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AN AMERICAN NATIONAL STANDARD

Hydrants for Utility and Maintenance Use

ANSI/ASME A112.21.3M - 1985

(REVISION OF ANSI A112.21.3 - 1976)

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THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

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FOREWORD

(This Foreword is not part of ANSI/ASME A112.21.3-1985.)

In the broadest definition, a hydrant, as covered by this Standard, is a device with a water supply shut-off valve and with a means to connect a hose in a safe and sanitary manner. Hydrants covered herein serve as utility hose terminals for general building and grounds maintenance. This Standard does not cover fire hydrants (plugs).

As the building industry became more sophisticated, it was apparent that convenient water supply was necessary at various locations in the building walls and in the grounds surrounding the buildings. This requirement spurred the development of hydrants for both wall and ground installations.

Two general categories were established:

(1) nonfreeze (frost proof) hydrants designed to be installed in areas which are subject to freezing temperatures;

(2) hydrants for wall and ground installations in areas where freezing temperatures are not encountered.

Hydrants are equipped with removable operating keys or handles to discourage misuse and vandalism.

Many hydrants installed directly in the walls of buildings are equipped with attractive functional boxes to enclose the hydrant head, thereby concealing the nozzle so that it presents neither a displeasing appearance nor an obstruction on the wall. Ground or yard hydrants are similarly equipped to conceal and protect the nozzles. Post hydrants were developed to provide easy access to water supply where concealment is not a factor.

The American National Standards Committee A112 was organized July 27, 1955 for the standardization of plumbing materials and equipment. The first organizational meeting was held on July 22, 1958. At the meeting on May 1, 1964, Panel No. 21 was created to establish standards on roof drains, floor drains, backwater valves, and other drainage specialties. Its scope was as follows: the recommendation of suitable existing standards, in cooperation with interested sponsors, or the development of adequate new standards as are needed for roof drains, floor drains, and other drains as used or installed in plumbing systems. The Committee has since been reorganized as an ASME Standards Committee.

This Standard was revised and approved by Panel 21, the ASME A112 Standards Committee, and ASME. Subsequently this modified version was adopted by the American National Standards Institute on January 25, 1985.

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CONTENTS

Foreword iii
Standards Committee Roster v

1 Scope and Purpose 1
2 Definitions 1
3 Connections 2
4 Materials 2
5 Variations 8
6 Testing and Operation 9
7 General Requirements 9

Figures

1 Schematic Illustration of Basic Elements of a Hydrant (Details Vary With Type and Manufacturer) 3
2A Recommended Installation With Valve Behind Building Wall in Heated Area to Prevent Freezing (Exposed Head) 4
2B Recommended Installation With Valve Behind Building Wall in Heated Area to Prevent Freezing (Concealed Head) 4
2C Recommended Installation in Walls Where There Is No Danger of Freezing 4
2D Recommended Installation (Plan View) With Valve Behind Building Wall in Heated Area to Prevent Freezing 5
2E Recommended Installation in Walls Where There Is No Danger of Freezing 5
2F Recommended Installation With Valve Below Frost Line to Prevent Freezing (Box Type) 6
2G Recommended Installation With Valve Below Frost Line to Prevent Freezing (Post Type) 6
3A Thread or Solder Union Elbow 6
3B Straight Inlet Connection, Integral With Valve Housing 7
3C Combination Straight or Union Elbow 7
3D Ground Hydrant Inlet Connection 7
3E Thread or Solder Elbow 7
3F Straight and Angle Outlet Connection 8

Tables

1 Nominal Size of Outlet Connection 2
2 Discharge Capacity Test 9
3 Life Test 9

Appendix

I Metric (SI) Conversion Table 10

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AN AMERICAN NATIONAL STANDARD

AN AMERICAN NATIONAL STANDARD

HYDRANTS FOR UTILITY AND MAINTENANCE USE

1 SCOPE AND PURPOSE

1.1 Scope

The scope of this Standard is the development of standards for hydrants including nonfreeze wall, ground, post, and floor types and moderate climate wall and floor types, which are used in buildings and grounds as water supply terminals, employed principally for lawn and flower bed watering hoses and normal building maintenance functions.

This Standard covers definitions, connections, materials, variations, testing and operation, and general requirements for the hydrant types included in the scope.

1.2 Purpose

The purpose of this Standard is to supply plumbing code authorities and others with full knowledge of the minimum design and quality criteria for hydrants necessary for sound performance and safe and sanitary installations. It is not intended as a specification guide.

NOTES:
(1) Figures used in this Standard are intended only to describe and portray typical hydrants and are not intended to restrict design or be used for specification purposes.
(2) All hydrant installations shall be in conformance with local codes, with protection against backflow and contamination provided. See para. 5.2 for information on vacuum breakers.

2 DEFINITIONS

2.1 Hydrants – General

The term *hydrant* as used in this Standard refers to a manufactured device that conveys water from supply pipe to a hose thread outlet, incorporating valve(s) with opening and closing means at the point of use, with all working parts accessible for maintenance. Opening and closing means shall be a removable (loose set) operating key engaging a recessed operating stem. (See Fig. 1.)

2.2 Hydrant Types

nonfreeze wall hydrant, exposed outlet – a hydrant for installation in building walls with outlet exposed, in which the valve is operable at temperatures below 32°F (0°C). (See Fig. 2A.)

nonfreeze wall hydrant, concealed outlet – a hydrant for installation in building walls with the outlet concealed, in which the valve is operable at temperatures below 32°F (0°C). (See Fig. 2B.)

wall hydrant for moderate climate, concealed outlet – a hydrant for installation in building walls with the outlet concealed, in which the valve is not operable at valve body temperatures below 32°F (0°C). (See Fig. 2C.)

hot and cold nonfreeze wall hydrant, concealed outlet – a hydrant with hot and cold water inlet connections for installation in building walls with the outlet concealed, in which the valves are operable at temperatures below 32°F (0°C). (See Fig. 2D.)

hot and cold wall hydrant for moderate climate, concealed outlet – a hydrant with hot and cold water inlet connections for installation in building walls with the outlet concealed, in which the valves are not operable at valve body temperatures below 32°F (0°C). (See Fig. 2E.)

nonfreeze ground (yard) hydrant, concealed outlet – a hydrant for installation in the ground with the outlet concealed at grade and the inlet below the frost line, in which the valve is operable at temperatures below 32°F (0°C). (See Fig. 2F.)

nonfreeze ground (yard) post hydrant, exposed outlet – a hydrant for installation in the ground with the outlet extended above grade and the inlet below the frost line, in which the valve is operable at temperatures below 32°F (0°C). (See Fig. 2G.)

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TABLE 1 NOMINAL SIZE OF OUTLET CONNECTION

Hose, in. (mm)	Symbol	No. of Threads/in.	Services
¾ (19.05)	NH	11½	Garden and similar hose
1 (25.4)	NPSH	11½	Steam, air, water, and all other hose connections to be made with standard pipe threads
1¼ (31.75)	NPSH	11½	
1½ (38.1)	NPSH	11½	
2 (50.8)	NPSH	11½	

3 CONNECTIONS

3.1 Inlet Connections

(*a*) *Threaded.* Threaded taper pipe threads (male and female) on inlets shall be American Standard taper pipe threads for general use (NPT) and shall conform to ANSI B2.1-1968.[1]

(*b*) *Soldered.* Solder joints (male and female) on inlets for connection to copper tube or copper tube fittings shall conform to the dimensions of ANSI/ASME B16.18-1984 or ANSI B16.22-1980. (The dimensions relative to connections are identical in both standards.)

3.2 Inlet Connection Types

union elbow – threaded (NPT) or soldered with center line at right angle to valve. (See Fig. 3A.)

straight, integral with valve housing (body) – threaded (NPT) or soldered with center line same as valve center line. (See Fig. 3B.)

combination straight or union elbow – threaded (NPT) and/or soldered, with male connections one pipe size larger than female connections. (See Fig. 3C.)

ground hydrant – inlet is as shown in Fig. 3D. Drain holes are a minimum of ⅛ NPT (tapped) to permit draining of casing.

elbow – threaded (NPT) or soldered with center line at right angle to and integral with valve. (See Fig. 3E.)

3.3 Outlet Connections

Threads shall conform to ANSI B2.4-1966(R1974), Hose Coupling Screw Threads.[2]

[1] ANSI B2.1 was revised in 1983 and redesignated ANSI/ASME B1.20.1-1983, Pipe Threads, General Purpose (Inch).

[2] ANSI B2.4 was reaffirmed in 1983 and redesignated ANSI/ASME B1.20.7-1966(R1983).

3.4 Outlet Connection Types

For straight and angle threaded connections, see Fig. 3F and Symbol NH of Table 1.

(*a*) *Wall Hydrants.* See Table 1 for ¾ and 1 in. (19.05 and 25.4 mm) sizes.

(*b*) *Ground Hydrants.* See Table 1 for ¾, 1, 1¼, 1½, and 2 in. (19.05, 25.4, 31.75, 38.1, and 50.8 mm) sizes.

4 MATERIALS

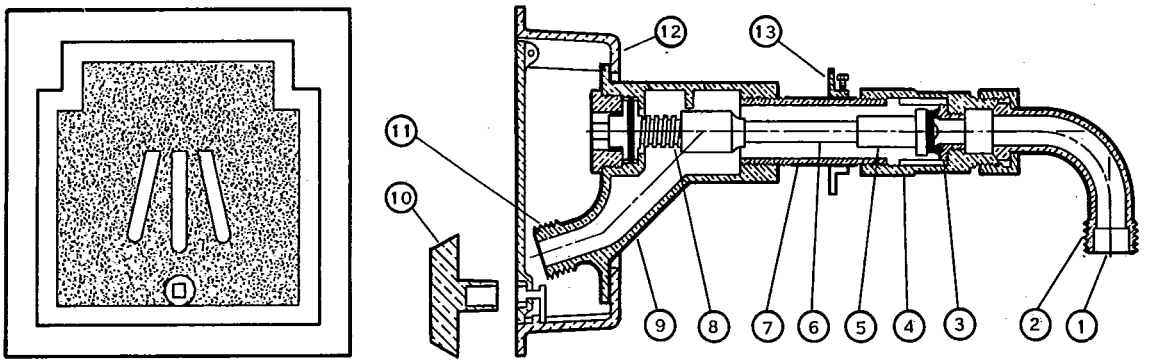
Materials coming into contact with potable water shall neither impact toxicity to nor contaminate the water. Certification from the FDA (Food and Drug Administration) or other recognized regulatory health agencies shall be considered acceptable. It is not the intent of this Standard to limit acceptable materials to those included in para. 4.1 below; it anticipates the use of other materials of comparable performance.

4.1 Castings

The items covered in this Standard shall be of the material specified, suitable for installation and service in the place specified, and shall meet all applicable requirements and standards given herein. All castings for hydrant heads, boxes, and valve housings shall be sound, free of blow holes (holes in casting due to air or gas in the metal or mold), cold shuts (casting defects formed when two streams of metal become so cold they do not fuse upon meeting, i.e., incomplete casting), and other imperfections adversely affecting casting quality, and shall be of uniform wall thickness and true to pattern. They shall also be clean and free of fins (projections on castings due to imperfect joints).

(*a*) *Cast Iron.* Cast iron castings shall conform to ANSI/ASTM Specification A 48-1976, Class 25.

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(1) Inlet
(2) Inlet connection, varies depending on size and type of water supply pipe
(3) Valve seat
(4) Valve housing
(5) Valve
(6) Operating rod (stem)
(7) Casing
(8) Operating mechanism
(9) Head
(10) Operating key (handle)
(11) Hose thread outlet
(12) Box (for concealed heads)
(13) Wall clamp

FIG. 1 SCHEMATIC ILLUSTRATION OF BASIC ELEMENTS OF A HYDRANT (DETAILS VARY WITH TYPE AND MANUFACTURER)

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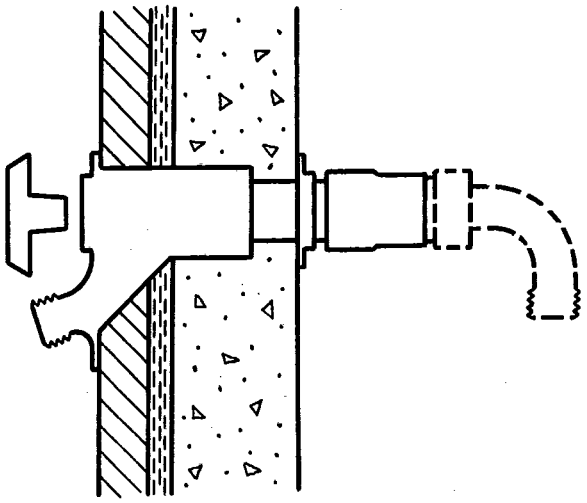


FIG. 2A RECOMMENDED INSTALLATION WITH VALVE BEHIND BUILDING WALL IN HEATED AREA TO PREVENT FREEZING (EXPOSED HEAD)

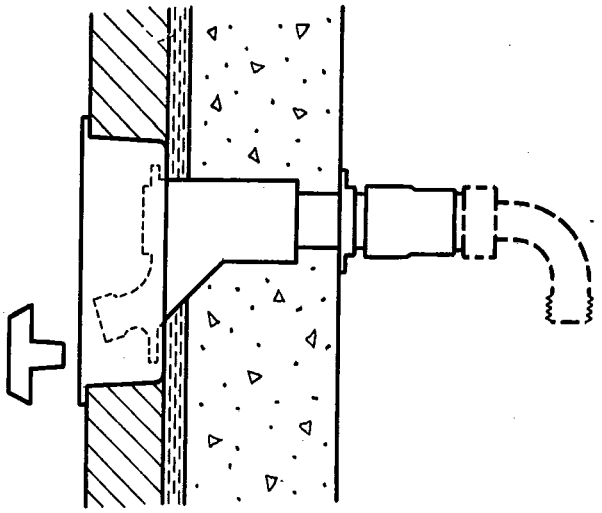


FIG. 2B RECOMMENDED INSTALLATION WITH VALVE BEHIND BUILDING WALL IN HEATED AREA TO PREVENT FREEZING (CONCEALED HEAD)

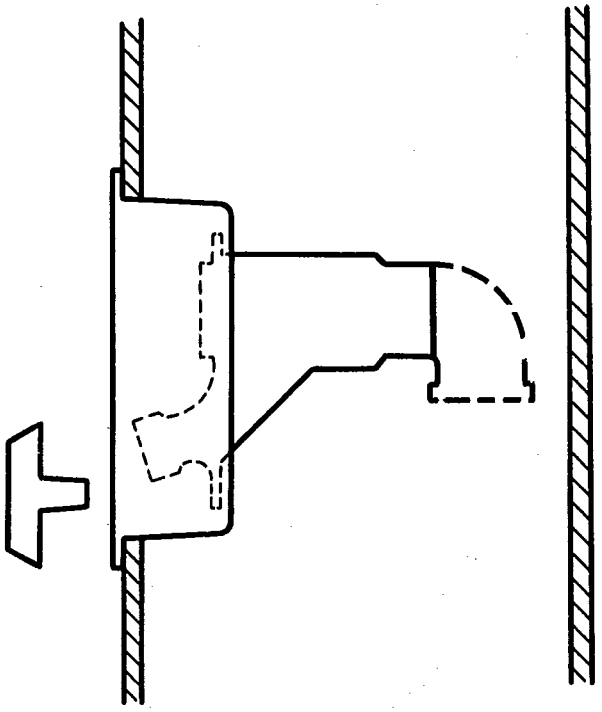


FIG. 2C RECOMMENDED INSTALLATION IN WALLS WHERE THERE IS NO DANGER OF FREEZING

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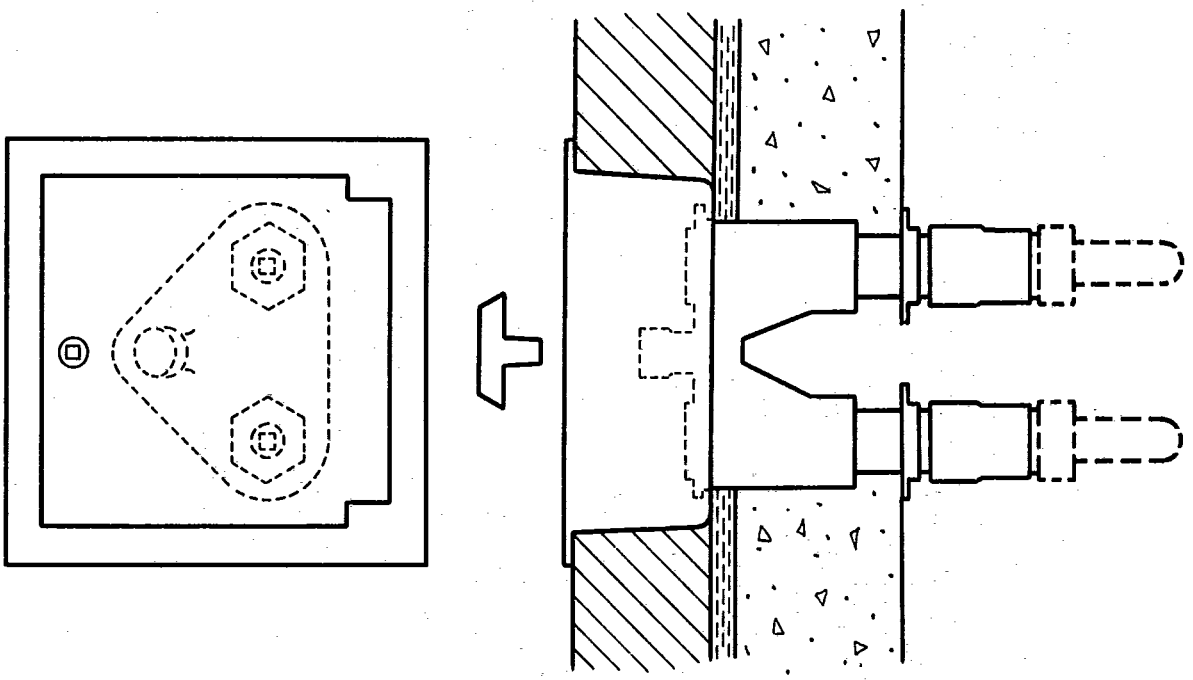


FIG. 2D RECOMMENDED INSTALLATION (PLAN VIEW) WITH VALVE BEHIND BUILDING WALL IN HEATED AREA TO PREVENT FREEZING

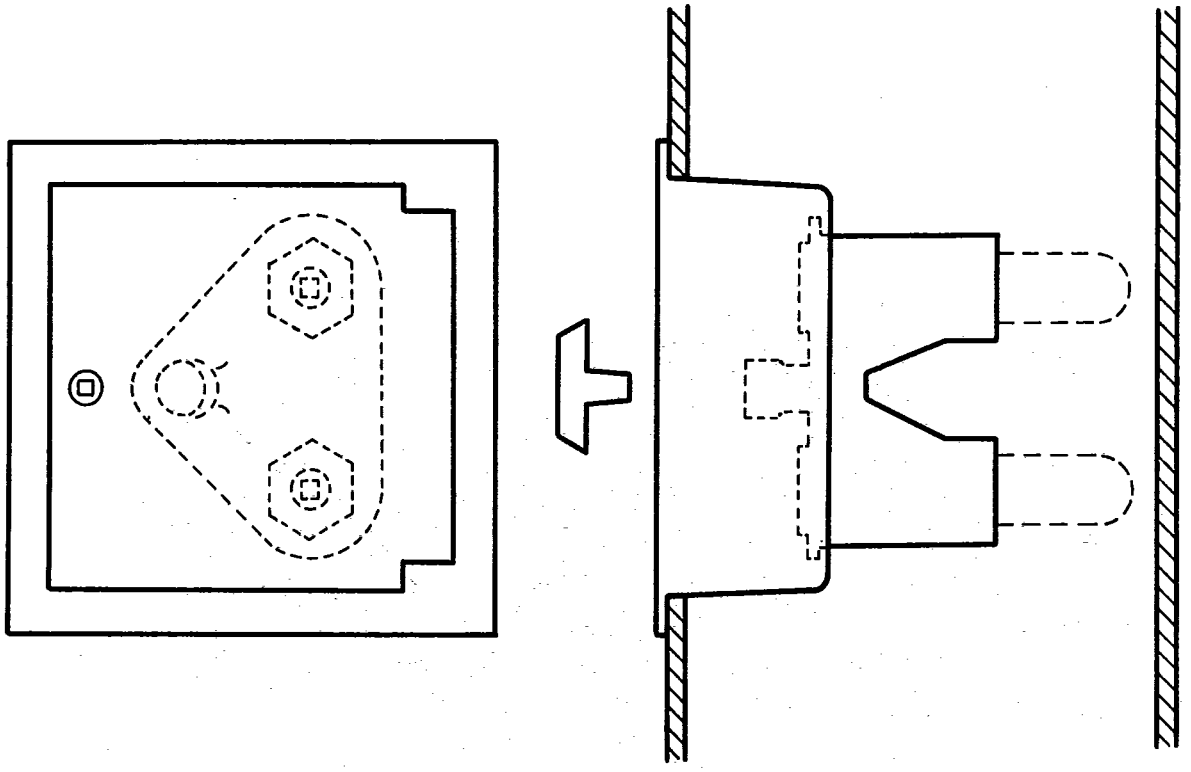


FIG. 2E RECOMMENDED INSTALLATION IN WALLS WHERE THERE IS NO DANGER OF FREEZING

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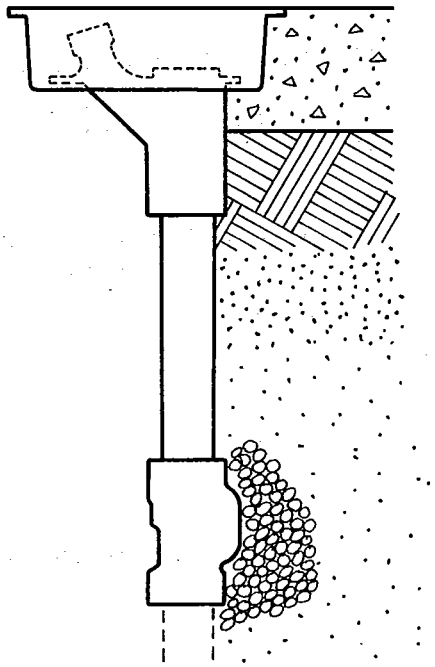


FIG. 2F RECOMMENDED INSTALLATION WITH VALVE BELOW FROST LINE TO PREVENT FREEZING (BOX TYPE)

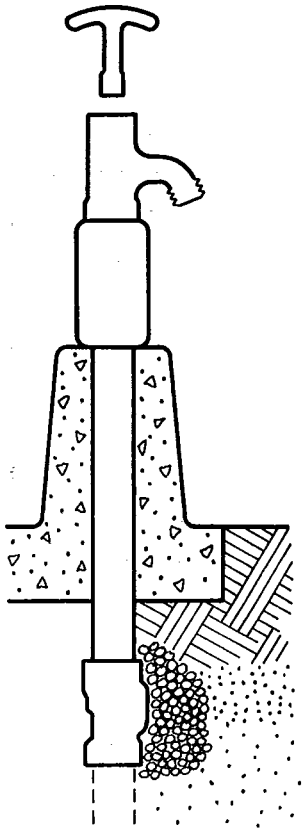


FIG. 2G RECOMMENDED INSTALLATION WITH VALVE BELOW FROST LINE TO PREVENT FREEZING (POST TYPE)

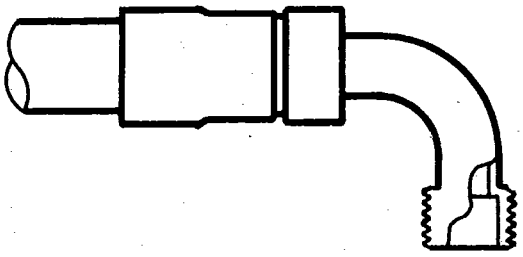


FIG. 3A THREAD OR SOLDER UNION ELBOW

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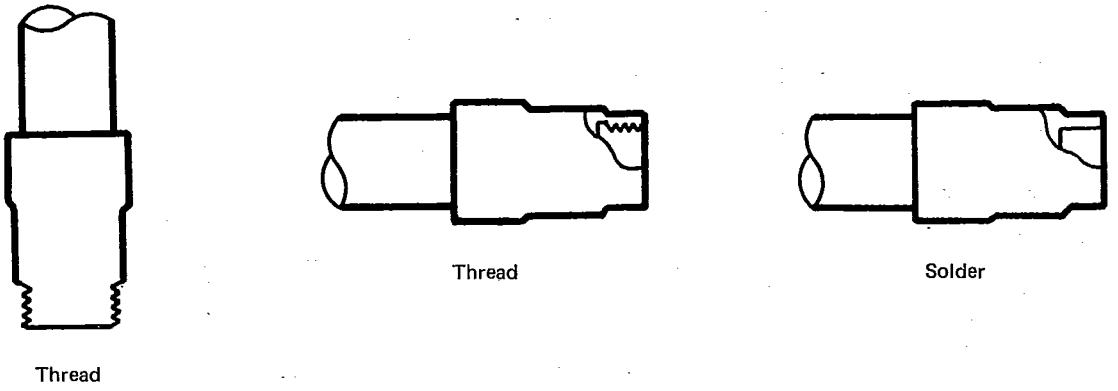


FIG. 3B STRAIGHT INLET CONNECTION, INTEGRAL WITH VALVE HOUSING



FIG. 3C COMBINATION STRAIGHT OR UNION ELBOW

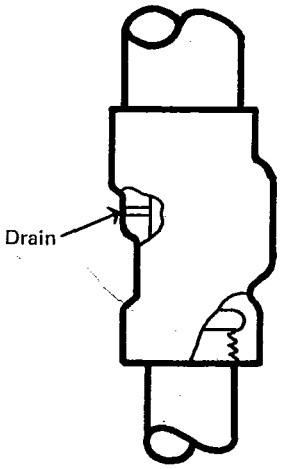


FIG. 3D GROUND HYDRANT INLET CONNECTION

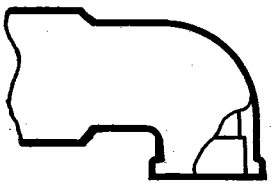


FIG. 3E THREAD OR SOLDER ELBOW

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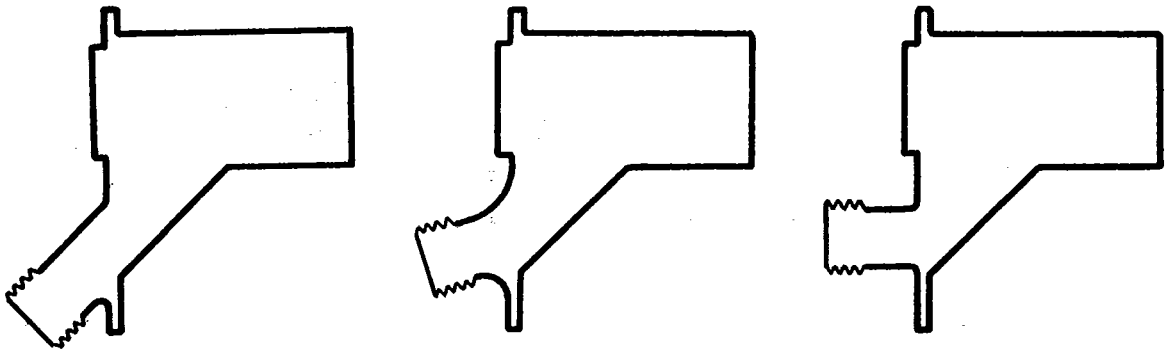


FIG. 3F STRAIGHT AND ANGLE OUTLET CONNECTION

(*b*) *Bronze.* Bronze castings shall conform to the ASTM specification for leaded red brass and leaded semi-red brass sand castings, B 584-85a, and be copper alloys C83600, C83800, or C84400.

(*c*) *Nickel Bronze.* Nickel bronze castings shall conform to the ASTM specification for leaded nickel brass (leaded nickel silver) and leaded nickel bronze (leaded nickel silver) sand castings B 584-85a, and be copper alloys C97300, C97600, or C97800.

(*d*) *Red Brass.* Red brass casings shall be commercial grade red brass pipe conforming to ASTM Specification B 43-84a.

(*e*) *Brass Internal Parts.* Brass internal parts other than castings shall conform to ASTM B 16-85.

(*f*) *Washers and Packings.* Washers and packings shall be of sufficient design and quality as to ensure leak-proof joints and be capable of providing satisfactory field service.

4.2 Finishes

In all cases where parts are to be coated or plated, they shall be treated as required and cleaned to provide suitable surface for proper bonding of the finish.

(*a*) *Paint Coatings.* Iron castings shall be cleaned and coated with a suitable paint, lacquer, or synthetic coating of quality to provide protection against rusting of ferrous surfaces during normal handling and warehousing prior to installation.

(*b*) *Cadmium Plate.* After preplating and cleaning, parts shall be given a commercial grade cadmium plate. (This applies only to parts not coming into contact with flow.)

(*c*) *Chrome Plating.* Parts that are plated shall be in accordance with the following requirements:

Chromium Plating, Where Used

	Minimum thickness of significant surfaces
Copper	(Use optional depending on base material)
Nickel	0.00010 in. (2.54×10^{-3} mm)
Chromium	0.00001 in. (2.54×10^{-4} mm)

4.3 Polishing

(*a*) *Rough Bronze.* Castings shall be cleaned but left unfinished.

(*b*) *Polished Bronze.* Castings shall be polished to a No. 4 finish or a satin finish.

(*c*) *Polished Nickel Bronze.* Castings shall be polished to a No. 4 finish or a satin finish.

(*d*) *Satin Chrome Plate.* Castings shall be polished after plating to a No. 4 finish.

(*e*) *Polished Chrome Plate.* Castings shall be polished after plating to a No. 7 finish.

5 VARIATIONS

The optional features listed are stated here to identify the variations available for the different applications.

5.1 Wall Clamp

5.2 Vacuum Breakers

(*a*) Removable hose end type (adaptor type)

(*b*) Integral hose end type

(*c*) Hose connection vacuum breakers are to conform with ANSI/ASSE Standard No. 1011-1982.

(*d*) Hydrants with integral hose end type vacuum breakers are to conform with ANSI/ASSE Standard No. 1019-1978.

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6 TESTING AND OPERATION

6.1 Water Test

Each hydrant shall be factory water tested to ensure reliability of function, including going through a closed to full open cycle, and all castings and casings shall be watertight; valve closure force is not to exceed 15 in.-lb (1.7 N·m). Nonfreeze hydrants shall be tested to ensure complete evacuation of the unit when fully closed. Failure in water test shall be cause for rejection of the hydrant. It is the manufacturer's option to either scrap the hydrant or rework to comply.

6.2 Proof Test

A representative production specimen of each type or model of hydrant shall be subjected to the following proof tests. Failure of the unit to pass any of the tests outlined in this paragraph shall be cause for rejection. In the event of such failure, the manufacturer is to be provided with the specific details thereof, with the option to submit the specimen for qualification retest after corrections are made.

(*a*) *Bursting.* Fittings shall withstand for 1 min., without failure or distortion, a hydrostatic pressure of 1000 psi (6890 kPa) applied internally.

(*b*) *Bending.* Any cross section of the waterway of a cast fitting shall withstand a bending moment of 65 ft-lb (88.1 N·m) without fracture. The force shall be applied not closer to the cross section being tested than twice the major diameter of the section.

(*c*) *Joints.* All factory assembled joints in systems supplying water shall be so designed that they can be securely made to withstand a hydrostatic test of 200 psi (1380 kPa) and a bending test of 65 ft-lb (88.1 N·m). Each joint to be hydrostatically tested shall be connected to a supply line of the same basic size as that of the joint with a pressure gage not less than 1 ft (305 mm) from the joint. Hydrostatic pressure shall be applied for a period of not less than 5 min. Bending tests shall be applied according to (b) above.

(*d*) *Discharge.* Hydrants shall be connected to smooth pipe at least 3 ft (914 mm) long. The pressure gage is to be placed 6 in. (152 mm) upstream from the hydrant inlet. Test pipe shall be of the same nominal size as the hydrant inlet. The test shall be made with cold water. The recommended inlet pressure at the gage shall be 20 psi (137.9 kPa). When flowing, the hydrant shall be tested in the fully open position and no hose, adaptor, or vacuum breaker should be attached. Where a vacuum breaker device is included, refer to para. 5.2.

(*e*) *Capacity.* The rate of discharge (U.S. gal/min) using the test conditions of (d) above shall be not less than the rates listed in Table 2.

TABLE 2
DISCHARGE CAPACITY TEST

Type	Size, in. (mm)	Minimum Discharge, gal/min (m^3/s)
Wall	¾ (19.05)	8 (5.05×10^{-4})
	1 (25.4)	15 (9.46×10^{-4})
Ground	¾ (19.05)	10 (6.31×10^{-4})
	1 (25.4)	18 (11.4×10^{-4})
	1¼ (31.75)	30 (18.9×10^{-4})
	1½ (38.1)	40 (25.2×10^{-4})
	2 (50.8 mm)	70 (44.2×10^{-4})

TABLE 3
LIFE TEST

Type	Size, in. (mm)	Cycles
Wall	¾, 1 (19.05, 25.4)	20,000
Ground	¾ (19.05)	20,000
	1 (25.4)	20,000
	1¼ (31.75)	20,000
	1½ (38.1)	20,000
	2 (50.8)	20,000

(*f*) *Life Test.* Moving parts of hydrants shall be subjected to life test cycles as shown in Table 3. One cycle is a full open to full closed operation. The cycle rate is 60/hr.

7 GENERAL REQUIREMENTS

7.1 Replacement Parts

Hydrants shall be designed so that wearing parts may be replaced after installation, without removing the device from the system.

7.2 Seating Members

(*a*) Seat disk (washer) design shall incorporate a restraining wall so that the disk will not swell or distort.

(*b*) Valve components, disk arrangements, or plungers shall be so made that they will not vibrate or loosen in service and are replaceable.

7.3 Marking

Each hydrant shall be marked with the manufacturer's name or registered trademark or, in the case of private brand sales, the name or trademark of the customer for whom the unit was manufactured.

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APPENDIX I
METRIC (SI) CONVERSION TABLE

(This Appendix is not a part of ANSI/ASME A112.21.3M-1985 and is included for information only.)

$t_c = t_f - 32/1.8$

1 in. = 25.4 mm

1 psi = 6.89 kPa

1 ft-lb = 1.36 N·m

1 in.-lb = 0.113 N·m

1 gal (U.S. liquid)/min = 0.0631 L/s

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