TR-4

HDB/HDS/SDB/PDB/MRS

Listed Materials

3/12/2013

PPI Listing of
Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings For Thermoplastic Piping Materials or Pipe

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TABLE OF CONTENTS

Foreword 4

Notes to the Reader 5

Definitions and Acronyms 8

Common Plastics Abbreviations 13

SECTION I 14

MATERIALS WITH PPI RECOMMENDED HYDROSTATIC DESIGN BASIS (HDB) OR STRENGTH DESIGN BASIS (SDB) ESTABLISHED IN ACCORDANCE WITH PPI TR-3 (ASTM D 2837).

PART A - MATERIALS EVALUATED FROM DATA DEVELOPED ON EXTRUDED PIPE SPECIMENS (HDB) – THESE MATERIALS MAY BE USED FOR EITHER EXTRUDED PIPE OR MOLDING APPLICATIONS

PART B - MATERIALS EVALUATED FROM DATA DEVELOPED ON MOLDED PIPE SPECIMENS (HDB), EXTRUDED PIPE (HDB), OR MOLDED PLAQUES (SDB) - THESE MATERIALS MAY BE USED FOR MOLDING APPLICATIONS ONLY

SECTION II 51

PIPES WITH PPI RECOMMENDED PRESSURE DESIGN BASIS (PDB) AND MAXIMUM PRESSURE RATINGS (PR) ESTABLISHED IN ACCORDANCE WITH PPI TR-3 (ASTM D 2837).

SECTION III 53

MATERIALS WITH PPI RECOMMENDED MINIMUM REQUIRED STRENGTH (MRS) AND CATEGORIZED REQUIRED STRENGTH (CRS) ESTABLISHED IN ACCORDANCE WITH ISO 9080 AND ISO 12162.

APPENDIX 59

Hydrostatic Design Basis (HDB), Hydrostatic Design Stress (HDS), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe

FOREWORD

This report lists thermoplastic piping materials with a Plastics Pipe Institute (PPI) recommended Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) or Minimum Required Strength (MRS) rating for thermoplastic piping materials or pipe.

These listings have been established in accordance with PPI TR-3, *"Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) or Minimum Required Strength (MRS) Ratings for Thermoplastic Piping Materials or Pipe"*. Copies are available from the PPI website. Questions concerning any listing in this report should be referred to:

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In the case of any deviation or circumstance not covered by a specific policy, a disposition will have to be made by the HSB (Hydrostatic Stress Board) in consultation with the manufacturer.

The Plastics Pipe Institute (PPI) as a service to the industry has prepared this report. Reasonable efforts are made by PPI, its members and staff to ensure that the required methods, policies, standards and procedures have been followed and that the presented test data are reliable. PPI expressly disclaims any warranty, expressed or implied, regarding the HDB, SDB, PDB or MRS values derived from submitted information, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Each product manufacturer that lists compositions with the Hydrostatic Stress Board does so voluntarily and with the express agreement that PPI assumes no liability in regard to the lists, and that it will hold PPI harmless from any claims or liability in connection with its listed pipe compositions. PPI does not endorse the proprietary products or processes of any manufacturer, and assumes no responsibility for compliance with applicable laws and regulations.

PPI offers various technical reports, technical notes and statements to assist engineers, code officials, specifiers, installers and users in proper selection and application of plastics piping. Copies of this report, as well as other publications, are available for download from PPI on the website www.plasticpipe.org.

This report was first published in September 1967. This update was issued in March 2011.

NOTES TO THE READER
SOME RULES AND CONDITIONS

1. **Processing Techniques**: It is stressed that these policies and procedures are for development of recommended ratings for thermoplastics piping materials or pipe based on test data from good quality pipes (extruded or molded) made by specific processing techniques. These recommended ratings may or may not be valid for products made by differing processing techniques.

2. **Definitions and Acronyms:** Definitions and Acronyms are shown in the next section. The terminology of this report is in accordance with the definitions given in ASTM Standards D883, "Standard Definition of Terms Relating to Plastics," and F412, "Standard Terminology Relating to Plastic Piping Systems".

3. **Adjusting Recommended Ratings for Application-Specific Environments:** HDB/PDB/MRS/SDB recommended ratings issued by PPI are for conditions equivalent to those under which the test data were obtained, e.g., constant pressure, temperature and specific test environment. Various industry standards or regulations provide appropriate design factors or design coefficients to calculate the corresponding maximum allowable operating pressure for the piping system used in the desired application. Under some conditions, such as pressure cycling, higher temperature, more aggressive environment, or handling and installation quality, all of which may significantly reduce pipe durability, a more conservative design factor or design coefficient should be chosen. More information on design factors and design coefficients is given in PPI TR-9, "Recommended Design Factors and Design Coefficients for Pressure Applications of Thermoplastic Pipe Materials". ***Sustained pressure testing at elevated temperatures used to obtain these ratings may not be sufficient to fully evaluate either the thermal or oxidative stability performance of thermoplastic materials or pipe.***

4. **Product Standards:** An HDB/PBD/SDB/MRS recommended rating has been shown, through both scientific procedures and historical experience, to be a useful indicator of the relative long-term strength of a thermoplastic material when tested under the conditions set out in test method ASTM D2837 or ISO 9080. The performance of a material (or a piping product made with that material) under actual conditions of installation and use is dependent upon a number of other factors and conditions, which are not addressed in this report. These other factors and conditions are properly governed by the relevant product standard. The usefulness and adequacy of an HDB/PDB/SDB/MRS as an indicator of the strength of a material or pipe for use in any particular application is reflected in its incorporation in the applicable product standard, along with other appropriate performance parameters for the product and its component material. The appropriateness of an HDB/PDB/SDB/MRS for a specific application is also determined by the decision of a private or governmental entity to adopt such a standard as part of its own requirements for the product. The term "50-year strength value," as used in ASTM D2837, is a mathematical extrapolation that is useful in the context of developing an HDB. It does not necessarily constitute a representation that any material with such a value will perform under actual use conditions for that period of time.

5. **Sunlight (UV) Exposure:** These policies do not take into consideration the adequacy of a plastic composition's protection against sunlight exposure. Manufacturers may include in plastic pipe compositions suitable ingredients for the protection of properties against possible degradation by sunlight radiation during normal storage and use. The user should insure that sufficient protection has been incorporated into the selected piping composition should the application involve extended sunlight exposure during storage and/or use.

6. **Recommended Ratings are Formulation Specific:** Each HDB/PDB/SDB/MRS issued by PPI is specific to that particular thermoplastic piping material formulation, including the procedure for mixing, which is represented by the data submitted to the HSB. Any changes in the mixing procedure, in the formulation, or in its ingredients, outside those permitted in TR-3 are considered to result in a new composition, which may have different long-term strength properties. The listed HDB/PDB/SDB/MRS does not apply to this new composition, unless the changes have been made, or validated, in accordance with one or more of the policies presented in this report; or have been ruled upon by the HSB as acceptable based on information provided to the HSB.

7. **Resin Changes:** An inherent assumption in the development of these policies and procedures is that the commercial pipe resin will be of equivalent chemical and molecular composition, insofar as these parameters influence long-term strength and durability, to the resin used in the composition on which the original long-term data supplied to PPI were obtained. Any modification of the resin composition is considered to result in a different material from the one on which the original listings were based. The Chairman of the HSB should be notified of such modifications and the applicable policy followed to maintain the listing. In the case of a change in manufacturing location of the resin used in a listed compound, the Chairman of the HSB should be notified and any applicable policy followed to maintain the listing. Also, in the case of any deviation or circumstance not covered by a specific policy, a disposition will have to be made by the HSB in consultation with the manufacturer.

8. **Disclaimer:** While every effort has been made by the Plastics Pipe Institute to assure that these policies are sound, reasonable and prudent, PPI expressly disclaims any guarantee or warranty regarding their application. Each manufacturer who lists compositions in accordance with the procedures in TR-3 does so voluntarily and with the express agreement that PPI assumes no liability in regard to the listed compositions, and that the manufacturer will hold PPI harmless from any claims or liability arising in connection with its listed pipe compositions.

9. **Manufacturer's Responsibility:** The manufacturer is responsible to insure that his product is continually manufactured in such a manner as to maintain the long-term strength and durability consistent with the long-term data supplied to the HSB. In the case of a deviation or circumstance not covered by a specific policy, a disposition will have to be made by the HSB in consultation with the manufacturer.

10. **Adoption of Policies and Procedures**: These policies and procedures have been adopted using standard letter ballot methods.

11. **Interpretations:** Questions pertaining to the interpretation of any policies in this report should be referred to the Chairman of the HSB, Plastics Pipe Institute, 105 Decker Court, Suite 825, Irving, TX 75063.

12. **Maximum Temperature for Listings:** The maximum temperature for which PPI will list an HDB/PDB/SDB/MRS for a material in accordance with the policies and procedures in TR-3 is 200°F (93°C). PPI listing for temperatures above 200°F may be requested as a "Special Case" (see note 13) for consideration by the HSB.

13. **Special Case Listings:** The policies and procedures in TR-3 are intended to cover HDB/PDB/SDB/MRS listings for most thermoplastic piping materials. PPI recognizes there may be unusual cases, issues or circumstances that are not covered in TR-3, and that may justify an exception to the standard policies. To allow manufacturers an opportunity to have their material(s) listed by PPI when this occurs, the HSB has provided a "Special Case" system. The manufacturer may present its "Case" to the HSB at one of their two annual meetings, usually in February and August, using the approved "**Checklist for HSB Submissions**" form in TR-3 Appendix A.1. All information provided to HSB in these special cases will be made available for review only by HSB members and PPI staff, and will be held by them in strict confidence, in accordance with PPI's written confidentiality procedures (available from the HSB Chairman). There is a PPI fee for each

special case. You must contact the HSB Chairman well in advance of each meeting to arrange for your special case. A completed HSB submission form **must** be received at least two (2) weeks prior to the HSB meeting to permit HSB consideration at that meeting.

Definitions and Acronyms

ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
API	American Petroleum Institute 211 North Ervay Suite 1700 Dallas, TX 75201
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
CSA	CSA, International 178Rexdale Boulevard Etobicoke, Ontario CANADA M9W 1R3
HSB	Hydrostatic Stress Board c/o Plastics Pipe Institute, Inc. 105 Decker Court, Suite 825 Irving, TX 75062
ISO	International Organization of Standardization Central Secretariat Geneva, Switzerland USA Contact: American National Standards Institute 1430 Broadway New York, NY 10018
NSF	NSF International 789 Dixboro Road Ann Arbor, MI 48113-0140 P. O. Box 5059 2600 GB Delft, Netherlands
PPI	Plastics Pipe Institute, Inc. 105 Decker Court, Suite 825 Irving, TX 75062

Brittle	A failure mode which exhibits no visible (to the naked eye) material deformation (stretching, elongation, or necking down) in the area of the break.
Composite pipe	Pipe consisting of two or more different materials arranged with specific functional purpose to serve as pipe.
CRS θ,t	The Categorized Required Strength, CRS θ,t, is the categorized lower prediction limit (LPL) of the long-term hydrostatic strength at a temperature (θ) and a time (t) as determined in accordance with ISO 9080 and ISO 12162. CRS θ,t , at 20°C and 50 years equals MRS.
Dependent Listing	A separate listing of a formulation that has previously been established as an independent listing under another owner's designation. Refer to Part D.3 of TR-3.
Ductile	A failure mode which exhibits material deformation (stretching, elongation, or necking down) in the area of the break.
E-X	The data level of an experimental grade listing where 'X' is the number of the grade level. e.g.: E-2 covers data out to at least 2,000 hours, E-8 covers data out to at least 8,000 hours, etc.
Experimental Grade (E)	A PPI HSB recommended rating that is valid for a limited duration, given to those materials covered by data that do not yet comply with the full requirements of the Standard Grade, but satisfy the applicable minimum preliminary data requirements that are detailed in TR-3. **The owner of an experimental listing must understand there is a potential risk in commercial sale of an experimental product in case it does not meet all the TR-3 requirements for a standard grade.**
HDB	The term HDB (Hydrostatic Design Basis) refers to the categorized long-term hydrostatic strength (LTHS) in the circumferential or hoop direction, for a given set of end use conditions, as established by ASTM Test Method D 2837, "Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials." Hydrostatic Design Basis (HDB) – one of a series of established stress values (specified in Test Method D 2837) for a plastic compound obtained by categorizing the long-term hydrostatic strength determined in accordance with ASTM Method D 2837.
Independent listing	A listing that has been established by a formulation owner under the provisions of Part A of TR-3.
LCL Ratio	The ratio of $\frac{LCL}{LTHS}$ expressed as a percentage. This ratio is a measure of the amount of scatter in the data and must be at least 85%.
LCL	Lower Confidence Limit - The lowest value of the LTHS, based on a statistical analysis of the regression data that can be expected at 100,000 hours.
LTHS	Long-term hydrostatic strength - the estimated tensile stress in the wall of the pipe in the circumferential orientation that when applied continuously will cause failure of the pipe at 100,000 hours. This is the intercept of the stress regression line with the 100,000-h coordinate.

MRP

Minimum Required Pressure – one of a series of established pressure values for a plastic piping component (multilayer pipe, fitting, valve, etc.) obtained by categorizing the long-term hydrostatic pressure strength in accordance with ISO 9080.

MRS

The term MRS (Minimum Required Strength) refers to the categorized long-term hydrostatic strength in the circumferential, or hoop direction, for a given set of end use conditions, as established by ISO 9080, "Determination of Long-Term Hydrostatic Strength of Thermoplastic Materials in Pipe form by Extrapolation." Minimum Required Strength – one of a series of established stress values for a plastic compound obtained by categorizing the long-term hydrostatic strength determined by hydrostatic testing in accordance with ISO 9080 and ISO 12162.

Multilayer pipe

Multilayer is a type of composite

TYPE 1: A pressure rated pipe having more than one layer (bonded together) in which at least 60% of the wall thickness is polymeric material that has an HDB (Hydrostatic Design Basis) or MRS (Minimum Required Strength), from which the pressure rating of the pipe is determined.

DISCUSSION: An example of this is coextruded plastic pipe with an outer layer for barrier or color purposes. If this outer layer has the same HDB/MRS as the bulk wall, the entire wall thickness is used for pressure calculations; if not, only the bulk wall that has an HDB/MRS rating is used for pressure calculations.

TYPE 2: A pressure rated pipe having more than one layer (bonded together) where at least 60% of the wall thickness is polymeric material, where the pipe pressure rating is determined by pipe size and pipe wall construction, and this pipe rating is listed by a PDB (Pressure Design Basis) or MRP (Minimum Required Pressure).

DISCUSSION: An example of this is PEX/AL/PEX pipe.

TYPE 3: non-pressure rated pipe comprising more than one layer in which at least 60% of the wall thickness is polymeric material.

NOTE: the different layer(s) of multilayer pipe may provide color, barrier, stiffness or other properties according to the intended application.

PDB

The term PDB (Pressure Design Basis) refers to the categorized long-term pressure strength for multilayer pipes or other complex piping components, as established by ASTM Test Method D 2837, "Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials." Pressure Design Basis – one of a series of established pressure values for a plastic piping component (multilayer pipe, fitting, valve, etc.) obtained by categorizing the long-term hydrostatic pressure strength determined in accordance with an industry test method that uses linear regression analysis. Although ASTM D 2837 does not use "pressure values", the PPI Hydrostatic Stress Board uses the principles of

	ASTM D2837 in plotting log pressure vs. log time to determine a "long-term hydrostatic pressure strength" and the resulting "Pressure Design Basis" for multilayer pipe that is listed in PPI TR-4.
PHR	Parts by weight of a specified ingredient per hundred parts by weight of the base resin.
PR	Pressure Rating – the estimated maximum pressure that the medium in the pipe can exert continuously with a high degree of certainty that failure of the pipe will not occur. PR = 2 (HDB) x (design factor) / (SDR-1), SDR = Standard Dimension Ratio = Average outside diameter / minimum wall thickness Or PR = (PDB) (design factor)
Private Listing	Manufacturer's listing that is held privately within PPI and is not published in PPI TR-4.
SDB	Strength Design Basis – one of a series of established stress values (specified in Test Method D 2837) for a plastic molding compound obtained by categorizing the long-term strength determined in accordance with ASTM Test Method F 2018. The term SDB (Strength Design Basis) refers to the categorized long-term strength for a plastic molding compound obtained by ASTM F 2018, "Standard Test Method for Time-to - Failure of Plastics Using Plane Strain Tensile Specimens." NOTE: The SDB is used only for a material intended for molding applications. The SDB shall not be used for pipe applications.
Standard Grade (S)	A PPI HSB recommended rating that is valid for a five year period, given to those materials that comply with the full data requirements of TR-3.
Substantiation	A requirement of ASTM D 2513 for PE materials to show that extrapolation of the 73°F stress regression curve is linear to the 438,000-hour intercept.
Thermoplastic	A plastic that repeatedly can be softened by heating and hardened by cooling through a temperature range characteristic of the plastic, and that in the softened state can be shaped by flow into articles by molding or extrusion.
TR	Technical Report
TR-X	A PPI Technical Report where 'X' is the number of the report. e.g.: TR-3/2002 is the 2002 edition of TR-3, *"Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Pressure Design Basis (PDB) and Minimum Required Strengths (MRS) Ratings for Thermoplastic Piping Materials or Pipe".*

UCL	Upper Confidence Limit - The highest value of the LTHS, based on a statistical analysis of the regression data that can be expected at 100,000 h.
UV	Ultra-Violet radiation from solar exposure.
Validation	The process of ensuring that, for those materials that exhibit a transition from ductile to brittle failure mode, this transition occurs after 100,000 h at the rated temperature.

Common Plastics Abbreviations

CPVC	Chlorinated Poly (vinyl chloride)
PA	Polyamide (aka nylon)
PB	Polybutylene
PE	Polyethylene
PEX	Crosslinked polyethylene
PFA	Perfluoro (alkoxy alkane)
POM	Polyoxymethylene (aka polyacetal)
PP	Polypropylene
PVC	Poly (vinyl chloride)
PVDF	Poly (vinylidene difluoride)

SECTION I

MATERIALS WITH PPI RECOMMENDED HYDROSTATIC DESIGN BASIS (HDB), MAXIMUM HYDROSTATIC DESIGN STRESS (HDS) OR STRENGTH DESIGN BASIS (SDB) ESTABLISHED IN ACCORDANCE WITH PPI TR-3 (ASTM D 2837).

PART A - MATERIALS EVALUATED FROM DATA DEVELOPED ON EXTRUDED PIPE SPECIMENS (HDB) – THESE MATERIALS MAY BE USED FOR EITHER EXTRUDED PIPE OR MOLDING APPLICATIONS

The tables that follow present PPI recommended HDB's in effect on the date of issue of this report. Information on subsequently listed materials may be obtained by contacting the Plastics Pipe Institute. Each table has been divided into dependent listings and independent listings. A resin manufacturer or pipe manufacturer may have an independent listing in which they provide all the stress rupture data required by TR-3. A resin manufacturer may transfer their listing to the pipe manufacturer using the protocol in TR-3. In this case, the pipe manufacturer has a dependent listing.

The listings of HDB's have been sub grouped in accordance with the material's standard pipe material designation code. In this designation system, which is widely used by major national product standards, the plastic is identified by its standard abbreviated terminology in accordance with ASTM D 1600, "Standard Terminology Relating to Abbreviations, Acronyms, and Codes for Terms Relating to Plastics", followed by a four or five digit number. The first two or three digits, as the case may be, code the material's ASTM classification (short-term properties) in accordance with the appropriate ASTM standard specification for that material. The last two digits of this number represent the PPI recommended HDS at 73°F (23°C) divided by one hundred. Three examples of this pipe material designation code are as follows:

- CPVC 4120 is a chlorinated polyvinyl chloride (the CPVC abbreviation is in accordance with ASTM D 1600) classified as Type 4, Grade 1 (in accordance with ASTM F 441) which has a 2,000 psi maximum recommended HDS utilizing a 0.5 design factor at 73°F (23°C) for water.

- POM 21110 is a polyoxymethylene (the POM abbreviation is in accordance with ASTM D 1600) classified as Group 2, Class 1, Grade 1 (in accordance with ASTM D 4181) which has a 1,000 psi maximum recommended HDS utilizing a 0.5 design factor at 73°F (23°C) for water.

- PE 3408 is a polyethylene (the PE abbreviation is in accordance with ASTM D 1600) classified as a grade PE 34 with a density cell class of 3 and a slow crack growth cell class of 4 (in accordance with ASTM D 3350). It has an 800-psi maximum recommended HDS utilizing a 0.5 design factor at 73° F (23°C) for water.

The standard pipe material designation codes covered by this report are:

Pipe Material Designation Code	Maximum HDS at 73^0F (23^0C) psi	HDB at 73^0F (23^0C) psi	ASTM Specification
	Polyvinyl Chloride (PVC)		
PVC 1120	2,000	4000	D 1785
PVC 2116	1,600	3150	"
	Chlorinated Polyvinyl Chloride (CPVC)		
CPVC 4120	2,000	4000	F 441
	Polyethylene (PE)		
PE 1404	400	800	D 3350
PE 2406	630	1250	"
PE 2708	800	1250	"
PE 3408	800	1600	"
PE 3608	800	1600	"
PE 3708	800	1600	"
PE 3710	1000	1600	"
PE 4608	800	1600	"
PE 4708	800	1600	"
PE 4710	1000	1600	"
	Crosslinked Polyethylene (PEX)		
PEX 0006	630	1250	F 876
PEX 1006	630	1250	"
PEX 3006	630	1250	"
PEX 5006	630	1250	"
PEX 5206	630	1250	"
PEX 0008	800	1600	"
PEX 1008	800	1600	"
	Polyacetal (Polyoxymethylene - POM)		
POM 21110	1,000	2000	D 4181
	Polyvinylidene Fluoride (PVDF)		
PVDF 2016	1600	3150	D 3222
PVDF 2020	2000	4000	"
PVDF 2025	2500	5000	"
	Polyamide (PA)		
PA 32312	1250	2500	D 6779
PA 32316	1600	3150	"
PA 42316	1600	3150	"

TABLE I.A.1 - PVC 1120 MATERIALS[1]

The following materials carry a recommended HDB of 4,000 psi and a maximum recommended HDS of 2,000 psi at 73°F (23°C) for water.

1. Pipe Listings Dependent on PPI Generic Range Composition

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Certainteed Corp.	CERTAVIN BC-54	73	4000	S	12/31/2016
Charlotte Pipe	CP-110-P	73	4000	S	12/31/2016
Cresline	CRESLINE 7802	73	4000	S	12/31/2016
Diamond Plastics	DPC B-1	73	4000	S	12/31/2016
Diamond Plastics	DPC B-2	73	4000	S	12/31/2016
Diamond Plastics	DPC B-3	73	4000	S	12/31/2016
Diamond Plastics	DPC-ST1	73	4000	S	12/31/2016
Durman Esquivel	DURECO 7N	73	4000	S	12/31/2016
Formosa Plastics Corp	FORMOLON-550	73	4000	S	12/31/2016
Formosa Plastics Corp	FORMOLON-AW02	73	4000	S	12/30/2016
Formosa Plastics Corp	FORMOLON-AW04	73	4000	S	12/30/2016
Formosa Plastics Corp	FORMOLON-AW09	73	4000	S	12/30/2016
Formosa Plastics Corp	FORMOLON-AW11	73	4000	S	12/30/2016
George Fischer Sloane	GSR 110-145	73	4000	S	12/31/2016
Georgia Gulf Chemicals Vinyls	Georgia Gulf 3152 Gray 434	73	4000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	Georgia Gulf 3350 White 125	73	4000	S	12/31/2016
Harvel Plastics	HARVEL 707	73	4000	S	12/31/2016
Heritage Plastics South	CPC 1	73	4000	S	12/31/2016
Hoffman Plastic Compounds	117-110	73	4000	S	12/31/2016
IPEX Technologies Inc	S907	73	4000	S	12/31/2016
JM Manufacturing	JM SERIES 30	73	4000	S	12/31/2016
JM Manufacturing	JMR90	73	4000	S	12/31/2016
JM Manufacturing	PW 1000	73	4000	S	12/31/2016
K-Bin Inc	KBD-4000	73	4000	S	12/31/2016
Liberty Plastics, LLC	Liberty Blend	73	4000	S	1/11/2018
Mexichem Resinas Vinilicas	PRIM 225-2	73	4000	S	12/31/2016
National Pipe and Plastics	N/O	73	4000	S*	12/30/2016
National Pipe and Plastics	NATIONAL 1185	73	4000	S	12/31/2016
North American Bristol Corp.	N. AMERICAN BP (1, 2 or 4)	73	4000	S	12/31/2016
North American Pipe Co.	FREEDOM PLASTICS FG	73	4000	S	12/31/2016
North American Pipe Co.	N. AMERICAN M	73	4000	S	12/31/2016
North American Pipe Co.	NORTH AMERICAN M	73	4000	S	12/31/2016
Northern Pipe Products	NPP301R	73	4000	S	12/31/2016
Pipelife Jet Stream, Inc	JS 21085	73	4000	S	12/31/2016
Rigdeline Pipe Manufacturing	RL H2O	73	4000	S	12/31/2013
Rocky Mountain Colby	RMCP-CO	73	4000	S	12/31/2016
Royal Pipe Systems	ROYAL NSF PW	73	4000	S	12/31/2016
Sanderson Pipe Corporation	PP1	73	4000	S	12/31/2016
Sekisui Industrial Piping Co.	ESLON SCH80 PVC Pipe	73	4000	S	12/31/2014
Shoreline Plastics	SLP 1	73	4000	S	12/31/2014
Silver-Line Plastics	SL-1000	73	4000	S	12/31/2016
Texas United Pipe	U-G-1	73	4000	S	12/31/2016
Univ 100 Prod	UP-4000-G	73	4000	S	12/31/2016

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Vinylplex Inc	VPX	73	4000	S	12/31/2016
Vinyltech Corporation	V1	73	4000	S	12/31/2016
Vulcan Plastics	S-203	73	4000	S	12/31/2016

2. Independent Listings – PVC 1120

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Certainteed Corp.	CERTAVIN BC-16	73	4000	S	12/31/2016
Certainteed Corp.	CERTAVIN BC-30A	73	4000	S	12/31/2016
Georgia Gulf Chemicals Vinyls	Georgia Gulf 3152 White125	73	4000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	Georgia Gulf 3401 White125	73	4000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	Georgia Gulf 3450 White125	73	4000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	Georgia Gulf CM-2	73	4000	S	12/31/2015
Gulf Plastic Industries	GPI 031	73	4000	S	12/31/2017
IPEX Technologies Inc	PVC E05	73	4000	S	12/31/2014
IPEX Technologies Inc	S1007	73	4000	S	12/31/2016
JM Manufacturing	JM SERIES 90	73	4000	S	12/31/2016
Omya North America	Omya PVC 1120 Range Formulation	73	4000	S	12/31/2016
Plastics Pipe Institute	PPI - PVC 1120 Range Formulation	73	4000	S	12/31/2020
PolyOne	GEON E 1344	73	4000	S	12/31/2016
PolyOne	GEON E 1353	73	4000	S	12/31/2016
PolyOne	GEON E 1354	73	4000	S	12/31/2016
PolyOne	GEON 87431	73	4000	S	12/31/2016

TABLE I.A.2 PVC 2116 MATERIALS[1]

The following materials carry a recommended HDB of 3,150 psi and a maximum recommended HDS of 1,600 psi at 73°F (23°C) for water.

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
PolyOne	GEON M1200/M3200	73	3200	S	12/31/2016

TABLE I.A.3 - CPVC 4120 MATERIALS[1]

The following materials carry a recommended HDB of 4,000 psi and a maximum recommended HDS of 2,000 psi at 73ï‚°F (23°C) for water.

1. Dependent Listings – CPVC 4120

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Charlotte Pipe	ReUze made with FlowGuard	73	4000	S	12/31/2017
Charlotte Pipe	ReUze made with FlowGuard	180	1000	S	12/31/2017
Georgia Gulf Chemicals Vinyls	PROTHERM 4303	73	4000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	PROTHERM 4303	180	1000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	PROTHERM 4303 GRAY 165	73	4000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	PROTHERM 4303 GRAY 165	180	1000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	PROTHERM 4303 ORANGE 25	73	4000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	PROTHERM 4303 ORANGE 25	180	1000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	PROTHERM 4303 TAN 01	73	4000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	PROTHERM 4303 TAN 01	180	1000	S	12/31/2014
Georgia Gulf Chemicals Vinyls	PROTHERM 4305 GRAY 165	73	4000	S	12/31/2013
Georgia Gulf Chemicals Vinyls	PROTHERM 4305 GRAY 165	180	1000	S	12/31/2013
PolyOne	Geon EC900 Tan 3189	73	4000	S	12/31/2014
PolyOne	Geon EC900 Tan 3189	180	1000	S	12/31/2014
PolyOne	Geon EC920 Tan 3189	73	4000	S	12/31/2014
PolyOne	Geon EC920 Tan 3189	180	1000	S	12/31/2014
PolyOne	Geon EC950 Gray 2777	73	4000	S	12/31/2013
PolyOne	Geon EC950 Gray 2777	180	1000	S	12/31/2013
Spears Manufacturing	Spears CPI-45A Gray	73	4000	S	12/31/2015
Spears Manufacturing	Spears CPI-45A Gray	180	1000	S	12/31/2015
Spears Manufacturing	Spears CPI-45A Orange	73	4000	S	12/31/2015
Spears Manufacturing	Spears CPI-45A Orange	180	1000	S	12/31/2015
Spears Manufacturing	Spears CPI-45A Tan	73	4000	S	12/31/2015
Spears Manufacturing	Spears CPI-45A Tan	180	1000	S	12/31/2015
Spears Manufacturing	Spears CPI-53A Gray	73	4000	S	12/31/2015
Spears Manufacturing	Spears CPI-53A Gray	180	1000	S	12/31/2015
Spears Manufacturing	Spears CPI-53A Orange	73	4000	S	12/31/2015
Spears Manufacturing	Spears CPI-53A Orange	180	1000	S	12/31/2015
Spears Manufacturing	Spears SP2300	73	4000	S	12/30/2014
Spears Manufacturing	Spears SP2300	180	1000	S	12/30/2014
Spears Manufacturing	Spears SP2400	73	4000	S	12/30/2013
Spears Manufacturing	Spears SP2400	180	1000	S	12/30/2013

2. Independent Listings – CPVC 4120

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Georgia Gulf Chemicals Vinyls	PROTHERM 4345 Gray 165	73	4000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4345 Gray 165	180	1000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4345 Orange 25	73	4000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4345 Orange 25	180	1000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4345 Tan 01	73	4000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4345 Tan 01	180	1000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4353 Gray 165	73	4000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4353 Gray 165	180	1000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4353 Orange 25	73	4000	S	12/31/2015
Georgia Gulf Chemicals Vinyls	PROTHERM 4353 Orange 25	180	1000	S	12/31/2015
Kaneka North America LLC	KANEKA KNK-5003	73	4000	S	12/31/2014
Kaneka North America LLC	KANEKA KNK-5003	180	1000	S	12/31/2014
Kaneka North America LLC	KANEKA KNK-5005	73	4000	S	12/31/2013
Kaneka North America LLC	KANEKA KNK-5005	180	1000	S	12/31/2013
Kaneka North America LLC	KANEKA KNK-5007	73	4000	S	12/31/2016
Kaneka North America LLC	KANEKA KNK-5007	180	1000	S	12/31/2016
KEM ONE - Innovative Vinyls	LUCALOR PEY 792	73	4000	S	12/31/2013
KEM ONE - Innovative Vinyls	LUCALOR PEY 792	180	1000	S	12/31/2013
KEM ONE - Innovative Vinyls	LUCALOR PEY 795	73	4000	S	12/31/2013
KEM ONE - Innovative Vinyls	LUCALOR PEY 795	180	1000	S	12/31/2013
Lubrizol Advanced Materials	TEMPRITE 3105 TAN 309	73	4000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 3105 TAN 309	180	1000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 3107 PURPLE 795	73	4000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 3107 PURPLE 795	180	1000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 3107 TAN 309	73	4000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 3107 TAN 309	180	1000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 3118 GRAY 245	73	4000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 3118 GRAY 245	180	1000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 3120 GRAY 245	73	4000	S	12/31/2014
Lubrizol Advanced Materials	TEMPRITE 3120 GRAY 245	180	1000	S	12/31/2014
Lubrizol Advanced Materials	TEMPRITE 3212 GRAY 245	73	4000	S	12/31/2014
Lubrizol Advanced Materials	TEMPRITE 3212 GRAY 245	180	1000	S	12/31/2014
Lubrizol Advanced Materials	TEMPRITE 88065 ORANGE 734	73	4000	S	12/31/2014
Lubrizol Advanced Materials	TEMPRITE 88065 ORANGE 734	180	1000	S	12/31/2014
Lubrizol Advanced Materials	TempRite 88096 Tan 309	73	4000	S	12/31/2014
Lubrizol Advanced Materials	TempRite 88096 Tan 309	180	1000	S	12/31/2014
Lubrizol Advanced Materials	TEMPRITE 88610 TAN 309	73	4000	E-6	12/31/2013
Lubrizol Advanced Materials	TEMPRITE 88610 TAN 309	180	1000	E-6	12/31/2013
Lubrizol Advanced Materials	TEMPRITE 88615 TAN 309	73	4000	S	12/31/2014
Lubrizol Advanced Materials	TEMPRITE 88615 TAN 309	180	1000	S	12/31/2014
Lubrizol Advanced Materials	TEMPRITE 88620 TAN 309	73	4000	S	12/31/2015
Lubrizol Advanced Materials	TEMPRITE 88620 TAN 309	180	1000	S	12/31/2015
Lubrizol Advanced Materials	TEMPRITE 88628 GRAY 245A	73	4000	E-8	12/31/2013
Lubrizol Advanced Materials	TEMPRITE 88628 GRAY 245A	180	1000	E-10	12/31/2013
Lubrizol Advanced Materials	TEMPRITE 88628 TAN 309A	73	4000	E-8	12/31/2013
Lubrizol Advanced Materials	TEMPRITE 88628 TAN 309A	180	1000	E-10	12/31/2013

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Lubrizol Advanced Materials	TEMPRITE 88708	73	4000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 88708	180	1000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 88709	73	4000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 88709	180	1000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 88738 ORANGE 734	73	4000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 88738 ORANGE 734	180	1250	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 88756 BLUE 470	73	4000	S	12/31/2017
Lubrizol Advanced Materials	TEMPRITE 88756 BLUE 470	180	1000	S	12/31/2017
North American Bristol Corp.	BP-C1	73	4000	S	12/31/2014
North American Bristol Corp.	BP-C1	180	1000	S	12/31/2014
Spears Manufacturing	Spears SP2500 Gray	73	4000	S	12/31/2017
Spears Manufacturing	Spears SP2500 Gray	180	1000	S	12/31/2017
Spears Manufacturing	Spears SP2500 Orange	73	4000	S	12/31/2017
Spears Manufacturing	Spears SP2500 Orange	180	1000	S	12/31/2017
Spears Manufacturing	Spears SP2500 Tan	73	4000	S	12/31/2017
Spears Manufacturing	Spears SP2500 Tan	180	1000	S	12/31/2017
Spears Manufacturing	Spears SP2600 Gray	73	4000	S	12/31/2017
Spears Manufacturing	Spears SP2600 Gray	180	1000	S	12/31/2017
Spears Manufacturing	Spears SP2600 Orange	73	4000	S	12/31/2017
Spears Manufacturing	Spears SP2600 Orange	180	1000	S	12/31/2017

TABLE I.A.4 - PE 1404 MATERIALS[1]

The following materials carry a recommended HDB of 800 psi and a maximum recommended HDS of 400 psi at 73°F (23°C) for water.

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Dow Chemical Company	DFDA 6080 BK 1404	73	800	S	12/31/2017

TABLE I.A.5. - PE 2406 MATERIALS[1]

The following materials carry a recommended HDB of 1,250 psi and a maximum recommended HDS of 630 psi at 73°F (23°C) for water. (*) - Indicates the material meets policy in TR-3 and ASTM D2513 requirement for substantiation. Stress rupture data confirm that the 73°F (23°C) regression islinear to 50 years.Note: In 2002 ASTM D3350 was revised and many PE2406 compounds were reclassified at PE2708.

1. Dependent Listings – PE 2406

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PE 2406

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

TABLE I.A.6. - PE 2708 MATERIALS[1]

The following materials carry a recommended HDB of 1250 psi and qualify for a 0.63 design factor to establish a maximum recommended HDS of 800 psi at 73°F (23°C) for water. These materials also meet the requirements for a PE 2406 as per ASTM D3350-02a. (*) - Indicates the material meets policy in TR-3 and ASTM D2837/D2513 requirement for substantiation. Stress rupture data confirm that the 73°F (23°C) regression is linear to 50 years.

1. Dependent Listings – PE 2708

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Bow Plastics LTD	Bow OxyPE-RT	73	1250	S*	12/31/2017
Bow Plastics LTD	Bow OxyPE-RT	180	630	S	12/31/2017
Charter Plastics	HD2100-U/SW 2231Y	73	1250	S*	12/31/2013
Charter Plastics	HD2100-U/SW 2231Y	140	800	S	12/31/2013
Cresline	Cresline PE Yellow	73	1250	S*	12/31/2016
Cresline	Cresline PE Yellow	140	1000	S	12/31/2016
Duraline Corporation	PolyPipe Y-20-A	73	1250	S	12/31/2017
Duraline Corporation	PolyPipe Y-20-A	140	1000	S	12/31/2017
Duraline Corporation	PolyPipe Y-20-B	73	1250	S*	12/31/2016
Duraline Corporation	PolyPipe Y-20-B	140	1000	S	12/31/2016
Duraline Corporation	PolyPipe Y-20-C	73	1250	S*	12/31/2017
Duraline Corporation	PolyPipe Y-20-C	140	1000	S	12/31/2017
Endot Industries	EID2420	73	1250	S*	12/31/2017
Endot Industries	EID2420	140	1000	S	12/31/2017
International Pipe	IPG	73	1250	S*	12/31/2016
International Pipe	IPG	140	1000	S	12/31/2016
JM Manufacturing dba JM Eagle	FP3902	73	1250	S*	12/31/2014
JM Manufacturing dba JM Eagle	FP3902	140	1000	S	12/31/2014
JM Manufacturing dba JM Eagle	J-M MDPE GAS PIPE-1	73	1250	S*	12/31/2016
JM Manufacturing dba JM Eagle	J-M MDPE GAS PIPE-1	140	1000	S	12/31/2016
JM Manufacturing dba JM Eagle	UAC 1210Y	73	1250	S*	12/31/2017
JM Manufacturing dba JM Eagle	UAC 1210Y	140	1000	S	12/31/2017
KWH Pipe	WEHOGAS	73	1250	S*	12/31/2017
KWH Pipe	WEHOGAS	140	1000	S	12/31/2017
KWH Pipe	Wehogas K38-20-160	73	1250	S*	12/31/2016
KWH Pipe	Wehogas K38-20-160	140	1000	S	12/31/2016
Oil Creek Plastics	HEATFLEX	73	1250	S*	12/31/2017
Oil Creek Plastics	HEATFLEX	180	630	S	12/31/2017
Oil Creek Plastics	OCP-188	73	1250	S*	12/31/2016
Oil Creek Plastics	OCP-188	140	1000	S	12/31/2016
Oil Creek Plastics	OCP-2420	73	1250	S*	12/31/2017
Oil Creek Plastics	OCP-2420	140	1000	S	12/31/2017
Performance Pipe Division	DriscoPlex PE2708	73	1250	S*	12/31/2017
Performance Pipe Division	DriscoPlex PE2708	140	1000	S	12/31/2017
Polytubes	PT-I27	73	1250	S*	12/31/2016
Polytubes	PT-I27	140	1000	S	12/31/2016
Versaprofiles Products Inc	Versapipe Gas PE2708	73	1250	S*	12/31/2016
Versaprofiles Products Inc	Versapipe Gas PE2708	140	1000	S	12/31/2016

2. Independent Listings – PE 2708

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Borealis AB	BorSafe ME3440	73	1250	S	12/31/2016
Borealis AB	BorSafe ME3441	73	1250	S	12/31/2016
Borealis AB	BorSafe ME3444	73	1250	S	12/31/2016
Chevron Phillips Chemical	MARLEX TR-418P8	73	1250	S*	12/31/2017
Chevron Phillips Chemical	MARLEX TR-418P8	140	1000	S	12/31/2017
Chevron Phillips Chemical	MARLEX TR-418P8D	73	1250	S	12/31/2017
Chevron Phillips Chemical	MARLEX TR-418P8D	140	1000	S	12/31/2017
Dow Chemical Company	CONTINUUM DGDA 2420 YL	73	1250	S*	12/31/2017
Dow Chemical Company	CONTINUUM DGDA 2420 YL	140	1000	S	12/31/2017
Dow Chemical Company	DOWLEX 2344	73	1250	S*	12/31/2017
Dow Chemical Company	DOWLEX 2344	180	630	S	12/31/2017
Formosa Plastics Corporation	HP3902/MDYC-303	73	1250	S*	12/31/2014
Formosa Plastics Corporation	HP3902/MDYC-303	140	1000	S	12/31/2014
Formosa Plastics Corporation	HP3902/PO2107	73	1250	S*	12/31/2014
Formosa Plastics Corporation	HP3902/PO2107	140	1000	S	12/31/2014
Formosa Plastics Corporation	HP3902/PO2240	73	1250	S*	12/31/2014
Formosa Plastics Corporation	HP3902/PO2240	140	1000	S	12/31/2014
INEOS Olefins & Polymers USA	K38-20-123	73	1250	S*	12/31/2014
INEOS Olefins & Polymers USA	K38-20-160	73	1250	S*	12/31/2016
INEOS Olefins & Polymers USA	K38-20-160	140	1000	S	12/31/2016
NOVA Chemicals Ltd	NOVAPOL HD-2100-U YELLOW	73	1250	S*	12/31/2013
NOVA Chemicals Ltd	NOVAPOL HD-2100-U YELLOW	140	800	S	12/31/2013

TABLE I.A.7 - PE 3408 MATERIALS[1]

The following materials carry a recommended HDB of 1,600 psi and a maximum recommended HDS of 800 psi at 73°F (23°C) for water. (*) - Indicates the material meets policy in TR-3 and ASTM D2837/D2513 requirement for substantiation. Stress rupture data confirm that the 73°F (23°C) regression is linear to 50 years.Note: In 2002 ASTM D3350 was revised and many compounds were reclassified to other designations such as PE 3608, PE 3708, PE 3710, PE 4708, PE 4710.

1. Dependent Listings – PE 3408

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

TABLE I.A.8. - PE 3608 MATERIALS[1]

The following materials carry a recommended HDB of 1600 psi and a maximum recommended HDS of 800 psi at 73°F (23°C) for water. These materials also meet the requirements for a PE 3408 as per ASTM D3350-02a. (*) - Indicates the material meets policy in TR-3 and ASTM D2837/D2513 requirement for substantiation. Stress rupture data confirm that the 73°F (23°C) regression is linear to 50 years.

1. Dependent Listings – PE 3608

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Advanced Drainage Systems	PolyFlex (1)	73	1600	S*	12/31/2016
Advanced Drainage Systems	PolyFlex (1)	140	800	S	12/31/2016
Advanced Drainage Systems	PolyFlex (2)	73	1600	S*	12/31/2017
Advanced Drainage Systems	PolyFlex (2)	140	1000	S	12/31/2017
Advanced Drainage Systems	PolyFlex (3)	73	1600	E-8	12/31/2013
Appalachian Piping Products	Appalachian Plastic Tubing	73	1600	S*	12/31/2016
Appalachian Piping Products	Appalachian Primeline	73	1600	S*	12/31/2016
Appalachian Piping Products	Appalachian Water Service	73	1600	S*	12/31/2016
Blue Diamond Industries	BDII 3608	73	1600	S*	12/31/2016
Blue Diamond Industries	BDII 3608	140	800	S	12/31/2016
Blue Diamond Industries	BLUE DIAMOND BDI-3408	73	1600	S*	12/31/2017
Blue Diamond Industries	BLUE DIAMOND BDI-3408	140	800	S	12/31/2017
Centennial Plastics	PE3408 CENFLO HDPE	73	1600	S*	12/31/2016
Centennial Plastics	PE3408 CENFLO HDPE	140	800	S	12/31/2016
Centennial Plastics	PE3408 CENFLO HDPE (1)	73	1600	S*	12/31/2014
Centennial Plastics	PE3408 CENFLO HDPE (1)	140	800	S	12/31/2014
Centennial Plastics	PE3408 CENFUSE	73	1600	S*	12/31/2016
Centennial Plastics	PE3408 CENFUSE	140	800	S	12/31/2016
Centennial Plastics	PE3408 CENFUSE (1)	73	1600	S*	12/31/2014
Centennial Plastics	PE3408 CENFUSE (1)	140	800	S	12/31/2014
Centennial Plastics	PE3608 CENFUSE	73	1600	S*	12/31/2017
Centennial Plastics	PE3608 CENFUSE	140	1000	S	12/31/2017
Charter Plastics	Black N1	73	1600	S*	12/31/2017
Charter Plastics	BLUE A-1	73	1600	S*	12/31/2017
Charter Plastics	BLUE A-1	140	800	S	12/31/2017
Charter Plastics	BLUE N-1	73	1600	S	12/31/2016
Charter Plastics	BLUE N-1	140	630	S	12/31/2016
Charter Plastics	Blue Stripe N1	73	1600	S*	12/30/2016
Charter Plastics	GREEN N-1	73	1600	S	12/31/2016
Charter Plastics	GREEN N-1	140	630	S	12/31/2016
Charter Plastics	Green Stripe N1	73	1600	S*	12/31/2017
Charter Plastics	HD-2007-A/SW 2153	73	1600	S	12/31/2013
Charter Plastics	HD-2007UVS-BLUE	73	1600	S	12/31/2016
Charter Plastics	HD-2007UVS-XB	73	1600	S	12/31/2016
Charter Plastics	HD-LAV	73	1600	S	12/31/2017
Charter Plastics	HD-LAV	140	630	S	12/31/2017
Charter Plastics	HP401N/SW2139	73	1600	S*	12/31/2017
Charter Plastics	HP401N/SW2139	140	800	S	12/31/2017
Charter Plastics	Lav Stripe N1	73	1600	S*	12/31/2017
Co-Ex Pipe Co.	(FP) CO-FLEX	73	1600	S*	12/31/2014
Co-Ex Pipe Co.	(FP) CO-FLEX	140	800	S	12/31/2014
CPI	DLC3408U	73	1600	S*	12/31/2013
Cresline	CRESLINE CE BLUE	73	1600	E-8	12/31/2013
Cresline	CRESLINE HD-2	73	1600	S*	12/31/2016
Cresline	CRESLINE HD-2	140	800	S	12/31/2016
Endot Industries	ENDOT EIC-80	73	1600	S*	12/31/2013
Endot Industries	ENDOT EIC-80	140	800	S	12/31/2013
Extrumex	Extrupak PE-3608	73	1600	S*	12/31/2017

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Extrumex	Extrupak PE-3608	140	800	S	12/31/2017
Extrumex	Extrupak PE-3608N	73	1600	S*	12/31/2017
Extrumex	Extrupak PE-3608N	140	800	S	12/31/2017
Flint Global Poly	GP36-D	73	1600	S*	12/31/2013
Flint Global Poly	GP36-D	140	800	S	12/31/2013
Flying W Plastics	FT108	73	1600	S*	12/31/2017
Flying W Plastics	FT108	140	800	S	12/31/2017
Flying W Plastics	FW 108	73	1600	S*	12/31/2017
Flying W Plastics	FW 108	140	800	S	12/31/2017
Flying W Plastics	SW108	73	1600	S*	12/31/2017
Flying W Plastics	SW108	140	1000	S	12/31/2017
International Pipe	IP-A	73	1600	S*	12/31/2017
International Pipe	IP-A	140	1000	S	12/31/2017
Interstate Plastics	INTERSTATE PE3408 DL 02	73	1600	S*	12/31/2017
Interstate Plastics	INTERSTATE PE3408 DL 02	140	1000	S	12/31/2017
IPEX Inc.	HDPE NF07	73	1600	S*	12/31/2017
IPEX Inc.	HDPE NF07	140	800	S	12/31/2017
IPEX Inc.	HDPE Water Pressure Pipe	73	1600	S*	12/31/2017
IPEX Inc.	HDPE Water Pressure Pipe	140	1000	S	12/31/2017
JM Manufacturing dba JM Eagle	JM EAGLE HP401B PE3608	73	1600	S*	12/31/2017
JM Manufacturing dba JM Eagle	JM EAGLE HP401B PE3608	140	800	S	12/31/2017
JM Manufacturing dba JM Eagle	JM Eagle PE 3608 Pressure Pipe 7	73	1600	S*	12/31/2014
JM Manufacturing dba JM Eagle	JM Eagle PE 3608 Pressure Pipe 7	140	800	S	12/31/2014
JM Manufacturing dba JM Eagle	J-M PE GREY PRESSURE PIPE	73	1600	S	12/31/2016
JM Manufacturing dba JM Eagle	J-M PE GREY PRESSURE PIPE	140	630	S	12/31/2016
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-1	73	1600	S*	12/31/2017
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-1	140	800	S	12/31/2017
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-3	73	1600	S*	12/31/2014
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-3	140	800	S	12/31/2014
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-4	73	1600	S*	12/31/2013
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-4	140	800	S	12/31/2013
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-5	73	1600	S*	12/31/2017
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-5	140	1000	S	12/31/2017
KWH Pipe	SCLAIRPIPE HD-2007-BK	73	1600	S*	12/31/2017
KWH Pipe	SCLAIRPIPE HD-2007-BK	140	800	S	12/31/2017
KWH Pipe	SCLAIRPIPE K44-06-123	73	1600	S*	12/31/2017
KWH Pipe	SCLAIRPIPE K44-06-123	140	1000	S	12/31/2017
KWH Pipe	SCLAIRPIPE K44-08-123	73	1600	S*	12/31/2017
KWH Pipe	SCLAIRPIPE K44-08-123	140	1000	S	12/31/2017
KWH Pipe	SCLAIRPIPE K44-15-123	73	1600	S*	12/31/2016
KWH Pipe	SCLAIRPIPE K44-15-123	140	800	S	12/31/2016
National Pipe and Plastics	National PED	73	1600	S*	12/31/2013
National Pipe and Plastics	National PED	140	800	S	12/31/2013
National Pipe and Plastics	National PEF	73	1600	S*	12/31/2014
National Pipe and Plastics	National PEF	140	800	S	12/31/2014
National Pipe and Plastics	National PEFG	73	1600	S*	12/31/2014
National Pipe and Plastics	National PEFG	140	800	S	12/31/2014
National Pipe and Plastics	National PETL	73	1600	S*	12/31/2017
National Pipe and Plastics	National PETL	140	800	S	12/31/2017

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
NuMex Plastics	NUMEX PE3408 DL 02	73	1600	S*	12/31/2017
NuMex Plastics	NUMEX PE3408 DL 02	140	1000	S	12/31/2017
Oil Creek Plastics	AQUA BLUE	73	1600	S	12/31/2017
Oil Creek Plastics	AQUA-JET 15	73	1600	S*	12/31/2016
Oil Creek Plastics	AQUA-JET 15	140	800	S	12/31/2016
Poly Technology	Blue Ultra	73	1600	E-8	12/31/2013
Poly Technology	Poly Technology	73	1600	S*	12/31/2016
Poly Technology	Poly Technology	140	800	S	12/31/2016
Poly Technology	Poly Technology-N	73	1600	S*	12/31/2017
Poly Technology	Poly Technology-N	140	800	S	12/31/2017
Poly Technology	Ultra Clear	73	1600	E-8	12/31/2013
Polytubes	PT-H34	73	1600	S*	12/31/2017
Polytubes	PT-H34	140	800	S	12/31/2017
Silver-Line Plastics	Sil-O-Flex 220	73	1600	S*	12/31/2014
Silver-Line Plastics	Sil-O-Flex 220	140	800	S	12/31/2014
Silver-Line Plastics	Sil-O-Flex 441	73	1600	S*	12/31/2016
Silver-Line Plastics	Sil-O-Flex 441	140	800	S	12/31/2016
Silver-Line Plastics	ULTRA-PURE 2	73	1600	E-8	12/31/2013
Teel Plastics, Inc.	PE3608	73	1600	S*	12/31/2017
Teel Plastics, Inc.	PE3608	140	1000	S	12/31/2017
Teel Plastics, Inc.	Teel Plastics PE 3608 Pressure Pipe	73	1600	S*	12/31/2016
Teel Plastics, Inc.	Teel Plastics PE 3608 Pressure Pipe	140	800	S	12/31/2016
Trinus Pipes & Tubes Ltd.	TR-3	73	1600	S*	12/31/2017
Versaprofiles Products Inc	Versablue PW TP	73	1600	S*	12/31/2017
Versaprofiles Products Inc	Versablue PW TP	140	800	S	12/31/2017
Versaprofiles Products Inc	Versapipe HD80 BLK TP	73	1600	S*	12/31/2017
Versaprofiles Products Inc	Versapipe HD80 BLK TP	140	800	S	12/31/2017
Versaprofiles Products Inc	Versapipe HD80 NAT TP	73	1600	S*	12/31/2017
Versaprofiles Products Inc	Versapipe HD80 NAT TP	140	800	S	12/31/2017
KWH Pipe	SCLAIRPIPE DGDB-2480 BK3408	73	1600	S*	12/31/2013
KWH Pipe	SCLAIRPIPE DGDB-2480 BK3408	140	800	S	12/31/2013

2. Independent Listings – PE 3608

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Dow Chemical Company	DGDB 2480 BK	73	1600	S*	12/31/2013
Dow Chemical Company	DGDB 2480 BK	140	800	S	12/31/2013
Dow Chemical Company	DGDB 2480 BL	73	1600	S	12/31/2016
Dow Chemical Company	DGDB 2480 NT	73	1600	S	12/31/2014
Formosa Plastics Corporation	HP4306/AS4642	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4306/AS4642	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4306/AS4692	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4306/AS4692	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4306/MDPE-535-42	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4306/MDPE-535-42	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4306/PO2048 Gray	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4306/PO2048 Gray	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4306/PO2107	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4306/PO2107	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4306/PO2116	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4306/PO2116	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4306/PO2608 Blue	73	1600	S	12/31/2014
Formosa Plastics Corporation	HP4306/PO2608 Blue	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4401/AS4642	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4401/AS4642	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4401/AS4692	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4401/AS4692	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4401/MDPE-535-42	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4401/MDPE-535-42	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4401/PO2107	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4401/PO2107	140	800	S	12/31/2014
Formosa Plastics Corporation	HP4401/PO2116	73	1600	S*	12/31/2014
Formosa Plastics Corporation	HP4401/PO2116	140	800	S	12/31/2014
INEOS Olefins & Polymers USA	K44-06-123	73	1600	S*	12/31/2017
INEOS Olefins & Polymers USA	K44-06-123	140	1000	S	12/31/2017
INEOS Olefins & Polymers USA	K44-08-123	73	1600	S*	12/31/2017
INEOS Olefins & Polymers USA	K44-08-123	140	1000	S	12/31/2017
INEOS Olefins & Polymers USA	K44-15-122	73	1600	S	12/31/2013
INEOS Olefins & Polymers USA	K44-15-123	73	1600	S*	12/31/2016
INEOS Olefins & Polymers USA	K44-15-123	140	800	S	12/31/2016
INEOS Olefins & Polymers USA	K44-15-186	73	1600	E-8	12/31/2013
NOVA Chemicals Ltd	NOVAPOL HD-2007-H BLACK	73	1600	S*	12/31/2017
NOVA Chemicals Ltd	NOVAPOL HD-2007-H BLACK	140	800	S	12/31/2017
Total Petrochemicals USA	HDPE HP401N	73	1600	S*	12/31/2017
Total Petrochemicals USA	HDPE HP401N	140	800	S	12/31/2017
Total Petrochemicals USA	HDPE HP401N/BLK	73	1600	S*	12/31/2017
Total Petrochemicals USA	HDPE HP401N/BLK	140	800	S	12/31/2017
Total Petrochemicals USA	HDPE HP401N/BLUE	73	1600	S*	12/31/2017
Total Petrochemicals USA	HDPE HP401N/BLUE	140	800	S	12/31/2017
Total Petrochemicals USA	HDPE HP401N/Grey	73	1600	S*	12/31/2017
Total Petrochemicals USA	HDPE HP401N/Grey	140	800	S	12/31/2017

TABLE I.A.9. - PE 3708 MATERIALS[1]

The following materials carry a recommended HDB of 1600 psi and a maximum recommended HDS of 800 psi at 73°F (23°C) for water. These materials also meet the requirements for a PE 3408 as per ASTM D3350-02a. (*) - Indicates the material meets policy in TR-3 and ASTM D2837/D2513 requirement for substantiation. Stress rupture data confirm that the 73°F (23°C) regression is linear to 50 years.

1. Dependent Listings – PE 3708

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PE 3708

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Borealis AB	BorSafe HE3470-LS	73	1250	S	12/31/2016

TABLE I.A.10 - PE 3710 MATERIALS[1]

The following materials carry a recommended HDB of 1600 psi and qualify for a 0.63 design factor to establish a maximum recommended HDS of 1000 psi at 73°F (23°C) for water. These materials also meet the requirements for a PE 3408 as per ASTM D3350-02a. (*) - Indicates the material meets policy in TR-3 and ASTM D2837/D2513 requirement for substantiation. Stress rupture data confirm that the 73°F (23°C) regression is linear to 50 years.

1. Dependent Listings – PE 3710

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PE 3710

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

TABLE I.A.11- PE 4608 MATERIALS[1]

The following materials carry a recommended HDB of 1600 psi and a maximum recommended HDS of 800 psi at 73° (23°C) for water. These materials also meet the requirements for PE 3408 as per ASTM D3350-02a. (*) – Indicates the material meets policy in TR-3 and ASTM D2837/D2513 requirement for substantiation. Stress rupture data confirm that the 73° (23°C) regression is linear to 50 years.

1. Dependent Listings – PE 4608

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Advanced Drainage Systems	Polyflex (5)	73	1600	S*	12/31/2013
Advanced Drainage Systems	Polyflex (5)	140	1000	S	12/31/2013
Advanced Drainage Systems	Polyflex (7)	73	1600	S	12/31/2016
Charter Plastics	L5008/2139 Black	73	1600	S*	12/31/2013
Charter Plastics	L5008/2139 Black	140	1000	S	12/31/2013
Flying W Plastics	FL 110	73	1600	S*	12/31/2013
Flying W Plastics	FL 110	140	1000	S	12/31/2013
Industrial Pipe Fittings	IPF L5008-Black	73	1600	S*	12/31/2013
Industrial Pipe Fittings	IPF L5008-Black	140	1000	S	12/31/2013
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-6	73	1600	S*	12/31/2013
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-6	140	1000	S	12/31/2013

2. Independent Listings – PE 4608

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Equistar Chemicals, LP	ALATHON L5008 Black	73	1600	S*	12/31/2013
Equistar Chemicals, LP	ALATHON L5008 Black	140	1000	S	12/31/2013
Equistar Chemicals, LP	ALATHON L5008U-Blue	73	1600	S	12/31/2016
Equistar Chemicals, LP	ALATHON L5008U-Lavender	73	1600	S	12/31/2016

TABLE I.A.12 - PE 4708 MATERIALS[1]

The following materials carry a recommended HDB of 1600 psi and a maximum recommended HDS of 800 psi at 73°F (23°C) for water. These materials also meet the requirements for a PE 3408 as per ASTM D3350-02a. (*) - Indicates the material meets policy in TR-3 and ASTM D2837/D2513 requirement for substantiation. Stress rupture data confirm that the 73°F (23°C) regression is linear to 50 years.

1. Dependent Listings – PE 4708

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PE 4708

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Chevron Phillips Chemical	MARLEX H525 BK2	73	1600	S	12/31/2014

TABLE I.A.13 - PE 4710 MATERIALS[1]

The following materials carry a recommended HDB of 1600 psi and qualify for a 0.63 design factor to establish a maximum recommended HDS of 1000 psi at 73°F (23°C) for water. These materials also meet the requirements for a PE 3408 as per ASTM D3350-02a. (*) - Indicates the material meets policy in TR-3 and ASTM D2837/D2513 requirement for substantiation. Stress rupture data confirm that the 73°F (23°C) regression is linear to 50 years.

1. Dependent Listings – PE 4710

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Advanced Drainage Systems	ADS PolyFlex (4)	73	1600	E-10*	12/31/2013
Advanced Drainage Systems	ADS PolyFlex (4)	140	1000	E-6	12/31/2013
Advanced Drainage Systems	Polyflex (6)	73	1600	S*	12/31/2013
Blue Diamond Industries	BDID-4710	73	1600	S*	12/30/2015
Blue Diamond Industries	BDID-4710	140	1000	S	12/30/2015
Blue Diamond Industries	BDII 4710	73	1600	S*	12/31/2016
Blue Diamond Industries	BDII 4710	140	1000	S	12/31/2016
Centennial Plastics	PE4710 CENFUSE	73	1600	S*	12/31/2016
Centennial Plastics	PE4710 CENFUSE	140	1000	S	12/31/2016
Charter Plastics	A2490/F0092	73	1600	S*	12/31/2015
Charter Plastics	A2490/F0092	140	1000	S	12/30/2015
Charter Plastics	Charter Black L-1 HDPE	73	1600	S*	12/31/2017
Charter Plastics	Charter Black L-1 HDPE	140	1000	S	12/31/2017
Charter Plastics	H525/2107	73	1600	S*	12/31/2017
Charter Plastics	H525/2107	140	1000	S	12/31/2017
Charter Plastics	TUB121/BLK	73	1600	S*	12/31/2016
Charter Plastics	TUB121/BLK	140	1000	S	12/31/2016
Charter Plastics	XT10N/2139	73	1600	S*	12/31/2016
Charter Plastics	XT10N/2139	140	1000	S	12/31/2016
Charter Plastics	XT10N/2478	73	1600	E-10*	12/31/2013
Charter Plastics	XT10N/2478	140	1000	E-10	12/31/2013
Charter Plastics	XT10N/2978	73	1600	E-10*	12/31/2013
Charter Plastics	XT10N/2978	140	1000	E-10	12/31/2013
Co-Ex Pipe Co.	CO-FLEX(T)	73	1600	S*	12/31/2017
Co-Ex Pipe Co.	CO-FLEX(T)	140	1000	S	12/31/2017
Duraline Corporation	PolyPipe B-50-A	73	1600	S*	12/31/2017
Duraline Corporation	PolyPipe B-50-A	140	1000	S	12/31/2017
Duraline Corporation	PolyPipe B-50-B	73	1600	S*	12/31/2013
Duraline Corporation	PolyPipe B-50-B	140	800	S	12/31/2013
Duraline Corporation	PolyPipe B-50-C	73	1600	S*	12/31/2013
Duraline Corporation	PolyPipe B-50-C	140	1000	S	12/31/2013
Duraline Corporation	PolyPipe B-50-D	73	1600	S*	12/31/2013
Duraline Corporation	PolyPipe B-50-D	140	1000	S	12/31/2013
Duraline Corporation	PolyPipe B-50-E	73	1600	S*	12/31/2015
Duraline Corporation	PolyPipe B-50-E	140	1000	S	12/31/2015
Duraline Corporation	PolyPipe B-50-F	73	1600	S*	12/31/2016
Duraline Corporation	PolyPipe B-50-F	140	1000	S	12/31/2016
Duraline Corporation	PolyPipe B-50-G	73	1600	S*	12/31/2016
Duraline Corporation	PolyPipe B-50-G	140	1000	S	12/31/2016
Duraline Corporation	PolyPipe B-50-H	73	1600	S	12/31/2017

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Duraline Corporation	PolyPipe B-50-H	140	1000	S	12/31/2017
Duraline Corporation	PolyPipe B-50-J	73	1600	S	12/31/2015
Duraline Corporation	PolyPipe B-50-J	140	1000	S	12/31/2015
Duraline Corporation	PolyPipe B-50-K	73	1600	S*	12/31/2015
Duraline Corporation	PolyPipe B-50-K	140	1000	S	12/31/2015
Duraline Corporation	PolyPipe B-50-L	73	1600	S*	12/30/2015
Duraline Corporation	PolyPipe B-50-L	140	1000	S	12/30/2015
Duraline Corporation	PolyPipe B-50-M	73	1600	S	12/31/2013
Duraline Corporation	PolyPipe B-50-M	140	1000	S	12/31/2013
Duraline Corporation	PolyPipe G-50-A	73	1600	S*	12/31/2013
Duraline Corporation	PolyPipe G-50-A	140	800	S	12/31/2013
Endot Industries	ENDOT EID-100	73	1600	S*	12/31/2015
Endot Industries	ENDOT EID-100	140	1000	S	12/31/2015
Endot Industries	ENDOT EID-80	73	1600	S*	12/31/2013
Endot Industries	ENDOT EID-80	140	1000	S	12/31/2013
Endot Industries	ENDOT END-80	73	1600	E-4*	12/31/2013
Endot Industries	INE47B121	73	1600	S*	12/31/2016
Endot Industries	INE47B121	140	1000	S	12/31/2016
Extrumex	Tuberia Extrupak PE4710	73	1600	S*	12/31/2013
Extrumex	Tuberia Extrupak PE4710	140	1000	S	12/31/2013
Flint Global Poly	GP47-A	73	1600	S*	12/31/2017
Flint Global Poly	GP47-A	140	1000	S	12/31/2017
Flint Global Poly	GP47-B	73	1600	S*	12/31/2016
Flint Global Poly	GP47-B	140	1000	S	12/31/2016
Flint Global Poly	GP-47D	73	1600	S*	12/31/2015
Flint Global Poly	GP-47D	140	1000	S	12/31/2015
Flint Global Poly	GP-47L	73	1600	S*	12/31/2013
Flint Global Poly	GP-47L	140	1000	S	12/31/2013
Flint Global Poly	GPD2-4710	73	1600	S	12/30/2015
Flint Global Poly	GPD2-4710	140	1000	S	12/30/2015
Flint Global Poly	GPD-4710	73	1600	S*	12/31/2015
Flint Global Poly	GPD-4710	140	1000	S	12/31/2015
Flying W Plastics	FL 210	73	1600	S*	12/31/2017
Flying W Plastics	FL 210	140	1000	S	12/31/2017
Flying W Plastics	FT210	73	1600	S*	12/31/2017
Flying W Plastics	FT210	140	1000	S	12/31/2017
Flying W Plastics	SW210	73	1600	S*	12/31/2016
Flying W Plastics	SW210	140	1000	S	12/31/2016
Georg Fischer Central Plastics	DESIGN FLOW 347	73	1600	S	12/31/2015
Georg Fischer Central Plastics	DESIGN FLOW 347	140	1000	S	12/31/2015
Georg Fischer Central Plastics	DESIGN FLOW 348	73	1600	S*	12/31/2015
Georg Fischer Central Plastics	DESIGN FLOW 348	140	1000	S	12/31/2015
Georg Fischer Central Plastics	DESIGN FLOW 349	73	1600	S	12/31/2017
Georg Fischer Central Plastics	DESIGN FLOW 349	140	1000	S	12/31/2017
Georg Fischer Central Plastics	DESIGN FLOW 350	73	1600	S*	12/31/2015
Georg Fischer Central Plastics	DESIGN FLOW 350	140	1000	S	12/31/2015
Improved Piping Products, Inc	IPP PE4710 BK	73	1600	S*	12/31/2015
Improved Piping Products, Inc	IPP PE4710 BK	140	1000	S	12/31/2015
Industrial Pipe Fittings	IPF L4904-Black	73	1600	S	12/31/2017

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Industrial Pipe Fittings	IPF L4904-Black	140	1000	S	12/31/2017
International Pipe	IPT	73	1600	S*	12/31/2016
International Pipe	IPT	140	1000	S	12/31/2016
Interstate Plastics	INTERSTATE PE4710 DL 01	73	1600	S*	12/31/2016
Interstate Plastics	INTERSTATE PE4710 DL 01	140	1000	S	12/31/2016
IPEX Inc.	HDPE IF21	73	1600	S*	12/31/2016
IPEX Inc.	HDPE IF21	140	1000	S	12/31/2016
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe	73	1600	S*	12/31/2015
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe	140	1000	S	12/31/2015
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe 2	73	1600	S	12/30/2015
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe 2	73	1600	S*	12/31/2015
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe 3	73	1600	S*	12/31/2015
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe 3	140	1000	S	12/31/2015
JM Manufacturing dba JM Eagle	JM EAGLE PE4710 XT10N-BLACK	73	1600	S*	12/31/2017
JM Manufacturing dba JM Eagle	JM EAGLE PE4710 XT10N-BLACK	140	1000	S	12/31/2017
JM Manufacturing dba JM Eagle	JM Eagle PE4710/PE100 Pressure Pipe 4	73	1600	S*	12/31/2017
JM Manufacturing dba JM Eagle	JM Eagle PE4710/PE100 Pressure Pipe 4	140	1000	S	12/31/2017
JM Manufacturing dba JM Eagle	JMM PE 4710 Pressure Pipe	73	1600	S*	12/31/2016
JM Manufacturing dba JM Eagle	JMM PE 4710 Pressure Pipe	140	1000	S	12/31/2016
KWH Pipe	SCLAIRPIPE DGDA-2490 BK 100	73	1600	S*	12/31/2015
KWH Pipe	SCLAIRPIPE DGDA-2490 BK 100	140	1000	S	12/31/2015
KWH Pipe	SCLAIRPIPE DGDA-2492 BK	73	1600	S*	12/31/2015
KWH Pipe	SCLAIRPIPE DGDA-2492 BK	140	1000	S	12/31/2015
KWH Pipe	Sclairpipe DGDC-2482 BK	73	1600	S*	12/31/2015
KWH Pipe	Sclairpipe DGDC-2482 BK	140	1000	S	12/31/2015
KWH Pipe	SCLAIRPIPE L4904-Black	73	1600	S*	12/31/2017
KWH Pipe	SCLAIRPIPE L4904-Black	140	1000	S	12/31/2017
KWH Pipe	SCLAIRPIPE L5008HP-Black	73	1600	S*	12/31/2013
KWH Pipe	SCLAIRPIPE L5008HP-Black	140	1000	S	12/31/2013
KWH Pipe	Sclairpipe TUB121	73	1600	S*	12/31/2016
KWH Pipe	Sclairpipe TUB121	140	1000	S	12/31/2016
KWH Pipe	SCLAIRPIPE XT10N-Black	73	1600	S*	12/31/2016
KWH Pipe	SCLAIRPIPE XT10N-Black	140	1000	S	12/31/2016
Mercury Plastics Inc	Merflex Geothermal	73	1600	S*	12/31/2013
Mercury Plastics Inc	Merflex Geothermal	140	1000	S	12/31/2013
National Pipe and Plastics	National PEDGDC-2480	73	1600	S	12/30/2013
National Pipe and Plastics	National PEDGDC-2480	140	1000	S	12/30/2013
National Pipe and Plastics	National PETLXT	73	1600	S*	12/31/2017
National Pipe and Plastics	National PETLXT	140	1000	S	12/31/2017
NuMex Plastics	NuMex PE4710 DL 01	73	1600	S*	12/31/2016
NuMex Plastics	NuMex PE4710 DL 01	140	1000	S	12/31/2016
Oil Creek Plastics	Aqua-Jet 100A	73	1600	E-6*	12/31/2013
Oil Creek Plastics	Aqua-Jet 100A	140	1000	E-6	12/31/2013
Oil Creek Plastics	Aqua-Jet 100B	73	1600	E-10*	12/31/2013
Oil Creek Plastics	Aqua-Jet 100B	140	1000	E-6	12/31/2013
Oil Creek Plastics	Aqua-Jet 100C	73	1600	S*	12/31/2015
Oil Creek Plastics	Aqua-Jet 100C	140	1000	S	12/31/2015
Oil Creek Plastics	Aqua-Jet 121	73	1600	S	12/30/2016
Oil Creek Plastics	Aqua-Jet 121	140	1000	S	12/30/2016

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Oil Creek Plastics	AQUA-PERT	73	1600	E-10*	12/31/2013
Oil Creek Plastics	AQUA-PERT	180	800	E-10	12/31/2013
Performance Pipe Division	PP/9346 Grey	73	1600	S*	12/31/2013
Performance Pipe Division	PP/9346 Grey	140	800	S	12/31/2013
Performance Pipe Division	PP/DOW 2490 BL	73	1600	E-10*	12/31/2013
Performance Pipe Division	PP/DOW 2490 BL	140	1000	E-6	12/31/2013
Performance Pipe Division	PP/Dow2492	73	1600	S*	12/31/2015
Performance Pipe Division	PP/Dow2492	140	1000	S	12/31/2015
Performance Pipe Division	PP/H516HP BK	73	1600	S*	12/31/2015
Performance Pipe Division	PP/H516HP BK	140	1000	S	12/31/2015
Performance Pipe Division	PP/H525 Grey	73	1600	S	12/31/2014
Performance Pipe Division	PP/H525 Grey	140	1000	S	12/31/2014
Performance Pipe Division	PP/TUB 121	73	1600	S*	12/31/2016
Performance Pipe Division	PP/TUB 121	140	1000	S	12/31/2016
Performance Pipe Division	PP/XT10N Blue	73	1600	E-10*	12/31/2013
Performance Pipe Division	PP/XT10N Blue	140	1000	E-10	12/31/2013
Performance Pipe Division	PP47C1	73	1600	S*	12/31/2017
Performance Pipe Division	PP47C1	140	1000	S	12/31/2017
Performance Pipe Division	PP47C3	73	1600	S*	12/31/2013
Performance Pipe Division	PP47C3	140	1000	S	12/31/2013
Performance Pipe Division	PP47D1	73	1600	S*	12/31/2015
Performance Pipe Division	PP47D1	140	1000	S	12/31/2015
Performance Pipe Division	PP47E4	73	1600	S*	12/31/2017
Performance Pipe Division	PP47E4	140	1000	S	12/31/2017
Performance Pipe Division	PP47T2	73	1600	S*	12/31/2017
Performance Pipe Division	PP47T2	140	1000	S	12/31/2017
Pipeline Plastics, LLC	PLP A-1	73	1600	S*	12/31/2017
Pipeline Plastics, LLC	PLP A-1	140	1000	S	12/31/2017
Pipeline Plastics, LLC	PLP B-1	73	1600	S*	12/31/2013
Pipeline Plastics, LLC	PLP B-1	140	1000	S	12/31/2013
Pipeline Plastics, LLC	PLP C-1	73	1600	S	12/30/2016
Pipeline Plastics, LLC	PLP C-1	140	1000	S	12/30/2016
Pipeline Plastics, LLC	PLP D-1	73	1600	S*	12/31/2017
Pipeline Plastics, LLC	PLP D-1	140	1000	S	12/31/2017
Poly Technology	Blue Geothermal	73	1600	E-2*	12/31/2013
Poly Technology	Blue Ultra	73	1600	E-2*	12/31/2013
Poly Technology	Poly Technology	73	1600	S*	12/31/2016
Poly Technology	Poly Technology	140	1000	S	12/31/2016
Poly Technology	Poly Technology-EQ/Black	73	1600	S*	12/31/2013
Poly Technology	Poly Technology-EQ/Black	140	1000	S	12/31/2013
Polytubes	PT D247	73	1600	S*	12/31/2015
Polytubes	PT D247	140	1000	S	12/31/2015
Polytubes	PT T47	73	1600	S*	12/31/2017
Polytubes	PT T47	140	1000	S	12/31/2017
Silver-Line Plastics	Ultra Pure	73	1600	E-2*	12/31/2013
Silver-Line Plastics	Ultra Pure	140	1000	E-2	12/31/2013
Superlon Plastics	SAMMIX 47L	73	1600	S*	12/31/2017
Superlon Plastics	Sammix 47TBK	73	1600	S*	12/31/2017
Superlon Plastics	Sammix 47TBL	73	1600	E-10*	12/31/2013

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Superlon Plastics	Sammix 47TN	73	1600	E-10*	12/31/2013
Teel Plastics, Inc.	PE4170 Pressure Pipe	140	1000	S	12/31/2015
Teel Plastics, Inc.	PE4710 Pressure Pipe	73	1600	S*	12/31/2015
Trinus Pipes & Tubes Ltd.	TR-5	73	1600	S*	12/31/2017
Trinus Pipes & Tubes Ltd.	TR-5	140	1000	S	12/31/2017
United Poly Systems	UPS7473-1	73	1600	S	12/30/2017
United Poly Systems	UPS7473-1	140	1000	S	12/30/2017
United Poly Systems	UPS7473-2	73	1600	S*	12/31/2016
United Poly Systems	UPS7473-2	140	1000	S	12/31/2016
United Poly Systems	UPS7473-3	73	1600	S*	12/31/2017
United Poly Systems	UPS7473-3	140	1000	S	12/31/2017
Vanguard Pipe & Fittings Ltd.	Bruiser	73	1600	S*	12/31/2013
Vanguard Pipe & Fittings Ltd.	Bruiser	140	1000	S	12/31/2013
Viega LLC	Viega PE A-Black	73	1600	S*	12/31/2013
Viega LLC	Viega PE A-Black	140	1000	S	12/31/2013
WL Plastics	WL Plastics C1	73	1600	S*	12/31/2017
WL Plastics	WL Plastics C1	140	1000	S	12/31/2017
WL Plastics	WL Plastics C2	73	1600	S*	12/31/2013
WL Plastics	WL Plastics C2	140	800	S	12/31/2013
WL Plastics	WL Plastics D3	73	1600	S*	12/31/2015
WL Plastics	WL Plastics D3	140	1000	S	12/31/2015
WL Plastics	WL Plastics E2	73	1600	S*	12/31/2013
WL Plastics	WL Plastics E2	140	1000	S	12/31/2013
WL Plastics	WL Plastics E3	73	1600	S*	12/31/2017
WL Plastics	WL Plastics E3	140	1000	S	12/31/2017
WL Plastics	WL Plastics S5	73	1600	S*	12/31/2016
WL Plastics	WL Plastics S5	140	1000	S	12/31/2016
WL Plastics	WL Plastics T2	73	1600	S*	12/31/2017
WL Plastics	WL Plastics T2	140	1000	S	12/31/2017

2. Independent Listings – PE 4710

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Borealis AB	BorSafe HE3490-LS	73	1600	S	12/31/2016
Chevron Phillips Chemical	MARLEX 9346 BK2	73	1600	S*	12/31/2013
Chevron Phillips Chemical	MARLEX 9346 BK2	140	1000	S	12/31/2013
Chevron Phillips Chemical	MARLEX H516	73	1600	S*	12/31/2016
Chevron Phillips Chemical	MARLEX H516	140	1000	S	12/31/2016
Chevron Phillips Chemical	MARLEX H516C	73	1600	S*	12/31/2015
Chevron Phillips Chemical	MARLEX H516C	140	1000	S	12/31/2015
Chevron Phillips Chemical	MARLEX H516HP BK	73	1600	S*	12/31/2015
Chevron Phillips Chemical	MARLEX H516HP BK	140	1000	S	12/31/2015
Chevron Phillips Chemical	MARLEX H516HPY	73	1600	S*	12/31/2015
Chevron Phillips Chemical	MARLEX H516HPY	140	1000	S	12/31/2015
Chevron Phillips Chemical	MARLEX H525 BK	73	1600	S*	12/31/2017
Chevron Phillips Chemical	MARLEX H525 BK	140	1000	S	12/31/2017
Chevron Phillips Chemical	MARLEX HP132 BK	73	1600	S*	12/31/2015
Chevron Phillips Chemical	MARLEX HP132 BK	140	1000	S	12/31/2015

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Chevron Phillips Chemical	MARLEX HP132C	73	1600	S*	12/31/2015
Chevron Phillips Chemical	MARLEX HP132C	140	1000	S	12/31/2015
Dow Chemical Company	CONTINUUM DGDA 2490 BK	73	1600	S	12/31/2015
Dow Chemical Company	CONTINUUM DGDA 2490 BK	140	1000	S	12/31/2015
Dow Chemical Company	CONTINUUM DGDA 2490 BL	73	1600	E-10*	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2490 BL	140	1000	E-6	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2490 GN	73	1600	E-10*	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2490 GN	140	1000	E-6	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2490 NT	73	1600	E-6*	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2490 NT	140	1000	E-6	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2490 YL	73	1600	E-10*	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2490 YL	140	1000	E-6	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2492 BK	73	1600	S*	12/31/2015
Dow Chemical Company	CONTINUUM DGDA 2492 BK	140	1000	S	12/31/2015
Dow Chemical Company	CONTINUUM DGDC 2480 BK	73	1600	S	12/31/2013
Dow Chemical Company	CONTINUUM DGDC 2480 BK	140	1000	S	12/31/2013
Dow Chemical Company	CONTINUUM DGDC 2480 NT	73	1600	E-4*	12/31/2013
Dow Chemical Company	CONTINUUM DGDC 2482 BK	73	1600	S*	12/31/2015
Dow Chemical Company	CONTINUUM DGDC 2482 BK	140	1000	S	12/31/2015
Dow Chemical Company	CONTINUUM DGDD 2480 BK	73	1600	S*	12/31/2013
Dow Chemical Company	CONTINUUM DGDD 2480 BK	140	1000	S	12/31/2013
Dow Chemical Company	HYPERTHERM 2399 NT	73	1600	E-10*	12/31/2013
Dow Chemical Company	HYPERTHERM 2399 NT	180	800	E-10	12/31/2013
Dow Chemical Company	INTREPID 2499 NT	73	1600	E-10*	12/31/2013
Dow Chemical Company	INTREPID 2499 NT	180	800	E-10*	12/31/2013
Dow Chemical Company	PE-RT XDGDA-2399	73	1600	E-10*	12/31/2013
Dow Chemical Company	PE-RT XDGDA-2399	180	800	E-10	12/31/2013
Equistar Chemicals, LP	ALATHON L4904 Black	73	1600	S	12/31/2017
Equistar Chemicals, LP	ALATHON L4904 Black	140	1000	S	12/31/2017
Equistar Chemicals, LP	ALATHON L4904 Grey	73	1600	S*	12/31/2017
Equistar Chemicals, LP	ALATHON L4904 Grey	140	1000	S	12/31/2017
Equistar Chemicals, LP	ALATHON L5008HP Black	73	1600	S*	12/31/2013
Equistar Chemicals, LP	ALATHON L5008HP Black	140	1000	S	12/31/2013
INEOS Olefins & Polymers USA	TUB 121	73	1600	S*	12/31/2016
INEOS Olefins & Polymers USA	TUB 121	140	1000	S	12/31/2016
INEOS Olefins & Polymers USA	TUB 124	73	1600	E-2*	12/31/2013
INEOS Olefins & Polymers USA	TUB 124	140	1000	E-2	12/31/2013
Saudi Arabian Basic Corp. (SABIC)	P6006N	73	1600	E-2*	12/31/2013
Saudi Arabian Basic Corp. (SABIC)	P6006N	140	1000	E-2	12/31/2013
Saudi Arabian Basic Corp. (SABIC)	P6006N / IPBK010A	73	1600	E-2	12/31/2013
Saudi Arabian Basic Corp. (SABIC)	P6006N / IPBK010A	140	1000	E-2	12/31/2013
Saudi Arabian Basic Corp. (SABIC)	P6006N / PE-535-42	73	1600	E-2	12/31/2013
Saudi Arabian Basic Corp. (SABIC)	P6006N / PE-535-42	140	1000	E-2	12/31/2013
Total Petrochemicals USA	HDPE XS10 B	73	1600	S*	12/31/2014
Total Petrochemicals USA	HDPE XS10 B	140	1000	S	12/31/2014
Total Petrochemicals USA	HDPE XT10 N/BLK	73	1600	S*	12/31/2017
Total Petrochemicals USA	HDPE XT10 N/BLK	140	1000	S	12/31/2017
Total Petrochemicals USA	HDPE XT10N (natural)	73	1600	E-10*	12/31/2013
Total Petrochemicals USA	HDPE XT10N (natural)	140	1000	E-10	12/31/2013

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Total Petrochemicals USA	HDPE XT10N/Blue	73	1600	E-10*	12/31/2013
Total Petrochemicals USA	HDPE XT10N/Blue	140	1000	E-10	12/31/2013
Total Petrochemicals USA	HDPE XT10N/UV	73	1600	E-10*	12/31/2013
Total Petrochemicals USA	HDPE XT10N/UV	140	1000	E-10	12/31/2013

TABLE I.A.14A - PEX 0006 MATERIALS[1]

The following materials carry a recommended HDB of 1,250 psi and a maximum recommended HDS of 630 psi at 73°F (23°C) for water.The first digit is for chlorine resistance tested in accordance with ASTM F 2023. A digit “0” indicates it does not meet this requirement or it has not been tested.

1. Dependent Listings – PEX 0006

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
John Guest Limited	SPEEDFIT	73	1250	S	12/31/2016
John Guest Limited	SPEEDFIT	180	800	S	12/31/2016
John Guest Limited	SPEEDFIT	200	630	S	12/31/2016
Uponor	AQUAPEX PLUS	73	1250	S	12/31/2016
Uponor	AQUAPEX PLUS	180	800	S	12/31/2016
Uponor	AQUAPEX PLUS	200	630	S	12/31/2016
Uponor	FLEXPEX	73	1250	S	12/31/2016
Uponor	FLEXPEX	180	800	S	12/31/2016
Uponor	FLEXPEX	200	400	S	12/31/2016
Uponor	hePEXplus	73	1250	S	12/31/2016
Uponor	hePEXplus	180	800	S	12/31/2016
Uponor	hePEXplus	200	630	S	12/31/2016
Uponor	TuffPEX	73	1250	S	12/31/2016
Uponor	TuffPEX	180	800	S	12/31/2016
Uponor	TuffPEX	200	630	S	12/31/2016
Watts Water Technologies	WaterPEX/Plumbflow	73	1250	S	12/31/2015
Watts Water Technologies	WaterPEX/Plumbflow	180	800	S	12/31/2015
Watts Water Technologies	WaterPEX/Plumbflow	200	630	S	12/31/2015
Watts Water Technologies	WaterPEX/Radientflow	73	1250	S	12/31/2015
Watts Water Technologies	WaterPEX/Radientflow	180	800	S	12/31/2015
Watts Water Technologies	WaterPEX/Radientflow	200	630	S	12/31/2015

2. Independent Listings – PEX 0006

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
HeatLink Group	HeatLink	73	1250	S	12/31/2015
HeatLink Group	HeatLink	180	800	S	12/31/2015
Mercury Plastics Inc	MERFLEXPEX -1	73	1250	S	12/31/2013
Mercury Plastics Inc	MERFLEXPEX -1	180	800	S	12/31/2013
Mercury Plastics Inc	MERFLEXPEX -1	200	630	S	12/31/2013
NIBCO	DURA-PEX	73	1250	S	12/31/2016
NIBCO	DURA-PEX	180	800	S	12/31/2016
Padanaplast S.P.A.	POLIDAN T/A PEX	73	1250	S	12/31/2016
Padanaplast S.P.A.	POLIDAN T/A PEX	180	800	S	12/31/2016
Padanaplast S.P.A.	POLIDAN T/A PEX	200	630	S	12/31/2016
Padanaplast S.P.A.	POLIDAN T/A-HF PEX	73	1250	S	12/31/2016
Padanaplast S.P.A.	POLIDAN T/A-HF PEX	180	800	S	12/31/2016
Padanaplast S.P.A.	POLIDAN T/A-HF PEX	200	630	S	12/31/2016
REHAU Inc	RAUTHERM FW	73	1250	E-10	12/31/2013
REHAU Inc	RAUTHERM FW	180	800	E-10	12/31/2013
REHAU Inc	RAUTHERM FW	200	630	E-10	12/31/2013
Roth Industries	ROTH PEX	73	1250	S	12/31/2016
Roth Industries	ROTH PEX	180	800	S	12/31/2016
Roth Industries	ROTH PEX	200	630	S	12/31/2016
Safelink Systems	MR PEX	73	1250	S	12/31/2013
Safelink Systems	MR PEX	180	800	S	12/31/2013
Safelink Systems	MR PEX	200	630	S	12/31/2013
Silon Compounds	TA 1108 HD/TA 2361 HD (orange)	73	1250	S	12/31/2016
Silon Compounds	TA 1108 HD/TA 2361 HD (orange)	180	800	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2114 HD (natural)	73	1250	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2114 HD (natural)	180	800	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2342 HD (green)	73	1250	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2342 HD (green)	180	800	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2343 HD (black)	73	1250	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2343 HD (black)	180	800	S	12/31/2016
Silon Compounds	TA 1117 HD/TABOREX TA 2125 HD	73	1250	E-10	12/31/2013
Silon Compounds	TA 1117 HD/TABOREX TA 2125 HD	180	800	E-10	12/31/2013
Silon Compounds	TA 1117 HD/TABOREX TA 2125 HD	200	630	E-16	12/31/2013
Uponor	hePEX	73	1250	S	12/31/2016
Uponor	hePEX	180	800	S	12/31/2016
Uponor	hePEX	200	630	S	12/31/2016
Viega LLC	ProFlex	73	1250	S	12/31/2017
Viega LLC	ProFlex	180	800	S	12/31/2017
Viega LLC	ProFlex	200	630	S	12/31/2017
Viega LLC	ProFlex (black)	73	1250	S	12/31/2017
Viega LLC	ProFlex (black)	180	800	S	12/31/2017
Viega LLC	ProFlex (black)	200	630	S	12/31/2017
Viega LLC	ProFlex (natural)	73	1250	S	12/31/2016
Viega LLC	ProFlex (natural)	180	800	S	12/31/2016
Viega LLC	ProFlex (natural)	200	630	S	12/31/2016
Zurn PEX Plumbing	Zurn PEX 5	73	1250	E-10	12/31/2013

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Zurn PEX Plumbing	Zurn PEX 5	180	800	E-10	12/31/2013
Zurn PEX Plumbing	Zurn PEX 5	200	630	E-10	12/31/2013

TABLE I.A.14B - PEX 1006 MATERIALS[1]

The following materials carry a recommended HDB of 1,250 psi and a maximum recommended HDS of 630 psi at 73°F (23°C) for water.The first digit is for chlorine resistance tested in accordance with ASTM F 2023. A digit “1” indicates the PEX tubing has been tested and meets the F 876 requirement for minimum chlorine resistance at the end use condition of 25% at 140°F (60°C) and 75% at 73°F (23°C). A digit “0” indicates it does not meet this requirement or it has not been tested.

1. Dependent Listings – PEX 1006

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
JM Manufacturing dba JM Eagle	JM Manufacturing EverPEX	73	1250	S	12/31/2016
JM Manufacturing dba JM Eagle	JM Manufacturing EverPEX	180	800	S	12/31/2016
Silver-Line Plastics	Sil-O-PEX	73	1250	S	12/31/2013
Silver-Line Plastics	Sil-O-PEX	180	800	S	12/31/2013
Silver-Line Plastics	Sil-O-PEX	200	630	S	12/31/2013
THC Tecnologia Hidraulica	Flair-PEX	73	1250	S	12/31/2016
THC Tecnologia Hidraulica	Flair-PEX	180	800	S	12/31/2016
Viega LLC	A-1001LT	73	1250	S	12/31/2015
Viega LLC	A-1001LT	180	800	S	12/31/2015
Viega LLC	A-1001LT	200	630	S	12/31/2015
Viega LLC	A-PEX EXTRA	73	1250	S	12/31/2013
Viega LLC	A-PEX EXTRA	180	800	S	12/31/2013
Viega LLC	A-PEX EXTRA	200	630	S	12/31/2015
Watts Water Technologies	PLUMBFLOW	73	1250	S	12/31/2016
Watts Water Technologies	PLUMBFLOW	180	800	S	12/31/2016
Watts Water Technologies	RADIANTFLOW	73	1250	S	12/31/2016
Watts Water Technologies	RADIANTFLOW	180	800	S	12/31/2016

2. Independent Listings – PEX 1006

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
AEI Compounds	SX734/CM488	73	1250	S	12/31/2016
AEI Compounds	SX734/CM488	180	800	S	12/31/2016
AEI Compounds	SX734/CM488	200	630	S	12/31/2016
REHAU Inc	REHAU RAUPEX Oxygen Barrier	73	1250	S	12/31/2014
REHAU Inc	REHAU RAUPEX Oxygen Barrier	180	800	S	12/31/2014
REHAU Inc	REHAU RAUPEX Oxygen Barrier	200	630	S	12/31/2014
Silon Compounds	TA 1108 HD/TABOREX TA 2125 HD (natural)	73	1250	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2125 HD (natural)	180	800	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2321 HD (red)	73	1250	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2321 HD (red)	180	800	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2322 HD (blue)	73	1250	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2322 HD (blue)	180	800	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2323 HD (white)	73	1250	S	12/31/2016
Silon Compounds	TA 1108 HD/TABOREX TA 2323 HD (white)	180	800	S	12/31/2016
Zurn PEX Plumbing	QESTPEX-3	73	1250	S	12/31/2013
Zurn PEX Plumbing	QESTPEX-3	180	800	S	12/31/2013
Zurn PEX Plumbing	QESTPEX-3	200	630	S	12/31/2013

TABLE I.A.14C - PEX 3006 MATERIALS[1]

The following materials carry a recommended HDB of 1,250 psi and a maximum recommended HDS of 630 psi at 73°F (23°C) for water.The first digit is for chlorine resistance tested in accordance with ASTM F 2023. A digit “3” indicates the PEX tubing has been tested and meets the F 876 requirement for minimum chlorine resistance at the end use condition of 50% at 140°F (60°C) and 50% at 73°F (23°C).

1. Dependent Listings – PEX 3006

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PEX 3006

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
REHAU Inc	REHAU Municipex	73	1250	S	12/31/2014
REHAU Inc	REHAU Municipex	180	800	S	12/31/2014
REHAU Inc	REHAU Municipex	200	630	S	12/31/2014
REHAU Inc	REHAU RAUPEX	73	1250	S	12/31/2014
REHAU Inc	REHAU RAUPEX	180	800	S	12/31/2014
REHAU Inc	REHAU RAUPEX	200	630	S	12/31/2014
REHAU Inc	REHAU RAUPEX Red/Blue UV-Shield	73	1250	S	12/31/2014
REHAU Inc	REHAU RAUPEX Red/Blue UV-Shield	180	800	S	12/31/2014
REHAU Inc	REHAU RAUPEX Red/Blue UV-Shield	200	630	S	12/31/2014

TABLE I.A.14D - PEX 3008 MATERIALS[1]

The following materials carry a recommended HDB of 1600 psi and a maximum recommended HDS of 800 psi at 73°F (23°C) for water. The first digit is for chlorine resistance tested in accordance with ASTM F 2023. A digit “3” indicates the PEX tubing has been tested and meets the F 876 requirement for minimum chlorine resistance at the end use condition of 50% at 140°F (60°C) and 50% at 73°F (23°C).

1. Dependent Listings – PEX 3008

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PEX 3008

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
NIBCO	NIBCO PEX	73	1600	E-8*	12/31/2013
NIBCO	NIBCO PEX	180	800	E-10	12/31/2013
NIBCO	NIBCO PEX	200	630	E-8	12/31/2013

TABLE I.A.14E - PEX 5006 MATERIALS[1]

The following materials carry a recommended HDB of 1,250 psi and a maximum recommended HDS of 630 psi at 73°F (23°C) for water.The first digit is for chlorine resistance tested in accordance with ASTM F 2023. A digit “5” indicates the PEX tubing has been tested and meets the F 876 requirement for minimum chlorine resistance at the end use condition of 100% at 140°F (60°C).

1. Dependent Listings – PEX 5006

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Bow Plastics LTD	BOWPEX-3	73	1250	S	12/31/2015
Bow Plastics LTD	BOWPEX-3	180	800	S	12/31/2015
Bow Plastics LTD	BOWPEX-4 Black	73	1250	S	12/31/2013
Bow Plastics LTD	BOWPEX-4 Black	180	800	S	12/31/2013
Bow Plastics LTD	BOWPEX-4 Blue	73	1250	S	12/31/2013
Bow Plastics LTD	BOWPEX-4 Blue	180	800	S	12/31/2013
Bow Plastics LTD	BOWPEX-4 Red	73	1250	S	12/31/2013
Bow Plastics LTD	BOWPEX-4 Red	180	800	S	12/31/2013
Bow Plastics LTD	BOWPEX-4 White	73	1250	S	12/31/2013
Bow Plastics LTD	BOWPEX-4 White	180	800	S	12/31/2013
Bow Plastics LTD	BOWPEX-5 Natural	73	1250	S	12/31/2014
Bow Plastics LTD	BOWPEX-5 Natural	180	800	S	12/31/2014
Bow Plastics LTD	Oxypex-1	73	1250	S	12/31/2017
Bow Plastics LTD	Oxypex-1	180	800	E-16	12/31/2013
Cash Acme	SharkBite PEX	73	1250	S	12/31/2015
Cash Acme	SharkBite PEX	180	800	S	12/31/2015
Cash Acme	SharkBite PEX	200	630	S	12/31/2015
HeatLink Group	PureLink Plus	73	1250	S	12/31/2014
HeatLink Group	PureLink Plus	180	800	S	12/31/2014
HeatLink Group	PureLink Reclaimed	73	1250	S	12/31/2014
HeatLink Group	PureLink Reclaimed	180	800	S	12/31/2014
HeatLink Group	SureLink	73	1250	S	12/31/2014
HeatLink Group	SureLink	180	800	S	12/31/2014
IPEX Inc.	IPEX-P	73	1250	S	12/31/2015
IPEX Inc.	IPEX-P	180	800	S	12/31/2015
IPEX Inc.	IPEX-P	200	630	S	12/31/2015
Rifeng Enterprise Co Ltd	RIFENG PEX	73	1250	S	12/31/2016
Rifeng Enterprise Co Ltd	RIFENG PEX	180	800	S	12/31/2016
Watts Water Technologies	Heating PEX	73	1250	S	12/31/2015
Watts Water Technologies	Heating PEX	180	800	S	12/31/2015
Watts Water Technologies	Heating PEX	200	630	S	12/31/2015
Watts Water Technologies	RadiantPEX+	73	1250	S	12/31/2015
Watts Water Technologies	RadiantPEX+	180	800	S	12/31/2015
Watts Water Technologies	RadiantPEX+	200	630	S	12/31/2015
Watts Water Technologies	RadiantPEX-2	73	1250	S	12/31/2015
Watts Water Technologies	RadiantPEX-2	180	800	S	12/31/2015
Watts Water Technologies	RadiantPEX-2	200	630	S	12/31/2015
Watts Water Technologies	WaterPEX-2	73	1250	S	12/31/2015
Watts Water Technologies	WaterPEX-2	180	800	S	12/31/2015
Watts Water Technologies	WaterPEX-2	200	630	S	12/31/2015

2. Independent Listings – PEX 5006

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Borealis AB	BorPEX HE1878E-C2	73	1250	S	12/31/2014
Borealis AB	BorPEX HE1878E-C2	180	800	S	12/31/2014
Equistar Chemicals, LP	Lupolen 4261 A Q 416	73	1250	S	12/31/2015
Equistar Chemicals, LP	Lupolen 4261 A Q 416	180	800	S	12/31/2015
Equistar Chemicals, LP	Lupolen 4261 A Q 416	200	630	S	12/31/2015
Hyundai Engineering Plastics	Polylink XP650 (Natural)	73	1250	S	12/31/2017
Hyundai Engineering Plastics	Polylink XP650 (Natural)	180	800	E-16	12/31/2013
Saco Polymers	Pexidan L/T	73	1250	S	12/31/2015
Saco Polymers	Pexidan L/T	180	800	S	12/31/2015
Saco Polymers	Pexidan L/T	200	630	S	12/31/2015
Saco Polymers	Pexidan L/T Eclipse	73	1250	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse	180	800	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse	200	630	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Black	73	1250	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Black	180	800	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Black	200	630	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Blue	73	1250	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Blue	180	800	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Blue	200	630	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Red	73	1250	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Red	180	800	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse Red	200	630	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse White	73	1250	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse White	180	800	S	12/31/2013
Saco Polymers	Pexidan L/T Eclipse White	200	630	S	12/31/2013
Silon Compounds	TA 1108 HD/TA 2420 CL (Natural)	73	1250	S	12/31/2014
Silon Compounds	TA 1108 HD/TA 2420 CL (Natural)	180	800	S	12/31/2014
Silon Compounds	TA 1108 HD/TA 2420 CL (Natural)	200	630	S	12/31/2014

TABLE I.A.14F - PEX 5106 MATERIALS[1]

The following materials carry a recommended HDB of 1250 psi and a maximum recommended HDS of 630 psi at 73°F (23C) for water. The first digit is for chlorine resistance tested in accordance with ASTM F2023. A digit “5” indicates the PEX tubing has been tested and meets the F876 requirement for minimum chlorine resistance at the end use condition of 100% at 140°F (60°C). The second digit indicates the UV resistance as per ASTM F876. The digit “1” indicates a minimumÂ month UV exposure resistance.

1. Dependent Listings – PEX 5106

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PEX 5106

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Uponor	AQUAPEX	73	1250	S	12/31/2016
Uponor	AQUAPEX	180	800	S	12/31/2016
Uponor	AQUAPEX	200	630	S	12/31/2016

TABLE I.A.14G - PEX 5206 MATERIALS[1]

The following materials carry a recommended HDB of 1250 psi and a maximum recommended HDS of 630 psi at 73°F (23C) for water. The first digit is for chlorine resistance tested in accordance with ASTM F2023. A digit “5” indicates the PEX tubing has been tested and meets the F876 requirement for minimum chlorine resistance at the end use condition of 100% at 140°F (60°C). The second digit indicates the UV resistance as per ASTM F876. The digit “2” indicates a minimum 3 month UV exposure resistance.

1. Dependent Listings – PEX 5206

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PEX 5206

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Saco Polymers	Pexidan L/T-UV Red	73	1250	S	12/31/2013
Saco Polymers	Pexidan L/T-UV Red	180	800	S	12/31/2013
Saco Polymers	Pexidan L/T-UV Red	200	630	S	12/31/2013
Saco Polymers	Pexidan L/T-UV White	73	1250	S	12/31/2013
Saco Polymers	Pexidan L/T-UV White	180	800	S	12/31/2013
Saco Polymers	Pexidan L/T-UV White	200	630	S	12/31/2013

TABLE I.A.14H - PEX 5306 MATERIALS[1]

The following materials carry a recommended HDB of 1250 psi and a maximum recommended HDS of 630 psi at 73°F (23C) for water. The first digit is for chlorine resistance tested in accordance with ASTM F2023. A digit “5” indicates the PEX tubing has been tested and meets the F876 requirement for minimum chlorine resistance at the end use condition of 100% at 140°F (60°C). The second digit indicates the UV resistance as per ASTM F876. The digit “3” indicates a minimum 6 month UV exposure resistance.

1. Dependent Listings – PEX 5306

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Bow Plastics LTD	BOWPEX-5 Blue	73	1250	S*	12/31/2014
Bow Plastics LTD	BOWPEX-5 Blue	180	800	S	12/31/2014
Bow Plastics LTD	BOWPEX-5 Red	73	1250	S	12/31/2014
Bow Plastics LTD	BOWPEX-5 Red	180	800	S	12/31/2014
Bow Plastics LTD	BOWPEX-5 White	73	1250	S*	12/31/2014
Bow Plastics LTD	BOWPEX-5 White	180	800	S*	12/31/2014

2. Independent Listings – PEX 5306

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Silon Compounds	TA 1108 HD/TA 2410 CL (Red)	73	1250	S	12/31/2014
Silon Compounds	TA 1108 HD/TA 2410 CL (Red)	180	800	S*	12/31/2014
Silon Compounds	TA 1108 HD/TA 2410 CL (Red)	200	630	S*	12/31/2014
Silon Compounds	TA 1108 HD/TA 2411 CL (Blue)	73	1250	S	12/31/2014
Silon Compounds	TA 1108 HD/TA 2411 CL (Blue)	180	800	S	12/31/2014
Silon Compounds	TA 1108 HD/TA 2411 CL (Blue)	200	630	S	12/31/2014
Silon Compounds	TA 1108 HD/TA 2412 CL (White)	73	1250	S	12/31/2014
Silon Compounds	TA 1108 HD/TA 2412 CL (White)	180	800	S*	12/31/2014
Silon Compounds	TA 1108 HD/TA 2412 CL (White)	200	630	S*	12/31/2014

TABLE I.A.15 - PEX 0008 MATERIALS[1]

The following materials carry a recommended HDB of 1600 psi and a maximum recommended HDS of 800 psi at 73°F (23C) for water. The first digit is for chlorine resistance tested in accordance with ASTM F 2023. A digit “0” indicates it does not meet this requirement or it has not been tested.

1. Dependent Listings – PEX 0008

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PEX 0008

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
John Guest Limited	MS-PEX-E-2-W	73	1600	S	12/31/2017
John Guest Limited	MS-PEX-E-2-W	180	800	S	12/31/2017
John Guest Limited	MS-PEX-E-2-W	200	630	S	12/31/2017

TABLE I.A.17A - PA 32312 MATERIALS[1]

The following materials carry a recommended HDB of 2500 psi and a maximum recommended HDS of 1250 psi at 73°F (23°C) for water.

1. Dependent Listings – PA 32312

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PA 32312

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Arkema	Rilsan 11	73	2500	S	12/31/2013

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Arkema	Rilsan 11	140	1600	S	12/31/2013
Arkema	Rilsan 11	180	1250	S	12/31/2013

TABLE I.A.17B - PA 32316 MATERIALS[1]

The following materials carry a recommended HDB of 3150 psi and a maximum recommended HDS of 1600 psi at 73°F (23°C) for water.

1. Dependent Listings – PA 32316

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PA 32316

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Arkema	Rilsan R11P250 (BESHV)	73	3150	S	12/31/2014
Arkema	Rilsan R11P250 (BESHV)	180	1600	S	12/31/2014

TABLE I.A.18 - PA 42316 MATERIALS[1]

The following materials carry a recommended HDB of 3150 psi and a maximum recommended HDS of 1600 psi at 73°F (23°C) for water.

1. Dependent Listings – PA 42316

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

2. Independent Listings – PA 42316

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Evonik Degussa	VESTAMID PA12	73	3150	S	12/31/2013
Evonik Degussa	VESTAMID PA12	140	2000	S	12/31/2013
UBE America	UBESTA 3035	73	3150	S	12/31/2016
UBE America	UBESTA 3035	140	2000	S	12/31/2016
UBE America	UBESTA 3035	180	1600	S	12/31/2016

TABLE I.A.19 - PVDF 2016 MATERIALS[1]

The following materials carry a recommended HDB of 3150 psi and a maximum recommended HDS of 1600 psi at 73°F (23°C) for water.

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date

TABLE I.A.20 - PVDF 2020 MATERIALS[1]

The following materials carry a recommended HDB of 4000 psi and a maximum recommended HDS of 2000 psi at 73°F (23°C) for water.

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Arkema	KYNAR 1000	73	4000	S	12/31/2014
Arkema	KYNAR 1000	200	1250	S	12/31/2014
Arkema	KYNAR 740	73	4000	S	12/31/2014
Arkema	KYNAR 740	200	1250	S	12/31/2014

TABLE I.A.21 - PVDF 2025 MATERIALS[1]

The following materials carry a recommended HDB of 5000 psi and a maximum recommended HDS of 2500 psi at 73°F (23°C) for water.

Company Name	Material Designation	Temp °F	HDB (psi)	Grade	Expiration Date
Solvay Solexis	SOLEF 1010	73	5000	S	12/31/2016
Solvay Solexis	SOLEF 1010	248	1250	S	12/31/2016
Solvay Solexis	SOLEF 1010	284	800	S	12/31/2016

SECTION I

PART B – THESE MATERIALS MAY BE USED FOR MOLDING APPLICATIONS ONLY

TABLE I.B.1

Materials with recommended hydrostatic design basis (HDB) at 73°F (23°C) that have been established in accordance with TR-3 using:

Molded Specimens

Company Name	Material Designation	Designation Code	Temp °F	HDB (psi)	Grade	Expiration Date
PolyOne	GEON 87431	PVC 1120	73	4000	S	12/31/2016
PolyOne	GEON M1200/M3200	PVC 2116	73	3200	S	12/31/2016

TABLE I.B.2

Materials with recommended hydrostatic design basis (HDB) at 73°F(23°C) that have been established in accordance with TR-3 using:

Extruded Pipe Specimens intended for molding applications

Company Name	Material Designation	Designation Code	Temp °F	HDB (psi)	Grade	Expiration Date
		Extruded Pipe Specimens				

TABLE I.B.3

Materials with recommended strength design basis (SDB) at 73°F(23°C) that have been established in accordance with TR-3 using:

Molded Plaque Specimens

Company Name	Material Designation	Designation Code	Temp °F	SDB (psi)	Grade	Expiration Date
JM Manufacturing dba JM Eagle	UAC-MFPA1	PA 12116	73	3150	S	12/31/2014
Georg Fischer Central Plastics	GFCP-MNLN	PA012M40	73	4000	S	12/31/2016

SECTION II

PIPES WITH PPI RECOMMENDED PRESSURE DESIGN BASIS (PDB) AND MAXIMUM PRESSURE RATINGS (PR) ESTABLISHED IN ACCORDANCE WITH PPI TR-3 (ASTM D 2837).

This Section lists recommendations for the Pressure Design Basis (PDB) for composite pipes and pipes of multilayer construction consisting essentially of two layers of thermoplastic material that sandwich a thin layer of metallic reinforcement. Because the longer-term strength of pipes of such construction is determined not only by the properties of each of the materials used but also by the specific combination of materials and layer thicknesses, this Section differs from Section I in two important respects:

- The long-term strength recommendations are presented in terms of a *pressure design basis* (PDB) which represents the pipe's estimated long-term hydrostatic *pressure* strength; and
- Each PDB recommendation is specific to the particular wall construction and pipe diameter that are represented by the data upon which the PDB recommendation was established.

The PDB is the categorized estimated long-term hydrostatic pressure strength of a pipe. The procedures for the estimating of the long-term hydrostatic pressure strength, and for its categorization into preferred values, are the same as those used in Section I for the establishing of a material's hydrostatic design basis (HDB).

The *maximum* pipe pressure ratings (PR's) are obtained by multiplying the PDB by a 0.5 design factor. The design factor is intended to take into consideration all the variables and degree of safety involved on a particular application. The 0.5 value is without consideration to conditions such as aggressive environments, cyclic stressing, localized stress concentrations, and temperature fluctuations which were not present in the testing of the pipes but which could significantly affect long-term durability. Smaller design factors (effectively, larger safety factors) should be considered to compensate for conditions not adequately represented by the test protocol upon which the PDB's have been established. The pipe manufacturer, appropriate pipe standards and codes, and relevant technical information should be consulted for guidance.

The PDB's listed in this Section have been developed under the same PPI TR-3 protocol as is used for the establishing of the HDB's that are listed in Section I of this report. The use of this protocol, including the use of ASTM method D 2837, was deemed as appropriate for each of the listed pipe constructions because their pressure versus time-to-rupture behavior exhibits the same kind of regression with duration of loading as is exhibited by thermoplastic pipes of homogenous wall construction. The Hydrostatic Stress Board excludes wall constructions that cannot be evaluated and analyzed in accordance with ASTM D 2837 from consideration.

Experimental listings are also allowed.

There are indications that the long-term strength of a pipe of multilayer construction could be expressed as some function of the tensile strength properties and relative thickness of each of the separate material layers (Reference #1 and #2). Should this be confirmed for any of the listed material combinations, then the recommended strength for each such combination will be reported in terms of a material strength (i.e., and HDB), rather than a pipe strength (a PDB).

Reference #1 – Frank Furno, A New Concept in Plastics Piping, Proceedings of the Eleventh Plastic Fuel Gas Pipe Symposium (October 1989, San Francisco, CA), American Gas Association.

Reference #2 – Jeremy Bowman, The Influence of Time and Temperature on the Strength of Multilayered Pressure Pipe, Plastics Pipe VII Proceedings (September, 1992, Koningshof, The Netherlands) The Plastics and Rubber Institute.

TABLE II.A.1

Multi-layer/Composite pipes with recommended pressure design basis (PDB) that have been established in accordance with TR-3.

Company Name	Pipe Designation	Material Designation	Temp °F	PDB (psig)	Grade	Expiration Date
IPEX Inc.	PE/AL/PE	IPEX PE-AL-PE (1/2, 5/8, 3/4, 1")	73	400	S	12/31/2016
IPEX Inc.	PE/AL/PE	IPEX PE-AL-PE (1/2, 5/8, 3/4, 1")	140	200	S	12/31/2016
IPEX Inc.	PE/AL/PE	IPEX PE-AL-PE [PE-RT] (1/2, 5/8, 3/4, 1")	73	400	S	12/31/2016
IPEX Inc.	PE/AL/PE	IPEX PE-AL-PE [PE-RT] (1/2, 5/8, 3/4, 1")	180	200	S	12/31/2016
Uponor Rohrsysteme	PEX-AL-PEX	UPONOR PEX-AL-PEX (16,20,25,32mm)	73	400	S	12/31/2017
Uponor Rohrsysteme	PEX-AL-PEX	UPONOR PEX-AL-PEX (16,20,25,32mm)	140	320	S	12/31/2017
Uponor Rohrsysteme	PEX-AL-PEX	UPONOR PEX-AL-PEX (16,20,25,32mm)	180	250	S	12/31/2017
Uponor Rohrsysteme	PEX-AL-PEX	UPONOR PEX-AL-PEX (16,20,25,32mm)	200	200	S	12/31/2017
Rifeng Enterprise Co Ltd	PEX/AL/PEX	RIFENG PEX-AL-PEX (1/2", 5/8", 3/4", 1")	73	500	S	12/31/2017
Rifeng Enterprise Co Ltd	PEX/AL/PEX	RIFENG PEX-AL-PEX (1/2", 5/8", 3/4", 1")	200	250	S	12/31/2017
Westfalische Rohrwerke	PERT/AL/PERT	WRW PERT-AL-PERT (1/2", 5/8", 3/4", 1")	73	400	S	12/31/2017
Westfalische Rohrwerke	PERT/AL/PERT	WRW PERT-AL-PERT (1/2", 5/8", 3/4", 1")	140	315	S	12/31/2017
Westfalische Rohrwerke	PERT/AL/PERT	WRW PERT-AL-PERT (1/2", 5/8", 3/4", 1")	200	200	S	12/31/2017

SECTION III

MATERIALS WITH PPI RECOMMENDED MINIMUM REQUIRED STRENGTH (MRS) AND CATEGORIZED REQUIRED STRENGTH (CRS) ESTABLISHED IN ACCORDANCE WITH ISO 9080 AND ISO 12162.

For classification purposes, the MRS is determined using ISO 9080 and the ISO 12162 standard conditions of 20°C (68°F). The CRS (θ, t) is the Categorized Required Strength value of σ_{lpl} determined and categorized for the selected temperature (θ) and required time (t) in accordance with ISO 9080 using the 3 or 4 coefficient stress rupture/time equation. These CRS (θ, t) values are listed in Table III.B.1. This current listing approach is under review by the Hydrostatic Stress Board.

The reader is advised that the MRS and CRS(θ, t) values listed in TR-4 represent an approximation of the likelihood that pipe specimens produced from these materials will not fail when placed in service and utilized in conjunction with the appropriate design coefficients. HDB values as determined in accordance with TR-3 policies include a stress reduction factor (design factor) to arrive at a recommended HDS. MRS and CRS(θ, t) designations, as determined in accordance with ISO 9080, do not include any stress reduction factors (design coefficients) that are required prior to its application for an intended service. As such, it is the responsibility of the design engineer to determine the appropriate design coefficients for the particular application when using MRS and CRS(θ, t). The reader is advised to consult the owner of the material designation for specifics regarding interpretation or use of the MRS and CRS(θ, t) values listed in TR-4.

TABLE III.A.1 - PE 80 MATERIALS

The following materials have a recommended MRS of 8.0 MPa (1160 psi) at 20°C (68°F).

1. Dependent Listings – PE 80

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
IPEX Inc.	HDPE Water Pressure Pipe	20	8	S	12/31/2016

2. Independent Listings – PE 80

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Borealis AB	BorSafe HE3470-LS	20	8	S	12/31/2016
Borealis AB	BorSafe ME3440	20	8	S	12/31/2016
Borealis AB	BorSafe ME3441	20	8	S	12/31/2016
Borealis AB	BorSafe ME3444	20	8	S	12/31/2016
Chevron Phillips Chemical	MARLEX HHM 3802	20	8	S	12/31/2013
Chevron Phillips Chemical	MARLEX TR-418P8B	20	8	S	12/31/2013
Chevron Phillips Chemical	MARLEX TR-418P8C	20	8	S	12/31/2017
Chevron Phillips Chemical	MARLEX TR-480P8B	20	8	S	12/31/2013
Dow Chemical Company	CONTINUUM DGDA 2420 YL	20	8	S	12/31/2017
Dow Chemical Company	CONTINUUM DGDC 2480 BK	20	8	S	12/31/2013
Formosa Plastics Corporation	HP3902 Y	20	8	S	12/31/2017
Formosa Plastics Corporation	HP4401 BK	20	8	S	12/31/2017
INEOS Olefins & Polymers USA	K44-08-123	20	8	S	12/31/2016
INEOS Olefins & Polymers USA	K44-15-123	20	8	S	12/31/2016
IRPC Public Company	POLIMAXX BM3245PC	20	8	S	12/31/2016

TABLE III.A.2 - PE 100 MATERIALS

The following materials have a recommended MRS of 10.0 MPa (1450 psi) at 20°C (68°F).

1. Dependent Listings – PE 100

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Charter Plastics	Charter Black L-1 HDPE	20	10	S	12/31/2017
Duraline Corporation	PolyPipe B-50-E	20	10	S	12/31/2015
Duraline Corporation	PolyPipe B-50-F	20	10	S	12/31/2017
Duraline Corporation	PolyPipe B-50-G	20	10	S	12/31/2015
Duraline Corporation	PolyPipe B-50-H	20	10	S	12/31/2017
Duraline Corporation	PolyPipe B-50-J	20	10	S	12/31/2015
Duraline Corporation	PolyPipe B-50-K	20	10	S	12/31/2015
Endot Industries	ENDOT EID-100	20	10	S	12/31/2015
Endot Industries	INE00B121	20	10	S	12/31/2015
Flint Global Poly	Global-PE-100L	20	10	S	12/31/2017
Flint Global Poly	GPD-100P	20	10	S	12/31/2015
Flint Global Poly	GPD2-100	20	10	S	12/30/2015
Improved Piping Products, Inc	IPP PE4710 BK	20	10	S	12/31/2015
International Pipe	IPT	20	10	S	12/31/2015
IPEX Inc.	HDPE IF21	20	10	S	12/31/2015
JM Manufacturing dba JM Eagle	JM Eagle PE4710/PE100 Pressure Pipe 4	20	10	S	12/31/2017
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE	20	10	S	12/31/2015
KWH Pipe	SCLAIRPIPE DGDA-2490 BK 100	20	10	S	12/31/2015
KWH Pipe	SCLAIRPIPE DGDA-2492 BK	20	10	S	12/31/2015
KWH Pipe	Sclairpipe TUB121	20	10	S	12/31/2015
Performance Pipe Division	PP/Dow2492	20	10	S	12/31/2015
Performance Pipe Division	PP/H516HP BK	20	10	S	12/31/2015
Performance Pipe Division	PP/TUB 121	20	10	S	12/31/2015
Performance Pipe Division	PP47D1	20	10	S	12/31/2015
Performance Pipe Division	PP47T2	20	10	S	12/31/2017
Polytubes	PT D2100	20	10	S	12/31/2015
WL Plastics	WL Plastics D3	20	10	S	12/31/2015
WL Plastics	WL Plastics E3	20	10	S	12/31/2017
WL Plastics	WL Plastics S5	20	10	S	12/31/2015

2. Independent Listings – PE 100

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Borealis AB	BorSafe HE3490-IM	20	10	S	12/31/2013
Borealis AB	BorSafe HE3490-LS	20	10	S	12/31/2016
Chevron Phillips Chemical	MARLEX H516	20	10	S	12/31/2016
Chevron Phillips Chemical	MARLEX H516HP BK	20	10	S	12/31/2015
Chevron Phillips Chemical	MARLEX H524P10F	20	10	S	12/31/2014
Chevron Phillips Chemical	MARLEX H524P10G	20	10	S	12/31/2013
Chevron Phillips Chemical	MARLEX HP132 BK	20	10	S	12/31/2015
Chevron Phillips Chemical	MARLEX HP132C	20	10	S	12/31/2015
Dow Chemical Company	CONTINUUM DGDA 2490 BK	20	10	S	12/31/2015
Dow Chemical Company	CONTINUUM DGDA 2492 BK	20	10	S	12/31/2015

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Equistar Chemicals, LP	ALATHON L4904 Black	20	10	S	12/31/2017
INEOS Olefins & Polymers USA	TUB 121	20	10	S	12/31/2015
IRPC Public Company	POLIMAXX AM3245PC	20	10	S	12/31/2013
Total Petrochemicals USA	HDPE XS10 B	20	10	S	12/31/2014
Total Petrochemicals USA	HDPE XT10 N/BLK	20	10	S	12/31/2017

TABLE III.A.4 - PA 11 160 MATERIALS

The following materials have a recommended MRS of 16.0 MPa (2320 psi) at 20°C (68°F).

1. Dependent Listings – PA11 160

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
		-18	0		

2. Independent Listings – PA11 160

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Arkema	Rilsan 11	20	16	S*	12/31/2015

TABLE III.A.5 – PA11 180 MATERIALS

The following materials have a recommended MRS of 18.0 MPa (2611 psi) at 20°C (68°F).

1. Dependent Listings – PA11 180

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
		-18	0		

2. Independent Listings – PA11 180

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Arkema	Rilsan R11P250 (BESHV)	20	18	S	12/31/2017

TABLE III.A.6 – PA12 180 MATERIALS

The following materials have a recommended MRS of 18.0 MPa (2610 psi) at 20°C (68°F).

1. Dependent Listings – PA12 180

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
		-18	0		

2. Independent Listings – PA12 180

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Evonik Degussa	VESTAMID LX9030 PA12	20	18	S	12/31/2015
UBE America	UBESTA 3035	20	18	S	12/31/2016

TABLE III.B.1 - CRS (Θ, T)

The CRS (θ, t) is the categorized value of the ISO 9080 ?lpl for a material at a temperature of T (°C) and a time of t years, using the extrapolation limits of ISO 9080. This current listing approach is under review by the Hydrostatic Stress Board.The reader is advised that the MRS and CRS(θ, t) values listed in TR-4 represent an approximation of the likelihood that pipe specimens produced from these materials will not fail when placed in service and utilized in conjunction with the appropriate design coefficients. HDB values as determined in accordance with TR-3 policies include a stress reduction factor (design factor) to arrive at a recommended HDS. MRS and CRS(θ, t) designations, as determined in accordance with ISO 9080, do not include any stress reduction factors (design coefficients) that are required prior to its application for an intended service. As such, it is the responsibility of the design engineer to determine the appropriate design coefficients for the particular application when using MRS and CRS(θ, t). The reader is advised to consult the owner of the material designation for specifics regarding interpretation or use of the MRS and CRS(θ, t) values listed in TR-4.

Company	Material	CRS (MPa)	Grade	Expiration Date
		0		
		0		

APPENDIX

List of Manufacturer Contacts

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APPENDIX

PPI Membership

Benefits

8 Reasons to Join the Plastics Pipe Institute

1. **Learn from the Experts – Your Industry Peers!**
   PPI offers unmatched opportunities to learn more about the plastics pipe industry from the experts in your industry – your peers. Learn about best practices, market opportunities, standardization issues, ongoing research and many other areas critical to your company's success.

2. **Input into Industry Positions**
   PPI is recognized as the industry voice before North American and international standards setting organizations, code writing bodies, municipalities and other regulatory agencies. And we regularly provide industry positions to these groups. Help us develop positions that will benefit your interests.

3. **Networking**
   Membership allows you participation in all PPI forums and meetings. At these events, you will meet and learn from your peers in the industry. Our membership includes material and additive suppliers, pipe manufacturers, equipment manufacturers and distributors, giving you access to the complete supply chain. PPI's Spring and Fall meetings are recognized throughout the industry as "must-attends" and are open to members only.

4. **Technical Credibility of PPI and the Use of the PPI Logo**
   PPI is recognized around the world as the technical expert on plastic piping issues. The use of our logos is available to members only, and provides unmatched credibility. Use the logo(s) on your literature, product packaging, website and business cards to show that you are part of the worldwide leader on plastic pipe issues.

5. **Links to Your Company from PPI's Website**
   We provide links to all of our members through our website www.plasticpipe.org. PPI has thousands of visitors monthly, all looking for suppliers of piping products, or information about products. We provide a link for them to quickly get to you.

6. **Services of PPI's Staff**
   Our technical, engineering and marketing staff are ready to answer your questions and help you grow your business. This knowledge base is available to members everyday, and is a benefit we encourage you to use. Call us today!

7. **Discounts on PPI Services & Products**
   PPI members get significant discounts on PPI's products and services, including literature, certification program fees and product listing fees. These products and services will help your business succeed – and at a discount!

8. **50 + Years of Experience**
   PPI was founded in 1950, and through responsible and credible leadership, has established itself as the technical and marketing leader of the industry before a wide variety of stakeholders. Today, PPI is the voice of the plastics piping industry.