

USASI
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USA STANDARD

for

GRAY IRON AND DUCTILE IRON FITTINGS 3-INCH THROUGH 24-INCH FOR GAS

1968

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APPROVED

UNITED STATES OF AMERICA STANDARDS INSTITUTE
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Sponsors

American Gas Association
American Society for Testing and Materials
American Water Works Association
New England Water Works Association

USA STANDARD

A USA Standard implies a consensus of those substantially concerned with its scope and provisions. The consensus principle extends to the initiation of work under the procedure of the Institute, to the method of work to be followed, and to the final approval of the standard.

A USA Standard is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of a USA Standard does not in any respect preclude any party who has approved of the standard from manufacturing, selling, or using products, processes, or procedures not conforming to the standard.

A USA Standard defines a product, process, or procedure with reference to one or more of the following: nomenclature, composition, construction, dimensions, tolerances, safety, operating characteristics, performance, quality, rating, certification, testing, and the service for which designed.

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Published by American Gas Association, Inc.

FOREWORD

(This Foreword is not a part of A21.14 USA Standard for Gray Iron & Ductile Iron Fittings, 3-inch Through 24-inch, for Gas.)

This Standard has a history closely related to the USA Standard for Cast Iron Pipe Centrifugally Cast in Metal Molds for Gas, A21.7-1962, and to the USA Standard for Cast Iron Pipe Centrifugally Cast in Sand-Lined Molds for Gas, A21.9-1962, and the following is an excerpt from the Foreword of these Standards:

"Standard specifications for gas pipe and fittings were adopted by the American Gas Institute in October 1913 and later revised and adopted by the American Gas Association. The last revision was issued as 'American Gas Association Standard Specifications for Cast Iron Pipe and Special Castings, 1929.' These standards covered bell and spigot, flanged pipe and fittings of one thickness class. Dimensions and weights were given for pipe and fittings.

"In 1926, the ASA Sectional Committee on Cast Iron Pipe and Fittings, A21, was organized. The sponsor societies were the American Gas Association, the American Society for Testing and Materials, the American Water Works Association, and the New England Water Works Association. Sectional Committee A21 was assigned the following scope:

"Unification of specifications for cast iron pipe including materials, dimensions, pressure ratings, methods of manufacture (including such new developments as centrifugal casting) insofar as they may be necessary to secure satisfactory specifications, elimination of unnecessary sizes and varieties, consideration of the possibility of developing a coordinated scheme of metallic pipe and fittings applicable to all common mediums, and methods of making up joints insofar as they are determining as to the dimensional design of cast iron pipe.

"The types of cast iron pipe to include bell and spigot pipe, flanged pipe, flanged and bell mouth fittings and wall castings, pipe elbows, tees, Y's, return bends, and other fittings not now included in standard lists; cast iron pipe threaded for flanges or couplings. The standardization is not to include methods of installing pipe and similar matters, except as to

the making up of joints in its relationship to the dimensional standardization of pipe and fittings, as noted above.

"The Sectional Committee made many tests of pipe and fittings; these included tests of pipe under combined earth load and internal pressures on which the design of pipe thicknesses are based, corrosion tests, hydraulic friction loss in fittings and bursting tests of pipe and fittings. After exhaustive study of the test results and other research work, the committee in 1939 issued the American Standard Practice Manual for the Computation of Strength and Thickness of Cast Iron Pipe, A21.1. This design method is applicable to pipe of any strength iron, although the pipe specifications are written for 11/31 strength iron for pit cast pipe and 18/40 strength iron for centrifugally cast pipe.

"Discussions and interpretations of the ASA method of design of cast iron pipe were published in 1939 and presented to the American Gas Association and to the American Water Works Association. As a result of these publications and general acceptance of American Standard A21.1, a substantial volume of cast iron pipe was designed by the new method and furnished to manufacturers' standards between 1939 and 1953. Work on standards for centrifugally cast pipe was started after the design was finalized in 1939, but with the advent of war and other causes the standards were not formally issued until 1953."

While the above cast iron pipe standards were being developed, the USASI Sectional Committee also was developing the USA Standard for Cast-Iron Fittings, 2-inch Through 48-inch, for Water and Other Liquids, A21.10-1964, and the Foreword to it contains much history and test data pertinent to this Standard. Those interested in the details of this history, the test results that validate the pressure ratings adopted, etc., will find it interesting to procure A21.10-1964 and familiarize themselves with it. Briefly, it can be stated that the iron strengths and the fitting designs will provide a factor of safety in bursting of at least three times the rated pressure.

the history of Standards for gas fittings is reviewed, it will be noted they have followed and generally conformed to the water fitting designs and requirements. The American Gas Association Standard revised 1929 provided only one thickness and this was equivalent to the Class A 100'-head water pipe thickness shown in the then current American Water Works Association Standard. There was no mention of pressure in this A.G.A. Standard for Fittings and no pressure testing of the fittings was required. As gas distribution pressures increased over the years, the A.G.A. Standard became obsolete and gas companies naturally turned to the Mechanical Joint short body water fittings which were available and were first standardized in USASI A21.10 in 1952. The relatively heavy-walled cast iron fittings 3" to 12" shown in this Standard have been used regularly in service for many years and have an excellent record of reliability. It will be noted that Ductile Iron fittings also now are available in the 3" to 12" sizes for those who have special need or prefer a stronger, tougher fitting.

In the sizes 16" to 24", only Ductile Iron fittings are specified and this allows for greater assurance of strength without the undue burden of excessive weight.

Note that each fitting shall be subjected to an air test.

Information Required from the Purchaser

This Standard includes certain options which, if desired, must be specified on the purchase order.

These options are listed below:

<u>Design Detail</u>	<u>Section in Standard</u>
Size and Type	Tables
Special Joints	14-3.1
Type of Iron	14-3.2
Special Design	14-3.3
Certification by Manufacturer	14-4.2
Inspection by Purchaser	14-5.1
Special Coatings	14-8
Choice of Tests	14-11.1.3
Additional Tests	14-13

Special Service Requirements

The following special service requirements should be noted:

1. The fittings for which this Standard is intended are those normally used in the distribution of gas. Fittings for other services may require special considerations by the purchaser.
2. Although this Standard does not specifically orient the bolt holes in the flanges of the mechanical joint, it is at times convenient or necessary to have the bolt holes oriented. The usual but not universal practice is to have the bolt holes straddle the vertical centerline of the fittings and valves. (The vertical centerline of a fitting is determined when the fitting is in the position to change the direction of gas flow in a horizontal direction. With standard base bends and standard base tees, the vertical centerline is determined when the fitting is in a position to change the gas flow in a vertical direction.) If a specific orientation is necessary, it should be stated on the purchase order.

COMMITTEE PERSONNEL

Subcommittee 3, which developed this Standard, had the following personnel at that time:

Herbert W. Stuart, Chairman 1961-1966
Carl A. Henrikson, Chairman 1967-1968
Vance C. Lischer, Vice-Chairman

User Members

John W. Carroll
Richmond C. Holcombe
Vance C. Lischer
S. Logan Kerr
George F. Keenan

Producer Members

John C. Fay, Jr.
Tom D. Holmes
Albert H. Smith, Jr.
Arthur Roberts, Jr.
Charles W. Wright

Standards Committee A21 on cast-iron pipe and fittings, which approved this Standard, had the following personnel at the time of approval:

Kenneth W. Henderson, Chairman
Wallace T. Miller, Vice-Chairman
James B. Ramsey, Secretary

Organization Represented

American Gas Association
American Society of Civil Engineers
American Society of Mechanical Engineers
American Society for Testing and Materials
American Water Works Association
Cast Iron Pipe Research Association

Manufacturers' Standardization Society
of the Valve and Fittings Industry
New England Water Works Association
Naval Facilities Engineering Command,
Department of the Navy
Independent Producer
Independent Producer
Underwriters' Laboratories
Canadian Standards Association

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Richmond C. Holcombe
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USA STANDARD
for
GRAY IRON AND DUCTILE IRON FITTINGS
3-INCH THROUGH 24-INCH
FOR GAS

14-1. Scope

This standard covers 3-inch through 12-inch gray iron and 3-inch through 24-inch ductile iron fittings to be used with cast-iron and ductile-iron pipe for gas. All gray iron fittings and 16-, 20- and 24-inch ductile iron fittings in this standard are shown for rated working pressures of 150 psi. Ductile iron fittings 12-inches and smaller are shown for rated working pressures of 250 psi. Gray iron and ductile iron drip pot fittings are shown in sizes 4-inch through 12-inch for rated working pressures of 50 psi. Fittings with mechanical joints are given in the tables. This standard may be used for fittings with such other joints as may be agreed upon at the time of purchase.

14-2. Definitions

Under this standard, the following definitions shall apply:

14-2.1 Purchaser. The party entering into a contract or agreement to purchase fittings according to this standard.

14-2.2 Manufacturer. The party that produces the fittings.

14-2.3 Inspector. The representative of the purchaser, authorized to inspect in behalf of the purchaser to determine whether or not the fittings meet this standard.

14-2.4 Heat. The period during which fittings are cast and the melting unit is operated continuously.

14-2.5 Mechanical Joint. A bolted joint of the stuffing box type as detailed in Table 1 and as described in USA Standard A21.11-1964.

14-3. General Requirements

14-3.1 Fittings with mechanical joints shall conform to the dimensions and weights shown in the tables in this standard unless otherwise agreed upon at the time of purchase. The mechanical joint also shall conform in all respects to USA Standard A21.11-1964. Fittings with other types of joints shall comply with the joint dimensions and weights agreed upon but in all other respects shall fulfill the requirements hereinafter given.

14-3.2 Fittings shall be cast from gray iron or ductile iron, as shown in the tables. When both are shown in the tables, either may be used at the manufacturers' option unless otherwise specified on the purchase order.

14-3.3 Standard fittings will be furnished with end combinations shown in the tables. When fittings of non-standard design are ordered, it is the obligation of the purchaser to supply with each order the specific details for each size, pressure rating, or kind of fitting.

14-4. Inspection and Certification by Manufacturer

14-4.1 The manufacturer shall establish the necessary quality control, cleaning and inspection practices to assure compliance with this standard. All castings shall be clean and sound without defects which will impair their service. Repairing of such defects by plugging or welding shall not be allowed.

14-4.2 The manufacturer shall, if required on the purchase order, certify that the inspection and all the specified tests have been made and the results thereof comply with the requirements of this standard.