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(Revision of ANSI/AWWA C111/A21.11-12)

American Water Works Association

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AWWA Standard

Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C111/A21.11.*

I. Introduction.

I.A. *Background.* Cast-iron pipe was originally made with flanged joints, using lead gaskets. Improved joints of this type are still used for many aboveground plant installations and other specialized applications.

The bell-and-spigot joint was developed in 1785 and extensively used until the 1950s. This joint was assembled by caulking yarn or braided hemp into the base of the annular bell cavity and then pouring molten lead into the remaining space inside the bell. Upon solidification, the lead was compacted by caulking, thus effecting a watertight seal. Materials other than lead have also been used to confine yarn or hemp in the base of the bell cavity.

The mechanical joint was developed for gas industry use in the late 1920s but has since been used extensively in the water industry. This joint has standardized dimensions and uses the basic principle of the stuffing box and gland, with a rubber gasket being compressed by the gland.

The roll-on joint was developed in 1937 and was used for approximately 20 years before its manufacture was discontinued. Assembly of this joint involved a compressed rubber gasket rolled under a restriction ring, followed by caulked square braided jute. The remainder of the joint was packed with a bituminous compound.

The push-on joint was developed in 1956 and represented an important advancement in the water distribution field. This joint consists of a single rubber gasket placed in a groove inside the socket at the bell end of the pipe. After lubricating the joint in accordance with the manufacturer's instructions, the plain end of the pipe is pushed through the gasket, compressing it and forming a pressure-tight seal. Assembly of the push-on joint is simple and fast. Large bell holes are not required for this joint, and it can be assembled under wet-trench conditions or even underwater.

Several special joints are available. These joints include ball and socket for submarine or stream crossings, plain-end coupled, threaded and coupled, and other variations of restrained joints

I.B. *History.* American National Standards Committee A21 on Cast-Iron Pipe and Fittings was organized in 1926 under the sponsorship of the American Gas

* American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

Association (AGA), the American Society for Testing and Materials (ASTM), the American Water Works Association (AWWA), and the New England Water Works Association (NEWWA). Between 1972 and 1984, the cosecretariats were AGA, AWWA, and NEWWA, with AWWA serving as administrative secretariat. In 1984, the committee became an AWWA committee titled AWWA Standards Committee A21 on Ductile-Iron Pipe and Fittings.

The present scope of Committee A21 activity is to develop standards and manuals that address ductile-iron pressure pipe for water supply service and ductile-iron and gray-iron fittings for use with this pipe. These standards and manuals include design, dimensions, materials, coatings, linings, joints, accessories, and methods of inspection and testing.

The work of Committee A21 is conducted by subcommittees. The scope of Subcommittee 2, Joints for Pipe and Fittings, is to examine present A21 standards that describe joints for ductile-iron pressure pipe and ductile-iron and gray-iron fittings to determine what is needed to bring them up to date. These examinations should include related matters concerning joints for ductile-iron pressure pipe and ductile-iron and gray-iron fittings.

ANSI/AWWA C111/A21.11 was initially approved on July 16, 1953. The standard was subsequently reviewed, revised, and reissued in 1964, 1972, 1980, 1985, 1990, 1995, 2000, and 2007. This tenth edition was approved by the AWWA Board of Directors on Jan. 14, 2017.

During 1979, Committee A21 reached an agreement on a proposed new requirement for the marking of bolts and nuts that was generally acceptable to the bolt manufacturing industry. The significance of this change and other considerations led to approval of the 1980 revision.

The major changes in the 1980 edition were (1) inclusion of metric conversions; (2) inclusion of reduced ductile-iron mechanical-joint pipe bell thicknesses that are compatible with pipe barrel thicknesses; (3) inclusion of tee-head bolts with reduced shank diameters that are properly sized to accept rolled threads; (4) minimum elongation increased to 5 percent for ductile-iron glands; (5) deletion of the 2-in. and 2½-in. sizes; and (6) marking requirements for the tee-head bolts and nuts.

A 1984 addendum was issued to increase the thread length on ⅝-in. × 3-in. and ¾-in. × 3½-in. tee-head bolts by ¼ in. and to permit polygon-shaped bells on fittings.

The major revisions in the 1985 edition included the addition of Sec. 11-1.3, Modifications to Push-on and Mechanical Joints; revision of Sec. 11-2.5 defining the manufacturer as the party that produces joints according to this standard; and the addition