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NATIONAL BUREAU OF STANDARDS
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ENAMELS

Publications by Members of the Staff of the National Bureau of Standards, together with a list of Federal Specifications and Standard Samples.

CONTENTS

GENERAL INFORMATION

Some of the publications in this list have appeared in the regular series of publications of the Bureau and others in various scientific and technical journals. Unless specifically stated, papers are not obtainable from the National Bureau of Standards.

Where the price is stated, the publication can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C. The prices quoted are for delivery to addresses in the United States and its territories and possessions and in certain countries which extend the franking privilege. In the case of all other countries, one-third the cost of the publication should be added to cover postage. Remittances should be made either by coupons (obtainable from the Superintendent of Documents in sets of 20 for $1.00 and good until used), or by check or money order payable to the "Superintendent of Documents, Government Printing Office" and sent to him with order. Letter Circulars are obtainable, without charge, from the Bureau. Publications marked "OP" are out of print, but, in general, may be consulted at technical libraries.

For papers in other scientific or technical journals, the name of the journal or of the organization publishing the article is given in abbreviated form with the volume number (underscored), page, and year of publication, in the order named. In general, the Bureau cannot supply copies of these journals, or reprints from them, and it is unable to furnish information as to the availability or price. However, in a few cases (publications preceded by a single asterisk (*)) a very limited supply of reprints is available for distribution, and copies will be sent free upon request to the Bureau. They, too, can usually be consulted at technical libraries.

Serial letters are used to designate the several series of Bureau publications:

S = "Scientific Paper." S1 to S329 are "Reprints" from the "Bulletin of the Bureau of Standards." S330 to S572 were published as "Scientific Papers of the Bureau of Standards." This series was superseded by the "Bureau of Standards Journal of Research" in 1928.

T = "Technologic Paper." T1 to T370. This series was superseded by the "Bureau of Standards Journal of Research" in 1928.

RP = "Research Paper." These are reprints of articles appearing in the "Bureau of Standards Journal of Research" and the "Journal of Research of the National Bureau of Standards," the latter being the title of this periodical since July 1934 (volume 13, number 1).

CS = "Commercial Standard."

Circular C24 and supplements, the complete list of the Bureau's publications (1901-1936), is sold by the Superintendent of Documents for 55 cents. Announcement of new publications is made each month in the Technical News Bulletin which is obtainable by subscription at 50 cents per year.

PART I - TECHNOLOGIC PAPERS

Title	Series	Price
Notes on graphitization of white cast iron upon annealing. P. D. Merica and L. J. Guervich. Tech. Pap. BS 12(1919); Trans. Am. Inst. Met. Engr. (29 W. 39th Street, New York, N.Y.), 62, 509(1919); Bul. Am. Inst. Met. Engr. (29 W.39th Street, New York, N.Y.), 151, 1003(1919).	T129	OP
Materials and methods used in the manufacture of enameled cast-iron wares. H. F. Staley. Tech. Pap. BS 12(1919).	T142	OP

PART I - TECHNOLOGIC PAPERS - Cont'd

Title	Series	Price
Enamels for sheet iron and steel. J.B. Shaw. Tech. Pap. BS 13(1919-20).	T165	OP
Embrittlement of malleable cast iron produced by heat treatment, as revealed by impact tests. L.H. Marshall. Tech. Pap. BS 17, 677(1922-24).	T245	OP
Wet-process enamels for cast iron. R.R. Danielson and H.P. Reinecker. Tech. Pap. BS 17, 695 (1922-24); J. Am. Ceram. Soc. (2525 N. High Street, Columbus, Ohio), 5, 647(1922).	T246	OP
Controlling the consistency of enamel slips. W.N. Harrison. Tech. Pap. BS 22, 91(1927-28)	T356	.15

PART II - SCIENTIFIC PAPERS

Measurements of thermal dilitation of glass at high temperatures. C.G. Peters and C.H. Cragoe. Sci. Pap. BS 16, 449(1920).	S393	OP
Thermal expansion of a few steels. W. Souder and P. Hidnert. Sci. Pap. BS 17, 611(1922).	S433	OP
Gases in metals: I. The determination of combined nitrogen in iron and steel and the change in the form of nitrogen by heat treatment. L. Jordan and F.E. Swindells. Sci. Pap. BS 18, 499(1922-23); Chem. Met. Eng. (330 W. 42nd Street, New York, N.Y.), 27, 1135(1922).	S457	.05
Application of the interferometer to measurements of the thermal dilitation of ceramic materials. G.E. Merritt. Sci. Pap. BS 19, 357(1923-24).	S485	OP
Gases in metals: II. The determination of oxygen and hydrogen in metals by fusion in vacuum. Louis Jordan and James R. Eckman. Sci. Pap. BS 20, 445(1924-26).	S514	OP
Measurements on the thermal expansion of fused silica. W. Souder and P. Hidnert. Sci. Pap. BS 21, 1(1926-27).	S524	.10
Thermal expansion of alloys of the "stainless iron" type. Peter Hidnert and W.T. Sweeney. Sci. Pap. BS 22, 639(1927-28).	S570	.10

PART III - RESEARCH PAPERS

Title	Series	Price
A study of the hydrogen-antimony-tin method for the determination of oxygen in cast irons. Bengt Kjerrman and Louis Jordan. BS J. Research 1, 701(1928).	RP25	.05
The analysis of fluorspar. G.E.F. Lundell and J.I. Hoffman. BS J. Research 2, 671(1929).	RP51	OP
Determination of fluorine and of silica in glasses and enamels containing fluorine. J. I. Hoffman and G.E.F. Lundell. BS J. Research 3, 581(1929).	RP110	.05
*Blistering phenomena in the enameling of cast iron. A.I. Krynitsky and W.N. Harrison. BS J. Research 4, 757(1930); J. Am. Ceram. Soc. (2525 N. High Street, Columbus, Ohio), 13, 16(1930) (condensed report).	RP179	.30
Dimensional changes caused in glass by heating cycles. A.Q. Tool, D.B. Lloyd and G.E. Merritt. BS J. Research 5, 627(1930); J. Am. Ceram. Soc. 13, 652(1930).	RP219	.10
The determination of oxygen and nitrogen in iron and steel by the vacuum fusion method. H.C. Vacher and L. Jordan. BS J. Research 7, 375(1931).	RP346	.10
A method for determining the volume changes undergone by metals and alloys during casting. C.M. Saeger, Jr., and E.J. Ash. BS J. Research 8, 37(1932).	RP399	.10
Volume changes of cast irons during casting. E.J. Ash and C.M. Saeger, Jr. BS J. Research 8, 601(1932).	RP440	.05
The interference method of measuring thermal expansion. G.E. Merritt. BS J. Research 10, 59(1933).	RP515	.05
Some fusion properties of ground coat enamels as influenced by composition. W.N. Harrison and B.J. Sweo. BS J. Research 10, 189(1933).	RP524	.05
Properties of gray cast iron as affected by casting conditions. C.M. Saeger, Jr., and E.J. Ash. J. Research NBS 13, 573(1934).	RP726	.05

PART III - RESEARCH PAPERS - Cont'd

Title	Series	Price
Methods of determining gloss. R.S. Hunter. J. Research NBS 18, 19(1937).	RP958	.05
Soil-corrosion studies, 1934. Field tests of nonbituminous coatings for underground use. K.H. Logan and S.P. Ewing. J. Research NBS 18, 361(1937).	RP982	.10
Magnetic method for measuring the thickness of nickel coatings on nonmagnetic base metals. Abner Brenner. J. Research NBS 18, 565(1937).	RP994	.10
Consistency of eight types of vitreous enamels at and near firing temperatures. W.N. Harrison, R.E. Stephens and S.M. Shelton. J. Research NBS 20, 39(1938).	RP1063	.10
Reference tables for iron-constantan and copper-constantan thermocouples. Wm.F. Roeser and A.I. Dahl. J. Research NBS 20, 337(1938).	RP1080	.05
Magnetic method for measuring the thickness of nonmagnetic coatings on iron and steel. Abner Brenner. J. Research NBS 20, 369(1938).	RP1081	.05
Minimum perceptible colorimetric purity as a function of dominant wave length. I.G. Priest and F.G. Brickwedde. J. Research NBS 20, 673(1938).	RP1099	.05
Surface tension of vitreous enamel frits at and near firing temperatures. W.N. Harrison and D.G. Moore. J. Research NBS, 21, 337(1938).	RP1133	.10
Thermal expansion characteristics of some ground coat enamel frits. W.N. Harrison. J. Research NBS 22, 127(1939).	RP1172	.05
Elastic properties of cast iron. A.I. Krynitsky and C.M. Saeger, Jr. J. Research NBS 22, 191(1939).	RP1176	.15
Improved interferometric procedure with application to expansion measurements. James B. Saunders. J. Research NBS 23, 179(1939).	RP1227	.10
Effects of humidity and composition on strength and Young's modulus of enamel frits. D.G. Moore and W.N. Harrison. J. Research NBS 23, 329(1939)	RP1237	.05
Determination of thickness of acid-resistant portion of vitreous enamel coatings. L. Shartsis and W.N.Harrison. J. Research NBS 25, 71(1940)	RP1315	.05

PART IV - COMMERCIAL STANDARDS

Title	Series	Price
Bathroom accessories, colors for	CS63-38	.05
Colors for kitchen accessories	CS62-38	.05
Colors for sanitary ware	CS30-31	.20
Enameled ware; sanitary cast iron	CS77-40	.05

PART V - FEDERAL SPECIFICATIONS

(Issued by the Federal Specifications Executive Committee, Washington, D. C., and obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the prices stated.)

Title	Series	Price
Plumbing-fixtures; (for) land use	WW-P-541a	.15
Tile, wall; enameled-iron	RR-T-421	.05
Trays; photographic, enameled	RR-T-646	.05

PART VI - OUTSIDE PUBLICATIONS

List of papers which have appeared in the Journal of the American Ceramic Society, 2525 N. High Street, Columbus, Ohio.

Ground coat enamels for cast iron. H.F. Staley. 1, 99(1918).

Preparation and application of enamels for cast iron. H.F. Staley. 1, 534(1918).

Control of luster of enamels. H.F. Staley. 1, 640(1918).

Enamels for cast iron. H.F. Staley. 1, 703(1918).

PART VI - OUTSIDE PUBLICATIONS - Cont'd.

The cleaning of sheet steel and iron for enameling purposes. R.R. Danielson. 2, 883(1919).

Classification of enamels for sheet steel. R.R. Danielson. 3, 961(1920).

The cause and control of fish scaling of enamels for sheet iron and steel. R.R. Danielson and W.H. Souder. 4, 620(1921).

Some relations of composition to solubility of enamels in acids. H.F. Staley. 4, 703(1921).

The production of some white enamels for copper. R.R. Danielson and H.P. Reinecker. 4, 827(1921).

The effect of some substitutes for tin oxide on the opacity of white enamels for sheet steel. R.R. Danielson and M.K. Frehafer. 6, 634(1923).

*The relations between composition and properties of enamels for sheet steel. R.R. Danielson and B.T. Sweely. 6, 1011(1923).

*Factors affecting the warpage of sheet iron and steel in enameling. R.R. Danielson, T.D. Hartshorn and W.N. Harrison. 7, 326(1924).

*The development of some jewelry enamels. H.G. Wolfram and W.N. Harrison. 7, 857(1924).

Effects of composition on the properties of sheet steel enamels. H.G. Wolfram and W.N. Harrison. 8, 735(1925).

Effects of composition on the properties of ground coat enamels for sheet steel. W.N. Harrison and H.G. Wolfram. 10, 163(1927).

A preliminary study of ceramic colors and their use in vitreous enamels. W.N. Harrison and T.D. Hartshorn. 10, 747(1927).

Vitreous enamel slips and their control. W.N. Harrison. 10, 970(1927).

*Progress report on cast iron for enameling purposes. W.N. Harrison, C.M. Saeger, Jr., and A.I. Krynitsky. 11, 595(1928).

*A test for the adhesiveness of vitreous enamels to metal. W.N. Harrison and G.T. Thaler. 11, 803(1928).

PART VI - OUTSIDE PUBLICATIONS - Cont'd

A compilation of phase-rule diagrams of interest to the ceramist and silicate technologist. F.P. Hall and Herbert Insley. 16, 463(1934).

Strength and Young's modulus of some ground-coat enamels for sheet iron. W.N. Harrison, S.M. Shelton and W.H. Wadleigh. 18, 100(1935).

Optical specifications of vitreous enamels. D.B. Judd, W.N. Harrison and B.J. Sweo. 21, 16(1938).

Papers appearing in various scientific and technical journals other than the Journal of the American Ceramic Society

Oxygen content of coke and charcoal cast iron. L. Jordan, J.R. Eckman and W.E. Jominy. Trans. Am. Foundrymen's Assn. (222 W. Adams Street, Chicago, Ill.), XXXIII, 431(1925).

Blistering tendency of some cast irons when enameled. A.I. Krynitsky and W.N. Harrison. Trans. and Bul. Am. Foundrymen's Assn. (222 W. Adams Street, Chicago, Ill.), 1 (August 1930).

A practical method for studying the running quality of a metal cast in foundry molds. C.M. Saeger, Jr., and A.I. Krynitsky. Trans. and Bul. Am. Foundrymen's Assn. (222 W. Adams Street, Chicago, Ill.), 2, 513(1931); Met. Ind. (London), 43, 171(1932).

Oxygen, hydrogen and nitrogen as constituents in metals. H.C. Vacher. J. Chem. Education (Mills Building, Washington, D.C.), 9, 47(1932).

Humidity as a factor in the strength of enamel frits. D.G. Moore and W.N. Harrison. Better Enameling (1427 S. 55th Court, Cicero, Ill.), 10, 11 (Aug.1939); Ceramic Age (34 N. Crystal St., E. Stroudsburg, Pa.), 34, 37 (Aug. 1939); The Enamelist (4150 E. 56th St., Cleveland, Ohio), 16, 42 (Aug. 1939); Ceramic Industry (59 E. Van Buren St., Chicago, Ill.), 33, 45 (Sept. 1939). Emailwaren Industrie (Duisburg, Germany), 16, 203 (Aug. 14, 1939).

Determination of thickness of acid-resistant portion of vitreous enamel coatings. Better Enameling (1427 S. 55th Court, Cicero, Ill.), 11, 18 (July 1940); Ceramic Age (54 N. Crystal St., E. Stroudsburg, Penna.), 36, 7 (July 1940); The Enamelist (4150 E. 56th St., Cleveland, Ohio), 17, 50 (July 1940).

S T A N D A R D S A M P L E S

Standard samples of certain materials which are recommended for control work may be obtained from the National Bureau of Standards by prepayment of the indicated price. Such samples were prepared for checking the accuracy of methods of analysis, and those of particular interest to the ceramic industry are listed below. The Supplement to Circular C398, which can be obtained from this Bureau without charge, contains a complete list of our standard samples.

Standard Sample Number	Name	Constituents determined or intended use	Weight of sample in grams	Price
1a	Argillaceous limestone	Complete analysis	50	$2.00
39e	Benzoic acid	Acidimetric and calorimetric values	30	2.00
40c	Sodium oxalate	Oxidimetric value	60	2.00
69	Bauxite	Complete analysis	60	2.00
70	Feldspar	" "	40	2.00
76	Burnt refractory (40% Al_2O_3)	" "	60	2.00
77	Burnt refractory (60% Al_2O_3)	" "	60	2.00
78	Burnt refractory (70% Al_2O_3)	" "	60	2.00
79	Fluorspar	" "	60	2.50
80	Glass, soda-lime	" "	45	2.00
81	Glass sand	Fe_2O_3, Al_2O_3, TiO_2, ZrO_2, CaO, MgO	60	2.00
83	Arsenious oxide	Oxidimetric value	75	2.00
84	Acid potassium phthalate	Acidimetric value	60	3.00
88	Dolomite	Complete analysis	50	2.00
89	Glass, lead-barium	" "	60	2.00
91	Glass, opal	" "	45	2.00
92	Glass, low boron	B_2O_3 only	60	2.00
93	Glass, high boron	Complete analysis	60	2.00
97	Flint clay	" "	60	2.00
98	Plastic clay	" "	60	2.00
99	Soda feldspar	" "	40	2.00
102	Silica brick	" "	60	2.00
103	Chrome refractory	" "	60	2.00
104	Burned magnesite	" "	60	2.00
112	Silicon carbide	" "	85	2.00