may be cut for independent lab testing, archival retain or other uses.

c) Sample Identification
The segment shall be marked with the appropriate destructive sample (D/S) number.

d) Field Testing
Sample shall be tested in peel and in shear using the following procedure:

- Ten specimens of one-inch width shall be cut.
- Five specimens shall be tested for peel. Fusion welds shall be tested from both sides.
- Five specimens shall be tested for shear.
- The specimens shall be hand pulled to see if the seams exhibit a film tear bond (FTB) (see Exhibits B & C). If specified samples can also be sent to In-Line Plastics for in house testing in a tensiometer. Testing will occur at a rate of two inches per minute.

e) Pass/Fail Criteria
Seam shall exhibit a film tear bond (FTB) (see Exhibits B & C). For projects that utilize a tensiometer, the following table provides minimum acceptable values.

Seam Strength ASTM D 4437					
		Shear		Peel	
Product Name	Thickness ASTM D 5199 Mm (mils)	Extrusion kN/m (Lb./in)	Fusion kN/m (Lb./in)	Extrusion kN/m (Lb./in)	Fusion kN/m (LB/in)
HDPE Smooth	0.75 (30)	9.4 (54)	9.4 (54)	6.3 (36)	7.3 (42)
HDPE Smooth	1.0 (40)	13.3 (76)	13.3 (76)	8.7 (50)	10.3 (59)
HDPE Smooth	1.5 (60)	20.4 (117)	20.4 (117)	12.7 (78)	15.9 (91)
HDPE Smooth	2.0 (80)	27.1 (155)	27.1 (155)	18.2 (104)	21.1 (121)
LLDPE Smooth	0.75 (30)	7.3 (42)	7.3 (42)	6.1 (35)	6.1 (35)
LLDPE Smooth	1.0 (40)	9.8 (56)	9.8 (56)	8.4 (48)	8.4 (48)
LLDPE Smooth	1.5 (60)	14.7 (84)	14.7 (84)	12.6 (72)	12.6 (72)
LLDPE Smooth	2.0 (80)	19.6 (112)	19.6 (112)	16.8 (96)	16.8 (96)

Seam Strength ASTM D 4437					
		Shear		Peel	
Product Name	Thickness ASTM D 5199 Mm (mils)	Extrusion kN/m (Lb./in)	Fusion kN/m (Lb./in)	Extrusion kN/m (Lb./in)	Fusion kN/m (Lb./in)
HDPE Textured	0.75 (30)	9.4 (54)	9.4 (54)	6.3 (36)	7.3 (42)
HDPE Textured	1.0 (40)	13.3 (76)	13.3 (76)	8.7 (50)	10.3 (59)
HDPE Textured	1.5 (60)	20.4 (117)	20.4 (117)	12.7 (78)	15.9 (91)
HDPE Textured	2.0 (80)	27.1 (155)	27.1 (155)	18.2 (104)	21.1 (121)
LLDPE Textured	0.75 (30)	5.9 (34)	5.9 (34)	5.0 (29)	5.0 (29)
LLDPE Textured	1.0 (40)	8.4 (48)	8.4 (48)	7.0 (40)	7.0 (40)
LLDPE Textured	1.5 (60)	13.0 (70)	13.0 (70)	11.0 (60)	11.0 (60)
LLDPE Textured	2.0 (80)	16.8 (96)	16.8 (96)	14.0 (80)	14.0 (80)

In addition to these values, the sample shall not fail within the seam area. Three out of five specimens meeting the above criteria will constitute a passing test.

If the seam fails the test, the following procedure shall be followed. Additional sample segments of the same size shall be removed approximately 10 lineal feet in each direction from the failed seam. Both of these sample segments shall be tested in accordance with the criteria listed above and each segment must pass. This procedure is repeated until a passing result is obtained. In lieu of taking an excessive number of samples, the entire seam may be repaired as outlined in Section 2.3.8.a.

2.3.8 Defects and Repairs

All seams and non-seam areas of the polyethylene lining system shall be examined for identification of defects. Identification of defects or repair may be made by marking on the sheet/seam with an appropriate marking device.

a) Repair Procedures

Any portion of the polyethylene lining system exhibiting a defect which has been marked for repair shall be repaired with any one or combination of the following methods:

- Patching: using to repair holes, tears

- Grind and re weld: used to repair small sections of extruded seams
- Spot welding: used to repair small minor, localized flaws
- Flap welding: used to extrusion weld the flap of a fusion weld in lieu of a full cap
- Capping: used to repair failed seams
- Topping: application of extrudate bead directly to exist

The suspected defect shall be demonstrable as out of specification and detrimental to the performance of the liner.

The following conditions shall apply to all the above methods:

- Surfaces of the polyethylene which are to be repaired shall be lightly abraded to assure cleanliness
- All surfaces intended to receive extrudate must be clean and dry at the time of the repair
- All patches and caps shall extend at least four inches beyond the edge of the defect, and all patches shall have rounded corners.

b) Verification of Repairs
Repairs shall be non-destructively tested according to the criteria established in Section 2.3.6.e.

Repairs, which pass the non-destructive test, will be taken as an indication of an adequate repair. Failed tests indicate that the repair must be re-done and re-tested until a passing test result.

2.4.0 Lining System Acceptance

After work is complete, the Site Supervisor and/or QA Technician shall conduct a final inspection (walk-down) of the area for confirmation that all repairs have been appropriately performed, all test results are acceptable and the area has all scrap, trash and debris removed. Only after careful evaluation by the Site Supervisor and acceptance by the Customer shall any material be placed upon the lining system.

The geosynthetic lining system will be accepted by the customer when:

- Installation of materials is completed.
- Verification of the adequacy of all seams and repairs, including associated testing and documentation is completed

Signing a Certificate of Acceptance (see Attached) will indicate acceptance by all parties. Partial area of the installation may be accepted in order to allow further construction of the project.

3.1.0 Handling

All geotextile, geonets, and geocomposites shall be handled in such a manner as to ensure they are not damaged.

- On Slopes, the geosynthetics shall be securely anchored in the anchor trench and then rolled down the slope in such a manner as to keep the material in tension.
- Sandbags shall be used to secure the edges of the material when the potential wind damage is significant.

- Cutting the material shall be done in such a manner as to prevent damage to any underlying or adjacent geomembrane.
- Care should be taken when deploying geosynthetic materials that stones, debris or other material is not trapped by the geonet, geocomposites, geotextile or geosynthetic clay liner and which might damage the geosynthetic or geomembrane.

3.2.0 Deployment and Installation

3.2.1 Geonet – Drainage Net
Geonet shall be overlapped approximately four inches and fastened together with plastic cable ties.

3.2.2 Geotextile/ Geonet Geocomposite
The geonet component shall be overlapped approximately four inches and fastened together with plastic cable ties. The unbonded edge of the geotextile component shall remain overlapped. Bonded edge of the geocomposite shall be overlapped approximately four inches and fastened with plastic cable ties.

3.2.3 Geotextile
Geotextile may be installed by overlapping, by heat bonding (spot or continual basis) as indicated in the specifications.

3.2.4 Geosynthetic Clay Liner
Seaming of GCLs is achieved by overlap the GCL panels approximately six inches. End-of-roll seams shall be overlapped a minimum of 12". Supplemental granular bentonite is required for reinforced GCL. The granular bentonite shall be applied at a rate of one quarter pound per lineal foot between the overlapping panels and at end-of-roll.

3.3.0 Geosynthetic Repair

3.3.1 Geonet – Drainage Net
Any tear larger than twelve inches shall be repaired. Patches shall extend at least six inches from all sides of the tear and shall be fastened with plastic cable ties.

3.3.2 Geotextile/ Geonet Geocomposite
Holes and tears in the composite material shall be repaired with a patch of identical or similar material extending at least 6" from all sides of the hole or tear and fastened with plastic cable ties.

3.3.3 Geotextile
Holes in geotextile material shall be repaired using a patch of identical or similar materials extending approximately six inches on all sides from the hole or tear and heat bonded to parent material.

3.3.4 Geosynthetic Clay Liner
The area to be repaired (patched) must be free of contamination by foreign matter. Patches should have approximately twelve inches overlaps around the damaged area. For fabric-encased GCLs, the patch is to be tucked into place with excess bentonite poured over the overlap. However, temporary attachment of patches is required to ensure that the patch is not dislodged by covering with geomembrane or soil.

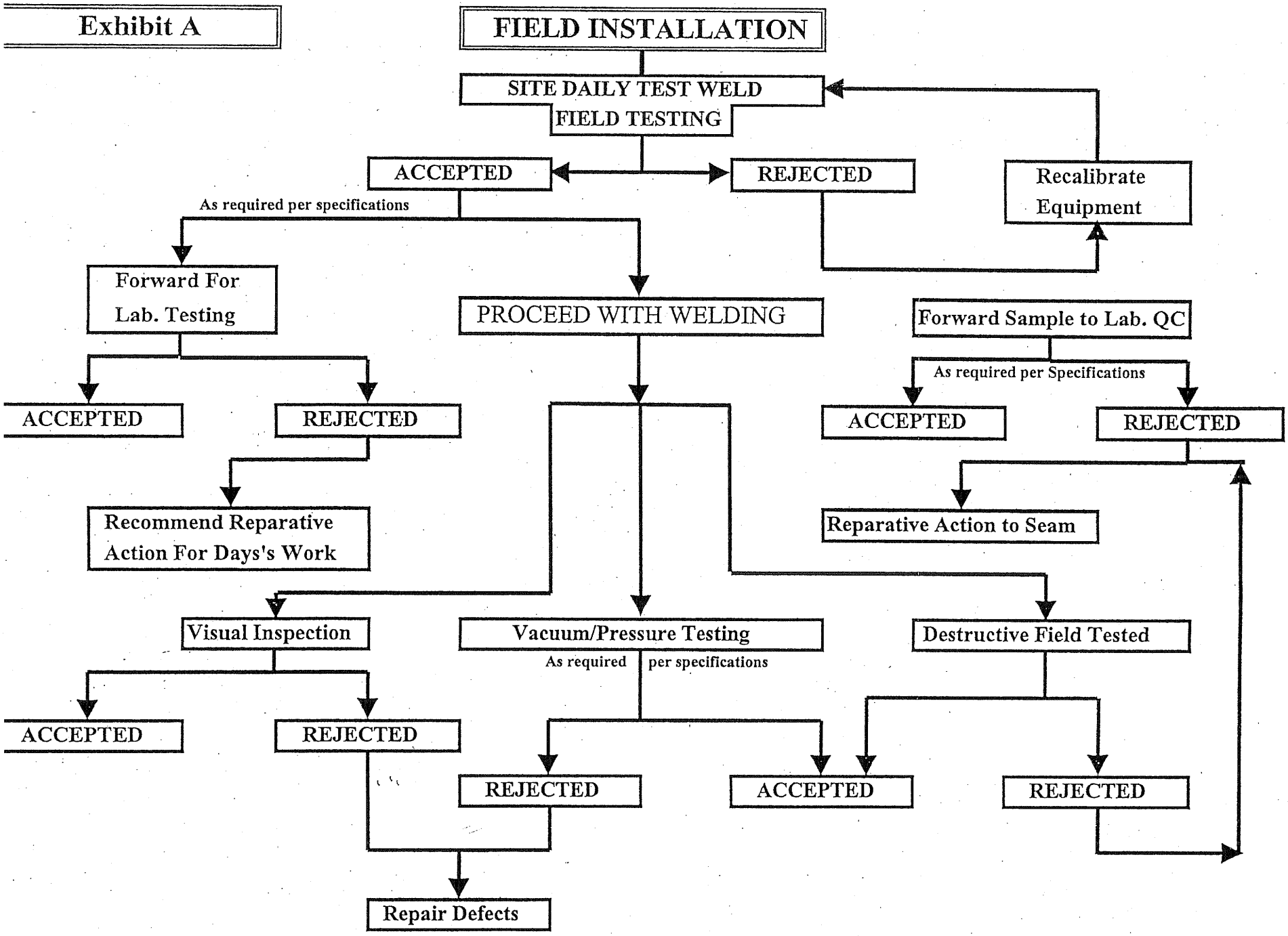
4.1.0 Exhibits

- A. QA Chart
- B. Pass / Fail Criteria – Hot Wedge Weld
- C. Pass / Fail Criteria – Extrusion Weld

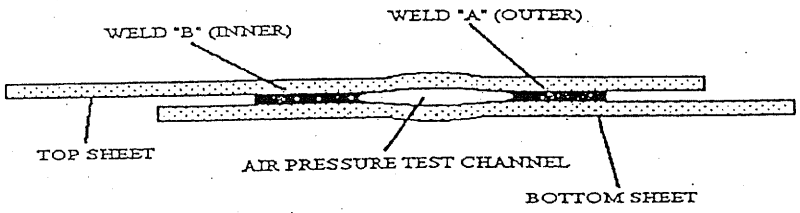
4.2.0 In-Line Plastic's Installation Forms

- D. Subgrade Acceptance
- E. Preweld Qualification
- F. Daily Progress Report Master
- G. Destructive Sample Report
- H. Certificate of Acceptance

Exhibit A


FIELD INSTALLATION
SITE DAILY TEST WELD FIELD TESTING
ACCEPTED
REJECTED
Recalibrate Equipment
As required per specifications
Forward For Lab. Testing
PROCEED WITH WELDING
Forward Sample to Lab. QC
As required per Specifications
ACCEPTED
REJECTED
ACCEPTED
REJECTED
Recommend Reparative Action For Days's Work
Reparative Action to Seam
Visual Inspection
Vacuum/Pressure Testing
As required per specifications
Destructive Field Tested
ACCEPTED
REJECTED
REJECTED
ACCEPTED
REJECTED
Repair Defects

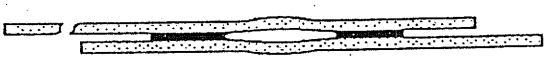
DESTRUCTIVE TESTING OF DUAL HOT WEDGE WELD



TEST STRIP

RESULTS

FTB IN BOTTOM SHEETING
***(PASS)

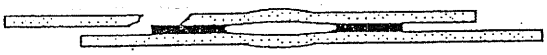


FTB IN TOP SHEETING
***(PASS)

FTB IN BOTTOM SHEETING AT INNER EDGE OF SEAM.
***(PASS)

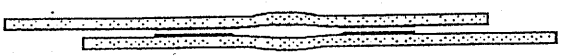
FTB = FILM TEAR BOND

FTB IN TOP SHEETING AT INNER EDGE OF SEAM.
***(PASS)



FTB IN TOP SHEETING OF SEAM AFTER SOME ADHESION FAILURE.
***(FAILURE)

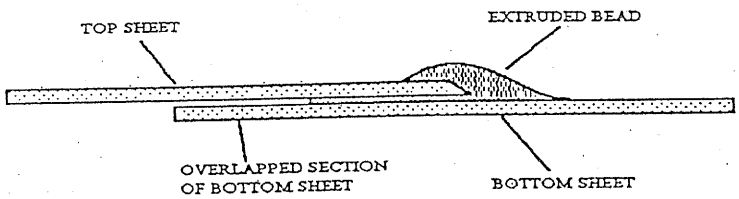
FTB IN BOTTOM SHEETING OF SEAM AFTER SOME ADHESION FAILURE.
***(FAILURE)

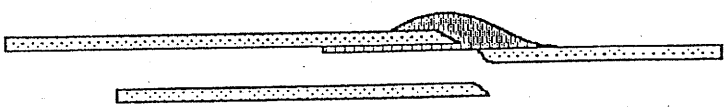
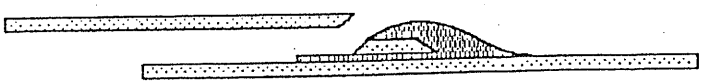


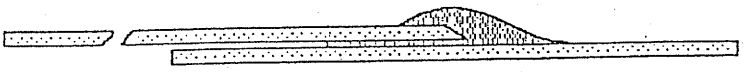
FAILURE IN ADHESION.
***(FAILURE)

FTB = FILM TEAR BOND

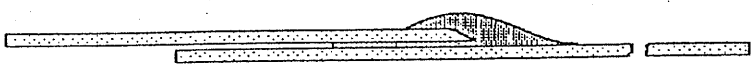
VARIETIES OF SEAM FAILURES DURING DESTRUCTIVE TESTING OF EXTRUSION WELD



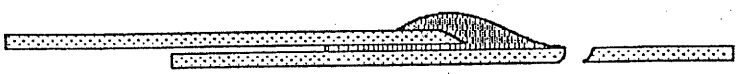
TEST STRIP	RESULTS
	FTB SEPARATION IN BOTTOM SHEET AFTER SOME DELAMINATION. ***(PASS)
	FTB SEPARATION IN TOP SHEET AT SEAM EDGE. ***(PASS)



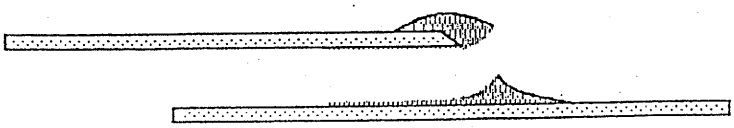
FTB SEPARATION IN TOP SHEET.
***(PASS)



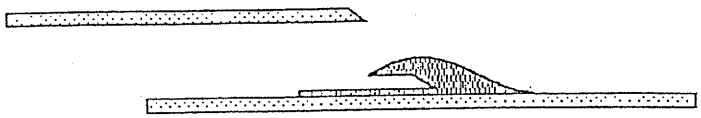
FTB SEPARATION IN BOTTOM SHEET.
***(PASS)



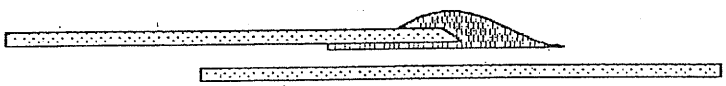
FTB SEPARATION IN BOTTOM SHEET AT OUTSIDE SEAM EDGE.
***(PASS)



FTB SEPARATION AT WELD (IF RECORDED STRESS MEETS SPEC).
***(PASS)



SEPARATION IN ADHESION.
***(FAILURE)



SEPARATION IN ADHESION.
***(FAILURE)

FTB = FILM TEAR BOND

IN-LINE PLASTICS, INC.

PREWELD QUALIFICATION

Customer:_____ Project Number::_____

Project Name:_____ Location:_____

Material: _____

Test Method: One-inch specimens were used for Peel & Shear Testing of the welds.

Date	Machine #	Operator	Temperature	Speed	Weld Type	Result	Peel Stress	Shear Stress	Pass / Fail

IN-LINE PLASTICS, INC.

SUBGRADE SURFACE ACCEPTANCE

Customer:_____ Date:_____

Project Name:_____ Project Number:_____

Location:_____ Partial:_____Final: _____

I, the undersigned duly authorized representative of In-Line Plastics, LC, certify that upon visual inspection the subgrade surface described below meets criteria for installation of:

_____

By signing below, however, In-Line Plastics, LC acknowledges no responsibility for the subgrade design, degree of moisture or compaction, integrity, elevation, or maintenance thereof, in any way.

Approximate size of area accepted:_____

Description of the area accepted: _____

_____

_____

_____

_____

_____

_____

In-Line Representative	Owner/Contractor	Inspector

IN-LINE PLASTICS, INC.

DESTRUCTIVE SAMPLE REPORT

Customer: _____ Project Number:: _____

Project Name: _____ Location: _____

Material: _____ Date: _____

Test Method: ASTM D4437 - One-inch specimens were used for Peel & Shear Testing of the welds.

Pond	Seam	Sample	Weld Type	Result Type	Peel Stress	Shear Stress

IN-LINE PLASTICS, INC.

DAILY PROGRESS REPORT MASTER

Date:_____ Project Name:_____ Job Number:_____

Location:_____ Customer: _____

In-Line Representative: _____ Inspector: _____

DEPLOYMENT				WELDING					NON DESTRUCTIVE TEST					
Type	Panel #	Roll #	Length	Mach #	Tech	Test Type	Seam #	Seam Ft	Start	Stop	Repair Location	Date Repair	Date Retest	Tech

IN-LINE PLASTICS, INC.

CERTIFICATE OF ACCEPTANCE

Project Name:_____ In-Line Contract Number:_____

Description of the Project: _____

_____

_____

_____

_____

_____

_____

_____

Total Area: _____ SF

I, the undersigned, duly authorized representative of _____ do hereby take over and accept the work described above from the date hereof and confirm that to the best of my knowledge, the work has been completed in accordance with the specifications and the terms and conditions of the contract. There appears no damage to the plastic lining nor any unacceptable interference within or without the surrounding works. Scrap and off-cuts have been removed and the works have been in clean and tidy condition. In-Line Plastics, LC undertakes to rectify any damage resulting from defective materials or workmanship within compliance of contract guarantees.

Name: _____ Signature: _____

Title: _____ Date: _____

Certified and accepted by In-Line Plastics, LC Representative

Name: _____ Signature: _____

Title: _____ Date: _____

Product Description MIRAFI®

Engineered Solutions for an Innovative World

product

Mirafi® N-Series NonWoven Polypropylene Geotextiles

for Soil Separation, Filtration, and Protection

TC Mirafi offers a wide range of nonwoven geotextiles for soil separation, filtration and protection. These geotextiles are cost-effective reinforcement elements which improve and enhance modern construction techniques in a variety of civil engineering applications.

PRODUCT DESCRIPTION

Mirafi® N-Series products are nonwoven geotextiles comprised of polypropylene staple fibers. Mirafi® N-Series Nonwoven Polypropylene Geotextiles provide excellent physical and hydraulic properties in addition to high tensile strengths.

FEATURES AND BENEFITS

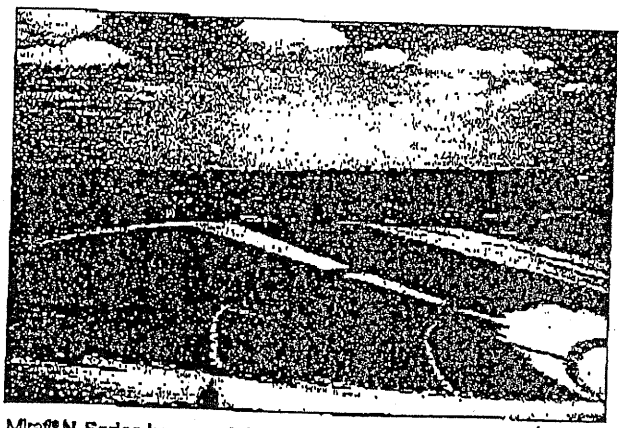
- **Construction.** Mirafi® N-Series geotextiles easily conform to the ground or trench surface for trouble-free installation;
- **Strength.** Mirafi® N-Series geotextiles withstand severe installation stresses with high puncture and burst resistance;
- **Filtration.** High permeability properties provide high water flow rates while providing excellent filtration properties;
- **Environmental.** Mirafi® N-Series geotextiles are chemically stable in a wide range of aggressive environments;
- **Cost effective.** Mirafi® N Series geotextiles provide economical solutions to many civil engineering applications including a cost-effective alternative to graded aggregate filters.

APPLICATIONS

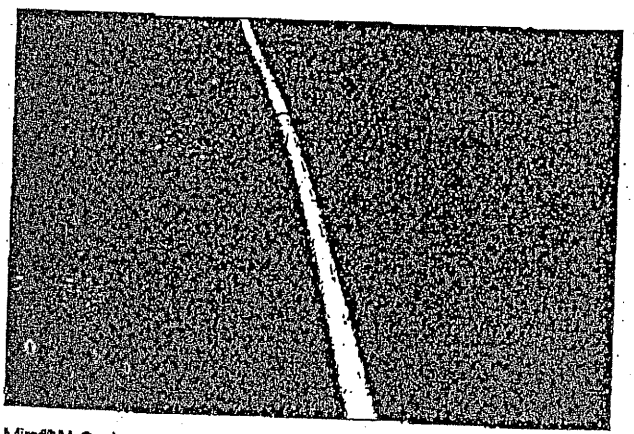
Mirafi® N-Series Nonwovens are used in a wide variety of applications including separation, filtration, and protection applications.

Lightweight nonwovens are predominantly used for subsurface drainage applications along highways, within embankments, under airfields, and athletic fields. For these drainage structures to be effective, they must have a properly designed protective filter. Mirafi® N-Series Nonwoven Geotextiles eliminate the problems of determining the aggregate gradation required to match soil conditions, finding a convenient and economical source of a specific aggregate gradation, transporting and placing graded aggregate, and assuring that the in place aggregate gradation provides effective filter performance.

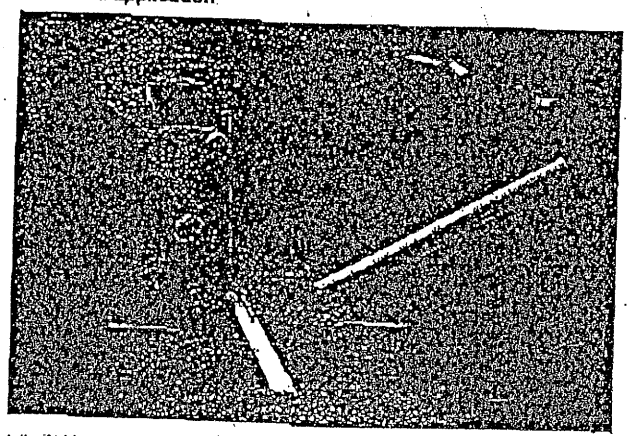
Heavyweight nonwovens are use in critical subsurface drainage systems, soil separation, permanent erosion control, and geomembrane liner protection within landfills. These geotextiles provide the required strength and abrasion resistance to withstand installation and application stresses to create an effective, long-term solution.



Mirafi® N-Series heavyweight nonwoven used as a liner protection in landfill application



Mirafi® N-Series lightweight nonwoven used as protective filter in subsurface drainage application.



Mirafi® N-Series light weight nonwoven used as protective filter in an athletic field

TC Mirafi

Technical Data MIRAFI®

Engineered Solutions for an Innovative World

product

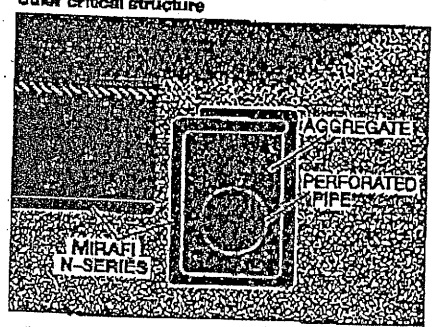
Mirafi® N-Series NonWoven Polypropylene Geotextiles

for Soil Separation, Filtration, and Protection

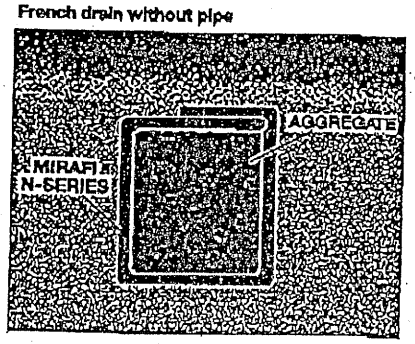
Property / Test Method	Units	140NL	140NC	140N	160N	170N	180N	1100N	1120N	1160N
MECHANICAL PROPERTIES										
Grab Tensile Strength										
ASTM D 4632										
Strength @ Ultimate	kN (lbs)	0.40 (90)	0.45 (100)	0.53 (120)	0.71 (160)	0.80 (180)	0.9 (205)	1.11(250)	1.34 (300)	1.69 (380)
Elongation @ Ultimate	%	50	60	50	50	50	50	50	50	50
Mullen Burst Strength	kPa	1309	1550	1654	2239	2412	2756	3514	4134	5167
ASTM D 3786	(psi)	(190)	(225)	(240)	(325)	(350)	(400)	(510)	(600)	(750)
Trapezoidal Tear Strength	kN	0.16	0.20	0.22	0.27	0.33	0.36	0.45	0.51	0.62
ASTM D 4355	(lbs)	(35)	(45)	(50)	(60)	(75)	(80)	(100)	(115)	(140)
Puncture Strength	kN	0.24	0.30	0.31	0.42	0.46	0.58	0.69	0.78	1.05
ASTM D 4833	(lbs)	(55)	(65)	(70)	(95)	(105)	(130)	(155)	(175)	(235)
UV Resistance after 500 hrs.	% strength	70	70	70	70	70	70	70	70	70
ASTM D 4355										
HYDRAULIC PROPERTIES										
Apparent Opening Size (AOS)	US Sieve	70	70	70	70	80	80	100	100	100
ASTM D 4751	mm	0.212	0.212	0.212	0.212	0.180	0.180	0.150	0.150	0.150
Permittivity	sec^{-1}	2.0	1.9	1.8	1.4	1.4	1.2	1.0	0.8	0.7
ASTM D 4491										
Flow Rate	l/min/m^2 (gal/min/ft^2)	6111 (150)	5698 (140)	5500 (135)	4477 (110)	4278 (105)	3866 (95)	3056 (75)	2648 (65)	2037 (50)
ASTM D 4491										
Packaging										
Roll Width	m(ft)	3.8 (12.5)	3.8 (12.5)	3.8 (12.5)	4.5 (15.0)	4.5 (15.0)	4.5 (15.0)	4.5 (15.0)	4.5 (15.0)	4.5 (15.0)
		4.5 (15.0)	4.5 (15.0)	4.5 (15.0)						
Roll Length	m(ft)	109.7 (360)	109.7 (360)	109.7 (360)	91.5 (300)	91.5 (300)	91.5 (300)	91.5 (300)	91.5 (300)	45.7 (150)
Est. Gross Weight	kg(lbs)	63 (138)	70 (154)	76 (167)	98 (215)	100 (225)	122 (270)	150 (330)	179 (393)	122 (269)
		75 (165)	83 (184)	91 (200)						
Area	m^2(yd^2)	418 (500)	418 (500)	418 (500)	418 (500)	418 (500)	418 (500)	418 (500)	418 (500)	209 (250)
		501 (600)	501 (600)	501 (600)						

NOTE: All Mechanical Properties and Hydraulic Properties shown are Minimum Average Roll Values (MARV).

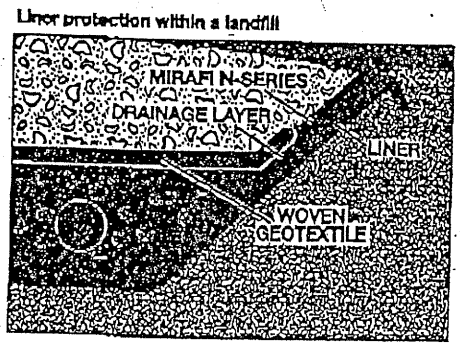
Cut-off/Inceptor drain along a roadway or other critical structure



French drain without pipe



Liner protection within a landfill



TC Mirafi

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Fax (706) 693-4400

TC Mirafi *TECHNICAL DATA SHEET*

Mirafi 1100N

Mirafi 1100N is a nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. 1100N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	kN (lbs)	1.11 (250)	1.11 (250)
Grab Tensile Elongation	ASTM D 4632	%	50	50
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.45 (100)	0.45 (100)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	3514 (510)	
Puncture Strength	ASTM D 4833	kN (lbs)	0.69 (155)	
Apparent Opening Size (AOS)	ASTM D 4751	mm (U.S. Sieve)	0.150 (100)	
Permittivity	ASTM D 4491	sec^{-1}	1.0	
Permeability	ASTM D 4491	cm/sec	0.25	
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	3056 (75)	
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m^2 (oz/yd^2)	339 (10.0)
Thickness	ASTM D 5199	mm (mils)	2.5 (100)
Roll Dimensions (width x length)	--	m (ft)	4.5 x 91 (15 x 300)
Roll Area	--	m^2 (yd^2)	418 (500)
Estimated Roll Weight	--	kg (lb)	150 (331)

DISCLAIMER: TC Mirafi warrants our products to be free from defects in material and workmanship when delivered to TC Mirafi's customers and that our products meet our published specifications. Contact your local TC Mirafi Representative for detailed product specification and warranty information.

TC Mirafi *TECHNICAL DATA SHEET*

Mirafi 180N

Mirafi 180N is a nonwoven geotextile composed of polypropylene fibers, which are formed into a stable network such that the fibers retain their relative position. 180N is inert to biological degradation and resists naturally encountered chemicals, alkalis, and acids.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Grab Tensile Strength	ASTM D 4632	kN (lbs)	0.9 (205)	0.9 (205)
Grab Tensile Elongation	ASTM D 4632	%	50	50
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.36 (80)	0.36 (80)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	2756 (400)	
Puncture Strength	ASTM D 4833	kN (lbs)	0.58 (130)	
Apparent Opening Size (AOS)	ASTM D 4751	mm (U.S. Sieve)	0.180 (80)	
Permittivity	ASTM D 4491	sec^{-1}	1.2	
Permeability	ASTM D 4491	cm/sec	0.28	
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	3866 (95)	
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	

Physical Properties	Test Method	Unit	Typical Value
Weight	ASTM D 5261	g/m^2 (oz/yd^2)	278 (8.2)
Thickness	ASTM D 5199	mm (mils)	2.3 (90)
Roll Dimensions (width x length)	--	m (ft)	4.5 x 91 (15 x 300)
Roll Area	--	m^2 (yd^2)	418 (500)
Estimated Roll Weight	--	kg (lb)	124 (273)

DISCLAIMER: TC Mirafi warrants our products to be free from defects in material and workmanship when delivered to TC Mirafi's customers and that our products meet our published specifications. Contact your local TC Mirafi Representative for detailed product specification and warranty information.

GSE HD*
HDPE Geomembrane

GSE HD is a high quality, high density polyethylene (HDPE) geomembrane produced from specially formulated, virgin polyethylene resin. This polyethylene resin is designed specifically for flexible geomembrane applications. GSE HD contains approximately 97.5% polyethylene, 2.5% carbon black and trace amounts of antioxidants and heat stabilizers; no other additives, fillers or extenders are used. GSE HD has outstanding chemical resistance, mechanical properties, environmental stress crack resistance, dimensional stability and thermal aging characteristics. GSE HD has excellent resistance to UV radiation and is suitable for exposed conditions.

TESTED PROPERTY	TEST METHOD	MINIMUM VALUES		
Thickness, mils (mm)	ASTM D 5199	27 (0.69)	36 (0.91)	54 (1.4)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94
Tensile Properties (each direction)	ASTM D 638, Type IV			
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm	122 (21)	162 (28)	243 (43)
Strength at Yield, lb/in-width (N/mm)		63 (11)	84 (15)	130 (23)
Elongation at Break, %	G.L. 2.0 in (51 mm)	700	700	700
Elongation at Yield, %	G.L. 1.3 in (33 mm)	13	13	13
Tear Resistance, lb (N)	ASTM D 1004	21 (93)	28 (124)	42 (187)
Puncture Resistance, lb (N)	ASTM D 4833	59 (263)	79 (352)	119 (530)
Carbon Black Content, %	ASTM D 1603	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	+Note 1	+Note 1	+Note 1
Notched Constant Tensile Load, hrs	ASTM D 5397, Appendix	400	400	400

REFERENCE PROPERTY	TEST METHOD	NOMINAL VALUES		
Thickness, mils (mm)	ASTM D 5199	30 (0.75)	40 (1.0)	60 (1.5)
Roll Length** (approximate), ft (m)		952 (290)	650 (198)	420 (128)
Low Temperature Brittleness, °F (°C)	ASTM D 746, Cond. B	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)
Oxidative Induction Time, minutes	ASTM D 3895, 200 °C; O_2, 1 atm	>100	>100	>100
Water Absorption, % wt. change	ASTM D 570	<0.01	<0.01	<0.01
Moisture Vapor Transmission, g/m^{2}day	ASTM E 96	<0.001	<0.001	<0.001
Dimensional Stability (each direction), %	ASTM D 1204, 100 °C, 1 hr	±2	±2	±2

+Note 1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

GSE HD is available in rolls approximately 22.5 ft (6.9 m) and 34.5 ft (10.5 m) wide and weighing about 2,900 lb (1,315 kg) and 4,400 lb (1,995 kg) respectively. Other material thicknesses are available upon request.

** Roll lengths correspond to the 22.5 ft (6.9 m) wide roll goods.

This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information. Check with GSE for current, standard minimum quality assurance procedures.

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Represented by:

*For environmental lining solutions...the world comes to GSE.**

A Gundle/SLT Environmental, Inc. Company

www.gseworld.com

GSE HD*

HDPE Geomembrane

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Thickness, mils (mm)	ASTM D 5199	27 (0.69)	36 (0.91)	54 (1.4)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94
Tensile Properties (each direction)	ASTM D 638, Type IV			
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm	122 (21)	162 (28)	243 (43)
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Elongation at Break, %	G.L. 2.0 in (51 mm)	700	700	700
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Notched Constant Tensile Load, hrs	ASTM D 5397, Appendix	400	400	400

REFERENCE PROPERTY	TEST METHOD	NOMINAL VALUES		
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Oxidative Induction Time, minutes	ASTM D 3895, 200 °C; O_2, 1 atm	>100	>100	>100
Water Absorption, % wt. change	ASTM D 570	<0.01	<0.01	<0.01
Moisture Vapor Transmission, g/m^{2}day	ASTM E 96	<0.001	<0.001	<0.001
Dimensional Stability (each direction), %	ASTM D 1204, 100 °C, 1 hr	±2	±2	±2

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Elongation at Break, %	G.L. 2.0 in (51 mm)	700	700	700
Elongation at Yield, %	G.L. 1.3 in (33 mm)	13	13	13
Tear Resistance, lb (N)	ASTM D 1004	21 (93)	28 (124)	42 (187)
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Water Absorption, % wt. change	ASTM D 570	<0.01	<0.01	<0.01
Moisture Vapor Transmission, g/m^{2}day	ASTM E 96	<0.001	<0.001	<0.001
Dimensional Stability (each direction), %	ASTM D 1204, 100 °C, 1 hr	±2	±2	±2

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Represented by:

*For environmental lining solutions...the world comes to GSE.**

A Gundle/SLT Environmental, Inc. Company

www.gseworld.com

GSE HD*
HDPE Geomembrane

GSE HD is a high quality, high density polyethylene (HDPE) geomembrane produced from specially formulated, virgin polyethylene resin. This polyethylene resin is designed specifically for flexible geomembrane applications. GSE HD contains approximately 97.5% polyethylene, 2.5% carbon black and trace amounts of antioxidants and heat stabilizers; no other additives, fillers or extenders are used. GSE HD has outstanding chemical resistance, mechanical properties, environmental stress crack resistance, dimensional stability and thermal aging characteristics. GSE HD has excellent resistance to UV radiation and is suitable for exposed conditions.

TESTED PROPERTY	TEST METHOD	MINIMUM VALUES		
Thickness, mils (mm)	ASTM D 5199	27 (0.69)	36 (0.91)	54 (1.4)
Density, g/cm^3	ASTM D 1505	0.94	0.94	0.94
Tensile Properties (each direction)	ASTM D 638, Type IV			
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm	122 (21)	162 (28)	243 (43)
Strength at Yield, lb/in-width (N/mm)		63 (11)	84 (15)	130 (23)
Elongation at Break, %	G.L. 2.0 in (51 mm)	700	700	700
Elongation at Yield, %	G.L. 1.3 in (33 mm)	13	13	13
Tear Resistance, lb (N)	ASTM D 1004	21 (93)	28 (124)	42 (187)
Puncture Resistance, lb (N)	ASTM D 4833	59 (263)	79 (352)	119 (530)
Carbon Black Content, %	ASTM D 1603	2.0	2.0	2.0
Carbon Black Dispersion	ASTM D 5596	+Note 1	+Note 1	+Note 1
Notched Constant Tensile Load, hrs	ASTM D 5397, Appendix	400	400	400

REFERENCE PROPERTY	TEST METHOD	NOMINAL VALUES		
Thickness, mils (mm)	ASTM D 5199	30 (0.75)	40 (1.0)	60 (1.5)
Roll Length** (approximate), ft (m)		952 (290)	650 (198)	420 (128)
Low Temperature Brittleness, °F (°C)	ASTM D 746, Cond. B	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)
Oxidative Induction Time, minutes	ASTM D 3895, 200 °C; O_2, 1 atm	>100	>100	>100
Water Absorption, % wt. change	ASTM D 570	<0.01	<0.01	<0.01
Moisture Vapor Transmission, g/m^{2}day	ASTM E 96	<0.001	<0.001	<0.001
Dimensional Stability (each direction), %	ASTM D 1204, 100 °C, 1 hr	±2	±2	±2

+Note 1: Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.

GSE HD is available in rolls approximately 22.5 ft (6.9 m) and 34.5 ft (10.5 m) wide and weighing about 2,900 lb (1,315 kg) and 4,400 lb (1,995 kg) respectively. Other material thicknesses are available upon request.

** Roll lengths correspond to the 22.5 ft (6.9 m) wide roll goods.

This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information. Check with GSE for current, standard minimum quality assurance procedures.

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SOLMAX

TECHNICAL DATA SHEET

SMOOTH HDPE GEOMEMBRANE

Properties	Test Method	Units Metric/(English)	SOLMAX 420	SOLMAX 430	SOLMAX 440	SOLMAX 460	SOLMAX 480	SOLMAX 500
Thickness*, Minimum Average	ASTM D5199	mm (mil)	0.50† (20)†	0.75† (30)†	1.00 (40)	1.50 (60)	2.00 (80)	2.50 (100)
Standard Roll Dimensions*†	N/A	m (ft)	6.7 x 427 (22 x 1400)	6.7 x 305 (22 x 1000)	6.7 x 228 (22 x 750)	6.7 x 152 (22 x 520)	6.7 x 122 (22 x 400)	6.7 x 98 (22 x 320)
Resin Density	ASTM D1505	g/cm³	>0.932	>0.932	>0.932	>0.932	>0.932	>0.932
Melt Index	ASTM D1238 Condition E	g/10 min.	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Oxidative Induction Time	ASTM D3895	min.	>100	>100	>100	>100	>100	>100
Sheet Density	ASTM D1505	g/cm³	>0.940	>0.940	>0.940	>0.940	>0.940	>0.940
Carbon Black Content	ASTM D4218	%	2.0 to 3.0	2.0 to 3.0	2.0 to 3.0	2.0 to 3.0	2.0 to 3.0	2.0 to 3.0
Carbon Black Dispersion (10 views)	ASTM D5596	Category	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2	1 or 2
Tensile Strength • Yield Strength • Yield Elongation (1.3 in. Gage Length)	ASTM D638 Type IV	kN/m (ppi) %	7.0 (40) 12	11.0 (63) 12	14.7 (84) 13	23.1 (132) 13	30.8 (176) 13	38.5 (220) 13
• Break Strength • Break Elongation (2 in. Gage Length)	ASTM D638 Type IV	kN/m (ppi) %	13.3 (76) 600	20.0 (114) 700	28.0 (160) 700	42.0 (240) 700	56.1 (320) 700	70.0 (400) 700
Tear Resistance	ASTM D1004	N (lbs)	88 (13)	93.5 (21)	125 (28)	187 (42)	249 (56)	311 (70)
Puncture Resistance	ASTM D4833	N (lbs)	160 (36)	240 (54)	320 (72)	481 (108)	641 (144)	801 (180)
Stress Crack Resistance (SP-NCTL)	ASTM D5397 (Appendix)	hrs	>200	>200	>200	>200	>200	>200
Dimensional Stability	ASTM D1204	%	±5	±2	±2	±2	±2	±2

*Custom thicknesses and roll sizes are available
†Thickness ±10%
‡Roll length may vary ±1%

Data provided for informational purposes only. Solmax International, Inc. assumes no responsibility if the above data is used for design or other performance criteria.

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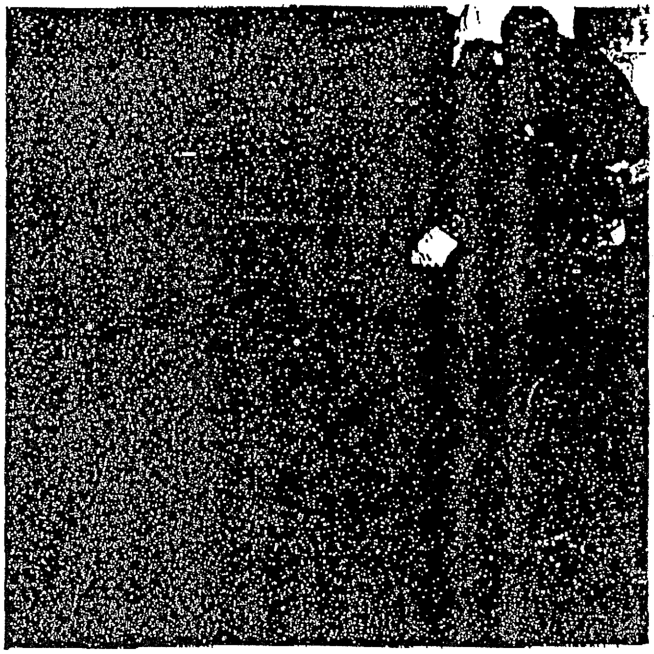
W. R. MEADOWS.
SEALTIGHT.

NO. 712

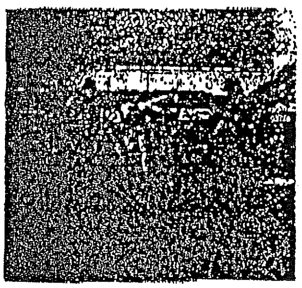
PROTECTION COURSE

WATERPROOFING PROTECTION



Effectively protects delicate waterproofing systems on vertical and horizontal surfaces.

SEALTIGHT PROTECTION COURSE products are tough, durable, lightweight panels specifically designed to protect delicate waterproofing materials from damage by normal construction traffic, movement of adjacent substrate and backfilling



Technical Description

SEALTIGHT PROTECTION COURSE is a multi-ply semi-rigid core composed of a mineral-fortified asphaltic core formed between two outside layers of asphalt-impregnated fiberglass mat, manufactured in accordance with ASTM D 6506.

When properly applied by work personnel trained in good waterproofing techniques, SEALTIGHT PROTECTION COURSE will absorb the impact of aggregate shock and normal jobsite foot traffic. It also protects the membrane waterproofing from penetration by sharp aggregate during backfilling and later settlement.

SEALTIGHT PROTECTION COURSE is available in three types: PC-1, Light Duty; PC-2, Standard Duty and PC-3, Heavy Duty. All three types are economical and convenient to use.

Uses

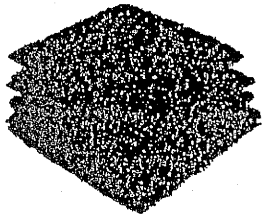
SEALTIGHT PROTECTION COURSE is used in between-slab construction, such as plaza decks, roof terraces, promenade decks, pedestrian concourses, tunnels, floors of bathrooms, shower, kitchens and mechanical rooms, parking garage decks, planter boxes, reflective pools and foundation walls. SEALTIGHT PROTECTION COURSE is compatible with most currently popular dampproofing and waterproofing materials.

January 2001
(Supersedes August 1999)
07/10 Waterproofing Membranes

PROTECTION COURSE

WATERPROOFING PROTECTION

W. R. MEADOWS. SEALTIGHT. PRODUCTS FOR CONCRETE/MASONRY



Packaging

4' X 8' (1.22m X 2.44m) panels

Precautions

1. Where PROTECTION COURSE is adhered to waterproofing membrane, use the adhesive recommended by the membrane manufacturer.
2. Where taped joints are desired with tape set in hot asphalt, consult membrane manufacturer.
3. PROTECTION COURSE is shipped on pallets with the polyethylene anti-stick sheet on the top or exposed side. PROTECTION COURSE should be stored on the pallets and placed on a level surface.
4. CAUTION... Do not apply the Protection Course over Liquid Waterproofing Membranes containing volatile solvents until all of the solvent has evaporated. Consult membrane manufacturer for specific application details prior to placing the Protection Course. Read and follow application information and precautions. Refer to Material Safety Data Sheet for complete Health and Safety information.

Features and Benefits

- Tough, durable and lightweight, panels are easily handled, quickly installed
- Full width fiberglass matting improves flexural strength
- Highly resistant to chemical action
- Performance is equally effective in above or below grade installations
- Unique dual-facing offers compatibility with most currently popular waterproofing materials
- Economical and convenient to use

Application

NOTE: Prior to application, consult the waterproofing manufacturer to determine whether the polyethylene film facing on one side, or the asphalt-impregnated fiberglass mat on the other side of SEALTIGHT PROTECTION COURSE is approved as "compatible" to the specific waterproofing product being protected.

SEALTIGHT PROTECTION COURSE is installed to form a continuous protective layer over the membrane waterproofing. The sheets can be easily cut with a roofer's knife for fitting at protrusions.

SURFACE CONDITION: The waterproofing membrane must be free of sharp projections, dirt and dust. If water testing is desired, it should be made prior to placing the PROTECTION COURSE. NOTE: PROTECTION COURSE should be applied at the end of each day's waterproofing to both horizontal and vertical surfaces.

HORIZONTAL SURFACES: PROTECTION COURSE should be installed over the waterproofing membrane as soon as permissible by the membrane applicator or manufacturer. PROTECTION COURSE sheets should be butted together and cut to fit all intersecting surfaces and protrusions. If desired, joints may be covered with SEALTIGHT Detail Strip or roofer's glass reinforced tape embedded in hot asphalt as a secondary waterproofing system. (see point 2 under Precautions).

VERTICAL SURFACES: For dampproofed and/or waterproofed vertical walls to receive backfill, the PROTECTION COURSE should be butt jointed and, if necessary, temporarily held in place while backfilling.

BACKFILLING: Backfilling against vertical walls should be done immediately using care and caution to avoid damaging the waterproofing application. Backfill material should not be dropped against the PROTECTION COURSE in such a manner that it could drag the sheet down as the backfill drops. For horizontal applications, the waterproofing and PROTECTION COURSE should be installed just prior to the installation of the wearing surface.

Application Tools

Trowel

Roofer's knife

ASTM D 6506
Protection Board Requirements

	Type 1	Type 2	Type 3
Puncture Strength (Classes A & B)	222 N (50 lbf) minimum	312 N (70 lbf) minimum	365 N (82 lbf) minimum
Thickness (Classes A & B)	1.3 to 1.8mm (0.050 to 0.070in.)	2.4 to 3.9mm (0.095 to 0.155in.)	5.6 to 7.1mm (0.220 to 0.280in.)
Water Absorption (Classes A & B)	10.0% maximum	10.0% maximum	10.0% maximum
Asphalt, % by weight (Class A)	65% minimum	65% minimum	65% minimum
Asphalt, % by weight (Class B)	40% minimum	40% minimum	40% minimum
Resistance to Decay (Classes A & B)	Meets puncture requirements after completion of test	Meets puncture requirements after completion of test	Meets puncture requirements after completion of test

Coverage:

TYPE	THICKNESS*	WIDTH	LENGTH
PC-1 Light Duty	62.5 mil-1/16" (1.59mm)	4' (1.22m)	8' (2.44m)
PC-2 Standard Duty	125 mil-1/8" (3.18mm)	4' (1.22m)	8' (2.44m)
PC-3 Heavy Duty	250 mil-1/4" (6.35mm)	4' (1.22m)	8' (2.44m)

*NOMINAL

To assist you in the specification of this product, Guide Specifications are available through your local SEALTIGHT Distributor, or contact your nearest W. R. Meadows, Branch office.
Phone: 1-800-342-5976

FOR THE MOST CURRENT PRODUCT INFORMATION, VISIT OUR WEBSITE:
www.wrmeadows.com

LIMITED WARRANTY...
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