

DEPARTMENT OF COMMERCE  
NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY  
(formerly National Bureau of Standards-NBS)  
OFFICE OF STANDARDS SERVICES

COMMERCIAL STANDARD CS245-62

VINYL-METAL LAMINATES

Commercial Standard CS245-62, Vinyl-Metal Laminates was withdrawn by the Department of Commerce on August 18, 1980. This standard was withdrawn based on activities and sponsorship of a private standards-writing organization - Society of the Plastics Industry (SPI).

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PS 34-70, Fluorinated Ethylene-Propylene (FEP) Plastic Lined Steel Pipe and Fittings; Society of the Plastics Industry; 12 months

PS 36-70, Body Measurements for the Sizing of Boys' Apparel; Mail Order Association of America; 24 months

PS 42-70, Body Measurements for the Sizing of Women's Patterns and Apparel; Mail Order Association of America; 24 months

PS 45-71, Body Measurements for the Sizing of Apparel for Young Men (Students); Mail Order Association of America; 24 months

PS 46-71, Flame-Resistant Paper and Paperboard; American Society for Testing and Materials; 18 months

PS 51-71, Hardwood and Decorative Plywood; Hardwood Plywood Manufacturers Association; 24 months

PS 52-71, Polytetrafluoroethylene (PTFE) Plastic; Society of the Plastics Industry; 12 months

PS 53-72, Glass-Fiber Reinforced Polyester Structural Plastic Panels; Society of the Plastics Industry; 12 months

PS 54-72, Body Measurements for the Sizing of Girls' Apparel; Mail Order Association of America; 24 months

PS 57-73, Cellulosic Fiber Insulation Board; American Hardboard Association; 6 months

PS 58-73, Basic Hardboard; American Hardboard Association; 6 months

PS 59-73, Prefinished Hardboard Paneling; American Hardboard Association; 6 months

PS 60-73, Hardboard Siding; American Hardboard Association; 6 months

PS 62-74, Grading of Diamond Powder in Sub-Sieve Sizes; Industrial Diamond Association of America; 12 months

PS 63-75, Latex Foam Mattresses for Hospitals; American Society for Testing and Materials; 24 months

PS 64-75, School Paste; the Crayon, Water Color and Craft Institute, Inc.; 18 months

PS 65-75, Paints and Inks for Art Education in Schools; The Crayon, Water Color and Craft Institute, Inc.; 18 months

PS 67-76, Marking of Gold Filled and Rolled Gold Plate Articles Other Than Watchcases; Jewelers Vigilance Committee; 36 months

PS 68-76, Marking of Articles Made of Silver in Combination with Gold; Jewelers Vigilance Committee; 36 months

PS 69-76, Marking of Articles Made Wholly or in Part of Platinum; Jewelers Vigilance Committee; 36 months

PS 70-76, Marking of Articles Made of Karat Gold; Jewelers Vigilance Committee; 36 months

PS 71-76, Marking of Jewelry and Novelties of Silver; Jewelers Vigilance Committee; 36 months

CS 98-82, Artists' Oil Paints; Artists Equity Association, Inc.; 18 months

CS 130-80, Color Materials for Art Education in Schools; The Crayon, Water Color and Craft Institute, Inc.; 18 months

CS 138-85, Insect Wire Screening; Insect Screening Weavers Association; 12 months

CS 151-80, Body Measurements for the Sizing of Apparel for Infants, Babies, Toddlers and Children (for the Knit Underwear Industry); Mail Order Association of America; 24 months

CS 192-83, General Purpose Vinyl Plastic Film; Society of the Plastics Industry; 12 months

CS 201-85, Rigid Polyvinyl Chloride Sheets; Society of the Plastics Industry; 12 months

CS 227-89, Polyethylene Film; Society of the Plastics Industry; 12 months

\* CS 245-82, Vinyl-Metal Laminates; Society of the Plastics Industry; 12 months

CS 257-83, TFE-Fluorocarbon (Polytetrafluoroethylene) Resin Molded Basic Shapes; Society of the Plastics Industry; 12 months

CS 268-85, Hide Trim Pattern for Domestic Cattlehides; National Hide Association; 12 months

CS 274-86, TFE-Fluorocarbon (Polytetrafluoroethylene) Resin Sintered Thin Coatings for Dry Film Lubrication; Society of the Plastics Industry; 12 months

R 2-82, Bedding Products and Components; National Association of Bedding Manufacturers; 12 months

R 192-83, Crayons and Related Art Materials for School Use (Types, Sizes, Packages, and Colors); the Crayon, Water Color and Craft Institute, Inc.; 18 months

The following standards have been replaced by standards published by private standards-writing organizations and, therefore, Department of Commerce sponsorship is no longer needed for them:

PS 26-70, Rigid Poly (Vinyl Chloride) (PVC) Profile Extrusions replaced by ASTM D 3678-78, Specification for Rigid Poly (Vinyl Chloride) (PVC) Profile Extrusions

PS 43-71, Fluorinated Ethylene-Propylene (FEP) Plastic Tubing replaced by ASTM D 3296-74, Specification for FEP-Fluorocarbon Resin Tubing

PS 47-71, Heat-Shrinkable Fluorocarbon Plastic Tubing replaced by ASTM D 2902-75, Specification for Fluorocarbon Resin Heat-Shrinkable Tubing

PS 53-72, Rigid Poly (Vinyl Chloride) (PVC) Plastic Siding replaced by ASTM D 3679-79 Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding

CS 11-63, Moisture Regain of Cotton Yarns replaced by ASTM D 1909-77 Standard Table of Commercial Moisture Regains for Textile Fibers and ASTM D 2494-74 Standard Method of Test for Commercial Weight of a Shipment of Yarn or Man-Made Staple Fiber

CS 21-58, Interchangeable Taper-Ground Joints, Stopcocks, Stoppers, and Spherical-Ground Joints replaced by ASTM E 675-79 Standard Specification for Interchangeable Stopcocks and Stoppers, ASTM E 676-79 Standard Specification for Interchangeable Taper-Ground Joints, and ASTM E 677-79 Standard Specification for Interchangeable Spherical-Ground Joints

CS 75-58, Automatic Mechanical-Draft Oil Burners Designed for Domestic Installations replaced by ANSI Z 91.2-1976 Performance Requirements for Automatic Pressure Atomizing Oil Burners of the Mechanical-Draft Type

CS 191-53, Flammability of Clothing Textiles replaced by ASTM D 1230-81 (1972) Test for Flammability of Clothing Textiles

CS 202-56, Industrial Lifts and Hinged Loading Ramps replaced by ANSI MH14.1-1978 Industrial Loading Dockboards (Ramps)

CS 209-57, Vinyl Chloride Plastics Garden Hose replaced by ASTM D 3901-80 Standard Consumer Product Specification for Garden Hose

CS 236-66, Mat-Formed Wood Particleboard replaced by ANSI A 206.1-1979 Mat-Formed Particleboard

In the absence of any request for retention or maintenance, the following standards will be withdrawn, as previously announced, on August 18, 1980:

PS 4-68, Standard Stock Light-Duty 1-3/8-and 1-3/4-inch Thick Flush-type Interior Steel Doors and Frames

PS 6-68, Trim for Water-Closet Bowls, Tanks and Urinals (Dimensional Standards)

PS 28-70, Glass Stopcocks with Polytetrafluoroethylene (PTFE) Plugs

PS 36-70, Steel Bi-fold Closet Door Units, Frames, and Trim

PS 40-70, Package Quantities of Green Olives

PS 41-70, Package Quantities of Instant Mashed Potatoes

PS 44-71, Paper Ice Bag Sizes

PS 48-71, Package Quantities of Cubed, Sized, Crushed, and Block Ice

PS 49-71, Portable Picnic Coolers

PS 50-71, Package Quantities of Toothpaste

CS 5-65, Pipe Nipples; Brass, Copper, Steel, and Wrought Iron

CS 46-65, Hosiery Lengths and Sizes Excluding Women's

CS 234-81, Measurements for Stretch Socks and Anklets

CS 242-82, Standard Stock Commercial 1-3/4-Inch Thick Steel Doors and Frames

CS 289-85, Aluminum Alloy Chain Link Fencing

R 46-55, Tissue Wrapping Paper

R 222-46, Hot-Rolled Carbon Steel Bars and Bar-Size Shapes

R 264-61, Standard Sizes of Oil-Hardenable Flat, Ground Tool Steel Stock

In accordance with section 10.1(e) of the revised Procedures for the Development of Voluntary Product Standards and by agreement with the Consumer Product Safety Commission, the Department will retain sponsorship of the following two Product Standards until such time as arrangements for their sponsorship by a private standards-writing organization can be made:

PS 66-75, Safety Requirements for Home Playground Equipment

PS 72-76, Toy Safety

For further information contact: James E. French, Office of Engineering Standards, National Bureau of Standards, Washington, D.C. 20234, Telephone: (301) 921-3272.

**COMMERCIAL STANDARD CS 245-62**

**Vinyl-Metal Laminates**

**WITHDRAWN**

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**  
**BUSINESS AND DEFENSE SERVICES ADMINISTRATION**  
**OFFICE OF TECHNICAL SERVICES**  
**Commodity Standards Division**

With the cooperation of the  
National Bureau of Standards

**EFFECTIVE DATE**

Having been passed through the regular procedures of the Commodity Standards Division, and approved by the acceptors hereinafter listed, this Commercial Standard is issued by the U.S. Department of Commerce, effective August 15, 1962.

LUTHER H. HODGES, *Secretary.*

**COMMERCIAL STANDARDS**

Commercial Standards are developed by manufacturers, distributors, and users in cooperation with the Commodity Standards Division of the Office of Technical Services, Business and Defense Services Administration, 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.

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The initial printing of CS 245-62 was made possible through the cooperation of the Vinyl-Metal Laminators Institute of the Society of the Plastics Industry, Inc.

# VINYL-METAL LAMINATES

[Effective August 15, 1962]

## 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; to give the consumer confidence in the quality of the product, and to provide means for identifying vinyl-metal laminate produced in conformance with this standard.

## 2. SCOPE

2.1 This standard covers the methods of test and requirements for vinyl-metal laminates and the vinyl chloride plastic (hereinafter referred to as vinyl) used to prepare such laminates. The requirements and methods of test are specified for the adhesion strength, flammability, abrasion resistance, light stability and stain resistance of the vinyl-metal laminate. It covers also the thickness, width, length, color and finish of the vinyl, and the requirements and methods of test for its abrasion resistance, plasticizer loss, light stability, stain resistance, adhesive strength and flammability. A recommended means for declaring compliance with the Standard is also included.

2.2 Requirements and tests for vinyl-metal laminates to be used in outdoor applications and severe staining conditions are not covered in this standard. The ball test for adhesion strength is designed primarily for an application involving a draw; if the material will not draw  $\frac{3}{8}$ "', it should not be considered suitable for applications involving a draw.

## 3. REQUIREMENTS

3.1 **Laminate.**—The vinyl-metal laminate shall consist of a sheet metal base, either ferrous or nonferrous, with one or both sides completely covered with vinyl securely bonded to the metal.

3.1.1 **Adhesion strength.**—The bond between the vinyl and the metal shall be considered satisfactory if the samples of the laminate meet the following requirements.

3.1.1.1 **Ball test.**—The vinyl shall securely adhere to the metal at the point of greatest elongation so that an area no more than  $\frac{1}{4}$  inch square of completely bare metal shall show when tested in accordance with 4.3.1.1.

3.1.1.2 **Salt spray.**—The vinyl-metal laminate shall show no blisters, delamination nor rust creepage in excess of  $\frac{1}{8}$ "' along the score marks when exposed for 200 hours in a salt spray fog test as conducted in accordance with 4.3.1.2.

3.1.1.3 **Boiling water.**—A ball test specimen (see 4.3.1.1.3) formed from the laminate shall withstand one hour exposure to the boiling water without visual delamination when tested in accordance with method 4.3.1.3.

**3.1.2 Flammability.**—The laminate shall be self-extinguishing when tested in accordance with method 4.3.2.

**3.1.3 Abrasion resistance.**—The abrasion resistance (Taber) of the laminate shall be no less than that specified under 3.2.2.1.1 when tested in accordance with 4.3.4.

**3.1.4 Light stability.**—The vinyl-metal laminate shall meet the same light stability requirements when exposed to the Fadeometer for 150 hours as specified for the vinyl under 3.2.2.3 when tested in accordance with method 4.3.6.

**3.1.5 Stain resistance.**—The vinyl-metal laminate shall be stain resistant to materials as described in 3.2.2.5 when tested in accordance with method 4.3.8.

**3.2 Vinyl.**—The vinyl shall be as free as is commercially practicable of visual defects such as cold checks, crow's feet, "pine trees", streaks, blisters, pinholes, particles of foreign matter and undispersed raw materials. The edges shall be smooth, free from cuts and nicks.

**3.2.1 Dimensions.**

**3.2.1.1 Width.**—The vinyl shall be held to a tolerance of plus  $\frac{1}{2}$  inch, minus 0 inch, of the nominal width specified. This tolerance shall apply when the material is in roll form on the core.

**3.2.1.2 Thickness.**—The average thickness of the vinyl shall be within  $\pm 20\%$  of that specified. The average thickness shall be determined from five uniformly spaced readings taken across the width of the sheet. Average thickness shall be determined by the method described in 4.3.3.

**3.2.1.3 Length.**—The length of the material, excluding that which has been subjected to embossing, printing, etc., shall be continuous in any one roll.

**3.2.2 Physical properties.**

**3.2.2.1 Abrasion resistance.**

**3.2.2.1.1 Printed.**—Printed vinyl shall show no print wear after 100 cycles on the Taber Abraser using CS-17 wheels with a 1,000-gram load when tested in accordance with the method described in 4.3.4.

**3.2.2.1.2 Unprinted.**—Unprinted vinyl shall not have more than an average loss of 0.050 gram for 100 cycles on the Taber Abraser using a CS-17 wheel and a 1,000-gram load in accordance with the method described in 4.3.4.

**3.2.2.2 Plasticizer loss.**—The plasticizer loss shall not exceed an average of 5% by weight when the vinyl is tested in accordance with 4.3.5.

**3.2.2.3 Light stability.**—The vinyl shall exhibit no discoloration or pigment fadeout after exposure in the Fadeometer for 150 hours when tested in accordance with 4.3.6.

**3.2.2.4 Embossing retention.**—The vinyl shall exhibit no more than moderate loss of embossing or change in luster when tested in accordance with 4.3.7. For test purposes, a moderate change is one which is readily perceptible without close examination, but insufficient to markedly alter the original appearance.

3.2.2.5 **Stain resistance.**—The vinyl shall be stain resistant to the following materials when tested in accordance with 4.3.8:

Orange Peel	Banana Peel
Lemon Peel	10% Sulfuric Acid
10% Nitric Acid	10% Hydrochloric Acid (Except on metallic finishes)
10% Citric Acid	10% Sodium Hydroxide
Mineral Oil	Cola beverage
Sodium Hypochlorite (Clorox or equivalent)	Spinach (canned)
Sweet Milk	Coffee
Bourbon (86 Proof)	Hot Bacon Grease

3.2.2.6 **Hydrogen sulfide.**—The vinyl shall show no permanent stain when tested in accordance with 4.3.8.1.

3.3 **Metal.**—The ferrous or nonferrous metal shall conform to standard commercial requirements for thickness and dimensions and freedom from defects. The finish and temper of the metal shall be suitable for good film adhesion and the forming of the end product.

3.4 **Adhesive.**—The adhesive used for vinyl-metal laminates shall be uniform in consistency and free of undispersed particles and foreign matter that would interfere with good bonding.

#### 4. TEST METHODS

4.1 **Sampling.**—The required number of samples shall be selected at random. In all cases, the average value of the indicated number of specimens shall be used to determine conformance with the detailed requirements.

4.2 **Conditioning.**—Unless otherwise specified in this standard, the test specimens shall be conditioned in accordance with Procedure A of ASTM Designation D618-61,<sup>1</sup> Standard Method of Conditioning Plastics and Electrical Insulating Materials for Testing, and shall be tested under these conditions.

##### 4.3 Test procedures.

##### 4.3.1 Adhesion strength.

##### 4.3.1.1 Ball test.

##### 4.3.1.1.1 Apparatus.

- (a) Die stock steel block 3'' x 3'' x 1'' with a hole in the center 1.060'' in diameter. The edges of the hole shall be rounded to a radius of not less than .060''.
- (b) A rubber pad to fit around the ball with a 1'' diameter hole in the center.
- (c) Ball.—A 1'' diameter steel ball bearing.
- (d) Hydraulic pressure jack for applying pressure, such as the Erickson or its equivalent.

4.3.1.1.2 **Test specimens.**—Three 3'' x 3'' specimens shall be cut from the same area of the laminate to be tested.

- (a) One specimen shall be tested in accordance with the procedure described in 4.3.1.1.3 to determine the depth of fracture of the laminate in inches. The depth of fracture shall be the vertical distance in inches from the flat upper surface of the laminate to the top of the dome formed by the ball when fracture occurs.

<sup>1</sup> Copies of ASTM publications are obtainable from the American Society for Testing and Materials, 1916 Race St., Philadelphia 3, Pa.

- (b) The two specimens of the laminate shall be scored (see Fig. 1) by two lines cut through the vinyl and adhesive layers. Care should be exercised not to score the metal. The cuts shall be parallel to one side, each 2" long and 1/4" apart along the center line of the specimen. Two additional cuts shall be made at right angles, also 1/4" apart along the center line to the initial scoring. The cuts in the surface shall intersect to form a 1/4" square.

**4.3.1.1.3 Procedure.**—The ball test apparatus is shown in Fig. 2. The laminate specimens shall be placed on the rubber block, with the scored vinyl side up. The ball bearing shall be held firmly in place by the rubber pad and the lower steel block, and then when it meets the upper steel block the ball shall be forced upward to form a dome 1/16" below the previously determined fracture point (see 4.3.1.1.2 (a)) or to a maximum of 3/8". One formed specimen shall be set aside for use in the boiling water test (see 4.3.1.3). The second specimen shall be inspected in accordance with 4.3.1.1.4.

**4.3.1.1.4 Inspection.**—The formed ball test specimen (see fig. 3) shall be cut through the vinyl and adhesive layers between the two parallel lines halfway up the dome and an attempt shall be made to pull the vinyl away from the metal in each of the quadrants.

**4.3.1.2 Salt spray.**

**4.3.1.2.1 Apparatus.**—The salt spray chamber shall conform to the requirements of ASTM Designation B117-57T, Tentative Method of Salt Spray (Fog) Testing.

**4.3.1.2.2 Test specimen.**—The specimen shall (see fig. 4) be 4" x 6" with the bare edges protected by beeswax or other suitable sealing material. Score marks at right angles shall be cut through the vinyl and adhesive layers on the lower half of the specimen.

**4.3.1.2.3 Test procedure.**—The specimen shall be placed in the chamber at the angle specified in ASTM B117-61T with the vinyl side up. The specimen shall be exposed for 200 hours under the conditions as stated in ASTM B117-61T.

**4.3.1.2.4 Inspection.**—After washing the specimen with warm water and mild abrasive (Bon-Ami or its equivalent) the specimen shall be examined for blisters on the vinyl, signs of delamination at the juncture of the score marks, and rust creepage (where ferrous metal is used) along the score marks.

**4.3.1.3 Boiling water test.**—A formed ball test specimen prepared and cut as per 4.3.1.1.3 shall be placed in boiling water for one hour, removed and allowed to cool to 73.4°F ± 1.8°F for one hour. At the end of that time the specimen shall be examined for delamination of the vinyl from the metal at the score marks.

**4.3.2 Flammability.**—The flammability of the laminate shall be determined in accordance with ASTM Designation D635-56T, Tentative Method of Test for Flammability of Rigid Plastics over 0.050" in thickness. Three specimens shall be tested, mounted so that the vinyl side of the laminate is towards the flame.

**4.3.3 Thickness.**—(Weight method.)

**4.3.3.1 Apparatus.**

- (a) Analytical balance, equipped with pan straddle or other stationary support, sensitive to 0.0005 gm.
- (b) Die or template, for cutting test specimens, 3.94 x 3.94" (10 x 10 cm), with a dimensional tolerance of ±0.004" (0.01 cm) per side.

(c) Sharp knife or razor.

4.3.3.2 **Test specimens.**—Five 3.94 x 3.94'' (10 x 10 cm) specimens of the vinyl taken uniformly across the width of the sheet shall be tested.

4.3.3.3 **Procedure.**

4.3.3.3.1 By means of the die or template and the sharp knife or razor, cut five specimens from the sample of material.

4.3.3.3.2 Weigh each specimen to the nearest 0.5 mg on the analytical balance. Record the weight as W.

4.3.3.3.3. Following the procedure of ASTM D792, Methods of Test for Specific Gravity of Plastics, method A, determine the specific gravity of each specimen and record as D. Use of a wetting agent is recommended.

4.3.3.4 **Calculations.**—Calculate the average thickness of each test specimen, using the following formula, and average the five values:

$$T = \frac{394W}{100D} = 3.94 \frac{W}{D},$$

where

T = average thickness of test specimen in mils

W = weight of test specimen in gm

D = density of test specimen in gm/cc (specific gravity = density in metric units)

394 = conversion factor, cm to mils

100 = area of specimen in sq cm

4.3.4 **Abrasion resistance.**—The abrasion resistance of the vinyl shall be determined in accordance with ASTM Designation D1044-56, Standard Method of Tests for Resistance of Transparent Plastics to Surface Abrasion, except that CS-17 wheels, 1,000-gram-weight load, and 100 cycles shall be used. In the case of free vinyl, it shall be attached to a metal plate by means of double sided contact pressure sensitive adhesive (such as PS-5502 furnished by Interchemical Corporation Finishes Division or its equivalent). Three specimens shall be tested and the average loss in grams for the 100 cycles shall be calculated.

4.3.4.1 Resurfacing of the wheels shall be done with the S-11 Taber Abrasion paper for 25 cycles at the beginning of each test.

4.3.5 **Plasticizer loss.**—Three 3'' x 3'' specimens of the vinyl shall be conditioned (see 4.2) and weighed to the nearest 0.01 gm. The specimens shall be immersed in an upright position so that they are not touching each other, the bottom, or the sides of a one pint jar containing technical grade hexane. The immersion shall be at a temperature of 73.4°F ± 1.8°F for one hour. After the immersion period, each specimen shall be dried at a temperature of 220°F ± 5°F for one hour in circulating air oven, removed and cooled to standard conditions for one hour, and weighed to the nearest 0.01 gm. The plasticizer loss, expressed as percentage weight loss as compared to the original specimen weight shall be computed as follows to the nearest 0.01 gm.

where

$$\text{Weight Loss, \%} = \frac{W_1 - W_2}{W_1} \times 100$$

W<sub>1</sub> = initial weight of test specimen and

W<sub>2</sub> = final weight of test specimen.

The values obtained for the three test specimens shall be averaged and reported as percentage weight loss of the sample tested.

**4.3.6 Light stability.**—The light stability shall be determined in accordance with ASTM Designation D1499-59T, Recommended Practice for Operation of Light and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Plastics, using an Atlas Fadeometer Type FDA-R or its equivalent.

**4.3.6.1 Test specimens.**—Two specimens 8'' x 2<sup>5</sup>/<sub>8</sub>'' shall be cut from the sample to be tested. The one specimen shall be placed in an envelope and filed as a standard for comparison. The second specimen shall be placed in the Fadeometer.

**4.3.6.2 Procedure.**—The specimen shall be exposed under the conditions specified in ASTM D1499-59T for 150 hours. The black panel temperature shall be 145°F±9°F. The water reservoir shall be filled with water at all times so that the wicks in the chamber are kept wet constantly.

**4.3.6.3 Inspection.**—After the specimen has been exposed in the Fadeometer for 150 hours, it shall be compared to the standard retained (see 4.3.6.1) for visual evidence of discoloration or pigment fadeout.

**4.3.7 Embossing retention.**—Two specimens of vinyl 2'' x 6'' shall be cut from the sample to be tested. The first specimen is to be retained as a standard for comparison. The second specimen shall be placed with the embossing side up on a metal plate no thicker than 24-gage steel previously dusted with talc or soap stone. The prepared sample shall be placed in a circulating air oven at a temperature of 315°F±5°F for eight minutes. The tested specimen shall be visually inspected and compared to the standard mentioned above for embossing or luster change.

**4.3.8 Stain resistance.**—Each of the materials listed in 3.2.2.5 shall be applied to a specimen of laminate or vinyl so as to cover a minimum area of 1/2'' x 1/2''. After one hour of contact, the surface shall be cleaned with soap and water and visually inspected. Any remaining stained areas may be further cleaned by using a mild abrasive (Bon-Ami or its equivalent), hexane, or ethyl or isopropyl alcohol. A tested area that fails to return to the original color shall be considered to be permanently stained.

**4.3.8.1 Hydrogen sulfide.**—Three specimens 3'' x 1/4'' of vinyl shall be suspended in a test tube containing 10 ml of distilled water. The specimens shall not touch the water. Hydrogen sulfide gas shall be bubbled through the water for one minute ±15 seconds. The test tube shall then be sealed permitting the specimens to remain in the resulting atmosphere of the tube for one minute ±15 seconds before removal for evaluation. Tests shall be conducted at 73.4°F±1.8°F. Exposed specimens shall be removed and allowed to stand at room temperature for a maximum of 24 hours to determine return to original color. Specimens that fail to return to original color shall be considered stained.

## 5. IDENTIFICATION

5.1 In order to assure the purchaser that he is receiving vinyl-metal laminate that complies with the standard requirements set forth herein, it is recommended that vinyl-metal laminate manufactured to

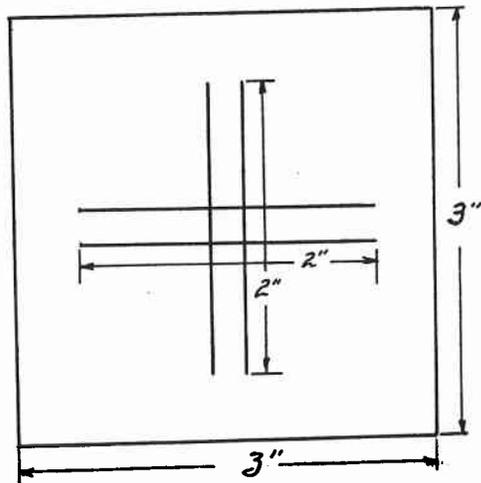


FIG. 1 - BALL TEST SPECIMEN

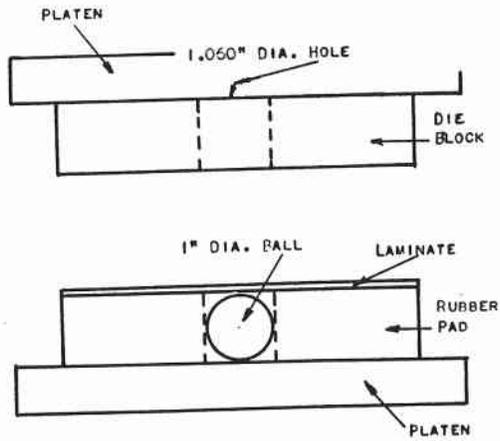


FIG. 2 - BALL TEST APPARATUS

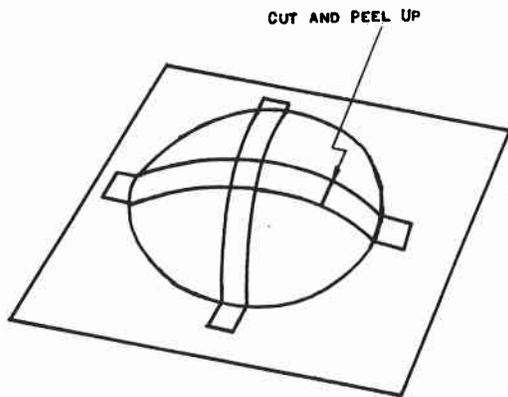


FIG. 3 - FORMED BALL TEST SPECIMEN

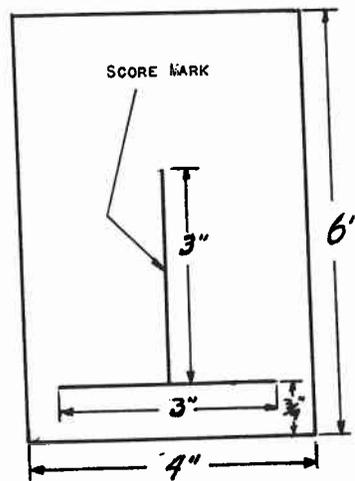


FIG. 4 - SALT SPRAY SPECIMEN

conform to such requirements be identified by a sticker, tag, or other label attached to the package or laminate itself, carrying the following statement:

This vinyl-metal laminate meets the requirements of Commercial Standard CS245-62, as developed by the industry under the procedure of the Commodity Standards Division and issued by the United States Department of Commerce.

or, more briefly

Conforms to CS245-62, as developed by the industry and issued by the United States Department of Commerce.

### HISTORY OF PROJECT

In a letter dated June 24, 1959, The Society of the Plastics Industry, Inc., requested the cooperation of the Commodity Standards Division in the establishment of a Commercial Standard for Vinyl-Metal Laminate, and submitted as a basis a tentative standard developed by the Vinyl-Metal Laminators Division of that organization.

The Commodity Standards Division circulated copies of the proposed Commercial Standard to representative producers, distributors, users, and Government agencies for constructive comment. All comments and suggestions received were carefully considered and adjustments were made to the proposal to satisfy the comment wherever practicable. The recommended Commercial Standard, TS-5564 was circulated to the trade on March 22, 1962.

On July 26, 1962, the Commodity Standards Division announced that acceptances had been received representing a satisfactory majority of the industry and the Commercial Standard, to be designated CS245-62 would be considered effective beginning August 15, 1962.

Project Manager: D. R. Stevenson, Commodity Standards Division, Office of Technical Services

Technical Adviser: Dr. G. M. Kline, Chief, 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. 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, U.S. Department of Commerce which acts as secretary for the Committee.

Lee E. Starr, Columbus Coated Fabrics Co., Division of the Borden Chemical Co., 7th and Grant Avenues, Columbus 16, Ohio (Chairman)

Gilbert Arm, Poloron Products, Inc., 165 Huguenot St., New Rochelle, New York

George Friedman, Plant Manager, Shwayder Bros., Inc., 4270 High St., Ecorse Station, Detroit 29, Mich.

Jack W. Shedrick, General Tire & Rubber Co., Pennsylvania Division, Jeannette, Pa.

Loren Stevens, Arvin Industries, Inc., 13th and Hutchins Streets, Columbus, Ind.

Paul W. Stokesbury, The American Research and Testing Laboratories, 32 North State St., Chicago 2, Ill.

Edward L. Taylor, Clad-Rex Division of Delta-Chicago, Inc., 11500 West King St., Franklin Park, Ill.

George Vernier, Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.

Irving N. Elbling, Westinghouse Corp., 3 Gateway Center, Pittsburgh, Pa.

Kelton E. Jansen, Glass and Chemical Products Div., Ford Motor Co., 151 Lafayette Ave., Mt. Clemens, Mich.

## ACCEPTORS

The manufacturers, distributors, users and others listed below have individually indicated in writing their acceptance of this Commercial Standard prior to its publication. The acceptances indicate an intention to utilize the standard as far as practicable, but reserve the right to depart from it as may be deemed desirable. The list is published to show the extent of recorded public support for the standard and should not be construed as indicating that all products made by the acceptors actually comply with its requirements.

Products that meet all requirements of the standard may be identified as such by a certificate, grade mark, or label. Purchasers are encouraged to require such specific evidence of compliance, which may be given by the manufacturer whether or not he is an acceptor.

### ASSOCIATIONS

(General Support)

Vinyl-Metal Laminators Institute, The Society of the Plastics Industry, Inc., New York, N.Y.

### FIRMS

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| <p>Acme Industries, Inc., Jackson, Mich.<br/>Aeromotive Specialties Corp., Detroit, Mich.<br/>Amchem Products, Inc., Ambler, Pa.<br/>American Motors Corp., Kelvinator Div., Detroit, Mich.<br/>American Nickeloid Co., Peru, Ill.<br/>American Radiator &amp; Standard Sanitary Corp., New York, N.Y.<br/>American Research &amp; Testing Laboratories, Chicago, Ill.<br/>Argus Cameras, Div. of Sylvania Electric Products, Inc., Ann Arbor, Mich.<br/>Arvinyl Division, Arvin Industries, Inc., Columbus, Ind.<br/>Automatic Music, Inc., Grand Rapids, Mich.<br/>Automatic Timing and Controls, Inc., King of Prussia, Pa.</p> <p>Borg-Warner Corp., Long Manufacturing Div., Detroit, Mich.<br/>Brown Instruments Division, Minneapolis-Honeywell Regulator, Philadelphia, Pa.</p> <p>Cary Chemicals, Inc., East Brunswick, N.J.<br/>Chase Brass &amp; Copper Co., Waterbury, Conn.<br/>Chrysler Corp., Missile Operations, Sterling Township, Mich.<br/>Chrysler Corp., Missile Div., Detroit, Mich.<br/>Chrysler Corp., Organic Materials Div., Detroit, Mich.<br/>Clad Rex Division of Simoniz Co., Franklin Park, Ill.<br/>Clarage Fan Co., Kalamazoo, Mich.<br/>Columbus Coated Fabrics Co., Div. of The Borden Chemical Co., Columbus, Ohio</p> <p>Divignez, Inc., Paul J., New York, N.Y.</p> <p>Elm Coated Fabrics Co., Inc., New York, N.Y.<br/>Emery Industries, Inc., Cincinnati, Ohio<br/>Enamel Products &amp; Plating Co., McKeesport, Pa.</p> <p>Firestone Plastics Co., Div. of The Firestone Tire &amp; Rubber Co., Pottstown, Pa.<br/>Ford Motor Co., Glass &amp; Chemical Products Division, Paint &amp; Chemical Products Plants, Mount Clemens, Mich.<br/>Fyr-Fyter Co., Newark, N.J.</p> <p>General Tire &amp; Rubber Co., Jeannette, Pa.</p> <p>Hamilton Cosco, Inc., Columbus, Ind.<br/>Harte &amp; Co., Inc., Brooklyn, N.Y.</p> | <p>Heywood-Wakefield Co., Gardner, Mass.<br/>Hexcel Products, Inc., Berkeley, Calif.</p> <p>Inland Steel Products Co., Milwaukee, Wis.<br/>Interchemical Corp., Finishes Div., Angier Adhesives Dept., Cambridge, Mass.<br/>International Harvester Co., Engineering Materials Research, Hinsdale, Ill.<br/>International Research &amp; Development Corp., Worthington, Ohio</p> <p>Koch Refrigerators, Inc., Kansas City, Kans.</p> <p>Litho-Strip Corp., Chicago, Ill.</p> <p>Metal &amp; Thermit Corp., New York, N.Y.</p> <p>Naugatuck Chemical, Div. of U.S. Rubber Co., Naugatuck, Conn.<br/>Norquist Products, Inc., Jamestown, N.Y.</p> <p>Omaha Testing Laboratories, Omaha, Neb.</p> <p>Parker Rust Proof Div., Hooker Chemical Corp., Detroit, Mich.<br/>Patzig Testing Laboratories, Des Moines, Iowa<br/>Pitney-Bowes, Inc., Stamford, Conn.<br/>Poloron Products, Inc., New Rochelle, N.Y.<br/>Pre Finish Metals, Inc., Elk Grove Village, Ill.</p> <p>Radio Corporation of America, Camden, N.J.<br/>Republic Steel Corp., Mfg. Divisions, Canton, Ohio</p> <p>S. A. Fabrique De Fer de Maubeuge à Louvroil (Nord) France, Louvroil (Nord) France<br/>Sears, Roebuck and Co., Chicago, Ill.<br/>Shwayder Brothers, Inc., Detroit, Mich. (Ecorse Sta.)<br/>Southern Testing Laboratories, Inc., Birmingham, Ala.<br/>Southwestern Laboratories, Fort Worth, Tex.<br/>Spiegel, Inc., Chicago, Ill.<br/>Stanley Chemical Div., Stanley Works, East Berlin, Conn.<br/>Stanley Tools, Div. of the Stanley Works, New Britain, Conn.<br/>Steel Products Engineering Co., Div. of Kelsey-Hayes Co., Springfield, Ohio</p> <p>Thomas Strip Div. of Pittsburgh Steel Co., Warren, Ohio<br/>Toledo Scale Div. of Toledo Scale Corp., Toledo, Ohio<br/>Torrington, Co., The, Torrington, Conn.<br/>Trade-Wind Div., Robbins &amp; Myers, Inc., Pico Rivera, Calif.<br/>Twin City Testing &amp; Engineering Lab., Inc., St. Paul, Minn.</p> |
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Wayne Works Div., Divco-Wayne Corp.,  
Richmond, Ind.  
Westinghouse Electric Corp., Beaver, Pa.  
Westinghouse Electric Corp., Metuchen, N.J.  
Westinghouse Electric Corp., Pittsburgh, Pa.  
Wico Corp., Chicago, Ill.

Yawata Econ Steel Co., Div. of Yawata Iron  
& Steel Co., Ltd., New York, N.Y.

Zenith Radio Corp., Chicago, Ill.

UNITED STATES GOVERNMENT

General Services Administration, Public  
Buildings Service, Wash., D.C.  
Health, Education & Welfare, Dept. of,  
Wash., D.C.  
Interior, Dept. of the, Division of Property  
Management, Wash., D.C.  
Veterans Administration, Technical Repre-  
sentative on Standards, Wash., D.C.

## ACCEPTANCE OF COMMERCIAL STANDARD

### CS 245-62 Vinyl-Metal Laminates

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  
Business and Defense Services Administration  
U. S. Department of Commerce  
Washington 25, D. C.

Gentlemen:

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

production<sup>1</sup>      distribution<sup>1</sup>      purchase<sup>1</sup>      testing<sup>1</sup>  
of this commodity.

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.

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 \_\_\_\_\_

<sup>1</sup>Underscore the applicable words. 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 interest, 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.