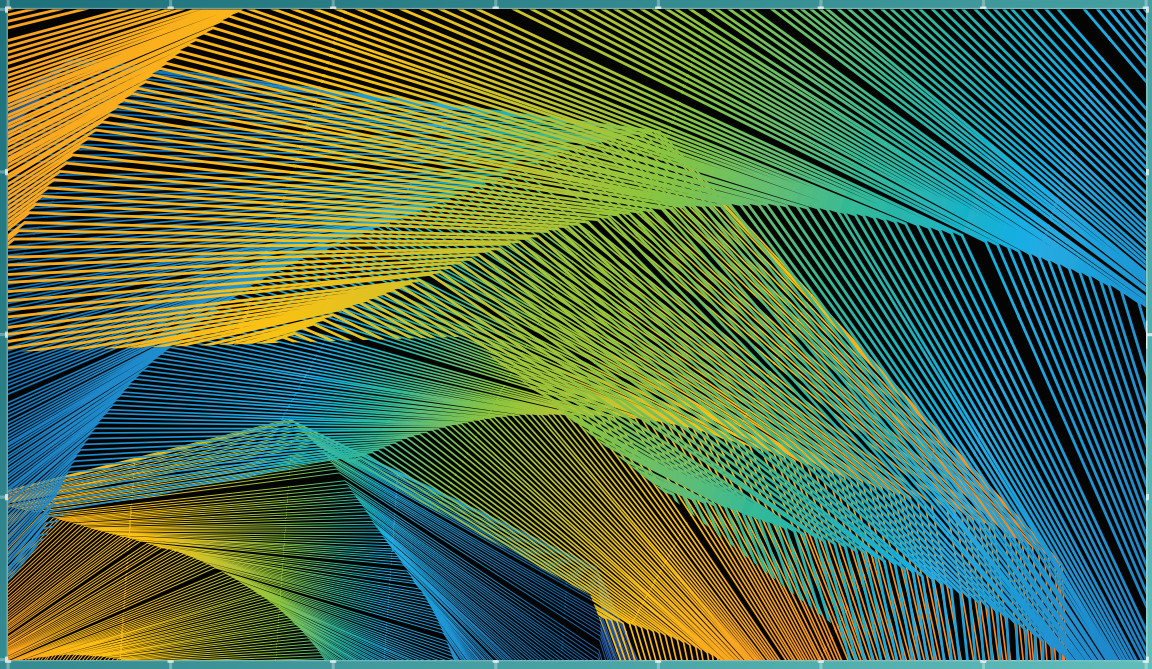
American Water Works Association

Manual of Water Supply Practices

M45

Fourth Edition



Fiberglass Pipe Design

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Manual of Water Supply Practices—M45, Fourth Edition

Fiberglass Pipe Design

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Cover Image: Mark Grenier/Shutterstock.com
Production: Innodata

Library of Congress Cataloging-in-Publication Data

Names: American Water Works Association, editor.
Title: M45 - Fiberglass Pipe Design / [edited] by American Water Works Association.
Description: First edition. | Denver, CO : American Water Works Association, [2026] | Includes bibliographical references and index. |
Identifiers: LCCN 2024030791 (print) | LCCN 2024030792 (ebook) | ISBN 9781647171957 (paperback) | ISBN 9781613007204 (pdf)
Subjects: LCSH: Water--Purification--Biological treatment.
Classification: LCC TD475 .M28 2025 (print) | LCC TD475 (ebook) | DDC 628.1/62--dc23/eng/20241023
LC record available at https://lccn.loc.gov/2024030791
LC ebook record available at https://lccn.loc.gov/2024030792

ISBN 978-1-64717-200-8 ISBN, electronic 978-1-61300-725-9
http://doi.org/10.12999/AWWA.M45ed4

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Contents

List of Figures, v

List of Tables, vii

Preface, ix

Acknowledgments, xi

Chapter 1 History and Use 1

1.1 Introduction, 1
1.2 History, 1
1.3 Applications, 2
1.4 Standards, Specifications, and Reference Documents, 2
1.5 Terminology, 7

Chapter 2 Materials, Properties, and Characteristics 9

2.1 General, 9
2.2 Characteristics, 9
2.3 The Material System, 10
2.4 Other Components, 12
2.5 Physical Properties, 12
2.6 Mechanical Properties, 14
2.7 References, 16

Chapter 3 Manufacturing 17

3.1 Introduction, 17
3.2 Filament Winding, 17
3.3 Centrifugal Casting, 20
3.4 Reference, 22

Chapter 4 Hydraulics 23

4.1 Hydraulic Characteristics, 23
4.2 Preliminary Pipe Sizing, 23
4.3 Typical Pipe Diameters, 24
4.4 Pressure Reduction Calculations, 24
4.5 Head Loss Fittings, 27
4.6 Energy Consumption Calculation Procedure, 29
4.7 Pressure Surge, 30
4.8 Design Examples, 31
4.9 References and Bibliography, 36

Chapter 5 Buried Pipe Design 39

5.1 Introduction, 39
5.2 Terminology, 40
5.3 Design Conditions, 42
5.4 Pipe Properties, 42
5.5 Installation Parameters, 43
5.6 Design Procedure, 43
5.7 Design Calculations and Requirements, 44
5.8 Axial Loads, 61

5.9 Special Design Considerations, 61
5.10 Design Example, 61
5.11 References, 67

Chapter 6 Guidelines for Underground Installation of Fiberglass Pipe 69

6.1 Introduction, 69
6.2 Related Documents, 70
6.3 Terminology, 71
6.4 In Situ Soils, 72
6.5 Embedment Materials, 73
6.6 Trench Excavation, 77
6.7 Pipe Installation, 79
6.8 Field Monitoring, 84
6.9 Contract Document Recommendations, 85
6.10 References, 86

Chapter 7 Buried Pipe Thrust Restraints 87

7.1 Unbalanced Thrust Forces, 87
7.2 Thrust Resistance, 88
7.3 Thrust Blocks, 89
7.4 Joints With Small Deflections, 91
7.5 Restrained (TIED) Joints, 94

Chapter 8 Aboveground Pipe Design and Installation 99

8.1 Introduction, 99
8.2 Thermal Expansion and Contraction, 99
8.3 Thermal Expansion Design, 100
8.4 Supports, Anchors, and Guides, 104
8.5 Bending, 109
8.6 Thermal Conductivity, 110
8.7 Heat Tracing, 110
8.8 Characteristics and Properties, 110
8.9 Design Examples, 112
8.10 References, 116

Chapter 9 Joining Systems, Fittings, and Specials 117

9.1 Introduction, 117
9.2 Fiberglass Pipe Joining Systems Classification, 117
9.3 Gasket Requirements, 118
9.4 Joining Systems, 118
9.5 Assembly of Bonded, Threaded, and Flanged Joints, 125
9.6 Fittings and Specials, 127
9.7 Service Line Connections, 130
9.8 Reference, 130

Chapter 10 Shipping, Handling, Storage, and Repair 131

10.1 Introduction, 131
10.2 Shipping, 131
10.3 Handling, 132
10.4 Storage, 135
10.5 Repair, 135

Glossary, 139

Index, 145

Manual List, 149

Figures

2-1 Typical circumferential stress–strain curves, 15
2-2 Typical axial stress–strain curves, 15
2-3 Static versus cyclic pressure testing, 16

3-1 Filament winding process, 18
3-2 Application of impregnated glass reinforcement of a filament-wound pipe, 18
3-3 Continuous advancing mandrel method, 19
3-4 Finished pipe emerging from curing oven, 20
3-5 Preformed glass reinforcement sleeve method, 21
3-6 Chopped glass reinforcement method, 21
3-7 Application of glass, resin, and sand, 22

4-1 Friction pressure loss due to water flow through fiberglass pipe, 25
4-2 Moody diagram for determination of friction factor for turbulent flow, 28

5-1 Distribution of AASHTO HS-20 or HS-25 live load through granular fill for $h \leq 45$ in. (1.14 m), 49
5-2 AASHTO HS-20 live load, soil load (120 lb/ft^3), and total load graph, 52
5-3 AASHTO HS-25 live load, soil load (120 lb/ft^3), and total load graph, 52
5-4 Cooper E80 live load, soil load (120 lb/ft^3), and total load graph, 53

6-1 Trench cross-section terminology, 72
6-2 Examples of bedding support, 80
6-3 Accommodating differential settlement, 81
6-4 Crossover of adjacent piping systems, 81
6-5 Proper compaction under haunches, 82

7-1 Thrust force definitions, 88
7-2 Typical thrust blocking of a horizontal bend, 89
7-3 Typical profile of vertical bend thrust blocking, 91
7-4 Restraint of thrust at deflected joints on long-radius horizontal curves, 92
7-5 Computation diagram for earth loads on trench conduits, 93
7-6 Restraint of uplift thrust at deflected joints on long-radius vertical curves, 94
7-7 Thrust restraint with tied joints at bends, 95
7-8 Length of tied pipe on each leg of vertical (uplift) bend, 96

8-1 Typical expansion joint installation, 102
8-2 Expansion loop dimensions, 103
8-3 Directional change, 104
8-4 Guide support, 105
8-5 Anchor support, 105
8-6 Typical support, 106

8-7 Fiberglass wear protection cradle, 108
8-8 Steel wear protection cradle, 109
8-9 Vertical support, 109

9-1 Tapered bell and spigot joint, 118
9-2 Straight bell and straight spigot joint, 119
9-3 Tapered bell and straight spigot joint, 119
9-4 Overlay joint construction, 120
9-5 Overlay joint, 120
9-6 Tapered ends overlay joint, 120
9-7 Bell and spigot overlay joint, 120
9-8 Single-gasket bell and spigot joint, 121
9-9 Single-gasket spigot, 121
9-10 Double-gasket bell and spigot joint, 121
9-11 Double-gasket spigot, 121
9-12 Gasketed coupling joint, 122
9-13 Gasketed coupling joint, cross-section, 122
9-14 Restrained gasketed bell and spigot joint, 123
9-15 Restrained gasketed coupling joint, 123
9-16 Restrained gasketed threaded bell and spigot O-ring joint, 123
9-17 Fiberglass flange to fiberglass and steel flange joint, 124
9-18 Fiberglass flanges to flanged steel valve connection, 124
9-19 Fiberglass flange with grooved face for O-ring seal, 124
9-20 Mechanical coupling joint, 124
9-21 Compression-molded fittings, 127
9-22 Flanged compression-molded fittings, 128
9-23 Mitered fitting configurations, 128
9-24 Mitered fitting, 129
9-25 Mitered fitting fabrication, 129
9-26 Mitered fittings, 129
9-27 Mitered fitting field fabrication, 130
9-28 Fittings field assembly, 130

10-1 Pipe shipment by truck, 132
10-2 Single-sling handling, 133
10-3 Double-sling handling, 133
10-4 Unitized small-diameter bundle, 133
10-5 Unitized load handling, 134
10-6 Handling nested pipes, 134
10-7 De-nesting pipes, 134
10-8 Pipe stacking, 135
10-9 Patch, 136
10-11 Steel coupling, 136
10-10 Cut out and replace, 136

Tables

2-1 Mechanical properties range, 13

4-1 Typical *K* factors for fiberglass fittings, 29

5-1 Shape factors D_f, 46
5-2 AASHTO HS-20, HS-25, and Cooper E80 live loads, 51
5-3 Soil classification chart, 55
5-4 M_{sb} based on embedment type and percent compaction, 56
5-5 Values for the soil support combining factor S_c, 58
5-6 Values for the constrained modulus of the native soil at pipe elevation, 58
5-7 Conditions and parameters for design example, 61

6-1 Soil classes, 73
6-2 Recommendations for installation and use of soils and aggregates for foundation and embedment, 74

7-1 Horizontal soil-bearing strengths, 90

8-1 Minimum support width for 120° contact supports, 108
8-2 Design example calculations, 112

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Preface

This manual is the fourth edition of AWWA Manual M45, *Fiberglass Pipe Design*. It provides the reader with both technical and general information to aid in the design, specification, procurement, installation, and understanding of fiberglass pipe and fittings. The manual is a discussion of recommended practice, not an AWWA standard calling for compliance with certain requirements. It is intended for use by utilities and municipalities of all sizes, whether as a reference book or textbook for those not fully familiar with fiberglass pipe and fitting products. Design engineers and consultants may use this manual in preparing plans and specifications for new fiberglass pipe design projects.

The manual covers fiberglass pipe and fitting products and certain appurtenances and their application to practical installations, whether of a standard or special nature. For adequate knowledge of these products, the entire manual should be studied. Readers will also find the manual a useful source of information when assistance is needed with specific or unusual conditions. The manual contains a list of applicable national standards, which may be purchased from the respective standards organizations (e.g., AWWA, ASTM, etc.).

This fourth edition includes updates to trench and soil terminology plus compaction definition changes to achieve uniformity among all piping materials. Several typographical errors were corrected.

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Acknowledgments

The American Water Works Association (AWWA) *Fiberglass Pipe Design* Manual Subcommittee, which developed this edition of the M45 manual, had the following personnel at the time:

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Chapter 1

History and Use

1.1 INTRODUCTION

Fiberglass pipe is made from glass fiber reinforcements embedded in or surrounded by cured thermosetting resin. This composite structure may also contain aggregate, granular, or platelet fillers; thixotropic agents; and pigments or dyes. By selecting the proper combination of resin, glass fibers, fillers, and design, the fabricator can create a product that offers a broad range of properties and performance characteristics. Over the years, the diversity and versatility of materials used to manufacture fiberglass pipe have led to a variety of names for fiberglass pipe. Among these are reinforced thermosetting-resin pipe, reinforced polymer mortar pipe, fiberglass-reinforced epoxy, glass-reinforced plastic, and fiberglass-reinforced plastic. Fiberglass pipes have also been categorized by the particular manufacturing process—filament winding or centrifugal casting. Frequently, the resin used to manufacture the fiberglass pipe—epoxy, polyester, or vinyl ester—has been used to classify or grade fiberglass pipes.

Regardless of the many possible combinations, the most common and useful designation is simply "fiberglass pipe." This name encompasses all the various available products and allows consideration as a unique and general class of engineering materials.

1.2 HISTORY

Fiberglass pipe was introduced in 1948. The earliest application for fiberglass piping and still one of the most widely used is in the oil industry. Fiberglass pipe was selected as a corrosion-resistant alternative to protected steel, stainless steel, and other more exotic metals. Product lines expanded to include applications of increasingly high pressure and downhole tubing with threaded connections. In the late 1950s, larger diameters became available, and fiberglass pipe was increasingly used in the chemical process industry because of the pipe's inherent corrosion-resistant characteristics.

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