

PVC Pipe—Design and Installation

AWWA MANUAL M23

Second Edition



**American Water Works
Association**

Science and Technology

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MANUAL OF WATER SUPPLY PRACTICES—M23, Second Edition
PVC Pipe—Design and Installation

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Foreword

This is the second edition of AWWA M23, *PVC Pipe Design and Installation*. This manual provides the user with both general and technical information to aid in design, procurement, installation, and maintenance of PVC pipe and fittings.

This manual presents a discussion of recommended practices. It is not intended to be a technical commentary on AWWA standards that apply to PVC pipe, fittings, and related appurtenances.

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This manual was developed by the AWWA Standards Committee on PVC Pressure Pipe and Fittings. The membership of the committee at the time it approved this manual was as follows:

S.A. McKelvie (Chair), Parsons Brinckerhoff Quade & Douglas, Boston, Mass.
J. Calkins, Certainteed Corporation, Valley Forge, Pa.
J.P. Castronovo, CH2M Hill, Gainesville, Fla.
G.F. Denison, Romac Industries, Inc., Bothell, Wash.
J.L. Diebel, Denver Water, Denver, Colo.
D.L. Eckstein (M23 Subcommittee Chair), The Eckstein Group, Anderson, S.C.
G. Gundel, Specified Fittings, Inc., Bellingham, Wash.
T.H. Greaves, City of Calgary Waterworks, Calgary, Alta.
D.W. Harrington, Bates & Harrington, Inc., Madison Heights, Va.
R. Holme, Earth Tech Canada, Markham, Ont.
J.F. Houle, PW Pipe, Eugene, Ore.
L.A. Kinney, Jr., Bureau of Reclamation, Denver, Colo.
J.H. Lee, Dayton & Knight Ltd., W. Vancouver, B.C.
G.J. Lefort, IPEX Inc., Langley, B.C.
M.D. Meadows (Standards Council Liaison), Brazos River Authority, Waco, Texas
E.W. Misichko, Underwriters Laboratories Inc., Northbrook, Ill.
J.R. Paschal, NSF International, Ann Arbor, Mich.
S. Poole, Epcor Water Services, Edmonton, Alta.
J.G. Richard, Jr., Baton Rouge, La.
J. Riordan, HARCO Fittings, Lynchburg, Va.
E.E. Schmidt, Diamond Plastics Corporation, Grand Island, Neb.
T. Shellenbarger, Dresser Mfg. Div., Dresser Ind., Bradford, Pa.
J.K. Snyder, Snyder Environ. Engrg. Assocs., Audubon, Pa.
J.S. Wailes (Staff Advisor), AWWA, Denver, Colo.
R.P. Walker, Uni-Bell PVC Pipe Association, Dallas, Texas
W.R. Whidden, Post Buckley Schuh & Jernigan, Orlando, Fla.
D.R. Young, Florida Cities Water Co., Sarasota, Fla.
K. Zastrow, Underwriters Laboratories Inc., Northbrook, Ill.

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Chapter **1**

General Properties of Polyvinyl Chloride Pipe

BACKGROUND

Polyvinyl chloride (PVC) was discovered in the late nineteenth century. Scientists at that time found the new plastic material unusual in that it appeared nearly inert to most chemicals. However, it was soon discovered that the material was resistant to change, and it was concluded that the material could not be easily formed or processed into usable applications.

In the 1920s, scientific curiosity again brought polyvinyl chloride to public attention. In Europe and America, extended efforts eventually brought PVC plastics to the modern world. Technology, worldwide and particularly in Germany, slowly evolved for the use of PVC in its unplasticized, rigid form, which today is used in the production of a great many extruded and molded products. In the mid-1930s, German scientists and engineers developed and produced limited quantities of PVC pipe. Some PVC pipe installed at that time continues to provide satisfactory service today. Molecularly oriented polyvinyl chloride (PVCO) pressure pipe has been installed in Europe since the early 1970s and in North America since 1991.

MATERIAL PROPERTIES OF PVC PIPE COMPOUNDS

Polyvinyl chloride pipe and fabricated fittings derive properties and characteristics from the properties of their raw material components. Essentially, PVC pipe and fabricated fittings are manufactured from PVC extrusion compounds. Injection molded fittings use slightly different molding compounds. PVCO is manufactured from conventional PVC extrusion compounds. The following summary of the material properties for these compounds provides a solid foundation for an understanding and appreciation of PVC pipe properties.

Polyvinyl chloride resin, the basic building block of PVC pipe, is a polymer derived from natural gas or petroleum, salt water, and air. PVC resin, produced by any of the common manufacturing processes (bulk, suspension, or emulsion), is combined