

U.S. Department of Commerce
National Institute of Standards and Technology
(formerly National Bureau of Standards-NBS)

COMMERCIAL STANDARD (CS) 221-59

**GEL-COATED GLASS-FIBER-REINFORCED
POLYESTER RESIN BATHTUBS**

Commercial Standard (CS) 221-59 on Gel-Coated Glass-Fiber-Reinforced Polyester Resin Bathtubs was withdrawn by the U.S. Department of Commerce effective June 23, 1971.

* * * * *

The following standard was used to replace CS221-59: ANSI Standard Z124.1-87,
Plastic Bathtub Units

The International Association of Plumbing and Mechanical Officials (IAPMO) is the standards organization accredited by ANSI to develop and maintain the standard.

For assistance and additional information concerning the standards and/or obtaining copies, contact:

IAPMO Headquarters
5001 East Philadelphia Street
Ontario, CA 91761
Telephone: 1.909.472.4100
Fax: (909) 472.4150
E-mail: iapmo@iapmo.org
<http://www.iapmo.org>

American National Standards Institute (ANSI)
25 West 43rd Street
New York, New York, 10036
Telephone: (212) 642-4990
Fax: (212) 398-0023
<http://www.ansi.org> (e-standards)
or <http://www.nssn.org>

DEPARTMENT OF COMMERCE

National Bureau of Standards

VOLUNTARY PRODUCT STANDARDS

Notice of Action on Proposed Withdrawal

In accordance with § 10.12 of the Department of Commerce Procedures for the Development of Voluntary Product Standards (36 CFR Part 10, as amended; 36 P.R. 3349 dated May 23, 1970), notice is hereby given of the withdrawal of 111 Voluntary Product Standards identified below, including 73 standards identified as "Simplified Practice Recommendations" (R), and 38 standards previously identified as "Commercial Standards" (CS). Each of these standards has been found to be obsolete, technically inadequate, no longer acceptable to and used by the industry, or otherwise not in the public interest.

Public notice of the Department's intention to withdraw these standards was published in the Federal Register on February 10, 1971 (36 P.R. 2313), and a 45-day period was provided for the submission of comments or objections concerning the proposed withdrawal of any of these standards. No objections to the Department's intention of withdrawing any of these standards have been received by the National Bureau of Standards.

The effective date for the withdrawal of these standards will be 60 days after the publication of this notice. This withdrawal action terminates the authority to refer to these standards as Voluntary Product Standards developed under the Department of Commerce Procedures.

- R 4-36... Asphalt.
- R 8-50... Ferrous range boilers, expansion tanks, and solar tanks.
- R 9-47... Galvanized woven-wire fencing and barbed wire.
- R 19-37... Asbestos paper and asbestos millboard.
- R 21-46... Lavatory and sink traps.
- R 23-54... Plow bolts.
- R 26-50... Steel reinforcing bars.
- R 35-44... Steel lockers.
- R 33-37... Sand-lime brick.
- R 49-26... Sidewalk, floor, and roof lights.
- R 59-27... Rotary-cut lumber stock for wire-bound boxes.
- R 63-29... Metal spools (for annealing, handling and shipping wire).
- R 65-31... Packaging of overhead electric railway material.
- R 67-36... Taper roller bearings.
- R 68-41... Metal and nonconducting flashlight cases.
- R 69-27... Packaging of razor blades.
- R 71-28... Turnbuckles.
- R 74-49... Hospital and institutional cotton textiles.
- R 75-29... Composition blackboard.
- R 80-28... Folding and portable wooden chairs.
- R 82-28... Hollow metal single-acting swing doors, frames and trim.
- R 83-28... Kiehmlein single acting swing doors, frames, and trim.
- R 88-37... Floor sweeps.
- R 89-35... Coated abrasive products.
- R 92-38... Hard fiber twine and lath yarn (ply and yarn goods).

- R 93-39... Paper shipping tags.
- R 94-63... Open-web steel joists and open-web malleable steel joists.
- R 95-30... Sild platforms.
- R 97-47... Bell-bottom screw licks.
- R 101-40... Metal partitions for toilets and showers.
- R 102-33... Granite curbstones.
- R 103-32... Wheelbarrows.
- R 107-31... Glassine bags.
- R 110-29... Soft fiber (jute) twine.
- R 112-29... Elastic shoe poring.
- R 115-30... Full-disk butting wheels.
- R 119-31... Fast-selviage terry towels.
- R 122-31... Wire insect-screen cloth.
- R 124-31... Polished cotton twine.
- R 126-41... Set-up paper boxes (used by department and specialty stores).
- R 127-41... Folding paper boxes (used by department and specialty stores).
- R 128-41... Corrugated fiber boxes (used by department and specialty stores).
- R 131-35... Glass containers for mayonnaise.
- R 138-32... Dental rubber (base and veneering).
- R 145-33... Packaging of electric railway motor and controller parts.
- R 154-38... Cupola refractories.
- R 156-41... Extruded honey packages.
- R 159-42... Forged axes.
- R 159-42... Forged hammers.
- R 160-42... Forged hatchets.
- R 161-35... Packaging of automotive (bus) engine parts.
- R 166-37... Color code for marking steel bars.
- R 169-45... Bolts and nuts (stock production sizes).
- R 171-36... Wooden boxes for canned fruits and vegetables.
- R 172-54... Stock folding boxes for garments and dry cleaning.
- R 177-41... Single-faced corrugated board rolls (used by department and specialty stores).
- R 178-41... First-aid unit dressings and treatments (packaging of).
- R 181-41... Nonferrous range boilers.
- R 188-54... Spring and slotted clothespins (sizes and packaging).
- R 189-42... Round and flat hardwood toothpicks (sizes and packaging).
- R 196-43... Glass containers for green olives.
- R 199-43... Cloth window shades.
- R 201-43... Iron and steel pop safety valves.
- R 202-48... Tank-mounted air compressors (1/4 to 10 horsepower).
- R 203-44... Containers and packages for household insecticides (liquid spray type).
- R 204-44... Bronze pop safety valves, and bronze, iron and steel relief valves.
- R 205-44... Iron and steel relief valves for petroleum, chemical and general industrial services.
- R 209-45... Peanut butter packages and containers.
- R 212-45... Cast brass solder-joint fittings.
- R 215-46... Luggage (trunks and suitcases).
- R 219-46... Automatic regulating valves.
- R 232-48... Low-pressure lubricating devices.
- R 233-48... Rotary files and burrs.
- R 234-48... Welded-wire fabric reinforcement concrete pipe.
- R 249-52... Plastic tableware.
- R 253-54... Retail container sizes for frozen fruits and vegetables.
- R 260-63... Gypsum board products.
- CS 3-40... Stoddard solvents (dry cleaning).
- CS 7-20... Standard weights malleable iron or steel screwed unions.
- CS 19-32... Foundry patterns of wood.
- CS 32-31... Cotton cloth for rubber and pyroxylin coating.
- CS 36-33... Fourdrinier wire cloth.
- SS 48-49... Domestic burners for Pennsylvania anthracite (unaged fed type).
- CS 56E-41... Oak flooring (exports).
- CS 59-41... Textiles—testing and reporting.
- CS 62-38... Colors for kitchen accessories.
- CS 63-38... Colors for bathroom accessories.
- CS 68-38... Liquid phycochlorite disinfectant, deodorant, and germicide.
- CS 93-50... Portable electric drills (exclusive of high frequency).
- CS 95-41... Calking lead.
- CS 96-41... Lead traps and bends.
- CS 102E-42... Diesel and fuel-oil engines (export classifications).
- CS 108-43... Treading automobile and truck tires.
- CS 110-43... Tire repairs—vulcanized (passenger, truck, and bus tires).
- CS 112-43... Homogeneous fiber wall-board.
- CS E124-45... Master disks.
- CS 126-56... Tank-mounted air compressors (classification and testing).
- CS 139-47... Work gloves.
- CS 154E-49... Wire rope (export classifications).
- CS 164E-50... Concrete mixers (export classifications).
- CS 170-50... Cotton flour-bag (sack) towels.
- CS 175-51... Circular-knitted gloves and mittens.
- CS 170-51... Installation of attic ventilation fans in residences.
- CS 181-52... Water-resistant organic adhesives for installation of clay tile.
- CS 212-57... Steel sliding closet door and frame installations.
- CS 213-57... Steel breakdown sliding closet door unit for wood frame installation.
- CS 221-59... Gel-coated glass-fiber-reinforced polyester resin ball-tubs.
- CS 222-59... Gel-coated glass-fiber-reinforced polyester resin shower receptors.
- CS 229-60... Copper drainage tube (DWV).

LEWIS M. BRANSCOMB,
Director.

APRIL 15, 1971.

Approved: April 19, 1971.

JAMES H. WALKER, Jr.,
Assistant Secretary
for Science and Technology

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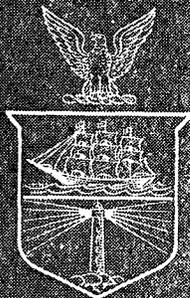
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COMMERCIAL STANDARD CS 221-59

**Gel-Coated Glass-Fiber-Reinforced
Polyester Resin Bathtubs**

WITHDRAWN

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



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U.S. DEPARTMENT OF COMMERCE

Lewis L. STRAUSS, 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 quality criteria, 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 Commercial 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.

The initial printing of Commercial Standard CS221-59 was made possible through the cooperation of the Society of the Plastics Industry in securing copies for its members.

Gel-Coated Glass-Fiber-Reinforced Polyester Resin Bathtubs

[Effective May 1, 1959]

1. PURPOSE

1.1 The purpose of this Commercial Standard is to establish generally acceptable quality standards for plastic bathtubs. Its purpose is also to serve as a guide for producers, distributors, architects, engineers, contractors, installers and users; to promote understanding regarding materials, manufacture and installation; to form a basis for fair competition; and to provide for identifying plastic bathtubs that conform with this standard.

2. SCOPE

2.1 This standard covers physical requirements and tests for tensile strength, impact resistance, water absorption, cleanability, and other significant properties, in addition to general description of the materials used. Certain features of construction and finish, and provisions for proper installation of the finished product, are also given, together with methods of marking and identification. An appendix giving certain additional information on the plastic material is also included. This standard is not intended to cover design features.

2.2 The plastic bathtubs covered by this standard are intended for use in ordinary residential and commercial buildings.

3. GENERAL REQUIREMENTS

3.1 *Materials*.—The bathtubs shall be made of gel-coated glass-fiber-reinforced polyester resins.

3.1.1 *Glass fiber reinforcing material*.—The glass fiber reinforcing material shall be a suitable commercial grade having a coupling agent which will produce a water-resistant bond between the glass reinforcement and the resin.

3.1.2 *Polyester resins*.—The polyester resins shall be of a suitable commercial grade containing styrene or equivalent monomers. A suitable catalyst system shall be used to cure the resins.

3.1.3 *Fillers and pigments*.—Organic and inorganic pigments in the gel coats may be used as needed to produce the proper color, and shall be permanent in nature under ordinary conditions of use. Fillers in gel coats and back-up resins shall be inert inorganic materials.

3.2 *Workmanship and finish*.—The bathtubs shall be free from cracks, crazing, pinholes, porosity, blisters, chipped areas, or molding defects that may affect their appearance and serviceability. There shall be no readily visible wrinkles in any area when viewed with

lighting as specified in par. 5.1.1. The gel coat shall be free from voids, and no voids between the gel coat and the back-up resin shall be closer than 0.020 inch to the inner face. Blemishes shall not exceed those specified in par. 5.1.1.

3.2.1 *Color*.—The color shall be as selected from the manufacturer's standard color charts, and be substantially permanent under ordinary conditions of use.

3.3 Definitions.

3.3.1 The following terms used in this standard are defined in ASTM D 675-58T: blister, crack, crazing, dimple (see sink-mark), dome, pinhole, porosity, and wrinkle.

3.3.2 The following definitions are specifically related to this standard:

Chipped area.—Any exposed surface in which the gel coat or laminate has been chipped.

Molding defects.—Any visible distortion related to forming, such as: short, let-go or sink-mark, as defined in ASTM D 675-58T.

Specks.—Particles of foreign matter which produce irregularities in the surface. These particles are described according to their physical size, as follows:

Small— $\frac{1}{100}$ to $\frac{1}{64}$ inch in maximum dimension

Medium—Over $\frac{1}{64}$ to $\frac{1}{32}$ inch in maximum dimension

Large—Over $\frac{1}{32}$ to $\frac{1}{16}$ inch in maximum dimension

Void.—An empty or unfilled space.

4. DETAIL REQUIREMENTS

Physical Properties of the Material¹

4.1 *Tensile properties*.—The bathtubs shall withstand a tensile load of not less than 900 pounds per linear inch of width when tested in accordance with 5.3.

4.2 *Impact resistance*.—A specimen cut from the side or bottom of the bathtub shall not show cracks in the gel coat when subjected to the impact test in accordance with 5.4.

4.3 *Hardness*.—The bathtub surface and backing shall show a minimum reading of 40 points on a Barcol Impressor, when tested in accordance with 5.5.

4.4 *Cracking or crazing*.—The complete bathtub, or test pieces taken from any part of it, shall not show evidence of cracking or crazing after the oven test given in 5.6.

4.5 *Water absorption*.—The bathtub shall not absorb water in excess of 0.5 percent in 24 hours, when tested in accordance with 5.7.

4.6 *Gel coat*.—The gel coat shall be not less than 0.015 inch nor more than 0.035 inch in thickness as determined in accordance with 5.8.

4.7 *Stain resistance*.—The stain resistance of the bathtub surface shall be such that it will withstand all reagents, except mustard, when tested in accordance with 5.9.

4.8 *Washability*.—Bathtubs shall withstand 40,000 cycles in the scrub test according to par. 5.10. Only slight brush marks at the completion of this test are allowable.

4.9 *Fungus and vermin resistance*.—Bathtubs shall withstand the tests for mildew resistance and for vermin in accordance with 5.11.

¹ For more complete references to ASTM and other publications designated herein, see Appendix B, p. 10.

4.10 *Accelerated aging.*—Samples taken from a newly made bathtub shall show no appreciable change in color, and shall not craze, crack, chalk or blister when exposed for 100 hours, according to 5.12. On continuing the exposure to 700 hours, no cracking, crazing or blistering shall occur, but slight chalking is permissible.

4.11 *Humidity resistance.*—After 4,000 hours exposure to salt water spray (fog) in accordance with 5.13, no blistering, delamination or other surface defects shall be apparent.

Construction of the Product

4.12 *Bathtub.*—Each bathtub, exclusive of apron, shall be a one-piece unit, with floor sloping toward the drain. Rims of the upturned edges intended for attachment to walls shall be sufficiently flexible to allow them to conform readily to the wall surface when moderate force is applied by hand.

4.12.1 *Drain fitting connection.*—The drain openings shall be suitable for the proper installation of commercial drain fittings that are ordinarily used for the purpose. When the fitting is installed the bathtub shall withstand the test given in 5.14.

4.12.2 *Overflow.*—The overflow opening, if required, shall be suitable for the proper installation of commercial overflow drain fittings that are ordinarily used for the purpose. If required in a bathtub that is furnished without an overflow opening, the opening shall be cut in accordance with the manufacturer's instructions.

4.13 *Support.*—The bathtub shall be provided with a supporting structure for the space between the bottom of the bathtub and the floor of the building on which the bathtub rests. The material of the supporting structure and means of attachment for the front panel shall be at least equivalent to the material of the bathtub in resistance to deterioration with age, and shall meet the requirements for fungus and vermin resistance in 4.9.

4.13.1 *Effectiveness of support.*—When the bathtub is installed according to the manufacturer's directions, there shall be no permanent deformation of the bathtub or its supporting structure, and no cracking or crazing of the bathtub surface, when load tested in accordance with 5.15. Under this test, there shall also be no permanent deformation nor cracking of the rim where attached to the wall and no visible warpage of the bathtub at any point which could detrimentally affect either its appearance or drainage. The bathtub shall also withstand the loading described in 5.15.1 and 5.15.2 without showing permanent deformation. Any unsupported areas shall withstand the load test given in 5.16.

5. INSPECTION AND TEST METHODS

5.1 *Method of inspection for surfaces of bathtubs.*—

5.1.1 The surface of the bathtubs shall be visually inspected for blemishes from a distance of two feet after being inked in accordance with 5.1.2. The light source shall be partially diffused daylight, supplemented, if necessary, with diffused artificial light to provide illumination comparable to that usually available within a few feet of an outside window, facing north, but not in direct sunlight. The illumination shall have an intensity of 100 to 200 foot-candles. Blemishes other than those given in the following table are not allowable.

TABLE 1. Allowable blemishes

Blemish	Size (maximum dimension)	Maximum number allowed per inspection window 3' in diam.	Maximum number allowed per fixture
Specks ¹	Small ($\frac{1}{100}$ to $\frac{1}{64}$)	2	(2)
	Medium ($\frac{1}{64}$ to $\frac{1}{32}$)	1	8
	Large ($\frac{1}{32}$ to $\frac{1}{16}$)	1	2
Dimples		1	8
Domes		1	8

¹ Certain gel-coats or finishes purposely incorporate specks or flecks to produce the desired appearance. For such finishes, the limitations given for speck blemishes do not apply.

² Not to be counted.

5.1.2 *Ink test.*—To aid with visual examination of the surface of the bathtub, ink is applied to the area to be inspected, as follows:

- (1) Wash the entire area to be inspected with a water-soluble ink.
- (2) Rinse the surface with fresh water and dry. Ink will remain entrapped in cracks, pits, etc.

In this standard, all references to visible damage shall refer to defects apparent to the eye upon close inspection, after the surface has been ink tested.

5.2 *Conditioning of samples for testing.*—Unless otherwise specified, specimens for the following tests shall be conditioned in accordance with Procedure A of ASTM Method D618-58.

5.3 *Tensile test.*—Tensile load shall be determined in accordance with ASTM Method D638-58T, except that results shall be expressed in pounds per linear inch of width. (See 4.1.)

5.4 *Impact.*—A suitable flat or nearly flat specimen from the bathtub shall be tested at room temperature 20° to 30° C. (68° to 86° F.) by supporting and clamping it firmly in a 5-inch-diameter frame. A 1½-inch diameter steel ball, weighing ½ pound, shall be dropped on the center of the panel, and be allowed to fall from a height of 6 inches to strike the reverse side, and from a height of 30 inches to strike the gel coat side. After each drop of the ball, the presence of a crack shall be determined by applying the ink test to the affected area (see 5.1.2) and carefully examining the area for conformity with 4.2.

5.5 *Hardness.*—The test shall be made with a Barcol Impressor, Model GYZJ-934-1. With the indenter perpendicular to the test surface, a light hand pressure is exerted against the instrument to drive the spring-loaded indenter into the material, and the hardness dial reading is taken and recorded after a 10-second interval. The average of at least five tests shall be used for determining conformity with 4.3.

5.6 *Oven test for cracking and crazing.*—After 10 days in a circulating-air oven maintained at 74°±2° C. (165°±4° F.), the test pieces shall be inspected for conformity with 4.4.

5.7 *Water absorption.*—The water absorption shall be determined in accordance with ASTM Method D570-57. (See 4.5.)

5.8 *Gel coat thickness*.—The thickness of the gel coat shall be measured by cutting a test section from the area to be measured and sandpapering the edge of the section until smooth. A suitable measuring device shall be placed across the edge, perpendicular to the plane of the gel coat, and the thickness of the gel coat shall be measured with the aid of a reading glass, if needed, for conformity with 4.6.

5.9 *Stain*.—Resistance to staining shall be determined in accordance with ASTM Method D1300-53T, except that mustard shall be omitted. (See 4.7.)

5.10 *Scrub test*.—The Gardner Straight Line Scrub Tester, or equivalent equipped with a 1-pound black butt-cut hot bristle brush shall be used for this test. Immerse the brush bristles in water at 25° to 30° C. for 30 minutes to a depth of 1/2 inch. Shake the brush vigorously several times to remove "free" water and then soak an additional 5 minutes in 0.5 percent Tide or equivalent detergent solution made with distilled water. Mount the test specimen firmly on the apparatus so that the brush will describe a straight line throughout its entire path and reverse its direction without bobbing (dipping and restoring at the end of stroke). Place the brush saturated with the detergent solution on the specimen, and start the brush moving immediately at approximately 40 cycles per minute. During the test permit additional detergent solution to drop into the middle of the path of the brush from a separatory funnel at a rate of about 12 drops per minute, or at a rate just sufficient to keep the specimen wet. Remove the specimen at the end of 40,000 brush cycles (80,000 strokes). Immediately wash the specimen with tap water at moderate temperature and inspect the specimen for conformity with 4.8.

5.11 *Fungus and vermin*.—Bathtubs shall be tested for mildew resistance in accordance with Commercial Standard 168-50. The resistance to attacks by vermin shall be determined by ASTM Test Method D1382-55T (roaches) and D1383-55T (rats). (See 4.9.)

5.12 *Exposure*.—Samples shall be tested in an Atlas Weatherometer Testing Machine or equivalent according to ASTM Method D822-57T. After 100 hours exposure, the samples will be examined for conformity with 4.10, and samples that withstand this test shall be subjected to an additional exposure of 700 hours, after which they shall be again examined for conformity with 4.10.

5.13 *Humidity*.—After 4,000 hours exposure to salt water spray in accordance with ASTM Method B117-54T, test pieces shall be examined for conformity with 4.11.

5.14 *Load test for drain fitting connection*.—The drain fitting shall be properly installed in the bathtub, and the bathtub shall be held by its flanges in a horizontal position as in a normal installation. A 25-pound weight shall be applied by means of a lever arm 2 feet in length connected to the drain fitting and extending horizontally, as shown in Fig. 1. The arm and weight shall be placed in various radial positions and the effect of the load in each position shall be carefully observed. There shall be no visible damage as determined by the ink test (see 5.1.2) to the bathtub with the weight in any position, in order to be considered as conforming with 4.12.1.

¹ This test is a modification of the test in par. 4.4.6.2 Federal Specification TT-P-29, dated December 22, 1955.

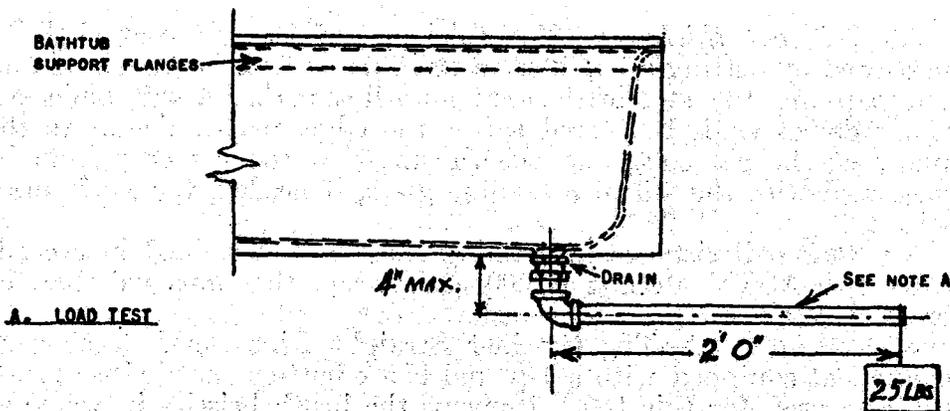


FIGURE 1. Test for Bathtub Drain Fitting Connection (par. 5.14).

NOTE A.—With lever arm approximately horizontal in the position shown, and in various other positions around the vertical axis, load is applied as illustrated.

5.15 *Load test for support.*—Gently lower a weight of 300 pounds, plus or minus 10 pounds, so that the weight is distributed evenly over the entire area of each deck corner successively. The deck corner shall be covered by a $\frac{1}{2}$ -inch thickness of sponge rubber or other suitable soft material and a weight distribution board $\frac{3}{4}$ to $1\frac{1}{2}$ inches thick, of sufficient area to cover the deck corner. Allow the weight to remain on each corner not less than 1 minute nor more than 10 minutes. After removal of the weight, the bathtub and supporting structure shall be inspected for conformity with 4.13.1.

5.15.1 The load described in 5.15 shall be applied to the bottom of the bathtub using board and padding to bear on an area of 50 ± 2 square inches. Duration of the test and determination of conformity shall be as described in 5.15.

5.15.2 The load described in 5.15, with suitable board and padding, shall be applied to an area 7 inches long by the width of the rolled-over edge and applied at the midpoint of the rolled-over edge of the bathtub. Duration of the test and determination of conformity shall be as described in 5.15.

5.16 *Deflection test for unsupported areas.*—A load of 10 pounds shall be applied at the central point of any unsupported areas, and any other selected area, of the bathtub by means of a 1-inch round steel rod rounded to a $\frac{1}{2}$ -inch radius at the end in contact with the bathtub without causing deflection of the surface greater than $\frac{1}{8}$ inch. There shall be no permanent deflection of the bathtub in order to be considered as conforming with 4.13.1.

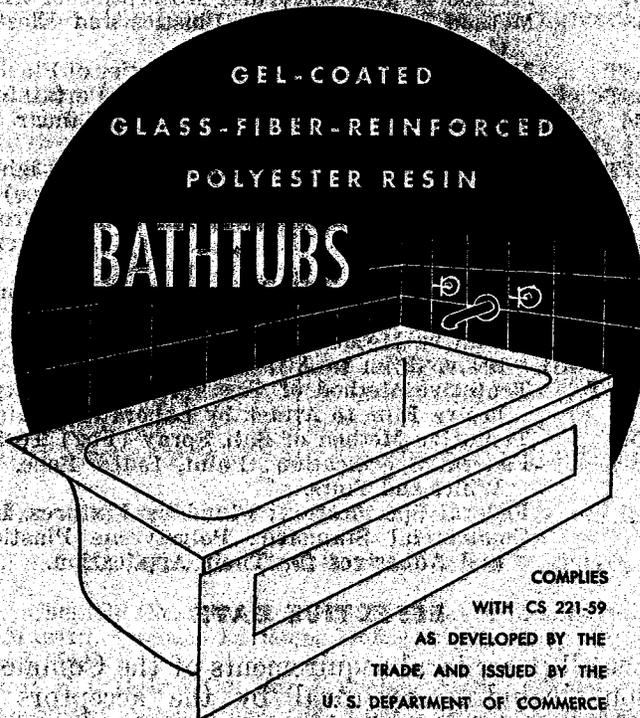
6. MARKING AND IDENTIFICATION

6.1 *Marking.*—Each bathtub shall be marked with the manufacturer's name or a registered trade mark by which he can be readily identified.

6.2 *Certification.*—In order that purchasers may be assured that plastic bathtubs actually comply with all requirements of the Commercial Standard, it is recommended that manufacturers include the following statement with their name and address on labels, invoices, sales literature, etc.:

This glass-fiber-reinforced polyester plastic bathtub complies with Commercial Standard CS221-59, as developed by the trade under the procedure of the Commodity Standards Division, and issued by the U.S. Department of Commerce.

6.3 *Hallmark.*—Bathtubs that comply in all respects with this Commercial Standard may carry the following hallmark to indicate compliance.



APPENDIX A

A1. The following test methods and information are provided for general use and do not constitute a requirement of this Commercial Standard.

A2. *Abrasion resistance.*—A well cured, properly formulated gel coat, when tested for abrasion according to ASTM D1044-56, using a 1,000 g. load on a CS-10F wheel, will not produce a weight loss of more than 35 mg. in 400 cs.

A3. *Thermal expansivity.*—Sections cut from the bathtub will not have a linear coefficient of expansion with change of temperature of more than 25 millionths (0.000025) of an inch per degree Fahrenheit over a base temperature range of 70°F. to 180°F. when measured in accordance with ASTM Method D696-44.

A4. *Gloss.*—A bathtub surface, with a porcelain appearance (except nonslip areas), will have minimum gloss readings, when tested on the Gardner Gloss Meter, or equivalent in accordance with ASTM Method D523-53T, as follows:

- a. Original 60° Specular Gloss 55
- b. Original 20° Specular Gloss 12

APPENDIX B

B1: The publications referred to herein are listed below. Later issues of these publications may be used, providing the requirements are applicable and consistent with the issues designated.

<i>Designation</i>	<i>Title</i>
ASTM D523-53T	Tentative Method of Test for Specular Gloss.
ASTM D570-57	Method of Test for Water Absorption of Plastics.
ASTM D618-58	Method of Conditioning Plastics and Electrical Insulation Materials for Testing.
ASTM D638-58T	Method of Test for Tensile Properties of Plastics.
ASTM D675-58T	Nomenclature of Descriptive Terms Pertaining to Plastics.
ASTM D696-44	Method of Test for Coefficient of Linear Thermal Expansion of Plastics.
ASTM D822-57T	Recommended Practice for Operating Light and Water Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer, and Related Products.
ASTM D1044-56	Method of Test of Resistance of Transparent Plastics to Surface Abrasion.
ASTM D1300-53T	Specifications and Methods of Test for Laminated Thermosetting Decorative Sheets.
ASTM D1382-55T	Tentative Method of Test for Susceptibility of Dry Adhesive Film to Attack by Roaches.
ASTM D1383-55T	Tentative Method of Test for Susceptibility of Dry Adhesive Film to Attack by Laboratory Rats.
ASTM B117-54T	Tentative Method of Salt Spray (Fog) Testing.
TT-P-29	Federal Specification: Paint, Latex Base, Interior Flat White and Tints.
WW-P-541b	Federal Specification: Plumbing Fixtures, Land Use.
CS168-50	Commercial Standard: Polystyrene Plastic Wall Tiles and Adhesives for Their Application.

EFFECTIVE DATE

Having met all 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 May 1, 1959.

EDWIN W. ELY,

Chief, Commodity Standards Division.

HISTORY OF PROJECT

Following a period of preliminary development by the Plastics Plumbing Fixture Standards Committee of the Society of the Plastics Industry, a Commercial Standard for gel-coated glass-fiber reinforced polyester resin bathtubs was proposed. On December 18, 1957, the cooperation of the Commodity Standards Division in the establishment of the standard was requested by the Society.

Upon reviewing the draft submitted and considering certain technical and editorial suggestions a Proposed Commercial Standard was prepared. On July 1, 1958, it was circulated to leading manufacturers, distributors, testing laboratories, plumbers, and builders for comment. Various suggestions were submitted and were considered with particular regard to their practicability under existing facilities and practices in the industry. Modifications in line with the con-

¹ Copies of ASTM publications are obtainable from the American Society of Testing Materials, 1916 Race Street, Philadelphia, Pa. Copies of Federal Specifications may be obtained from the Business Service Center, General Services Administration, Washington 25, D.C. See page 15 for availability of Commercial Standards.

sensus of the suggestions and information pertinent to them were embodied in a Recommended Commercial Standard, TS-5428. It was circulated to the trade on November 19, 1958, for written acceptance.

Acceptances were received from diverse interests, and were considered sufficiently representative of the industry as a whole to insure the successful application of the standard without significant dissent. The individual acceptors are listed herein. Accordingly, the establishment of the standard as CS221-59 was announced on March 30, 1959.

Project Manager: Alfred S. Best, Commodity Standards Division, Office of Technical Services.

Technical Advisers: F. W. Reinhart and B. G. Achhammer, Plastics Section, 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. Comment 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, United States Department of Commerce which acts as secretary for the committee.

JOHN A. WILLS, Chairman, John A. Wills & Co., 2941 Doyne Rd., Pasadena 8, Calif.

JAMES S. LUNN, Lunn Laminates, Inc., Oakwood Rd. & West 11th St., Huntington Station, N.Y.

L. R. DAILEY, Chemold Co., 2000 Colorado Ave., Santa Monica, Calif.

THOMAS J. MARTIN, Plastics Division, Monsanto Chemical Co., P.O. Box 1531, Springfield 2, Mass.

NEEL O'HAIR, P. E. O'Hair & Co., San Francisco, Calif. (Representing American Institute of Supply Associations, Inc., 1426 G St. NW., Washington 5, D.C.)

G. A. BAEHR, Dept. 642, Sears, Roebuck & Co., 925 S. Homan Ave., Chicago 7, Ill.

DONALD GARDNER, United States Testing Co., Inc., 1415 Park Ave., Hoboken, N.J.
The American Institute of Architects, 1741 New York Ave. NW., Washington 6, D.C. (Invited to name a representative).

GORDON G. HAZELL, Home Manufacturers' Association, 917 17th St. N.W., Washington 6, D.C.

ACCEPTANCE OF COMMERCIAL STANDARD

If an 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 CS221-59 constitutes a useful standard of practice, and we individually plan to utilize it as far as practicable in the production¹ distribution¹ purchase¹ testing¹ of gel-coated glass-fiber-reinforced polyester resin bathtubs. We reserve the right to depart from it as we deem advisable.

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

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.

(cut on this line)

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.

ACCEPTORS

The organizations listed below have individually accepted this standard for use as far as practicable in the production, distribution, or purchase of gel-coated glass-fiber-reinforced polyester resin bathtubs. In accepting the standard, they reserve the right to depart from it as they individually deem advisable. It is expected that products 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.

ASSOCIATIONS

(General Support)

American Institute of Architects, Department of Education & Research, Philadelphia, Pa.

FIRMS AND OTHER INTERESTS

Aiken Corp., Venice, Calif.
Allied Supply Co., Inc., Lyons, Ill.
B & H Laminated Plastics Inc., Pasadena, Calif.
Cadien, Robert J. L., Cliffside Park, N.J.
Camiet, J. Thomas, Garfield, N.J.
Cannon & Mullen, Salt Lake City, Utah
Celanese Corporation of America, Newark, N.J.
Chemical Industries, Pasadena, Calif.
Chemold Co., Santa Monica, Calif.
Cohagen, Chandler C., Billings, Mont.
Conrad & Cummings, Associated Architects, Binghamton, N.Y.
Danser Hardware & Supply Co., Weston, W. Va.
Dudley Industrial Corp., Santa Clara, Calif.
Empire Supply Co., Inc., Visalia, Calif.
Fiberglass Division, Hill's Archery Manufacturing Inc., Manitowish Waters, Wis.
Fiber Glass Division, Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Glass Fabrics Finishing Co., Division of Hess Goldsmith & Sons, Cedar Grove, N.J.
Grand Haven Plastics Co., Grand Haven, Mich.
Grellinger & Rose, Milwaukee, Wis.
Jacobson, A.D., Plumbing & Heating Co., Inc., Kansas City, Mo.
Jardine Plumbing Co., Chillicothe, Ohio
Jefferson Supply Co., Pine Bluff, Ark.
La Crosse Plumbing Supply Co., La Crosse, Wis.
Loeb, Laurence M., White Plains, N.Y.

Loup Engineering Co., Columbus, Nebr.
Malone Plumbing Supply Co., Pittsburgh, Pa.
Manchester Supply Co., Manchester, N.H.
Mann and Co., Hutchinson, Kans.
May Supply Co., Anderson, Ind.
Michigan Brass Co., Grand Haven, Mich.
Miner Supply Co., Red Bank, N.J.
Modern Plumbing & Heating Co., Grand Rapids, Mich.
Newar Supply Co., Chicago, Ill.
Ontario Research Foundation, Toronto, Ontario, Canada
Patzig Testing Laboratories, Des Moines, Iowa
Pittsburgh Plate Glass Co., Paint Division Research Center, Springdale, Pa.
Pittsburgh Testing Laboratory, Pittsburgh, Pa.
Plumber's Supply Co., Louisville, Ky.
Ponsford & Price, Oakland, Calif.
Post, Geo. B. & Sons, New York, N.Y.
Prescott, Geo. M., Co., Alhambra, Calif.
Royal Brass Manufacturing Co., Cleveland, Ohio
Schaeffer, Wilson & Evans, Bloomington, Ill.
Sears, Roebuck & Co., Chicago, Ill.
Seckinger, M. O., Co., Savannah, Ga.
Six Associates Inc., Asheville, N.C.
Square Supply Co., Knoxville, Tenn.
Stravs, Carl B., Twin Falls, Idaho
Sun Chemical Corp., Electro Technical Products Division, Nutley, N.J.
Union Carbide Plastics Co., New York, N.Y.
Wahpeton Plumbing & Heating Co., Wahpeton, N. Dak.
Walker Supply Co., Trenton, N.J.
Welker Supply Co., Cleveland, Ohio
Wills, John A., & Co., Pasadena, Calif.

U.S. GOVERNMENT

Department of the Army, 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. This list includes the purchase price of each publication and gives directions for ordering copies.