

DEPARTMENT OF COMMERCE
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
OFFICE OF STANDARDS SERVICES

PRODUCT STANDARD PS18-69

ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PLASTIC PIPE
(SCHEDULES 40 AND 80)

Product Standard PS18-69, Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (Schedules 40 and 80), [supersedes CS218-59, Rigid ABS Plastic Pipe (IPS Dimensions)], was withdrawn by the Department of Commerce on September 9, 1974.

This product standard was replaced by ASTM D1527, Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80. This ASTM standard is under the direct responsibility of Subcommittee F17.27 on Styrene Based Pipe. The Committee Staff Manager for Committee F17 on Plastic Piping Systems can provide assistance, information, and contacts for the subcommittee.

Contact: F17 Committee Staff Manager
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The Society of the Plastics Industry, Inc. (SPI) was the sponsor for Commercial Standard CS218-59.

For technical assistance and additional information, contact:

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federal register



DEPARTMENT OF COMMERCE
National Bureau of Standards
VOLUNTARY PRODUCT STANDARDS

Action on Proposed Withdrawal

In accordance with § 10.12 of the Department's "Procedures for the Development of Voluntary Product Standards" (15 CFR Part 10, as revised; 35 FR 8349 dated May 28, 1970), notice is hereby given of the withdrawal of the following Voluntary Product Standards:

- PS 10-69, "Polyethylene (PE) Plastic Pipe (Schedule 40—Inside Diameter Dimensions)".
- PS 11-69, "Polyethylene (PE) Plastic Pipe (SDR)".
- PS 12-69, "Polyethylene (PE) Plastic Pipe (Schedules 40 and 80—Outside Diameter Dimensions)".
- PS 18-69, "Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (Schedules 40 and 80)".
- PS 19-69, "Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (Standard Dimension Ratio)".
- PS 21-70, "Poly(Vinyl Chloride) (PVC) Plastic Pipe (Schedules 40, 80, and 120)".
- PS 22-70, "Poly(Vinyl Chloride) (PVC) Plastic Pipe (Standard Dimension Ratio)".

This action is taken in furtherance of the Department's announced intentions as set forth in the public notice appearing in the FEDERAL REGISTER of April 18, 1974 (39 FR 13908), to withdraw these standards.

The effective date for the withdrawal of these standards will be Sept. 9, 1974. This withdrawal action terminates the authority to refer to these standards as voluntary standards developed under the Department of Commerce procedures.

ERNEST AMBLER,
Acting Director.

JULY 3, 1974.

[FR Doc.74-15609 Filed 7-8-74;8:45 am]

Reference book not to be
taken from the library.

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Voluntary Product Standard

JUL 22 1970

PS 18-69

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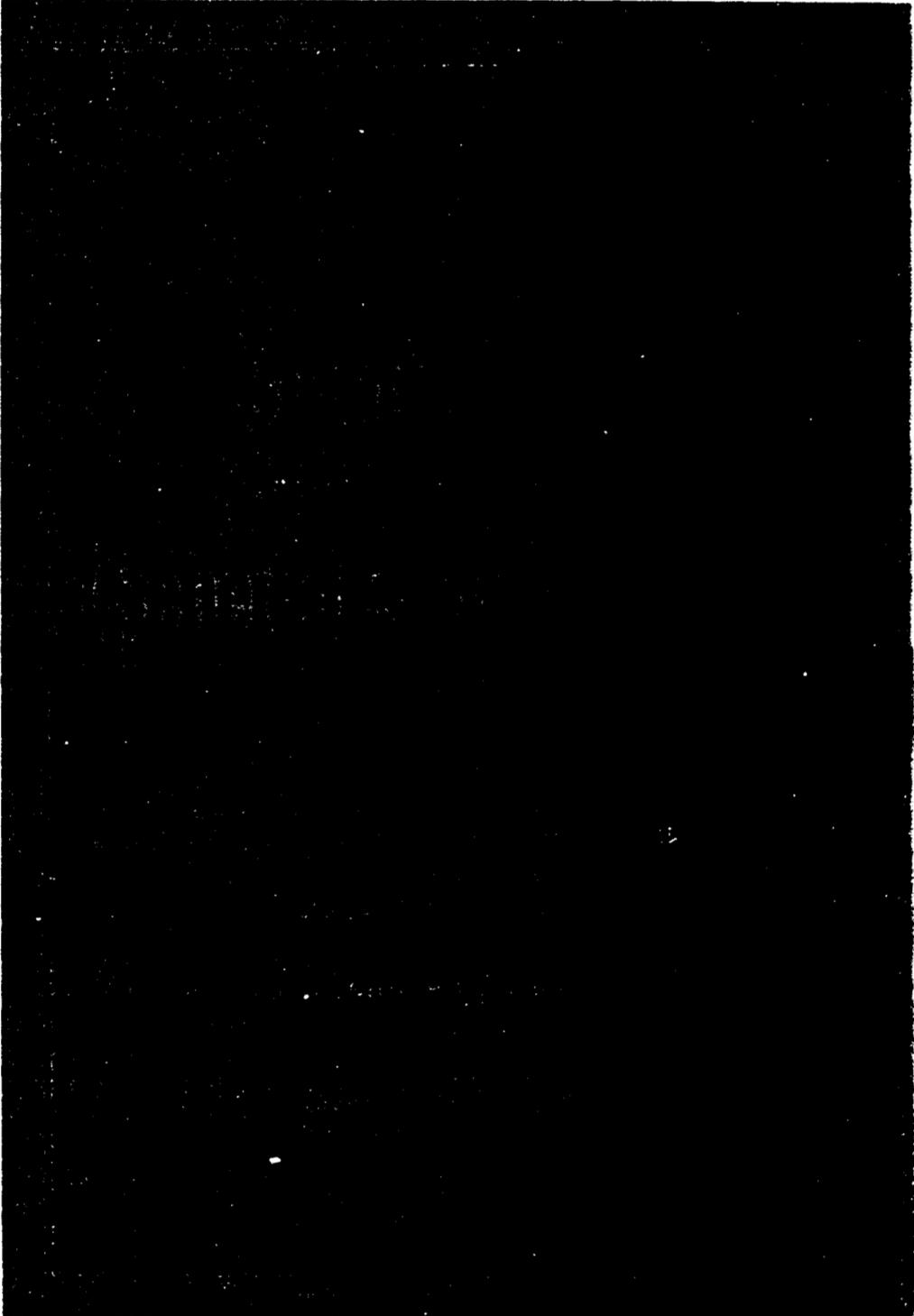


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PRODUCT STANDARDS

Product Standards are published voluntary standards that establish (1) dimensional requirements for standard sizes and types of various products, (2) technical requirements for the product, and (3) methods of testing, grading, and marking these products. The objective is to define requirements for these products in accordance with the principal demands of the trade. *Product Standards* are published by the National Bureau of Standards of the U. S. Department of Commerce.

Development of a PRODUCT STANDARD

The Bureau's Office of Engineering Standards Services works closely with business firms, trade organizations, testing laboratories, and other appropriate groups to develop such standards. (A group interested in developing a *Product Standard* may submit a written request to the Office of Engineering Standards Services, National Bureau of Standards.) After determining that the desired standard would be technically feasible and in the public interest, a specific proposal is developed in consultation with interested trade groups and circulated for industry consideration and comment.

Subsequently, a Standard Review Committee is established to review the proposed standard for conformance with the Department of Commerce procedures. The committee includes qualified representatives of producers, distributors, and users or consumers of the product. When approved by the committee, copies of the recommended standard are distributed for consideration and acceptance. When the acceptances show general agreement by all segments of the industry, and when there is no substantive objection deemed valid by the National Bureau of Standards, the Bureau announces approval of the *Product Standard* and proceeds with its publication.

Use of a PRODUCT STANDARD

Product Standards are developed for the maximum use of industry by ensuring that producers, distributors, and users or consumers cooperate in the development of a voluntary *Product Standard*. The adoption and use of a *Product Standard* is voluntary. *Product Standards* are used most effectively in conjunction with legal instrumentalities such as building codes, purchase orders, and sales contracts. When a standard is made part of such a contract, compliance with the standard is enforceable by the buyer or the seller along with other provisions of the contract. There is no governmental regulation or control involved.

Purchasers may order products that comply with *Product Standards* and determine for themselves that their requirements are met. More often, manufacturers refer to the standards in sales catalogs, advertising, invoices, and labels on the product. Commercial inspection and testing programs are also employed for greater effectiveness together with grade labels, hallmarks and certificates. Such assurance of compliance promotes confidence and understanding between buyers and sellers.

EFFECTIVE DATE

Having been passed through the regular procedures of the Office of Engineering Standards Services, National Bureau of Standards, and approved by the acceptors hereinafter listed in part, this *Product Standard* is issued by the National Bureau of Standards, effective:

December 31, 1969
(See Section 8)

Lewis M. Branscomb
Director

Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (Schedules 40 and 80)

(This voluntary standard, initiated by The Society of the Plastics Industry, Inc., has been developed under the *Procedures for the Development of Voluntary Product Standards*, published by the Department of Commerce. See Section 9, *History of the Project*, for further information.)

1. PURPOSE

The purpose of this Product Standard is to establish nationally recognized dimensions and significant quality requirements for acrylonitrile-butadiene-styrene (ABS) plastic pipe when it is made in Schedule 40 and 80 sizes with the outside diameter controlled. This Standard is also intended to provide producers, distributors, and users with a basis for common understanding of the material and dimensional characteristics of this product.

2. SCOPE AND CLASSIFICATION

2.1. Scope—This Product Standard covers the principal types, grades, sizes, and pressure ratings for commercially available ABS plastic pipe made in Schedule 40 and 80 sizes with the outside diameter controlled. Included are requirements and methods of test for materials, workmanship, dimensions, sustained pressure, and burst pressure. Methods of marking and labeling to indicate compliance with this Standard are also provided.¹

2.2. Classification—The ABS plastic material and pipe covered by this Product Standard are classified as follows:

2.2.1. Material—ABS plastics used to make pipe meeting the requirements of this Standard are categorized by means of two criteria, namely, short-term strength tests and long-term strength tests.

2.2.1.1. Basic materials—This Standard covers pipe made from three ABS plastics as defined in the American Society for Testing and Materials (ASTM)² D 1788-68, *Standard Specification for Rigid Acrylonitrile-Butadiene-Styrene (ABS) Plastics*,³ in which the requirements are based on short-term tests. These are Type I, Grade 2; Type I, Grade 3; and Type II, Grade 1.

2.2.1.2. Hydrostatic design stresses—This Standard covers pipe made from ABS plastics as defined by three hydrostatic design stresses developed on the basis of long-term tests.⁴ These hydrostatic design stresses are 1000, 1250, and 1600 psi for water at 23 °C (73.4 °F) and apply only to pipe meeting all the requirements of this Standard.

2.2.1.3. Pipe materials—This Standard covers pipe made from three ABS plastic pipe materials coded as follows:

¹ Information regarding the properties, applications, installation, and maintenance of acrylonitrile-butadiene-styrene plastic piping is contained in Technical Report PPI-TR12-SEP 1969, *Installation Procedures for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe*, published by the Plastics Pipe Institute, 250 Park Avenue, New York, N. Y. 10017.

² Copies of ASTM publications are obtainable from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.

³ Later issues of all publications specified in this Product Standard may be used providing the requirements are applicable and consistent with the issues designated.

⁴ Information regarding the method of test and other criteria used in assigning these hydrostatic design stresses may be obtained from the Plastics Pipe Institute (PPI), a division of The Society of the Plastics Industry, Inc., 250 Park Avenue, New York, N. Y. 10017.

(1) Type I, Grade 2, with a hydrostatic design stress of 1000 psi for water at 23 °C (73.4 °F), designated as ABS1210.

(2) Type I, Grade 3, with a hydrostatic design stress of 1600 psi for water at 23 °C (73.4 °F), designated as ABS1316.

(3) Type II, Grade 1, with a hydrostatic design stress of 1250 psi for water at 23 °C (73.4 °F), designated as ABS2112.

2.2.2. Pipe pressure rating—Pipe meeting the requirements of this Standard is rated for use with water at 23 °C (73.4 °F) at the maximum internal pressure shown in table 1 or table 2. These ratings have been calculated in accordance with the International Standards Organization⁵ (ISO) equation as defined in 5.1.3. Lower ratings may be recommended at the option of the pipe manufacturer. The pressure ratings for Schedule 80 threaded pipe are one-half those for non-threaded pipe in the same material and size. Schedule 40 pipe should not be threaded.

3. REQUIREMENTS

3.1. General—All pipe represented as complying with this Standard shall meet all of the requirements listed herein and shall be marked as specified in section 6.

3.2. Materials—The ABS plastic extrusion compound shall meet the requirements of either Type I, Grade 2; Type I, Grade 3; or Type II, Grade 1, as described in ASTM D 1788-68.

3.2.1. Rework material—Clean rework material generated from the manufacturer's own pipe production may be used by the same manufacturer provided that the materials specified in 3.2 are not mixed with one another and that the pipe produced meets all the requirements of this Standard.

3.3. Pipe dimensions and tolerances—

TABLE 1. Pressure ratings^a for water at 23 °C (73.4 °F), ABS plastic pipe, Schedule 40

Nominal pipe size	ABS1210 ^b	ABS1316 ^b	ABS2112 ^b
<i>inch</i>	<i>psi</i>	<i>psi</i>	<i>psi</i>
1/8	400	650	500
1/4	390	620	490
3/8	310	500	390
1/2	300	480	370
5/8	240	390	300
1	220	360	280
1 1/4	180	290	230
1 1/2	170	260	210
2	140	220	170
2 1/2	150	240	190
3	130	210	160
3 1/2	120	190	150
4	110	180	140
5	100	160	120
6	90	140	110
8	80	120	100
10	70	110	90
12	70	110	80

^a These pressure ratings apply only to unthreaded pipe. The industry does not recommend threading ABS plastic pipe in Schedule 40 dimensions.

Some minor adjustments have been made to keep the pressures uniform to simplify testings.

^b See 2.2.1.3 and 5.1.4 for code designation.

⁵ Address: 1430 Broadway, New York, N. Y. 10018, c/o American National Standards Institute, Inc.

TABLE 2. Pressure ratings^a for water at 23° C (73.4° F), ABS plastic pipe, Schedule 80

Nominal pipe size	ABS1210 ^b		ABS1316 ^b		ABS2112 ^b	
	Unthreaded	Threaded	Unthreaded	Threaded	Unthreaded	Threaded
	psi	psi	psi	psi	psi	psi
inch						
1/8	—	—	980	490	—	—
1/4	—	—	900	450	—	—
3/8	—	—	730	370	—	—
1/2	420	210	680	340	530 ^a	260
3/4	340	170	550	280	430	210
1	320	160	500	250	390	200
1 1/4	260	130	420	210	330	160
1 1/2	240	120	380	190	290	150
2	200	100	320	160	250	130
2 1/2	210	110	340	170	270	130
3	190	90	300	150	230	120
3 1/2	170	90	280	140	220	110
4	160	80	260	130	200	100
5	140	70	230	120	180	90
6	140	70	220	110	170	90
8	120	60	200	100	150	80
10	120	60	190	90	150	70
12	110	60	180	90	140	70

^a Some minor adjustments have been made to keep the pressures uniform to simplify testing.

^b See 2.2.1.3 and 5.1.4 for code designation.

3.3.1. Outside diameters—The outside diameters shall be as shown in table 3 when measured in accordance with 4.3 and 4.3.1. The tolerances for out-of-roundness apply only to pipe prior to shipment.

3.3.2. Wall thickness—The wall thicknesses shall be as shown in table 4 when measured in accordance with 4.3 and 4.3.2.

3.3.3. Wall thickness range—The wall thickness range (eccentricity of the inside and outside circumference) of the pipe shall not exceed 12 percent when measured in accordance with 4.3 and 4.3.3.

3.4. Performance requirements—

3.4.1. Sustained pressure—The pipe shall not fail, balloon, burst, or weep as defined in section 4 of ASTM D 1598-67, *Standard Method of Test for Time-to-Failure of Plastic Pipe Under Long-Term Hydrostatic Pressure*,⁶ at the test pressures given in table 5 or 6 when tested in accordance with 4.4.

3.4.2. Burst pressure—The minimum burst pressure of the pipe shall be as given in table 7 or 8 when determined in accordance with 4.5.

3.5. Workmanship—The pipe shall be homogeneous throughout and free from visible cracks, holes, or foreign inclusions. The pipe shall be uniform in color, opacity, and density.

3.6. Approval for potable water—All pipe intended for use with potable water shall meet the requirements for that purpose specified by the National Sanitation Foundation Testing Laboratory, Inc.,⁷ or specified by other organizations accredited by Federal or State Public Health agencies as having requirements for that purpose which are no less stringent than those of the National Sanitation Foundation Testing Laboratory, Inc.

TABLE 3. *Outside diameters and tolerances, ABS plastic pipe, Schedules 40 and 80*

Nominal pipe size	Average outside diameter	Tolerances		
		For average outside diameter	For maximum and minimum diameter (out-of-roundness)	
			Schedule 40	Schedule 80
<i>inch</i>	<i>inch</i>	<i>inch</i>	<i>inch</i>	<i>inch</i>
1/8	0.405	±0.004	±0.008	±0.008
1/4	.540	±.004	±.008	±.008
3/8	.675	±.004	±.008	±.008
1/2	.840	±.004	±.008	±.008
3/4	1.050	±.004	±.010	±.010
1	1.315	±.005	±.010	±.010
1 1/4	1.660	±.005	±.012	±.012
1 1/2	1.900	±.006	±.012	±.012
2	2.375	±.006	±.012	±.012
2 1/2	2.875	±.007	±.015	±.015
3	3.500	±.008	±.015	±.015
3 1/2	4.000	±.008	±.050	±.015
4	4.500	±.009	±.050	±.015
5	5.563	±.010	±.050	±.030
6	6.625	±.011	±.050	±.035
8	8.625	±.015	±.075	±.075
10	10.750	±.015	±.075	±.075
12	12.750	±.015	±.075	±.075

⁶ See footnotes 1 and 2, page 1.

⁷ Address: The National Sanitation Foundation Testing Laboratory, Inc., 2355 West Stadium Boulevard, Ann Arbor, Mich. 48106.

TABLE 4. Wall thicknesses, ABS plastic pipe, schedules 40 and 80

Nominal pipe size	Schedule 40		Schedule 80	
	Minimum	Maximum	Minimum	Maximum
<i>inch</i>	<i>inch</i>	<i>inch</i>	<i>inch</i>	<i>inch</i>
1/8	0.068	0.088	0.095	0.115
1/4	.088	.108	.119	.139
3/8	.091	.111	.126	.146
1/2	.109	.129	.147	.167
3/4	.113	.133	.154	.174
1	.133	.153	.179	.200
1 1/4	.140	.160	.191	.214
1 1/2	.145	.165	.200	.224
2	.154	.174	.218	.244
2 1/2	.203	.227	.276	.309
3	.216	.242	.300	.336
3 1/2	.226	.253	.318	.356
4	.237	.265	.337	.377
5	.258	.289	.375	.420
6	.280	.314	.432	.484
8	.322	.361	.500	.560
10	.365	.409	.593	.664
12	.406	.455	.687	.769

TABLE 5. Sustained test pressures^a for water at 23 °C (73.4 °F), ABS plastic pipe, Schedule 40

Nominal pipe size	ABS1210 ^b	ABS1316 ^b	ABS2112 ^b
<i>inch</i>	<i>psi</i>	<i>psi</i>	<i>psi</i>
1/8	860	1290	1090
1/4	830	1250	1050
3/8	670	1000	840
1/2	640	950	810
3/4	520	770	650
1	480	720	610
1 1/4	390	590	500
1 1/2	350	530	450
2	300	440	370
2 1/2	330	490	410
3	280	420	360
3 1/2	260	380	320
4	240	360	300
5	210	310	260
6	190	280	240
8	170	250	210
10	150	220	190
12	140	210	180

^a The hoop stresses used to derive these test pressures are as follows:

ABS1210 — 2140 psi

ABS1316 — 3200 psi

ABS2112 — 2700 psi

Some minor adjustments have been made to keep the pressures uniform to simplify testing.

^b See 2.2.1.3 and 5.1.4 for code designation.

4. INSPECTION AND TEST PROCEDURES

4.1. **Test conditions**—Tests shall be conducted in the standard laboratory atmosphere of 23 ± 2 °C (73.4 ± 3.6 °F) and $50 \pm$ percent relative humidity.

4.2. **Conditioning test specimens**—The test specimens shall be conditioned at 23 ± 2 °C (73.4 ± 3.6 °F) and 50 ± 5 percent relative humidity for not less than 40 hours prior to test in accordance with

Procedure A of ASTM D 618-61, *Standard Methods of Conditioning Plastics and Electrical Insulating Materials for Testing*.⁸

4.3. Dimensions—Measurements shall be made in accordance with ASTM D 2122-67, *Standard Method of Determining Dimensions of Thermoplastic Pipe*.⁸

4.3.1. Outside diameter—The outside diameter of the pipe shall be measured in accordance with section 7 of ASTM D 2122-67. The average outside diameter at any cross section on the length of the pipe is the arithmetic average of the maximum and minimum diameters at that section. The average outside diameter of the pipe is the arithmetic mean of the average diameters at all measured cross sections.

4.3.2. Wall thickness—Micrometer measurements of the wall thickness shall be made in accordance with section 4 of ASTM D 2122-67 to determine the maximum and minimum values. The wall thickness shall be measured at both ends of the pipe to the nearest 0.001 inch.

4.3.3. Wall thickness range—The wall thickness range, E, shall be calculated for each cross section as follows:

$$E, \% = \frac{A - B}{A} \times 100$$

where A and B are the maximum and minimum wall thicknesses, respectively, for each cross section. The wall thickness range shall not exceed 12 percent for any cross section measured.

TABLE 6. Sustained test pressures^a for water at 23 °C (73.4 °F), ABS plastic pipe, Schedule 80

Nominal pipe size	ABS1210 ^b	ABS1316 ^b	ABS2112 ^b
<i>inch</i>	<i>psi</i>	<i>psi</i>	<i>psi</i>
1/8	—	1960	—
1/4	—	1810	—
3/8	—	1470	—
1/2	910	1360	1150
3/4	740	1100	980
1	670	1010	850
1 1/4	560	830	700
1 1/2	500	750	640
2	430	650	550
2 1/2	450	680	570
3	400	600	510
3 1/2	370	550	470
4	350	520	440
5	310	460	390
6	300	450	380
8	260	390	330
10	250	370	320
12	240	360	310

^a The hoop stresses used to derive these test pressures are as follows:

ABS1210 — 2140 psi

ABS1316 — 3200 psi

ABS2112 — 2700 psi

Some minor adjustments have been made to keep the pressures uniform to simplify testing.

^b See 2.2.1.3 and 5.1.4 for code designation.

^c See footnotes 1 and 2, page 1.

TABLE 7. Minimum burst pressures^a for water at 23 °C (73.4 °F), ABS plastic pipe, Schedule 40

Nominal pipe size	ABS1210 ^b	ABS1316 ^b	ABS2112 ^b
<i>inch</i>	<i>psi</i>	<i>psi</i>	<i>psi</i>
1/8	2110	2420	2660
1/4	2040	2340	2570
3/8	1630	1870	2060
1/2	1560	1790	1970
3/4	1260	1450	1590
1	1180	1350	1490
1 1/4	970	1110	1220
1 1/2	870	990	1090
2	730	830	920
2 1/2	800	910	1000
3	690	790	870
3 1/2	630	720	790
4	580	670	730
5	510	580	640
6	460	530	580
8	410	470	510
10	370	420	460
12	340	390	430

^a The hoop stresses used to derive these pressures are as follows:

ABS1210 — 5240 psi

ABS1316 — 6000 psi

ABS2112 — 6600 psi

Some minor adjustments have been made to keep the pressures uniform to simplify testing.

^b See 2.2.1.3 and 5.1.4 for code designation.

TABLE 8. Minimum burst pressures^a for water at 23 °C (73.4 °F), ABS plastic pipe, Schedule 80

Nominal pipe size	ABS1210 ^b	ABS1316 ^b	ABS2112 ^b
<i>inch</i>	<i>psi</i>	<i>psi</i>	<i>psi</i>
1/8	3210	3680	4050
1/4	2960	3390	3730
3/8	2410	2750	3030
1/2	2220	2550	2800
3/4	1800	2060	2270
1	1650	1890	2080
1 1/4	1360	1560	1720
1 1/2	1230	1410	1550
2	1060	1210	1330
2 1/2	1110	1270	1400
3	980	1120	1240
3 1/2	910	1040	1140
4	850	970	1070
5	760	870	950
6	730	840	920
8	640	740	810
10	610	700	770
12	600	680	750

^a The hoop stresses used to derive these pressures are as follows:

ABS1210 — 5240 psi

ABS1316 — 6000 psi

ABS2112 — 6600 psi

Some minor adjustments have been made to keep the pressures uniform to simplify testing.

^b See 2.2.1.3 and 5.1.4 for code designation.

4.4. Sustained pressure test—Six specimens of pipe shall be tested with water at the internal pressure given in table 5 or 6. Each specimen shall be at least 10 times the nominal diameter in length, but not less than 10 inches nor greater than 3 feet between end closures, and shall bear the permanent marking as stated in section 6. The test shall be in accordance with ASTM D 1598-67 except that the pressure shall be maintained at the value given in table 5 or 6 for 1,000 hours. Pressure shall be held within plus or minus 10 psi of the appropriate table value. Failure of two of the six specimens tested constitutes failure of the test. Failure of one of the six specimens tested is cause for retest of six additional specimens. Failure of one of these six specimens constitutes failure of the test. Evidence of failure of the pipe shall be as defined in section 4 of ASTM D 1598-67 as follows:

4.4.1. Failure—Any continuous loss of pressure resulting from the transmission of the test liquid through the body of the specimen under test.

4.4.2. Ballooning—Any abnormal localized expansion of a pipe specimen while under internal hydraulic pressure.

4.4.3. Bursting—A break in the pipe with immediate loss of test liquid and continued loss at essentially no pressure.

4.4.4. Seepage or weeping—Failure that occurs through essentially microscopic breaks in the pipe wall, frequently only at or near the test pressure. At lower pressures the pipe may carry liquids without evidence of loss of the liquids.

4.5. Burst pressure—The minimum burst pressure shall be determined with at least five specimens in accordance with ASTM D 1599-62T, *Tentative Method of Test for Short-Time Rupture Strength of Plastic Pipe, Tubing, and Fittings*.⁹ The time of testing each specimen shall be between 60 and 70 seconds.

5. DEFINITIONS

5.1. General—Definitions and abbreviations are in accordance with ASTM D 883-69, *Standard Nomenclature Relating to Plastics*,⁹ ASTM D 1600-69, *Standard Abbreviations of Terms Relating to Plastics*,⁹ and Plastics Pipe Institute¹⁰ Technical Report PPI-TR1-NOV 1968, *A Glossary of Plastics Piping Terms*.¹¹

5.1.1. Hydrostatic design stress—The estimated maximum tensile stress in the wall of the pipe in the circumferential orientation due to internal hydrostatic water pressure that can be applied continuously with a high degree of certainty that failure of the pipe will not occur.

5.1.2. Pressure rating—The estimated maximum pressure that water in the pipe can exert continuously with a high degree of certainty that failure of the pipe will not occur.

5.1.3. Relation between dimensions, design stress, and pressure rating—The following expression, commonly known as the ISO equation (see ISO R161-1960, *Pipes of Plastic Materials for the Transport of Fluids*¹²), is used in this Product Standard to relate dimensions, design stress, and pressure rating:

⁹ See footnotes 1 and 2, page 1.

¹⁰ A division of The Society of the Plastics Industry, Inc., 250 Park Ave., New York, N. Y. 10017.

¹¹ See footnote 2, page 1.

¹² See footnote 4, page 1.

$$\frac{2S}{P} = \frac{OD}{t} - 1$$

Where S =design stress, psi
 P =pressure rating, psi
 OD =average outside diameter, inches
 t =minimum wall thickness, inches

5.1.4. Standard thermoplastic pipe materials designation code—The pipe materials designation code consists of the abbreviation ABS for the type of plastic, followed by the ASTM type and grade in Arabic numerals and the design stress in units of 100 psi with any decimal figures dropped. When the design stress code contains less than two figures, a zero is used before the number. Thus a complete material code consists of three letters and four figures. See 2.2.1.3.

6. MANDATORY MARKING.

Marking on the pipe shall include the following, spaced at intervals of not more than 5 feet.

- (1) The nominal pipe size (e.g., 2").
- (2) The pipe material designation code (e.g., ABS1210).
- (3) Schedule size (40 or 80 as applicable) and the pressure rating in psi for water at 23 °C (73.4 °F) (e.g., 125 psi). The pressure rating for threaded pipe shall be identified with a "T" after the value (e.g., 75T psi). When the indicated pressure rating is lower than that calculated in accordance with 5.1.3, a star shall be placed after the pressure rating.
- (4) This Product Standard designation, PS 18-69.
- (5) The manufacturer's name (or trademark) and code.
- (6) Pipe intended for transporting potable water shall include the seal of approval (or "nSf" mark) of the National Sanitation Foundation Testing Laboratory, Inc., or of some other testing laboratory accredited by Federal or State Public Health agencies. This marking shall be spaced at intervals required by the organization establishing the specifications but not more than 5 feet.¹³

7. IDENTIFICATION

In order that purchasers may identify products complying with all requirements of this voluntary Product Standard, producers choosing to produce such products in conformance with this voluntary Standard may include a statement in conjunction with their name and address on labels, invoices, sales literature, and the like. The following statement is suggested when sufficient space is available:

This ABS plastic pipe conforms to the requirements established in Product Standard PS 18-69, developed cooperatively with the industry and published by the National Bureau of Standards under the voluntary Product Standards procedures of the U.S. Department of Commerce. Full responsibility for the conformance of this product with the standard is assumed by (name and address of producer or distributor).

¹³ Manufacturers using the seal of approval of an accredited testing laboratory must obtain authorization from the laboratory concerned.

The following abbreviated statement is suggested when available space on labels is insufficient for the full statement:

Conforms to PS 18-69, (name and address of producer or distributor).

8. EFFECTIVE DATE

The effective date of a voluntary Product Standard is the date upon which reference to the Standard may be made by producers, distributors, users and consumers, and other interested parties. Compliance by producers with the requirements of a Product Standard may not actually occur until some time after the effective date. Products shall not be labeled or otherwise described as conforming to a Product Standard until such time as all applicable requirements established in the Standard are met. The effective date of this Standard is December 31, 1969.

9. HISTORY

9.1. First edition—On June 12, 1957, The Society of the Plastics Industry, Inc., requested the assistance of the Department of Commerce in the establishment of a Commercial Standard for rigid acrylonitrile-butadiene-styrene plastic pipe (IPS dimensions). With the assistance and cooperation of the industry, Commercial Standard CS 218-59 was developed and published on May 1, 1959.

9.2. Current revision—On July 11, 1967, approval was granted to process a revision of CS 218-59 in accordance with the *Procedures for the Development of Voluntary Product Standards* as published by the Department of Commerce on December 10, 1965. This revision was submitted to the National Bureau of Standards by the Plastics Pipe Institute of The Society of the Plastics Industry, Inc., to bring the Standard up to date through the incorporation of advanced technical knowledge regarding acrylonitrile-butadiene-styrene plastic pipe.

With the approval of its reconstituted Standing Committee, public announcement was made, and the recommended Product Standard was widely circulated on November 14, 1969, for consideration and acceptance. The response to this circulation recorded sufficient acceptance from producers, distributors, and users of acrylonitrile-butadiene-styrene plastic pipe to indicate success of the project.

Accordingly, on December 24, 1969, PS 18-69 *Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (Schedules 40 and 80)*, was announced to become effective on December 31, 1969.

Technical Standards Coordinator:

Karl G. Newell, Jr., Product Standards Section, Office of Engineering Standards Services, National Bureau of Standards, Washington, D.C. 20234.

10. STANDING COMMITTEE

The following individuals comprise the membership of the Standing Committee which is to review all revisions proposed to keep this Standard abreast of progress. Comments concerning the Standard and suggestions for revision may be addressed to any member of the committee or to the Office of Engineering Standards Services, National Bureau of Standards, U.S. Department of Commerce, which acts as secretary for the committee.

Representing Producers

- Frank J. Furno (Chairman), Celanese Plastics Company, 4550 Cemetery Road, Hilliard, Ohio 48026
Paul F. Finn, Kerona, Inc., 2547 West Jackson Street, Phoenix, Arizona 85009
Frank W. Reinhart, Plastics Pipe Institute, 9918 Sutherland Road, Silver Spring, Maryland 20901
E. W. Hendrick, Can-Tex Industries, P.O. Box 340, Mineral Wells, Texas 76067
Jeryl H. Zirkelbach, Cresline Plastic Pipe Company, Inc., 955 Diamond Avenue, Evansville, Indiana 47717

Representing Distributors

- James H. Peery, Central Supply Association, 221 North LaSalle Street, Chicago, Illinois 60601
W. K. Klein, Joseph T. Ryerson & Son, Inc., P.O. Box 8000-A, Chicago, Illinois 60680
Robert E. Hottle, Garden State Wholesale, Inc., 1437 Pine Street, Camden, New Jersey 08101
Robert C. Jones, Federal Corporation, 120 East Main Street, Oklahoma City, Oklahoma 73104

Representing Users

- Philip N. Shrake, Mobile Homes Manufacturers Association, 20 North Wacker Drive, Chicago, Illinois 60606
C. William Boyer, Halby Chemical Company, Inc., Terminal Avenue and Golding Street, Wilmington, Delaware 19899
Byron R. Eplett, National Association of Plumbing-Heating-Cooling Contractors, 544 Grove Avenue, Johnstown, Pennsylvania 15902
Euclid Faneuf, Whirlpool Corporation, Whirlpool Research and Engineering Center, Monte Road, Benton Harbor, Michigan 49022

General Interest

- R. N. Bowen, National Sanitation Foundation Testing Laboratory, Inc., 2355 West Stadium Boulevard, Ann Arbor, Michigan 48106
Robert E. Lyons, General Services Administration, Federal Supply Service, Standardization Division, Washington, D.C. 20405
W. K. Rodman, Department of Housing and Urban Development, Federal Housing Administration, Washington, D.C. 20411
Grover C. Sherlin, Building Research Division, National Bureau of Standards, Washington, D.C. 20234.

11. ACCEPTORS

The manufacturers, distributors, users, and others listed below have individually indicated in writing their acceptance of this Product Standard prior to its publication. The acceptors have indicated their intention to use the Standard as far as practicable, but reserve the right to depart from it when necessary. The list is published to show the extent of recorded public support for the Standard.

ASSOCIATIONS

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| ABS Institute, New York, New York | National Association of Home Builders, Washington, D.C. |
| American Institute of Supply Associations, Inc., Washington, D.C. | National Sanitation Foundation, Ann Arbor, Michigan |
| Indiana Farm Bureau Cooperative Association, Inc., Indianapolis, Indiana | Plastics Pipe Institute, New York, New York |