

PPI TR-4/2021

HDB/HDS/SDB/PDB/MRS

Listed Materials

**PPI HSB 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**



TABLE OF CONTENTS

FOREWORD	4
SUMMARY OF CHANGES	5
NOTES TO THE READER.....	6
ACRONYMS	9
DEFINITIONS.....	10
COMMON PLASTICS ABBREVIATIONS.....	14
SECTION I	15
PART A - MATERIALS EVALUATED FROM DATA DEVELOPED ON EXTRUDED PIPE SPECIMENS (HDB) - THESE MATERIALS MAY BE USED FOR EITHER EXTRUDED PIPE OR MOLDING APPLICATIONS	15
TABLE I.A.1 – PVC 1120 MATERIALS	17
TABLE I.A.3 – CPVC 4120 MATERIALS.....	19
TABLE I.A.3 – CPVC 4122 MATERIALS.....	21
TABLE I.A.3 – CPVC 23447-22 MATERIALS	23
TABLE I.A.3 – CPVC 23448-20 MATERIALS	23
TABLE I.A.3 – CPVC 23448-22 MATERIALS	23
TABLE I.A.4 – PE 1404 MATERIALS	24
TABLE I.A.4 – PE 2708 MATERIALS	25
TABLE I.A.8 – PE 3608 MATERIALS	27
TABLE I.A.9 – PE 3708 MATERIALS	28
TABLE I.A.11 – PE 4608 MATERIALS	28
TABLE I.A.13 – PE 4710 MATERIALS	28
TABLE I.A.14A – PEX 0006 MATERIALS	38
TABLE I.A.14B.1 – PEX 1006 MATERIALS	39
TABLE I.A.14C.1 – PEX 3006 MATERIALS	40
TABLE I.A.14C.2 – PEX 3206 MATERIALS	40
TABLE I.A.14C.2 – PEX 3306 MATERIALS	41
TABLE I.A.14D.1 – PEX 5006 MATERIALS	42
TABLE I.A.14D.2 – PEX 5106 MATERIALS	42
TABLE I.A.14D.4 – PEX 5306 MATERIALS	43
TABLE I.A.14D.5 – PEX 5308 MATERIALS	45
TABLE I.A.17A - PA 32312 MATERIALS	45
TABLE I.A.17B - PA 32316 MATERIALS	45

TABLE I.A.18 - PA 42316 MATERIALS	46
TABLE I.A.20 - PVDF 2020 MATERIALS.....	46
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	
TABLE I.B.1 – MOLDED SPECIMENS.....	48
TABLE I.B.2 – EXTRUDED PIPE SPECIMENS	48
SECTION II.....	49
PIPES WITH PPI RECOMMENDED PRESSURE DESIGN BASIS (PDB) AND MAXIMUM PRESSURE RATINGS (PR) ESTABLISHED IN ACCORDANCE WITH PPI TR-3 (ASTM D 2837).....	
TABLE II.A.1 – PDB (MULTILAYER).....	51
SECTION III.....	52
MATERIALS WITH PPI RECOMMENDED MINIMUM REQUIRED STRENGTH (MRS) AND CATEGORIZED REQUIRED STRENGTH (CRS) ESTABLISHED IN ACCORDANCE WITH ISO 9080 AND ISO 12162.	
TABLE III.A.1 - PE 80 MATERIALS	53
TABLE III.A.2 - PE 100 MATERIALS	54
TABLE III.A.3 - PE 112 MATERIALS	55
TABLE III.A.5 – PA11 180 MATERIALS	55
TABLE III.A.6 – PA12 180 MATERIALS	56
TABLE III.A.7 - PP 112 MATERIALS	56
TABLE III.A.8 – CRS (θ, t) – POLYETHYLENE MATERIALS	56
TABLE III.A.9 – CRS (θ, t) – POLYPROPYLENE MATERIALS	56
APPENDIX A – Example Request Letters for a PPI HSB listing	57
APPENDIX D – List of Manufacturer Contacts.....	58

FOREWORD

This technical report was developed and published with the technical help of the members of the (Plastics Pipe Institute, Inc.) Hydrostatic Stress Board (PPI HSB). The members have shown their interest in quality products by assisting independent standards-making and user organizations in the development of standards, and also by developing reports on an industry-wide basis to help engineers, code officials, specifying groups, and users.

This report lists thermoplastic piping materials with a PPI HSB 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". Reasonable efforts are made by the PPI HSB to ensure that the required methods, policies, standards and procedures have been followed and that the presented test data are reliable.

This report was prepared by the PPI HSB as a service to the industry. The information in this report is offered in good faith and believed to be accurate at the time of its preparation but is offered "as is" without any express or implied warranty, including **WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE**. Each product manufacturer that lists compositions with the PPI HSB 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.

Additional information may be needed in some areas, especially with regard to unusual or special applications. Consult the manufacturer or material supplier for more detailed information. PPI does not endorse the proprietary products or processes of any manufacturer, and assumes no responsibility for compliance with applicable laws and regulations.

Questions, comments, and problems of interpretation should be referred to the PPI HSB Chair, Plastics Pipe Institute, 105 Decker Court, Suite 825, Irving, TX 75062. Copies of this report, as well as other publications, are available from the PPI website: www.plasticpipe.org.

This report was first published in September 1967. This report was updated June 16, 2021.

© Copyright, The Plastics Pipe Institute, Inc. 2021

SUMMARY OF CHANGES

2020	
Foreword	Editorial revision to bring up-to-date with required PPI language.
Document	Editorial revision of “Chairman of the HSB” to “PPI HSB Chair”.
Table of Contents	Editorial revision of Appendix A: Noted that the manufacturer contact information are now available online. Editorial revision: removed mention of PPI membership.
Definitions	Editorial revision: Formatted the words/terms and definitions, that are in PPI TR-3, in a table.
Section introduction	Editorial revision: The Table of Contents includes a mention of Section I Part A (extruded pipe specimens) and Part B (molded pipe specimens). Added a section introduction for Part B as there are products now listed in PPI TR-4.
Document Title	Editorial revision: Added Categorized Required Strength (CRS) to the document title.
2021	
NOTES TO READER	Editorial revision: Corrected typo “insure” to “ensure”. This harmonizes with the editorial revision made to PPI TR-3/2020.
PPI Logo	Editorial revision: Updated to the PPI logo to the latest version.
Table headers	Editorial revision: Added table headers to the Table of Contents.
Appendix B	Editorial revision: This appendix was formerly labelled D. It is relabeled to Appendix B as PPI TR-3 does not have an Appendix B or C.

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 ensure 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 ensure 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. **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. 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.

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 Group 178 Rexdale Boulevard Etobicoke Ontario Canada M9W 1R3
PPI HSB	PPI 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 or P. O. Box 5059 2600 GB Delft, Netherlands
PPI	Plastics Pipe Institute, Inc. 105 Decker Court, Suite 825 Irving, TX 75062

DEFINITIONS

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	<p>This pipe is defined by the following Groups 1, 2 and 3. NOTE: The regression must have a negative slope.</p> <p>Group 1: Helically Wrapped Reinforced Thermoplastic Pipe (RTP): The case in which the reinforcement elements are applied such that they have the shape or form of a helix (spiral) and additional non-helical elements are acceptable.</p> <p>Group 2: Dispersed Reinforcement: Solid wall pipe with reinforcement dispersed by compounding in the polymer matrix.</p> <p>Group 3: Multilayer (non-helically wrapped): A pressure rated pipe having more than one layer and does not rely exclusively on a reinforcement for its strength.</p> <ul style="list-style-type: none"> i. Barrier: a pipe identified with distinct layers of dissimilar materials such as polymer/metal/polymer (PEX/AL/PEX) or polymer/non-stress rated polymer/polymer (PEX/EVOH/PEX). ii. Reinforced: a pipe identified with distinct layer(s) such as metal mesh, foamed or a layer with dispersed fillers. iii. Coextruded thermoplastic compounds: a pipe identified with distinct layers of thermoplastic compounds such as MDPE with a HDPE, PP with PE, natural plastic with a pigmented layer or others other coextruded structure.
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.
(C)	Design Coefficient - a number greater than 1.00 that takes into consideration the variables and degree of safety involved in a properly installed Thermoplastic pressure piping installation. For purposes of this document, a design coefficient recommended for use with an MRS category is designated C.
(DF)	Design Factor - a number less than 1.00 that takes into consideration the variables and degree of safety involved in a properly installed thermoplastic pressure piping installation. For purposes of this document, a design factor recommended for use with an HDB category is designated DF.
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.
HDS	Hydrostatic Design Stress – the recommended maximum hoop stress that can be applied continuously with a high degree of certainty that failure of the pipe will not occur.
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 <i>LCL</i> expressed as a percentage. This ratio is a measure of <i>LTHS</i> 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.
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. (See Appendix X. 3)
Pressure Rating (PR)	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. $PR = 2 (HDB) \times (\text{design factor}) / (SDR-1)$ <i>where</i> SDR = Standard Dimension Ratio = average outside diameter/ minimum wall thickness Or $PR = (PDB) (\text{design factor})$
Private listing	Manufacturer’s listing that is held privately within PPI and is not published in PPI TR-4.

SDB	<p>Strength Design Basis – one of a series of established stress values (specified in Test Method D2837) 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 F2018, “Standard Test Method for Time-to - Failure of Plastics Using Plane Strain Tensile Specimens.”</p> <p>NOTE: The SDB is used only for a material intended for molding applications. The SDB shall not be used for pipe applications.</p>
Solid Wall Pipe	The pipe wall is composed entirely of a single extruded layer of a single compound
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 D2513 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-3/2011 is the 2011 edition of TR-3, "Policies and Procedures for Developing Hydrostatic Design Basis (HDB), Hydrostatic Design Stresses (HDS), Pressure Design Basis (PDB), Strength Design Basis (SDB), Minimum Required Strength (MRS) Ratings, and Categorized Required Strength (CRS) 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°F (23°C) psi	HDB at 73°F (23°C) psi	ASTM Specification
Polyvinyl Chloride (PVC)			
PVC 1120	2,000	4000	D1784
PVC2116	1,600	3150	“
Chlorinated Polyvinyl Chloride (CPVC)			
CPVC 4120	2,000	4000	F441
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 1404	400	800	“
PE 2406	630	1250	“
PE 4708	800	1600	“
PE 4710	1000	1600	“
Crosslinked Polyethylene (PEX)			
PEX 0006	630	1250	F876
PEX1006	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 21110	1,000	2000	D4181
Polyvinylidene Fluoride (PVDF)			
PVDF 2016	1600	3150	D3222
PVDF 2020	2000	4000	“
PVDF 2025	2500	5000	“
Polyamide (PA)			
PA 32312	1250	2500	D6779
PA 32316	1600	3150	“
PA 42316	1600	3150	“

TABLE I.A.1 - PVC 1120 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Atkore International	CPC 1	73	4000	S	12/30/2021
Aurora Plastics Inc	CSI 1, AKA AP2465ANT1001	73	4000	S	12/30/2021
Charlotte Pipe	CP-110-P	73	4000	S	12/31/2021
Cresline Plastic Pipe Company	CRESLINE 7802	73	4000	S	12/31/2021
Diamond Plastics	DPC-ST1	73	4000	S	12/31/2021
EMMSA	CCM-004-PPI	73	4000	S	12/30/2021
Futura Industrial	COMHIDC900VIR	73	4000	S	12/31/2021
Geon Performance Solutions	GEON E 1353	73	4000	S	12/30/2021
Geon Performance Solutions	GEON E 1354	73	4000	S	12/30/2021
Geon Performance Solutions	GEON E 1356	73	4000	S	12/31/2021
Hebei Quanen High-Tech Piping Company	JM 90-QE	73	4000	S	12/30/2021
IPEX Technologies Inc	S907	73	4000	S	12/31/2021
JM Manufacturing dba JM Eagle	JM SERIES 30	73	4000	S	12/31/2021
JM Manufacturing dba JM Eagle	JMR90	73	4000	S	12/31/2021
K-Bin Inc	KBD-4000	73	4000	S	12/31/2021
NAPCO Pipe & Fittings	NAPCO P	73	4000	S	12/30/2021
NAPCO Pipe & Fittings	NORTH AMERICAN M	73	4000	S	12/30/2021
NAPCO Royal Pipe & Fittings	ROYAL NSF PW	73	4000	S	12/31/2021
National Pipe and Plastics	N/O	73	4000	S	12/31/2021
National Pipe and Plastics	NATIONAL 1185	73	4000	S	12/31/2021
Northern Pipe Products	NPP301R	73	4000	S	12/31/2021
Pacific Plastics	PACIFIC 2600	73	4000	S	12/31/2021
Pipelife Jet Stream Inc. DBA Jet Stream Inc	JS 21085	73	4000	S	12/31/2021
Pipelife Jet Stream Inc. DBA Jet Stream Inc	PL101-OM	73	4000	S	12/31/2021
Sanderson Pipe Corporation	PP1	73	4000	S	12/31/2021
Shoreline Plastics	SLP 1	73	4000	S	12/31/2021
Silver-Line Plastics, LLC	SL-1000	73	4000	S	12/31/2021
Spears Manufacturing	SP1120 PVC	73	4000	S	12/31/2021
Texas United Pipe	U-G-1	73	4000	S	12/31/2021
Vinylplex Inc	VPX	73	4000	S	12/31/2021
Vinyltech Corporation	V1	73	4000	S	12/31/2021
Vulcan Plastics	S-203	73	4000	S	12/31/2021
Westlake Compounds, LLC	Axiall / Georgia Gulf 3152 Gray 434	73	4000	S	12/31/2021
Westlake Compounds, LLC	Axiall / Georgia Gulf 3350 White 125	73	4000	S	12/31/2021

2. Independent Listings – PVC 1120

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Diamond Plastics	DPC B-1	73	4000	S	12/31/2021
Diamond Plastics	DPC B-2	73	4000	S	12/31/2021
Diamond Plastics	DPC B-3	73	4000	S	12/31/2021
Huber Carbonates	Hubercarb G3 PVC 1120	73	4000	E-8	6/30/2021
Huber Carbonates	Hubercarb Q3 PVC 1120	73	4000	E-8	12/31/2021
IPEX Technologies Inc	S1007	73	4000	S	12/31/2021
JM Manufacturing dba JM Eagle	JM SERIES 90	73	4000	S	12/31/2021
NAPCO Pipe & Fittings	NAPCO-30A	73	4000	S	12/31/2021
NAPCO Pipe & Fittings	NAPCO-B4	73	4000	S	12/31/2025
NAPCO Pipe & Fittings	NAPCO-B5	73	4000	S	12/31/2021
Omya North America	Omya PVC 1120 Range Formulation	73	4000	S	12/31/2021
Plastics Pipe Institute	PPI - PVC 1120 Range Formulation	73	4000	S	12/31/2021
Westlake Compounds, LLC	Axiall / Georgia Gulf 3152 White125	73	4000	S	12/31/2025
Westlake Compounds, LLC	Axiall / Georgia Gulf 3401 White 125	73	4000	S	12/31/2025
Westlake Compounds, LLC	Axiall / Georgia Gulf 3450 White125	73	4000	S	12/31/2025
Westlake Compounds, LLC	Axiall / Georgia Gulf CM-2	73	4000	S	12/31/2025

TABLE I.A.3 - CPVC 4120 MATERIALS¹

These 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. Dependent Listings – CPVC 4120

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Alphagary	DUROVIN CPVC-EXT03	73	4000	S	12/31/2021
		180	1000	S	12/31/2021
Geon Performance Solutions	Geon EC900 Tan 3189	73	4000	S	12/30/2021
		180	1250	E-10	12/30/2021
		180	1000	S	12/30/2021
Geon Performance Solutions	Geon EC920 Tan 3189	73	4000	S	12/30/2021
		180	1250	E-10	12/30/2021
		180	1000	S	12/30/2021
Geon Performance Solutions	Geon EC950 Gray 2777	73	4000	S	12/30/2021
		180	1250	E-6	12/30/2021
		180	1000	S	12/30/2021
Spears Manufacturing	Spears SP2300	73	4000	S	12/30/2021
		180	1250	E-10	12/30/2021
		180	1000	S	12/30/2021
Spears Manufacturing	Spears SP2400	73	4000	S	12/30/2021
		180	1250	E-6	12/30/2021
		180	1000	S	12/30/2021
Supreme Industries	CPVC 2001	73	4000	S	12/30/2022
		180	1000	S	12/30/2022
Westlake Compounds, LLC	PROTHERM 4303 GRAY 165	73	4000	S	12/31/2021
		180	1250	E-10	12/31/2021
		180	1000	S	12/31/2021
Westlake Compounds, LLC	PROTHERM 4303 ORANGE 25	73	4000	S	12/31/2021
		180	1250	E-10	12/31/2021
		180	1000	S	12/31/2021
Westlake Compounds, LLC	PROTHERM 4303 TAN 01	73	4000	S	12/31/2021
		180	1250	E-10	12/31/2021
		180	1000	S	12/31/2021
Westlake Compounds, LLC	PROTHERM 4305 GRAY 165	73	4000	S	12/31/2021
		180	1250	E-6	12/31/2021
		180	1000	S	12/31/2021

NOTE1: CPVC 4120 represents the material designation.

2. Independent Listings – CPVC 4120

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Kaneka North America LLC	KANEKA KNK-5003	73	4000	S	12/31/2021

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		180	1250	E-10	12/31/2021
		180	1000	S	12/31/2021
Kaneka North America LLC	KANEKA KNK-5005	73	4000	S	12/31/2021
		180	1250	E-6	12/31/2021
		180	1000	S	12/31/2021
Kaneka North America LLC	KANEKA KNK-5007	73	4000	S	12/31/2021
		180	1000	S	12/31/2021
Kaneka North America LLC	KNK-5003 Almond	73	4000	S	12/31/2021
		180	1250	E-10	12/31/2021
		180	1000	S	12/31/2021
KEM ONE	LUCALOR PEY 792	73	4000	S	6/30/2022
		180	1000	S	6/30/2022
KEM ONE	LUCALOR PEY 795	73	4000	S	6/30/2022
		180	1000	S	6/30/2022
Lubrizol Advanced Materials	TEMPRITE 3105 TAN 309	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Lubrizol Advanced Materials	TempRite 3107 Blue 470	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 3107 PURPLE 795	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Lubrizol Advanced Materials	TEMPRITE 3107 TAN 309	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Lubrizol Advanced Materials	TEMPRITE 3115 TAN 309	73	4000	S	12/31/2025
		180	1250	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 3118 GRAY 245	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Lubrizol Advanced Materials	TEMPRITE 3120 GRAY 245	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 3135 BLUE 470	73	4000	S	12/31/2025
		180	1250	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 3140 GRAY 245	73	4000	S	12/31/2021
		180	1250	S	12/31/2021
Lubrizol Advanced Materials	TempRite 3215 Blue 470	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 3215 TAN 309	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 88610 TAN 309	73	4000	S	12/31/2023
		180	1000	S	12/31/2023
Lubrizol Advanced Materials	TEMPRITE 88615 TAN 309	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 88620 TAN 309	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 88628 GRAY 245A	73	4000	S	12/31/2023
		180	1000	S	12/31/2023
Lubrizol Advanced Materials	TEMPRITE 88628 TAN 309A	73	4000	S	12/31/2023
		180	1000	S	12/31/2023
Lubrizol Advanced Materials	TEMPRITE 88708	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Lubrizol Advanced Materials	TEMPRITE 88709	73	4000	S	12/31/2022

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		180	1000	S	12/31/2022
Lubrizol Advanced Materials	TEMPRITE 88738 ORANGE 734	73	4000	S	12/31/2022
		180	1250	S	12/31/2022
Lubrizol Advanced Materials	TEMPRITE 88756 BLUE 470	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Spears Manufacturing	Spears SP2500 Gray	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Spears Manufacturing	Spears SP2500 Orange	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Spears Manufacturing	Spears SP2500 Tan	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Spears Manufacturing	Spears SP2600 Gray	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Spears Manufacturing	Spears SP2600 Orange	73	4000	S	12/31/2022
		180	1000	S	12/31/2022
Westlake Compounds, LLC	PROTHERM 4345 Gray 165	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Westlake Compounds, LLC	PROTHERM 4345 Orange 25	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Westlake Compounds, LLC	PROTHERM 4345 Tan 01	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Westlake Compounds, LLC	PROTHERM 4353 Gray 165	73	4000	S	12/31/2025
		180	1000	S	12/31/2025
Westlake Compounds, LLC	PROTHERM 4353 Orange 25	73	4000	S	12/31/2025
		180	1000	S	12/31/2025

NOTE1: CPVC 4120 represents the material designation.

TABLE I.A.3 - CPVC 4122 MATERIALS¹

The following materials carry a recommended HDB of 4,500 psi and a maximum recommended HDS of 2,250 psi at 73°F (23°C) for water.

2. Independent Listings – CPVC 4122

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Lubrizol Advanced Materials	TempRite 88616 Gray 245	73	4500	S	12/31/2021
		180	1250	S	12/31/2021
Lubrizol Advanced Materials	TempRite 88616 Tan 309	73	4500	S	12/31/2021
		180	1250	S	12/31/2021

NOTE1: CPVC 4122 represents the material designation.

TABLE I.A.3 - CPVC 23447-20 MATERIALS¹

The following materials carry a recommended HDB of 4,500 psi and a maximum recommended HDS of 2,250 psi at 73F

(23C) for water.

2. Independent Listings – CPVC 23447-20

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Lubrizol Advanced Materials	Temprite 3214 Gray 245	73	4000	E-6	6/30/2021
		180	1000	E-8	6/30/2021

NOTE1: CPVC 23447 represents the cell classification per ASTM D1784-11.

TABLE I.A.3 - CPVC 23447-22 MATERIALS¹

The following materials carry a recommended HDB of 4,500 psi and a maximum recommended HDS of 2,250 psi at 73F (23C) for water.

2. Independent Listings – CPVC 23447-22

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Lubrizol Advanced Materials	TempRite 89307 GRAY 245	73	4500	S	12/31/2022
		180	1250	E-16	12/31/2022
Lubrizol Advanced Materials	TempRite 89307 TAN 309	73	4500	S	12/31/2022
		180	1250	E-16	12/31/2022

NOTE1: CPVC 23447 represents the cell classification per ASTM D1784-11.

TABLE I.A.3 - CPVC 23448-20 MATERIALS¹

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

2. Independent Listings – CPVC 23448-20

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Lubrizol Advanced Materials	TempRite 88619 Tan 309	73F	4000	S	12/31/2022
		180F	1250	S	12/31/2022

NOTE1: CPVC 23448 represents the cell classification per ASTM D1784-11.

TABLE I.A.3 - CPVC 23448-22 MATERIALS¹

The following materials carry a recommended HDB of 4,500 psi and a maximum recommended HDS of 2,250 psi at 73F (23C) for water.

2. Independent Listings – CPVC 23448-22

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Lubrizol Advanced Materials	TEMPRITE 88631 Tan 311	73F	4500	E-10	12/31/2023
		180F	1250	E-10	12/31/2023
Lubrizol Advanced Materials	TEMPRITE 88632 Tan 311	73F	4500	E-10	12/31/2023
		180F	1250	E-10	12/31/2023

NOTE1: CPVC 23448 represents the cell classification per ASTM D1784-11.

TABLE I.A.4 - PE 1404 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Dow Chemical Company	DFDA 6080 BK 1404	73	800	S	12/31/2022

TABLE I.A.6. - PE 2708 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Bow Plumbing Group	Bow OxyPE-RT	73	1250	S*	12/31/2022
		180	630	S	12/31/2022
Centennial Plastics	PE2708 CenGas	73	1250	S*	12/30/2021
		140	1000	S	12/30/2021
Charter Plastics	3902/2240Y	73	1250	S*	12/31/2022
		140F	800	S	12/31/2022
Charter Plastics	DGDA-2420 YL	73	1250	S*	12/31/2022
		140	1000	S	12/31/2022
Charter Plastics	FP3902/PO2240	73	1250	S*	12/30/2022
		140	800	S	12/30/2022
Charter Plastics	TR418Q/M358Y3	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
Cresline Plastic Pipe Company	Cresline PE Yellow	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Duraline Corporation	PolyPipe Y-20-A	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
Duraline Corporation	PolyPipe Y-20-B	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Duraline Corporation	PolyPipe Y-20-C	73	1250	S*	12/31/2022
		140	1000	S	12/31/2022
Duraline Corporation	PolyPipe Y-20-D	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
Endot Industries	EID2420	73	1250	S*	12/31/2022
		140	1000	S	12/31/2022
Infra Pipe Solutions, Ltd	Wehogas 2420	73	1250	S*	12/31/2022
		140	1000	S	12/31/2022
Infra Pipe Solutions, Ltd	Wehogas K38-20-160	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
International Pipe	IPG	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
JM Manufacturing dba JM Eagle	JM MDPE 2420 YL2	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
JM Manufacturing dba JM Eagle	JM MDPE K38	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
JM Manufacturing dba JM Eagle	JM MDPE TR418	73F	1250	S*	12/31/2022
		140F	1000	S	12/31/2022
Oil Creek Plastics	HEATFLEX	73	1250	S*	12/31/2022
		180	630	S	12/31/2022

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Oil Creek Plastics	OCP-188	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Oil Creek Plastics	OCP-2420	73	1250	S*	12/31/2022
		140	1000	S	12/31/2022
Performance Pipe Division	PP/K38	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Performance Pipe Division	PP/TR418	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
Performance Pipe Division	PP/TR418BK	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
Pipeline Plastics, LLC	PLP-C2	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Pipeline Plastics, LLC	PLP-D2	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
Polytubes 2009, Inc.	PT-D242	73	1250	S*	12/31/2022
		140	1000	S	12/31/2022
Polytubes 2009, Inc.	PT-I27	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Silver-Line Plastics, LLC	GAS	73	1250	S*	12/30/2021
		140	1000	S	12/30/2021
Silver-Line Plastics, LLC	GAS2420	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Sioux Chief Manufacturing	Pro-Poly	73	1250	S*	12/30/2022
		140	800	S	12/30/2022
Teel Plastics, Inc.	Teel MDPE Gas Pipe	73	1250	S*	12/30/2022
		140	800	S	12/30/2022
Valencia Pipe Company	HOME-FLEX Underground	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Valencia Pipe Company	HOME-FLEX Underground 2	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Versaprofiles Products Inc	Versapipe Gas PE2708	73F	1250	S*	12/31/2021
		140F	1000	S	12/31/2021
Versaprofiles Products Inc	Versapipe PE2708BM Gas	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021

2. Independent Listings – PE 2708

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Borealis AG	BorSafe ME3440	73	1250	S	12/31/2021
Borealis AG	BorSafe ME3441	73	1250	S	12/31/2021
Borealis AG	BorSafe ME3444	73	1250	S	12/31/2021
Chevron Phillips Chemical	MARLEX TR-418P8D	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
Dow Chemical Company	CONTINUUM DGDA 2420 YL	73	1250	S*	12/31/2022
		140	1000	S	12/31/2022
Dow Chemical Company	CONTINUUM DGDA-2420 YL2	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021
Dow Chemical Company	DOWLEX 2344	73	1250	S*	12/31/2022

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		180	630	S	12/31/2022
Formosa Plastics Corporation, U.S.A.	HP3902/MDYC-303	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
Formosa Plastics Corporation, U.S.A.	HP3902/PO2240	73	1250	S*	12/31/2022
		140	800	S	12/31/2022
INEOS Olefins & Polymers USA	K38-20-123	73	1250	S*	12/31/2025
		140	800	S	12/31/2025
INEOS Olefins & Polymers USA	K38-20-160	73	1250	S*	12/31/2021
		140	1000	S	12/31/2021

TABLE I.A.8. - PE 3608 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Advanced Drainage Systems	PolyFlex (1)	73	1600	S*	12/31/2021
		140	800	S	12/31/2021
Advanced Drainage Systems	PolyFlex (2)	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Advanced Drainage Systems	PolyFlex (3)	73	1600	S*	12/31/2023
Centennial Plastics	PE3408 CENFUSE	73	1600	S*	12/30/2021
		140	800	S	12/30/2021
Centennial Plastics	PE3408 CENFUSE (1)	73	1600	S*	12/30/2025
		140	800	S	12/30/2025
Co-Ex Pipe Co.	CO-FLEX-IN	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Infra Pipe Solutions, Ltd	SCLAIRPIPE K44-06-123	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Infra Pipe Solutions, Ltd	SCLAIRPIPE K44-15-123	73	1600	S*	12/30/2021
		140	800	S	12/30/2021
International Pipe	IP-A	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE-4	73	1600	S*	12/31/2025
		140	800	S	12/31/2025
Poly Technology	Poly Technology	73	1600	S*	12/31/2021
		140	800	S	12/31/2021
Polytubes 2009, Inc.	PT-I38	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Shawcor Composite Pipe Division	GP36-D	73	1600	S*	12/31/2025
		140	800	S	12/31/2025

2. Independent Listings – PE 3608

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Dow Chemical Company	DGDB 2480 BK	73	1600	S*	12/31/2025
		140	800	S	12/31/2025
Dow Chemical Company	DGDB 2480 NT	73	1600	S	12/31/2025
Formosa Plastics Corporation, U.S.A.	HP4401/AS4642	73	1600	S*	12/31/2025
		140	800	S	12/31/2025
Formosa Plastics Corporation, U.S.A.	HP4401/MDPE-535-42	73	1600	S*	12/31/2025
		140	800	S	12/31/2025
INEOS Olefins & Polymers USA	K44-06-123	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
INEOS Olefins & Polymers USA	K44-08-123	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
INEOS Olefins & Polymers USA	K44-15-122	73	1600	S	12/31/2024
INEOS Olefins & Polymers USA	K44-15-123	73	1600	S*	12/31/2021
		140	800	S	12/31/2021
INEOS Olefins & Polymers USA	K44-15-186	73	1600	S*	12/31/2023

TABLE I.A.9. - PE 3708 MATERIALS¹

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.

2. Independent Listings – PE 3708

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Borealis AG	BorSafe HE3470-LS	73	1250	S	12/31/2021

TABLE I.A.13 - PE 4710 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Advanced Drainage Systems	ADS PolyFlex 4710 (1)	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Advanced Drainage Systems	ADS PolyFlex 4710 (2)	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Advanced Drainage Systems	ADS PolyFlex 4710 (3)	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Advanced Drainage Systems	ADS PolyFlex 4710 (4)	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Advanced Drainage Systems	ADS PolyFlex 4710 (5)	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Advanced Drainage Systems	ADS PolyFlex 4710 (6)	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Advanced Drainage Systems	ADS PolyFlex 4710 (7)	73	1600	E-10*	6/30/2021
		140	1000	E-10	6/30/2021
Advanced Drainage Systems	ADS PolyFlex 4710 (8)	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Agru America	AGRULINE 2	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Blue Diamond Industries	BDID-4710	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Blue Diamond Industries	BDII 4710	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
CB Supplies Ltd	Bruiser+	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
CB Supplies Ltd	Bruiser++	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
CB Supplies Ltd	CanPERT	73	1600	S*	6/30/2021
		180	800	S	6/30/2021
Centennial Plastics	PE4710 CENFUSE	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
Charter Plastics	A2490/005A LV	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
Charter Plastics	A2490/A0027 GN	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
Charter Plastics	A2490/DFDB BL	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
Charter Plastics	A2490/F0092	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Charter Plastics	BLUE ICE	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Charter Plastics	Charter Black L-1 HDPE	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Charter Plastics	DC2502/F0092BK	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Charter Plastics	FP E6210C	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Charter Plastics	S1 4985	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Charter Plastics	TRB-432 BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Charter Plastics	TRB437LS/PE53542	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Co-Ex Pipe Co.	CO-FLEX-IN-121	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Co-Ex Pipe Co.	CO-FLEX-LB	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Co-Ex Pipe Co.	CO-FLEX-LB2	73	1600	S*	12/31/2022

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		140	1000	S	12/31/2022
Co-Ex Pipe Co.	CO-FLEX-LB2-LS	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Co-Ex Pipe Co.	CO-FLEX-SAS	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Cresline Plastic Pipe Company	Cresline HD	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Dow Chemical Company	GPD5-4710	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Duraline Corporation	PolyPipe B-50-G	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Duraline Corporation	PolyPipe B-50-H	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Duraline Corporation	PolyPipe B-50-J	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Dynaflex Pipe Technologies	Dynaflex Pipe	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Dynaflex Pipe Technologies	Dynaflex Pipe 1	73	1600	E-10*	12/31/2021
		140	1000	E-10	12/31/2021
Endot Industries	END-100	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Endot Industries	ENDOT EEQ4904 LS	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Endot Industries	ENDOT EID-100	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Endot Industries	Endot EIS	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Endot Industries	INE124BL	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Endot Industries	INE47B121	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Fluidos Industriales Mexicanos, SA de CV	TUBERIA TKP TIPO II PE 4710	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Fluidos Industriales Mexicanos, SA de CV	TUBERIA TKP TIPO II PE4710 REFLEX	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Flying W Plastics	DHF210	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Flying W Plastics	DLS210	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Flying W Plastics	FL 210	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Flying W Plastics	SS210	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Flying W Plastics	SW210	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Georg Fischer Central Plastics	Design Flow #354	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Georg Fischer Central Plastics	DESIGN FLOW 347	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Georg Fischer Central Plastics	DESIGN FLOW 348	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Georg Fischer Central Plastics	DESIGN FLOW 349	73	1600	S*	12/30/2022
		140	1000	S	12/30/2022
Georg Fischer Central Plastics	DESIGN FLOW 350	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Georg Fischer Central Plastics	DESIGN FLOW 352	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Georg Fischer Central Plastics	DESIGN FLOW 353	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
Hebei Quanen High-Tech Piping Company	JM Quanen PE 4710 Pressure Pipe	73	1600	S*	7/31/2021
		140	1000	S	7/31/2021
Improved Piping Products, Inc	IPP PE4710 BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Infra Pipe Solutions, Ltd	SCLAIRPIPE DGDA-2490 BK 100	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Infra Pipe Solutions, Ltd	Scclairpipe DGDC-2502 BK	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Infra Pipe Solutions, Ltd	SCLAIRPIPE L4904-Black	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Infra Pipe Solutions, Ltd	Scclairpipe L4904LS	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Infra Pipe Solutions, Ltd	Scclairpipe TUB121	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
International Pipe	IPT	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Interstate Plastic	INTERSTATE PE4710 DL 01	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Interstate Plastic	Interstate PE4710 DL 02	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
Interstate Plastic	INTERSTATE PE4710 DL 04	73	1600	E-10*	6/30/2021
		140	1000	E-10	6/30/2021
IPEX Inc.	DC90	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
IPEX Inc.	FS20	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
IPEX Inc.	HDPE FS85	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
IPEX Inc.	HDPE IF21	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
JM Manufacturing dba JM Eagle	JM EAGLE PE4710 TRB-432	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
JM Manufacturing dba JM Eagle	JM EAGLE PE4710 TRB-437LS	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe 2	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe 3	73	1600	S*	12/31/2025

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		140	1000	S	12/31/2025
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 HDPE Pressure Pipe 5	73	1600	S*	12/30/2023
		140	1000	S	12/30/2023
JM Manufacturing dba JM Eagle	JM Eagle PE 4710 P6006 Black	73	1600	S*	7/31/2021
		140	1000	S	7/31/2021
JM Manufacturing dba JM Eagle	JM Eagle PE4710 DGDA-2490 GY	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
JM Manufacturing dba JM Eagle	JM Eagle PE4710 DGDC-2502 BK	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
JM Manufacturing dba JM Eagle	JM Eagle PE4710 HD4985 BK	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
JM Manufacturing dba JM Eagle	JM EAGLE PE4710 L4904LS	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
JM Manufacturing dba JM Eagle	JM Eagle PE4710/PE100 Pressure Pipe 4	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
JM Manufacturing dba JM Eagle	JM Eagle Pure Core PE 4710	73	1600	E-10*	12/31/2021
		140	1000	E-10	12/31/2021
JM Manufacturing dba JM Eagle	JMEagle PURE CORE PE4710-2	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
JM Manufacturing dba JM Eagle	JMM PE 4710 Pressure Pipe	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Modern Polymer Products	MPE TRB-432	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Modern Polymer Products	MPE TRB-437LS	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Modern Polymer Products	MPP LYB-1	73	1600	S*	12/30/2022
		140	1000	S	12/30/2022
NuMex Plastics	NuMex PE4710 DL 01	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
NuMex Plastics	NuMex PE4710 DL 02	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
Oil Creek Plastics	Aqua-Blue 124	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Oil Creek Plastics	Aqua-Jet 100B	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Oil Creek Plastics	Aqua-Jet 100C	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Oil Creek Plastics	Aqua-Jet 121	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Oil Creek Plastics	AQUA-PERT	73	1600	S*	6/30/2021
		180	800	S	6/30/2021
Performance Pipe Division	PP/DOW 2490	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Performance Pipe Division	PP/Dow 2490 YL2	73	1600	S*	12/30/2022
		140	1000	S	12/30/2022
Performance Pipe Division	PP/Dow 2490-C	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Performance Pipe Division	PP/DOW 2499 BK	73	1600	S*	6/30/2021
		180	800	S	6/30/2021

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Performance Pipe Division	PP/Dow 2502	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Performance Pipe Division	PP/Dow 2502-C	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Performance Pipe Division	PP/H516HP BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Performance Pipe Division	PP/H516LS BK	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Performance Pipe Division	PP/L4904	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Performance Pipe Division	PP/TUB 121	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Pipeline Plastics, LLC	PLP B-1	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Pipeline Plastics, LLC	PLP B-2	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Pipeline Plastics, LLC	PLP B-4	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Pipeline Plastics, LLC	PLP C-1	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Pipeline Plastics, LLC	PLP D-3	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Pipeline Plastics, LLC	PLP E-1	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Pipeline Plastics, LLC	PLP E-2	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Pipeline Plastics, LLC	PLP E-3	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Pipeline Plastics, LLC	PLP E-4	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Pipeline Plastics, LLC	PLP G-1	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Pipeline Plastics, LLC	PLP-B3	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Plasson USA	IPF DGDA-2490 BL	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Plasson USA	IPF L4904-Black	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Plasson USA	IPF TRB-432 BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Plasson USA	IPF TRB-437LS BK	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Policonductos S.A. de C.V.	PLC PE-4710 D1	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Poly Technology	Poly Technology 4710	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Poly Technology	Poly Technology 4710 Blue	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Poly Technology	POLYTECHNOLOGY-EQ L4904/BLACK	73	1600	S*	12/31/2022

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		140	1000	S	12/31/2022
Poly Technology	POLYTECHNOLOGY-H112PC-BK	73	1600	E-10*	12/31/2021
		140	1000	E-10	12/31/2021
Poly Technology	POLYTECHNOLOGY-IRPC P901BK	73	1600	E-8*	12/31/2021
Polytubes 2009, Inc.	PT BLUE47	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Polytubes 2009, Inc.	PT D247	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Polytubes 2009, Inc.	PT D347	73	1600	S*	12/30/2023
		140	1000	S	12/30/2023
Polytubes 2009, Inc.	PT D447	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Polytubes 2009, Inc.	PT D47	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Polytubes 2009, Inc.	PT-I47	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
PTM	EAC-5P-002	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
QualPol	Qp6C	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
QualPol	Qp6D	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
QualPol	Qp6D2	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Shawcor Composite Pipe Division	GP-47D	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Shawcor Composite Pipe Division	GPD2-4710	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Shawcor Composite Pipe Division	GPD3-100	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Shawcor Composite Pipe Division	GPD4-4710	73	1600	S*	12/30/2023
		140	1000	S	12/30/2023
Shawcor Composite Pipe Division	GPD5-4710	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Shawcor Composite Pipe Division	GPRT	73	1600	S*	6/30/2021
		180	800	S	6/30/2021
Shawcor Composite Pipe Division	GPS1-4710	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Silver-Line Plastics, LLC	SL 47 121	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Silver-Line Plastics, LLC	SL 47 2490	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Silver-Line Plastics, LLC	Ultra Pure	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021
Silver-Line Plastics, LLC	Ultra Pure 2490	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Teel Plastics, Inc.	PE4710 Pressure Pipe	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Teel Plastics, Inc.	Teel PE4710 Pipe	73	1600	S*	12/31/2025

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		140	1000	S	12/31/2025
Teel Plastics, Inc.	Teel Plastics PE4710 Pressure Pipe 3	73	1600	S*	12/30/2022
		140	1000	S	12/30/2022
Tex-Trude Pipe Company	TTPC CP-1	73	1600	S*	12/30/2022
		140	1000	S	12/30/2022
Tex-Trude Pipe Company	TTPCO D-1	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Tex-Trude Pipe Company	TTPCO D-2	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Tex-Trude Pipe Company	TTPCO L-1	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Tex-Trude Pipe Company	TTPCO L-1GR	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Tex-Trude Pipe Company	TTPCO L-2	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Tododren	TDR PE4710	73	1600	S*	12/30/2022
		140	1000	S	12/30/2022
Trinus Pipes & Tubes Ltd.	Trinus Pipes & Tubes Ltd. TRIDROP	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Trinus Pipes & Tubes Ltd.	Trinus TR-4	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Tubi USA	Tubi	73	1600	S*	12/30/2022
		140	1000	S	12/30/2022
Tubi USA	TUBI B1	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Tubi USA	TUBI B2	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Tubi USA	TUBI B4	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
United Poly Systems	UPS 7473-5	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
United Poly Systems	UPS7473-1	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
United Poly Systems	UPS7473-2	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
United Poly Systems	UPS7473-4	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
United Poly Systems	UPS7473-4-4	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
United Poly Systems	UPS7473-6	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
United Poly Systems	UPS7473-7	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
United Poly Systems	UPS7473-8	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
United Poly Systems	UPSL4904LS	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Valtic, S.A. DE. C.V.	VALTIC PREMIUM +PE100 HE3490-LS	68		S	12/31/2021
Valtic, S.A. DE. C.V.	Valtic Premium 121	73	1600	S*	12/30/2021

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		140	1000	S	12/30/2021
Valtic, S.A. DE. C.V.	Valtic Premium 2502	73	1600	S*	12/30/2023
		140	1000	S	12/30/2023
Valtic, S.A. DE. C.V.	VALTIC PREMIUM 3049-428	73	1600	E-8*	6/30/2021
		140	1000	E-6	6/30/2021
Versaprofiles Products Inc	VERSAPIPE 4710 GAS	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Versaprofiles Products Inc	Versapipe HD100 BK-3	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Versaprofiles Products Inc	Versapipe HD100 BL-2	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Viega LLC	Viega PE A-Black	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
WL Plastics	WL Plastics A1	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
WL Plastics	WL Plastics C3	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
WL Plastics	WL Plastics C4	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
WL Plastics	WL Plastics E3	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
WL Plastics	WL Plastics E4	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
WL Plastics	WL Plastics S5	73	1600	S*	12/30/2021
		140	1000	S	12/30/2021

2. Independent Listings – PE 4710

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Basell Polyolefine GmbH	Hostalen CRP 100 RESIST CR black	73	1600	E-8*	12/31/2021
		140	1000	E-8	12/31/2021
Borealis AG	BorSafe HE3490-LS	73	1600	S	12/31/2021
Borealis AG	BorSafe HE3490-LS-H	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Borouge Pte Ltd	BorSafe HE3490-LS	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
BRASKEM IDESA S.A.P.I	HDP3049LS/ RTP42008	73	1600	E-8*	6/30/2021
		140	1000	E-6	6/30/2021
Chevron Phillips Chemical	MARLEX H516HP BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Chevron Phillips Chemical	MARLEX H516HPY	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Chevron Phillips Chemical	MARLEX TRB-432 BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Chevron Phillips Chemical	Marlex TRB-437LS BK	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Chevron Phillips Chemical	Marlex TRB-437LS NT	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Dow Chemical Company	CONTINUUM DGDA 2490 BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Dow Chemical Company	CONTINUUM DGDA 2490 BL	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Dow Chemical Company	CONTINUUM DGDA 2490 GN	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Dow Chemical Company	CONTINUUM DGDA 2490 NT	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Dow Chemical Company	CONTINUUM DGDA 2490 YL	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Dow Chemical Company	CONTINUUM DGDA 2490 YL2	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Dow Chemical Company	CONTINUUM DGDA 2492 BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Dow Chemical Company	CONTINUUM DGDA 2502 BK	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Dow Chemical Company	CONTINUUM DGDA-2490 GY	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Dow Chemical Company	CONTINUUM DGDA-2490 LV	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Dow Chemical Company	CONTINUUM DGDA-2490 WH	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
Dow Chemical Company	CONTINUUM DGDC 2480 BK	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Dow Chemical Company	CONTINUUM DGDC 2482 BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Dow Chemical Company	CONTINUUM DGDC-2490 BK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Dow Chemical Company	CONTINUUM DGDC-2502 BK	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Dow Chemical Company	CONTINUUM DGDD 2480 BK	73	1600	S*	12/31/2024
		140	1000	S	12/31/2024
Dow Chemical Company	HYPERTHERM 2399 BK	73	1600	S*	6/30/2021
		180	800	S	6/30/2021
Dow Chemical Company	HYPERTHERM 2399 NT	73	1600	S*	6/30/2021
		180	800	S	6/30/2021
Dow Chemical Company	INTREPID 2499 BK	73	1600	S*	6/30/2021
		180	800	S	6/30/2021
Dow Chemical Company	INTREPID 2499 NT	73	1600	S*	6/30/2021
		180	800	S	6/30/2021
Equistar Chemicals, LP	ALATHON L4904 Black	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Equistar Chemicals, LP	ALATHON L4904 Grey	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Equistar Chemicals, LP	ALATHON L4904LS-Black	73	1600	S*	12/31/2023
		140	1000	S	12/31/2023
Equistar Chemicals, LP	ALATHON L5008HP Black	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Formosa Plastics Corporation, U.S.A.	E6210A/MD53542	73	1600	S*	12/31/2025

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		140	1000	S	12/31/2025
Formosa Plastics Corporation, U.S.A.	E6210A/PO2107	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
Formosa Plastics Corporation, U.S.A.	E6210C BLK	73	1600	S*	12/31/2025
		140	1000	S	12/31/2025
INEOS Olefins & Polymers USA	TUB 121	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
INEOS Olefins & Polymers USA	TUB 124	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
INEOS Olefins & Polymers USA	TUB121N NATURAL	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
INEOS Olefins & Polymers USA	TUB122 YELLOW	73	1600	S*	12/31/2021
		140	1000	S	12/31/2021
INEOS Olefins & Polymers USA	TUB127 Lavender	73	1600	E-10*	6/30/2021
		140	1000	E-10	6/30/2021
IRPC Public Company	P901BK	73	1600	E-8*	12/31/2021
Sasol Chemicals North America, LLC	HD 4985 BK	73	1600	S*	12/31/2022
		140	1000	S	12/31/2022
Saudi Arabian Basic Corp. (SABIC)	P6006N	73	1600	S*	7/31/2021
		140	1000	S	7/31/2021
Saudi Arabian Basic Corp. (SABIC)	P6006N / IPBK010A	73	1600	S*	7/31/2021
		140	1000	S	7/31/2021
Saudi Arabian Basic Corp. (SABIC)	P6006N / PE-535-42	73	1600	S*	7/31/2021
		140	1000	S	7/31/2021
Thai Polyethylene	SCG HDPE H112PC	73	1600	E-10*	12/31/2021
		140	1000	E-10	12/31/2021

TABLE I.A.14A - PEX 0006 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Uponor	hePEXplus	73	1250	S	12/30/2021
		180	800	S	12/30/2021
		200	630	S	12/30/2021

2. Independent Listings – PEX 0006

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Hyundai Engineering Plastics	PolyLink XP650/XC200R	73	1250	E-2	12/31/2021
		180	800	E-10	12/31/2021
		200	630	S	12/31/2021
Roth Industries	ROTH PEX	73	1250	S	12/31/2021
		180	800	S	12/31/2021
		200	630	S	12/31/2021
Uponor	AQUAPEX PLUS	73	1250	S	12/31/2021
		180	800	S	12/31/2021
		200	630	S	12/31/2021
Uponor	hePEX	73	1250	S	12/31/2021
		180	800	S	12/31/2021
		200	630	S	12/31/2021
Viega LLC	ProFlex	73	1250	S	12/31/2022
		180	800	S	12/31/2022
		200	630	S	12/31/2022
Viega LLC	ProFlex (black)	73	1250	S	12/31/2022
		180	800	S	12/31/2022
		200	630	S	12/31/2022
Viega LLC	ProFlex (natural)	73	1250	S	12/31/2021
		180	800	S	12/31/2021
		200	630	S	12/31/2021

TABLE I.A.14B.1 - PEX 1006 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Silver-Line Plastics, LLC	Sil-O-PEX	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
Viega LLC	A-1001LT	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
Viega LLC	A-PEX EXTRA	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025

2. Independent Listings – PEX 1006

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Golan Plastic Products	PEXGOL	73	1250	S	12/31/2022

TABLE I.A.14C.1 - PEX 3006 MATERIALS¹

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).

2. Independent Listings – PEX 3006

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
REHAU Inc	REHAU RAUPEX	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025

TABLE I.A.14C.2 - PEX 3206 MATERIALS¹

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). The second digit is for UV resistance tested in accordance with ASTM F2657. A digit “2” indicates the PEX tubing has been tested and meets the F 876 requirement for minimum UV resistance of 3 months.

2. Independent Listings – PEX 3206

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
REHAU Inc	REHAU RAUPEX Oxygen Barrier	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025

TABLE IA.14C.3 - PEX 3306 MATERIALS¹

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). The second digit is for UV resistance tested in accordance with ASTM F2657. A digit “3” indicates the PEX tubing has been tested and meets the F 876 requirement for minimum UV resistance of 6 months.

2. Independent Listings – PEX 3306

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
REHAU Inc	REHAU Municipex	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
REHAU Inc	REHAU RAUPEX Red/White/Blue UV-Shield	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025

TABLE IA.14D.1 - PEX 5006 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Bow Plumbing Group	BOWPEX-5 Natural	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
Bow Plumbing Group	Oxypex-1	73	1250	S	12/31/2021
		180	800	E-16	12/31/2021
IPEX Inc.	IPEX-P	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
REHAU Inc	RAUPEX CL5 UV Shield	73	1250	S	12/31/2021
		180	800	S	12/31/2021
		200	630	S	12/31/2021

2. Independent Listings – PEX 5006

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Borealis AG	BorPEX HE1878E-C2	73	1250	S	12/31/2021
		180	800	S	12/31/2021
		200	630	S	12/31/2021
Hyundai Engineering Plastics	Polylink XP650 (Natural)	73	1250	S	12/31/2021
		180	800	E-16	12/31/2021
Kafrit NA Ltd	TA 1108 HD/TA 2420 CL (Natural)	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T Eclipse	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025

TABLE I.A.14D.2 - PEX 5106 MATERIALS¹

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 minimum of 1 month UV exposure resistance.

1. Dependent Listings – PEX 5106

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
HeatLink Group	PureLink Plus	73	1250	S	12/31/2021
		180	800	S	12/31/2021
		200	630	S	12/31/2021
HeatLink Group	PureLink Reclaimed	73	1250	S	12/31/2021
		180	800	S	12/31/2021
HeatLink Group	SureLink	73	1250	S	12/31/2021
		180	800	S	12/31/2021

2. Independent Listings – PEX 5106

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Uponor	AQUAPEX	73	1250	S	12/31/2021
		180	800	S	12/31/2021
		200	630	S	12/31/2021

TABLE I.A.14D.4 - PEX 5306 MATERIALS¹

The following materials carry a recommended HDB of 1250 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 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.

2. Independent Listings – PEX 5306

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Kafrit NA Ltd	TA 1108 HD/TA 2410 CL (Red)	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
Kafrit NA Ltd	TA 1108 HD/TA 2411 CL (Blue)	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
Kafrit NA Ltd	TA 1108 HD/TA 2412 CL (White)	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
Kafrit NA Ltd	TA 1108 HD/TA 2417 CL (Black)	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
Kafrit NA Ltd	TA 1108 HD/TA 2418 CL (Red)	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
Kafrit NA Ltd	TA 1108 HD/TA 2419 CL (White)	73	1250	S	12/31/2025
		200	630	S	12/31/2025
Kafrit NA Ltd	TA 1117 HD/TA 2410 CL (Red)	73F	1250	S	12/31/2025
		180F	800	S	12/31/2025
		200F	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T Eclipse Black	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T Eclipse Blue	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T Eclipse Red	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T Eclipse White	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T-UV Blue	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T-UV Red	73	1250	S	12/31/2025
		180	800	S	12/31/2025
		200	630	S	12/31/2025
SACO AEI Polymers	PEXIDAN L/T-UV White	73	1250	S	12/31/2025
		180	800	S	12/31/2025

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
		200	630	S	12/31/2025

TABLE I.A.14D.5 - PEX 5308 MATERIALS¹

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 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.

2. Independent Listings – PEX 5308

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Kafrit NA Ltd	TA 1117/ TA 2410 CL (Red)	73	1600	S	12/31/2021
		180	800	E-10	12/31/2021
		200	630	E-16	12/31/2021

TABLE I.A.17A - PA 32312 MATERIALS¹

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.

2. Independent Listings – PA 32312

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Arkema	Rilsan 11	73	2500	S	12/31/2022
		140	1600	S	12/31/2022
		180	1250	S	12/31/2022

TABLE I.A.17B - PA 32316 MATERIALS¹

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.

2. Independent Listings – PA 32316

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Arkema	Rilsan R11P250 (BESHV)	73	3150	S	12/31/2021
		180	1600	S	12/31/2021

TABLE I.A.18 - PA 42316 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Teel Plastics, Inc.	Teel PA-12	73	3150	S	12/31/2025
		140	2000	S	12/31/2025

2. Independent Listings – PA 42316

Company Name	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Evonik Degussa	VESTAMID PA12	73	3150	S	12/31/2025
		140	2000	S	12/31/2025
Evonik Degussa	VESTAMID PA12	180	1600	S	12/31/2025

TABLE I.A.20 - PVDF 2020 MATERIALS¹

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	Listing Name	Temp °F	HDB (psi)	Grade	Expiration Date
Arkema	KYNAR 1000	73	4000	S	12/31/2021
		200	1250	S	12/31/2021
Arkema	KYNAR 740	73	4000	S	12/31/2021
		200	1250	S	12/31/2021

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 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 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	Listing Name	Designation Code	Temp °F	HDB (psi)	Grade	Expiration Date
Geon Performance Solutions	GEON 87431		73	4000	S	12/31/2021
Geon Performance Solutions	GEON M1200/M3200		73	3200	S	12/31/2021

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

Company Name	Listing Name	Designation Code	Temp °F	HDB (psi)	Grade	Expiration Date
IPEX Technologies Inc	PVC E05 Gray	Extruded Pipe for Molding	73	4000	S	12/31/2021
IPEX Technologies Inc	PVC E05 White	Extruded Pipe for Molding	73	4000	S	12/31/2021
Lubrizol Advanced Materials	TEMPRITE 3212 GRAY 245	Extruded Pipe for Molding	73	4000	S	12/31/2025
			180	1000	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 3235 BLUE 470	Extruded Pipe for Molding	73	4000	S	12/31/2025
			180	1000	S	12/31/2025
Lubrizol Advanced Materials	TEMPRITE 88065 ORANGE 734	Extruded Pipe for Molding	73	4000	S	12/31/2025
			180	1000	S	12/31/2025
Lubrizol Advanced Materials	TempRite 88096 Tan 309	Extruded Pipe for Molding	73	4000	S	12/31/2025
			180	1000	S	12/31/2025
Westlake Compounds, LLC	Axiall / Georgia Gulf 6907 BLUE 83	Extruded Pipe for Molding	73	4000	S	12/31/2025

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 Fumo, 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 IIA.1

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

Company Name	Pipe Designation	Listing Name	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	12/31/2021
			140	200	S	12/31/2021
IPEX Inc.	PE/AL/PE	IPEX PE-AL-PE [PE-RT] (1/2, 5/8, 3/4, 1")	73	400	S	12/31/2021
			180	200	S	12/31/2021
Rifeng Enterprise Co Ltd	PEX/AL/PEX	RIFENG PEX-AL-PEX (1/2", 5/8", 3/4", 1")	73	500	S	12/31/2022
			200	250	S	12/31/2022
Westfälische Rohrwerke	PERT/AL/PERT	WRW PERT-AL-PERT (1/2", 5/8", 3/4", 1")	73	400	S	12/31/2022
			140	315	S	12/31/2022
			200	200	S	12/31/2022

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 $CRS_{(\theta,t)}$ 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 $CRS_{(\theta,t)}$ 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 $CRS_{(\theta,t)}$ 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 $CRS_{(\theta,t)}$. The reader is advised to consult the owner of the material designation for specifics regarding interpretation or use of the MRS and $CRS_{(\theta,t)}$ 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
Sioux Chief Manufacturing	Pro-Poly	20	8	S	12/30/2022

2. Independent Listings – PE 80

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Borealis AG	BorSafe HE3470-LS	20	8	S	12/31/2021
Borealis AG	BorSafe ME3440	20	8	S	12/31/2021
Borealis AG	BorSafe ME3441	20	8	S	12/31/2021
Borealis AG	BorSafe ME3444	20	8	S	12/31/2021
Chevron Phillips Chemical	MARLEX TR-418P8D	20	8	S	12/31/2022
Dow Chemical Company	CONTINUUM DGDA 2420 YL	20	8	S	12/31/2022
Dow Chemical Company	CONTINUUM DGDC 2480 BK	20	8	S	12/31/2024
Formosa Plastics Corporation, U.S.A.	HP3902 Y	20	8	S	12/31/2022
Formosa Plastics Corporation, U.S.A.	HP4401 BK	20	8	S	12/31/2022
INEOS Olefins & Polymers USA	K44-08-123	20	8	S	12/31/2021
INEOS Olefins & Polymers USA	K44-15-123	20	8	S	12/31/2021

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
Agru America	AGRULINE 2	20	10	S	12/31/2021
Charter Plastics	Charter Black L-1 HDPE	20	10	S	12/31/2022
Charter Plastics	TRB-432 BK	20	10	S	12/31/2025
Charter Plastics	TRB437LS/PE53542	20	10	S	12/31/2022
Duraline Corporation	PolyPipe B-50-J	20	10	S	12/31/2025
Endot Industries	INE00B121	20	10	S	12/31/2021
Fluidos Industriales Mexicanos, SA de CV	TUBERIA TKP TIPO II PE PE-100	20	10	S	12/30/2021
Georg Fischer Central Plastics	DESIGN FLOW 353	20	10	S	12/31/2021
Improved Piping Products, Inc	IPP PE4710 BK	20	10	S	12/31/2025
Infra Pipe Solutions, Ltd	Sclairpipe TUB121	20	10	S	12/31/2021
JM Manufacturing dba JM Eagle	JM Eagle PE 100 TUB 121	20	10	S	12/31/2021
JM Manufacturing dba JM Eagle	JM Eagle PE100 DGDC-2502 BK	20	10	S	12/30/2024
JM Manufacturing dba JM Eagle	JM EAGLE PE100 TRB-432	20	10	S	12/31/2025
JM Manufacturing dba JM Eagle	JM Eagle PE4710/PE100 Pressure Pipe 4	20	10	S	12/31/2022
JM Manufacturing dba JM Eagle	J-M PE PRESSURE PIPE	20	10	S	12/31/2025
Modern Polymer Products	MPE TRB-432	20	10	S	12/31/2025
Modern Polymer Products	MPE TRB-437LS	20	10	S	12/31/2022
Modern Polymer Products	MPP LYB-1	20	10	S	12/30/2022
NuMex Plastics	NuMex PE4710 DL 03	20	10	S	12/31/2022
Performance Pipe Division	PP/DOW 2490	20	10	S	12/31/2025
Performance Pipe Division	PP/H516HP BK	20	10	S	12/31/2025
Performance Pipe Division	PP/H516LS BK	20	10	S	12/31/2021
Performance Pipe Division	PP/TUB 121	20	10	S	12/31/2021
Policonductos S.A. de C.V.	PLC PE-100	20	10	S	12/31/2021
Polytubes 2009, Inc.	PT D100	20	10	S	12/31/2025
Polytubes 2009, Inc.	PT D47	20	10	S	12/31/2025
Polytubes 2009, Inc.	PT-I100	20	10	S	12/31/2021
Shawcor Composite Pipe Division	GPD2-100	20	10	S	12/31/2025
Tubi USA	TUBI B4	20	10	S	12/31/2022
Union Pipes Industry	UPI/HE 3490-LS	20	10	S	12/30/2023
United Poly Systems	UPSL4904LS	20	10	S	12/30/2022
Valtic, S.A. DE. C.V.	Valtic Poly-PERT	20	10	S	12/30/2025
WL Plastics	WL Plastics A1	20	10	S	12/31/2024
WL Plastics	WL Plastics C3	20	10	S	12/31/2025
WL Plastics	WL Plastics E3	20	10	S	12/31/2022
WL Plastics	WL Plastics S5	20	10	S	12/31/2021

2. Independent Listings – PE 100

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Basell Polyolefine GmbH	Hostalen CRP 100 RESIST CR black	20	10	S	12/31/2024
Borealis AG	BorSafe HE3490-IM	20	10	S	12/31/2025
Borealis AG	BorSafe HE3490-LS	20	10	S	12/31/2021
Borealis AG	BorSafe HE3490-LS-H	20	10	S	12/31/2025
Borouge Pte Ltd	BorSafe HE3490-LS	20	10	S	12/31/2023
BRASKEM IDESA S.A.P.I	HDP3049LS / BK033A	-07	10	S	1/21/2025
Chevron Phillips Chemical	MARLEX H516HP BK	20	10	S	12/31/2025
Chevron Phillips Chemical	MARLEX TRB-432 BK	20	10	S	12/31/2025
Chevron Phillips Chemical	MARLEX TRB-432 NT	20	10	S	12/31/2021
Chevron Phillips Chemical	Marlex TRB-437LS BK	20	10	S	12/31/2022
Chevron Phillips Chemical	Marlex TRB-437LS NT	20	10	S	12/31/2024
Dow Chemical Company	CONTINUUM DGDA 2490 BK	20	10	S	12/31/2025
Dow Chemical Company	CONTINUUM DGDA 2492 BK	20	10	S	12/31/2025
Dow Chemical Company	CONTINUUM DGDA 2502 BK	20	10	S	12/31/2021
Dow Chemical Company	CONTINUUM DGDC-2502 BK	20	10	S	12/31/2024
Equistar Chemicals, LP	ALATHON L4904 Black	20	10	S	12/31/2022
Equistar Chemicals, LP	ALATHON L4904LS-Black	20	10	S	12/31/2023
Formosa Plastics Corporation, U.S.A.	E6210A/PO2107	20	10	S	12/31/2025
INEOS Olefins & Polymers USA	TUB 121	20	10	S	12/31/2021
IRPC Public Company	P901BK	20	10	S	12/31/2022
Sasol Chemicals North America, LLC	HD 4985 BK	20	10	S	12/31/2024
Thai Polyethylene	SCG HDPE H1000PC	20	10	S	12/31/2024
TOTAL	TOTAL XRT70	20	10	S	12/31/2025

TABLE III.A.3 - PE 112 MATERIALS

The following materials have a recommended MRS of 11.2 MPa (1625 psi) at 20°C (68°F).

2. Independent Listings – PE 112

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Thai Polyethylene	SCG HDPE H112PC	20	11.2	S	12/31/2023

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).

2. Independent Listings – PA11 180

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Arkema	Rilsan R11P250 (BESHV)	20	18	S	12/31/2021

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).

2. Independent Listings – PA12 180

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Evonik Degussa	VESTAMID NRG 2101	20	18	S	12/31/2021

TABLE III.A.7 - PP 112 MATERIALS

The following materials have a recommended MRS of 11.2 MPa (1625 psi) at 20°C (68°F).

2. Independent Listings – PP 112

Company	Material	Temp °C	MRS (MPa)	Grade	Expiration Date
Borealis AG	RA7050	20	11.2	S	12/31/2025
Borealis AG	RA7050-GN	20	11.2	S	12/31/2025

TABLE III.A.8 – CRS (θ, t) – POLYETHYLENE MATERIALS

The CRS (θ, t) is the categorized value of the ISO 9080 LPL for a material at a temperature of θ (°C) and a time of t-years, using the extrapolation limits of ISO 9080 and in accordance with ISO 12162.

1. Dependent Listings – CRS (θ, t) - POLYETHYLENE

Company	Material	Temp °C	CRS (MPa), t (yrs)	Grade	Expiration Date
Valtic, S.A. DE. C.V.	Valtic Poly-PERT	82	4.0 MPa, 2.58-yr	S	12/31/2025

2. Independent Listings – CRS (θ, t) - POLYETHYLENE

Company	Material	Temp °C	CRS (MPa), t (yrs)	Grade	Expiration Date
TOTAL	TOTAL XRT70	82	4.0 MPa, 2.58-yr	S	12/31/2025

TABLE III.A.9 – CRS (θ, t) – POLYPROPYLENE MATERIALS

The CRS (θ, t) is the categorized value of the ISO 9080 LPL for a material at a temperature of θ (°C) and a time of t-years, using the extrapolation limits of ISO 9080 and in accordance with ISO 12162.

2. Independent Listings – CRS (θ, t) - POLYPROPYLENE

Company	Material	Temp °C	CRS (MPa)	Grade	Expiration Date
Borealis AG	RA7050-GN	60	6.3	S	12/31/2022
		70	5.0	S	12/31/2022
Borealis AG	RA7050-grey	60	6.3	S	12/31/2022
		70	5.0	S	12/31/2022

APPENDIX A – Example Request Letters for a PPI HSB listing

**The request templates are available on the PPI HSB web page.

APPENDIX B – List of Manufacturer Contacts

**See the PPI HSB Search Listing feature, on the PPI HSB web page.