

ANSI A21.52-1981
Revision of A21.52-1976

**American National Standard for
DUCTILE-IRON PIPE,
CENTRIFUGALLY CAST,
IN METAL MOLDS OR
SAND-LINED MOLDS
FOR GAS**

SECRETARIATS
American Gas Association
American Water Works Association
New England Water Works Association

Revised Edition Approved By
American National Standards Institute
November 3, 1981

A.G.A. Catalog No. X 60282

American National Standard

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**AMERICAN GAS ASSOCIATION
AMERICAN WATER WORKS ASSOCIATION
NEW ENGLAND WATER WORKS ASSOCIATION**

Revised edition approved by
American National Standards Institute, Inc.
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COMMITTEE PERSONNEL

Subcommittee 1, Pipe, which reviewed this standard, had the following personnel at that time:

Edward C. Sears, Chairman
Walter Amory, Vice-Chairman

User Members

W. Amory
R. Bryant
F. E. Dolson
L. J. Dosedlo
H. J. Forr
G. F. Keenan
W. H. Smith

Producer Members

W. D. Goode
T. D. Holmes
H. Kennedy, Jr.
P. I. McGrath, Jr.
J. H. Miller
L. L. Neeper
E. C. Sears
T. F. Stroud
T. Upchurch
T. B. Wright

Standards Committee A21, Cast Iron Pipe and Fittings, which reviewed and approved this standard, had the following personnel at the time of approval:

Arnold M. Tinkey, Chairman
Thomas D. Holmes, Vice-Chairman
John I. Capito, Secretary

Organization Represented

American Gas Association
American Society of Mechanical Engineers
American Society for Testing and Materials

American Water Works Association

Name of Representative

Harry J. Forr
James S. Vanick
Ben C. Helton+
Joseph J. Palmer+
Gerald S. Allen
Robert A. Arthur
Donald R. Boyd
Kenneth W. Henderson
John Porter Hennings
Raymond J. Kocol
Robert L. Lee
W. Harry Smith
Arnold M. Tinkey
David L. Tippin
Lloyd W. Weller
Thomas D. Holmes
Harold Kennedy, Jr.
Philip I. McGrath, Jr.
Leland L. Neeper
Troy F. Stroud
Thurman Upchurch
Albert Helt*
Stanley C. Baker
Lee J. Dosedlo
W. Carey*
W. F. Semenchuk+

Ductile Iron Pipe Research Association

Individual Producers
New England Water Works Association
Naval Facilities Engineering Command
Underwriters Laboratories, Inc.

Canadian Standards Association

*Alternate

+ Liaison representative without vote

TABLE OF CONTENTS

	Page Number
Committee Personnel	ii
Foreword	
I. History of Standard	iv
II. Major Revisions	iv
III. Options	iv
Standard	
52-1 Scope	1
52-2 Definitions	1
52-3 General Requirements	1
52-4 Inspection and Certification by Manufacturer	1
52-5 Inspection by Purchaser	2
52-6 Delivery and Acceptance	2
52-7 Tolerances or Permitted Variations	2
52-8 Coating	2
52-9 Hydrostatic Test	3
52-10 Air Test	3
52-11 Marking Pipe	3
52-12 Acceptance Tests	3
52-13 Additional Control Tests by Manufacturer	4
52-14 Foundry Records	4
52-15 Additional Tests Required by Purchaser	4
52-16 Defective Specimens and Retests	4
52-17 Rejection of Pipe	4
52-18 Determining Rejection	4
Tables	
1 Selection Table for Mechanical—Joint Ductile Iron Pipe	8
2 Standard Thickness Selection Table for Ductile- Iron Pipe	10
3 Standard Dimensions and Weights of Mechanical- Joint Ductile-Iron Pipe	11
Appendix A Tables	
A1 Pipe Thicknesses Required for Different Tap Sizes as per ANSI B2.1 for Standard Taper Pipe Threads with Two, Three, and Four Full Threads	13
Appendix B Metric Tables	
1M Selection Table for Mechanical-Joint Ductile-Iron Pipe	17
2M Standard Thickness Selection Table for Ductile- Iron Pipe	19
3M Standard Dimensions and Masses of Mechanical-Joint Ductile-Iron Pipe	20
A1M Pipe Thicknesses in Millimeters Required for Different Tap Sizes As Per ANSI B2.1 For Standard Taper Pipe Threads With Two, Three, and Four Full Threads	23
Figures	
1 Tensile-Test Specimen	6
2 Impact Test Specimen	7
Figures Metrics	
1M Tensile-Test Specimen	15
2M Impact Test Specimen	16

FOREWARD

This foreward is for information only and is not a part of ANSI A21.52.

I. HISTORY OF STANDARD

American National Standards Committee A21 on Cast-Iron Pipe and Fittings was organized in 1926 under the sponsorship of the American Gas Association, the American Society for Testing and Materials, the American Water Works Association and the New England Water Works Association. Since 1972, the co-secretariats have been A.G.A., AWWA, and NEWWA. AWWA is the administrative secretariat. The present scope of Committee A21 activity is:

Standardization of specifications for cast-iron and ductile-iron pressure pipe for gas, water and other liquids, and fittings for use with such pipe. These specifications to include design, dimensions, materials, coatings, linings, joints, accessories, and methods of inspection and test.

The work of Committee A21 is carried out by subcommittees. The directive to Subcommittee 1—Pipe is:

The scope of the Subcommittee activity shall include the periodic review of all current A21 standards for pipe, the preparation of revisions or new standards when needed, as well as other matters pertaining to pipe standards.

The first edition of A21.52, the standard for ductile-iron pipe for gas, was issued in 1965, and revisions were issued in 1971 and 1976. The 1976 revision reflected changes in the standard thickness Classes converting from Class 1, 2, etc. to Class 50, 51, 52, etc. The standard laying conditions were renamed: "A" became "Type 1" and "B" became "Type 2". Some thicknesses were also changed to conform to the 1976 changes in ANSI/AWWA C150/A21.50. The design stresses and design safety factors are unchanged from the 1971 Edition. Subcommittee 1 reviewed this standard and submitted a proposed revision to American National Standards Committee A21 in 1980.

II. MAJOR REVISIONS

1. Metric Conversion. Metric conversions of all dimensions and physical requirements are included in this standard. Metric conversions of figures and tables are shown in Appendix B. Metric dimensions are direct conversions of customary U.S. inch-pound units and are not those specified in the International Standards Organization (ISO) standards.
2. Three inch pipe with 12-ft. laying length has been deleted.
3. Bell weights vary due to differences in bell design. Bell weights in this standard have been revised to indicate the minimum bell weights produced in accordance with ANSI/AWWA C111/A21.11-1979.
4. Mechanical Joint Glands and Bolts. Follower glands shall be of ductile iron and bolts and nuts shall be low alloy high strength steel as specified in ANSI Specification A21.11 of latest revision.

III. OPTIONS

This standard includes certain options which, if desired, must be specified on the purchase order. Also, a number of items must be specified to describe completely the pipe required. The following summarizes these details and available options, and lists the sections of the standard where they can be found.

1. Size, thickness or class and laying length (Tables).
2. Special joints (Sec. 52-3.1).
3. Certification by manufacturer (Sec. 52-4.2).
4. Inspection by purchaser (Sec. 52-5).

5. Coating (Sec. 52-8.1).
6. Special coating (Sec. 52-8.2).
7. Special marking on pipe (Sec. 52-11).
8. Written transcripts of foundry records (Sec. 52-14).
9. Special tests (Sec. 52-15).

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AMERICAN NATIONAL STANDARD for DUCTILE-IRON PIPE CENTRIFUGALLY CAST, IN METAL MOLDS OR SAND-LINED MOLDS FOR GAS

Sec. 52–1 Scope

This standard covers 3 inch through 24 inch Mechanical Joint ductile-iron pipe, centrifugally cast, in metal molds or sand-lined molds for gas. This standard may be used for pipe with such other types of joints as may be agreed upon at the time of purchase.

Sec. 52–2 Definitions

Under this standard, the following definitions shall apply:

52–2.1 Ductile-iron. A cast ferrous material in which a major part of the carbon content occurs as free carbon in nodular or spheroidal form.

52–2.2 Inspector. The representative of the purchaser, authorized to inspect in behalf of the purchaser, to determine whether or not the pipe meets this standard.

52–2.3 Manufacturer. The party that produces the pipe.

52–2.4 Mechanical-Joint. The gasketed and bolted joint as detailed in ANSI/AWWA C111/A21.11 of latest revision.

52–2.5 Purchaser. The party entering into a contract or agreement to purchase pipe according to this standard.

Sec. 52–3 General Requirements

52–3.1 Pipe with mechanical joints shall conform to the applicable dimensions and weights shown in this standard and to the applicable requirements of ANSI/AWWA C111/A21.11 of latest revision. Unless otherwise specified, follower glands for the mechanical joint shall be ductile-iron and bolts and nuts shall be low alloy, high strength steel as specified in ANSI/AWWA Standard C111/A21.11 of latest revision. Pipe with other types of joints shall comply with the joint dimensions and weights agreed upon at the time of purchase, but in all other respects shall fulfill the requirements of this standard.

52–3.2 The nominal laying length of the pipe shall be as shown in the tables. A maximum of 20 percent of the total number of pipe of each size specified in an order may be furnished as much as 24 inches (610 mm) shorter than the nominal laying length and an additional 10 percent may be furnished by as much as 6 inches (152 mm) shorter than nominal laying length.

Sec. 52–4 Inspection and Certification by Manufacturer

54–4.1 The manufacturer shall establish the necessary quality control and inspection practice to assure compliance with this standard.

52-4.2 The manufacturer shall, if required on the purchase order, furnish a sworn statement that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of this standard.

52-4.3 All pipe shall be clean and sound without defects which will impair their service. Repairing of defects by welding or other method shall not be allowed if such repairs will adversely affect the serviceability of the pipe or its capability to meet strength requirements of this standard.

Sec. 52-5 Inspection by Purchaser

52-5.1 When the purchaser desires to inspect pipe at the manufacturer's plant, the purchaser shall so specify on the purchase order, stating the conditions (such as time, and the extent of inspection) under which the inspection shall be made.

52-5.2 The inspector shall have free access to those parts of the manufacturer's plant which are necessary to assure compliance with this standard. The manufacturer shall make available for the inspector's use such gages as are necessary for inspection. The manufacturer shall provide the inspector with assistance as necessary for handling of pipe.

Sec. 52-6 Delivery and Acceptance

All pipe and accessories shall comply with this standard. Pipe and accessories not complying with this standard shall be replaced by the manufacturer at the agreed point of delivery. The manufacturer shall not be liable for shortages or damaged pipe after acceptance at the agreed point of delivery except as recorded on the delivery receipt or similar document by the carrier's agent.

Sec. 52-7 Tolerances or Permitted Variations

52-7.1 **Dimensions.** The spigot end, bell and socket of the pipe and the accessories shall be gaged with suitable gages at sufficiently frequent intervals to assure that the dimensions comply with the requirements of this standard.

The smallest inside diameter of the sockets and the outside of the spigot ends shall be tested with circular gages. Other socket dimensions shall be gaged as appropriate.

52-7.2 **Thickness.** Minus thickness tolerances of pipe and bell shall not exceed those shown below:

Size, Inch	Inch	Minus Tolerance, (mm)
3-8	0.05	(1.3)
10-12	0.06	(1.5)
14-24	0.07	(1.8)

An additional minus tolerance of 0.02 in. (0.5 mm) shall be permitted along the barrel of the pipe for a distance not to exceed 12 in. (305 mm).

52-7.3 **Weight.** The weight of any single pipe shall not be less than the tabulated weight by more than 6 percent for pipe 12 inches or smaller in diameter, nor by more than 5 percent for pipe larger than 12 inches in diameter.

Sec. 52-8 Coating

52-8.1 **Outside coating.** Unless otherwise specified on the purchase order, pipe may be coated on the outside at the manufacturer's option with an asphaltic coating approximately one mil (25 μ m) thick. The finished coating shall be continuous, smooth, neither brittle when cold nor sticky when exposed to the sun and shall be strongly adherent to the pipe.

52-8.2 **Special coating.** For special conditions, other types of coatings may be available. Such special coatings shall be specified in the invitation for bids and on the purchase order.

Sec. 52-9 **Hydrostatic Test**

Each pipe shall be subjected to a hydrostatic test of not less than 500 psi (3.45 MPa). The pipe shall be under the full test pressure for at least 10 seconds. Suitable controls and recording devices shall be provided so that the test pressure and duration may be adequately ascertained. Any pipe that leaks or does not withstand the test pressure shall be rejected.

Sec. 52-10 **Air Test**

In addition to the hydrostatic test, each length of pipe and its socket sealing surface shall be subjected to an air test prior to coating. These tests may be made simultaneously or separately at the manufacturer's option. The air test pressure shall be a minimum of 50 psi (0.34 MPa). The joint sealing surface test shall be made in such a manner as to assure no leakage when the joint is properly assembled. The pipe shall be under the test pressure a sufficient length of time to permit careful inspection for leakage. While under this air pressure, the pipe shall be immersed in water or covered with a soapy water solution. Any length of pipe that leaks shall be rejected.

Sec. 52-11 **Marking Pipe**

The weight, class or nominal thickness, and casting period shall be shown on each pipe. The manufacturer's mark, the year in which the pipe was produced and the letters "DI" or "DUCTILE" shall be cast or stamped on the pipe. When specified on the purchase order, initials not exceeding four in number shall be cast or stamped on the pipe. All required markings shall be clear and legible and all cast marks shall be on or near the bell.

All letters and numerals on pipe sizes 14 in. and larger shall be not less than ½-in. (12.7 mm) in height.

Sec. 52-12 **Acceptance Tests**

The standard acceptance tests for the physical characteristics of the pipe shall be as follows:

52-12.1 **Tensile test.** A tensile test specimen shall be cut longitudinally from the midsection of the pipe wall. This specimen shall be machined and tested in accordance with Figure 1 and ASTM (American Society for Testing and Materials) designation E8-79 Tension Testing of Metallic Materials. The yield strength shall be determined by the 0.2% offset, half of pointer, or extension under load methods. If check tests are to be made, the 0.2% offset method shall be used. All specimens shall be tested at room temperature (70 ± 10F), (21 ± 6C).

52-12.1.1 **Acceptance values.** The acceptance values for test specimens shall be as follows:

Grade of Iron	Tensile Strength, Minimum psi (MPa)	Yield Strength, Minimum psi (MPa)	Per Cent Elongation, Minimum
60-42-10	60,000 (413.7)	42,000 (289.6)	10

52-12.2 **Impact test.** Tests shall be made in accordance with ASTM designation E-23-78 Notched Charpy Tests, except that specimens shall be 0.500 inch (12.7 mm) and full thickness of pipe wall. The notched impact test specimen shall be in accordance with Figure 2. In cases when the pipe wall thickness exceeds 0.40 inch (10.2 mm) the impact specimen may be machined to a nominal thickness of 0.40 inch (10.2 mm). In all tests,