

MAY 9 1944

CS116-44

Pipe, bituminized-fibre; drain and sewer

UNITED STATES DEPARTMENT OF COMMERCE

JESSE H. JONES, Secretary

NATIONAL BUREAU OF STANDARDS

LYMAN J. BRIGGS, Director

**BITUMINIZED-FIBRE DRAIN
AND SEWER PIPE**

COMMERCIAL STANDARD CS116-44

Effective Date for New Production From March 10, 1944



**A RECORDED VOLUNTARY STANDARD
OF THE TRADE**

**UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1944**

U. S. Department of Commerce

National Bureau of Standards

PROMULGATION

of

COMMERCIAL STANDARD CS116-44

for

BITUMINIZED-FIBRE DRAIN AND SEWER PIPE

On November 30, 1943, a recommended commercial standard for bituminized-fibre drain and sewer pipe, proposed by leading manufacturers and adjusted through correspondence with representative distributors and users was circulated for acceptance. Those concerned have since accepted and approved the standard as shown herein for promulgation by the U. S. Department of Commerce, through the National Bureau of Standards.

The standard is effective for new production from March 10, 1944.

Promulgation recommended.

I. J. Fairchild,
Chief, Division of Trade Standards.

Promulgated.

Lyman J. Briggs,
Director, National Bureau of Standards.

Promulgation approved.

Jesse H. Jones,
Secretary of Commerce.

BITUMINIZED-FIBRE DRAIN AND SEWER PIPE

COMMERCIAL STANDARD CS116-44

PURPOSE

1. The purpose of this commercial standard is to provide a nationally recognized specification for guidance of producers, distributors, and users; to insure satisfaction and promote fair competition; and to provide a basis for guarantee of quality.

SCOPE

2. This standard covers uses, general requirements, dimensions, physical and chemical properties, and methods of testing, of bituminized-fibre drain and sewer pipe (including 45- and 90-degree bends, straight couplings, and 5-degree angle couplings) in diameters ranging from 2 to 8 inches and in 5- and 8-foot lengths. It also establishes a uniform method of guaranteeing compliance with the standard.

USES

3. The requirements of this standard are intended to provide pipe suitable for conducting liquids and for drainage where tight joints are necessary, and where resistance to corrosion, erosion, and disintegration is indicated, such as the following:

- a. House connections to sewers and septic tanks.
- b. Farm drainage and low-head irrigation conductor pipe.
- c. Downspouts, leaders, and storm drains.
- d. Salt water disposal in oil well country.
- e. Industrial waste drainage, and other uses outside of buildings, as indicated by pipe characteristics.

GENERAL REQUIREMENTS

4. *Material.*—Pipe, bends, and couplings shall be composed of a bituminous compound reinforced with an interwoven fibrous structure. The fibrous material shall be thoroughly impregnated. The wall of the pipe shall be dense and homogeneous, without seams or laminations and with smooth interior surface free from obstructions and rough or flaky areas.

5. *Method of joining.*—Pipe and bends shall be provided with accurately machined taper joints, and a taper sleeve coupling shall be provided for each length of pipe, and for each bend. All joints for a given size shall be interchangeable, and shall be watertight, when properly assembled, as determined by test procedure, par. 21. Dimensions of the joint are given in table 1 and figure 1. (A hand-operated tooling lathe can be obtained for cutting joints on the job when necessary.)

5a. *Taper.*—The slope of the machined taper in both pipe and couplings shall be 2 degrees (4 degrees included angle).

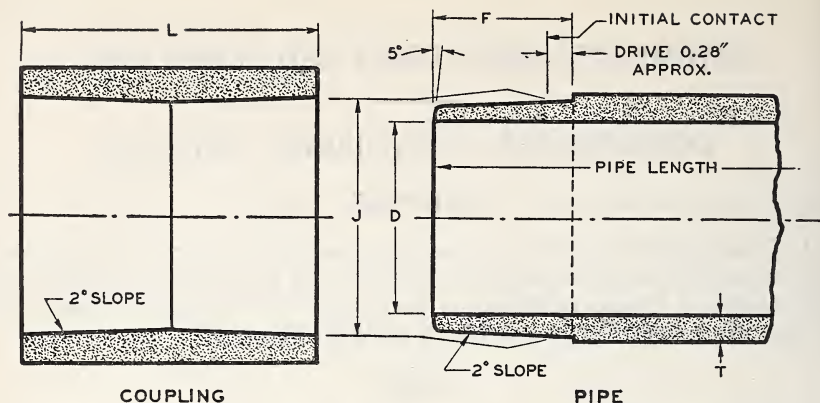


FIGURE 1.—Dimensions of taper joint, pipe, and coupling.

TABLE 1.—Dimensions of pipe and couplings

Nominal size (in.)	2	3	4	5	6	8
Minimum inside diameter (in.) D	2.00	3.00	4.00	5.00	6.00	8.00
Minimum wall thickness (in.) T	0.23	0.28	0.32	0.41	0.46	0.57
Minimum length of coupling (in.) L	2.90	3.42	3.92	3.92	3.92	5.00
Diameter inside large end of coupling and at point of initial contact on pipe taper (in.) J ¹	2.470	3.448	4.493	5.726	6.782	9.110
Length of pipe joint (in.) F	1.43	1.69	1.94	1.94	1.94	2.48
Laying length of pipe (ft.) ±1 in.	25	8	8	25	25	25

¹ Joint dimension and taper are checked by gaging at time and place of manufacture.² At the option of the manufacturer, 2-, 5-, 6-, and 8-inch sizes may be supplied also in 8-foot lengths.

6. *Bore.*—The bore of the pipe and couplings shall be circular in cross section when tested in accordance with par. 22.

DETAIL REQUIREMENTS

7. Dimensions of pipe shall be as specified in figure 1 and table 1.

7a. Length measurements shall include the tapered ends of the pipe and a tolerance of plus or minus 1 inch shall be allowed. On any shipment or lot, the shipper may supply up to 15 percent of the total footage specified in lengths shorter than standard. Short lengths in all sizes may be 7½, 7, 6½, 6, 5 and 4 feet.

8. *Dimensions of bends.*—Wall thickness of bends shall be the same as for pipe. A round ball, ¼-inch less in diameter than the nominal size, shall pass freely through the bore of bends. Dimensions of 45- and 90-degree bends of various radii are shown in figure 2 and table 2.

9. *Dimensions of 5-degree angle couplings.*—Dimensions of 5-degree angle couplings are shown in figure 3 and table 3.

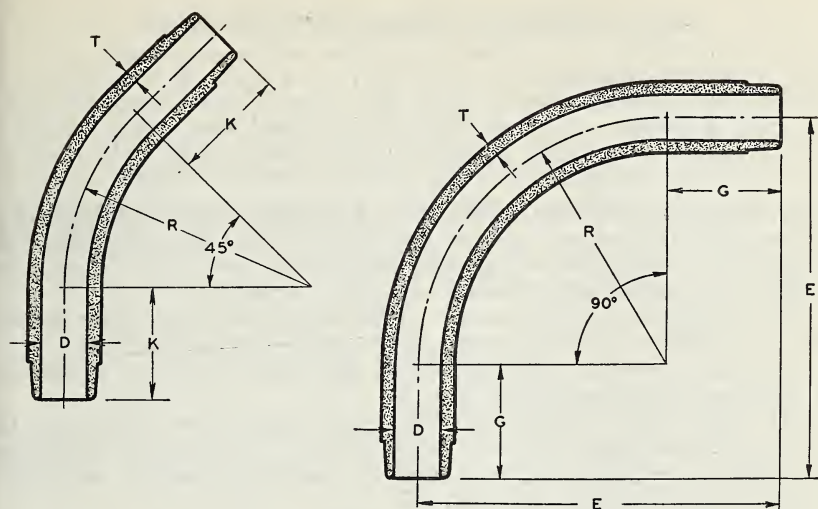


FIGURE 2.—Dimensions of bends.

TABLE 2.—Dimensions of bends (inches).¹

Size (in.).....	2				3				4		5		6	8
D.....	2.00				3.00				4.00		5.00		6.00	8.00
T (min).....	0.23				0.28				0.32		0.41		0.46	0.57
R.....	9.5	18	24	36	13	24	36	16	36	24	36	36	36	48
E.....	17.5	26	32	38	21	32	38	24	38	32	36	36	36	(²)
G.....	8	8	8	2	8	8	2	8	2	8	0	0	0	(²)
K.....	8	8	8	8	8	8	8	8	8	8	8	8	8	8

¹ Details of joint are given in table 1 and figure 1.

² 8-in. bends are supplied regularly in 45-degree angles only.

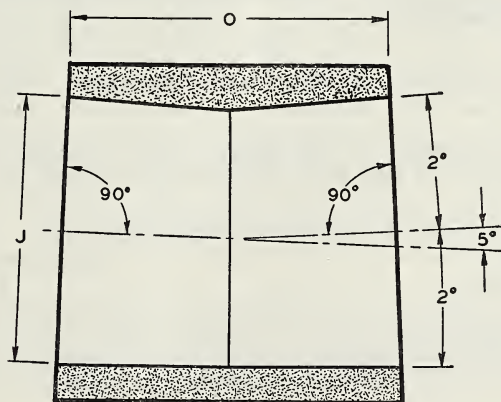


FIGURE 3.—Five-degree angle coupling.

TABLE 3.—Dimensions of 5-degree angle couplings (in.).

Nominal size (in.)...	2	3	4	5	6	8
O (min).....	2.98	3.5	4.00	4.00	4.00	5.00
J.....	2.470	3.448	4.493	5.726	6.782	9.110

10. *Chemical resistance*.—Bituminized pipe and bends shall be resistant to acids, alkalies, and salts as determined by test procedure, par. 23.

11. *Water absorption*.—Pipe and bends shall not exceed a gain in weight of 2 percent when tested according to par. 24.

12. *Resistance to boiling water*.—Pipe and bends shall show resistance to boiling water as determined by test procedure, par. 25.

13. *Heat resistance*.—Pipe and bends shall show resistance to heat as determined by test procedure, par. 26.

14. *Resistance to flattening*.—The pipe shall have resistance to flattening when loaded and subjected to heat. Decrease in diameter at point of application of load shall not exceed 3 percent when determined in accordance with par. 27.

15. *Dry and wet crushing strength*.—The pipe shall have crushing strength not less than that specified in table 4 when tested in accordance with pars. 28 and 29.

TABLE 4.—Crushing strength (ultimate)

Nominal size (in.).....	2	3	4	5	6	8
Crushing strength (lb. per ft.).....	1,100	1,100	1,100	1,300	1,300	1,600

16. *Beam strength*.—The pipe shall have beam strength not less than that specified in table 5, when tested in accordance with par. 30.

TABLE 5.—Beam strength (ultimate)

Nominal size (in.).....	2	3	4	5	6	8
Span (ft.).....	1	2	2	2	3	4
Beam strength (lb).....	1,000	1,000	2,200	4,200	4,400	7,000

17. *Crushing strength of couplings*.—The crushing strengths of couplings shall be not less than those shown in table 6.

TABLE 6.—Crushing strengths of couplings

Nominal size (in.).....	2	3	4	5	6	8
Crushing strength (lb. minimum)...	270	315	370	430	430	670

SAMPLING AND TEST PROCEDURES

18. *Method of sampling.*—Samples to be tested shall be selected at random from manufacturer's stock or from shipment. Undamaged samples only are to be used. At least three, and not more than six samples of pipe and bends with couplings, shall be selected for test, and compliance of these samples shall be accepted as evidence of compliance of the entire lot. Couplings are tested for crushing strength only (see pars. 17 and 31).

19. *Retest.*—If any of the test results do not meet requirements, the buyer may agree to retest of additional samples, all of which samples shall meet requirements.

20. *Material requirements.*—(See par. 4) shall be determined by visual inspection of specimens cut from pipe.

21. *Joint tightness.*—One 10-foot assembly of pipe, and one short length (approx. 6 to 12 inches) shall be joined with a taper sleeve coupling until the pipe joints shoulder on the coupling. The whole assembly shall be tested in vertical position with the bottom end sealed by any suitable method, and with the 10-foot assembly uppermost. The pipe shall be filled with water to the top, and be loosely covered to prevent evaporation, thus maintaining the lower joint under a 10-foot head of water. Over a period of 24 hours there shall be no appreciable drop in the water level and no evidence of leakage at the joint.

22. *Bore and length dimensions.*—Samples of pipe shall be calipered for diameter and wall thickness and measured for length to determine compliance with dimensional requirements.

23. *Chemical resistance.*—6-inch lengths of pipe shall be immersed in solutions of 0.1 normality, of sulfuric acid, sodium carbonate, and sodium sulfate. After 30 days the specimens shall show no evidence of softening or disintegration.¹

24. *Water absorption.*—12-inch lengths of pipe (6-inch lengths optional) shall be cleanly sawed from pipe, wiped clean and dry, and accurately weighed, then immersed in water at approximately 75° F. for 48 hours. The specimens shall then be removed, wiped clean and dry, and immediately reweighed. Gain in weight shall be expressed as a percentage of the original weight. (These same specimens may then be tested for "wet crushing strength," see par. 29.)

25. *Resistance to boiling water.*—12-inch lengths of pipe (6-inch lengths optional) shall be cleanly sawed from pipe, and then immersed in boiling water for 1 hour. Upon removal, they shall show no evidence of disintegration or separation into laminations.

26. *Heat resistance.*—Any convenient length of pipe shall be laid horizontally on a flat surface in an oven maintained at 180°, $\pm 2^\circ$ F, for 8 hours. There shall be no appreciable exudation of pitch or flattening of the pipe.

¹ Purchasers who desire to use a 48-hour test may, at their option, test the pipe by the method for chemical resistance given in ASTM Designation C13-40 and Federal Specification SS-P-361a for Clay Sewer Pipe, although that method, designed for testing an inorganic material, is not considered wholly dependable as a test for chemical resistance of bituminized-fibre pipe. Drying the specimen to constant weight should be conducted at a temperature not above 215° F to avoid conditions that may cause erratic results. In testing pipe for conformance with this standard, and for referee purposes, the method described in par. 23 shall be used in all cases.

27. *Resistance to flattening.*—Two 3-inch lengths shall be accurately and cleanly sawed from pipe, and accurately measured for inside diameter, and the points at which measurements are taken shall be marked for identification. These two pieces shall be placed in an oven, on a common flat base with their axes parallel, and with the measured diameter in a vertical direction. (See fig. 4.) They shall be bridged symmetrically with a flat plate, and the plate shall be symmetrically loaded to produce a total load, or load per piece, according to table 7.

The oven shall be maintained at 120° , $\pm 2^{\circ}$ F, for 48 hours. At the end of 48 hours, the two pieces shall be unloaded and removed from the oven, and allowed to cool for at least 1 hour at 75° F in air, after which the inside diameters shall again be measured. Change in diameter shall be expressed as a percentage of the original diameter.

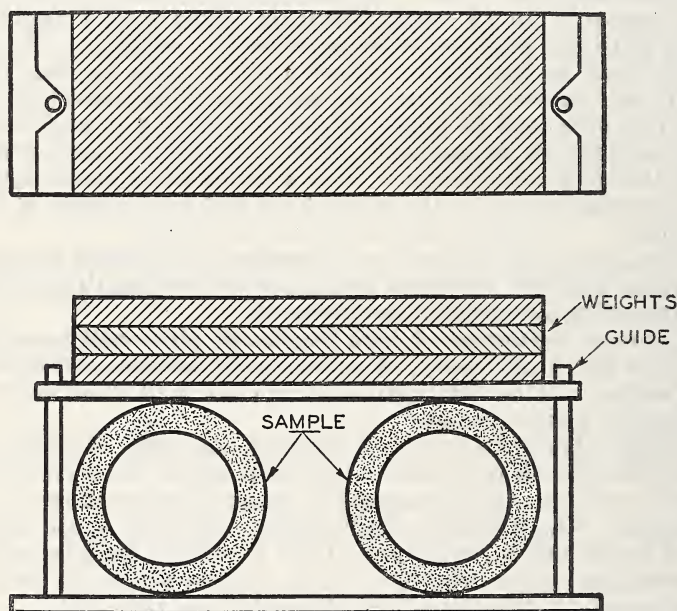


FIGURE 4.—*Flattening test.*

TABLE 7.—*Flattening loads*

Nominal size (in.).....	2	3	4	5	6	8
Total load (lb.).....	55	55	55	65	65	80
Load per piece.....	27.5	27.5	27.5	32.5	32.5	40
Load (lb. per ft.).....	110	110	110	130	130	160

28. *Dry crushing strength.*—A 12-inch length (6-inch optional) cleanly sawed from the pipe shall be kept in air at not over 75° F. for 24 hours. The specimen shall be laid horizontally between two flat plates in a testing machine having a head speed of 0.5 inch per minute. The load at rupture shall be reported in pounds per linear foot.

29. *Wet crushing strength.*—Specimens like those used for test in par. 28 shall be kept in water not over 75° F. for 48 hours. (Specimens used for water absorption (par. 24) may be used for this test). Within one-half hour after removal from the water, they shall be tested in accordance with par. 28.

30. *Beam strength.*—Specimens for this test shall be cleanly sawed from pipe, to the lengths tabulated in table 8. These specimens shall be maintained at a temperature not over 75° F. for 24 hours before the test is run. The testing fixture shall consist of V-blocks and a flexible strap for applying load as described in figure 5, and the test shall be made by a machine having a head speed of 0.5 inch per minute. Span and breaking loads in pounds shall be reported.

TABLE 8.—*Beam strength test specimens*

Nominal size (in.).....	2	3	4	5	6	8
Lengths (in.).....	20	30	30	30	42	56

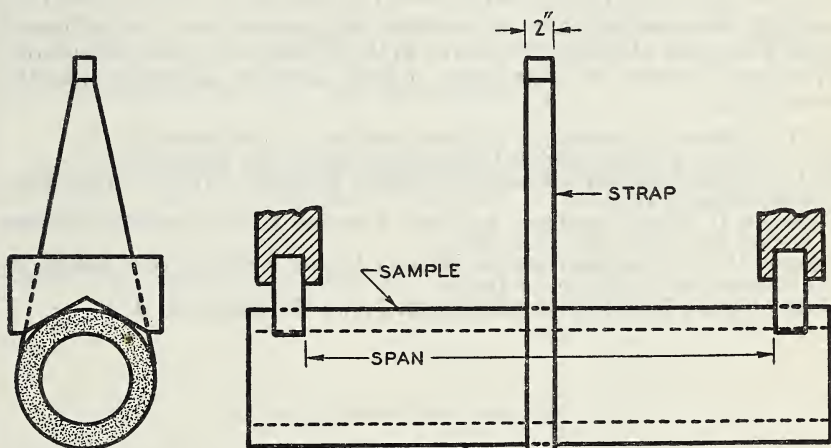


FIGURE 5.—*Beam test.*

31. *Crushing strength of couplings.*—The entire coupling shall be tested after being conditioned in air at not over 75° F. for 24 hours. Tests for dry strength only are made. Testing machine and operation shall be as described in par. 28. The load at rupture of the coupling shall be reported.

MARKING OF PRODUCT

32. It is recommended that each length of pipe be marked with the name of the manufacturer or his brand name, and also that the number of this Commercial Standard, CS116-44, be stamped under the brand, which shall constitute a guarantee of conformance with this standard.

GUARANTEE

33. It is recommended that manufacturers guarantee compliance of their product with the requirements of this standard by means of the following statement, incorporated in invoices, catalogs and labels:

The ----- Company guarantees that this bituminized-fibre drain and sewer pipe (manufacturer's designation) conforms to all requirements of Commercial Standard CS116-44, as issued by the National Bureau of Standards of the United States Department of Commerce.

EFFECTIVE DATE

34. The standard is effective for new production from March 10, 1944.

STANDING COMMITTEE

35. 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. Each organization nominated its own representative. Comment concerning the standard and suggestions for revision may be addressed to any member of the committee or to the Division of Trade Standards, National Bureau of Standards, which acts as secretary for the committee.

B. G. LE MIEUX (chairman), The Fibre Conduit Co., Orangeburg, N. Y.

F. L. COSGROVE, Fibre Conduit Plant, Line Material Co., Barton, Wis.

E. L. FLENTJE, National Association of Master Plumbers, 917 15th Street NW., Washington 5, D. C.

BERNARD D. KURTZ, secretary and sales manager, L. H. Kurtz Co., 312-314 Walnut Street, Des Moines 8, Iowa.

ROBERT M. LAW, technical director, Housing Authority of the City of Pittsburgh, 417 Grant Street, Pittsburgh 19, Pa.

HARRY SWEET, Tube Mill Superintendent, Brown Co., Berlin, N. H.

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_____

Division of Trade Standards,
National Bureau of Standards,
Washington 25, D. C.

Gentlemen:

Having considered the statements on the reverse side of this sheet, we accept the Commercial Standard CS116-44 as our standard of practice in the

Production ¹ Distribution ¹ Use ¹ Testing ¹

of bituminized-fibre drain and sewer pipe.

We will assist in securing its general recognition and use, and will cooperate with the standing committee to effect revisions of the standard when necessary.

Signature of individual 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 and State_____

¹ Please designate which group you represent by drawing lines through the other three. Please file separate acceptances for all subsidiary companies and affiliates which should be listed separately as acceptors. In the case of related interests, trade papers, colleges, etc., desiring to record their general approval, the words "in principle" 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 commercial 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 Nation-wide 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 the Department of Commerce, the support of any standard is inadequate, the right is reserved to withhold promulgation and publication.

ACCEPTORS

The organizations and individuals listed below have accepted this specification as their standard of practice in the production, distribution, and use of bituminized-fibre drain and sewer pipe. Such endorsement does not signify that they may not find it necessary to deviate from the standard, nor that producers so listed guarantee all of their products in this field to conform with the requirements of this standard. Therefore, specific evidence of conformity should be obtained where required.

ASSOCIATIONS

American Hospital Association, Chicago, Ill.
American Specification Institute, Chicago, Ill.
Plumbing & Heating Contractors Association, Norfolk, Va.
Prefabricated Home Manufacturers' Institute, Washington, D. C. (In principle.)
Saginaw, Michigan, Master Plumbers Association, Saginaw, Mich.
Southern Wholesalers Association, Atlanta, Ga.
Vermont Master Plumbers Association, Windsor, Vt.

FIRMS

Adams, Franklin O., Tampa, Fla.
Aitchison-Richmond Supply Co., Saint Joseph, Mo.
Allied Architects & Engineers of Indianapolis, Indianapolis, Ind.
Allied Chemical & Dye Corporation, The Barrett Division, New York, N. Y. (In principle.)
Altfillisch, Charles, Decorah, Iowa.
American Potash & Chemical Corporation, Trona, Calif.
Andrews, Jones, Biscoe & Whitmore, Boston, Mass.
Barber Asphalt Corporation, Barber, N. J.
Barrett Supply Co., Augusta, Ga.
Better Farms, Pulaski, N. Y. (In principle.)
Bishop, Horatio W., La Mesa, Calif.
Blackwell-Wielandy Co., Saint Louis, Mo.
Blake-Rounds Supply Co., Portland, Maine.
Blithe, Wesley Leshar, Philadelphia, Pa.
Blodgett Supply Co., Inc., The, Burlington, Vt.
Boehm, George A., New York, N. Y.
Brazier, Clarence W., New York, N. Y.
Brown Co., Berlin, N. H.
Brust & Brust, Milwaukee, Wis.
Bucky, Fred W., Jr., Jacksonville, Fla.
Buechner & Orth, Saint Paul, Minn. (In principle.)
Buffalo, City of, Architectural Service, Div. of Buildings, Department of Public Works, Buffalo, N. Y.
California Oregon Power Co., The, Medford, Ore.
California-Pacific Utilities Co., San Francisco, Calif.
California Public Service Co., Portland, Ore.
Camlet, J. Thomas, Passaic, N. J.
Cannon & Mullen, Salt Lake City, Utah.
Careva Co., Inc., The, York, Pa.
Carter Oil Co., Tulsa, Okla.
Cedar Rapids Pump & Supply Co., Cedar Rapids, Iowa.
Central Vermont Public Service Corporation, Rutland, Vt.
Chandler Co., Cedar Rapids, Iowa.
Channel Co., Long Beach, Calif.
Chapin, Rollin C., Minneapolis, Minn.
Cohen & Son, P., Brooklyn, N. Y.
Columbia, City of, Water & Light Department, Columbia, Mo.
Connecticut Light & Power Co., The, Waterbury, Conn.
Connor Co., Peoria, Ill.
Conrad & Cummings, Binghamton, N. Y.
Conwell & Co., E. L., Philadelphia, Pa.
Co-op Community Builders, Inc., Wauwatosa, Wis.
County Seat Plumbing Supply Co., Inc., White Plains, N. Y.
Crane Co., Chicago, Ill.
Cuyahoga Falls, City of, Cuyahoga Falls, Ohio.

Dakota Public Service Co., Huron, S. Dak.
Dallas Power & Light Co., Dallas, Tex.
Dalton Supply Co., Clarks Summit, Pa.
Derby Oil Co., The, Wichita, Kans.
Dutton Lumber Corporation, A. C., Poughkeepsie, N. Y.
Edison Light & Power Co., York, Pa.
Elizabeth Plumbing & Heating Supply Co., Elizabeth, N. J.
Emery Industries, Inc., Cincinnati, Ohio.
Endicott Supply Co., Vineland, N. J.
Estabrook's Sons, R., S. Boston, Mass.
Fall River Steam & Gas Pipe Co., Fall River, Mass.
Fibre Conduit Co., The, Orangeburg, N. Y.
Flannagan, Eric G., Henderson, N. C.
Fleck Co., Camden, N. J.
Florida, University of, Gainesville, Fla.
Foltz & Son, Herbert, Winter Haven, Fla. (In principle.)
Frontier Water & Steam Supply Co., Buffalo, N. Y.
Gainesville, City of, Department of Public Service, Gainesville, Fla.
Galloup Pipe & Supply Co., Battle Creek, Mich.
General Electric Supply Corporation, Bridgeport, Conn.
Georgeson, Franklin T., Eureka, Calif.
Grady Plumbing Co., Carbondale, Ill.
Grand Haven, City of, Grand Haven, Mich.
Hancock Oil Co., Long Beach, Calif.
Hansen Plumbing Co., Dallas, Tex.
Hasness, Carlisle D., Harrisburg, Pa.
Hastings, City of, Water & Light Department, Hastings, Nebr.
Holsman & Holsman, Chicago, Ill.
Hooker Electrochemical Co., Niagara Falls, N. Y.
Hooper Plumbing Co., F. W., Dallas, Tex.
Hope, Frank L., Jr., San Diego, Calif.
Ivey, Inc., Edwin J., Seattle, Wash.
Johnson, Wallwork & Dukehart, Portland, Ore.
Kahn Associated Architects & Engineers, Inc., Albert, Detroit, Mich.
Kansas State College, Agricultural Engineering Division, Manhattan, Kans.
Keffner & Jones, Des Moines, Iowa.
Kelley, Frederic P., New York, N. Y.
Klefaber Co., The W. H., Dayton, Ohio.
Kilham, Hopkins & Greeley, Boston, Mass.
Kirtley Lumber & Supply, Nebraska City, Nebr.
Knapp Supply Co., The, Muncie, Ind.
Koppers Co., Engineering & Construction Division, Pittsburgh, Pa.
Kurtz Co., L. H., Des Moines, and Mason City, Iowa.
Lansing Supply Co., Lansing, Mich.
Law, Law & Potter, Madison, Wis.
Lebanon Plumbing Supply Co., Lebanon, Pa.
Levingston Supply Co., Inc., Baton Rouge, La.
Levy, Will, Saint Louis, Mo.
Line Material Co., Fibre Conduit Plant, Barton, Wis.
Loeb, Laurence M., Elmsford, N. Y.
Long Plumbing & Heating Supply Co., Chicago, Ill.
Malone Plumbing Supply Co., Pittsburgh, Pa.
Martin, Edgar, Chicago, Ill.
Mason & Co., George D., Detroit, Mich.
Master Plumber & Heating Contractor, Brooklyn, N. Y.
Merced Irrigation District, Merced, Calif. (In principle.)

- Michigan Supply Co., Lansing, Mich.
 Mid Continent Petroleum Corporation, Tulsa, Okla.
 Midland Plumbing Supply Co., Inc., E. Saint Louis, Ill.
 Miller & Yeager, Terre Haute, Ind.
 Milwaukee Plumbing & Heating Supply Co., Milwaukee, Wis.
 Modern Plumbing & Heating Co., Grand Rapids, Mich.
 Modesto Irrigation District, Modesto, Calif.
 Montgomery Ward & Co., Chicago, Ill.
 Mooser, William, San Francisco, Calif.
 Muhlenberg Bros., Reading, Pa.
 Murdock Manufacturing & Supply Co., The, Cincinnati, Ohio.
 New York State College of Agriculture, Ithaca, N. Y.
 Newark Milk & Cream Co., Newark, N. J.
 Northwestern Public Service Co., Huron, S. Dak.
 Officer, Gwynn, Berkeley, Calif.
 Orange Memorial Hospital, Orange, N. J.
 O'Rourke Plumbing & Heating Co., W. R., Walla Walla, Wash.
 Pacific Plumbing & Heating Supply Co., San Francisco, Calif.
 Penniman & Browne, Baltimore, Md.
 Pennsylvania Water & Power Co., Baltimore, Md.
 Pepper, George W., Jr., Philadelphia, Pa.
 Piers, Eber F., Ogden, Utah.
 Pittsburgh, Housing Authority of the City of, Pittsburgh, Pa.
 Pittsburgh Testing Laboratory, Pittsburgh, Pa.
 Platt & Bro., F. P., New York, N. Y.
 Plumbers' Supply Co., New Bedford, Mass.
 Plumbing & Heating Selling Co., New Orleans, La.
 Puget Sound Power & Light Co., Seattle, Wash.
 Rayl Co., The, Detroit, Mich.
 Reeves-Wiedeman Supply Co., Kansas City, Mo.
 Reichle Supply Co., Saginaw, Mich.
 Ringwood Chemical Corporation, Ringwood, Ill.
 Ritchie & Associates, James H., Boston, Mass.
 Robbins-Gamwell Corporation, Pittsfield, Mass.
 Roberts & Bro., Inc., J. T., Baltimore, Md.
 Robischung-Kiesling Contracting Corporation, Houston, Tex.
 Rochester General Hospital, The, Rochester, N. Y.
 Ruffing & Sons, C. L., Pittsburgh, Pa.
 Safe Harbor Water Power Corporation, Baltimore, Md.
 Saint Louis, City of, Board of Education, Saint Louis, Mo.
 Santa Fe Springs Waste Water Disposal Co., Santa Fe Springs, Calif.
 Seashore Supply Co., Atlantic City, N. J.
 Shivers Plumbing Supply Co., W. M., Houston, Tex.
 Smith, Emery & Co., San Francisco, Calif.
 Southern Supply Co., Inc., Baltimore, Md.
 Specification Record, Chicago, Ill.
 Staten Island Supply Co., Inc., New York, N. Y.
 Staub & Rather, Houston, Tex.
 Stoetzel, Ralph E., Chicago, Ill.
 Taylor, Edward Cray & Ellis Wing, Los Angeles, Calif.
 Thorne, Henry Calder, Ithaca, N. Y.
 Tomkins Bros., Jamaica, Long Island, N. Y., and other cities.
 Twining Laboratories, The, Fresno, Calif.
 West, Albert E. (formerly Harper & West), Boston, Mass.
 Westchester Square Plumbing Supply Co., Inc., New York, N. Y.
 Wiedeman-Reeves Co., Kansas City, Mo.
 Willatsen, Andrew, Seattle, Wash.
 Winterbottom Supply Co., Waterloo, Iowa.
 Wischmeyer, William F., Saint Louis, Mo.
 Woolcock Plumbing & Heating Co., Niagara Falls, N. Y.
 Young, Lorenzo S., Salt Lake City, Utah.
 Zimmerman, A. C., Pasadena Calif.

U. S. GOVERNMENT

- Agriculture, U. S. Department of, Washington, D. C.
 Justice, Department of, Bureau of Prisons, Construction Division, Washington, D. C.
 Interior, Department of the, Construction Division, Office of Indian Affairs, Chicago, Ill.
 Interior, Department of the, Purchasing Office, Washington, D. C.
 War Department, Washington, D. C.
 War Production Board, Civilian Relations Division, Office of Civilian Requirements, Washington, D. C.

