

# Custom-Built U-Bends

*By GHP Systems, Inc.*

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## **PRODUCT COMPONENT SUBMITTALS**



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## PRODUCT SUBMITTAL

**Project Name:** \_\_\_\_\_

**Project Location:** \_\_\_\_\_

**Contractor:** \_\_\_\_\_

### **DRISCOPLEX<sup>®</sup> 5300 CLIMATE GUARD<sup>®</sup> PIPE AND FITTINGS**

**Scope:**

This Product Submittal is for DriscoPlex<sup>®</sup> 5300 Climate Guard<sup>®</sup> pipe and fittings for geothermal (ground source heat pump) applications.

**Reference Documents:**

DriscoPlex<sup>®</sup> 5300 Climate Guard<sup>®</sup> pipe is manufactured in accordance with ASTM D-3035. DriscoPlex<sup>®</sup> 5300 Climate Guard fittings are manufactured in accordance with ASTM D-2683 for socket fusion fittings, ASTM D-3261 for butt fusion fittings, ASTM F-1055 for electrofusion fittings and ASTM F-1924, Section 3.1.6.1 for Mechanical Fittings.

**Materials:**

DriscoPlex<sup>®</sup> 5300 Climate Guard<sup>®</sup> polyethylene pipe and heat fused materials are manufactured from high density polyethylene material meeting ASTM D-3350 cell classification 345464C. The material has a 1600 psi Hydrostatic Design Basis at 73°F per ASTM D-2837 and is listed in the manufacturers name in PPI TR4 as a PE3408 compound.

**Certification:**

Performance Pipe certifies that DriscoPlex<sup>®</sup> 5300 Climate Guard<sup>®</sup> pipe and fittings meet the specifications and requirements identified herein.

**Limited Warranty Summary:**

Performance Pipe warrants, subject to specific conditions, Climate Guard<sup>®</sup> 5300 Series pipe and fusion fittings for a period of 50 years against rust, rot, electrolytic corrosion and defects in workmanship and materials. This warranty is valid when pipe, tubing and/or fittings are utilized and installed in a closed loop geothermal heat pump system in accordance with accepted and approved industry guidelines and practices. (See Full Limited Warranty for complete terms, conditions and disclaimers).

**PERFORMANCE PIPE**, a division of Chevron Phillips Chemical Company LP

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## **DRISCOPEX<sup>®</sup> 5300 Series Climate Guard<sup>®</sup> Polyethylene Pipe and Fusion Fittings Limited Warranty**

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### **5300 Series Products:**

Performance Pipe warrants DriscoPlex<sup>®</sup> 5300 Series Climate Guard<sup>®</sup> pipe and fusion fittings for a period of 50 years against defects in workmanship and materials. This warranty is valid when pipe and/or fittings are utilized and installed in a closed loop geothermal heat pump system in accordance with accepted and approved industry guidelines and practices. This warranty applies only to Performance Pipe DriscoPlex<sup>®</sup> 5300 Series Climate Guard<sup>®</sup> pipe and fusion fittings. It does not apply to any fusion joining process or any other method or device used to join the pipe or fusion fitting performed by any other party. It does not apply to the design or installation of the system or any other component of the system.

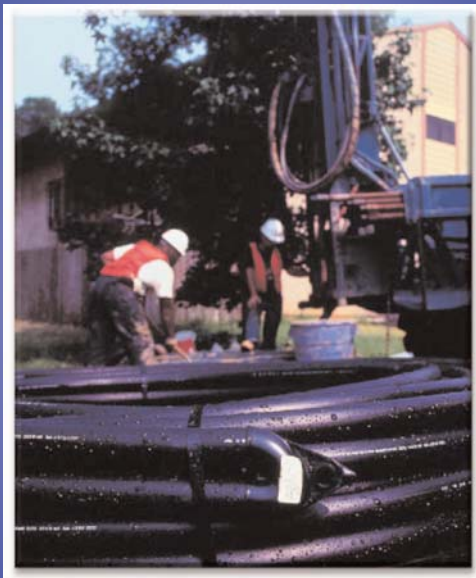
Subject to the price adjustments described below, Performance Pipe will replace, with a like quantity of new products, any DriscoPlex<sup>®</sup> 5300 Series Climate Guard<sup>®</sup> pipe or fusion fittings that were installed and utilized as described above and that subsequently fail within fifty (50) years from the date of purchase due to a defect in workmanship or materials. For warranty claims occurring within one year after the date of purchase, the defective product(s) shall be replaced free of product and freight charges. For warranty claims occurring during the second (2<sup>nd</sup>) through eleventh (11<sup>th</sup>) years after the date of purchase, the replacement product cost and freight expense borne by Performance Pipe shall be calculated by reducing the then current price by eight percent (8%) per year. For warranty claims occurring during the twelfth (12<sup>th</sup>) through the fiftieth (50<sup>th</sup>) years after the date of purchase, the replacement product cost and freight expense borne by Performance Pipe shall be calculated by reducing the then current price by eighty percent (80%) plus one half percent (0.5%) per year for each year after the 11<sup>th</sup> year.

**SUBJECT TO ANY EXPRESS WARRANTIES CONTAINED IN PERFORMANCE PIPE'S SALES ORDER APPLICABLE TO THE PRODUCT(S) IN QUESTION, THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, EXPRESS OR IMPLIED, AND PERFORMANCE PIPE DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. PERFORMANCE PIPE SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES RELATING TO DEFECTS OF PERFORMANCE PIPE DRISCOPEX<sup>®</sup> 5300 SERIES CLIMATE GUARD<sup>®</sup> PIPE AND FUSION FITTINGS, WHETHER USED SINGULARLY OR IN COMBINATION WITH OTHER PRODUCTS OR MATERIALS.** Some states do not allow this exclusion, so it may not apply to you. This limited warranty gives the purchaser specific legal rights and there may be other rights, which vary from state to state.



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## DRISCOPEX<sup>®</sup> 5300 SERIES CLIMATE GUARD<sup>®</sup> SYSTEMS



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DRISCOPEX<sup>®</sup> Series 5300 Climate Guard<sup>®</sup>  
HDPE Pipe and Fitting System for  
Closed-Loop Ground-Source  
Heat Pump Applications

Bulletin: PP 650

## DRISCOPEX® 5300 Series Climate Guard®

HDPE Pipe and Fitting System for  
Closed-Loop Ground-Source Heat Pump Applications

### Performance Pipe

PERFORMANCE PIPE is the functional successor to the operations of Plexco<sup>1</sup> and Driscopipe<sup>2</sup>. On July 1, 2000, Chevron Chemical Company and Phillips Chemical Company were joined to form Chevron Phillips Chemical Company LP. Performance Pipe, a division of Chevron Phillips Chemical Company LP, succeeds Plexco and Driscopipe as North America's largest producer of polyethylene piping products for geothermal, industrial, municipal, mining, oilfield, gas and utility applications.

Performance Pipe offers more than forty years of polyethylene pipe manufacturing experience, nine manufacturing facilities ISO certified in eight states.

The unmatched quality and performance of Performance Pipe polyethylene piping products is enhanced and strengthened with over four decades of quality polyolefin plastic resin production from Chevron Phillips Chemical Company LP.

### **DRISCOPEX® 5300 Series Climate Guard® Pipe and Fitting System**

DriscoPlex® 5300 Series Climate Guard® high-density polyethylene pipe and fittings are the quality piping system for closed-loop, earth-coupled heat pump applications. DriscoPlex® 5300 Series Climate Guard® pipe and fittings are the system of choice for residential, commercial, institutional and industrial installations. Performance Pipe offers a complete system of DriscoPlex® 5300 pressure-rated pipe and fittings that meet or exceed applicable IGSHPA and ASTM specifications and requirements.

### **DRISCOPEX® 5300 Climate Guard® Systems - The Key to Performance**

**Economical** - Easy to join, lightweight and flexible to help reduce construction and installation costs.

**Tough and Durable** - Excellent impact and abrasion resistance. Pressure ratings based on long-term tests. Exceptional resistance to slow crack growth and environmental stress cracking.



<sup>1</sup> Formerly - Plexco, a Division of Chevron Chemical Company

<sup>2</sup> Formerly - Phillips Driscopipe, A Division of Phillips Petroleum Company

**NOTICE - This publication is intended for use as a guide to support the designer of piping systems. It is not intended to be used as installation instructions, and should not be used in place of the advice of a professional engineer. It does not constitute a guarantee or warranty for piping installations. Performance Pipe has made every reasonable effort to ensure the accuracy of this publication, but it may not provide all necessary information, particularly with respect to special or unusual applications. This publication may be changed from time to time without notice. Contact Performance Pipe to determine if you have the most current edition.**

**Ductile and Flexible** - Flexible DriscoPlex® 5300 Climate Guard® Series pipe follows the "lay of the land" to ease trench and down hole installation.

**Resistant to Chemicals and Corrosion** - Excellent resistance to most chemical compounds and aggressive soils.

**Thermally Conductive** - DriscoPlex® 5300 Climate Guard® pipe offers high strength PE 3408 to minimize pipe wall thickness and maximize heat transfer.

**Leak-Tight Joining** - Long, continuous coils or straight lengths reduce joining requirements. Properly made heat fusion joints are as strong as the pipe itself and do not leak.

**Excellent Hydraulics** - DriscoPlex® 5300 Climate Guard® pipe offers high volume flows with low flow resistance. The hydraulically smooth, non-wetting surface provides excellent flow properties. A Hazen-Williams C-factor of 150-155 is typically used to estimate flow resistance. DriscoPlex® 5300 Climate Guard® pipe does not rust, rot, corrode, tuberculate or support biological growth.

**Sequential Footage Markings** on coils to assist with proper depth setting in borehole installations.

## DRISCOPEX® 5300 Climate Guard® Pipe and Fitting Products

### *Pipe*

- PE 3408 DR 11- 3/4" IPS, 1" IPS, 1-1/4" IPS, 1-1/2" IPS, 2" IPS, 3" IPS and 4" IPS standard.
- PE 3408 DR 15.5 - 3" IPS, 4" IPS, 6" IPS and 8" IPS standard.
- Other sizes through 54" IPS, other DR's, and Schedule 40 available upon request.
- DriscoPlex® 5300 Climate Guard® Unicoil™ proprietary twin-coil with patented Polywing™ u-bend for down hole or horizontal loop applications - 3/4" IPS, 1" IPS and 1-1/4" IPS

### *Fittings and Valves*

DriscoPlex® 5300 Climate Guard® molded fittings for butt fusion through 8" IPS and for socket fusion through 4" IPS.

### *Materials and Standards*

DriscoPlex® 5300 Climate Guard® pipe and molded fittings are manufactured from high-density, high molecular weight PE 3408 polyethylene compound that meets or exceeds ASTM D 3350 cell classification 345464C, and is listed by the Plastic Pipe Institute in PPI TR-4 with HDB ratings of 1600 psi (11.04 MPa) at 73°F (23°C) and 800 psi (5.52 MPa) at 140°F (60°C).

DriscoPlex® 5300 Climate Guard® pipe is manufactured in accordance with ASTM D 3035. Molded fittings are manufactured in accordance with ASTM D 3261 (butt outlet) and ASTM D 2683 (socket outlet).

## Secure Joining

DriscoPlex® 5300 Climate Guard® pipe and fittings are quickly joined by socket, butt or saddle heat fusion, electrofusion, or mechanical fittings. Climate Guard® 5300 mechanical connection fittings are available for joining to other materials or to itself. Suitable electrofusion fittings may also be used. Heat fusion joining procedures are available upon request.

## Unicoil™ U-Bend Coil

### *Pre-Fused Polyethylene U-Bend Coils for Efficient, Reliable Installation*

Until now, installers have spent precious field time fabricating u-bends from elbows and making-up u-bend coils for down hole and horizontal heat pump piping loops. But no more - Now there is Unicoil™ u-bend coil from Performance Pipe.

Unicoil™ u-bend coil is the original pre-fused polyethylene u-bend coil system created by Performance Pipe. Unicoil™ u-bend coil features the patented one-piece Polywing Unibend that is pre-fused to two coils of DriscoPlex® 5300 Climate Guard® pipe, all in one convenient package.

### *Unibend with Polywing - It Goes Down Easy, and Stays Down*

Unibend is the first tight radius one-piece u-bend designed specifically for geothermal heat pump applications. The unique Unibend is factory pre-fused to two lengths of DriscoPlex® 5300 Climate Guard® pipe (supply and return) that are coiled together and banded into a single package for easy handling and quick field installation. Unibend features a pointed end for self-guiding installation to slide through the toughest borehole conditions. The one-piece Unibend design eliminates the third fusion where two elbows are fused together, thus fewer joints are buried at extreme depths.

Unibend features the patented Polywing anti-buoyancy attachment port to minimize the possibility of a loop assembly "floating" out of the borehole. When an anti-buoyancy wing tube is fitted through the Polywing attachment port, the wing tube folds against the Unibend during down-hole insertion, but the wing tube springs out to resist buoyant forces. The Polywing anti-buoyancy port may also be used to connect weights, stiffeners, or other devices without risking damage or compromising Unibend performance.



## Configurations

DriscoPlex® 5300 Climate Guard® Unicoil™ piping systems are available in three pipe sizes and two pressure ratings.

- Pipe sizes: 3/4" IPS, 1" IPS or 1-1/4" IPS
- Working pressure ratings: SDR 11 160 psi water at 73°F (standard) or SDR 9 200 psi water at 73°F (special order) for deep installations or high static pressures.
- Outside width across Unibend†: 

3/4" IPS & 1" IPS	3 1/4" wide
1-1/4" IPS	4" wide

† This dimension is the approximate outside width across the Unibend at the end of the Unicoil™ u-bend coil including the fusion beads. When used in downhole applications, appropriate clearance between the borehole and the outside width of the Unibend is required to allow downhole passage.

DriscoPlex® 5300 Climate Guard® Unicoil™ geothermal piping systems sets the standard for reliability, cost-efficiency and ease of installation in the ground source heat pump industry.

### **General Guidelines for Closed-Loop Ground-Source Heat Pump Applications**

- Verify that the total system pressure, operating plus surge, does not exceed the pressure rating of the lowest rated component in the system.
- Carefully inspect the pipe to detect any damage that may have occurred during shipping or handling.
- Conduct hydrostatic leak testing in accordance with Performance Pipe procedures. *Do not test piping with pressurized air.*
- Install DriscoPlex® 5300 Climate Guard® piping products in accordance with accepted standards for water-source heat pump applications and ASTM D 2774 *Underground Installation of Thermoplastic Pressure Piping*.
- When laid in a trench, ensure that the trench bottom is smooth and free from sharp or angular objects. Embedment soils must be free from refuse, organic material, cobbles, boulders, large rocks or stones, and frozen clods. Blocking must not be used to change pipe grade or to intermittently support pipe across excavated sections.
- When installed down-hole, such as in a vertical loop, be sure any ballast used to facilitate down-hole insertion does not impinge, gouge or cut into the pipe.

## Technical Information

### Heat Transfer

Heat transfer properties of various materials can be expressed by a "K-Value". A higher K-Value reflects greater heat transfer properties.

<i>Material</i>	<i>K-Value, BTU-h/ft-°F</i>
DriscoPlex <sup>1</sup> ™ 5300 Climate Guard <sup>®</sup> PE 3408	0.225
PVC	0.087

**Table 1 Approximate Water Volume for 100 Feet of Pipe†**

<i>Nominal Pipe Size</i>	<i>Gallons</i>	<i>Nominal Pipe Size</i>	<i>Gallons</i>
3/4" IPS DR 11	2.93	3" IPS DR 11	32.57
1" IPS DR 11	4.60	4" IPS DR 11	53.84
1-1/4" IPS DR 11	7.33	6" IPS DR 15.5	133.47
1-1/2" IPS DR 11	9.60	8" IPS DR 15.5	226.17
2" IPS DR 11	15.00		

\* Approximate volume of water in U.S. gallons at 73°F for ASTM D 3035 nominal outside diameter and average wall thickness for pipe.

**Table 2 Climate Guard<sup>®</sup> 5300 Pressure Rating (psi) vs. Temperature (°F)‡**

<i>Temp, °F</i>	<i>DR 15.5</i>	<i>SDR 11</i>	<i>SDR 9**</i>
73	110	160	200
80	104	151	189
90	95	138	173
100	87	126	157
110	78	114	142
120	70	102	128
130	63	91	114
140	55	80	100

\* PE 3408 pressure ratings for water. PE 3408 HDB = 1600 psi at 73°F and 800 psi at 140°F. Intermediate temperature LTHS interpolated in accordance with PPI TN-18. \*\* Optional SDR 9 for Unicoil™.

**Table 3 Estimated Flow Properties for 100 Feet of Pipe - GPM, Pressure Drop (psi), Velocity (fps), Velocity (ft/min)**

GPM	3/4" IPS DR 11		1" IPS DR 11		1-1/4" IPS DR 11		1-1/2" IPS DR 11		2" IPS DR 11		3" IPS DR 11		4" IPS DR 11		6" IPS DR 15.5		8" IPS DR 15.5	
	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps	psi	fps
2	0.34	1.14	0.11	0.73	0.04	0.46	0.02	0.35	0.01	0.22								
3	0.73	1.71	0.24	1.09	0.08	0.68	0.04	0.52	0.01	0.33								
4	1.24	2.27	0.41	1.45	0.13	0.91	0.07	0.69	0.02	0.44								
5	1.87	2.84	0.63	1.81	0.20	1.14	0.10	0.87	0.04	0.56	0.01	0.26						
6	2.62	3.41	0.88	2.18	0.28	1.37	0.15	1.04	0.05	0.67	0.01	0.31						
7	3.48	3.98	1.17	2.54	0.38	1.59	0.19	1.22	0.07	0.78	0.01	0.36						
8	4.46	4.55	1.49	2.90	0.48	1.82	0.25	1.39	0.08	0.89	0.01	0.41						
9	5.54	5.12	1.85	3.26	0.60	2.05	0.31	1.56	0.10	1.00	0.02	0.46						
10	6.74	5.69	2.25	3.63	0.73	2.28	0.38	1.74	0.13	1.11	0.02	0.51	0.01	0.31				
12			3.16	4.35	1.02	2.73	0.53	2.08	0.18	1.33	0.03	0.61	0.01	0.37				
15			4.77	5.44	1.54	3.41	0.80	2.60	0.27	1.67	0.04	0.77	0.01	0.46				
18			6.69	6.53	2.15	4.10	1.12	3.13	0.38	2.00	0.06	0.92	0.02	0.56				
21					2.86	4.78	1.48	3.65	0.50	2.33	0.08	1.07	0.02	0.65				
24					3.66	5.46	1.90	4.17	0.64	2.67	0.10	1.23	0.03	0.74				
27					4.56	6.14	2.36	4.69	0.80	3.00	0.12	1.38	0.04	0.84				
30					5.54	6.83	2.87	5.21	0.97	3.33	0.15	1.54	0.04	0.93				
35					7.37	7.96	3.82	6.08	1.29	3.89	0.20	1.79	0.06	1.08	0.01	0.44		
40							4.89	6.95	1.65	4.45	0.25	2.05	0.07	1.24	0.01	0.50		
45							6.08	7.81	2.05	5.00	0.31	2.30	0.09	1.39	0.01	0.56		
50							7.39	8.68	2.49	5.56	0.38	2.56	0.11	1.55	0.01	0.62		
55									2.97	6.11	0.45	2.81	0.13	1.70	0.01	0.69		
60									3.49	6.67	0.53	3.07	0.16	1.86	0.02	0.75		
70									4.65	7.78	0.70	3.58	0.21	2.17	0.02	0.87	0.01	0.52
80									5.95	8.89	0.90	4.09	0.27	2.48	0.03	1.00	0.01	0.59
90									7.40	10.00	1.12	4.61	0.33	2.79	0.04	1.12	0.01	0.66
100											1.36	5.12	0.40	3.10	0.04	1.25	0.01	0.84
110											1.63	5.63	0.48	3.41	0.05	1.37	0.01	0.81
120											1.91	6.14	0.56	3.72	0.06	1.50	0.02	0.88
130											2.21	6.65	0.65	4.02	0.07	1.82	0.02	0.96

H.U.S. gallons of water. ASTM D 3035 nominal outside diameter & average wall thickness. Pressure drop estimated using Hazen-Williams C = 150 for water at 60°F.

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## CONTACT INFORMATION:

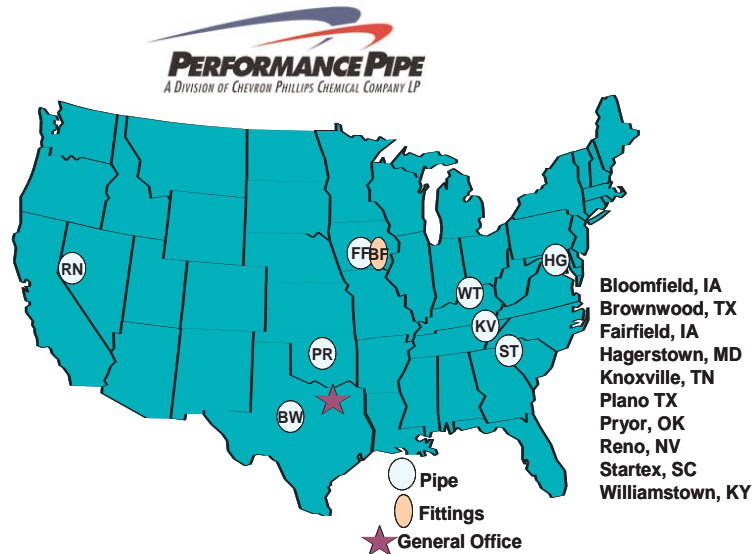
**PERFORMANCE PIPE**, a division of  
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## PERFORMANCE PIPE PLANTS



Strategically Located Plants  
To Better Serve Your Needs!



## PERFORMANCE PIPE Product Literature

Technical Notes & Bulletins\*:

- PP 102-DS** DRISCOPLEX® 5300 Series Climate Guard® Geothermal Piping System Data Sheet
- PP 652** Model Specifications for DRISCOPLEX® 5300 Climate Guard® Systems

## Model Specifications DRISCOPEX<sup>®</sup> 5300 Series Climate Guard<sup>®</sup> Systems for Geothermal Applications

**Scope:** This specification designates requirements for geothermal (ground source heat pump) pipe and fittings.

**Material:** All pipe and heat fused materials shall be manufactured from high density, extra-high molecular weight PE 3408 material. The material shall maintain a 1600 psi Hydrostatic Design Basis at 73.4 degrees F per ASTM D-2837, and shall be listed in PPI TR4 as a PE3408 piping formulation. The material shall have a cell classification of 345464C as specified in ASTM D-3350.

**Pipe:** The extruded pipe shall conform to the specifications and requirements of ASTM D-3035. Clean rework material from the manufacturer's own production may be used provided the pipe or fittings meet all requirements of this specification. Recycled and reclaimed materials from outside the manufacturer's plant shall not be used. Pipe used for vertical bore applications shall include a factory-fused, single, piece, injection molded U-bend Polywing fitting. The approved pipe product is DRISCOPEX<sup>®</sup> 5300 Series Climate Guard<sup>®</sup> Pipe from Performance Pipe.

**Fittings:** Molded fittings shall be manufactured to the specifications and requirements of ASTM D-2683 for socket fittings, ASTM D-3261 for butt fittings, ASTM F-1055 for electrofusion fittings and ASTM F-1924 Section 3.1.6.1 for Mechanical fittings. All fittings shall be rated for pressure service equivalent to SDR 11 PE 3408 pipe. The material used in fitting manufacture shall be the same approved base resin material as the connecting pipe.

The approved fittings are DRISCOPEX<sup>®</sup> 5300 Series Climate Guard<sup>®</sup> Systems from Performance Pipe.

**Joints:** Approved joining methods are heat fusion, electrofusion, flanging, transition fittings and approved mechanical stab fittings. Persons performing heat fusion shall be qualified in accordance with the manufacturer's recommended fusion joining procedures. Electrofusion and mechanical joints shall be made in accordance with the fitting manufacturer's instructions.

**NOTICE.** This publication is for informational purposes and is intended for use as a reference guide. It should not be used in place of the advice of a professional engineer. This publication does not contain or confer any warranty or guarantee of any kind. Performance Pipe has made every reasonable effort towards the accuracy of the information contained in this publication, but it may not provide all necessary information, particularly with respect to special or unusual applications. This publication may be changed from time to time without notice. Contact Performance Pipe to ensure that you have the most current edition.

**Manufacturer:**The pipe and fittings manufacturer shall have in place a functional quality assurance program shall and be ISO (the International Organization for Standardization) Certified.

The approved manufacturer for pipe and fittings is Performance Pipe

**Marking:** Each pipe shall be durably marked with the manufacturer's name, nominal size, pressure rating, ASTM standard, material designation or cell classification number and date and location of manufacture. Coils shall be marked with footage marks at intervals no greater than two feet. Each fitting shall be identified with the manufacturer's name, nominal size, ASTM standard and lot number.

**Installation:** Construction and installation shall be in compliance with IGSHPA Standards (as amended from time to time) and all applicable local, state and federal regulations. The Contractor shall observe all appropriate safety requirements in accordance with local, state and federal codes and regulations.

**Hydrotesting:** The completed system shall be hydrostatically tested at a pressure not greater than 150% of the pipe pressure rating in accordance with Performance Pipe hydrostatic leak testing procedures. Testing with compressed air or a compressed gas is prohibited.

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## DriscoPlex<sup>®</sup> 5300 Series PE3608 / (PE3408) Geothermal Systems Data Sheet

### Typical Material Physical Properties of DriscoPlex<sup>®</sup> 5300 Series

#### High Density Polyethylene Materials

Property	Unit	Test Procedure	Typical Value
Material Designation	---	PPI TR-4	PE3608
Cell Classification	---	ASTM D3350	345464C
<b>Pipe Properties</b>			
Density	gms / cm <sup>3</sup>	ASTM D1505	0.955 (black)
Melt Index Condition 190 / 2.16	gms / 10 minutes	ASTM D1238	0.08
Hydrostatic Design Basis 73°F (23°C)	psi	ASTM D2837	1600
Hydrostatic Design Basis 140°F (60°C)	psi	ASTM D2837	800
Color: UV Stabilizer [C] [E]	---	ASTM D3350	Min 2% carbon Black Color UV Stabilizer
<b>Material Properties</b>			
Flexural Modulus 2% Secant - 16:1 span: depth, 0.5 in / min.	psi	ASTM D790	>110,000
Tensile Strength at Yield	psi	ASTM D638 Type IV	3200
Elongation at Break 2 in / min., Type IV bar	%	ASTM D638	>800
Elastic Modulus	psi	ASTM D638	>150,000
Hardness	Shore D	ASTM D2240	62
PENT	hrs	ASTM F1473	>100
<b>Thermal Properties</b>			
Vicat Softening Temperature	°F	ASTM D1525	256
Brittleness Temperature	°F	ASTM D746	-103
Thermal Expansion	in / in / °F	ASTM D696	1.0 x 10 <sup>-4</sup>

For more information and technical assistance contact:

Performance Pipe, a division of  
Chevron Phillips Chemical Company LP  
P.O. Box 269006  
Plano, TX 75026-9006  
800.527.0662



Members Of:  PLASTICS PIPE INSTITUTE™

NOTICE: This data sheet provides typical physical property information for polyethylene resins used to manufacture PERFORMANCE PIPE polyethylene piping products. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for piping products. Some of these typical physical property values were determined using compression molded plaques. Values obtained from tests of specimens taken from piping product can vary from these typical values. Performance Pipe has made every reasonable effort to ensure the accuracy of this data sheet, but this data sheet may not provide all necessary information, particularly with respect to special or unusual applications. The data sheet may be changed from time to time without notice. Contact Performance Pipe to determine if you have the most recent edition.

Bulletin: PP 102

Revision Date September, 2006

Another quality product from



Before using the piping product, the user is advised and cautioned to make its own determination and assessment of the safety and suitability of the piping 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 piping product is suited and the information is applicable to the user's specific application. This data sheet provides typical physical property information for polyethylene resins used to manufacture the piping product. It is intended for comparing polyethylene piping resins. It is not a product specification, and it does not establish minimum or maximum values or manufacturing tolerances for resins or for the piping product. These typical physical property values were determined using compression-molded plaques prepared from resin. Values obtained from tests of specimens taken from the piping product can vary from these typical values. Performance Pipe does not make, and expressly disclaims, all warranties, of merchantability or fitness for a particular purpose, regardless of whether oral or written, express or implied, allegedly arising from any usage of trade or from any course of dealing in connection with the use of information contained herein or the piping product itself. The user expressly assumes all risk and liability, whether based in contract, tort or otherwise, in connection with th



# Material Safety Data Sheet

## SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

### Performance Pipe (PE Pipe and Fittings: Various Colors)

**Product Use:** Conveyance of liquids, gases and other media.

**Synonyms:** Polyethylene Plastic DriscoPlex® Pipe and Fittings

**Product Cas No.:** Mixture

**Company Identification:**

Performance Pipe, A Division of  
Chevron Phillips Chemical Company LP  
5085 W Park Blvd, Ste 500  
PlanoTX 75093

**Product Information:**

MSDS Requests: 1 - (800) 852-5530  
Technical Information: 1 - (800) 527-0662

**24-Hour Emergency Telephone Numbers**

HEALTH:Chevron Phillips Emergency Information Center 866.442.9628 (North America) and 1.832.813.4984 (International)

TRANSPORTATION: North America: CHEMTREC 800.424.9300 or 703.527.3887

ASIA: +1.703.527.3887

EUROPE: BIG .32.14.584545 (phone) or .32.14.583516 (telefax)

SOUTH AMERICA SOS-Cotec Inside Brazil: 0800.111.767

Outside Brazil: 55.19.3467.1600

## SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENT	CAS NUMBER	AMOUNT	EINECS	SYM	R-PHRASES
Polyethylene	9002-88-4	> 96 % weight	EXEMPT	NA	NA
Polyethylene Hexene Copolymer	25213-02-9	> 96 % weight	EXEMPT	NA	NA
Polyethylene Butene Copolymer	25087-34-7	> 96 % weight	NA	NA	NA
May Include: Carbon Black	1333-86-4	0 - 4 % weight	215-609-9	NA	NA
May Include: Lead Chromate Pigment	1344-37-2	0 - 1 % weight	215-693-7	T, N	R62, R61, R50/53, R40, R33

**Occupational Exposure Limits:**

Component	Limit	TWA	STEL	Ceiling / Peak	Notation
May Include: Carbon Black	ACGIH	3.5 mg/m3	NA	NA	NA
May Include: Carbon Black	German MAK	6 mg/m3	NA	NA	NA
May Include: Carbon Black	OSHA PEL	3.5 mg/m3	NA	NA	NA
May Include: Lead Chromate Pigment	ACGIH	.01 mg/m3	NA	NA	NA
May Include: Lead Chromate Pigment	German MAK	.1 mg/m3	NA	4	NA
May Include: Lead Chromate Pigment	OSHA SP	.05 mg/m3	NA	NA	NA
Polyethylene	ACGIH	3 mg/m3	NA	NA	NA
Polyethylene	CPCHEM	Not Established	NA	NA	NA
Polyethylene	German MAK	6 mg/m3	NA	NA	NA
Polyethylene Butene Copolymer	CPCHEM	Not Established	NA	NA	NA
Polyethylene Hexene Copolymer	CPCHEM	Not Established	NA	NA	NA

**SECTION 3 HAZARDS IDENTIFICATION**

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**EMERGENCY OVERVIEW**

Colored plastic (various colors)

- FORMALDEHYDE MAY BE PRODUCED AT ELEVATED TEMPERATURE.

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**IMMEDIATE HEALTH EFFECTS:**

**Eye:** Not expected to cause prolonged or significant eye irritation. If this material is heated, thermal burns may result from eye contact.

**Skin:** Contact with the skin is not expected to cause prolonged or significant irritation. Contact with the skin is not expected to cause an allergic skin response. If this material is heated, thermal burns may result from skin contact. Thermal burns to the skin: may include pain or feeling of heat, discoloration, swelling, and blistering.

**Ingestion:** Not expected to be harmful if swallowed.

**Inhalation:** Not expected to be harmful if inhaled. If this material is heated, fumes may be unpleasant and produce nausea and irritation of the upper respiratory tract.

**SECTION 4 FIRST AID MEASURES**

**Eye:** If heated material should splash into eyes, flush eyes immediately with fresh water for 15 minutes while holding the eyelids open. Remove contact lenses, if worn. Get immediate medical attention.

**Skin:** If the hot material gets on skin, quickly cool in water. See a doctor for extensive burns. Do not try to peel the solidified material from the skin or use solvents or thinners to dissolve it. The use of vegetable oil, mineral oil, or petroleum jelly is recommended for removal of this material from the skin.

**Ingestion:** If swallowed, do not induce vomiting. Give the person a glass of water or milk to drink and get immediate medical attention. Never give anything by mouth to an unconscious person.

**Inhalation:** Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue.

**SECTION 5 FIRE FIGHTING MEASURES****FIRE CLASSIFICATION:**

Classification (29 CFR 1910.1200): Not flammable or combustible. This material will burn although it is not easily ignited.

**NFPA RATINGS:** Health: 0 Flammability: 0 Reactivity: 0

**FLAMMABLE PROPERTIES:**

**Flashpoint:** NA

**Autoignition:** NA

**Flammability (Explosive) Limits (% by volume in air):** Lower: NA Upper: NA

**EXTINGUISHING MEDIA:** Use water fog, foam, dry chemical or carbon dioxide (CO<sub>2</sub>) to extinguish flames.

**PROTECTION OF FIRE FIGHTERS:**

**Fire Fighting Instructions:** Material will not burn unless preheated. Clear fire area of all non-emergency personnel. Only enter confined fire space with full gear, including a positive pressure, NIOSH-approved, self-contained breathing apparatus. Cool surrounding equipment, fire-exposed containers and structures with water. Container areas exposed to direct flame contact should be cooled with large quantities of water (500 gallons water per minute flame impingement exposure) to prevent weakening of container structure. If possible, water should be applied as a spray from a fogging nozzle since this is a surface burning material. The application of high velocity water will spread the burning surface layer. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

**Combustion Products:** Incomplete combustion can also produce formaldehyde. Normal combustion forms carbon dioxide, water vapor and may produce carbon monoxide, original monomer, other hydrocarbons and hydrocarbon oxidation products, depending on temperature and air availability. Combustion may form: Carbon Dioxide, Carbon Monoxide

**SECTION 6 ACCIDENTAL RELEASE MEASURES**

**Protective Measures:** Eliminate all sources of ignition in vicinity of spilled material.

**Spill Management:** If heated material is spilled, allow it to cool before proceeding with disposal methods.

**Reporting:** U.S.A. regulations may require reporting spills of this material that could reach any surface waters. Report spills to local authorities and/or the National Response Center at (800) 424-8802 as appropriate or required.

**SECTION 7 HANDLING AND STORAGE**

**READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL . REFER TO PRODUCT LABEL OR MANUFACTURERS TECHNICAL BULLETINS FOR THE PROPER USE AND HANDLING OF THIS MATERIAL .**

**Precautionary Measures:** Avoid contact of heated material with eyes, skin, and clothing. Avoid breathing vapor or fumes from heated material.

**Unusual Handling Hazards:** Potentially toxic/irritating fumes may be evolved from heated material. At temperatures (>350°F, >177°C), polyethylenes can release vapors and gases, which are irritating to the mucous membranes of the eyes, mouth, throat, and lungs. These substances may include acetaldehyde, acetone, acetic acid, formic acid, formaldehyde and acrolein. Based on animal data and limited epidemiological evidence, NTP, IARC (2A), and OSHA have listed formaldehyde as a probable human carcinogen. Following all recommendations within this MSDS should minimize exposure to thermal processing emissions.

**SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION**

**GENERAL CONSIDERATIONS:**

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities,

and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

**ENGINEERING CONTROLS:**

If heated material generates vapor or fumes, use process enclosures, local exhaust ventilation, or other engineering controls to control exposure.

**PERSONAL PROTECTIVE EQUIPMENT:**

**Eye/Face Protection:** Wear eye protection such as safety glasses, chemical goggles, or faceshields if engineering controls or work practices are not adequate to prevent eye contact. If this material is heated, wear chemical goggles or safety glasses and a face shield.

**Skin Protection:** If this material is heated, wear insulated clothing to prevent skin contact if engineering controls or work practices are not adequate to prevent skin contact.

**Respiratory Protection:** If user operations generate harmful levels of airborne material that is not adequately controlled by ventilation, wear a NIOSH approved respirator that provides adequate protection. Use the following elements for air-purifying respirators: Organic Vapor and Formaldehyde.

**Occupational Exposure Limits:**

Component	Limit	TWA	STEL	Ceiling / Peak	Notation
May Include: Carbon Black	ACGIH	3.5 mg/m3	NA	NA	NA
May Include: Carbon Black	German MAK	6 mg/m3	NA	NA	NA
May Include: Carbon Black	OSHA PEL	3.5 mg/m3	NA	NA	NA
May Include: Lead Chromate Pigment	ACGIH	.01 mg/m3	NA	NA	NA
May Include: Lead Chromate Pigment	German MAK	.1 mg/m3	NA	4	NA
May Include: Lead Chromate Pigment	OSHA SP	.05 mg/m3	NA	NA	NA
Polyethylene	ACGIH	3 mg/m3	NA	NA	NA
Polyethylene	CPCHEM	Not Established	NA	NA	NA
Polyethylene	German MAK	6 mg/m3	NA	NA	NA
Polyethylene Butene Copolymer	CPCHEM	Not Established	NA	NA	NA
Polyethylene Hexene Copolymer	CPCHEM	Not Established	NA	NA	NA

**SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES**

**APPEARANCE AND ODOR:** Colored plastic (various colors)

**pH:** NA

**VAPOR PRESSURE:** NA

**VAPOR DENSITY (AIR=1):** NA

**BOILING POINT:** NA

**SOLUBILITY (in water):** Insoluble in water.

**MELTING POINT:** 100°C (212°F) - 135°C (275°F)

**SPECIFIC GRAVITY:** 0.91 - 1.02

**DENSITY:** 0.91 - 0.97 g/cm3

**SECTION 10 STABILITY AND REACTIVITY**

**Chemical Stability:** This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.

**Conditions to Avoid:** heating above recommended processing temperature

**Incompatibility With Other Materials:** None.  
**Hazardous Decomposition Products:** Carbon Oxides.  
**Hazardous Polymerization:** Hazardous polymerization will not occur.

## SECTION 11 TOXICOLOGICAL INFORMATION

### IMMEDIATE HEALTH EFFECTS:

**Acute Oral Toxicity:** LD50 / not known  
**Acute Dermal Toxicity:** LD50 / not known  
**Acute Inhalation Toxicity:** LC50 / not known

**Eye Irritation:** Polyethylene: This material is not expected to be irritating to the eyes.  
**Skin Irritation:** This material is not expected to be irritating to the skin.  
**Sensitization:** Dermal - not a sensitizer / human

### ADDITIONAL TOXICOLOGY INFORMATION:

This product contains POLYMERIZED OLEFINS. During thermal processing (>350°F, >177°C) polyolefins can release vapors and gases (aldehydes, ketones and organic acids) which are irritating to the mucous membranes of the eyes, mouth, throat, and lungs. Generally these irritant effects are all transitory. However, prolonged exposure to irritating off-gases can lead to pulmonary edema. Formaldehyde (an aldehyde) has been classified as a probable human carcinogen by NTP, IARC (2A), and OSHA based on animal data and limited epidemiological evidence.

Pigments containing carbon black, lead chromate, nickel, antimony, or titanium compounds may have been incorporated into this product. The International Agency for Research on Cancer (IARC) has classified carbon black as a Group 2B carcinogen (possibly carcinogenic to humans) based on sufficient evidence in animals and inadequate evidence in humans. However, the pigments in this product are bound in a polymer matrix which severely limits its extractability, bioavailability and toxicity. The lead chromate pigment is also silica-encapsulated as well as bound in the polymer matrix. None of these pigments is likely to cause adverse health effects under recommended conditions of use.

## SECTION 12 ECOLOGICAL INFORMATION

### ECOTOXICITY:

This material is not expected to be harmful to aquatic organisms.

### ENVIRONMENTAL FATE:

This material is not expected to be readily biodegradable.

## SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material as manufactured is a non hazardous waste but may be contaminated upon use. If this material must be discarded, depending on its use and application, it may meet the criteria of a hazardous waste as defined by the US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make accurate determinations. If this material is

subsequently classified as a hazardous waste, federal law requires disposal at a permitted hazardous waste disposal facility.

## SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

### Shipping Descriptions per regulatory authority.

#### US DOT

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION

#### ICAO / IATA

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION

#### IMO / IMDG

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION

#### RID / ADR

NOT REGULATED AS A HAZARDOUS MATERIAL OR DANGEROUS GOODS FOR TRANSPORTATION

## SECTION 15 REGULATORY INFORMATION

### SARA 311/312 CATEGORIES:

1. Immediate (Acute) Health Effects:	NO
2. Delayed (Chronic) Health Effects:	NO
3. Fire Hazard:	NO
4. Sudden Release of Pressure Hazard:	NO
5. Reactivity Hazard:	NO

### REGULATORY LISTS SEARCHED:

01 = CA Prop 65	17 = FDA 178	33 = RCRA Waste Appendix VIII
02 = LA RTK	18 = FDA 179	34 = RCRA Waste D-List
03 = MA RTK	19 = FDA 180	35 = RCRA Waste P-List
04 = MN Hazardous Substance	20 = FDA 181	36 = RCRA Waste U-List
05 = NJ RTK	21 = FDA 182	37 = SARA Section 311/312
06 = PA RTK	22 = FDA 184	38 = SARA Section 313
07 = CAA Section 112 HAPs	23 = FDA 186	39 = TSCA 12 (b)
08 = CWA Section 307	24 = FDA 189	40 = TSCA Section 4
09 = CWA Section 311	25 = IARC Group 1	41 = TSCA Section 5(a)
10 = DOT Marine Pollutant	26 = IARC Group 2A	42 = TSCA Section 8(a) CAIR
11 = FDA 172	27 = IARC Group 2B	43 = TSCA Section 8(a) PAIR
12 = FDA 173	28 = IARC Group 3	44 = TSCA Section 8(d)
13 = FDA 174	29 = IARC Group 4	45 = WHIMS - IDL
14 = FDA 175	30 = NTP Carcinogen	46 = Germany D TAL

15 = FDA 176  
16 = FDA 177

31 = OSHA Carcinogen  
32 = OSHA Highly Hazardous

47 = Germany WKG  
48 = DEA List 1  
49 = DEA List 2

**The following components of this material are found on the regulatory lists indicated.**

Polyethylene 4  
May Include: Carbon Black 1, 3, 4, 5, 6, 27, 45  
May Include: Lead Chromate Pigment 1, 3, 4, 5, 6, 25, 26, 30, 34, 38, 39, 45, 46

**CERCLA REPORTABLE QUANTITIES(RQ)/SARA 302 THRESHOLD PLANNING QUANTITIES(TPQ):**

Component	Component RQ	Component TPQ	Product RQ
May Include: Lead Chromate Pigment	10 lbs	None	1000 lbs

**WHMIS CLASSIFICATION:**

This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

**CHEMICAL INVENTORY LISTINGS:**

PEOPLE'S REPUBLIC OF CHINA: This product is subject to special EXEMPTION for use.

EUROPEAN UNION (EU): This product is exempt from inventory listing requirements.

KOREA: This product is exempt from inventory listing requirements.

PHILIPPINES: This product is exempt from inventory listing requirements.

UNITED STATES: This product or a component of this product is not on the TSCA inventory, but is subject to special EXEMPTION for use in Commerce.

AUSTRALIA: This product is exempt from inventory listing requirements.

CANADA: This product is exempt from inventory listing requirements.

**EU Symbols:** NA - Not Applicable

**SECTION 16 OTHER INFORMATION**

**NFPA RATINGS:** Health: 0 Flammability: 0 Reactivity: 0 Special: NA

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, \*- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA).

**REVISION STATEMENT:** The following sections have been updated: 2, 15

**ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:**

TLV - Threshold Limit Value TWA - Time Weighted Average  
-  
STEL - Short-term Exposure Limit PEL - Permissible Exposure Limit  
ACGIH - American Conference of Government Industrial Hygienists OSHA - Occupational Safety & Health Administration

NIOSH	- National Institute for Occupational Safety & Health	NFPA	- National Fire Protection Agency
WHMIS	- Workplace Hazardous Materials Information System	IARC	- Intl. Agency for Research on Cancer
EINECS	- European Inventory of existing Commercial Chemical Substances	RCRA	- Resource Conservation Recovery Act
SARA	- Superfund Amendments and Reauthorization Act.	TSCA	- Toxic Substance Control Act
EC50	- Effective Concentration	LC50	- Lethal Concentration
LD50	- Lethal Dose	CAS	- Chemical Abstract Service
NDA	- No Data Available	NA	- Not Applicable
<=	- Less Than or Equal To	>=	- Greater Than or Equal To
CNS	- Central Nervous System	MAK	- Germany Maximum Concentration Values

**This data sheet is prepared according to the latest adaptation of the EEC Guideline 67/548.  
This data sheet is prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200).  
This data sheet is prepared according to the ANSI MSDS Standard (Z400.1).  
This data sheet was prepared by EHS Product Stewardship Group, Chevron Phillips Chemical Company LP, 10001 Six Pines Drive, The Woodlands, TX 77380.**

**The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.**