

DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS
WASHINGTON, D. C.

Letter
Circular 291

(November 19, 1930)

Replacing
LC 59 Revised and
LC 212 Revised

BUREAU OF STANDARDS PUBLICATIONS ON
PAINT, VARNISH, AND BITUMINOUS MATERIALS

The Technologic Papers, Circulars of General Information, Miscellaneous Publications and Research Papers not starred are in printed form and may be purchased at the prices indicated from the Superintendent of Documents, Government Printing Office, Washington, D. C. The Superintendent of Documents does not accept stamps. Those marked with a star are out of print, but may be consulted at leading libraries.

The Letter Circulars (having LC numbers) are in mimeographed form and can be secured from the Bureau of Standards, Washington, D. C., without charge.

On account of a new system of numbering and publishing Federal Specifications the lists of paint, varnish and bituminous material specifications that have been included in previous editions of LC 59 and LC 212 have been omitted. Anyone interested in specifications should purchase from the Superintendent of Documents, Government Printing Office, for 5 cents the latest edition of Federal Standard Stock Catalogue, Section IV, Federal Specifications, which lists all Federal Specifications with information as to how they may be secured.

The publications in "Outside Journals Etc." are not generally available as separates, but the journals mentioned can be consulted in most large libraries. Circulars of the Paint Manufacturers Association of the U. S. and American Paint and Varnish Manufacturers Association that are in print are obtainable from the Institute of Paint and Varnish Research, 2201 New York Avenue, N.W., Washington, D. C. Engineering Societies, 29 W. 39th Street, New York City, maintain a duplicating service and are prepared to supply photostated copies of technical articles that are available in any of the large libraries in New York City.

Technologic Papers

B.S.No.

Title

- *T 9 The density and thermal expansion of linseed oil and turpentine H. W. Bearce

The paper describes an experimental determination of the density and thermal expansion of linseed oil and turpentine. The work was undertaken for the purpose of obtaining the necessary data for preparing tables to give the density of these substances at any temperature between 10° and 40°C from the density at any other temperature. The data obtained are herein presented, together with the tables prepared therefrom. There are included also tables for converting pounds to gallons and gallons to pounds. (Apr. 15, 1912) 27 pp.

- *T 37 Iodine number of linseed and petroleum oils W. H. Smith and J. B. Tuttle

The iodine values of raw, boiled, and burnt linseed oils, and petroleum oils, were determined by the Hanus method, varying widely the amounts of oil and iodine used and the time of adsorption. A study of the effect of temperature on the iodine value was made. It is shown that in order to obtain concordant results a prescribed procedure must be followed and exact conditions stated. (Apr. 28, 1914) 17 pp.

- *T 65 Determination of oil and resin in varnish E. W. Boughton

Some existing methods include precipitation of "gums" by petroleum ether and extraction of oxidized films with chloroform to dissolve out the resin, or both of these steps. It is shown that these methods give erroneous results with certain types of varnish. Determinations of the glycerol yield and calculation of the oil content therefrom gave fairly satisfactory results except with varnish that contained Chinese wood oil. The proposed method included saponification

Technologic Papers, continued

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Title

of the varnish, separation of unsaponifiable matter, and separation of fatty acids from resin acids by the Twitchell or Wolff methods of esterification. Ethyl ether is used as solvent after esterification. A correction is applied for resinous matter that is weighed as fatty acids. The greatest error in the average results with the proposed method was 2.2 per cent, expressed as percentage of the varnish. (Feb. 19, 1916) 32 pp.

*T 66 Detection of resin in drier . . E. W. Boughton

For the detection of resin in drier, three steps are proposed: (1) The Liebermann and Storch test for rosin; (2) treatment of the mixture of unsaponifiable matter, fatty acids, and resin acids obtained from the drier with 97 per cent alcohol (if the drier contains much Kauri or similar resin, a turbidity or insoluble deposit will result); (3) esterification by absolute alcohol and concentrated sulphuric acid with subsequent titration with alkali. (If the resulting acid number - mg of KOH per gram of the mixture of unsaponifiable matter and acids taken - is over 10, resin is present in the drier. By this procedure resin can be detected where the amount is at least 6 per cent.) (Jan. 15, 1916) 9 pp.

*T 71 Effect of certain pigments on linseed oil
 E. W. Boughton

The effect of storage of white-lead and linseed-oil paste on the constants of the oil is shown. Effect of storage of mixtures of various pigments with linseed oil on the constants of the oil is shown. An examination was made of oils from partially oxidized films of pigment and linseed-oil mixtures. The action of linseed-oil fatty acids on white lead and white

Technologic Papers, continued

B. S. No.	Title	Price
	zinc was investigated. The relative effects of certain pigments on the oxidation of linseed oil in paint films are shown. (Apr. 13, 1916) 16 pp.	
T 76	Determination of volatile thinner in oil varnish E. W. Boughton	5 ¢
	With samples of varnish containing turpentine or "mineral spirits" (light petroleum oil), methods based on (1) steam distillation, (2) on evaporation of the thinner from a film at 115°C, and (3) on evaporation of the thinner from a very thin film at room temperature, were all found to be sufficiently accurate for practical purposes. The results should be reported as the whole percentages next above the figures obtained. (June 21, 1916) 6 pp.	
T 176	Slushing oils . . Percy H. Walker and Lawrence L. Steele	5 ¢
	A description of the general composition, properties, and uses of slushing oils is given. It is pointed out that these nondrying oily materials are intended for the protection of metal parts from corrosion in cases where it is not practical to galvanize, paint, or coat with some similar permanent protective agent. Comparative tests upon many commercial rust preventive oils are given, and a proposed specification has been drawn up. It is believed that satisfactory slushing oils may be purchased upon the results of simple laboratory tests given in the proposed specification. (Oct. 14, 1920) 23 pp.	
T 232	Shellac . . Percy H. Walker and Lawrence L. Steele	5 ¢
	A description is given of the source, manufacture, uses, and common methods of testing shellac. Emphasis is laid on the extent to which	

Technologic Papers, continued

B.S.No.	Title	Price
	shellac spirit varnishes are adulterated and the inadequacy of present methods for detecting such adulteration is shown. A new method for detecting adulteration in either flake or spirit shellac is described, and data are given on many samples of different grades. A suggested table for rating shellac samples from the data of this method is given. Recommended methods are given for the determination of such material in shellac as is insoluble in hot alcohol and for the determination of the shellac-alcohol ratio in a spirit varnish. Suggested specifications for pure orange flake shellac and pure orange shellac varnish are given. (Mar. 12, 1923) 20 pp.	
T 248	Exposure tests on colorless waterproofing materials D. W. Kessler	15 ¢
	<p>This paper describes a series of tests of several colorless waterproofing materials on different types of natural stone. The tests were made to determine the relative effectiveness of the materials, their durability under exposure to the weather, and their effect on the appearance of the stone.</p> <p>The results indicate that certain types of waterproofing materials are quite effective in preventing the absorption of water and some of these showed practically no deterioration during the two years covered by the tests. (Jan. 7, 1924) 33 pp.</p>	
T 254	Emissive tests of paints for decreasing or increasing heat radiation from surfaces W. W. Coblentz and C. W. Hughes	5 ¢
	<p>Data are given on the emissivity of sheet iron, cotton duck, roofing material, artificial leather, etc., covered with white paint, vi-</p>	

Technologic Papers, continued

B.S.No.	Title	Price
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treous enamel, aluminum paint, etc. A coat of aluminum paint emits only 30 to 50 per cent as much thermal radiation as white paint, vitreous enamel, or other non-metallic surfaces.

The data are of interest in reducing the heat emitted from the under sides of roofs, awnings, tents, automobile tops, etc.

As applied to house radiators, which are con- vectors of heat, a gain of 15 to 20 per cent in heat dissipation may be expected by covering the surface with a paint which is free from flakes of a metal, such as aluminum or bronze. (Mar. 13, 1924) 17 pp.

T 274	Use of United States Government specification paints and paint materials P. H. Walker and E. F. Hickson	1.0 ¢
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A brief description is given of the various materials covered by the specifications. It is believed that the existing specifications are sufficient for practically all necessary painting operations of the Government. The system of using semipaste paint, whenever possible, is recommended, and suitable thinning formulas applicable for the average painting conditions have been developed. The proper method of breaking up and thinning stiff pastes in oil, semipastes, and mixed paints is discussed. The practical application of the various paints to all of the ordinary surfaces, such as wood, metal, cement, plaster, concrete, etc., is brought out and recommendations made. The care of brushes and the brushing of paint is described. (Dec. 15, 1924) 20 pp.

T 306	A photometric method for measuring the hiding power of paints H. D. Bruce	1.0 ¢
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Technologic Papers, continued

B.S.No.	Title	Price
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In this paper is described a method for measuring the hiding power of paints. Measurements are made upon the dry paint film. A black and white plate is mechanically coated with paint. The contrast between the black and white portions of the plate is then measured with a Martens photometer. The thickness of the paint film is measured by a direct reading gauge. Formulas are developed and presented for the calculation of the hiding power. The method is applicable to all but very opaque paints. Laboratory data are tabulated showing the accuracy of the method to be quite satisfactory. (Jan. 16, 1926) 18 pp.

Circulars of General Information

B.S.No.	Title	Price
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C 69	Paint and varnish	15 ¢
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This publication is intended to give, without unnecessary detail, information which should be of value to those interested in the use of paint and varnish. After a general discussion and classification of paints and varnishes and an explanation of the process of "drying" the raw materials, including oils, driers, thinners, resins, and pigments that enter into the composition of paint or varnish, are individually described. The methods of manufacture and of testing varnishes are presented, ready-mixed or prepared paints are discussed, and somewhat detailed instructions on mixing paints and stains, on color blending, and on the application of paint and varnish to various surfaces are given. Specifications in common use for many of the materials treated, and a glossary of painters' terms also appear. (Nov. 1917)

Circulars of General Information, continued

B.S.No.	Title	Price
C 70	Materials for the household	50 ¢

Describes the more common materials used by the household, comprising paint materials, cement, clay products, lime, plasters and stucco, wood, metals, bituminous roofing, inks and dyes, adhesives, paper, textiles, rubber, leather, cleansers and preservatives, fuels, illuminants, lubricants, and a concluding chapter on quantity in the purchasing of materials. Each title is treated under the general heads of composition and definition, sources, properties, uses, tests, preservation, hints as to selection and use, and references. (Dec. 1917)

Miscellaneous Publications

B.S.No.	Title	Price
M 15	Some technical methods of testing miscellaneous supplies, including paints and paint materials, inks, lubricating oils, soaps, etc.	15 ¢

In this publication are assembled methods, chiefly chemical, which have been found useful in a large number of cases in testing miscellaneous materials purchased either under definite specifications or examined for prospective purchases in competition with other samples of a similar nature. As a general rule, the methods described are not original but have been compiled from a variety of sources and modifications introduced when necessary. (Nov. 15, 1916) 68 pp.

Research Papers

B.S.No.	Title	Price
RP 1	Accelerated tests of organic protective coatings . . . Percy H. Walker and E. F. Hickson	5 ¢

Research Papers, continued

B. S. No.	Title	Price
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This paper describes the equipment used at the Bureau of Standards in accelerated tests of paints, varnishes, lacquers, bitumens, etc.

A great variety of organic coatings, when subjected to a cycle of alternate exposure to light from an inclosed carbon arc, water spray and ozonized air, were shown to exhibit the same kind of decay as observed on exposure to the weather.

The difficulty of determining the relative condition of exposure tests is discussed, and methods for quantitatively determining when the coating ceases to protect are described.
(July, 1928)

RF 7	Tinting strength of pigments . . . H. D. Bruce	10 ¢
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In this paper there is presented a discussion of the tinting strength of pigments. It is not primarily proposed herein to offer a new method for estimating and expressing tinting strength, but rather to aid in clarifying ideas on the subject, so that when the science of colorimetrics has been further advanced a rational means for appraising this valuable property may be the more easily developed.

The necessity for considering the tinting strength of chromatic pigments as a two-factor property is shown. A distinction between the tinting strength of whites and of blacks is drawn. New names for three differentiated factors involved in tinting are offered, namely, chromatic, darkening, and brightening strengths. A method for treating these properties photometrically or spectrophotometrically and of indicating their relative magnitude by numerical indices is suggested. Tabular and graphical data are presented.

Research Papers, continued

B.S.No.	Title	Price
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In connection with and incidental to the subject of tinting, certain empirical formulas have been developed in the argument which may be used for computing the proper mixture of white pigment with pigment of another color in order to obtain a tint of some desired brightness or colorimetric purity.

The procedure employed in this work for specifying color in the monochromatic terms of dominant wave length, purity, and brightness is set forth with concise explanation in an appendix. (Aug., 1928)

RP 142	The Ring and Ball Method of test for softening point of bituminous materials, resins, and similar substances Percy H. Walker	5 ¢
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The softening point of materials which, like asphalt, have no definite melting point, but which when heated gradually change from brittle or very thick and slow-flowing materials to more mobile liquids, can only be determined by some arbitrary method. The ring and ball method which briefly consists of determining the temperature at which a disk of the material held in a ring and loaded with a ball will flow through a definite distance when heated at a prescribed rate is one of the best methods for such tests. Published directions for making the test are, however, open to very serious objections, and this paper describes the apparatus and procedure used at the National Bureau of Standards. The principal modifications in the apparatus are a beveled instead of a cylindrical ring, and a centering device for the ball. The procedure is so described that some latitude in nonessential details is permitted. (Feb., 1930)

Research Papers, continued

B.S.No.	Title	Price
RP 146	Durability tests of spar varnish . . C. L. Came	5 ¢

Fifty commercial spar varnishes, which had been tested for conformity to Federal Specification No. 18b, were exposed to several accelerated weathering cycles and outdoors. Kauri reduction values were also determined. The varnish was applied both by whirling and brushing. Sand-blasted and nonsand-blasted panels were used.

This paper correlates the tests mentioned above and also gives the results of similar tests made on experimental varnishes, prepared in the laboratory from various oils and resins.

A short bibliography pertaining to the subject matter of this paper is appended. (Feb., 1930)

RP 197	Accelerated Tests of Asphalts . . O. G. Strieter	10 ¢
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Equipment and methods for testing asphalt by accelerated weathering are described.

A variety of asphalts are shown to exhibit the same type of changes when exposed alternately to a cycle consisting of light from an inclosed carbon arc, water spray, and sudden temperature changes as when exposed outdoors under actual weather conditions. (Aug., 1930)

Letter Circulars

B.S.No.	Title
LC 42	Acid Proof Coatings for Concrete Surfaces
LC 54	Protection of Track Scale Parts from Corrosion
LC 64	Shingle Stains
LC 81	Specification for Paint for Use on R.R. Track Scales
LC 139	Report of Service Test on Concrete Floor Treatments
LC 262	Traffic Paint
LC 263	Painting of Steam and Hot Water Radiators
LC 275	Polishes
LC 288	Painting Plaster

Outside Journals, Etc.

"Some Tests of Paints for Steel Subjected to Alternate Exposure to Air and Fresh Water", Percy H. Walker and S. S. Voorhees, J. Ind. & Eng. Chem., 5, p. 899; Nov., 1913.

Notes on the Color Designation of Oil Varnish, F. A. Wertz, J. Ind. Eng. Chem., 10, p. 475; June, 1918.

A New Hexabromide Method for Linseed Oil, L. L. Steele and F. M. Washburn, J. Ind. Eng. Chem., 12, p. 52; Jan., 1920.

The Determination of Acid Number of Tung and other Vegetable Oils, L. L. Steele and G. G. Sward, J. Ind. Eng. Chem., 14, p. 57; Jan., 1922.

Some Physical Properties of Faint, Percy H. Walker and J. G. Thompson, Proc. Am. Soc. Test. Materials, 22, Part 2, p. 464; 1922.

Abietic Acid and Certain Metal Abietates, L. L. Steele, J. Am. Chem. Soc., 44, p. 1333; June, 1922.

Notes on Two Fossil Coal Resins, L. L. Steele, Am. J. Sci. VII, p. 389; May, 1924.

Importance of Position in Weather Tests, Percy H. Walker, Ind. Eng. Chem., 16, p. 58; May, 1924.

Some Observations on Red Lead as a Paint Pigment, E. F. Hickson and H. R. Smoke, Paint Mfrs. Assn. of the U. S., Circ. 207, p. 47; July, 1924.

Effect of Certain Metallic Soaps on the Drying of Raw Linseed Oil, L. L. Steele, J. Ind. Eng. Chem., 16, p. 957; Sept., 1924.

Paints Resistant to Sulphide Fumes, Percy H. Walker and E. F. Hickson, J. Ind. Eng. Chem., 16, p. 1142; Nov., 1924.

Some Observations on Aluminum Paint, Percy H. Walker and E. F. Hickson, Chem. & Met. Eng., Vol. 31, No. 18; Nov. 3, 1924.

Outside Journals, Etc.

The Swinging Beam Method of Testing Varnish Films, Percy H. Walker and L. L. Steele, Paint Mfrs. Assn. of the U. S., Circ. 229; March, 1925.

Paint and Varnish Research at the Bureau of Standards, Percy H. Walker, J. Chem. Education, 3, p. 777; July, 1926.

A Study of the Peroxide and Persulphate Methods for Determining Chromium in Chrome Paint Pigments, E. F. Hickson, Am. Paint & Varnish Mfrs. Assn., Circ. 294; Nov., 1926.

Penetration Tests on Paste Paint, E. F. Hickson, Am. Paint & Varnish Mfrs. Assn., Circ. 300; Jan., 1927.

A Study of Commercial Flat Wall Paints (Lithopone Type), E. F. Hickson, Am. Paint & Varnish Mfrs. Assn., Circ. 305; Mar., 1927.

The Measurement of the Gloss of Paints by the Ingersoll Glarimeter, E. F. Hickson, Am. Paint & Varnish Mfrs. Assn., Circ. 307; Apr., 1927.

Some Precautions to be Observed in Using Saturated Solutions for Controlling the Humidity of Air Spaces, Percy H. Walker, L. L. Steele and E. F. Hickson, Am. Paint and Varnish Mfrs. Assn., Circ. 310, p. 292; May, 1927.

Effect of Certain Organic Bases in Plasticized Nitrocellulose Films, L. L. Steele, Ind. Eng. Chem., 19, p. 807; July, 1927.

Some Methods of Testing Paint and Varnish Materials, Percy H. Walker, International Congress for Testing Materials, Part II, p. 603; 1927.

Accelerated Tests of Organic Protective Coatings, Percy H. Walker and E. F. Hickson, Ind. Eng. Chem., 20, p. 591; June, 1928

Unreliability of Visual Inspection of Exposure Tests of Paint, Percy H. Walker and E. F. Hickson, Ind. Eng. Chem., 20, p. 997; October, 1928.

Present Status of the Technic of Evaluating Paint Service, Percy H. Walker, Proceedings Wood Painting Conference, Madison,

Outside Journals, Etc.

Wisc., Sept. 13 and 14, 1929. (Issued in mimeographed form by Forest Products Laboratory).

Preparation of Surfaces Other than Wood and Composition Board for Paint and Similar Coatings, Percy H. Walker. (Read April 11, 1930, to Paint and Varnish Superintendent's Club of the Philadelphia District. Published by Adelpia Reporting Board, Philadelphia, Pa.).

Some Random Suggestions on the Purchase of Paint, Percy H. Walker, Commercial Standards Monthly, Vol. 7, No. 1; July, 1930.

