

Approval Standard

Pipe Couplings and Fittings
for Aboveground
Fire Protection Systems

Class Number 1920
November 2007

Approval Standard

for

Pipe Couplings and Fittings for Aboveground Fire Protection Systems

Class Number 1920

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Foreword

Approvals are intended to verify that the products and services described will meet stated conditions of performance, safety and quality useful to the ends of property conservation. The purpose of Approval Standards is to present the criteria for Approval of various types of products and services, as guidance for FM Approvals personnel, manufacturers, users and authorities having jurisdiction.

Products submitted for Approval shall demonstrate that they meet the intent of the Approval Standard, and that quality control in manufacturing and/or applications shall ensure a consistently uniform and reliable product or service. Approval Standards strive to be performance-oriented and to facilitate technological development.

For examining equipment, materials and services, Approval Standards:

- a) Must be useful to the ends of property conservation by preventing, limiting or not causing damage under the conditions stated by the Approval listing; and
- b) Must be readily identifiable.

Continuance of Approval and Listing depends on compliance with the Master Agreement, satisfactory performance in the field, on successful re-examinations of equipment, materials, and services as appropriate, and on periodic follow-up audits of the manufacturing facility or service/application.

FM Approvals LLC reserves the right in its sole judgment to change or revise its standards, criteria, methods, or procedures.

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1. INTRODUCTION

1.1 Purpose

- 1.1.1 This standard states Approval criteria for threaded, grooved, welded, flanged, specialized and plain end pipe joining methods and the associated fittings for use in aboveground automatic fire protection systems.
- 1.1.2 Approval criteria may include, but are not limited to, performance requirements, marking requirements, examination of manufacturing facility(ies), audit of quality assurance procedures, and a follow-up program.

1.2 Scope

- 1.2.1 This standard encompasses the design and performance requirements for grooved end couplings and other pipe fittings, outlined below, for use with steel pipe in either wet or dry pipe sprinkler systems, or both, but in all cases for aboveground fire protection systems. Typical applications are in sprinkler risers, in feed mains passing through walls from one building area to another, branch lines, or in locations subject to earthquakes, in the discharge line from aboveground pump suction tanks, in new connections to existing feed mains, and in air or water fire service lines subject to excess vibration or difficult alignment.
- 1.2.2 This standard encompasses the design and performance requirements for sizes: 1/2, 3/4, 1, 1-1/4, 1-1/2, 2, 2-1/2, 3, and 4 inch NPS threaded fittings. The sizes indicated are for fittings with equal size outlets. For reducing fittings, the minimum reduced outlet size covered in this standard is 1/4 inch NPS.
- 1.2.3 This standard encompasses the design and performance requirements for sizes: 3/4, 1, 1-1/4, 1-1/2, 2, 2-1/2, 3, 3-1/2, 4, 5, 6, 8, 10, and 12 inch NPS grooved end couplings, reducing couplings, grooved split flanges, mechanical tees, mechanical crosses, and standard grooved end pipe fittings.
- 1.2.4 This standard encompasses the design and performance requirements for sizes: 1, 1-1/4, 1-1/2, 2, and 2-1/2 inch NPS plain end couplings and fittings.
- 1.2.5 This standard encompasses the design and performance requirements for run sizes: 1, 1-1/4, 1-1/2, 2, 2-1/2, 3, 3-1/2, 4, 5, 6, and 8 inch NPS welded branch outlet fittings. The maximum outlet size for these fittings is limited to one pipe size smaller than the run pipe to which they are welded. Equal size outlets are not permitted.
- 1.2.6 This standard encompasses the design and performance requirements for sizes: 2, 2-1/2, 3, 3-1/2, 4, 5, 6, 8, 10, and 12 inch NPS flanged pipe fittings, and flange adapters.
- 1.2.7 This standard encompasses the design and performance requirements for sizes: 3/4, 1, 1-1/4, 1-1/2, and 2 inch NPS specialized pipe couplings and fittings.
- 1.2.8 Approval of products made in metric sizes is also incorporated into this Approval Standard. In the event that the test criteria for a metric size is not called out specifically, the nearest larger equivalent inch size value shall be used.

- 1.2.9 Due to the international availability of grooved couplings and other pipe fittings, the following table has been provided as a reference between nominal pipe sizes manufactured to ASME B36.10M-2000 dimensions and those of other standards.

<i>Nominal Pipe Size</i>		<i>Nominal Outside Diameter</i>	
<i>NPS</i>	<i>DN</i>	<i>Inch</i>	<i>mm</i>
1/2	15	0.840	21.7
3/4	20	1.050	27.2
1	25	1.315	33.4
1-1/4	32	1.660	42.7
1-1/2	40	1.900	48.3
2	50	2.375	60.3
2	65	2.875	73.1
2-1/2	-	2.995	76.1
3	80	3.500	88.9
3-1/2	90	4.000	101.6
4-1/4	-	4.250	108
4	100	4.500	114
5	125	5.000	127
5-1/4	-	5.250	133
5-1/2	-	5.500	139.7
5	125	5.625	141.3
6-1/4	-	6.250	159
6-1/2	-	6.500	165.1
6	150	6.625	168.3
8 (JIS)	-	-	216.3
8	200	8.625	219.1
10 (JIS)	-	-	267.4
10	250	10.750	273
12 (JIS)	300	-	318.5
12	300	12.750	323.9

- 1.2.10 Other types and sizes of gasketed pipe couplings and other pipe fittings may be FM Approved if they meet the requirements and intent of this standard. Gasketed pipe couplings and other pipe fittings of unusual design may be subjected to special tests to determine their suitability.

1.3 Basis for Requirements

- 1.3.1 The requirements of this standard are based on experience, research and testing, and/or the standards of other organizations. The advice of manufacturers, users, trade associations, jurisdictions and/or loss control specialists was also considered.
- 1.3.2 Approval Standards are intended to verify that the product described will meet stated conditions of performance, safety, and quality useful to the ends of property conservation. The requirements of this standard reflect tests and practices used to examine characteristics of pipe couplings and fittings for the purpose of obtaining Approval. Gasketed pipe couplings and other pipe fittings having characteristics not anticipated by this standard may be FM Approved if performance equal, or superior, to that required by this standard is demonstrated, or if the intent of the standard is met. Alternatively, pipe couplings and fittings which meet all of the requirements identified in this standard may not be FM Approved if other conditions which adversely affect performance exist or if the intent of this standard is not met.

1.4 Basis for Approval

Approval is based upon satisfactory evaluation of the product and the manufacturer in the following major areas:

1.4.1 Examination and tests on production samples shall be performed to evaluate:

- The suitability of the product;
- The performance of the product as specified by the manufacturer and required by FM Approvals; and, as far as practical,
- The durability and reliability of the product.

1.4.2 An initial facilities and procedures audit shall be conducted to evaluate the manufacturer's ability to consistently produce the product that was examined and tested as part of the Approval project. The audit shall review the facility and in-place quality control procedures used in the manufacturing of the product. Typically, areas of review are incoming inspection, work in progress, production testing, final quality control, marking, calibration of equipment, shipping procedures, and document and drawing control. These audits are repeated periodically as part of the FM Approvals product follow-up program. (Refer to Section 5.2, Facility and Procedures Audit.)

1.5 Basis for Continued Approval

1.5.1 Continued Approval is based upon:

- Production or availability of the product as currently FM Approved;
- The continued use of acceptable quality assurance procedures;
- Satisfactory field experience;
- Compliance with the terms stipulated in the Master Agreement;
- Satisfactory re-examination of production samples for continued conformity to requirements; and
- Satisfactory Facilities and Procedures Audits (F&PAs) conducted as part of FM Approval's product follow-up program.

1.5.2 Also, as a condition of retaining Approval, manufacturers may not change an FM Approved product or service without prior authorization by FM Approvals. (Refer to section 5.1.3 for further details regarding changes.)

1.6 Effective Date

The effective date of an Approval standard mandates that all products tested for Approval after the effective date shall satisfy the requirements of that standard. Products FM Approved under a previous edition shall comply with the new version by the effective date or forfeit Approval.

The effective date of this standard is **March 31, 2009** for compliance with all requirements.

1.7 System of Units

Units of measurement used in this standard are United States (U.S.) customary units. These are followed by their arithmetic equivalents in International System (SI) units, enclosed in parentheses. The first value stated shall be regarded as the requirement. The converted equivalent value may be approximate. Appendix A lists the selected units and conversions to SI units for measures appearing in this standard. Conversion of U.S. customary units is in accordance with Institute of Electrical and Electronics Engineers (IEEE)/American Society for Testing Materials (ASTM) SI 10-2002, *American National Standard for Use of the International System of Units (SI): The Modern Metric System*.

1.8 Applicable Documents

The following standards, test methods, and practices are referenced in this standard:

- ANSI B16.1 - 1998, *Cast Iron Pipe Flanges and Flanged Fittings*
- ANSI B16.3 - 1998, *Malleable Iron Threaded Fittings*
- ANSI B16.4 - 1998, *Gray Iron Threaded Fittings*
- ANSI B16.11 - 2005, *Forged Fittings, Socket-Welded and Threaded*
- ANSI/American Society of Mechanical Engineers (ASME) B1.20.1 - 1983, *Pipe Threads, General Purpose* (R2001),
- ANSI/American Water Works Association (AWWA) C606-2004, *Grooved and Shouldered Joints*
- ASTM A53/A53M - 2005, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*
- ASTM A135/A135M - 2006, *Standard Specification for Electric-Resistance-Welded Steel Pipe*
- ASTM A795/A795M - 2004, *Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use*
- Deutsches Institut für Normung e.V. (DIN) EN 10220 (2003-03), *Seamless and Welded Steel Tubes - Dimensions and Masses per Unit Length*
- EN 10226-1 - 2004, *Pipe Threads Where Pressure Tight Joints Are Made on the Threads - Part 1: Taper External Threads and Parallel Internal Threads - Dimensions, Tolerances and Designation*
- EN 10226-2 - 2005, *Pipe Threads Where Pressure-Tight Joints Are Made on the Threads - Part 2: Taper External Threads and Taper Internal Threads - Dimensions, Tolerances and Designation*
- EN 10226-3 - 2005, *Pipe Threads Where Pressure-Tight Joints Are Made on the Threads - Part 3: Verification By Means Of Limit Gauges*
- EN 10242 - 2003, *Threaded Pipe Fittings in Malleable Cast Iron*
- EN 10255 - 2004, *Non-Alloy Steel Tubes Suitable For Welding and Threading - Technical Delivery Conditions*
- FM Global Property Loss Prevention Data Sheets
- IEEE/ASTM SI 10 - 2002, *Standard for Use of the International System of Units (SI): The Modern Metric System*
- International Standard (ISO) 65 - 1981, *Carbon Steel Tube Suitable for Screwing in Accordance with ISO 7/1*
- ISO 7/1 - 2000, *Pipe Threads: Designation, Dimensions/Tolerances*
- ISO 4200 - 1991, *Plain End Steel Tubes, Welded and Seamless - General Tables of Dimensions and Masses per Unit Length*
- ISO 17025 - *General Requirements for the Competence of Testing and Calibration Laboratories*
- Japanese Industrial Standard (JIS) G3454 - 2005, *Carbon Steel Pipes for Pressure Service*
- Malhotra, P. K., Senseny, P. E., Braga, A. C., and Allard, R. L. - 2003, "Testing Sprinkler Pipe Seismic Brace Components", *Earthquake Spectra* 19(1), pp 87-109.

1.9 Definitions

For purposes of this standard, the following terms apply:

Accepted

This term refers to installations acceptable to the authority enforcing the applicable installation rules. When the authority is FM Global, such locations are termed "FM Global Accepted." Acceptance is based upon an overall evaluation of the installation. Factors other than the use of FM Approved equipment impact upon the decision to accept, or not to accept. Acceptance is not a characteristic of a product. It is installation specific. A product accepted for one installation may not be acceptable elsewhere. (Contrast with FM Approved.)

Blind Flange

A blind flange is a fitting that is used to block off fluid flow in flanged piping systems. This fitting is the equivalent of a plug or cap in threaded systems, or an end cap in grooved piping systems.

Concentric Reducer

A concentric reducer is a fitting that is used to make a transition from one pipe size to another along a common pipe axis. These fittings are available in any of the end connection types discussed in this Approval Standard. There is also a transition style of concentric reducer that can change end connection styles as well as pipe sizes within one fitting.

Coupling

A coupling is a fitting that is used to join two or more components together. For the purposes of this Approval Standard, the term “coupling” when used by itself, will refer to the threaded end type with equal connections. Other types of couplings will be identified by their proper names, such as grooved or gasketed couplings, plain end couplings, reducing couplings, etc.

Cross

A cross is a cast or fabricated fitting that is characterized by four coplanar inlets / outlets equally spaced around a common center. Cross fittings are available as equal fittings, or in reducing configurations. These fittings are typically supplied with all ends having the same type of end connection. The common end connections for cross fittings are: cut or roll grooved, threaded, or flanged.

Cut Groove

A groove that is machined into the outside diameter of a pipe or fitting near the end to allow joining by means of a gasketed, split, grooved pipe coupling.

Eccentric Reducer

An eccentric reducer is a fitting that is used to make a transition from one pipe size to another that are not along the same pipe axis.

Elbow

A cast or fabricated fitting characterized by changing the direction of flow. This fitting is also commonly referred to as a “Bend”. The typical angular changes are: 11-1/4, 22-1/2, 45, and 90 degrees. The common end connections for elbows are: threaded, cut groove, roll groove, flanged, or plain end.

Elbow, Base

A cast elbow with an integral support base extending out from the outer surface of the elbow to the floor. The base elbow is typically supplied with flanged end connections.

Elbow, Drain

A drain elbow is similar to the standard elbow but has an auxiliary port (typically threaded) to allow for the removal of water or air during maintenance. The drain elbow is commonly used at either the lowest or highest point in the piping system for this reason.

Elbow, Reducing

A reducing elbow is similar to the standard elbow, except the end connections are of the same type but are of different nominal pipe sizes.

Elbow, Street

A street elbow is similar to a standard elbow with the exception that the end connections are of different types. For example, a 1 inch NPS street elbow may have a female threaded inlet and male threaded outlet. These fittings are also available in reducing styles. The most common end connection for street elbows is threaded ends.

End Caps

An end cap is used to close off the end of a pipeline. End caps are available with grooved or threaded end connections.

End Connections

The term “End Connections” refers to the method of connecting components of a pipe system. Typical end connections in a fire protection service are cut groove, rolled groove, threaded, plain end, and welded end.

Fitting

The term “fitting” refers to a piping related product that is manufactured to standardized dimensions. These dimensions may exist in Industry Standards or be based on those of manufacturers that have been accepted by the market as the “norm”.

Flange Adapters

A flange adapter is a fitting that makes the transition from one style of end connection to flange type connection as a single component. This is different from grooved split flanges as they are made of multiple components. Common types of flange adapters are grooved end by flange, and welding end by flange.

Flanged Fittings

The term flanged fittings has been taken to refer to any style of pipe fitting covered in the scope of this Approval Standard with integral flanged end connections.

FM Approvals Certification Marks

The FM Approvals Certification Marks are detailed in Appendix B. Their use is mandatory on all units of FM Approved products. These registered marks cannot be used except as authorized by FM Approvals via the granting of Approval to a specific product.

FM Approved

This term refers to products FM Approved by FM Approvals. Such products are listed in the Approval Guide, a publication of FM Approvals, issued annually, or one of its supplements. All products so listed have been successfully examined by FM Approvals, and their manufacturers have signed and returned a Master Agreement to FM Approvals. This form obligates the manufacturer to allow re-examination of the product and audit of facilities and procedures at FM Approvals discretion. It further requires the manufacturer not to deviate from the as-FM Approved configuration of the product without review by and agreement of FM Approvals. Approval is product specific.

Grooved Coupling, Flexible

A grooved coupling is an assembly that is used to join two similar sized grooved ends together. The flexible grooved coupling is characterized by its ability to allow for angular, or rotational differences between the components being joined after assembly. These products may provide greater system reliability in situations involving excessive vibration, difficult alignment, or seismic activity. They may also provide greater system flexibility than historic use of rigid systems of flanged pipe and fittings.

Grooved Coupling, Reducing

A reducing grooved coupling is an assembly that is used to join two different sized grooved ends together. Telescoping of the smaller pipe into the larger is prevented by various means, such as a steel internal washer. Reducing grooved end couplings are available in flexible and rigid styles.

Grooved Coupling, Rigid

A rigid grooved coupling is an assembly that is used to join two similar sized grooved ends together. The rigid grooved coupling is characterized by its prevention of rotation of the joined ends, and reduced tolerance for angular variations after assembly.

Grooved Split Flange

A grooved split flange is an assembly that is used to make the transition from a grooved end to a flanged connection. Unlike the flange adapter which needs to be joined to the mating grooved end by means of a grooved coupling, the split flange acts as a grooved coupling and flange adapter. Sealing is achieved by the use of the gasket provided with the grooved split flange.

Lateral

A lateral is similar in configuration to a tee, with the exception of the branch outlet being at an angle to the run piping. Laterals are available with threaded, grooved, or flanged end connections.

Lightwall Pipe

Lightwall pipe is characterized by having a combination of outside diameter and wall thickness not suitable for cut grooving or threading. Lightwall pipe shares the same outside diameter dimensions as Schedule 40 pipe; however the wall thickness of Lightwall pipe ranges between that of Schedule 5 and 10 and can vary from manufacturer to manufacturer. The normal end connections for Lightwall pipe are: welded, roll grooved, and plain end. This pipe is also commonly referred to in industry as “Flow” pipe or “Schedule 7” pipe. There is no national or international standard for this product at this time.

Long Radius Elbows or Tees

A long radius tee or elbow is characterized as having a larger bend radius than a standard elbow or tees.

Mechanical Cross

A mechanical cross is created when two mechanical tees are used to cover through holes in a run pipe. The holes may or may not be of the same size. In this case, only the “saddles” of the mechanical tees, gaskets, and bolting are used.

Mechanical Tee

A mechanical tee is a fitting that provides a connection to a pipe line in place of a tee. The pipe is pre-drilled per the manufacturer’s instructed hole size, and the “saddle” is placed over the hole so that the mechanical tee gasket encircles the hole. The fitting has a second piece that loops around the pipe and allows for the “saddle” to be drawn tight against the pipe surface. Approval for these fittings is limited to fittings having a minimum of one pipe size reduction as the branch outlet. Equal size outlets are not permitted. The typical end connections to these fittings are threaded and grooved end.

Nipples

The term “nipple” or “pipe nipple” refers to short lengths of pipe that are used to make up the space between end connections. Pipe nipples are also used to allow the use of common fittings with the same end connections. For example, a union and valve are to be assembled together, but both are supplied with female threaded connections, so a pipe nipple is used to connect them both.

Plain End Coupling

Pipe couplings designed to work with pipe ends that have been cut perpendicular to its axis and incorporating no grooves or threads. The coupling is typically fastened to the pipe by mechanical means, such as a fastener.

Plain End Fittings

Pipe fittings designed to work with pipe ends that have been cut perpendicular to its axis and incorporating no grooves or threads. The fitting is typically fastened to the pipe by mechanical means, such as a fastener.

Pipe Schedule

The commonly accepted reference indicating a specified wall thickness for a given nominal pipe size. Traditional steel pipe schedules were derived on a largely empirical basis and do not represent truly proportional design. Generally, smaller sizes are much thicker in proportion to diameter than larger sizes. This is because mechanical considerations predominate in smaller sizes, and pressure carrying capacity predominates in larger sizes.

Plugs

A plug is a threaded fitting that is used to block off an opening in the piping system, or threaded port on pressure retaining parts. The characteristic feature of a plug is that the fitting is supplied with external threads.

Rated Working Pressure

This is the maximum pressure rating that the pipe coupling or fitting is intended to operate at for its entire design life. This value sets the basis for the testing described in Section 4.

Rolled Groove

This term refers to the end connections where there is a groove pressed into the surface of a pipe or fitting near the end to allow joining by means of a gasketed, split, grooved pipe coupling. For clarity, the definition used in this Standard is for grooves that start from the outside diameter of the pipe and project radially inward towards the pipe axis. Not to be confused with rolled shoulder end connections that may be formed on similar equipment.

Rolled Shoulder

This term refers to the end connection where there is a groove that is formed radially outward from the pipe surface. Unlike traditional shoulder end joints, the rolled shoulder joint has the shoulder located a distance in from the end of the pipe like a rolled groove joint mentioned above. Since the rolled shoulder joint is outward from the pipe outside diameter, where the traditional grooved end connection is formed inward from the pipe diameter, these two styles of connections are not interchangeable without a transition piece. All connections shall be made per the manufacturer's specification for rolled shoulder dimensions.

Schedule 40 Pipe

Schedule 40 pipe refers to a historically accepted combination of outside diameter and wall thickness that has been subsequently published in national standard ASME B36.10M-2000. Other national and international standards also make reference to Schedule 40 pipe but may or may not reflect the same dimensions for a given nominal pipe size. Therefore, Approval of pipe couplings and/or fittings with Schedule 40 pipes manufactured under the specifications of other national or international standards must be specified in the listing in the FM Approvals' Approval Guide using the title of the standard to which the pipe was manufactured. For the purposes of this standard, dimensional values of Schedule 40 pipe and pipes of similar outside diameter and wall thickness have been listed in Appendix E. FM Approved end connections for Schedule 40 steel pipes are: threaded, welded, rolled or cut groove, or plain end.

Schedule 30 Pipe

Schedule 30 pipe refers to a historically accepted combination of outside diameter and wall thickness that has been subsequently published in national standard ASME B36.10M-2000. Other national and international standards also make reference to Schedule 30 pipe but may or may not reflect the same dimensions for a given nominal pipe size. Therefore, Approval of pipe couplings and/or fittings with Schedule 30 pipes manufactured under the specifications of other national or international standards must be specified in the listing in the FM Approvals' Approval Guide using the title of the standard to which the pipe was manufactured. FM Approved end connections for Schedule 30 steel pipes are: threaded (for NPS 8 and above), welded, rolled groove, or plain end.

Schedule 10 Pipe

Schedule 10 pipe refers to a historically accepted combination of outside diameter and wall thickness that has been subsequently published in national standard ASME B36.10M-2000. Other national and international standards also make reference to Schedule 10 pipe but may or may not reflect the same dimensions for a given nominal pipe size. Therefore, Approval of pipe couplings and/or fittings with Schedule 10 pipes manufactured under the specifications of other national or international standards must be specified in the listing in the FM Approvals' Approval Guide using the title of the standard to which the pipe was manufactured. FM Approved end connections for Schedule 10 steel pipes are: welded, rolled groove, or plain end.

Schedule 5 pipe

Schedule 5 pipe refers to a historically accepted combination of outside diameter and wall thickness that has been subsequently published in national standard ASME B36.10M-2000. Other national and international standards also make reference to Schedule 5 pipe but may or may not reflect the same dimensions for a given nominal pipe size. Therefore, Approval of pipe couplings and/or fittings with Schedule 5 pipes manufactured under the specifications of other national or international standards must be specified in the listing in the FM Approvals' Approval Guide using the title of the standard to which the pipe was manufactured. For the purposes of this standard, dimensional values of Schedule 5 pipe have been listed in Appendix E. FM Approved end connections for Schedule 5 steel pipes are: welded, roll grooved*, plain end. (* - Limited Approval of rolled grooved connections. Refer to the listings of the pipe couplings or fittings, in the Approval Guide, for specific mention of their suitability for use with Schedule 5 pipe.)

Segmentally Welded Fittings

Any fitting that is fabricated by welding pipe segments together in the shape of other common fittings. For example, pipe segments welded together to form an elbow. Segmentally welded fittings are typically supplied with grooved end connections.

Short Radius Elbows and Tees

A short radius tee or elbow is characterized by having a bend radius that is smaller than a standard elbow or tee.

Shouldered End

Pipe with mechanical shoulders that are cast, welded, or mechanically formed on the outside diameter of the pipe. For clarity, the definition as used in this Standard refers only to shoulders that start at the pipe outside diameter, and extend radially outward from the pipe axis.

Slip-On Flange

A slip-on flange is a metal ring that is supplied pre-drilled with a bolt hole pattern that slips over the outside diameter of the pipe. The pipe end is subsequently flared out, thus retaining the flange.

Sweep Elbow

A sweep elbow is a fitting that has been made from mechanically forming a straight section of pipe into the shape of an elbow. These fittings typically have lower friction loss due to a larger bend radius as compared to a standard cast elbow.

Tee

A tee is a fitting that is either cast or fabricated and is characterized by two ends inline (run) and one end connection perpendicular (branch). These fittings are available with threaded, flanged, grooved, or plain end connections.

Tee, Bull Head

A bull head tee is similar to the standard tee with the exception that the branch outlet is of a larger nominal pipe size than the run outlets. The common end connections for bull head tees are grooved, threaded and flanged.

Tee, Street

A street tee is similar to a standard tee with the exception that the branch outlet is of a different type of end connection. For example, a 1 inch NPS street tee would be supplied with female threaded run connections and a male threaded branch outlet. The street tee is typically supplied with threaded ends.

Threaded End

Pipe couplings or fittings which have been furnished with its ends threaded with internal or external pipe threads conforming to national or international standards for pipe threads for the nation of intended use (i.e. ANSI B1.20.1, ISO 7/1).

Thinwall Pipe

Thinwall pipe is characterized by having a combination of outside diameter and wall thickness that may be suitable for threading but not suitable for cut grooving. Threadable thinwall pipe typically has outside diameter dimensions less than Schedule 40 pipe, however the wall thickness ranges between that of Schedules 10 and 40 and may vary from manufacturer to manufacturer. The normal end connections for Thinwall pipe are: threaded, roll grooved, welded, or plain end.

Union – Flat and tapered seat

A union is an assembly of components that are used to join two lengths of pipe together. The unique feature of a union is that there are two ends that thread onto the ends of the pipe, and a large nut that is retained on one fitting, and threads onto the second end thus joining the two pipes. Unions provide the ability of allowing for rotation along the pipe axis before the retaining nut is tightened. The seal for this fitting is created by either the compression of the internal tapered male and female end components, or by the compression of a flat seal retained within one of the components.

Welded Branch Outlet Fitting

A welded branch outlet fitting is a component that is used to make a perpendicular connection to a length of pipe. A hole is predrilled into the pipe wall, and the welded branch outlet fitting is then placed directly over the hole, and welded to the pipe. These fittings are commonly available with threaded and grooved outlet, and either flat or saddle like welding ends.

Welding End

Steel pipe furnished with weld ends are characterized by having the ends cut perpendicular to its axis and finished with a pronounced bevel on each end to allow for butt welding.

Wye, Tee

A wye tee is a fitting that is composed of a straight run and an angled branch outlet. The unique feature of this type of fitting is that the outlet of the branch is perpendicular to the axis of the straight run of the fitting initially, and then angled.

Wye, True

A true wye fitting is a fitting that is composed of a straight run and an angled branch outlet. The end connections of a true wye share the same axis relative to their position on the fitting (i.e. the ends of the run are on the axis of the run, the end of the branch is on the axis of the branch).

2. GENERAL INFORMATION

2.1 Product Information

- 2.1.1 The products outlined in Section 1.2 of this standard are for use in aboveground fire protection systems. Installations shall be in accordance with FM Global Property Loss Prevention Data Sheets and the manufacturer's installation instructions.
- 2.1.2 In order to meet the intent of this standard, pipe couplings and other pipe fittings must be examined on a model-by-model, type-by-type, manufacturer-by-manufacturer, and plant-by-plant basis. This is predicated on the basis that identical designs, fabricated in identical materials by different manufacturers or, even by different plants of the same manufacturer, have been seen to perform differently in testing. Sample pipe couplings and other pipe fittings, selected in conformance to this criterion shall satisfy all of the requirements of this standard.

2.2 Approval Application Requirements

- 2.2.1 To apply for an Approval examination the manufacturer, or its authorized representative, shall submit a request to:

Hydraulics Group Manager
FM Approvals Hydraulics Laboratory
743A Reynolds Road
West Glocester, RI 02814 U.S.A.

- 2.2.2 The manufacturer shall provide the following preliminary information with any request for Approval consideration:
- A complete list of all models, types, sizes, and options for the products or services being submitted for Approval consideration,
 - General assembly drawings, one complete set of manufacturing drawings, materials list(s) (e.g., ASTM A 48, Class 40A, Gray Iron Casting), anticipated marking format, brochures, sales literature, specification sheets, installation, operation and maintenance procedures, and
 - The number and location(s) of manufacturing facilities.
- 2.2.3 All documents shall identify the manufacturer's name, document number or other form of reference, title, date of last revision, and revision level. All foreign language documents shall be provided with English translation.

2.3 Requirements for Samples for Examination

Following set-up and authorization of an Approval examination, the manufacturer shall submit samples for examination and testing. Sample requirements are to be determined by FM Approvals following review of the preliminary information. Sample requirements may vary depending on design features, results of prior testing, and results of the foregoing tests. It is the manufacturer's responsibility to submit samples representative of production. Any decision to use data generated utilizing prototypes is at the discretion of FM Approvals. The manufacturer shall provide any special test fixtures, which may be required to evaluate the gasketed pipe coupling or other pipe fitting.