DEPARTMENT OF COMMERCE

CIRCULAR

OF THE

BUREAU OF STANDARDS

S. W. STRATTON, DIRECTOR

No. 50

NATIONAL STANDARD HOSE COUPLINGS AND FITTINGS FOR PUBLIC FIRE SERVICE

Issued November 25, 1914

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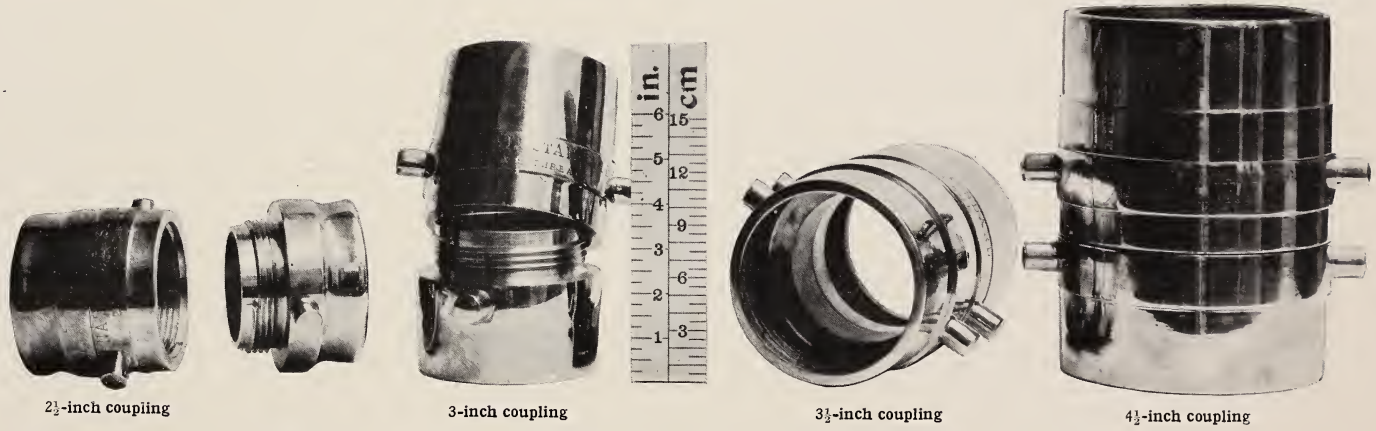

2½-inch coupling

3-inch coupling

3½-inch coupling

4½-inch coupling

FIG. 1.—*The national standard fire-hose couplings (the four sizes)*

NATIONAL STANDARD HOSE COUPLINGS AND FITTINGS FOR PUBLIC FIRE SERVICE

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I. INTRODUCTION

1. DIVERSITY OF STANDARDS

For many years there has been a great diversity in the dimensions of fire-hose couplings and hydrant connections. The appalling loss during certain disastrous fires such as the Boston fire in 1872 and the Baltimore fire in 1904 clearly demonstrate and emphasize the necessity for uniformity in fire-hose connections, fire departments of other cities frequently responding to calls for aid only to find themselves, upon arrival, unable to render assistance because their engine and hose connections would not couple up with outlets of local fire hydrants which were of a different type and diameter. The great advantages that would result from a standardization of hose connections has always been recognized by those intimately connected with fire departments and organizations devoted to the cause of fire

protection, but the absence of coordinated effort among the fire departments and other authoritative organizations having control or supervision of such utilities has for many years retarded any considerable effort toward standardization of these highly important adjuncts in public fire protection.

2. COOPERATION TOWARD STANDARDIZATION

During the past 10 years, however, owing to persistent concentration of effort and vigorous action of the special committee on hose couplings and hydrant fittings appointed by the National Fire Protection Association, this necessary coordination has been materially advanced through the joining together of all of the more important national organizations which are concerned with fire protection and prevention, in a serious endeavor to terminate the existing confusion by concurrent approval and adoption of the "national standard hose couplings and hydrant fittings."

II. HISTORICAL SUMMARY

1. ORIGIN OF THE MOVEMENT

The real movement for standardization of fire-hose couplings may be said to date back at least to the great Boston fire of 1872, referred to above. Some of the neighboring cities, profiting by the experience gained at this fire, adopted what was known as the Roxbury thread coupling, which was the Boston standard at that time.

2. CONVENTIONS OF FIRE ENGINEERS, ETC.

The matter of standard hose couplings was brought before the first convention of fire chiefs, held at Baltimore in 1873. At this convention, which was called "The Convention of Fire Engineers," the following resolution was offered by Fire Chief James Hill, of Cleveland:

> Whereas experience has shown that the fire departments of the country should be provided with a universal or standard coupling for hose and fire hydrants, so that when a city or town calls for aid, in case of large fires or conflagrations, from another city or town, each department can act in unison with the other: Therefore be it
>
> *Resolved* That a committee be appointed by this convention to take under consideration and report back to this convention the practicability of adopting a standard coupling of some kind to be used by all fire departments throughout the United States.

This resolution after adoption was referred to a committee which reported as follows:

> In our opinion a uniformity of coupling should be adopted throughout the United States, so that one city when called upon could lend aid to another when needed, and would recommend

that all cities purchasing couplings and hydrants should adopt a uniform standard, and for the purpose of avoiding expense in changing those now in use would recommend the adoption of reducers and expanders.

The second convention of fire engineers, held at St. Louis in 1874, adopted a resolution urging that all fire departments install standard couplings, and that adapters be provided for use when necessary to assist at places having no standard equipment.

In 1875 the National Association of Fire Engineers at its third convention which was held in New York City adopted the following:

Your special committee, appointed to report upon a uniform thread and dimensions of hose couplings, after full and mature deliberation recommend that the inside diameter of couplings should be 2⅝ inches in the clear; that the outside be 3⅛ inches, exclusive of the thread and including the thread 3⅜ inches, and that the number of threads be eight to the inch. We also recommend in this connection the adoption by fire departments of the adjustable thread couplings.

At the convention of 1876 at Philadelphia the proceedings show that when topic No. 5, covering report on hose couplings, was called for presentation, a resolution was offered and adopted "that the report on hose couplings be laid on the table, and that adopted at New York be the standard which this association recommends." Later in the session the report was taken from the table, recommitted and read; this report was somewhat lengthy, recommending in part: First, "that this convention, so far as lay in its power, do adopt as the standard thread for all 2½-inch hose couplings throughout the country; outside diameter male couplings 3⅜-inch outside of thread; number of threads to the inch 8; angle of thread to be a 'V'." Second, "We would further recommend that every department commence *at once* and order all *new* hose with couplings having this standard thread." Third, recommended that an "ample supply of reducing couplings, both male and female," be supplied in each department.

This report, with an added suggestion that the committee be continued, was duly adopted. As may be noted, the action taken at this time was in the nature of a confirmation of that taken in 1875.

In 1878 the following resolution was adopted by the association at its sixth convention held in Cleveland:

The report of the committee adopted in Philadelphia, September, 1876, as to the advisability of adopting a uniform standard thread for hose couplings recommended the following thread as standard, viz, for 2½-inch hose couplings; outside diameter of male coupling 3⅜ inches and 8 threads to the inch. Said recommendation has not been carried out on account, it is claimed, of impracticability. Be it resolved, that a committee of five be appointed to consider the question of a standard uniform thread for hose couplings for fire departments; that such committee be instructed to consult with manufacturers of couplings, and obtain from them samples of couplings

and suggestions as to the best thread to be adopted as standard and report at the next convention of this association, with a further recommendation that a suitable bill be drafted and submitted to Congress, praying that the standard hereafter adopted by this association shall be enforced in all fire departments, under suitable penalties.

The committee appointed, as a result of the above action, submitted a lengthy report at the seventh convention held at Washington in 1879. This report recommended that the standard coupling for 2½-inch hose should have 6 threads to the inch. The reasons for this recommendation are given in the following extract from the report:

> The first object which your committee had in view was to ascertain the thread least liable to become damaged, the most easily handled and the least likely to become useless from fouling, as with dirt, gravel, etc. They have concluded to recommend the thread which, in their belief, most nearly accomplishes these desired ends, namely, six to the inch, and have given such measurements for the working portion of the coupling as will insure metal enough being used in the right place which will obviate, to a great degree, the bending and jamming of couplings, rendering them now so frequently useless. Other things being equal, the shortest coupling is undoubtedly the best, allowing, as it does, the more perfect reeling of the hose, allowing of its fitting closer on small spools and with less dead weight, giving the same results.

This report was unanimously adopted, as previous ones had been, thus placing the association on record as having adopted specifications for fire-hose couplings not in conformity with its past action in such matters. The following year a resolution was adopted urging the universal adoption of this coupling.

The proceedings of 1880 show the following resolution, which also was "unanimously adopted"—"that this association can not too strongly urge upon the associations of firemen and upon the Chief Engineers of the country the importance of using every means at their command to secure a uniform thread for hose couplings." An appeal to the various legislatures was then made "to enforce the adoption of the standard thread recommended by this association at its 7th annual convention [1879]."

Again, in 1883, at the New Orleans convention, a set of resolutions was adopted showing the continued inaction of the association members in this matter.

During the next seven years it seems that but little was accomplished toward the actual establishment of a national standard for fire-hose couplings.

The proceedings of the convention held in Detroit in 1890 show that C. A. Landy read a paper on standardization of hose couplings and presented resolutions as follows: "Resolved, that there should be a single standard thread for 2½-inch couplings, which should be universal throughout the United States. Resolved, that this convention considers the exact

size, or form or pitch or diameter of this thread, of far less importance than the question of having some one thread which shall be standard," and in support of the resolutions suggested "that a committee of —— members should be appointed, and instructed to prepare a standard thread for 2½-inch hose couplings, and that this committee shall limit their investigations to the dimensions and form of the thread itself, without specifying as to the dimensions or the weight of the rest of the coupling." This paper was accepted and a committee was appointed "in accordance with the suggestions of the paper just read, so that a standard thread can be adopted, and reported at the next meeting."

In accordance with this resolution a special committee, with Ex Chief C. A. Landy, of Elmira, N. Y., as chairman, submitted to the association at the convention held in Springfield, Mass., in 1891, a comprehensive report covering the various designs of different sizes of threaded couplings used by fire departments throughout the country. This report recommended that the standard coupling for 2½-inch hose should have an outside diameter of $3\frac{1}{16}$ inches, with 7½ threads to the inch instead of 6 threads, with outside diameter of $3\frac{7}{32}$ inches, as agreed upon by the association in 1879. In addition to the adoption of this specification for the 2½-inch coupling, the special committee submitted specifications for the dimensions of couplings for 2⅝, 2¾, 3, 3½, 4, 4½, 5, and 6 inches inside diameter, with 8 threads to the inch in each case. This report was duly put to vote and adopted by the association.

3. COOPERATION OF THE DEPARTMENT OF COMMERCE AND LABOR

In April, 1904, the Merchants & Miners' Transportation Co. requested the Secretary of the Department of Commerce and Labor to have the matter of fire-hose couplings investigated, with the object of making useful suggestions relative to the much-needed standardization. It was requested that the department even go so far as to suggest legislation on the subject.

Attention was called to certain facts, which may be summarized briefly as follows:

1. There was a lack of uniformity in fire-hose couplings throughout the country.

2. At the Baltimore fire, in February, 1904, neither the Washington, the Philadelphia, nor the New York fire engines which had been sent to render assistance could make connections with the local fire hydrants.

3. The Merchants & Miners' Transportation Co.'s ships which touched at Boston, Providence, Philadelphia, Baltimore, Newport News, Norfolk, and Savannah were forced to carry five different hose connections.

4. The United States Government itself had several different standards.

The matter was referred by the Secretary of Commerce and Labor to the Bureau of Standards, and this Bureau at once communicated with the fire departments of different cities to collect data upon the various standards used throughout the country with the view of making suggestions that would tend to bring about uniformity.

As a result of this investigation the Bureau found that great confusion existed, and that couplings with 6, 7, 7½, and 8 threads per inch were used for the ordinary 2½-inch fire hose in different cities. Moreover, by measuring numerous couplings submitted to this Bureau it was found that in some cases even those couplings having the same number of threads per inch would not interchange, owing to differences in outside diameter.

The United States Navy standard coupling for 2½-inch fire hose was found to have 7 threads per inch and an outside diameter of $3\frac{11}{32}$ inches.

In the nature of the case the War Department at local posts had to conform to local standards as long as these varied, and a uniform standard could hardly be expected except after national standardization.

The Steamboat-Inspection Service found great need of a uniform standard hose connection for the merchant marine, so that the boats when not in dock could interconnect their hose systems in case of fire. It was deemed less necessary to connect with pier hydrants, since the port fire companies could act independently of the ship fire apparatus in fighting fires in vessels in port. For this reason, and in the absence of a national standard, a more immediate standardization was found practicable on the basis of the "iron pipe (Briggs) standard" then in common use.

It was reported by the chief of the Chicago fire department that he often had difficulty in connecting his engines to the fire hydrants of adjacent towns, there being no uniformity as to couplings.

In New Orleans it was said that each fire company carried no less than two adapters because of lack of uniformity in the fire-hose connections of that city.

At this time the disastrous fire at Baltimore in 1904 had caused renewed interest to be taken in the matter of standardization of hose couplings, and the firemen's associations joined with the National Fire Protection Associa-

tion in active endeavor to bring about the country-wide adoption of an acceptable standard for these highly important public utilities.

It was apparent that any standard that might be agreed upon would entail more or less expense upon those cities that adopted the standard couplings but whose existing equipment was radically different from the proposed standard. New York City, for example, carrying an enormous equipment of fire-hose connections having 8 threads per inch, might not be inclined to consider a change to any other standard. St. Louis, on the other hand, whose standard was 6 threads per inch, willingly adopted the national standard which had been agreed upon.

The opinion was held by some, including the Bureau of Standards, that, from a mechanical standpoint for strength and general efficiency, a standard of 6 threads per inch was to be preferred for the 2½-inch coupling. However, in view of the fact that the majority of cities used 7, 7½, or 8 threads per inch, the consensus of opinion seemed to be in favor of a national standard having 7½ threads per inch. Advocates of the 7½-thread standard urged that a large proportion of the existing equipment of cities having couplings with 7, 7½, or 8 threads to the inch could, at small expense, be made interchangeable with the proposed 7½-thread national standard, by the use of an adjustable tap or die.

4. REPORTS OF COMMITTEES OF NATIONAL SOCIETIES

At a conference of the committees of the National Fire Protection Association and American Water Works Association, held in New York City April 24, 1905, it was resolved that 7½ threads per inch should be recommended as a national standard for 2½-inch fire-hose couplings.

At West Baden, Ind., on May 9, 1905, the American Water Works Association adopted unanimously the report of its committee on fire insurance, recommending likewise the standard of 7½ threads per inch for 2½-inch fire-hose couplings.

The National Fire Protection Association at a meeting in New York City May 23, 1905, adopted the report of its committee on standard threads for hose couplings. This report included specifications for fire-hose couplings of 2½, 3, 3½, and 4½-inch diameter in which 7½ threads per inch was also recommended for 2½-inch couplings.

At the annual convention of the International Association of Fire Engineers, held at Duluth, August, 1905, in the report of a special com-

mittee appointed the preceding year at Chattanooga, the adoption of 6 threads per inch as the standard for 2½-inch couplings was favored. During a lengthy discussion of the subject at this conference, this report met with strong opposition. In an address by F. M. Griswold, chairman of the National Fire Protection Association committee, the national standard for 2½-inch hose couplings having 7½ threads to the inch was indorsed and recommended for adoption as being the most practicable standard, for the following reasons:

> There can be no justifiable objection to the use of the 7½ threads to the inch on 2½-inch fire-hose couplings; it is mechanically correct and at the same time will prove adaptable to the largest number of equipments in the country; hence, it will prove the cheapest and most available device which could be conceived in making the change from inharmony to harmony in all fire departments. Furthermore, the standard here advocated is essentially the same as that accepted by your association at its annual convention held in Springfield, Mass., in 1891. (Landy committee report.)

The association then adopted as its standard for 2½-inch hose the 7-½ thread coupling as presented by the National Fire Protection Association, and at the convention held at Dallas, Tex., October, 1906, reaffirmed the action taken at Duluth, and made its record complete by adopting the national standard specifications covering couplings of 3 and 3½ inches inside diameter, each to have 6 threads to the inch, and a 4½-inch coupling having 4 threads to the inch, and at the same time approved the specifications for a standard nut on hydrant stems and nozzle caps.

III. THE NATIONAL STANDARD AS ADOPTED BY FIRE-PROTECTION ORGANIZATIONS

COMMITTEE REPORT TO THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

The American Society of Mechanical Engineers, at its annual meeting in New York City, December 3, 1913, voted unanimously to adopt the report of its subcommittee which recommended the national standard specifications as formulated by the committee of the National Fire Protection Association. In this report the national standard is treated in a very clear and comprehensive manner, as follows:

REPORT OF THE SUBCOMMITTEE ON FIRE PROTECTION ON NATIONAL STANDARD THREADS FOR HOSE COUPLINGS FOR FIRE SERVICE.[1]

1. In considering the problem of the adoption of a hose-coupling thread, it became a question whether to advise specifications which would show the extreme of mechanical strength without

[1] This report (adopted Dec. 3, 1913) was signed by the members of the subcommittee on fire protection: John R. Freeman, chairman; E. V. French, vice chairman; Albert Blauvelt, F. M. Griswold, H. F. J. Porter, T. W. Ransom, and I. H. Woolson.

reference to the preponderance of designs of a less theoretical value in general use, or to seek for the introduction of a threaded coupling, the characteristics of which would most closely accord with the majority class, and at the same time prove to be an intermediary of such capacity as to accommodate itself to interchange with a large proportion of couplings not exactly conforming to its dimensions.

2. Accepting the latter method of procedure as promising the widest measure of success, a committee of the National Fire Protection Association undertook a special investigation of existing conditions, using the report of a special committee under C. A. Landy, chairman, in 1891, as a basis. After securing much additional data they became convinced of the practical value of the specifications named in that report, and submitted as a standard coupling for 2½-inch hose, one showing a diameter of $3\frac{1}{16}$ inches over male end thread with 7½ threads to the inch, by the use of which it was practically demonstrated that couplings ranging in outside diameter from $3\frac{1}{32}$ inches to $3\frac{5}{64}$ inches, with either 7, 7½, or 8 threads to the inch, could be so modified as to couple up in service with this suggested standard, and thus render over 70 per cent of the 2½-inch couplings known to be in use conformable to the proposed standard at small expense as to time, money, or labor.

3. In elucidation of the essential features of this standard it was deemed wise to formulate specifications covering 2½, 3, 3½, and 4½ inch hose couplings, the inside diameters of which were to be in conformity with the sizes named, specific details relating to each of the standard sizes being shown in the printed specifications, as follows:

SPECIFICATIONS FOR HOSE COUPLINGS

Inside diameter of hose, inches	2½	3	3½	4½
Number of threads per inch	7½	6	6	4
Male Couplings				
Outside diameter of thread *finished*, inches	$3\frac{1}{16}$	$3\frac{5}{8}$	$4\frac{1}{4}$	$5\frac{3}{4}$
Diameter at root of thread, inches	2.8715	3.3763	4.0013	5.3970
Clearance between male and female threads, inch	0.03	0.03	0.03	0.05
Total length of threaded male end, inches	1	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{3}{8}$

The above are to be of the 60-degree V-thread pattern, with 0.01 inch cut off the top of thread and 0.01 inch left in the bottom of the valley in 2½-inch, 3-inch, and 3½-inch couplings and 0.02 inch in like manner for the 4½-inch couplings, and with ¼-inch blank end on male part of coupling in each case. Female ends are to be cut ⅛ inch shorter for endwise clearance, and they should also be bored out 0.03 inch larger in the 2½-inch, 3-inch, and 3½-inch sizes, and 0.05 inch larger in the 4½-inch size, in order to make up easily and without jamming or sticking.

SUGGESTIONS FOR CONVERTING NONSTANDARD COUPLINGS FOR SERVICEABLE INTERCHANGE WITH THE NATIONAL STANDARD

4. The fact that the national standard has received the unqualified approval of all the leading organizations concerned with water supplies and fire departments, forms a strong argument for its early adoption in all localities. In order to demonstrate that the question of expense in changing over to the standard is less serious than is often imagined, the following suggestions, contemplating a gradual change from nonstandard to full-standard equipment, are submitted in the belief that the comparatively light cost of such a procedure should not delay so important and beneficial an improvement in any town or city. These suggestions are intended to apply to the period of transition which must of necessity precede complete standardization.

5. Considering first the 2½-inch hose couplings and hydrant outlets in general use, we suggest that—

(*a*) Contracts for new hydrants should specify that the nipples be equipped with the national standard hose thread.

(*b*) Existing hydrant nipples should be replaced by standard nipples. This may readily be accomplished at comparatively small expense through the use of a special device or tool now on the market; or as a less satisfactory method, the nipples may be equipped with adapters having standard thread on the outboard end. These adapters should be fastened in position so as not to be readily removable.

(*c*) Fire-engine nipples should be provided with adapters having standard thread on the outboard end. These should be secured in place so as not to be readily removable.

(*d*) In many cities and towns where the 2½-inch hose couplings, as well as the nipples on hydrants and fire-engine outlets, show 7, 7½, or 8 threads to the inch, wide variations occur in outside diameter over the thread of the male end of the couplings. If such variation does not exceed $\frac{1}{32}$ inch below $3\frac{1}{16}$ inches (equaling $3\frac{1}{32}$ inches), or if the variation does not exceed $\frac{1}{64}$ inch in excess of $3\frac{1}{16}$ inches (equaling $3\frac{5}{64}$ inches), it becomes feasible to render both male and female couplings adaptable for interchange with the standard 2½-inch hose couplings (measuring $3\frac{1}{16}$ inches outside diameter on the male end and 7½ threads to the inch) by the use of an adjustable tap for the female end of the coupling or an adjustable die for the male end of the coupling, either tap or die having the same number of threads to the inch as the coupling or nipple to be treated.

Any deviation within the limits named may readily and cheaply be overcome without the removal of couplings from the hose or of the nipples from the hydrant or engine.

It may be well to emphasize the fact that in adapting the 7 and 8 thread coupling to interchange with the national standard of 7½ threads it is thus intended to provide an interim measure to serve until the standard has been fully installed, the reduced coupling being discarded as the hose wears out and all new hose purchased to be fitted with the standard couplings, thus securing a gradual and inexpensive method of standardizing the whole equipment of the city.

(*e*) Couplings of new hose, whenever purchased, should be the national standard, and specifications under which new hose is purchased should always include a clause to this effect.

(*f*) Until all hose on hand has been provided with standard couplings or has been converted as suggested under paragraph No. 4 a sufficient number of adapters should be carried on each hose wagon, so that the unconverted hose can be coupled up with the standard outlets of hydrants or fire engines.

(*g*) In view of the fact that 3-inch hose is coming into more general use, it is deemed advisable that such hose should be fitted with 2½-inch couplings having threads which conform to those on 2½-inch hose already in use.

6. It is believed that the total expense involved in a complete change from existing to standard conditions will not exceed the cost of the operation described in (*b*), (*c*), and (*f*), and that no further steps will be needed in any city save to order all new equipment of every description to be supplied with national standard threads.

7. It is of course clear that a similar line of action as noted in (*a*), (*b*), (*c*), (*e*), and (*f*) should be followed in the case of the couplings and hydrant outlets pertaining to the suction hose of the engines. While the cost will be greater per outlet, the outlets to be thus equipped will be much less in number than for the 2½-inch connections.

8. While the extremes of diameter in couplings as herein indicated appeal to this committee as being conservatively reliable for the treatment recommended, many instances of adaptation have been recorded wherein the deviations treated range as low as 3 inches and as high as $3\frac{3}{32}$ inches with satisfactory results in service, thus strongly emphasizing the value of the "national standard" as an intermediary or accommodation thread coupling of wide adaptability.

9. It is recommended that the Higbee style of cutting the thread be adopted hereafter in order to facilitate speed in coupling up and in avoiding crossing.

10. These specifications, covering the essential features for hose couplings and hydrant fittings for public fire service, have been agreed upon in joint conference with accredited representatives

of a number of organizations and associations interested in or controlling this class of work. They will be known as the "national standard," and to date have been adopted by the following associations: American Public Works Association, American Society of Municipal Improvements, American Waterworks Association, International Association of Fire Engineers, League of American Municipalities, Minnesota State Firemen's Association, National Board of Fire Underwriters, National Fire Protection Association, National Firemen's Association, New England Waterworks Association, North Carolina State Firemen's Association, Pennsylvania Waterworks Association, Virginia State Firemen's Association.

National Standard Hose Coupling

	Inches	Centimeters
Inside diameter of hose coupling	2.5000	6.3500
Blank end of male part	0.2500	0.6350
Outside diameter of thread finished	3.0625	7.7788
Diameter of root of thread	2.8715	7.2936
Clearance between male and female threads	0.0300	0.0762
Total length of threaded male end	1.0000	2.5400
Number of threads per inch	7½	
Pattern of thread	60°V	
Cut off at top of thread	0.01 of an inch	
Left in bottom of valley	0.01 of an inch	

Female end to be cut 0.125 of an inch shorter than male end for endwise clearance.

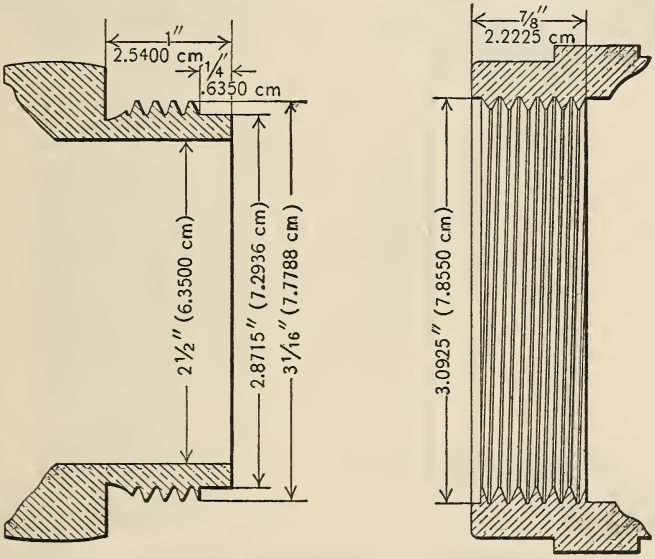

FIG. 2.—*The 2½-inch coupling (section)*

National Standard Hose Coupling

	Inches	Centimeters
Inside diameter of hose coupling	3.0000	7.6200
Blank end of male part	0.2500	0.6350
Outside diameter of thread finished	3.6250	9.2075
Diameter of root of thread	3.3763	8.5758
Clearance between male and female threads	0.0300	0.0762
Total length of threaded male end	1.1250	2.8575

Number of threads per inch.....6
Pattern of thread.....60°V
Cut off at top of thread.....0.01 of an inch
Left in bottom of valley.....0.01 of an inch
Female end to be cut 0.125 of an inch shorter than male end for endwise clearance.

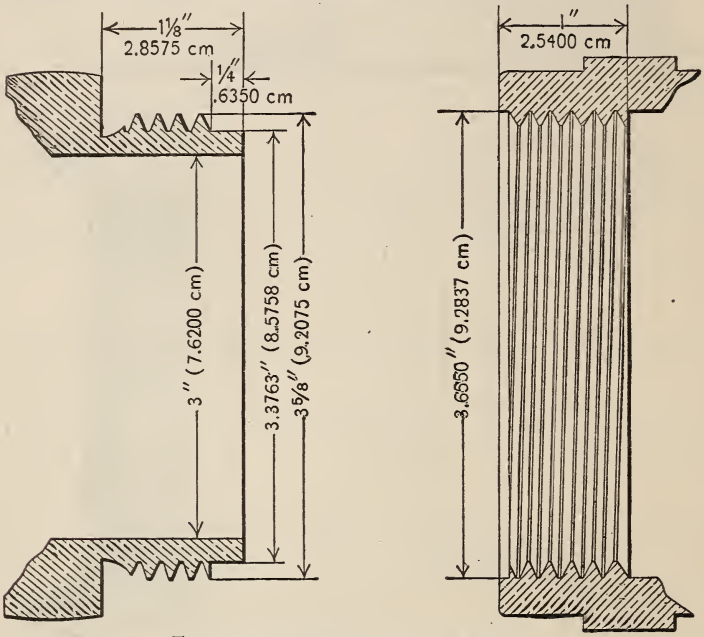

FIG. 3.—*The 3-inch coupling (section)*

National Standard Hose Coupling

	Inches	Centimeters
Inside diameter of hose coupling	3.5000	8.8900
Blank end of male part	0.2500	0.6350
Outside diameter of thread finished	4.2500	10.7950
Diameter of root of thread	4.0013	10.1633
Clearance between male and female threads	0.0300	0.0762
Total length of threaded male end	1.1250	2.8575
Number of threads per inch	6	
Pattern of thread	60°V	
Cut off at top of thread	0.01 of an inch	
Left in bottom of valley	0.01 of an inch	

Female end to be cut 0.125 of an inch shorter than male end for endwise clearance.

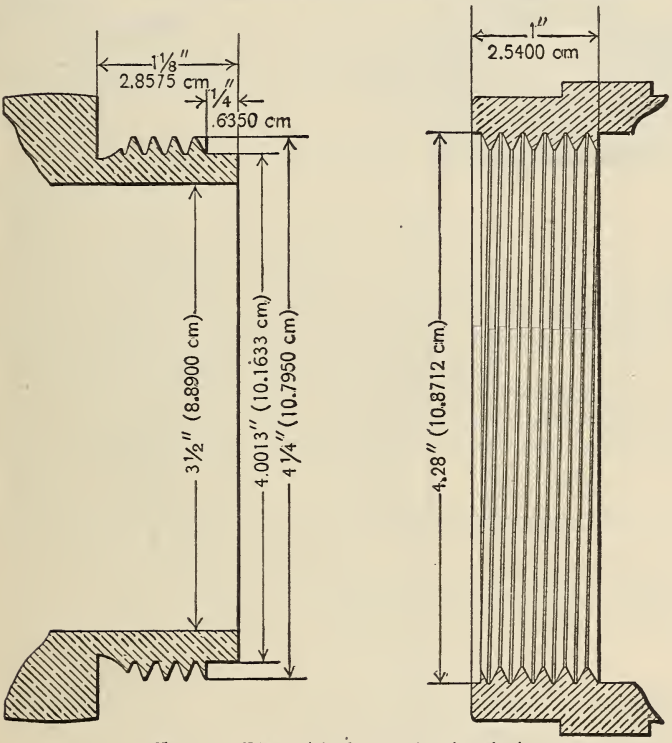

FIG. 4.—*The 3½-inch coupling (section)*

National Standard Hose Coupling

	Inches	Centimeters
Inside diameter of hose coupling	4.5000	11.4300
Blank end of male part	0.2500	0.6350
Outside diameter of thread finished	5.7500	14.6050
Diameter of root of thread	5.3970	13.7084
Clearance between male and female threads	0.0500	0.1270
Total length of threaded male end	1.3750	3 4925
Number of threads per inch	4	
Pattern of thread	60°V	
Cut off at top of thread	0.02 of an inch	
Left in bottom of valley	0.02 of an inch	

Female end to be cut 0.125 of an inch shorter than male for endwise clearance.

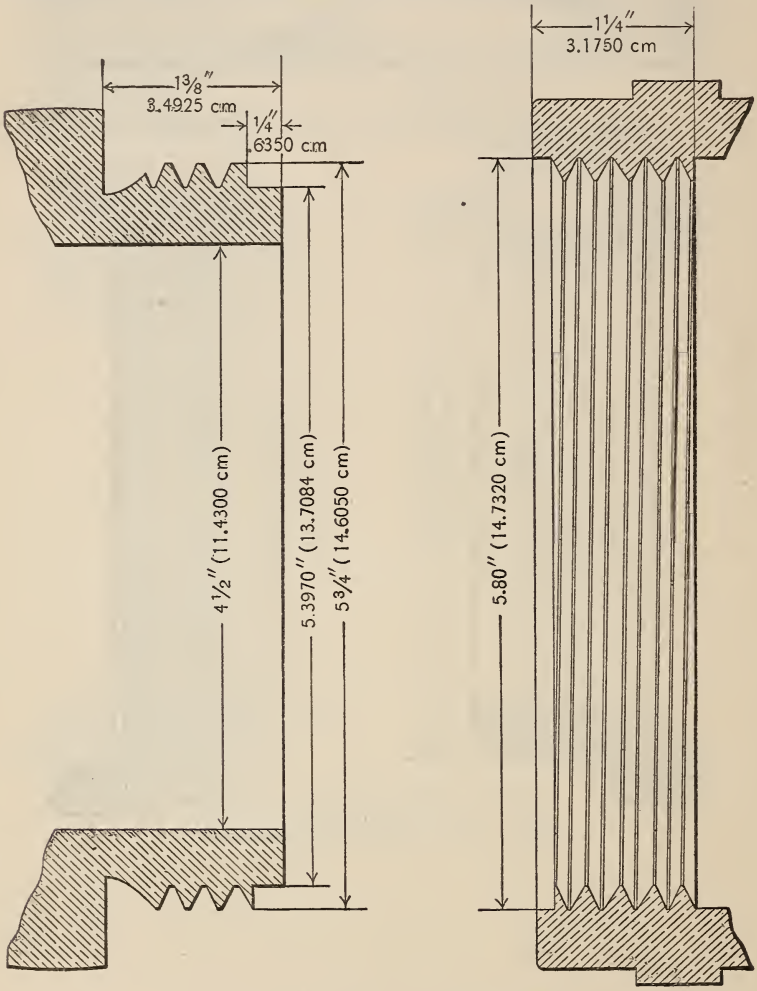

FIG. 5.—*The 4½-inch coupling (section)*

IV. PRESENT STATUS OF THE NATIONAL STANDARD FIRE-HOSE COUPLING

Since the first publication of the specifications for the national standard in 1905 by the committee of the National Fire Protection Association there has been no serious criticism of these specifications, no modification or substitute has been suggested, nor has any organization refused approval.

1. CITIES [2] AT THIS DATE USING THE NATIONAL STANDARD FIRE-HOSE COUPLING

In the following named cities and towns the national standard fire-hose coupling is in use. Incorporated therewith is a list of places in which facilities are provided for adaptation to interchange with the national standard. The list is arranged alphabetically by States. The data were furnished by fire chiefs or waterworks officials, except where followed by an asterisk (*). Type shown in small capitals indicates new standard equipment or adaptation to interchange.

Alabama.—Abbeville, Auburn,* Dothan,* EUFALA,* HUNTSVILLE, LAVERNE, Mobile,* New Decatur, Opelika, Samson,* Toney.*

Alaska.—Skagway.

Arizona.—GRAND CANYON* (A., T. & S. F. R. R.), Tucson.

Arkansas.—Benton,* DE QUEEN,* Texarkana.

California.—Alameda, Bakersfield, Berkeley, Fruitvale, Hanford, Monrovia, Napa, Oakland, Palo Alto, Pasadena, Petaluma, Pomona, Redlands, Riverside, San Diego, San Francisco, San Mateo, Santa Ana, Santa Barbara, Santa Clara, Santa Monica, Stockton, Watsonville.

Canada.—MONTREAL,* PORT HOPE,* ST. ANNE,* ST. JOSEPH.*

Colorado.—ANTONITO,* Boulder, Durango, GRAND JUNCTION,* Montrose, Salida, Trinidad.

Connecticut.—Ansonia, Branford, Buck,* Danbury,* DERBY (waterworks)*, East Hartford, ENFIELD, Greenwich, Groton, Meriden, Naugatuck, NEW BRITAIN, New London, Newton,* NORWICH, Ridgefield, Rockville, South Norwalk, Torrington.

Delaware.—BRIDGEVILLE.*

Florida.—Daytona, APALACHICOLA,* EUSTIS,* KISSIMMEE,* LAKE CITY, Lakeland, LAKE WORTH,* Miami, Palatka,* PALMETTO,* SEBRING,*.

Georgia.—ADEL,* Albany, ATHENS,* Ashburne,* ATLANTA, Covington,* CORDELE*, Dalton, DOUGLASSVILLE,* HAMPTON,* HAZLEHURST,* Lagrange, LYONS,* Millen,* Monroe,* PAVA,* PERRY,* RICHLAND,* SPARKS,* SYLVESTER,* Thomson,* Toccoa,* Valdosta, Vidalia,* Vienna,* WILLACOOCHEE,* WINDER.*

Idaho.—ASHTON,* Lewiston, NAMPA,* ORCHARD,* PRESTON.*

Illinois.—Aurora, Beardstown, BELVIDERE, BLUE ISLAND, Charleston, Chicago Heights, Danville, Dixon, EAST MOLINE, EAST ST. LOUIS, Galena,* Galva, Granite City, Hoopeston, Jacksonville, Kankakee, Kewanee, LAKE ZURICH,* Lemont, Litchfield, Maywood, MOLINE, Murphysboro, NEW ATHENS,* Nokomis,* NORMAL,* Ottawa, Pana, PEKIN, Peoria, Princeton, PRINCEVILLE,* Quincy,* Rockford, ROCK ISLAND,* Sheffield,* SILVIS, Sterling, TOULON.*

[2] The list of cities and towns given has been furnished by F. M. Griswold, member of the committee on standard hose couplings, National Fire Protection Association.

Indiana.—CHESTERTON,* Converse,* Crawfordsville, Cromwell,* ELKHART, Evansville, HAMMOND,* OTTERBEIN,* Owensville,* Petersburg,* Plainfield,* Sheridan,* SULLIVAN,* Union City.

Iowa.—BLANCHARD,* Charles City, Clinton,* DAVENPORT,* ELLSWORTH,* Fort Dodge, Iowa City, KEOKUK,* LOST NATION,* Marshalltown, OSCEOLA,* Ottumwa, Paton,* Sioux Falls,* Washington, Waterloo.*

Kansas.—BUCKLIN CITY,* BURDEN,* CHAPMAN,* Cherryvale, CLEARWATER,* Coffeyville, DELPHOS,* Emporia, ENGLEWOOD,* FOREST LAKE,* FOWLER,* GALENA,* GLENN ELDER,* Goodland,* HORTON,* Iola, KENSINGTON,* Junction City, LA CYNGE,* MADISON,* MULBERRY,* OXFORD,* Parsons, PITTSBURG,* Sedan,* SEDGEWICK CITY,* WAKEENEY,* Wellington, WESTMORELAND,* Winfield.

Kentucky.—Ashland, Covington, Cynthiana, Henderson, Hickman,* Newport, Owensboro.

Louisiana.—Lake Arthur,* SHREVEPORT, ZACHARY.*

Maine.—Androscoggin Mills,* Augusta, Brewer, Brunswick, Calais, Danforth,* Eastport, Ellsworth, Fort Fairfield, FORT KENT,* LINCOLN,* Presque Isle, Rockland, Saco, South Lincoln,* STONINGTON,* Waterville, Winthrop.*

Maryland.—BERLIN,* Cambridge, Cumberland, Oakland.*

Massachusetts.—Abington, Adams, Agawam,* Amesbury,* Arlington,* BARNSTABLE,* Beverly, BLANDFORD,* Bridgewater, BROCKTON, Brookline, Cambridge,* Cherry Valley,* CHICOPEE, Clinton,* Danvers,* Dedham, East Hampton, Enfield,* Everett, Fitchburg, Framingham, Franklin, Gloucester, Greenfield, Hardwick,* HOLYOKE, Lenox,* LENOX DALE,* LEOMINSTER, Malden, Marblehead, Melrose, Methuen, Milford,* Milton, Natick, Newburyport, Newton, North Adams, Northampton,* Northbridge,* Oxford,* PALMER,* Peabody, Pittsfield,* Revere, Rochdale,* RUSSELL,* Somerville, South Adams,* SPRINGFIELD, STOCKBRIDGE,* Stoneham, Swampscott, Taunton, TURNERS FALLS,* Uxbridge,* Ware, Wareham,* Watertown, Webster, Westboro, Westfield,* WEST GROTON,* WEST SPRINGFIELD, Weymouth, Whitman, Winchester, Winthrop, Worcester, Worthington.*

Mexico.—PEARSON.*

Michigan.—Alpena, Ann Arbor, BATTLE CREEK, Benton Harbor, Berrien Springs,* Big Rapids, Charlotte, Cheboygan, Frankfort,* Galesburg,* GAGETOWN,* Grand Haven, GRAND RAPIDS, Holland, Ishpeming, JACKSON, Kalamazoo, LANSING, Monroe, Mount Pleasant, Petoskey, Port Hope.*

Minnesota.—Anoka, Brainerd, Colerains,* Eveleth, Fergue Falls, Hastings,* HIBBING, Moorhead, NEWMARKET,* Red Wing, VIRGINIA.*

Mississippi.—ACKERMAN,* Canton,* Columbia,* FRIARS POINT,* Goodman,* GREENVILLE,* Hattiesburg, IUKA,* JACKSON, LEXINGTON,* McComb, Ocean Springs,* OSYKA,* Shaw,* Vicksburg, Yazoo City.

Missouri.—Aurora, Brookfield, CARTHAGE, De Soto, DEXTER,* Fulton, Hannibal,* HARRISONVILLE,* Jefferson City,* LEE SUMMIT,* MALDEN,* MARCELINE CITY,* MOBERLY,* MOUNTAIN GROVE,* NEOSHO, ST. LOUIS, Sedalia, Springfield, Webb City.

Montana.—Billings, Bozeman, Great Falls, Helena,* Kalispell, Livingston, MALTA,* MANHATTAN,* SHELBY,* Townsend.*

Nebraska.—BLAIR,* BRUNING,* DECATUR,* Grand Island, Hastings, HAVELOCK,* HEMINGFORD,* JANSEN,* Lincoln,* MITCHELL VILLAGE,* NEBRASKA CITY, NELSON,* Oakdale,* OGALALLA,* Omaha, PETERSBURG,* Plattsmouth, YUTAN.*

Nevada.—Reno.

New Hampshire.—Berlin, Claremont, Derry, Exeter, Franklin, Greenville,* NORTH WALPOLE,* Rochester, Union.*

New Jersey.—Bridgeton, Cranbury,* Flemington, Hackensack, Harrison, Highland,* Lambertville, Mendham,* MILFORD,* Mount Tabor,* NEW BRUNSWICK, Newton,* Oxford,* PINE PLAINS,* Point Pleasant,* Pompton Lake,* Stockton City,* Tenafly,* TRENTON, VERONA.

New Mexico.—CLOVIS,* PORTALES,* Raton.

New York.—Adams, Alexandria, Antwerp, Auburn,* Avon, Baldwinsville,* Ballston Spa, Batavia, Bath, Bergen,* BINGHAMTON, BLACK RIVER,* BROWNSVILLE,* CAMILLUS,* Canandaigua, CANDOR,* Carthage, Catskill,* Cleveland, Clifton Springs,* Clyde,* COMSTOCK PRISON,* Constable, Cooperstown,* COPENHAGAN,* Corning, Coxsackie,* Depew,* Despatch,* Dexter,* Dunkirk, East Aurora,* East Syracuse,* Endicott, Franklin,* Geneseo,* Geneva,* Gilbertsville,* Glen Cove, Gouverneur, GREENE,* Greenwich,* Groton,* Halcottsville,* Hamburg,* Hamilton,* Hancock,* Hartwick,* Hoosick Falls, Hudson, Huntington, INDEX,* Lancaster,* Lestershire,* Liberty,* Livonia,* LOWVILLE,* Lyons Falls,* McGrawville,* Manhassett,* Manlius,* Matteawan, Mechanicsville,* Medina, Minetto,* Montour Falls, Morrisville,* Mount Kisco,* Mount Morris, Newburg, NIAGARA FALLS,* Nichols,* Oneida, Owego,* Oxford,* Penn Yan, Phelps,* Philadelphia, Pleasantville,* Port Byron,* Portchester, Poughkeepsie, Prattsburgh, Pulaski,* Rensselaer, St. Johnsville,* Sandy Hill, Sherburne,* Shortsville,* SILVER BAY,* Sloan,* Tonawanda,* Treadwell,* TROY,* Tully,* Valatie,* VARYSBURG,* Vernon,* Victory Mills,* Walton,* Waterford,* Waterloo, WATERTOWN, Waterville,* Watkins, Webster,* Weedsport,* West Seneca,* White Plains, Williamsville,* Windsor.*

North Carolina.—ANDREWS,* BLACK MOUNTAIN,* BRYSON CITY,* CANTON,* Elizabeth City, Granite Falls,* Henderson, HICKORY, LENOIR,* Marion,* MURPHY,* NORTH WILKESBARRE,* Reidsville, Statesville, Washington.

North Dakota.—Grand Forks, Litchville,* Minot.

Ohio.—Berea, Boston,* Bowling Green,* Centerburg,* COLUMBUS, COVINGTON,* DELTA,* Dresden,* East Cleveland, FAIRPORT,* Galion, HUDSON*, KENTON,* LANCASTER,* Lorain, LOWELLVILLE,* MANSFIELD, Marysville,* MONTPELIER,* NELSONVILLE,* Norwood, OBERLIN,* Ottoville,* Painesville, PIQUA,* Put in Bay,* RICHMOND,* Sandusky,* SHELBY,* Stoutsville,* UTICA,* Vermilion,* WAUSEON,* Xenia.*

Oklahoma.—CHEROKEE,* CHICKASHA, CLINTON,* COLGATE,* EDMOND,* FAIRVIEW,* HARTSHORNE,* OSAGE,* PONCA, Roff,* SOPER,* STILLVILLE,* Wanette.*

Ontario.—Bothwell,* BRAMPTON.*

Oregon.—Albany, Haines.*

Pennsylvania.—Avalon, (Boro'),* BERLIN,* BERWYN,* BIGLERVILLE,* Bridgeville,* Chambersburg, COBURN,* CONNEAUT LAKE,* Conneautville,* Delaware Water Gap,* East Brady,* FALL CREEK,* FORT PALMER* SIDING, FRACKVILLE,* Huntingdon, JOHNSTOWN, Kane,* Kensington,* Lancaster, Midland,* Millersville,* Milton, Monogahela, Mount Pleasant, Nanticoke, NORTHAMPTON, North East, Olyphant, PLEASANT GAP,* PORT ROYAL,* PUNXSUTAWNEY, RED HILL,* Reynoldsville, Rochester, SALIX,* Shamokin,* Shenandoah, SPRINGDALE,* Taylor, Uniontown,* Warren, WESTFIELD,* Wilkensburg, Wyoming.*

Porto Rico.—AIBONITO.*

Rhode Island.—Apponaug,* Bristol, Centerville,* Central Falls, East Greenwich,* East Providence, Pawtucket, Providence, Valley Falls, Woonsockett.*

South Carolina.—Camden, COLUMBIA, DARLINGTON, Georgetown, Greenwood, Lancaster,* ORANGEBURG.*

South Dakota.—EDGEMONT,* Ipswich,* KENNEBECK,* ONEIDA,* Hot Springs,* REDFIELD, Watertown.

Tennessee.—Bristol, Cleveland, Columbia,* Cookeville,* Dyersburg, JACKSON, Lawrenceburg,* NASHVILLE, NEWPORT.*

Texas.—Arlington Heights,* Amarilla, Belton, Blooming Grove,* Bonham, Brownsville, Childress,* Clebourne, Clifton,* Conroe,* Corsicana, Crockett,* Floresville,* Fort O'Connor,* Hillsboro, Lubbock,* Marshall, Memphis,* Meridian,* Merkel,* Midland,* Midlothian,* Mineola,* Nacagdoches,* Plain View,* Port Arthur, San Angelo, San Augustine,* Snyder,* Texarkana, Texas City,* Tulia,* Tyler, Victoria,* Yoakum.

Utah.—Beaver City,* Bingham,* Clear Lake,* Coalville,* Fillmore,* Helper,* Honeyville,* Levan,* Oquirrh,* Panguish,* Roosevelt,* Santaquin,* Springville,* Temple Station,* Vernal.*

Vermont.—Barre,* Bellows Falls, Brattleboro, Montpelier, North Troy,* Queechy,* St. Albans, St. Johnsbury,* Winooski.

Virginia.—Bedford City,* Franklin,* Harrisonburg,* Monterey,* Phoebus,* South Boston.

Washington.—Arlington,* Everett, Mount Vernon,* North Yakima, Olympia, Port Townsend, Seattle, Sedro Woolley,* Snohomish, Spokane, Tacoma, Thornwood,* Walla Walla.

West Virginia.—Benwood, Keyser, Logan* (Coal Co.), North Fork,* Williamson.

Wisconsin.—Ashland, Beaver Dam, Beloit, Berlin, Cedarburg, Cudahy, Fox Lake,* Grafton,* Gratiot,* Hartford,* Kaukauna, La Crosse, Manitowoc, Menominee,* Milwaukee, Platteville, Rhinelander, Shawano,* Sheboygan, Stevens Point, Sturgeon Bay, Wausau, Weyauwega.*

Wyoming.—Cheyenne, Rochester.*

2. TRANSITION METHOD

In changing from nonstandard to the standard equipment the method described in paragraph 5 (*d*) of the report of the subcommittee of the American Society of Mechanical Engineers (see p. 12 of this Circular) may be followed. The results have been summarized by F. M. Griswold as follows:

In evidence of progress in this work, the record shows 73 cities or towns in which the national standard has been put into service, either as new equipment or by adaptation of nonstandard couplings to interchange with the standard, while seven installations include the complete substitution of national standard hose couplings and hydrant nipples in place of previously prevailing nonstandard devices, under such conditions as to methods of procedure and cost of substitution warranting brief mention. Notable among these is the city of St. Louis, Mo., the pioneer in the active promotion of standardization, where over 11,000 hydrant outlets and the couplings on many thousands of feet of fire hose were changed from a so-called "bastard" six thread to the standard, all of the work being done by city employees, at an average net cost of $1 per hose coupling and of $2.82 per hydrant outlet, the latter being principally of 4½-inch steamer suction type, each of which was laboriously chipped out by use of a cold chisel.

Closely following this action by St. Louis, the city of East St. Louis, which lies on the opposite shore of the river in Illinois, brought its equipment into conformity with that of the larger city, upon which it must call for aid in time of threatening disaster.

During the winter of 1910–11, the city of Springfield, Mass., discarded the "universal clutch" coupling and substituted for it the national standard, changing 1,350 hydrants, some of which had four outlets, at the rate of from 50 to 100 outlet replacements per day, at an average net cost of $1 per outlet, giving credit for the old metal, sold at 9½ cents per pound, and excluding cost of labor performed by the regular force of waterworks employees. Couplings on 22,000 feet of hose were changed by department employees at a like net cost of $1 each.

It is interesting to note that this work at Springfield was carried out in the winter season and that it was accomplished without accident by the use of surprisingly simple and expeditious methods, in that, where hydrant nipples were leaded-in, the use of a 6-pound sledge proved an efficient means for their removal, while in the case of screwed-in nipples an expanding wrench, entered from the outboard end of the nipples engaged the operating lugs and permitted the easy removal of the device, while the 4½-inch leaded-in suction nipples were melted out by the use of a plumber's gasoline blow torch, at the rate of 5 minutes per operation. This practical and unique demonstration of "how to do it" is commended as being worthy of serious consideration.

Following this action at Springfield, the contiguous cities of Chicopee, Holyoke, and West Springfield each brought its equipment into conformity with the standard, at an expense probably no greater than was that of the change at Springfield.

Shreveport, La., replaced the old-time "Feyh" coupling by installing the standard, but there are no data as to method of procedure nor as to the cost of the operation.

The desirability of including in the national standard specifications for hose smaller than 2½ inches has been recognized, and the matter has been brought before the hose-couplings committee of the National Fire Protection Association. It is hoped that in the near future the national standard will include the smaller couplings, at least for 1½ and 2 inch hose, which are extensively used for inside work.

3. LISTS OF ORGANIZATIONS WHICH HAVE APPROVED THE NATIONAL STANDARD FIRE-HOSE COUPLINGS AND THE OPERATING NUT FOR HYDRANT STEMS

(a) STANDARD FIRE-HOSE COUPLINGS

The national standard fire-hose couplings have been approved by the following organizations: American Society of Mechanical Engineers (adopted the report of its subcommittee recommending the national standard), American Public Works Association, American Society of Municipal Improvements, American Water Works Association, International Association of Fire Engineers, League of American Municipalities, Minnesota State Firemen's Association, National Board of Fire Underwriters, National Fire Protection Association, National Firemen's Association, New England Waterworks Association, North Carolina State Firemen's Association, Pennsylvania Waterworks Association, and Virginia State Firemen's Association.

(b) OPERATING NUT ON HYDRANT STEMS

The importance of standardizing the operating nuts on hydrant stems and caps is generally recognized.

In the national standard specifications under the title "Hydrant fittings" is presented a standard for operating nut on hydrant stems, which provides "the operating nut for hydrant stems and nozzle caps to be pentagon in shape and 1½ inches in diameter, measured from flat to point."

These specifications were duly adopted as standard by the following organizations, at places and dates named: American Society of Municipal Improvements, Birmingham, October, 1906; American Waterworks Association, Boston, July, 1906; International Association of Fire Engineers, Dallas, October, 1906; League of American Municipalities, Chicago, September, 1906; National Board of Fire Underwriters, New York, May, 1907; National Firemen's Association, Roanoke, Va., August, 1906; National Fire Protection Association, New York, May, 1907; New England Waterworks Association, Boston, August, 1906; Virginia State Firemen's Association, Richmond, Va., August, 1906.

V. SUMMARY

1. The movement for the adoption of standard fire-hose couplings dates from the great Boston fire of 1872, which showed the impossibility of the fire departments of adjacent towns acting in unison when provided with the diverse sizes of hose fittings then prevailing.

2. The matter was taken up at the first convention of fire engineers, in 1873, and was discussed at various conventions in succeeding years. The resolutions gradually became more definite, although little was accomplished toward bringing about the desired changes until the agitation received a new impetus from the Baltimore fire in 1904, when neither the Washington, Philadelphia, nor New York fire engines, on their arrival, could make connection with the local fire hydrants.

3. This condition led the Merchants & Miners Transportation Co. in April, 1904, to request the Secretary of the Department of Commerce and Labor to investigate the subject of fire-hose couplings. The Secretary referred the matter to the Bureau of Standards, and in the investigation which followed, it was found that there was a great diversity in sizes and threads of couplings throughout the United States. It was evident that considerable expense would be involved in changing from one standard to another, and therefore, at the conference of the committees of the National Fire Protection Association and American Water Works Association, held in New York City, April 24, 1905, the Bureau of Standards suggested that either the thread most extensively used, or that thread which possessed the greatest advantages in other respects, might be adopted. Following the latter course, the conference resolved that 7½ threads per inch should be recommended for 2½-inch fire-hose couplings. This thread was not regarded as necessarily an ideal standard, but was considered as a practicable basis for unification under prevailing conditions.

4. At the annual convention of the International Association of Fire Engineers at Duluth in 1905 this standard was adopted after lengthy discussion, and at Dallas in 1906 the convention reaffirmed the action taken at Duluth and made its record complete by adopting the national standard specifications covering couplings of 3 and 3½ inches inside diameter, each to have 6 threads to the inch and a 4½-inch coupling having 4 threads to the inch.

5. Since then a dozen large organizations have adopted the national standard. The report of the committee of the American Society of Mechanical Engineers, adopted December 3, 1913, treats its present status in a very clear and comprehensive manner, with suggestions for converting nonstandard couplings for serviceable interchange with the national standard. Up to 1914 the national standard had been put into service in 287 towns and cities, either as new equipment or by adaptation of nonstandard couplings to interchange with the standard.

S. W. Stratton,
Director.

Approved:
William C. Redfield,
Secretary.