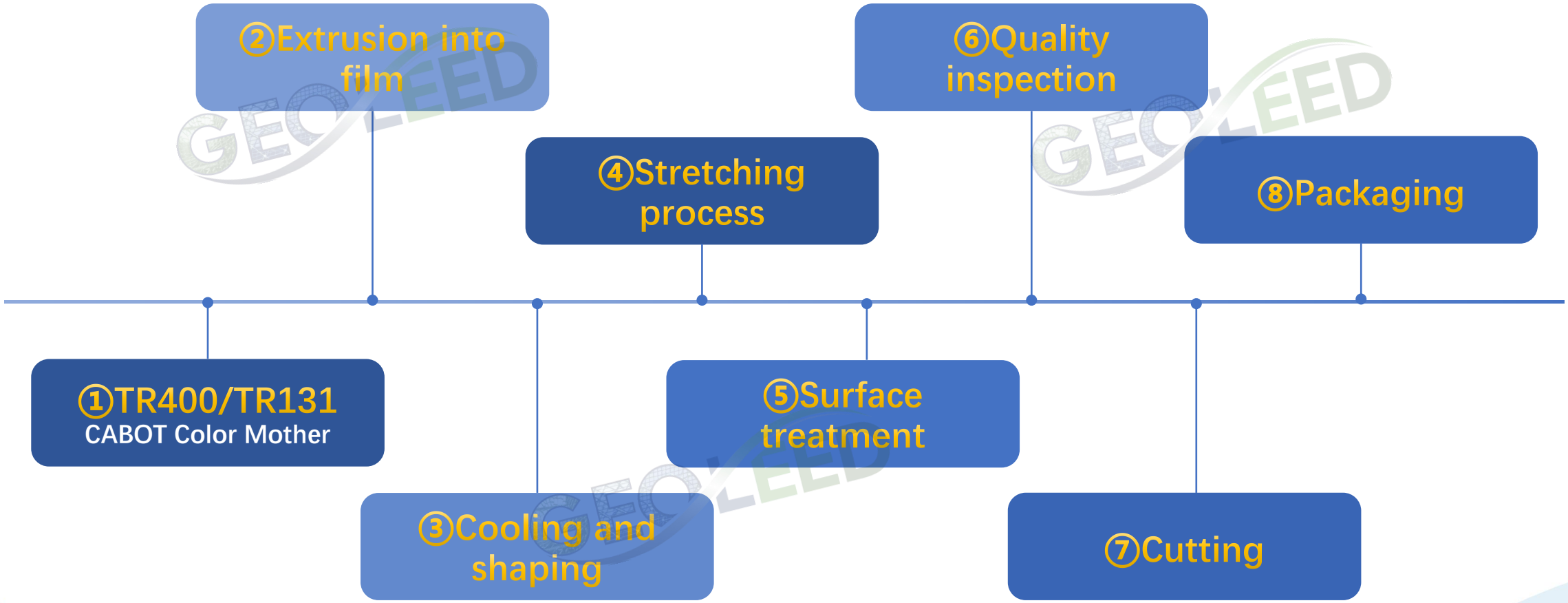
ISO quality system certification
CE certification

GEOLEED adheres to the business philosophy of "technological innovation, quality-oriented" and is committed to providing high-quality, high-performance geomembrane products and overall solutions to global customers.

Email:info@geoleed.com
Website:www.geoleed.com
Address:Development Zone, Tai'an City, Shandong, China
Address:lchi-no-Machihigashi, Sakai-ku, Sakai City, Osaka, Japan

Geomembrane production process of GEOLEED



① Raw material mixing

01

If no special requirements for raw material,
100% virgin HDPE will be used to produce
ASTM standard Geomembrane. If customer need
GB standard Geomembrane, we will produce as your request.

① Raw material mixing

01

Additives are subject to the order requirements, generally: carbon black (black) or color masterbatch (other colors) light stabilizers, antioxidants, and so on.

Raw material Testing Report

Polyethylene Borstar® FB1370

Sept 2015

Product Data Sheet

Polyethylene

Borstar® FB1370

ENHANCED POLYETHYLENE

DESCRIPTION

Borstar®FB1370 is produced using the proprietary **Borstar®** Bimodal Technology resulting in easy extrusion with superior mechanical properties. Film/Sheet made from the product exhibits excellent impact strength and stiffness balance combined with excellent yield, Tensile strength and bubble stability resulting excellent processability on Blown/Cast extrusion machines. Toughness is retained at low temperature. The film has good seal strength and superior ESCR properties.

Borstar®FB1370 contains antioxidant.

APPLICATIONS

Geomembrane
Mono layer & co-extrusion films
Wide width films
Pond Liners

SPECIAL FEATURES

Easy processability
Excellent mechanical properties balance
Good seal properties
Excellent bubble stability
Superior ESCR

PHYSICAL PROPERTIES

Property	Typical Value	Unit	Test Method
Density	938	Kg/m³	ASTM D792
Melt Flow Rate MFR (190 °C/2.16 kg)	0.12	g/10min	ASTM D1238
Melt Flow Rate MFR (190 °C/5.0 kg)	0.50	g/10min	ASTM D1238
Melt Flow Rate MFR (190 °C/21 kg)	13	g/10min	ASTM D1238
ESCR – 10% Igepal / F50	>5000	Hours	ASTM D 1693
Melting Temp.	129	°C	ISO 11357/03
Vicat Softening Temperature A50 (10 N)	113	°C	ISO 306

*Data should not be used for specification work

Borouge Pte Ltd | 1 George Street | #18-01 | Singapore 049145
Tel +65 6275 4100 | Fax +65 6377 1233 | www.borouge.com
Borouge is part of the ADNOC and Borealis group of companies
Company Registration Number 199801755H

Polyethylene Borstar® FB1370

FILM PROPERTIES

Property		Typical Value	Unit	Test Method
Tensile Strength at Break	MD/TD	65/50	MPa	ISO 527-3
Elongation at Break	MD/TD	400/650	%	ISO 527-3
Tensile Strength at Yield	TD	20	MPa	ISO 527-3
Tensile Modulus	MD/TD	550/650	MPa	ASTM D 882
Coefficient of Friction		0.35	-	ASTM D 1894
Dart Drop		300	g	ASTM D 1709/A
Tear resistance	MD/TD	1/7	N	ASTM D 1922

*Data should not be used for specification work
**The film properties are dependent on extrusion conditions.
Blown Film properties: 40µm, BUR=3:1, FLH=4DD, Die gap 1.2mm

PROCESSING GUIDELINES

Borstar®FB1370 can be processed easily on Blown / Cast sheet equipment designed for polyethylene extrusion. The balance of draw down properties and bubble stability is superior to conventional LLDPE. Thickness of 15µm to >2500µm can be processed with good bubble stability. The product is well suited for co-extrusion.

Recommended melt temperature is 190 - 210°C.

FOOD CONTACT REGULATIONS

Borstar®FB1370 fulfils the food contact regulations in most countries. If required, contact your Borouge representative for a certificate.

STORAGE

The product should be stored in dry conditions at temperatures below 50°C and protected from UV-light. Improper storage can initiate degradation, which results in odour generation and colour changes and can have negative effects on the physical properties of this product.

More information on storage can be found in Safety Information Sheet for this product.

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Company Registration Number 199801755H

Polyethylene Borstar® FB1370

SAFETY

The product is not classified as a hazardous mixture.

Dust and fines from the product carry a risk of dust explosion. All equipment should be properly earthed. Inhalation of dust should be avoided as it may cause irritation of the respiratory system. Small amounts of fumes are generated during processing of the product. Proper ventilation is therefore required.

A Safety Information Sheet is available on request. Please contact your Borouge representative for more details on various aspects of safety, recovery and disposal of the product.

RECYCLING

The product is suitable for recycling using modern methods of shredding and cleaning. In-house production waste should be kept clean to facilitate direct recycling.

RELATED DOCUMENTS

Most datasheets and statements are available on Borouge website www.borouge.com. If more information is required, please contact a Borouge representative for information.

DISCLAIMER

The product(s) mentioned herein are not intended to be used for medical, pharmaceutical or healthcare applications and we do not support their use for such applications.

To the best of our knowledge, the information contained herein is accurate and reliable as of the date of publication, however we do not assume any liability whatsoever for the accuracy and completeness of such information.

Borouge makes no warranties which extend beyond the description contained herein. Nothing herein shall constitute any warranty of merchantability or fitness for a particular purpose.

It is the customer's responsibility to inspect and test our products in order to satisfy itself as to the suitability of the products for the customer's particular purpose. The customer is responsible for the appropriate, safe and legal use, processing and handling of our products.

No liability can be accepted in respect of the use of Borouge products in conjunction with other materials. The information contained herein relates exclusively to our products when not used in conjunction with any third party materials.

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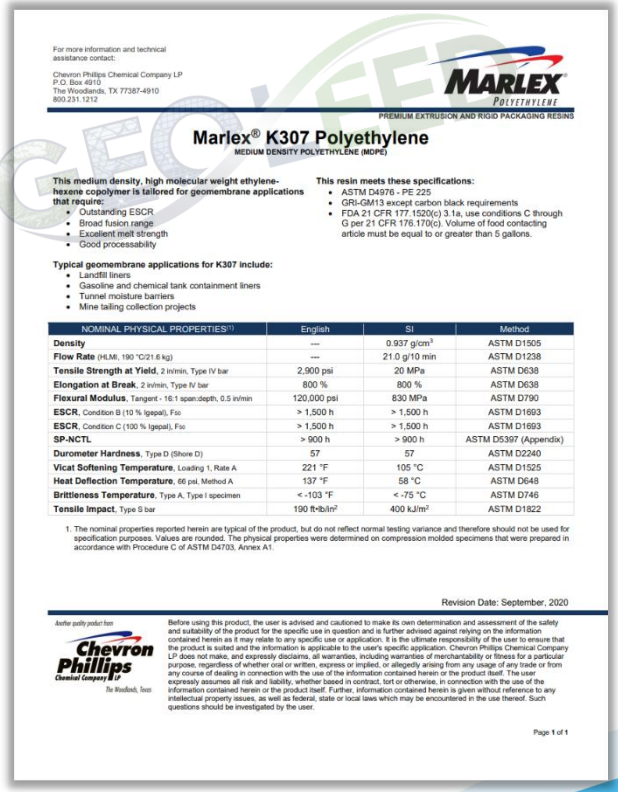


For more information and technical assistance contact:

Chevron Phillips Chemical Company LP
P.O. Box 4910
The Woodlands, TX 77387-4910
800.231.1212

MARLEX POLYETHYLENE

PREMIUM EXTRUSION AND RIGID PACKAGING RESINS

Marlex® K307 Polyethylene

MEDIUM DENSITY POLYETHYLENE (MDPE)

This medium density, high molecular weight ethylene-hexene copolymer is tailored for geomembrane applications that require:

- Outstanding ESCR
- Broad fusion range
- Excellent melt strength
- Good processability

This resin meets these specifications:

- ASTM D4976 - PE 225
- GRI-GM13 except carbon black requirements
- FDA 21 CFR 177.1520(c) 3.1a, use conditions C through G per 21 CFR 176.170(c). Volume of food contacting article must be equal to or greater than 5 gallons.

Typical geomembrane applications for K307 include:

- Landfill liners
- Gasoline and chemical tank containment liners
- Tunnel moisture barriers
- Mine tailing collection projects

NOMINAL PHYSICAL PROPERTIES[1]	English	SI	Method
Density	---	0.937 g/cm³	ASTM D1505
Flow Rate (HLMI, 190 °C/21.6 kg)	---	21.0 g/10 min	ASTM D1238
Tensile Strength at Yield, 2 in/min, Type IV bar	2,900 psi	20 MPa	ASTM D638
Elongation at Break, 2 in/min, Type IV bar	800 %	800 %	ASTM D638
Flexural Modulus, Tangent - 16:1 span:depth, 0.5 in/min	120,000 psi	830 MPa	ASTM D790
ESCR, Condition B (10 % Igepal), F50	> 1,500 h	> 1,500 h	ASTM D1693
ESCR, Condition C (100 % Igepal), F50	> 1,500 h	> 1,500 h	ASTM D1693
SP-NCTL	> 900 h	> 900 h	ASTM D5397 (Appendix)
Durometer Hardness, Type D (Shore D)	57	57	ASTM D2240
Vicat Softening Temperature, Loading 1, Rate A	221 °F	105 °C	ASTM D1525
Heat Deflection Temperature, 66 psi, Method A	137 °F	58 °C	ASTM D648
Brittleness Temperature, Type A, Type I specimen	< -103 °F	< -75 °C	ASTM D746
Tensile Impact, Type S bar	190 ft•lb/in²	400 kJ/m²	ASTM D1822

1. The nominal properties reported herein are typical of the product, but do not reflect normal testing variance and therefore should not be used for specification purposes. Values are rounded. The physical properties were determined on compression molded specimens that were prepared in accordance with Procedure C of ASTM D4703, Annex A1.

Revision Date: September, 2020

Another quality product from Chevron Phillips Chemical Company LP The Woodlands, Texas

Before using this product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the product for the specific use in question and is further advised against relying on the information contained herein as it may relate to any specific use or application. It is the ultimate responsibility of the user to ensure that the product is suited and the information is applicable to the user's specific application. Chevron Phillips Chemical Company LP does not make, and expressly disclaims, all warranties, including warranties of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, or allegedly arising from any usage of any trade or from any course of dealing in connection with the use of the information contained herein or the product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with the use of the information contained herein or the product itself. Further, information contained herein is given without reference to any intellectual property issues, as well as federal, state or local laws which may be encountered in the use thereof. Such questions should be investigated by the user.

Page 1 of 1

Geomembrane TRI GM13 test report

TRI ENVIRONMENTAL — TESTING, RESEARCH, CONSULTING AND FIELD SERVICES
Austin, TX - USA | Anaheim, CA - USA | Anderson, SC - USA | Gold Coast - Australia | Suzhou - China

Oct 13th, 2025

Yan Tao
Geoleed Engineering Materials Co., Ltd 泰安瑞丰工程材料有限公司
Workshop 1, New material R&D and Production Project, No. 3777,
Longteng Road, Beijipo Sub-District Office, Gaoxin District
Taian, Shangdong Province, China

GAI-LAP
Initial: SVZ Steve Xi #: 79
DATE: 10/13/2025

Re: PARTIAL LABORATORY TEST REPORT 中期实验室检测报告

Dear Mr. Yan:

Thank you for consulting TRI Suzhou for your material testing needs.
感谢选用 TRI 苏州实验室为您检测材料
Enclosed is the *partial* laboratory report for the **Conformance** testing of **one (1) 1.5mm HDPE Smooth Geomembrane sample.**
附上一份 HDPE 膜样品的中期符合性实验室检测报告

PROJECT NAME 项目名称: GM-13 Conformance Testing — DATE REPORTED 报告日期: **Oct 13th, 2025**
REFERENCE TRI JOB NO.涉及工作编号: SCH25243
DATE RECEIVED 接收日期: Aug 11th, 2025
SAMPLE(S) SENT BY 送样人: Geoleed Engineering Materials Co., Ltd

SAMPLE IDENTIFICATIONS 样品信息:

SAMPLE ID 样品 ID	*TRI CONTROL NUMBER 受控编号*
Smooth HDPE Geomembrane	13425

TESTS REQUIRED / PERFORMED 检测要求/检项:

TEST METHOD 检测方法	*DESCRIPTION 描述*
1. ASTM D5199	Thickness 厚度
2. ASTM D1505	Density 密度
3. ASTM D6693	Tensile Property 拉伸性能
4. ASTM D1004	Tear Resistance 直角撕裂
5. ASTM D4833	Puncture Resistance 抗穿刺强度
6. ASTM D4218	Carbon Black Content 炭黑含量
7. ASTM D5596	Carbon Black Dispersion 炭黑分散度
8. ASTM D8117	Standard OIT 标准氧化诱导
9. ASTM D5885	HPOIT 高压氧化诱导
11. ASTM D5721	Oven Aging 烘箱老化
12. ASTM D7238	QUV 抗紫外老化
13. ASTM D5397	SP-NCTL 耐环境应力开裂

TEST RESULTS 检测结果: The test results are summarized in the attached Table(s) 1. 检测结果参见附表 1.

Note: The general conditioning and testing of material samples identified in this report were performed within the range of the laboratory environmental conditions; i.e. 21±2℃ and 65±5RH. Otherwise, the actual environmental conditions are indicated in the respective test method reported.
注意：本报告中所提及的材料样本的一般性处理和测试均在实验室环境条件下进行，即温度 21±2℃，相对湿度 65±5%。否则，实际环境条件会在相应的测试方法报告中说明。

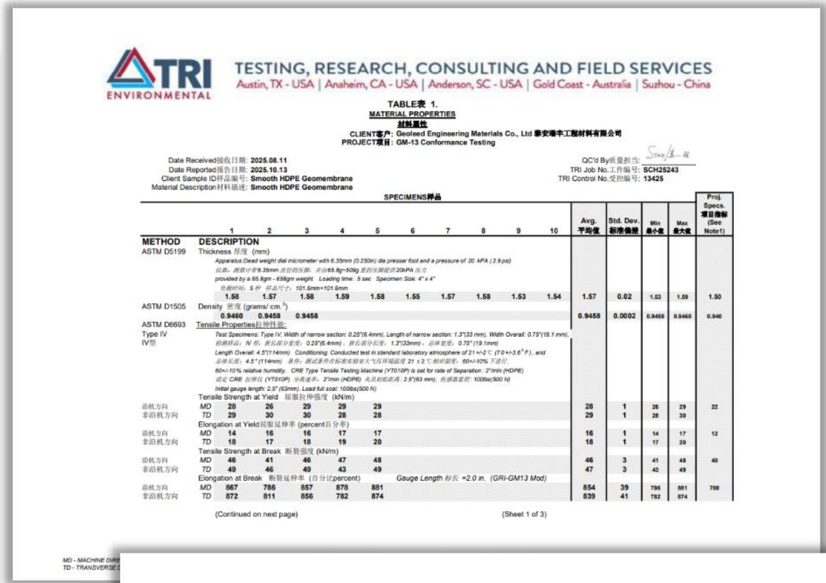
Respectfully,此致

TRI Geosynthetic Testing and Services (Suzhou) Co., Ltd.
苏州德尔埃土工材料检测服务有限公司

Steve Xi — Quality Assurance
Chad Blackwell — General Manager

Signatures are on file

Room 113 A2, 218 Xinghu Road BIOBAY SIP, Suzhou, Jiangsu Prov., www.tri-env.cn
江苏苏州工业园区星湖街 218 号生物纳米园 A2 楼 113 室



TRI ENVIRONMENTAL — TESTING, RESEARCH, CONSULTING AND FIELD SERVICES
Austin, TX - USA | Anaheim, CA - USA | Anderson, SC - USA | Gold Coast - Australia | Suzhou - China

TABLE表 1.
MATERIAL PROPERTIES
材料属性
CLIENT客户: Geoleed Engineering Materials Co., Ltd 泰安瑞丰工程材料有限公司
PROJECT项目: GM-13 Conformance Testing

Date Received 接收日期: 2025.08.11
Date Reported 报告日期: 2025.10.13
Client Sample ID 样品编号: Smooth HDPE Geomembrane
Material Description 材料描述: Smooth HDPE Geomembrane
QC'd By 质量担当:
TRI Job No. 工作编号: SCH25243
TRI Control No. 受控编号: 13425

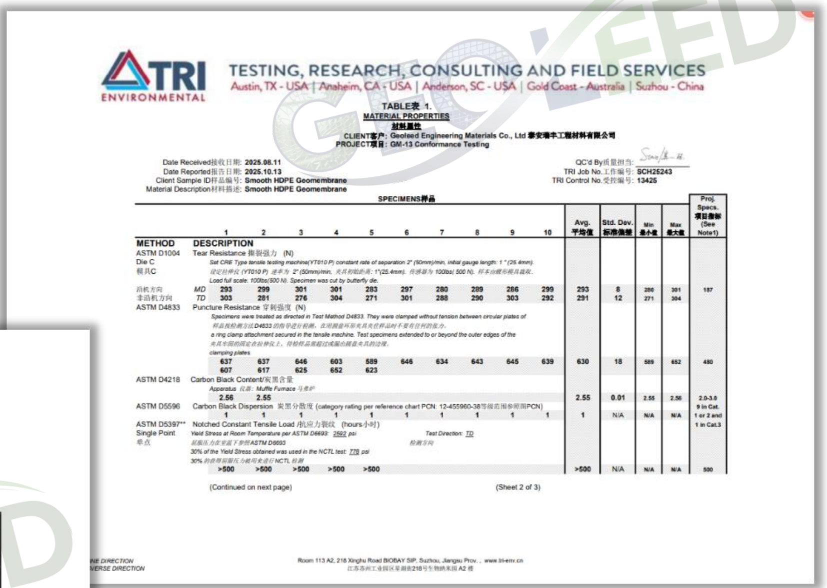
SPECIMENS样品

METHOD	DESCRIPTION	1	2	3	4	5	6	7	8	9	10	Avg. 平均值	Std. Dev. 标准偏差	Min 最小值	Max 最大值	Proj. Specs. 项目指标 (See Note1)
ASTM D5199	Thickness 厚度 (mm)	1.58	1.57	1.58	1.59	1.58	1.55	1.57	1.58	1.53	1.54	1.57	0.02	1.53	1.59	1.50
ASTM D1505	Density 密度 (grams/ cm.³)	0.9460	0.9458	0.9458								0.9458	0.0002	0.9458	0.9460	0.940
ASTM D6693 Type IV IV型	Tensile Properties 拉伸性能: Tensile Strength at Yield 屈服拉伸强度 (kN/m)															
沿机方向	MD	28	26	29	29	29						28	1	26	29	22
非沿机方向	TD	29	30	30	28	28						29	1	28	30	
	Elongation at Yield 屈服延伸率 (percent百分率)															
沿机方向	MD	14	16	16	17	17						16	1	14	17	12
非沿机方向	TD	18	17	18	19	20						18	1	17	20	
	Tensile Strength at Break 断裂强度 (kN/m)															
沿机方向	MD	46	41	46	47	48						46	3	41	48	40
非沿机方向	TD	49	46	49	43	49						47	3	43	49	
	Elongation at Break 断裂延伸率 (百分比percent) Gauge Length 标长 =2.0 in. (GRI-GM13 Mod)															
沿机方向	MD	867	786	857	878	881						854	39	786	881	700
非沿机方向	TD	872	811	856	782	874						839	41	782	874	

Thickness: Apparatus:Dead weight dial micrometer with 6.35mm (0.250in) die presser foot and a pressure of 20 kPA (2.9 psi) provided by a 65.8gm - 658gm weight. Loading time: 5 sec Specimen Size: 4" x 4"

Tensile: Test Specimens: Type IV, Width of narrow section: 0.25"(6.4mm), Length of narrow section: 1.3"(33 mm), Width Overall: 0.75"(19.1 mm), Length Overall: 4.5"(114mm) Conditioning: Conducted test in standard laboratory atmosphere of 21+/-2℃ (70+/-3.6°F), and 60+/-10% relative humidity. CRE Type Tensile Testing Machine (YT010P) is set for rate of Separation : 2"/min (HDPE) Initial gauge length: 2.5" (63mm). Load full scal: 100lbs(500 N)

(Continued on next page) (Sheet 1 of 3)



TRI ENVIRONMENTAL — TESTING, RESEARCH, CONSULTING AND FIELD SERVICES
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QC'd By 质量担当:
TRI Job No. 工作编号: SCH25243
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SPECIMENS样品

METHOD	DESCRIPTION	1	2	3	4	5	6	7	8	9	10	Avg. 平均值	Std. Dev. 标准偏差	Min 最小值	Max 最大值	Proj. Specs. 项目指标 (See Note1)
ASTM D1004 Die C 模具C	Tear Resistance 撕裂强力 (N)															
沿机方向	MD	293	299	301	301	283	297	280	289	286	299	293	8	280	301	187
非沿机方向	TD	303	281	276	304	271	301	288	290	303	292	291	12	271	304	
ASTM D4833	Puncture Resistance 穿刺强度 (N)	637	637	646	603	589	646	634	643	645	639	630	18	589	652	480
		607	617	625	652	623										
ASTM D4218	Carbon Black Content/炭黑含量	2.56	2.55									2.55	0.01	2.55	2.56	2.0-3.0
ASTM D5596	Carbon Black Dispersion 炭黑分散度 (category rating per reference chart PCN: 12-455960-38等级范围参照图PCN)	1	1	1	1	1	1	1	1	1	1	1	N/A	N/A	N/A	9 in Cat. 1 or 2 and 1 in Cat.3
ASTM D5397** Single Point 单点	Notched Constant Tensile Load /抗应力裂纹 (hours小时)	>500	>500	>500	>500	>500						>500	N/A	N/A	N/A	500

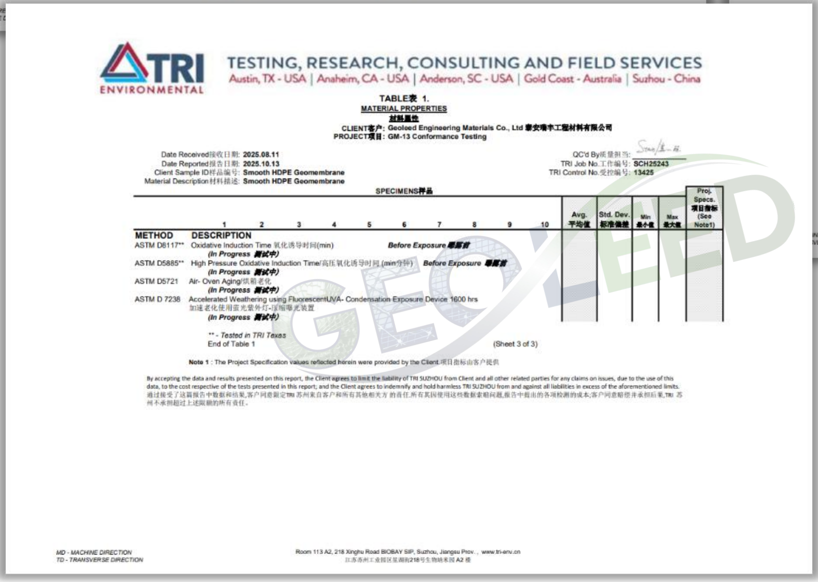
Tear Resistance: Set CRE Type tensile testing machine(YT010 P) constant rate of separation 2" (50mm)/min, initial gauge length: 1" (25.4mm). Load full scale: 100lbs(500 N). Specimen was cut by butterfly die.

Puncture Resistance: Specimens were treated as directed in Test Method D4833. They were clamped without tension between circular plates of a ring clamp attachment secured in the tensile machine. Test specimens extended to or beyond the outer edges of the clamping plates.

Carbon Black Content: Apparatus 仪器: Muffle Furnace 马弗炉

NCTL: Yield Stress at Room Temperature per ASTM D6693: 2592 psi — Test Direction: TD 检测方向. 30% of the Yield Stress obtained was used in the NCTL test: 778 psi

(Continued on next page) (Sheet 2 of 3)



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PROJECT项目: GM-13 Conformance Testing

Date Received 接收日期: 2025.08.11
Date Reported 报告日期: 2025.10.13
Client Sample ID 样品编号: Smooth HDPE Geomembrane
Material Description 材料描述: Smooth HDPE Geomembrane
QC'd By 质量担当:
TRI Job No. 工作编号: SCH25243
TRI Control No. 受控编号: 13425

SPECIMENS样品

METHOD	DESCRIPTION
ASTM D8117**	Oxidative Induction Time 氧化诱导时间(min) *Before Exposure 暴露前* *(In Progress 测试中)*
ASTM D5885**	High Pressure Oxidative Induction Time/高压氧化诱导时间 (min分钟) *Before Exposure 暴露前* *(In Progress 测试中)*
ASTM D5721	Air- Oven Aging/烘箱老化 *(In Progress 测试中)*
ASTM D 7238	Accelerated Weathering using FluorescentUVA- Condensation Exposure Device 1600 hrs 加速老化使用荧光紫外灯-压缩曝光装置 *(In Progress 测试中)*

*** - Tested in TRI Texas*
End of Table 1 (Sheet 3 of 3)

Note 1 : The Project Specification values reflected herein were provided by the Client.项目指标由客户提供

By accepting the data and results presented on this report, the Client agrees to limit the liability of TRI SUZHOU from Client and all other related parties for any claims on issues, due to the use of this data, to the cost respective of the tests presented in this report; and the Client agrees to indemnify and hold harmless TRI SUZHOU from and against all liabilities in excess of the aforementioned limits.
通过接受了这篇报告中数据和结果,客户同意限定TRI 苏州来自客户和所有其他相关方 的责任,所有其因使用这些数据索赔问题,报告中提出的各项检测的成本;客户同意赔偿并承担后果,TRI 苏州不承担超过上述限额的所有责任。

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION

Room 113 A2, 218 Xinghu Road BIOBAY SIP, Suzhou, Jiangsu Prov., www.tri-env.cn

② Extrusion into film

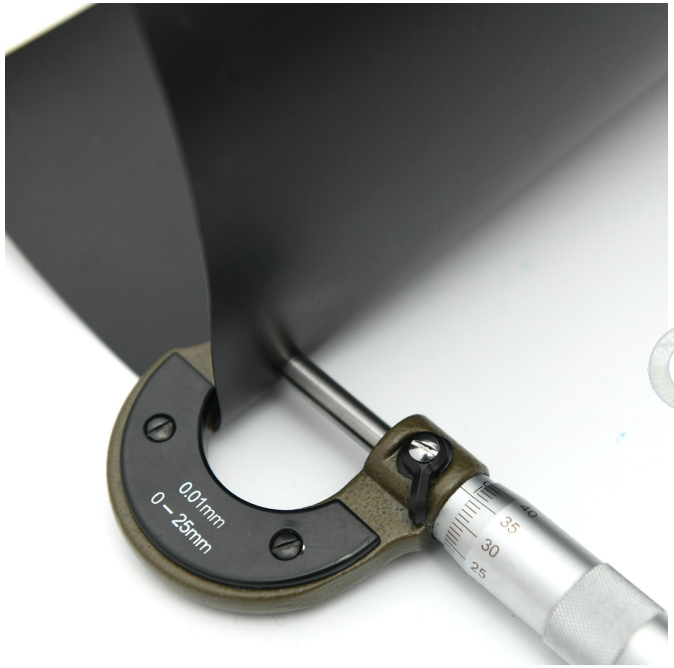
After the person in charge complete equipment comission, confirm production,every 2 hours should do a comprehensive inspection and fill the testing form and process record sheet during the normal production process.

PRODUCT MODEL:		First inspection of the product:			
		Welding point tension			
Required value		Inspector			
		Detection time			
Production process inspection					
Welding point tension			Welding point tension		
Inspector			Inspector		
Detection time			Detection time		

※ Dimensional deviation range

Single volume length and width control range:

±1%



Smooth thickness control range:

-10%

Rough surface thickness control rangee:

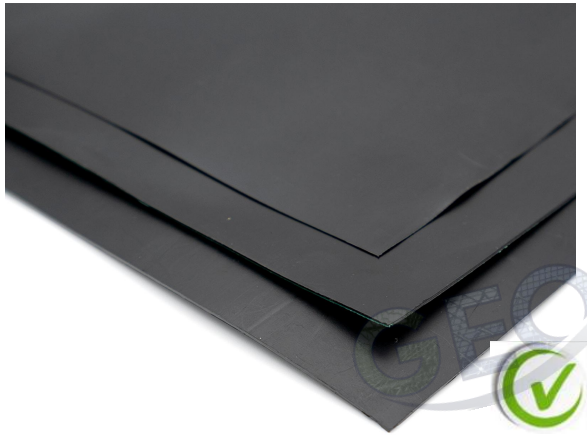
-5%

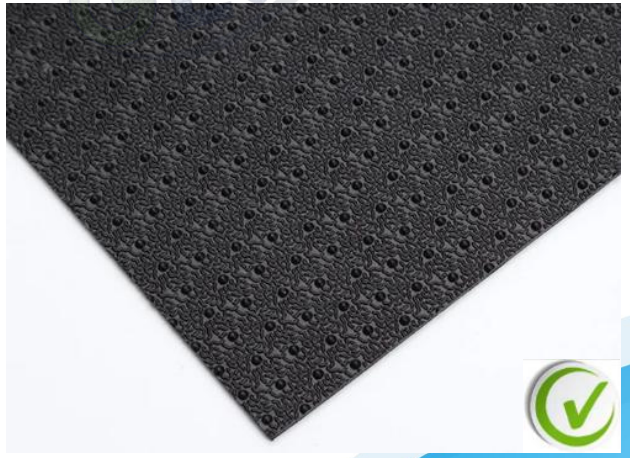
Will follow the order if you have special requirements.

Appearance

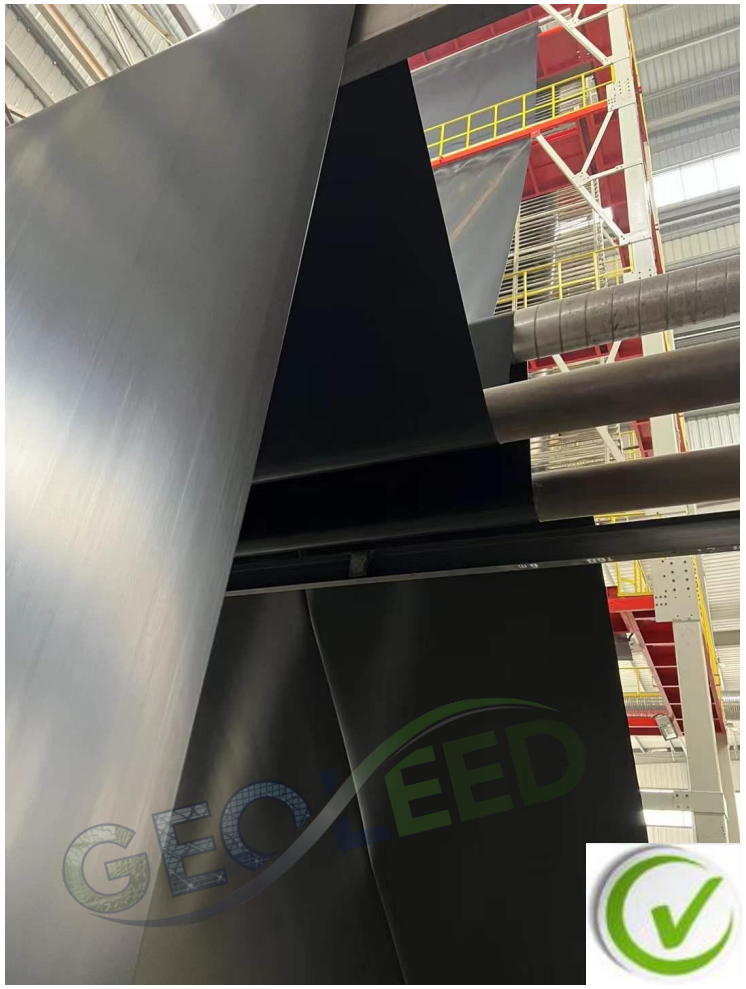
No scratches on the surface, no bubbles, no damage and other problems affecting the appearance of the sheet.

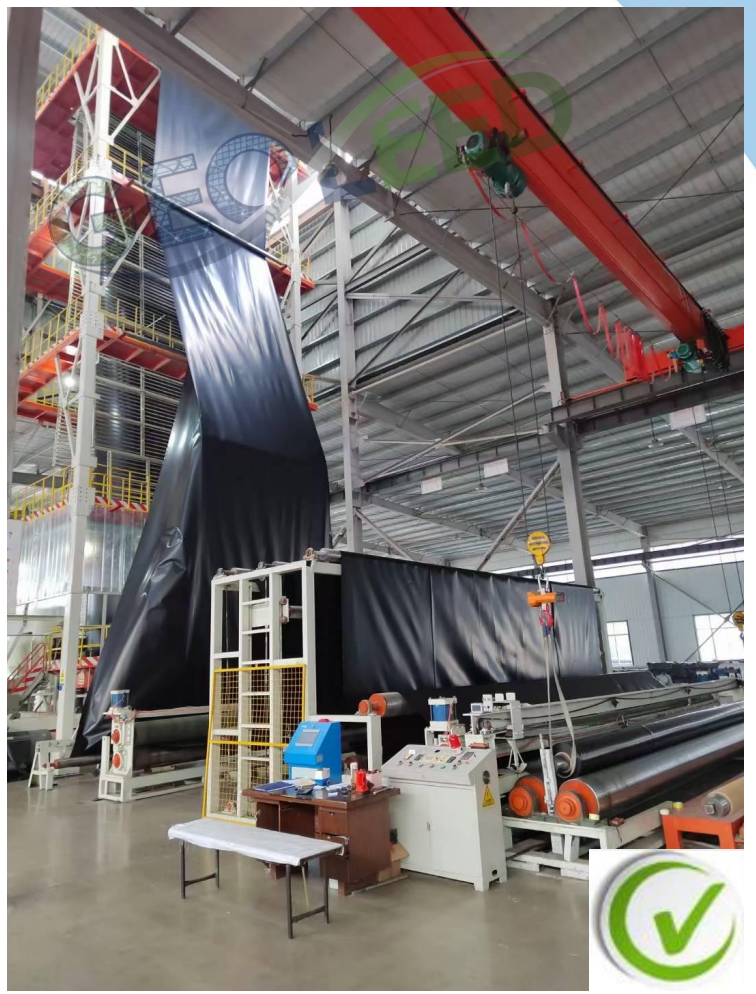
Uniform, without lumps, defects or other such phenomena.





③ Cooling and shaping





Type

High-density polyethylene geomembrane (HDPE geomembrane): It is the most widely used type of geomembrane. It has excellent anti-seepage performance, good chemical stability and high mechanical strength, and the cost is moderate.

01

Low-density polyethylene geomembrane (LDPE geomembrane): good flexibility, large elongation, suitable for projects with large uneven settlement, but slightly inferior to HDPE in strength and aging resistance.

02

Linear low-density polyethylene geomembrane (LLDPE geomembrane): has both the flexibility of LDPE and the strength of HDPE, and its performance is between the two.

03

Type

Ethylene-vinyl acetate copolymer geomembrane (EVA geomembrane): good flexibility, low temperature resistance, stress cracking resistance, often used in anti-seepage projects under special environments.

04

EVOH geomembrane is a functional anti-seepage membrane made by co-extruding or multi-layering EVOH barrier layer with HDPE or LLDPE layer. EVOH has excellent gas barrier properties and can effectively block methane, benzene, VOC, harmful gases, etc.

05

Composite geomembrane: composed of geotextile and geomembrane, it has both the protection and reinforcement performance of geotextile and the anti-seepage performance of geomembrane, and is often used in anti-seepage projects under complex geological conditions.

06

Type

Double rough surface geomembrane is a waterproof material made of high molecular materials, featuring roughness on both sides. It has high tensile strength, elongation and aging resistance, and can adapt to various harsh environmental conditions.

07

Single rough surface geomembrane is a new type of anti-seepage material. It increases the friction coefficient and anti-slip function, making it more suitable for steep slopes and vertical anti-seepage, and improving the stability of the project. It has one smooth side and one rough side.

08

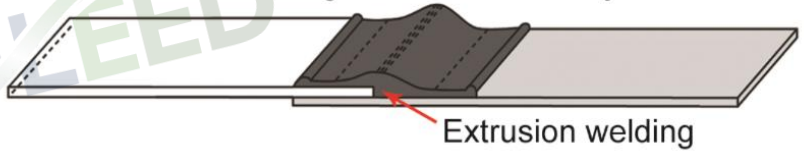
④ Quality inspection

Welding method

Welding machine

Self-propelled fusion Cross section of junction

Extrusion welding Cross section of junction



Welding gun

Lap joint

Joint 100 mm wide.

Adhesive bonding, joint width 50mm.

⑤ Cutting

The incision is straight without obvious serrations.

6 Packing

Both simple packaging and woven bag packaging are acceptable.
Packaging can be customized according to customer requirements.

Clean Surface

Keep the surface clean.

⑦ Application