

Fiberglass Pipe Design

AWWA MANUAL M45

Second 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.

MANUAL OF WATER SUPPLY PRACTICES—M45, Second Edition
Fiberglass Pipe Design

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Foreword

The American Water Works Association prepares documents, including manuals, for water supply service applications. Chapters 1 and 2 of this manual contain general information about applications other than water supply service for fiberglass pipe for informational and historical purposes. The use of this manual is intended for water supply service applications.

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Preface

This is the second edition of AWWA Manual M45, *Fiberglass Pipe Design*. This manual provides the reader with both technical and general information to aid in the design, specification, procurement, installation, and understanding of fiberglass pipe and fittings. It is a discussion of recommended practice, not an AWWA standard calling for compliance with certain specifications. 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., American Water Works Association, American Society for Testing and Materials, etc.).

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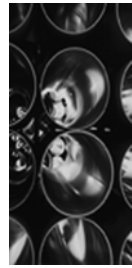
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Chapter 1

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 (RTRP), reinforced polymer mortar pipe (RPMP), fiberglass reinforced epoxy (FRE), glass reinforced plastic (GRP), and fiberglass reinforced plastic (FRP). Fiberglass pipes have also been categorized by the particular manufacturing process—filament winding or centrifugal casting. Frequently, the particular 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 of 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 down-hole 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.

Since the 1960s, fiberglass pipe products have been used for municipal water and sewage applications. Fiberglass pipe combines the benefits of durability, strength, and