

U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT  
HOUSING - FEDERAL HOUSING COMMISSIONER

TO: AREA OFFICE DIRECTORS  
INSURING OFFICE DIRECTORS

Series and Series No.

USE OF MATERIALS  
BULLETIN NO. 78

Date

April 25, 1978

**SUBJECT:** POLYETHYLENE (PE), ACRYLONITRILE - BUTADIENE - STYRENE (ABS),  
POLY (VINYL CHLORIDE) (PVC) AND POLYBUTYLENE (PB) PLASTIC  
PIPING FOR DOMESTIC COLD WATER SERVICE

Members of the HUD Staff processing cases and inspecting construction shall use this information in determining acceptability of the subject material for the uses indicated.

This bulletin should be filed with Bulletins on Special Methods of Construction and Materials as required by prescribed procedures. Additional copies may be requisitioned by the field offices.

*The technical description, requirements and limitations expressed herein do not constitute an endorsement, approval or acceptance by the Department of Housing and Urban Development (HUD/FHA) of the subject matter, and any statement or representation, however made, indicating approval or endorsement by the Department of Housing and Urban Development is unauthorized and false, and will be considered a violation of the United States Criminal Code 18, U. S. C. 709.*

*Any reproduction of this Bulletin must be in its entirety and any use in sales promotion or advertising is not authorized.*

Subject to good workmanship, compliance with applicable codes, and the methods of application listed herein, the materials described in this bulletin may be considered suitable for HUD Housing Programs, including Housing for the Elderly and Care-Type Housing.

The eligibility of a property under these Programs is determined on the property as an entity and involves the consideration of underwriting and other factors not indicated herein. Thus, compliance with this bulletin should not be construed as qualifying the property as a whole, or any part thereof, as to its eligibility.

The methods of application for the materials listed herein are to be considered as part of the HUD Minimum Property Standards and shall remain effective until this bulletin is cancelled or superseded.

## SECTION I - GENERAL STATEMENT

This Bulletin sets forth the requirements and conditions for the acceptance of plastic piping for domestic cold water service manufactured from Polyethylene (PE), Acrylonitrile-Butadiene-Styrene (ABS), Poly(Vinyl Chloride) (PVC) or Polybutylene (PB)<sup>1/</sup> plastic. The information contained herein may be used as a guide by manufacturers, architects, engineers and builders seeking appropriate HUD/FHA acceptance. These materials may be used in the applications detailed in Section II. Terminology used is consistent with that of the nationally recognized model plumbing codes.

This Bulletin supersedes the following Use of Materials Bulletins:

| <u>Number</u> | <u>Subject</u>                                                                       | <u>Date</u>       |
|---------------|--------------------------------------------------------------------------------------|-------------------|
| UM 31e        | Polyethylene Plastic Pipe and Fittings for Domestic Water Service                    | September 1, 1966 |
| UM 41a        | Polyvinyl Chloride Plastic Pipe and Fittings for Domestic Water Service              | April 15, 1969    |
| UM 43         | Acrylonitrile-Butadiene-Styrene Plastic Pipe and Fittings for Domestic Water Service | November 1, 1966  |

## SECTION II - ALLOWABLE USES

PE, ABS, and PVC pipe, fittings and joining materials conforming to the standards and other publications referenced in Section III may be used for domestic cold water service piping, drop piping for jet or submersible pumps, yard hydrants, lawn or garden irrigation/sprinkler systems, swimming pool circulation piping and condensate piping for single and multifamily structures, including Housing for the Elderly and Care-type Housing. These materials may not be used for interior water distribution piping in residential buildings nor for any other application in which the temperature in the piping material may exceed 140°F (120°F for PE). PB pipe, fittings and joining materials conforming to ASTM D 3309 and this UM <sup>1/</sup> may be utilized for building cold water service piping in diameters of 2 inches and less.

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<sup>1/</sup> For Polybutylene (PB) building hot and cold water distribution piping, see UM 76.

### SECTION III - REFERENCE STANDARDS

The latest editions of the following publications, dated prior to the issue date of this Bulletin, form a part of this Bulletin:

#### ASTM<sup>2/</sup> Standards and Specifications

- D 789        Nylon Injection Molding and Extrusion Materials
- D 1527       Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
- D 1784       Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds, Rigid
- D 1785       Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40, 80 and 120
- D 1788       Rigid Acrylonitrile-Butadiene-Styrene (ABS) Plastics
- D 2104       Polyethylene (PE) Plastic Pipe, Schedule 40
- D 2146       Propylene Plastic Molding and Extrusion Materials
- D 2235       Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
- D 2239       Polyethylene (PE) Plastic Pipe (SDR-PR)
- D 2241       Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
- D 2282       Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)
- D 2464       Threaded Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- D 2465       Threaded Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 80
- D 2466       Socket-Type Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings, Schedule 40

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<sup>2/</sup>American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103

- D 2467     Socket-Type Poly(Vinyl Chloride) (PVC) and Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings Schedule 80
- D 2468     Socket-Type Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40
- D 2469     Socket-Type Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 80
- D 2564     Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- D 2581     Polybutylene (PB) Plastics
- D 2609     Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe
- D 2737     Polyethylene (PE) Plastic Tubing
- D 2774     Rec. Practice for Underground Installation of Thermoplastic Pressure Piping
- D 2855     Rec. Practice for Making Solvent Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
- D 3309     Polybutylene (PB) Plastic Hot Water Distribution Systems
- D 3350     Polyethylene Plastics Pipe and Fittings Materials
- E 119      Standard Methods of Fire Tests of Building Construction and Materials
- F 402      Rec. Practice for Safe Handling of Solvent Cements Used for Joining Thermoplastic Pipe and Fittings

Other Publications

PPI<sup>3/</sup> TR<sup>4/</sup> 8. Installation procedures for Polyethylene (PE) Plastic Pipe

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<sup>3/</sup> Plastics Pipe Institute, A Division of the Society of the Plastics Industry, 355 Lexington Avenue, New York, New York 10017

<sup>4/</sup> Technical Report (of the Plastics Pipe Institute)

|                                                                                                                  |                    |                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------------------------------------|
| PPI                                                                                                              | TR 10              | Recommended Practice for Making Solvent Cemented Joints With Polyvinyl Chloride (PVC) Plastic Pipe and Fittings |
| PPI                                                                                                              | TR 12              | Acrylonitrile-Butadiene-Styrene (ABS) Plastic Piping Design and Installation                                    |
| PPI                                                                                                              | TR 13              | Poly(Vinyl Chloride) (PVC) Plastic Piping Design and Installation                                               |
| PPI                                                                                                              | TR 16              | Thermoplastic Water Piping Systems                                                                              |
| PPI                                                                                                              | TR 17              | Thermoplastic Piping For Swimming Pool Water Circulation Systems                                                |
| PPI                                                                                                              | TR 21              | Thermal Expansion and Contraction of Plastic Pipe                                                               |
| PPI                                                                                                              | TN <sup>5/</sup> 1 | Sealants for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Piping                                               |
| PPI                                                                                                              | TN 2               | Sealants for Polyvinyl Chloride (PVC) Plastic Pipe                                                              |
| PPI                                                                                                              | TN 6               | Recommendations for Coiling Polyethylene Plastic Pipe and Tubing                                                |
| PPI                                                                                                              | TN 8               | Making Threaded Joints with Thermoplastic Pipe and Fittings                                                     |
| PPI                                                                                                              | TN 9               | Recommendations for Coiling Polyvinyl Chloride (PVC) Plastic Pipe and Tubing                                    |
| PPI                                                                                                              |                    | Plastics Piping Manual                                                                                          |
| NSF <sup>6/</sup> Standard No. 14. Thermoplastic Materials, Pipe, Fittings, Valves, Traps and Joining Materials. |                    |                                                                                                                 |

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<sup>5/</sup> Technical Note (of the Plastics Pipe Institute)

<sup>6/</sup> National Sanitation Foundation, P. O. Box 1468, Ann Arbor, Michigan 48106

## SECTION IV - MATERIALS

### A. Composition and Properties

Pipe, fittings and joint cements shall be manufactured from materials as defined in the following specifications:

| Pipe and Fitting Materials                                                                                                                                                                                                                                                                                                                                                                    | Joint Cements                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <u>Pipe Materials</u><br><p>PE - ASTM D 3350</p> <p>ABS - Type 1, Grades 2 or 3, or Type II, Grade 1: ASTM D 1788</p> <p>PVC - Classifications 12454-B, 12454-C or 14333-D: ASTM D 1784</p> <p>PB - ASTM D 2581</p>                                                                                                                                                                           |                                                                                        |
| <u>Fitting Materials</u><br><p>For PE Pipe Fittings -</p> <p>ABS Type I or II: ASTM D 1788</p> <p>NP Type I or II (except Grade 2A): ASTM D 789</p> <p>PP Type II, Grade 05207: ASTM D 2146</p> <p>PVC Type I Grade 1, Type I Grade 2, Type I Grade 3, or Type II Grade 1: ASTM D 1784</p> <p>For ABS Pipe Fittings - ABS</p> <p>Type I Grades 1, 2 or 3, or Type II Grade 1: ASTM D 1788</p> | <p>For ABS - ASTM D 2235</p> <p>For PVC - ASTM D 2564</p> <p>For ABS - ASTM D 2235</p> |

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|                                                                                                                                                                                             |                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <p>For PVC Pipe Fittings -</p> <p>Classifications 12454-B<br/>12454-C, 11443-B or<br/>14333-D: ASTM D 1784</p> <p>For Fittings for Use with PB<br/>Pipe and Tubing -</p> <p>ASTM D 3309</p> | <p>For PVC - ASTM D 2564</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|

B. Dimensional Details and Test Requirements

Dimensions, tolerances, shapes and applicable test requirements for pipe, fittings and joint cements shall conform with the following specifications:

| Pipe and Fittings                                                                                                                                                                                                                                                                                                                                   | Joint Cements                                             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| <p><u>Pipe</u></p> <p>PE - ASTM D 2104 (Schedule 40)<br/>ASTM D 2239 (SDR-PR)</p> <p>ABS - ASTM D 1527 (Schedules<br/>40 and 80)<br/>ASTM D 2282 (SDR-PR)</p> <p>PVC - ASTM D 1785 (Schedules<br/>40, 80 and 120)<br/>ASTM D 2241 (SDR-PR)</p> <p>PB - ASTM D 3309</p> <p><u>Fittings</u></p> <p>For PE Pipe -</p> <p>ASTM D 2609 (Insert Type)</p> | <p>For ABS - ASTM D 2235</p> <p>For PVC - ASTM D 2564</p> |

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|                                                                                                                                                                                                                                                                                                                                                                                        |                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|
| <p>For ABS Pipe -</p> <p>ASTM D 2468 (Socket Type, Schedule 40)</p> <p>ASTM D 2469 (Socket Type, Schedule 80)</p> <p>ASTM D 2465 (Threaded Type, Schedule 80)</p> <p>For PVC Pipe -</p> <p>ASTM D 2466 (Socket Type, Schedule 40)</p> <p>ASTM D 2467 (Socket Type, Schedule 80)</p> <p>ASTM D 2464 (Threaded Type, Schedule 80)</p> <p>For PB Pipe and Tubing -</p> <p>ASTM D 3309</p> | <p>For ABS - ASTM D 2235</p> <p>For PVC - ASTM D 2564</p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------|

## SECTION V - SYSTEM DESIGN AND INSTALLATION REQUIREMENTS

### A. General Requirements

The selection, design, installation and leak testing of plastic piping systems shall conform with all applicable requirements of the HUD Minimum Property Standards, the applicable nationally recognized model code and industry standards. A summary appendix of industry standards of good practice is being prepared, based on the referenced publications listed below.

### B. Pressure Rating

Thermoplastic piping used for domestic cold water service shall be pressure rated for at least 160 psi working pressure at 73°F.

### C. Requirements for Making Joints and Connections

The materials and installation techniques used for joining pipes and fittings shall assure adequate resistance of the completed system to leaking, and shall assure adequate resistance to joint failure from long-term exposure to the service environment. No joints shall be made in or beneath



slab or foundation. Where solvent cements are required, only cements with shelf-life marking shall be used. The recommendations of the manufacturer and applicable industry standards shall be followed in making joints and connections. Standards and other publications defining generally accepted practice include the following:

PE

PPI TR 8, Paragraph 5.2  
PPI Plastics Piping Manual, Chapter 6, Page 54

ABS

ASTM D 2235, Appendix X1  
PPI TR 12, Paragraph 6.2  
PPI Plastics Piping Manual, Chapter 4, Pages 40 and 41  
Chapter 5, Pages 48 and 49

PVC

ASTM D 2564  
ASTM D 2855  
PPI TR 10  
PPI Plastics Piping Manual, Chapter 7, Pages 59 and 60

PB

ASTM D 3309, Appendix X2  
PPI Plastics Piping Manual, Chapter 4, Pages 40 and 41  
Chapter 9, Page 68

D. Control of Expansion and Contraction

Installation procedures shall provide for accommodation of thermal expansion and contraction without compromising the essential performance of the system. Installation procedures shall be in accordance with the manufacturer's recommendations and applicable industry standards. Publications defining generally accepted practice include the following:

PE

PPI TR 21  
PPI TR 8, Paragraph 3.2  
PPI Plastics Piping Manual, Chapter 6, Page 54

ABS

PPI TR 21  
PPI TR 12, Paragraph 4.2  
PPI Plastics Piping Manual, Chapter 3, Pages 22 - 26  
Chapter 5, Page 48

PVC

PPI TR 21  
PPI TR 13, Paragraph 4.2  
PPI Plastics Piping Manual, Chapter 7, Page 58

PB

ASTM D 3309, Appendix X2  
PPI Plastics Piping Manual, Chapter 3, Pages 22 - 26  
Chapter 9, Page 68

E. Requirements for Hangers and Supports

Hangers and straps shall not damage the pipe or fittings. Supports shall be provided for horizontal piping at intervals sufficient to prevent deflections likely to interfere with drainage or leak resistance. Vertical piping shall be anchored at appropriate intervals.

Selection and installation of hangers and supports shall be in accordance with the manufacturer's recommendations and applicable industry standards. Publications defining generally accepted practice include the following:

PE

PPI TR 8, Paragraph 5.1  
PPI Plastics Piping Manual, Chapter 4, Pages 41 and 42

ABS

PPI TR 12, Paragraph 6.1  
PPI Plastics Piping Manual, Chapter 4, Pages 41 and 42  
Chapter 5, Page 50

PVC

PPI TR 13, Paragraph 6.1  
PPI Plastics Piping Manual, Chapter 4, Pages 41 and 42

F. Requirements for Underground Installation

Techniques used for trenching and backfilling shall not produce stresses and strains, or cutting or abrasive effects, likely to interfere with leak resistance or to result in structural collapse. Earth and live loads, without internal pressure, shall be less than the manufacturer's published load rating for the material and conditions of installation used. Methods used shall be in accordance with the manufacturer's recommendations and applicable industry standards. Publications defining generally accepted practice include the following:

PE

ASTM D 2774  
PPI TR 8, Paragraph 5.3  
PPI TR 16, Paragraph 4.4  
PPI Plastics Piping Manual, Chapter 4, Pages 41, 43

ABS

ASTM D 2774  
PPI TR 12, Paragraph 6.3  
PPI TR 16, Paragraph 4.4  
PPI Plastics Piping Manual, Chapter 4, Pages 41 and 43  
Chapter 5, Page 50

PVC

ASTM D 2774  
PPI TR 13, Paragraph 6.3  
PPI TR 16, Paragraph 4.4  
PPI Plastics Piping Manual, Chapter 4, Pages 41, 43

PB

ASTM D 2774  
PPI Plastics Piping Manual, Chapter 3, Pages 22 - 24  
Chapter 4, Pages 41, 43

G. Requirements for Fire Safety

The cold water piping with which this bulletin is concerned, as designed and installed in required fire rated walls and chases, shall not compromise the fire endurance ratings of such building elements as required in Section 405 of the HUD Minimum Property Standards and as evaluated by methods based on ASTM E 119, Standard Methods of Fire Tests of Building Construction and Materials.

The following construction requirements for the use of thermoplastic cold water piping shall be complied with:

1. With the exception of one and two family housing, all plastic piping installed in private and public spaces shall be installed in enclosed walls, floors, ceilings, chases or shafts complying with the fire resistance ratings of Table 4-5.1 of the Minimum Property Standards for Multifamily and Care Construction, as applicable.
2. All penetrations through required fire resistive walls, partitions or chases, which are cut to allow the passage of plastic pipe, shall not be excessively larger than required for passage of the lateral and shall be backpacked or sealed with plaster spackling or suitable non-combustible material resistant to deterioration or disruption caused by movement of the pipe.
3. Thermoplastic risers in chases more than forty feet in height shall be sleeved with galvanized steel not thinner than eighteen gauge and shall be fire-stopped and backpacked as described above at each floor where the pipe is anchored, but not less than every fourth floor. Sleeves shall be not less than four pipe diameters in length or twelve inches, whichever is greater, and shall be positioned midway in the fire-stop.
4. The pipe and fittings of a plastic piping assembly in an enclosed required fire resistive wall or chase shall have sufficient clearance so that no part of the assembly, other than the pipe lateral, penetrates the backside of the wall membrane.

Departure from the above construction requirements may be taken only on the basis of tests demonstrating that fire safety is not compromised by the proposed construction.

#### SECTION VI - HANDLING AND STORAGE REQUIREMENTS

Handling and storage shall not compromise the essential performance characteristics of pipe and fittings from exposure to sunlight, heat and cold, impact, and superimposed weight. Handling and storage methods shall be in accordance with the

manufacturer's recommendations and applicable industry standards. Publications defining generally accepted practice include the following:

PE

PPI TR 8, Paragraph 3.4.2, Paragraph 3.4.3 and Paragraph 4  
PPI TN 6  
PPI Plastics Piping Manual, Chapter 4, Page 40,  
Chapter 6, Page 54

ABS

ASTM F 402  
PPI TR 12, Paragraph 5  
PPI Plastics Piping Manual, Chapter 4, Page 40,  
Chapter 5, Page 48

PVC

ASTM F 402  
PPI TR 13, Paragraph 5  
PPI TN 9  
PPI Plastics Piping Manual, Chapter 4, Page 40

PB

ASTM D 3309, Appendix X2  
PPI Plastics Piping Manual, Chapter 4, Page 40  
Chapter 9, Page 68

SECTION VII - DETERMINATION OF COMPLIANCE

Marking

Pipe, fittings and joining materials shall be marked or labeled. in accordance with the following standards as applicable:

PE

ASTM D 2104  
ASTM D 2239  
ASTM D 2609  
ASTM D 2737

ABS

ASTM D 1527  
ASTM D 2235  
ASTM D 2282  
ASTM D 2465  
ASTM D 2468  
ASTM D 2469

PVC

ASTM D 1785  
ASTM D 2241  
ASTM D 2464  
ASTM D 2466  
ASTM D 2467  
ASTM D 2564

PB

ASTM D 3309

The marking shall indicate the applicable ASTM specification and shall show the logo of an acceptable, nationally recognized testing laboratory<sup>7/</sup>. In addition, the marking shall identify the manufacturer's name or trademark.

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<sup>7/</sup> One such testing laboratory is the National Sanitation Foundation Testing Laboratory, whose logo for thermoplastic piping materials intended for the conveyance of potable water is "NSF-pw" certifying compliance with the requirements of the standard(s) identified by the marking. This program is administered under the protocol detailed in NSF Standard No. 14, Thermoplastic Materials, Pipe, Fittings, Valves, Traps and Joining Materials.