Steel Pipe—
A Guide for Design and Installation

AWWA MANUAL M11
Fourth Edition

American Water Works Association

Science and Technology
AWWA unites the drinking water community by developing and distributing authoritative scientific and technological knowledge. Through its members, AWWA develops industry standards for products and processes that advance public health and safety. AWWA also provides quality improvement programs for water and wastewater utilities.
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Foreword

This manual was first authorized in 1943. In 1949, committee 8310D appointed one of its members, Russel E. Barnard, to act as editor in chief in charge of collecting and compiling the available data on steel pipe. The first draft of the report was completed by January 1957; the draft was reviewed by the committee and other authorities on steel pipe. The first edition of this manual was issued in 1964 with the title Steel Pipe—Design and Installation.

The second edition of this manual was approved in June 1984 and published in 1985 with the title Steel Pipe—A Guide for Design and Installation.

The third edition of the manual was approved in June 1988 and published in 1989.

This fourth edition of the manual was approved March 2003. Major revisions to the third edition included in this edition are (1) the manual was metricized and edited throughout; (2) a discussion of Chemistry, Casting and Heat Treatment (Sec. 1.3) and a discussion of stress evaluation in spiral-welded pipe (Sec. 1.12) were added to chapter 1; (3) Table 4-1 was revised to reflect new steel grades and Charpy test requirements for pipe with wall thicknesses greater than \( \frac{1}{2} \) in. (12.7 mm); (4) calculations for external fluid pressure (Sec. 4.4) was revised to include consideration of pipe stiffness added by the cement–mortar coating and lining; (5) in Table 6-1, values of \( E' \) used for calculation of pipe deflection were revised to reflect increasing soil stiffness with increasing depth of cover; (6) in chapter 7, the discussion of ring girder design was revised, and a design example was added; (7) chapter 9, Fittings and Appurtenances, was revised to reflect the provisions of AWWA C208-96; (8) a new section on installation of flanged joints was added to chapter 12; and (9) thrust-restraint design calculations in chapter 13 were revised.

This manual provides a review of experience and design theory regarding steel pipe used for conveying water, with appropriate references cited. Application of the principles and procedures discussed in this manual must be based on responsible judgment.
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Acknowledgments

This revision of Manual M11 was made by the following members of the Steel Water Pipe Manufacturers Technical Advisory Committee (SWPMTAC). The Steel Water Pipe Manufacturers Technical Advisory Committee Task Group on updating the manual M11 had the following personnel at the time of revision:

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