

COMMERCIAL STANDARD CS209-57

Vinyl Chloride Plastics Garden Hose

A recorded
voluntary standard of the
trade published by
the U. S. Department
of Commerce



**For sale by the Superintendent of Documents
U. S. Government Printing Office, Washington 25, D. C. - Price 10 cents**

U. S. DEPARTMENT OF COMMERCE

SINCLAIR WEEKS, Secretary

Issued by

OFFICE OF TECHNICAL SERVICES

Commodity Standards Division

With the cooperation of

NATIONAL BUREAU OF STANDARDS

COMMERCIAL STANDARDS

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division of the Office of Technical Services, and with the National Bureau of Standards. Their purpose is to establish standard methods of test, rating, certification, and labeling of manufactured commodities and to provide uniform bases for fair competition.

The adoption and use of a Commercial Standard is voluntary. However, when reference to a standard is made in contracts, labels, invoices, or advertising literature, the provisions of the standard are enforceable through usual legal channels as a part of the sales contract.

Commercial Standards originate with the proponent industry. The sponsors may be manufacturers, distributors, or users of the specific product. One of these three elements of industry submits to the Commodity Standards Division the necessary data to be used as the basis for developing a standard of practice. The Division, by means of assembled conferences or letter referenda, or both, assists the sponsor group in arriving at a tentative standard of practice and thereafter refers it to the other elements of the same industry for approval or for constructive criticism that will be helpful in making any necessary adjustments. The regular procedure of the Division assures continuous servicing of each Commercial Standard through review and revision whenever, in the opinion of the industry, changing conditions warrant such action.

SIMPLIFIED PRACTICE RECOMMENDATIONS

Under a similar procedure the Commodity Standards Division cooperates with industries in the establishment of Simplified Practice Recommendations. Their purpose is to eliminate avoidable waste through the establishment of standards of practice for sizes, dimensions, varieties, or other characteristics of specific products; to simplify packaging practices; and to establish simplified methods of performing specific tasks.

Vinyl Chloride Plastics Garden Hose

[Effective April 20, 1957]

1. PURPOSE

1.1 The purpose of this Commercial Standard is to establish a national standard of quality for the information and guidance of producers, distributors and users; to promote understanding between buyers and sellers; to provide a basis for fair competition among producers of high-quality products; to give the consumer confidence in the quality of the product; and to provide means for identifying vinyl chloride plastics garden hose produced in conformance with this standard.

2. SCOPE

2.1 This Commercial Standard establishes requirements and test methods for burst strength, low-temperature flexibility, water extraction, water flow rate, and couplings, and requirements for appearance, concentricity, and inside diameters and tolerances for plastics garden hose. A recommended statement for declaring compliance with the standard and an identifying hallmark are included.

2.2 This standard covers vinyl chloride plastics garden hose to be used:

- (a) with cold water not exceeding 100° F,
- (b) with one end open,
- (c) with nozzle or spray device which does not completely cut off flow of water.

3. REQUIREMENTS

3.1 *Appearance.*—The hose shall be as free as commercially practicable from visual defects such as foreign matter, undispersed raw materials, die lines, pinholes, and striations; and the hose shall have a smooth unblemished longitudinal surface, both internally and externally.

3.2 *Concentricity.*—The outside and inside surfaces of the plastics garden hose shall appear concentric on visual observation of the hose section.

3.3 *Wall thickness.*—No requirement is given for wall thicknesses except that the thickness shall be sufficient to enable the hose to meet all requirements of this standard.

3.4 *Length.*—Plastics garden hose with couplings shall not be shorter than 99.5 percent of the length designated by the manufacturer.

3.5 *Inside diameter.*—Standard inside diameters and minus tolerances are given in table 1.

TABLE 1. *Inside diameters and tolerances*

Inside diameter	Tolerance
<i>Inch</i>	<i>Inch</i>
$\frac{7}{16}$ -----	-0.020
$\frac{3}{2}$ -----	-.020
$\frac{9}{16}$ -----	-.020
$\frac{5}{8}$ -----	-.020
$\frac{3}{4}$ -----	-.020

3.6 *Burst strength.*—The hose shall not burst when subjected to a static water pressure of 100 psi for 30 minutes at 100° F, when tested in accordance with paragraph 4.1.

3.7 *Low-temperature flexibility.*—The hose shall bend sufficiently to break the surface of the liquid bath when tested at 32° F in accordance with the method described in paragraph 4.2.

3.8 *Water extraction.*—The loss in weight shall not exceed 3½ percent when the hose is tested in accordance with paragraph 4.3.

3.9 *Water flow rate.*—The flow of water shall be not less than that shown in table 2, when the hose is tested in accordance with paragraph 4.4.

TABLE 2. *Minimum water flow at 50 psi input pressure*

Length of coupled hose	Size	Minimum water delivery
<i>Feet</i>	<i>Inch</i>	<i>Gal/min</i>
25-----	$\frac{7}{16}$	7
50-----	$\frac{7}{16}$	5.5
25-----	$\frac{1}{2}$	10
50-----	$\frac{1}{2}$	8
75-----	$\frac{1}{2}$	6
25-----	$\frac{9}{16}$	13
50-----	$\frac{9}{16}$	10
75-----	$\frac{9}{16}$	8.5
25-----	$\frac{5}{8}$	16
50-----	$\frac{5}{8}$	12
75-----	$\frac{5}{8}$	10
25-----	$\frac{3}{4}$	26
50-----	$\frac{3}{4}$	20
75-----	$\frac{3}{4}$	17

3.10 *Couplings.*

3.10.1 *Leakage.*—A coupled length of garden hose shall withstand a pressure of 100 psi for 5 minutes at room temperature without visible water leakage, when tested in accordance with paragraph 4.5.1.

3.10.2 *Dead-load coupling pull.*—Couplings shall be attached to the hose so that they will withstand a continuous dead load of 150 pounds for a minimum of 5 minutes, when tested in accordance with paragraph 4.5.2. After this test there shall be no leakage at the couplings, when tested in accordance with paragraph 4.5.1.

3.10.3 Couplings shall be so constructed that electrolytic corrosive action is not likely to occur.

4. METHODS OF TEST

4.1 *Burst strength.*—Three specimens of hose selected from different parts of the sample shall be tested, each approximately 15 inches long and provided with couplings at each end. A fitting shall be provided to permit closure of one end. The specimens shall be conditioned in water at $100^{\circ} \pm 2^{\circ}$ F for 30 minutes with the water contacting the hose completely, both internally and externally. With one end closed and the specimen remaining immersed, water at 100° F shall be pumped into the hose at such a rate that the pressure reaches 100 ± 0.5 psi in approximately 6 seconds. The specimen shall be held at that temperature and pressure for 30 minutes. If a coupling pullout occurs, the specimen shall be discarded and the test repeated with an additional specimen. A single specimen shall be considered as failing to pass the test if bursting occurs during the 30-minute period. The sample shall be reported as meeting the test requirements if at least 2 of the 3 specimens pass the test, and as failing if 2 or more of the 3 specimens fail the test.

4.2 *Low-temperature flexibility.*

4.2.1 *Equipment.* An insulated water tank with metal lining and a removable framework as shown in figure 1.

4.2.2 *Specimens.*—One specimen $10\frac{1}{4}$ inches long shall be cut from the sample to be tested. The specimen shall have a perforation located $\frac{1}{4}$ inch from one end.

4.2.3 *Procedure.*—The hose specimen shall be fitted over the mandrel, as shown in figure 1, with $5\frac{1}{4}$ inches of hose extending beyond the end of the mandrel, and with the perforation at the free end of the specimen. The hook is inserted in the perforation, and the tank shall be filled to a level 4 inches above the hose specimen with an ice-alcohol or ice-water mixture maintained at a temperature of 32° F. After the hose is conditioned for 30 minutes in the 32° F liquid, the weight specified in table 3 for the hose size being tested shall be placed on the pan. Failure of the hose to bend sufficiently for the end to break the surface of the liquid in 15 seconds shall be considered failure of the sample.

TABLE 3. *Flexibility test weights*

Hose size	Specified test weight
<i>Inch</i>	<i>Pounds</i>
$\frac{7}{16}$ -----	6
$\frac{1}{2}$ -----	8
$\frac{9}{16}$ -----	9
$\frac{5}{8}$ -----	10
$\frac{3}{4}$ -----	20

4.3 *Water extraction test.*—Reference: *An Improved Water Extraction Test for Polyvinyl Chloride Elastomers.* by E. F. Schulz, ASTM Bulletin No. 183, July 1952.

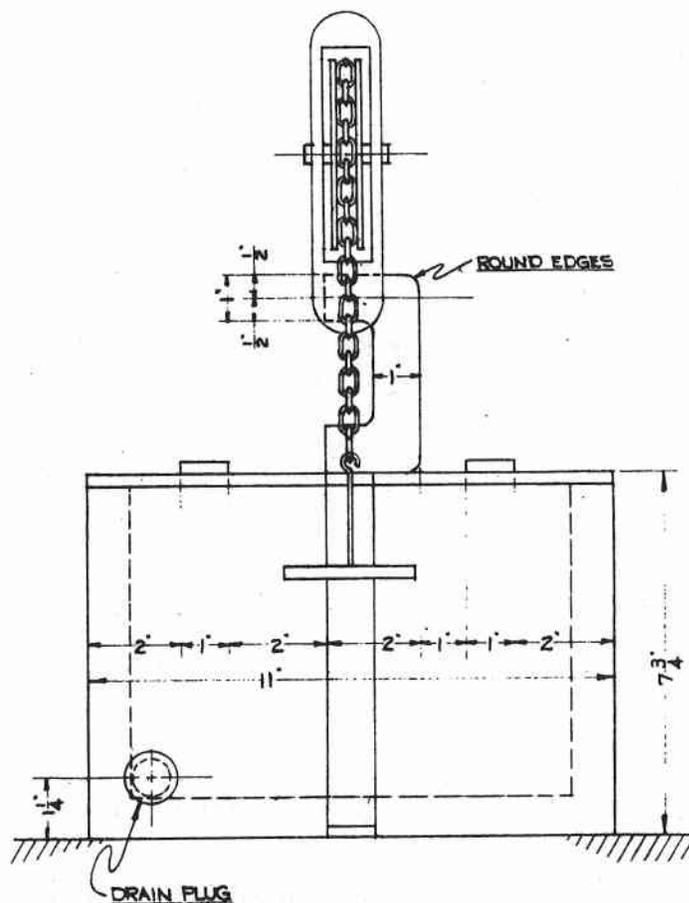


FIGURE 1B. Low-temperature flexibility test equipment—end view.

4.3.1 *Equipment and reagents.*

- (a) Suitable glass jar with loose-fitting cover.
- (b) Oven capable of maintaining a temperature of 85° C.
- (c) Barium oxide desiccator.
- (d) Distilled water.
- (e) Activated carbon (Carbide & Carbon Chemicals Co. "Columbia" grade AC granular 6/14 mesh), washed to complete removal of alkalinity.

4.3.2 *Specimens.*—Specimens shall be 1 inch in length. Six specimens cut from various parts of the sample shall be tested.

4.3.3 *Procedure.*—Precondition test specimens in a barium-oxide desiccator at 60° C for 24 hours. Weigh the specimens immediately after removal and pack into a glass jar so that each specimen is completely surrounded by at least ½ inch of carbon. Use only 6/14 mesh, prewashed activated carbon which has been tested for nonalkalinity. Cover the specimens and activated carbon with the distilled water and place the assembly in an oven at a temperature of 85° C for 10 days. Cover container and keep it filled with water. Remove the specimens, wipe dry, and postcondition for 24 hours in a barium oxide desiccator at 60° C before final weighing. Reweigh specimens and record weight loss due to extraction.

4.4 *Water flow rate.*

4.4.1 *Equipment.*—The equipment for testing water flow rate is shown in figure 2. The water supply shall be capable of maintaining a constant pressure of 50 psi on the manifold.

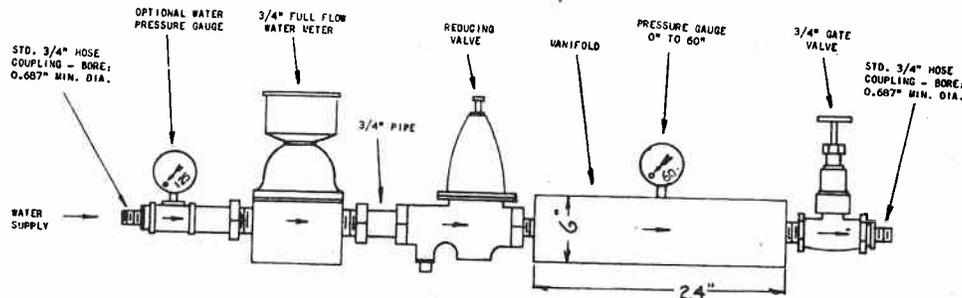


FIGURE 2. *Flow-rate test equipment.*

4.4.2 *Procedure.*—The length of hose to be tested shall be connected to the hose connection on the gate valve of the equipment. The hose shall be laid out in a straight line and level with the equipment. The free end shall be open, without attached nozzle, sprinkler, or other obstruction. The gate valve shall be open full during the measurement of flow, and the supply shall be adjusted to maintain a constant pressure of 50 psi on the manifold gage. The rate of flow shall be determined by taking the difference in flow meter readings before and after a flow interval of not less than 5 minutes, and computed in gallons per minute.

4.5 *Couplings.*

4.5.1 *Leakage.*—Water shall be pumped into a specimen so that 100 psi gage pressure will be developed in approximately 6 seconds. The pressure shall be maintained for 5 minutes.

4.5.2 *Dead-load pull.*—A 150-pound tensile load shall be applied to the couplings of the specimen for 5 minutes at a room temperature of $75^{\circ} \pm 5^{\circ}$ F. After the load is released, a 5-minute interval shall elapse before testing the specimen for leakage in accordance with paragraphs 3.10.1 and 4.5.1. Adjustable couplings may be rerighted if required.

5. DECLARATION OF COMPLIANCE

5.1 In order that purchasers may be assured that the vinyl chloride plastics garden hose actually complies with all requirements of this Commercial Standard, it is recommended that manufacturers include the following statement in conjunction with their name and address on labels, invoices, sales literature, etc.:

This vinyl chloride plastics garden hose conforms to all requirements of Commercial Standard CS209-57, as developed by the trade under the procedure of the Commodity Standards Division, and issued by the U. S. Department of Commerce.

5.2 Vinyl chloride plastics garden hose complying with this standard may be identified by use of the hallmark shown below.



FIGURE 3. *Hallmark.*

6. EFFECTIVE DATE

6.1 Having met all the procedural requirements of the Commodity Standards Division, including approval by the acceptors hereinafter listed, this Commercial Standard was issued by the United States Department of Commerce, effective from April 20, 1957.

EDWIN W. ELY,

Chief, Commodity Standards Division

HISTORY OF PROJECT

In a letter dated October 5, 1956, the Society of the Plastics Industry, Inc. requested the establishment of a Commercial Standard for vinyl chloride plastics garden hose, and submitted a specification developed by the Garden Hose Division of the Society. An earlier draft of the specification previously had been reviewed by the Commodity Standards Division and the National Bureau of Standards; after some further adjustment, it was circulated to the industry for acceptance on February 7, 1957.

On March 20, 1957, the Commodity Standards Division announced that acceptances had been received representing a satisfactory majority of the industry, and that the Commercial Standard, to be designated CS209-57, would be considered effective beginning April 20, 1957.

Project Manager: F. W. Reynolds, Commodity Standards Division, Office of Technical Services.

Technical Adviser: Frank W. Reinhart, Organic Plastics Section, Organic and Fibrous Materials Division, National Bureau of Standards.

STANDING COMMITTEE

The following individuals comprise the membership of the standing committee, which is to review, prior to circulation for acceptance, revisions proposed to keep the standard abreast of progress. Comments concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce, which acts as secretary for the committee.

J. H. GERSTENMAIER, *Chairman*

R. C. BADER, Hibbard, Spencer, Bartlett & Co., 2201 West Howard St., Evanston, Ill.
EPHRAIM FREEDMAN, director, Macy Bureau of Standards, R. H. Macy & Co., 34th St. and Broadway, New York 1, N. Y.
J. H. GERSTENMAIER, Goodyear Tire & Rubber Co., St. Marys, Ohio.
ROLAND K. GRIFFITH, Borden Co., Chemical Division, Santa Barbara, Calif.
HOMER G. PERRY, Sears, Roebuck & Co., 925 South Homan Ave., Chicago 7, Ill.
ELMER SZANTAY, Sandee Manufacturing Co., 5050 West Foster Ave., Chicago, Ill.
BASIL O. TEMPLE, Jr., Shapleigh Hardware Co., 900 Spruce St., St. Louis 2, Mo.

ACCEPTORS

The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, testing, purchase, or use of vinyl chloride plastics garden hose. In accepting this standard they reserved the right to depart from it as they individually deem advisable. It is expected that articles which actually comply with the requirements of this standard in all respects will be regularly identified or labeled as conforming thereto, and that purchasers will require such specific evidence of conformity.

FIRMS

American Biltrite Rubber Co., Inc., Chelsea, Mass.
Atlantic Tubing & Rubber Co., Cranston, R. I.
Bakelite Co., Division of Union Carbon & Carbide Corp., New York, N. Y.
Borden Co., Resinite Department, Chemical Division, Santa Barbara, Calif.
Boston Woven Hose & Rubber Co., Division of American Biltrite Rubber Co., Inc., Cambridge, Mass.
CAMPCO, Division of Chicago Molded Products Corp., Chicago, Ill.
Crane Co., Chicago, Ill.
Dumont Plastics Co., Bound Brook, N. J.
Electric Hose & Rubber Co., Wilmington, Del.
Fullerton Manufacturing Co., Fullerton, Calif.
Gering Products, Inc., Kenilworth, N. J.
Goodyear Tire & Rubber Co., Akron, Ohio
Goodyear Tire & Rubber Co., St. Marys, Ohio
Hancock Manufacturing, Inc., Philadelphia, Pa.
Hibbard, Spencer, Bartlett & Co., Evanston, Ill.
Industrial Plastic Co., Metuchen, N. J.
Mayon Plastics, Hopkins, Minn.
Monsanto Chemical Co., Springfield, Mass.
Moore Manufacturing, Inc., San Francisco, Calif.
Patzig Testing Laboratories, Des Moines, Iowa
Penney, J. C., Co., Inc., New York, N. Y.
Quaker Pioneer Rubber Division, H. K. Porter Co., Inc., Pittsburg, Calif.
Quaker Rubber Division, H. K. Porter Co., Inc., Philadelphia, Pa.
Rosenberg Bros. & Co., Smithtown, N. Y.
Sandee Manufacturing Co., Chicago, Ill.
Sears, Roebuck & Co., Chicago, Ill.
Shapleigh Hardware Co., St. Louis, Mo.
Spiegel, Inc., Chicago, Ill.
Supplex Co., Garwood, N. J.
Swan Rubber Co., Bucyrus, Ohio
Yardley Plastics Co., Columbus, Ohio

U. S. GOVERNMENT

Department of the Air Force, Directorate of Engineering Standards, Wright-Patterson Air Force Base, Ohio
Public Housing Administration, Washington, D. C.

Other Commercial Standards

A list of Commercial Standards may be obtained from the Commodity Standards Division, Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. These publications may be purchased at the prices indicated on the list, which also includes directions for ordering copies.

ACCEPTANCE OF COMMERCIAL STANDARD

If acceptance has not previously been filed, this sheet properly filled in, signed, and returned will provide for the recording of your organization as an acceptor of this Commercial Standard.

Date -----

Commodity Standards Division
Office of Technical Services
U. S. Department of Commerce
Washington 25, D. C.

Gentlemen:

We believe that Commercial Standard CS209-57 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the

production ¹ distribution ¹ purchase ¹ testing ¹
of vinyl chloride plastics garden hose.

We reserve the right to depart from the standard as we deem advisable.

We understand, of course, that only those articles which actually comply with the standard in all respects can be identified or labeled as conforming thereto.

(Cut on this line)

Signature of authorized officer ----- (In ink)

(Kindly typewrite or print the following lines)

Name and title of above officer -----

Organization -----
(Fill in exactly as it should be listed)

Street address -----

City, zone, and State -----

¹ Underscore the one that applies. Please see that separate acceptances are filed for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade associations, trade papers, etc., desiring to record their general support, the words "General support" should be added after the signature.

TO THE ACCEPTOR

The following statements answer the usual questions arising in connection with the acceptance and its significance:

1. *Enforcement.*—Commercial Standards are commodity specifications voluntarily established by mutual consent of those concerned. They present a common basis of understanding between the producer, distributor, and consumer and should not be confused with any plan of governmental regulation or control. The United States Department of Commerce has no regulatory power in the enforcement of their provisions, but since they represent the will of the interested groups as a whole, their provisions through usage soon become established as trade customs, and are made effective through incorporation into sales contracts by means of labels, invoices, and the like.

2. *The acceptor's responsibility.*—The purpose of Commercial Standards is to establish, for specific commodities, nationally recognized grades or consumer criteria, and the benefits therefrom will be measurable in direct proportion to their general recognition and actual use. Instances will occur when it may be necessary to deviate from the standard and the signing of an acceptance does not preclude such departures; however, such signature indicates an intention to follow the standard, where practicable, in the production, distribution, or consumption of the article in question.

3. *The Department's responsibility.*—The major function performed by the Department of Commerce in the voluntary establishment of Commercial Standards on a nationwide basis is fourfold: first, to act as an unbiased coordinator to bring all interested parties together for the mutually satisfactory adjustment of trade standards; second, to supply such assistance and advice as past experience with similar programs may suggest; third, to canvass and record the extent of acceptance and adherence to the standard on the part of producers, distributors, and users; and fourth, after acceptance, to publish and promulgate the standard for the information and guidance of buyers and sellers of the commodity.

4. *Announcement and promulgation.*—When the standard has been endorsed by a satisfactory majority of production or consumption in the absence of active, valid opposition, the success of the project is announced. If, however, in the opinion of the standing committee or of the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.