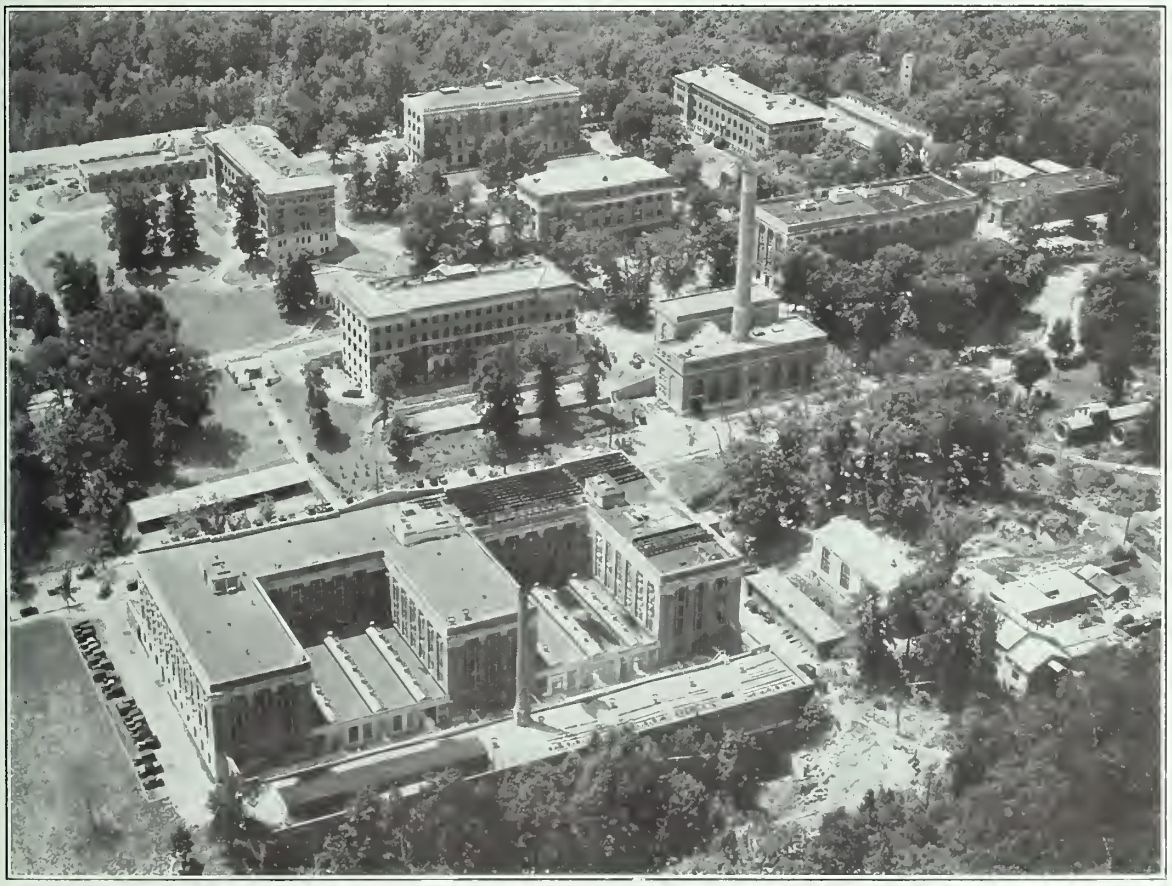
COMMERCIAL STANDARDS MONTHLY

A Review of Progress in Commercial Standardization and Simplification



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AIRPLANE VIEW OF BUREAU OF STANDARDS (LOOKING SOUTH)

ISSUED BY THE BUREAU OF STANDARDS OF THE UNITED STATES DEPARTMENT OF COMMERCE, WASHINGTON, D. C., U. S. A.

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U. S. DEPARTMENT OF COMMERCE
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COMMERCIAL STANDARDS MONTHLY, S. F. Tillman, Editor

The Commercial Standardization Group

A. S. Mc ALLISTER, Assistant Director

DIVISION OF SIMPLIFIED PRACTICE

Edwin W. Ely

The division of simplified practice cooperates with industrial and commercial groups to reduce waste, usually through eliminating unnecessary variety of product, method, or practice. Its function is to bring together all parties interested in a project of this character, and to coordinate their work in developing a simplified practice recommendation. Such work includes surveys of current practice, formulation of a simplified practice program, and presentation of that program for action by a general conference representing all interests. The division then transmits to all concerned a full report of the general conference, with a request for written acceptance of the action taken. When the volume of acceptances is sufficient to indicate initial success, the Department of Commerce indorses the program and publishes the recommendation. The division thereafter cooperates with a standing committee appointed by the industry concerned, in conducting periodic surveys to determine the degree of adherence, to maintain and extend support of the recommendation, and to secure data for reaffirmation or revision. Simplified practice may be applied to any commodity or activity in which it will reduce waste. The division stands ready to render service in developing and making effective any application of simplified practice which will reduce waste, stabilize business, or extend commerce.

BUILDING AND HOUSING DIVISION

J. S. Taylor

The division of building and housing, formed in 1921, cooperates with business, technical, and professional groups in furthering construction activities. It works to modernize building codes and to encourage improved standards for the quality of building construction, and the practical application of the latest development in design and use of building materials.

It encourages home ownership through the development of an enlarged, steadier, more intelligent, and more discriminating demand for dwellings—the largest single class of buildings which the construction industries provide.

The division also cooperates with other governmental agencies and with many private business and professional groups in efforts to distribute building activity more evenly throughout the year and to secure less fluctuation from year to year.

The work on city planning and zoning has the broad objective of making buildings more useful through proper location with respect to other structures, stabilizing of land values and property uses, well coordinated thoroughfare systems, and well laid out public works.

STANDARDIZATION
..IS..
A CONTINUING PROCESS
ITS AIM IS NOT FIXITY OR STAGNATION
..BUT..
TO ADD SERVICEABILITY AS OFTEN AS THE POTENTIAL GAIN MAKES IT WORTH WHILE

DIVISION OF SPECIFICATIONS

A. S. McAllister

The duties of the division of specifications are to promote and facilitate the use and unification of specifications. In doing so it carries on activities involving cooperation with technical societies; trade associations; Federal, State, and municipal Government specifications making and using agencies; producers, distributors, and consumers; and testing and research laboratories. It ascertains the standardization and specifications promoting activities of the associations and societies, and brings to their attention the work being done by the commercial standardization group. It brings the Federal specifications and commercial standards to the attention of the maximum number of producers and users of commodities complying with these standards and specifications. It compiles and distributes lists of sources of supply of materials guaranteed to comply with the standards and specifications. It shows both buyers and sellers the benefits from handling nationally specified, certified, and labeled commodities. The division prepares directories of governmental and nongovernmental testing laboratories and the Directory of Specifications, and is working on an encyclopedia of specifications, the first two volumes of which have been issued, namely, "Standards and Specifications in the Wood-Using Industries" and "Standards and Specifications for Nonmetallic Minerals and their Products." It also aids in preparing the Standards Yearbook.

DIVISION OF TRADE STANDARDS

I. J. Fairchild

The division of trade standards, on request, assists industrial and commercial groups in the voluntary establishment of standards covering grades, quality, dimensional interchangeability, or other acceptance criteria as a national basis for marketing manufactured commodities.

The detail criteria are selected or determined voluntarily by interested buyers or sellers, without any Government dictation or domination, and adjusted at a general conference of producers, distributors, and users so as to represent the composite views of all branches. The division functions chiefly as a neutral agency to see that all interested elements are given full opportunity to be heard and satisfied; to solicit and record acceptances; and to publish and promulgate the standard when a satisfactory majority of acceptances is obtained and provided there is no active opposition.

Industries are encouraged to apply self-certifying labels to products meeting the commercial standard requirements, as a means of protecting the consumer and the scrupulous seller from misrepresentation or unfair methods of marketing.

Provision is made for regular revision of the standard through the appointment of a standing committee to consider periodically any necessity for revision of the standard, in order that it may be kept constantly compatible with progress in the industry.

COMMERCIAL STANDARDS MONTHLY

A Review of Progress in Commercial Standardization and Simplification

VOLUME 9 — WASHINGTON, D. C., NOVEMBER, 1932 — NUMBER 5

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AN INVITATION TO VISIT THE BUREAU OF STANDARDS

A cordial invitation is extended to all interested in scientific progress to visit the laboratories of the Bureau of Standards when in Washington. A personally conducted trip is organized at 2.15 p. m. daily except on holidays. Special trips for groups may be arranged at other times by writing to the bureau in advance. The bureau's illustrated Visitor's Manual may be had for the asking. This lists the work in progress and gives an airplane view of the ensemble and a brief statement of typical discoveries and inventions which have been notable, basic contributions to radio, aviation, and other modern arts and industries.

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BUREAU OF STANDARDS OF THE UNITED STATES DEPARTMENT OF COMMERCE

WASHINGTON, D. C.

FUNCTIONS

Development, Construction, Custody, and Maintenance of Reference and Working Standards and Their Intercomparison, Improvement, and Application in Science Engineering, Industry, and Commerce

STANDARDS	PURPOSE
1 **STANDARDS OF MEASUREMENT** Reference and working standards for measurements of all kinds, including fundamental and derived STANDARDS OF MEASUREMENT for expressing the quantitative aspects of space, time, matter, energy, and motion, and of their interrelations. By definition, specification, or material standard, covering, for example, length, area, and volume; mass, weight, density, and pressure; heat, light, electricity, and radioactivity, including for each the quantity, flux, intensity, density, etc.	To AID ACCURACY IN INDUSTRY through uniform and correct measures; To ASSIST COMMERCE IN SIZE STANDARDIZATION of containers and products; To PROMOTE JUSTICE IN DAILY TRADE through systematic inspection and regulation; To FACILITATE PRECISION IN SCIENCE and TECHNOLOGIC RESEARCH through calibration of units, measures, and instruments involved.
2 **STANDARD CONSTANTS** Natural standards or the measured numerical data as to materials and energy, known as physical or STANDARD CONSTANTS—the fixed points or quantities which underlie scientific research and industrial processes when scientifically organized. Mechanical equivalent of heat, light, electricity, and gravitation; specific densities; viscosities; melting and boiling points; heat capacity; heats of combustion; velocity of propagation of light; conductivities of materials to heat and light; electrochemical and atomic weights; and many similar magnitudes determined experimentally with maximum precision and referred to fundamental standards of measure.	To SERVE as an EXACT BASIS for scientific study, experiment, computation, and design; To FURNISH an EFFICIENT CONTROL for industrial processes in securing reproducible and uniformly high quality in output; To SECURE UNIFORMITY OF PRACTICE in graduating measuring instruments, or in compiling tables for standards of quality and performance, and wherever such uniformity is desirable; To AID LABORATORY RESEARCH BY REDUCING ERRORS and uncertainty caused by use of data of doubtful accuracy.
3 **STANDARDS OF QUALITY** Specifications for material (by description, sample, or both), known as STANDARDS OF QUALITY, fixing in measurable terms a property or group of properties which determine the quality. The numerical magnitude of each constituent property pertinent to the quality involved, and specific magnitude in units of measure of such significant factors as uniformity, composition, form, structure, and others.	To SECURE HIGH UTILITY in the PRODUCTS of industry by setting an attainable standard of quality; To FURNISH a SCIENTIFIC BASIS for FAIR DEALING to avoid disputes or settle differences; To PROMOTE TRUTHFUL BRANDING and ADVERTISING by suitable standards and methods of test To PROMOTE PRECISION and AVOID WASTE in science and industry by affording quality standards by which materials may be made, sold, and tested.
4 **STANDARDS OF PERFORMANCE** Specification of operative efficiency or action for machines and devices, known as STANDARDS OF PERFORMANCE, specifying the factors involved in terms susceptible of measurement. Numerical statement of speed, uniformity, output, economy, durability, and other factors which together define the net efficiency of an appliance or machine.	To CLARIFY THE UNDERSTANDING between maker, seller, buyer, and user as to operative efficiency of appliances and machines; To MAKE EXACT KNOWLEDGE THE BASIS of the buyer's choice; To STIMULATE AND MEASURE MECHANICAL PROGRESS.
5 **STANDARDS OF PRACTICE** Codes and regulations impartially analyzed and formulated after study and experiment into STANDARDS OF PRACTICE for technical regulation of construction, installation, and operation, and based upon standards of measurement, quality, and performance. Collation of standard data, numerical magnitudes, and ranges of the pertinent factors defining quality, safety, economy, convenience, and efficiency.	To FURNISH for each utility a single IMPERSONAL STANDARD of practice as a BASIS FOR AGREEMENT of all interests, clearly defined in measurable terms. To INSURE EFFECTIVE DESIGN and INSTALLATION of utilities of all kinds; To PROMOTE SAFETY, EFFICIENCY, and CONVENIENCE in the MAINTENANCE and OPERATION of such utilities; To SECURE UNIFORMITY OF PRACTICE where such is practicable, and EFFECTIVE ALTERNATES in other cases.

ACTIVITIES OF THE BUREAU OF STANDARDS

Research and Testing Conducted for the Government, Industry, and the Public

(See facing page for descriptive chart of functions)

By H. D. Hubbard, *Bureau of Standards*

The Bureau of Standards is a technical service laboratory for the Federal Government, but is serving all the State governments as well, directly or indirectly. It serves as scientific research and technical adviser for the Government departments. Its research and testing are of value both to the Government and to industry. The testing adds effectiveness to the work of practically every Government unit.

Congress gave the Bureau of Standards the custody of the standards, the authority to construct standards, and to compare these with the standards used in the measured control of the coinage, in the precise surveys of our domain and coast, in the local inspection of trade weights and measures, in the measurements of modern industry, and in experimental research both in the Government and industry.

Congress specifically authorized the bureau to cooperate with State and local officials in the technical details of inspection service. This helps to assure the American people full measure in the countless transactions of daily trade. This aid the bureau renders by tests of the State standards, by personal consultations with local officials, by formulating model laws, regulations, and practice, inspectors' manuals, and by the national annual conferences at the bureau, at which State governments are officially represented, to discuss problems vital to their nation-wide service to the public. Through these activities a notable improvement is evident in the local inspection, resulting in increased assurance of justice in daily trade.

Bureau test cars travel on a nation-wide mission of standardization, examining, testing, and certifying the master track scales, mine scales, and commercial track scales of State governments, railroads, and industry. Upon the indication of such scales approximately $4,000,000,000 of freight charges are annually collected, and most of the output of field, mine, and factory are weighed. The bureau's tests of such scales assures all interests that the weighings will furnish a fair and just basis for the charges. This service is continuous throughout the year, disclosing an ever-increasing accurary in such scales.

To set up standards for the ever-increasing number of new kinds of measurements is difficult and calls for the utmost in science, technique, and ingenuity. The test is made more complex by the growing demands for higher precision, for wider ranges, for automatic and quick action, and for unnumbered special uses, each calling for some unusual research.

Besides the primary function of maintaining standards, Congress authorized the bureau to solve problems arising in connection with standards, to test apparatus, to determine physical constants and the properties of materials. Congress has interpreted these functions by special provision for many definite lines of research within the bureau's field.

The five kinds of standards—measurement, constants, quality, performance, and practice—may be illustrated by examples. The National Prototype Meter No. 27, our standard of length, is an example of a national standard of measurement, well established and efficient. A proposed standard now under consideration for world adoption is the standard of light constructed at the bureau. It makes use of the radiation from a hollow inclosure at the temperature of melting platinum—a reproducible, accurate, scientific standard.

Standards of nature, measured values of characteristics of matter and energy, are the basis of physical science. The bureau has determined many such data, and in turn uses them in establishing standards. For example, the ice and steam points of water define the fundamental interval on the temperature scale—the 0° and the 100° points on the centigrade scale.

Standards of performance are illustrated by the measured values assigned to the pertinent factors affecting the efficiency of a machine or other device—an aircraft engine for example, as mentioned below.

Standards of practice involve the measured values of pertinent factors in a process or procedure—safe voltages, effective insulation, and the like. A typical standard of practice is the national safety code for electrical practice, prepared under the auspices of the bureau and now adopted as an American standard.

It is too little realized that precise measurements and standards are an important means for the advancement of science and technology. Two examples will illustrate. Radio and aviation are based on standard measurements, and it is the bureau's task to maintain these standards and compare them with the standards used in private enterprise. Safety in aircraft is a basic requisite. All new types of commercial aircraft engines before being put into interstate service must pass the tests of the Aeronautics Branch of the United States Department of Commerce, and these tests are made at the Bureau of Standards. In radio the standardization service is important. Precisely timed frequencies are broadcast by the bureau to aid the broadcasting industry in the rating and adjustment of their equipment. The bureau has recently maintained a constancy in radio-frequency (waves per second) nearly a thousand times better than attainable a few years ago. These standard frequencies afford the broadcasting stations a means of keeping well within the very narrow frequency range recently set up by the Federal Radio Commission. This means better control, less interferences, and better reception.

Research for the Government yields important results. Without increase in cost, the durability of currency paper was doubled by methods devised and applied by the Bureau of Standards in test runs. The same methods may be useful by the paper industry in making high-grade bond and ledger papers. A parallel investigation of the permanence of papers demonstrated to bureau experts that the control of acidity was the vital factor in permanence, even when pure

rag stock is used. Without acidity control within measured limits, the paper (even pure rag stock) would unduly deteriorate. An important laboratory research resulted in a new type of paper from three to five times as strong as the paper hitherto furnished for United States securities. The bureau's process is now included in the Government's specification for distinctive paper.

The strength of the Bureau of Standards as a research organization is in its unique union of some hundred specialized sections, each with an expert staff cooperating, where joint action is helpful, on research problems. This combination has been built up through years of conscientious planning and effort. Industrial problems are best solved by cooperation. This is an era of cooperative research. Scores of cooperating committees of the technical and industrial interests work with the bureau in planning its research activities. Such researches are directed to problems of concern to entire industries and to the public. Always they are of interest and concern to the Government.

Much testing has been done on structural materials (cement, concrete aggregate, brick, stone, and other materials) for Government building projects throughout the country. The present peak of bureau work of this kind has not been equaled since the war. The bureau gave expert advice on the character of cement for the Hoover Dam and other massive concrete work of the Government. A cement which evolved the least heat in reaction with water was found desirable. Fifty specimens were studied by the bureau, and several superior brands were selected for further study, in part at the Denver laboratory of the Bureau of Standards.

The United States Bureau of Public Roads will not hereafter approve the use of any cement on any Federal-aid highways or other projects unless it has been tested in a laboratory inspected by a representative of the bureau's cement reference laboratory, and the equipment and operation of the former duly certified. The cement reference laboratory is maintained jointly by the American Society for Testing Materials and the Bureau of Standards.

Another example of technical service is for the Federal Specifications Board, of which the director of the bureau is chairman. Members of the bureau's staff hold 27 chairmanships of the board's technical committees and are officially represented on 65 of these committees. The bureau actively heads up the work of the National Screw Thread Commission established by Congress. The director is ex officio chairman of the commission, and the active experimental work is conducted by the bureau on this important and technical subject.

The bureau cooperates in many ways with the National Advisory Committee for Aeronautics, through experimental research in the interest of aeronautics, involving the use of its wind tunnels, dynamometer laboratory, aeronautic instruments section, and its radio laboratories.

For the Post Office Department the bureau furnishes technical advice, especially on labor-saving devices (stamp-vending machines, mail-metering devices, and the like). On request it rates stream-speed meters for the Geological Survey, the Reclamation Service, the Mississippi River Commission, and the United States Engineer's Office. These meters are rated in the bureau's tank (400 feet long) and are recalibrated periodically to insure the high accuracy required in the forecast of water supply, flood, drought, and height of rivers.

The bureau's experts aided the Bureau of Engraving and Printing in the design, installation, and operation of a plant for producing paper money printing plates from the master plates by a new electrolytic process, adding service life by a chromium coating. Reports show that marked economies resulted from the installation.

Much consulting and expert work has been done for the Supervising Architect of the Treasury, Post Office, and for the Architect of the Capitol, on standardizing heating equipment, the certification of steam radiators and heat insulating materials. It has also rendered expert advice on installations of air conditioning and ventilating equipment.

Aid was given the Government departments by tests of ball bearings, lubricants, gasolines, and automotive equipment, including ambulances. An experimental basis was reached through bureau researches, for the control of all purchases of gasoline for civil and military purposes of the Federal Government. Tests of gasoline are made to aid the Bureau of Mines in the compilation of its annual survey of gasoline.

An important service is being rendered by bureau experts in reducing fire hazards in prisons and in the vessels inspected by the Steamboat Inspection Service, through tests of fire extinguishers and fusible plugs for boilers. Aid was given in connection with tests of fireproof safes, in the protection of aircraft hangars, and in fire protection of Government records. The work of the Federal Fire Council heads up at the bureau, the director being chairman of the council, and the bureau's fire expert being the active executive who surveys the occupancies of Government and makes recommendations for reducing fire hazards.

Some 6,000 clinical thermometers, on the accuracy of which diagnosis depends, are tested each month for the United States Public Health Service and the Veterans' Administration. The radium of the country is bought, sold, and used on the basis of the Bureau of Standards tests and certified values of the radioactive strength of each specimen.

These few examples might be multiplied and would still be an inadequate picture of the service of the bureau to the Government, and in fundamental ways to the people of the nation.

Space fails to even mention all important lines. Some 2,000 bureau publications, however, report its activities in research and standardization. Four periodical publications are issued: The Journal of Research, the Technical News Bulletin, the Commercial Standards Monthly, and the Standards Yearbook. Besides these, research papers, circulars, and miscellaneous publications are sold as separates by the Superintendent of Documents, as are the Commercial Standards and the Simplified Practice Recommendations.

The commercial standards group is active in projects for reducing the needless sizes and varieties of products, for establishing standards for industry, and for aiding in the solution of fundamental problems of building and housing. In general, the Government lends its assistance, but the actions are taken by industry itself. The bureau is the service institution

for the Government and the public. The consumer is represented by the work on the certification plan, under which firms agree to furnish, on request, commodities meeting the Government specifications, and by the work on the labeling plan which supplements the certification. These aid the consumer by assuring him that the goods he buys are equal to Government standard quality. Closely related is the work of preparing building codes, promoting city zoning, and issuing information of concern to the housing industry.

The Bureau of Standards touches American life at vital points, affecting justice in trade, efficiency in industry, accuracy in science, effectiveness in process and practice. Its apparently diversified functions are unified by the unity of method—research and standardization through precise measurements and standards.

It helps to assure due quality in materials, satisfactory performance of mechanical devices, and efficiency in technical operations and practices. It is recognized that standardization is an essential part of every well-ordered enterprise and is a continuing enterprise—the modern means of applying new science to industry and through industry to human service. It is even more fundamentally true that all standardization to be effective or enduring must rest on research foundation.

STANDARD METHOD FOR ANALYSIS OF WEIGHTED SILK

Raw silk, as it comes to the manufacturer, contains about 75 per cent of fiber (fibroin) and about 25 per cent of gum (sericin), exclusive of moisture. At some stage of the processing the gum is removed by "boiling off" in a soap solution. The silk may then be "weighted" by the addition of various metallic salts or other substances, the amount of the weighting being determined by the purposes for which the silk is intended, the selling price, and similar considerations. The amount of weighting added seldom is less than the amount of the gum removed, and it may exceed the amount of the silk fibroin. The claim is made that weighted silk has a better "hand" or "feel" than unweighted silk, that it drapes better and that its lower cost makes possible the use of silk by persons who otherwise could not afford it.

The need for a standard method of analysis for weighted silk arose several years ago when special attention was given to the problem of overweighting. There was an insistent demand from numerous manufacturers, distributors, and consumers for definite limits on the amount of weighting to be allowed on different types of silk fabrics. This led to the tentative designation of limits by the Silk Association of America in January, 1929. The existing methods of chemical tests were considered by the technical committee and the conclusions reached that they were inadequate for the purpose intended. A method which has been found generally applicable, rapid, and convenient, is described in Research Paper No. 498, in the November issue of the Bureau of Standards Journal of Research.

By this method, weighting and finishing materials are removed by repeated extractions first with hot water, then with a 2 per cent solution of sodium carbonate, and finally with a solution containing 2 per cent of hydrochloric and 2 per cent of hydrofluoric acids. Results of analyses of samples of known composition are presented which indicate that the results are correct to within 1 per cent of the weight of the dried finished material. Results obtained by inexperienced analysts, working in different laboratories, have been in good agreement when samples of the same silk were analyzed. Qualitative methods for the identification of the following weighting materials are given: Aluminum, lead, phosphate, silica, tin, and zinc.

BRITISH STANDARD FOR STEELWORK IN BUILDINGS

The British Standards Institution has issued a specification dealing with the use of structural steel in buildings. The issue of this specification is of great importance to the building industry in formulating a standard upon which practice may be based in accordance with the most modern developments in the application of steelwork.

The specification is based upon the work carried out by the steel structures research committee of the Department of Scientific and Industrial Research, and by the British Steelwork Association, on behalf of the steel and structural engineering industries. Approval of the specification has already been given by the Ministry of Health and H. M. Office of Works has indicated its intention of using the new specification. The official recognition given by the Ministry of Health will have the greatest effect in establishing, with the friendly cooperation of local authorities, the specification as the basis of a national building code.

The building division of the institution is continuing its work, and a series of specifications for building materials, other than steel, is being prepared.

BEDSTEADS, SPRINGS, AND MATTRESSES SPECIFICATION

The revision of simplified practice recommendation covering bedsteads, springs, and mattresses has been accepted by all interests in the industry and is to be effective as of November 1, 1932.

This recommendation, which was proposed and developed by the industry, is concerned with the size, length, and width of straight foot wood beds having wood or steel angle side rails; the size, length, and width of straight foot metal beds having steel angle side rails, and the class, type, size, length, and width of bed springs.

Heretofore it was recommended that mattresses be made to conform to the bed dimensions. There is now before the industry for approval a proposal to specify definitely the sizes of mattresses as 6 feet 1 inch long by 4 feet 4 inches; 3 feet 10 inches; 3 feet 1 inch; or 2 feet 10 inches. These widths are the same as those already selected for the top widths of the spiral or coil wire springs.

STANDARDIZING CONCRETE MATERIALS WEIGHING DEVICES

By P. M. Tebbs [1]

Standardization in the construction of concrete roads has been the result of efforts to increase efficiency, reduce cost, and attain a more durable concrete. The strides that have been made in the improvement and development of grading machinery, mixers, road forms, finishing machines, hauling, and batching equipment, have been very rapid during the past several years. This change in methods of operation has done much to standardize this type of construction, and the engineer looks with confidence at any change which will improve the quality, increase the efficiency, and decrease the cost.

The need for standardization in weighing equipment.—The quality of concrete is in part predicated on its uniformity and workability; and variations in uniformity and workability will result when the water content, variations in the aggregate gradings, lack of proper mixing, and the accuracy of measurements of the various ingredients are not reliable.

Measurement of aggregate by volume is not accurate on account of the wide variation in bulking due to moisture content, and the manner in which the measuring unit is filled. It is possible to vary the amount of fine aggregate by as much as 20 per cent due to the bulking of the material. The variation in the volume of coarse aggregates may be as much as 5 per cent due to variations in the grading of the material.

To secure uniformity it is undoubtedly necessary to secure a method of measurement that will minimize these conditions. Aggregates can be readily weighed to a high degree of accuracy, and the resulting proportions will insure greater uniformity, better workability, and more uniform strength when combined by mixing to make concrete.

Procedure employed to develop standardization.—Many States, cities, and subdivision of States, require the proportioning of aggregates by weight, and the United States Bureau of Public Roads require that all aggregates for concrete pavements used in Federal-aid projects must be proportioned by weight. Committees of the American Association of State Highway Officials and the American Road Builders' Association, working independently, developed specifications for the standardization of weighing devices for concrete aggregates. In order to correlate fully the work of the two associations, they agreed upon the formation of a joint committee. The results of this committee's work were submitted to the American Association of State Highway Officials at its 1931 convention in Salt Lake City and to the American Road Builders' Convention at Detroit in January, 1932. This proposed specification was adopted by the joint committee after numerous conferences, attended by representatives of various State highway departments, the American Road Builders' Association, and the equipment manufacturers. The proposed specifications cover:

Part 1. Bin batcher type of equipment for weighing aggregates, which includes definitions covering the various terms and the requirements of the various parts of the equipment, such as bins, hoppers, scales, arrangement of parts, and operation.

Part 2. Specifications for weight-proportioning equipment for mixers of one-half cubic yard capacity (14S), or smaller, where bin batcher type equipment is not used. This covers the weighing container, scales, and the tolerances in accuracy which will be allowed in the weight of the aggregates.

Part 3. Specifications for the bin batcher type of equipment for weighing cement, giving the requirements for the bin, batcher, hoppers, scales, arrangement, and operation of the equipment.

Part 4. Specification for bulk cement weighing equipment, utilizing a mobile batch container. The main difference between this type of equipment and that as outlined in part 3, is that the mobile batch container is so designed that the container, after being properly weighed, may be placed directly on the hauling equipment and transported to the mixer.

Part 5. Specifications for a separate container for transporting the cement from the proportioning plant to the mixer, to be so designed as to insure the complete discharge of the entire batch of cement, and constructed so as to protect the cement from damage in transit.

Part 6. Discusses equipment for volume proportioning of aggregate. The recommendations of the committee discourage the use of volume proportioning except on small projects of minor importance.

Part 7. No specifications have been developed for the measuring of water, in that the committee feels that accurate measurements may be satisfactorily accomplished either by volume or weight.

Benefits to be derived from standardization.—As early as 1924, R. W. Crum, then of the University of Iowa, now Director of the Highway Research Board, National Research Council, in a series of tests conducted on actual construction projects determined that the percentage of variation in the cement content of mixed concrete was as high as 11 per cent where volume proportioning was used, while the maximum variation was 3 per cent on jobs where weight proportioning was used.

The uniformity and workability of the concrete have been improved.

Better riding surfaces have resulted due to greater ease in finishing.

A greater yield of concrete which is reflected in lower bid prices with no sacrifice of quality, has resulted.

The standard specifications developed by the joint committee should result in simplified manufacturing procedure, in that the contractor, the engineer, and the manufacturers are in accord on the requirements for such equipment.

[1] Assistant chief engineer, department of highways, Harrisburg, Pa.; chairman, joint committee, American Association of State Highway Officials and the American Road Builders' Association.

BRINGING THE CONSUMER AND PRODUCER CLOSER TOGETHER

Textile Section of the Bureau of Standards Cooperates with Industry in Aiding Consumer and Producer to Reach a Common Understanding of Textiles

By Miss R. K. Worner, *Bureau of Standards*

The textile section of the Bureau of Standards actively cooperates with industry through the research associate plan; through close contact with the commercial standards group of the bureau and the Federal Specifications Board; and through correspondence and conferences with individuals and organizations seeking technical information relating to textiles.

The research associate plan permits industrial groups to maintain research men at the bureau to work on problems of mutual interest. The bureau provides facilities for the work and assumes responsibility for it. The associate is subject to the same regulations and privileges as other members of the bureau staff, and the results of his work are available to the entire industry. The following organizations have had or now have research associates in the textile section of the bureau: American Association of Textile Chemists and Colorists, Associated Knit Underwear Manufacturers of America, Cordage Institute, Cotton Textile Institute, National Association of Dyers and Cleaners, and National Association of Hosiery and underwear manufacturers. Some of the accomplishments of the cooperative work made possible by the research associate plan will be described.

This is the second of a series of articles describing the work of the textile section of the Bureau of Standards. Readers of Commercial Standards Monthly desirous of obtaining more information on the subject reviewed should communicate directly with the Bureau of Standards. Another article by the same writer will appear in the next issue of Commercial Standards Monthly.

The color of textiles may be relatively fast or fugitive with reference to light, laundering, perspiration, and numerous other agencies, depending upon the dyestuff and the way it has been applied. In order to specify the color fastness required of cloth for a given use or to evaluate the degree of fastness of cloths, standard test methods are necessary. The American Association of Textile Chemists and Colorists has been actively engaged in the development of adequate test methods for this purpose for nearly 10 years, and much of the experimental work has been carried out by a research associate at the bureau. The methods which have resulted are widely used throughout the textile industry and are taught in many of the colleges and textile schools. The limited income of the association and the limited personnel of the bureau would have delayed this undertaking. Working together, the association and the bureau have provided a much needed basis for a common understanding of color fastness by manufacturers, distributors, and users of textiles.

A few years ago the designated sizes of knit underwear and hosiery made by different manufacturers were not the same, since each manufacturer had his own system of numbering. The fact that a certain size from one manufacturer would fit a user did not mean that the size of the same designation from another one would fit. The Associated Knit Underwear Manufacturers of America sought to correct this situation with respect to underwear and the National Association of Hosiery and Underwear Manufacturers sought to correct it with respect to hosiery.

The research associates employed to work on these problems at the bureau were the first in the textile section. Not only have the standard methods of measuring and designating sizes which have been developed been generally adopted by the industries concerned, but they have recently been promulgated as "Commercial Standards" having the written approval of consumers and retailers as well as manufacturers.

Work on new and extended uses for cotton has been carried out at the bureau by a research associate for the Cotton Textile Institute. A systematic study of the properties of cotton yarns and fabrics planned of the properties of cotton ning to bear fruit in the form of basic data relating the type of construction to characteristics related to appearance, feel, or serviceability of cotton cloth.

The recent introduction of noninflammable solvents in the dry-cleaning industry, together with machinery especially designed for their use in large and small dry-cleaning plants and in the home, aroused considerable concern as to the relative merits and safety of the newer solvents. The results of an unbiased study of the new and old types of solvents were needed. The National Association of Dyers and Cleaners requested the cooperation of the bureau in this study and placed a research associate at the bureau to assist in carrying out the work. A study was made of the effect of the solvents upon typical fabrics and the ability of the solvents to remove soil and stains. In order to do this, it was necessary to develop standard procedures for soiling and cleaning samples of the cloth under strictly controlled conditions. Rapid progress was possible because the bureau had previously worked on the development of detergency tests with the detergents committee of the American Oil Chemists Society and was thoroughly familiar with the difficulties to be overcome. As a result of the work, the value of the newer solvents was clearly shown and the precautions necessary in using them developed. The experimental methods have proved to be useful in the control of commercial dry-cleaning plants. The general quality of dry-cleaning work may be expected to be raised as these methods of control are applied throughout the country.

Numerous textile standardization projects are brought by manufacturers or consumers to the commercial-standards group of the bureau. This group

includes the divisions of simplified practice, trade standards, and specifications. It offers the textile industry means for the establishment of commercial standards which provide essentially for a better understanding between buyer and seller. The service of the textile section on technical questions involved in these standards are in constant demand. Frequently, the proposed standards result from the work of the research associates. This is true of the commercial standards for knit underwear and for hosiery.

Simplified practice recommendations are concerned with the reduction of waste through elimination of unnecessary varieties of a product, method, or practice. A number of recommendations of interest to the textile industry have been promulgated. They include recommendations for the reduction in number of sizes of bed blankets, cotton duck, paint and varnish brushes, hospital and institutional textiles, adhesive plaster, floor sweeps, hard fiber twines, soft fiber (jute) twine, fast selvage terry towels, and polished cotton twine.

The division of trade standards assists industry in the voluntary establishment of commodity standards covering grade, quality, dimensions, or tolerances for a product. Among the commercial standards of particular concern to the textile industry are those for Stoddard solvent (dry-cleaning solvent); regain of mercerized cotton yarns; measurements for dress patterns, boys' blouses and shirts, men's pajamas, and knit underwear; construction and quality of cotton cloth for rubber and pyroxylin coating; and basis for marking cotton fabric tents, tarpaulins, and covers.

The textile section is represented on no less than nine technical committees of the Federal Specifications Board which are engaged in the preparation of specifications for textiles or related commodities purchased by the Government. In this capacity, the section endeavors to promote specifications calling for commodities that are not only adequate for the service required by the Government departments, but that can be produced in the ordinary course of business. The chemical and physical methods used for testing textiles for conformance to Government specifications are usually developed in the textile section. The value of the Federal specifications is indicated by the fact that some of the States and numerous private organizations use them in purchasing textiles.

GLOSSARY OF TERMS USED IN ILLUMINATION AND PHOTOMETRY

A revised edition of the British standard glossary of terms used in illumination and photometry, which was first issued in 1925, has recently been published by the British Standards Institution, and incorporates the decisions reached at the meetings of the International Commission on Illumination last year.

The principal changes are that new definitions for regular and diffuse reflection, regular and diffuse reflection factors, regular and diffuse transmission, regular and diffuse transmission factors, curve of light distribution, polar curve of light distribution, solid of light distribution, and symmetrical and asymmetrical light distribution have been included, while photometric surface with its appropriate definitions has been substituted for comparison surface and uniformity ratio and diversity ratio for variation factor and variation range.

The definitions of direct lighting, semi-direct lighting, semi-indirect lighting and indirect lighting have been revised and a new term and definition for general lighting added.

Uniformity of nomenclature in the field of lighting is promoted by the activities of the International Commission on Illumination, and to a large extent the terms and definitions in the British standard glossary are essentially the same as those established in American practice. Not all of the new British definitions have been accepted in America, but some of those listed above are included in the revised American Standard Illuminating Engineering Nomenclature and Photometric Standards which is now before the American Standards Association for approval. The revised American definitions have also been included (as Group 55, Illumination) in the Report on Proposed American Standard Definitions of Electrical Terms recently published by the American Institute of Electrical Engineers.

SURGEONS' GLOVES

Printed pamphlets for Surgeons' Rubber Gloves, Commercial Standard CS40–32 and Surgeons' Latex Gloves, Commercial Standard CS41–32 by the Bureau of Standards are now available through sale by the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5 cents per copy.

These standards cover the chemical and physical requirements for surgeons' gloves, together with provisions for identification and certification to buyers. The standard for rubber gloves follows very closely the Federal specification for surgeons' rubber gloves, ZZ–G–421. The requirements for latex gloves are somewhat higher with respect to tensile strength and resistance to steam sterilization, and include a standard Geer oven aging test.

Both standards became effective July 6, 1932.

PORTLAND BLAST-FURNACE CEMENT

The British Standards Institution has issued a specification for Portland blast-furnace cement. This takes the place of an earlier edition, which appeared in 1926, and is required owing to the revision of the specification for Portland cement.

The changes introduced, which bring the physical tests in the two specifications into exact agreement, include a clause which no longer makes the neat cement test obligatory. The 28-day mortar test has also been replaced by a 3-day test, so that the periods for the tensile tests on mortar are 3 and 7 days, respectively. The quantity of water required for preparing the neat cement paste or cement and sand mortar is now to be determined by a modification of the Vicat plunger method.

The appropriate British standard wire cloths for test sieves are substituted for those previously specified.

STANDARDS COMMON TO PRODUCTION CONTROL

By James J. Phalen[1]

While the teeth of depression have been tearing apart the manufacturing companies of our country for the past few years, we should not lose sight of the fact that prosperity must return again. In the meanwhile, diligent study of industry will bring one face to face with the fact that a great manufacturing problem of to-day is production. And a comprehensive solution will be found in the word "control." The definition for control reads: "A check, restraint, superintendence, authority; controlled, to restrain, govern, regulate." All of these have a direct bearing on production, but the one definition that stands out foremost and produces the best results is, "a check."

To get down to real requirements of production control, the organization must adopt such simple methods as will give first-hand control of all activities. No company can obtain real control of production and cost until the organization is so arranged that definite responsibility for every activity and operation required can be placed. It makes no difference what a company manufactures, the prime elements of production and costs are the same; that is, labor, material, expense; and they constitute the unit of measure for cost of production.

To control these prime elements through the various divisions and check each activity, there must be a straight line movement of material, from vendor to the finished product. The real purpose of any manufacturing company should be to get out of labor, material, and expense, all that can be obtained in the shape of finished product, at a minimum cost.

Before undertaking to describe standards common to production control, the first essential step is to establish the various divisions necessary to regulate the activities of any manufacturing company. These major departments all come under the direct responsibility of the production engineer—engineering department, purchasing department, general stores, part stores, finished stores, production department, shipping department, and cost department. The following sequence is considered a standard order of arrangement for production control, from the lay-out of material required, by engineers, and its progress from vendor to the finished product.

Engineering department.—This department is responsible for the following subdivisions: Drawing room, time study, tool rooms, tool design, tool inspection, patternmaking, apprentice, new equipment, equipment maintenance, and is organized for the purpose of supervising and improving details of manufacture, to secure maximum production at minimum cost, by systematic control and use of modern methods, to eliminate unnecessary handling and lost motion.

The engineering department must be composed of personnel having practical knowledge of metal-trades manufacture, and make careful study of machines and machine tools, recommending changes and improvements to obtain greater efficiency and decreased costs. The engineers prepare all data on tools and gages to provide best methods for inspection of the product, so that the highest quality of manufacture will be maintained at all times. They also plan sequence of all operations in the manufacture of the product; assign machine and departments where the operation is to be performed; arrange and take time studies to set piece rates on all operations possible; and prepare estimates for cost comparison on all new products. They will also calculate material specifications and prepare master record cards for each and every part to be manufactured; also machine study cards, from inventory of machines. These are the foundation of production control, and all planning and scheduling are determined on these cards, in the utilizing of plant capacity.

Purchasing department.—To make intelligent and satisfactory purchases, the purchasing department should be guided and directed in every instance by specifications and blue prints for everything that is bought. The production department must prepare and furnish the raw-material stores with detailed specifications for all raw materials, which embody the amount required each month for a given year. The general stores prepare detailed specifications for operating and general factory supply items that are carried on the maximum and minimum basis.

With requisitions for purchasing thus prepared by departments familiar with what is required, as to character, quantity, quality, and date to be delivered, the purchasing department can devote its energies to obtaining materials when required, and avoid the delay incident to drawing specifications, and securing information which is furnished automatically. When stores departments require material they issue a purchase requisition, in triplicate. The original and duplicate are forwarded to the purchasing department and the triplicate remains in the stores department. When the purchase order is issued, the duplicate requisition is forwarded to the cost department. Purchase requisitions for materials when furnished by the production department, on a schedule basis and materials carried on a maximum and minimum basis, will require the signature of the foreman of the stores department. Requisitions for special material must be approved by the production engineer. Purchase requisitions must be issued by the stores ledger clerk, from the stores ledger, and in every case checked by the stores foreman, before being forwarded to the purchase department, so that material on hand can be checked and substitution made if possible. No materials can be ordered direct from the purchasing department, all requests must first pass through the stores ledger. The stores foreman must assume all responsibility for all materials requisitioned to be purchased.

In this connection it must be borne in mind that the stores foreman is a custodian of the company's property. He is accountable for its disposition, just as a cashier is responsible for the disposition of money. A proper system of recording materials demands just as close a record of storekeeping, as it does of actual money. This plan will not only prevent overbuying, but keep material at a low inventory.

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From the purchase requisition, the purchase order is issued, and forwarded by the purchasing department to the outside supplier.

Production department.—This department is responsible for the following subdivisions: Planning and scheduling, machine planning, order division, dispatchers, and timekeeping. The personnel of the department consists of foreman, clerks, and typists. To control production in any factory it is most economical to process parts on a schedule basis. Plan and schedule the manufacture from raw material to the finished product. To accomplish this, a master schedule of machines or units, must cover one year. The production department can then subdivide the schedule into different periods, most fitted to the product. The master schedule must be given to the production department at least three months in advance of the final assembly, to allow for the time lag in securing material and processing the parts. As previously explained, the foundation for production control is based on standards prepared by the engineering, purchasing, and stores departments. This information and data enable the production department to start scheduling and planning the purchase of raw material and processing the parts.

Standards common to stores control.—No department in any manufacturing business contributes more to inventory control than do the stores departments, which are three in number. These are, namely, general stores, which cover all purchases of any kind; part stores, which cover all pieces and parts; and finished stores, which cover all completed units for shipment.

These items are controlled through the medium of stock ledgers, which have many functions. They record the receipt of material, and issue, and the purpose for which issued; a perpetual inventory of the quantity on hand at all times; and the quantity of parts consumed for any given time. The ledger sheets also show the following information: Part number, part name, maximum and minimum, quantity due on open order, order number, and balance on hand. The particular need in connection with the keeping of stores and ledgers is the importance of these records being kept up to the minute. The value of this need can not be overestimated, as the ledgers become a bureau of information, so that the stores employee will have absolute information as to the location of any and all kinds of material. Also, this gives them command of all parts, by record, and will enable them to show location on requisition, so that the stores keeper can send stores clerks, or truckmen, to the proper point for drawing material to be delivered.

IMPROVING SPECIFICATIONS FOR DEFORMED CONCRETE REINFORCEMENT BARS

Specifications are often made a part of the contract between a vendor and a purchaser so that the vendor will know what quality is expected and the purchaser may have tests made to determine whether he is getting what he wants. When these specifications are not definite in all respects, disagreements are likely to arise as to interpretation and methods of test.

In the past, most of the specifications for deformed concrete-reinforcement bars have not defined clearly the method of determining the area of the bar. The value for this area is used for computing the tensile properties from the load values observed during the tensile test of the bar. A study has been made at the Bureau of Standards of four methods of area determinations now in more or less general use, to find out which method is most suitable. The results showed that the nominal area was most convenient for specification work and should be used if it were considered sufficiently accurate. Further, the weight-length method was more suitable for this use than either the immersion, micrometer, or planimeter method.

These specifications also have allowed the testing of machined bars in place of the bars with the original deformations. Data were lacking as to the difference in tensile properties due to these differences in the form of the test specimen. Tests were therefore made on bars having the original lugs, bars from which the lugs have been filed, and bars which had been machined to a cylindrical cross section.

The results of the tensile tests of different sizes and shapes of deformed bars, which is reviewed in Bureau of Standards research paper No. 486, showed that the lugs were effective to some extent in resisting tensile stresses; that machining the deformed bars to a cylindrical cross section increased the tensile strength and the yield point of the material, but only to a small degree, and that this machining did not appreciably affect the elongation of the tensile specimens. The differences in all cases were too small to warrant the expense of machining the bars.

PRISON PLUMBING FIXTURES

The division of trade standards of the Bureau of Standards is cooperating with the manufacturers of prison plumbing fixtures, and companies that build jails, upon their request, toward the establishment of a commercial standard to cover plumbing fixtures for jails, prisons, reform schools, and similar institutions.

In order to expedite the work a committee has been formed to collect data and suggestions to be used in the preparation of the proposed standard. The committee is composed of 7 members, 3 of whom are representatives of the Manufacturers Advisory Committee on Vitreous China Plumbing Fixtures, 3 representatives of jail building supply companies, and 1 representative of the Bureau of Standards.

The industry believes that the establishment of a commercial standard for these types of plumbing fixtures will result in worthwhile economies to both manufacturers and taxpayers. Dimensional variations add materially to the cost of designing and construction of penal institutions. Nonstandard fixtures increase the cost of production and distribution because of the large stocks that must be carried by the manufacturer and jobber, thereby increasing the overhead. Standardization of such fixtures should simplify their installation and maintenance, should improve the living conditions in such institutions, and should create a better understanding between buyer and seller, thus reducing possibilities for error and misunderstanding.

QUALITY CONTROL OF NONFERROUS METALS

Laboratory Studies by Bureau of Standards to Determine Commercial Adaptability of Mine Products

By H. S. Rawdon, *Bureau of Standards*

The term " nonferrous " has become conventional in metallurgical parlance in referring to metals other than iron and to alloys which do not contain iron as an essential constituent. This usage has come about naturally as a result of the preponderating commercial importance of iron and its alloys—the steels. The class of nonferrous metals is, in consequence, a very broad one in which are included many unrelated members ranging from the common familiar metals, such as lead, tin, aluminum, copper, and zinc to the rare and precious metals.

Metallurgical investigative work, in general, is concerned with two broad aspects of the subject of metallurgy; the processes by which the metals are recovered from the ores in which they occur in nature and the putting of the crude metal thus obtained into useful form for practical utilization. It is the second phase which receives attention at the Bureau of Standards. The utilizing of any metal to best advantage is predicated upon a knowledge of the characteristic properties and fundamental constants of the pure metal. This necessitates a knowledge of the naturally occurring impurities in such metals, together with the development of methods for their removal. Most metals find their greatest sphere of usefulness as alloys, hence the necessity of the study of the mixing or alloying processes. In short, all those factors which underlie the commercial utilization of metals form the basis of the metallurgical studies carried out. Practically all of the divisions of the Bureau of Standards are carrying out work of interest to some branch of the nonferrous metallurgical industry.

A great deal of the work on nonferrous metals is planned with a view to its immediate commercial application as is illustrated by the typical examples discussed below:

Accurate determinations of the chemical composition of nonferrous materials, such as metals and ceramic products, must usually be made for the purpose of controlling manufacturing processes or of determining whether the manufactured product meets specifications. Some years ago inaccurate analyses were common and led not only to the production of faulty material, but also to disputes concerning the composition of good material. One of the outstanding factors in correcting this situation has been the bureau's distribution of samples of certified composition. To-day an analyst can quickly check his methods against these samples, which include brasses, bronzes, bearing metals, light aluminum alloys, die-casting alloys, and ceramic materials, such as limestones, clays, feldspars, refractories, and glasses.

In connection with the preparation of these samples it often happens that improved methods of analysis are developed, or unsuspected sources of error in the old methods are uncovered. These are embodied in numerous publications which have been distributed by the bureau, or published in outside journals. A very practical illustration of the need of knowing the composition of a metal before attempting to use it is afforded in the testing of fusible boiler plugs for the Steamboat Inspection Service. The filling of these plugs is high-grade tin, and samples of all heats furnished by the manufacturer must be approved by the Bureau of Standards. It has been found by experience that tin containing appreciable amounts of impurities oxidizes readily under the action of steam and thus defeats the purpose of the plug as a safety device.

In this country the Bureau of Standards was probably the pioneer in applying the spectrograph to commercial testing, since for 18 years its spectroscopy section has been making practical use of the spectrograph for chemical analysis. In the meantime many industrial laboratories and research institutions have acquired equipment for this purpose, and in many instances this method of testing now supplements or even displaces the ordinary chemical methods. The spectrochemical method has been found useful not only in qualitative analysis (identification of chemical elements) but also in quantitative determinations. It is based upon the fact that the chemical elements when luminous emit characteristic spectra of bright lines which uniquely identify the elements, and the relative intensities of lines due to different elements change with different proportions of the elements.

A speck of the material to be analyzed is vaporized by electric means, the light produced is dispersed into a spectrum which is photographed, and the analysis is read from the photographic plate. This optical method has several obvious advantages—only small samples are required, less time is consumed, and for many elements it is more sensitive than ordinary chemical procedure. It is especially efficient for the detection of " impurities " and is easily made quantitative in the range of 0.0001 per cent to several per cent by comparison with standards of known composition. It is only since the spectrograph has been consulted in the preparation of pure materials that really " pure " metals have become available. As examples of the application of spectrographic analysis to nonferrous metals mention may be made of the preparation of spectroscopically pure platinum, rhodium, and iridium and the annual check up on the purity of proof gold for the Treasury Department.

In this article, the first of two, Dr. H. S. Rawdon, chief, division of metallurgy, Bureau of Standards, shows the relationship of this bureau to the nonferrous metals and minerals industry. In the second article, which will appear in the next issue of the COMMERCIAL STANDARDS MONTHLY, the author will continue his discussion.

Precise determinations of the linear thermal expansion of numerous nonferrous metals and alloys have been made by the Bureau of Standards. Some of the metals and alloys which have been investigated are as follows: Aluminum and various important aluminum alloys, beryllium and aluminum-beryllium alloys, brasses, bronzes, copper, lead, magnesium, nickel, stellite, tantalum, tungsten, tungsten carbide, and zinc. Data on these and other materials have been published. This information will assist manufacturers to select component parts of apparatus which may compensate for variations with changes in temperature. These parts, if not properly selected, would cause difficulties as temperature changes are encountered. A research is now in progress to determine the accuracy of different types of thermal expansion equipment and the proper basis of selection to meet the numerous requirements of industry.

The freezing or melting points of pure metals are constants which may be used as thermometric fixed points on a practical scale for the measurement of temperatures. Consequently, it is desirable that the location of these points on the scale be determined as accurately as possible. Silver and gold are the two metals whose freezing points are included in the six basic points upon which the international temperature scale, adopted in 1927, was established. The numerical values assigned on this scale are 960.5° C. (1,760.9° F.) for the freezing point of silver and 1,063° C. (1,945° F.) for that of gold. Accurate determinations of the freezing points of a considerable number of other nonferrous metals have been made at the Bureau of Standards to fix their location as secondary points on this scale. These determinations range from tin, the temperature of freezing of which is 231.9° C. (449° F.), to platinum, 1,773.5° C. (3,224° F.), and iridium 2,453° C. (4,447° F.).

The Bureau of Standards has prepared for distribution samples of a number of metals of known purity, the melting temperature of which can be certified. The melting points of these "pyrometric standards," which include tin, lead, zinc, aluminum, and copper, cover the temperature range from 231.9° C. (449° F.) to 1,080° C. (1,976° F.) and form a very convenient means of calibrating various temperature-measuring devices in metallurgical and other industrial laboratories.

In addition to its use as a fixed point on the temperature scale, the freezing point of platinum was accurately determined in connection with the bureau's proposal to adopt a reproducible standard of light based on the temperature of freezing platinum. For a similar standard of light at a still higher temperature the freezing point of iridium has been determined to be 2,453° C. As an intermediate point between these two it is planned to determine accurately the freezing point of rhodium, which, from a preliminary determination already made, has been tentatively set at 1,985° C. ± 10°.

BRITISH STANDARD FOR MACHINE-CUT GEARS

A specification for helical and straight spur machine-cut gears has recently been issued by the British Standards Institution, which contains a great deal of information on the design and strength of industrial gears. Hitherto reliance has had to be placed on one or other of several formulas, and on this account no simple and reliable system of checking could be applied, such as can be used with certainty in other branches of engineering. Another practical point, to which attention has been given, is that of intermittent rating of gears which, in normal operation, are subjected to varying loads, overloads, and periods of rest.

The specification deals with machine-cut gears connecting parallel shafts, the teeth being either straight, single-helical, or double-helical, and of the 20° full-depth involute system (with a working height of twice the module), of the following three classes: Class A covers precision-ground or cut gears, suitable for peripheral speeds exceeding 2,000 feet per minute; class B refers to high class cut gears, suitable for peripheral speeds between 750 and 3,000 feet per minute; class C concerns commercial cut gears suitable for peripheral speeds below 1,200 feet per minute.

In addition to dealing with the form of gear teeth, clearance, maximum permissible pitch errors and tolerances, the specification lays down standard formulas for the strength and rating of gears and includes a series of charts showing at a glance, the proportions of gear wheels of different materials. The next section of the gearing specifications to be taken in hand will be that dealing with bevel and spiral gearing.

UNIFORM STATE LAWS RECOMMENDED BY CONFERENCE

Forty-second National Conference of Commissioners on Uniform State Laws Draft Proposals for Uniform Laws

The forty-second annual conference of the National Conference of Commissioners on Uniform State Laws, held in Washington, D. C., October 4 to 10, inclusive, considered proposed standardization of State laws on 15 subjects.

Outstanding among the many projects considered were the following: Standard or uniform statutes for control of the manufacture, sale, or use of machine guns and the sale of narcotic drugs, which were approved; proposed uniform State law on mechanics' liens, which was approved. The subject matter of the adopted uniform act has been before the conference for approximately seven years. The act was drafted in cooperation with a committee working with the Department of Commerce upon which were representatives of all of the interests of the construction industry. This committee worked in conjunction with the division of building and housing of the Bureau of Standards.

The conference considered a second draft of a uniform automobile liability security act, requiring proof of financial responsibility on the part of owners and operators of motor vehicles whose licenses are revoked for law violations, who have poor accident records or who fail to satisfy judgments arising out of motor-vehicle accidents. No final conclusion on this subject was reached, however, but the draft was proposed for later consideration with a view to adoption.

THE UNITED STATES INCH

By H. W. Bearce, *Bureau of Standards*

At times the impression exists in industry that there is considerable uncertainty and variability in the United States inch as used in American industry; for example, that important manufacturers of precision tools, such as Brown & Sharpe, Pratt & Whitney, Ford-Johansson, Starrett, and others, use different inches, one from another.

That there is no ground whatever for such an impression is shown by the fact that tools and instruments from all of these firms are sent to the Bureau of Standards for certification, and all are certified on the same basis. The only uncertainty or lack of agreement involved is that involved in any comparison, namely, errors of equipment and errors of observation. In general, these errors are so small as to be of no importance or concern to industry.

In the production and inspection of precision gage blocks, measurements, in terms of light waves, that are accurate to 0.000005 inch or better, are the rule rather than the exception. Accuracy on the order of one or two millionths of an inch is not uncommon in this work. It can not, therefore, be said that there is any great uncertainty or variability in the value of the United States inch.

In connection with the definition of a unit of measurement, the embodiment of this unit in a standard at one temperature, and the use of this standard at some other temperature, there are certain points that appear not to be generally understood. For example, it is sometimes implied that because inch standards and metric standards are used at several different temperatures it necessarily follows that there are several different inches and several different meters in use. It can readily be shown that such is not the case.

As an example let us take the case of the British yard and inch. The yard is defined as the length of a certain bronze bar when at a temperature of 62° F., and the inch as one-thirty-sixth of this length. Suppose we have a standard, A, which is correct at 62° F., and suppose we wish to express in terms of the yard or the inch, as represented by A, the length of some other standard, B, at some temperature other that 62° F., say at 68° F. An obvious procedure would be to compare A and B, each standard being at its own standard temperature; that is, A at 62° F. and B at 68° F. The difference between the two standards would represent the error in B at 68° F.

In actual practice, however, comparisons can not usually be made in this way. Usually the comparison must be made with the two standards at the same temperature, in this case, say at 68° F.; then the actual length of standard A, at 68° F., must be calculated from its length at 62° F., and its known coefficient of thermal expansion. Obviously, if standard A has a length of 1 yard at 62° F., then at 68° F. it will have a length of 1 yard plus its expansion between 62° F. and 68° F. If standard B is to be correct at 68° F. then when compared with standard A, at 68° F., standard B should be shorter than standard A by the amount of expansion of standard A between 62° F. and 68° F. The unit, that is, the yard, will be the same at 68° as at 62°, but the standard, if correct at 62° F., will, at 68° F., be of a different length in terms of that unit.

Similarly, the meter is defined as the length of a certain bar when at a temperature of 0° C. This fact, however, does not preclude the possibility of having standards that are 1 meter in length when at any other desired temperature. Standards are, in fact, made to be correct at 15° C., 20° C., 25° C., and other temperatures as desired. The unit, that is, the meter, is the same in all cases, but the standards, if all were at the same temperature, would be of different lengths depending upon the coefficient of thermal expansion of each and upon the temperature at which each was correct.

From the foregoing it is evident that Great Britain in changing the temperature basis of its industrial measurements of length from 62° F. to 68° F. has not thereby changed the length of the imperial yard in any way. It simply means that industrial gages, machine parts, etc., are now measured in terms of a standard which is correct at 68° F.; that is, in terms of a standard which at 68° F. has the same length as the imperial standard when at 62° F. Dimensions of such gages, machine parts, etc., are still expressed in terms of the imperial yard, or in terms of the inch derived therefrom.

There is a notable example of the results of failure to appreciate the practical necessity of the above interpretation as to the variability of standards and the invariability of units. France, the cradle and nursery of the metric system, has always insisted upon the advantage, and even the necessity, of defining the basic unit of length, the meter, in terms of the length of a certain standard when at a temperature of 0° C. This basic definition has been generally accepted without objection.

There has been a tendency in France, however, to go a step farther and to hold that industrial standards of length should also have their correct nominal length at 0° C. It is held by most metrologists outside of France, and by many in France, that this does not necessarily follow, and that in view of the fact that most industrial standards of length are used at temperatures not far from 20° C., it is more logical and more convenient, to have them so constructed that they are correct at 20° C. This becomes practically imperative if gages and various interchangeable parts have different coefficients of thermal expansion.

It has been proposed by certain European standardizing committees that a relation between the yard and the meter be set up on a basis such that the dimensions of gages, parts, etc., can be converted from inches to millimeters, or vice versa, and at the same time the temperature of reference changed from one basis to another. For example, so that measurements of a part, in millimeters, at 20° C. (68° F.) can be converted to inches at 62° F. by the use of a single conversion factor.

Such a conversion factor could, in fact, be set up for a single set of conditions and materials; but this factor would not apply to other conditions and other

materials. Because of this fact it is much simpler, in the long run, to make the conversion in two steps, the first step being based on the relation of the units involved, and the second step being based on the temperature difference and the known or assumed coefficient of thermal expansion of the material involved.

AMERICAN STANDARDS ASSOCIATION

Current developments of the following standardization projects under the auspices and procedures of the American Standards Association have been reported by that association.

Rotating air cylinders and adapters.—An important new American standard on rotating air cylinders and adapters has been approved by the association. It was developed by the technical committee on chucks and chuck jaws of the sectional committee on small tools and machine tool elements, working under the sponsorship of the American Society of Mechanical Engineers, the National Machine Tool Builders' Association, and the Society of Automotive Engineers. The standard has been developed to obtain interchangeability of different makes of air cylinders on the spindles of machine tools without changing the adapter or drawrod.

Three sizes of standard adapters cover the range of standard air cylinders from 3 to 18 inches, inclusive. Adapter A fits the 3 and 4½ inch cylinders; adapter B fits the 6 and 8 inch cylinders; and adapter C fits all sizes of cylinders from the 10 to 18 inch, inclusive. A fourth size, adapter D, is also included and is provided to accommodate the 20-inch air cylinder or other power-operated devices having a drawrod pull of 26,000 to 40,000 pounds. The length of stroke of the standard cylinders, the position of the piston rod at the end of the stroke, and the diameter of the tapped hole in the piston rod have also been standardized so that air cylinder drawrods do not have to be fitted to individual air cylinders.

In order to allow the use of air cylinders on spindles with comparatively small holes, the diameters of the piston rods are as small as is consistent with the requisite strength. The piston rods and adapters of this standard have been designed to withstand stress resulting from air pressures up to 100 pounds per square inch. It is intended, however, that these pistons and adapters may be applied to hydraulic cylinders or to other mechanical operating devices which do not develop working stresses in excess of those developed by the corresponding sizes of air cylinders,

Concrete joist construction.—A new American standard on forms for concrete joist construction floors has been approved by the association. It covers the main dimensions of removable and permanent forms, pans, or domes made of wood, steel, or other material used in concrete ribbed floor construction. The standard is a revision of simplified practice recommendation R87–31, developed by the industry under the auspices of the Bureau of Standards. The new standard was submitted to the American Standards Association by the Concrete Reinforcing Steel Institute and the Bureau of Standards as an existing standard.

Testing methods for petroleum products.—The association has approved two new American standards and four American tentative standards for methods of testing petroleum products and lubricants, and has also approved the revision of an existing American standard and the advancement of four American tentative standards to the status of American standard. This recent action followed the endorsement and submittal to A. S. A. by the sponsor (the American Society for Testing Materials) of recommendations from the sectional committee on methods of testing petroleum products and lubricants concerning standards developed by A. S. T. M. committee. The following were approved as American standards:

Carbon residue of petroleum products (Conradson carbon residue).
Testing gas oils (gravity, distillation, sulfur, carbon residue, pour point, viscosity, water).

The titles of the approved American tentative standards are:

Expressible oil and moisture in paraffin waxes.
Definitions of terms relating to petroleum.
Dilution of crankcase oils.
Precipitation number of lubricating oils.

The title of the American standard method of test for distillation of natural gas gasoline, has been revised to read: "Method of test for distillation of natural gasoline." Other revisions in this standard are confined to certain changes in the text to clarify the procedure and to eliminate a form for recording data, and to editorial changes in the text.

The following American tentative standards have been advanced to the status of American standard:

Method of test for cloud and pour points of petroleum products.
Method of test for melting point of petrolatum.
Determination of autogenous ignition temperatures.
Flash point of volatile flammable liquids.

In connection with the advancement of these standards to American standards, a minor revision, editorial in character, has been made in one section of the standard, "Method of test for cloud and pour points."

Inch-millimeter conversion.—An American standard value to be used by industry in converting inches to millimeters was recommended by a general conference held under the auspices of the American Standards Association on October 21, following a request of the Ford Motor Co. (For details see October, 1932, issue of Commercial Standards Monthly.) Representatives of 18 industrial groups having an interest in precise measurements and methods of limit gaging were present. The conference unanimously recommended the conversion factor of 1 inch equals 25.4 millimeters to become the American standard value for industrial use, replacing for this purpose both the official ratio 25.40005 and the rounded value 25.4001 given in certain handbooks and tables.

STUDYING THE PROPERTIES OF FLOOR COVERING

A Review of the Bureau's Research on Floor Coverings, in Which Carpet, Rubber Tile, and Asphalt Tile are Considered

By J. W. McBurney, *Bureau of Standards*

Barring bed-ridden invalids and people who spend their entire time out of doors, the properties of floors and floor coverings should be of interest to everybody. Therefore, the Bureau of Standards investigations of floor coverings may be considered a typical example of consumer research. On account of limitations of space, the present discussion will be confined to an account of the bureau's work on three types of materials —rubber tile, carpet, and asphalt or mastic tile.

Before going into the details of these investigations, some attention should be given to the why and how of research on materials. The kind of investigation made on a material depends largely on whether the material is manufactured by man or by nature. Building stone is an example of a material which, except for shaping, is used as nature made it. About all that an investigator can do for the building stone industry is to measure and catalogue the various properties of stones as quarried and marketed, and conclude that a particular kind of stone is or is not to be recommended for a particular condition of service. On the other hand, where a material is compounded and fabricated and the resultant behavior can be varied and controlled over a wide range, the question to be answered by the investigator is not so much "What are the properties?" but "What should they be?" Usually a question that must also be answered is, "By what processes of compounding and fabricating can certain desired properties be secured?"

A program of investigation is conducted somewhat as follows: The first step is to locate and read what is already in print about the material. This includes reference books and technical articles in the scientific and technical press, as well as any patents that may have been granted. The next step is to secure samples and information from a representative list of manufacturers. Characteristic installations, the older the better, are inspected, with especial attention to failures. On the basis of the information and ideas accumulated, a testing program for the samples is then laid out. In general, the tests would be of two types—measurements of fundamental physical properties and tests designed to imitate or accelerate conditions met in service. Chemical analyses and tests are frequently useful. The next step is to correlate the data obtained in the laboratory with field observations. Sometimes no correlation is found. The remedy, in such a case, is to provide more and better data. Assuming that a definite relation were found between the results of laboratory tests or measurements and the behavior of the material in service, all that remained would be to select the tests and set the proper limits for the test values, and the specification would be written. It should be remarked that, in general, it is not advisable to have a specification state both "how" and "what." In other words, the best practice is either to give a manufacturer wide leeway in the composition and fabrication of an article and specify that it meet definite performance tests, or to provide that the article shall be made in such and such a manner with such and such a composition and expect that the performance will automatically follow.

It must not be supposed that a specification is the only service rendered the consumer by such an investigation. It is true that many department stores, institutions, and other large purchasers are to-day buying goods on specifications modeled on those of the Federal Specifications Board, and certain commodities can be bought by the housewife under a label or certificate guaranteeing compliance with a Federal or American Society for Testing Materials' specification. But it is probable that the consumer's greatest benefit is derived from the improvement of the manufacturer's product. Instances of this will be given in the description of the bureau's work on carpet, rubber tile, and asphalt tile. Still another benefit to the consumer can be found in the guidance given architects in the selection of the most suitable material for a specific use. An illustration of this is found in the question of an architect as to which of two types of floor coverings was the more suitable for a school for crippled children. A comparison of the coefficients of friction of rubber (the rubber tips of crutches) on the two floorings in dispute gave an emphatic answer to the question.

Rugs and carpets have been under investigation by the Bureau of Standards for the past several years. The original purpose was the production of a specification. At the present time the effect of variation in the height and density of pile and grade of wool used on the life of the carpet is being studied. The nature of the underlay used in combination with carpets was found to be responsible for lengthened service up to 150 per cent. The first step in the investigation was the design of a machine for simulating wear due to walking. Excellent relation was found between the laboratory results and behavior on the floor. With the cooperation of the manufacturers, the consumer can expect materially longer life of rugs and carpets as a result of this work.

Compared with rugs and carpets, rubber tile is a relatively new material. Technical development moves rapidly in the rubber industry, hence a survey based on "the present state of the art" is open to the same criticism as the young man of a generation ago who had read law and presented himself before a judge in a certain Midwestern State for examination for admission to the bar. The judge asked the young man, "What do you know?" The applicant answered, "I have memorized the revised statutes of this State." "Young man," said the judge, "the State legislature some day is going to repeal everything you know." The bureau's investigation included, first, the determination of the fundamental properties of the brands of all available makes of rubber tile as received from manufacturers, and second, the correlation of aging behavior with the

properties of the rubber compounds. The tests included measurements of hardness, bending, indentation, wear resistance, and staining. Some work was done on ease and effect of cleaning. Sample floors were laid and are under observation for aging effects.

The study of asphalt or mastic tile floor covering was started but a short time ago in cooperation with the Asphalt and Mastic Tile Association. Asphalt tile represents a material whose properties can be varied within a wide range. Take, for instance, the property of resistance to indentation. Asphalt tile can be produced which is hard as the proverbial board, or quite soft. The bureau's interest is not in the fact that a particular brand of tile has a certain indentation as received on a given date, but rather, first, in determining what method of indentation testing will give results directly comparable with those resulting from furniture, and second, what is the most desirable range of indentation. It is of interest to note that quantitative relations have been found where time and load are varied so that indentation at the end of several hours can be quite accurately predicted where the indentation after one or two minutes is known. Likewise regular relations exist between indentation and load over a wide range.

Among the tests used to date are cross bending, where both loads and deflections are measured; resistance to abrasion by Kessler's method; softening point; impact; and indentation by several methods. Maintenance problems will be studied. The research has been characterized to date by considerable study of methods of test in themselves and by evaluation of tests by comparison with field results.

It should be emphasized that the important thing in these investigations on flooring materials is not the determination of the properties of given brands but rather the development, study, and interpretation of methods of test.

SECOND INTERNATIONAL CONGRESS ON LIGHT

The Second International Congress on Light, dealing with all questions of biological and biophysical researches in the fields of light and light therapy, was held in Copenhagen, Denmark, August 15 to 18, 1932. Dr. W. W. Coblentz of the Bureau of Standards, attended the congress as the United States member of the international committee on measurement and standardization and as the representative of the council on physical therapy of the American Medical Association.

Four principal subjects were considered by the congress: (1) How can the effect of light baths on tuberculosis be explained? (2) the basis and organization of helioclimatic researches in relation to public hygiene; (3) the rôle of pigmentation in the biologic action of light, and the therapeutic effect of light baths; and (4) the choice of a unit and a method of measuring ultra-violet radiation used in medicine. Many other special papers were presented in the fields of physics, biology, therapy, and biochemistry.

Considering only the results of the deliberations of the committee on measurement and standardization, these may be summarized as follows:

It is recommended that ultra-violet radiation stimuli be evaluated upon a physical (radiometric) basis in absolute units. The ultra-violet radiation from the source is to be separated into three components by means of a nonselective radiometer (thermopile) and a series of three standard filters. The specifications for these filters are provisional, and may undergo slight changes with future developments. Doctor Coblentz was assigned the task of preparing and standardizing the filters, sets of which will be deposited at the following national research laboratories: Bureau of Standards, Washington, D. C.; Comitade Nazionale della Richerche de Rome; Institut d'Actinologie, Paris; Institut Finsen, Copenhagen; Institut für Strahlenforschung, Berlin; and the National Physical Laboratory, Teddington. If possible, these laboratories will deliver the filters to manufacturers, physicians, and meteorologists.

The committee recommends to physicians the use of simple methods of measurement (biological, photochemical, or photo-electrical) to control the constancy of each lamp used, and emphasizes that at the present time a comparison is only possible for the same lamp and not between different lamp types.

The International Congress on Light will meet again in 1936. The present indications are that, in the meantime, there will be much greater international cooperation, and when the committee on measurement and standardization again meets, those present should have ample information and data available upon the questions now awaiting action.

OIL REFINING HEAT EXCHANGE EQUIPMENT

A code of recommendations for oil refining heat exchange equipment, worked out by a committee representing both refiners and manufacturers, has been approved and published by the petroleum division of the American Society of Mechanical Engineers.

Included in the recommendations are data which refiners should supply manufacturers when they ask for proposals on heat exchange equipment, suggestions for shop inspection and shop tests of equipment; methods of making performance tests and an appendix discussing factors of design, cleaning methods, and fouling resistance. The code developed for performance tests is expected to develop data on heat transfer rates and fouling resistance which should be of great value to the industry. Under the code this data will be the exclusive property of the manufacturer and refiner directly interested, but the committee has expressed the hope that considerable data may be released for the benefit of the industry as a whole. A standard method of testing and reporting is offered which should facilitate study of the subject.

Objects of the performance tests are to determine capacity and efficiency of heat exchange equipment for comparison with manufacturers' guarantees and to determine the effects of fouling on capacity and efficiency. Within 48 hours after new equipment is installed the initial test is to be given under requirements of the code. In addition, a service test is to be made, preferably not later than three months after the equipment is installed.

BUREAU OF STANDARDS HAS AIDED LUMBER INDUSTRY

Safety Codes, Simplified-Practice Recommendations, Trade Standards, and Building Codes Useful to Industry

The interest of the Bureau of Standards in the lumber industry extends as far back as the operation involved in fashioning the raw products. One of the series of the National Safety Code with which the bureau has been identified is the American Logging and Sawmill Safety Code. This is one of the codes formulated under recommendations to the American Standards Association, and developed under the plans and rules of procedure of this body. That logging is one of our hazardous industries is shown by compensation records. The Pacific slope represents a logging district where all the States have compensation laws and accidents are actually reported. Consistent applications of the safety rules contained in this code should materially improve the records of the individual States.

The American Logging and Sawmill Code applies to all logging operations, including the transportation of logs to the mill; to the ordinary sawmill operations, including lath and shingle manufacture but excluding the manufacture of veneer and cooperage stock; and to dry kilns and yard operations. The purpose of this code is to provide reasonable safety for life, limb, and health. Approval of specifications or methods should, when necessary, be based on tests made by an unprejudiced institution of recognized standing with final appeal in such tests to the Bureau of Standards or the United States Forest Service, according to subject. A discussion of the rules which is intended to assist the reader in understanding the reasons for them, is included with the code.

The lumber industry is one of the outstanding examples of the application of the cooperative services of the Bureau of Standards in aiding industry to promulgate simplified practice recommendations and commercial standards. The concerted action of the lumber industry resulted in the development of the American Lumber Standards, published as Simplified Practice Recommendation No. 16, Lumber. This recommendation provides the basic provision for grading lumber, and includes the recognized classification, nomenclature, basic grades, seasoning standards, shipping provisions, grade marking, tally cards, and inspection of lumber.

The problems of simplification of sizes, nemenclature, grades, and trade practices have been before the lumber industry for many years, and it has been long recognized that, even though cut from different species, lumber of similar characteristics and intended for similar purposes could be produced, merchandised, and applied in accordance with fixed standards. It was also stated that the wide variation in regional practices as to size, grading, and names reacted to the disadvantage of the user, retailer, wholesaler, manufacturer, and, indeed, all groups interested in lumber, and that sane standardization offered promise of increased economy, more profitable and stable business, and markedly better service. The constructive advance to solution may be dated from the convention of the American Lumber Congress in 1919, when an organized program was adopted looking to the simplification of lumber-grading standards, greater uniformity in the basis of similar grades of competing species, and the standardization of yard and factory lumber.

A sound basis was at hand in the work of the Forest Products Laboratory of the United States Department of Agriculture, which for many years had been studying, investigating, and urging national lumber standardization. Progress, though continuous, was somewhat slow during 1920 and 1921, but early in 1922 the Secretary of Commerce responded to the request of the industry with suggestions for hastening results and an offer of cooperation along definite lines. Efforts were to be specifically directed toward simplification and standardization, and to the development of more adequate quality guarantees to the lumber-using public. As a consequence of the efforts of the Secretary of Commerce and the discussions at previous meetings, a general conference was held in 1922 under the auspices of the division of simplified practice of the Bureau of Standards. This conference developed unanimous resolution of the industry to proceed with the formation and adoption of the necessary standards in sizes and grades, together with methods of interpreting and applying these standards.

A second general conference was held in 1922, at which a central committee was formed. This committee organized a larger group, the consulting committee on lumber standards, the members of which were appointed from all interests to work out the detailed data and appropriate recommendations, which were submitted to the third general conference, held in 1923. This conference accomplished two great objectives, namely: First, by the elimination of unnecessary and often wasteful sizes, the number of actual finished yard lumber items were reduced nearly 60 per cent, and by fixing definitions of basic grades a firm foundation was established for grade equalization. Such simplification of business practice meant economies of great magnitude. Second, and even more important through the operation of the recommendation, the home builders of America were assured a supply of standard lumber and standard practices maintained by the united forces of the industry.

This conference made full provision for the consideration of necessary details to complete the undertaking. These details were considered at the fourth, fifth, sixth, and seventh conferences, the last held in 1928. The principal subjects considered and upon which affirmative action was taken at this conference were: (1) Revisions in the structural material provisions, (2) dryness of lumber as a basis for the measurement of sizes, (3) classes of lumber dryness, (4) uniform patterns for worked lumber, (5) representation of the illustrations of the 7,000 series of moldings by showing them in full size and in perspective, (6) amplification of basic provisions for factory and shop lumber, (7) clarification of tables

of sizes of worked lumber, (8) revision in the methods of packing western red shingles, (9) nomenclature of commercial softwoods, and (10) several minor matters relating to other features of the current standards.

Following revision conferences at which constructive changes were made in the American Lumber Standards, revised editions of Simplified Practice Recommendation No. 16 were issued by the Bureau of Standards. The present revised issue embodies all changes up to date. It has been accepted by producers, distributors, users, and other interested organizations, representing a substantial portion of the industry. As a result of the high degree of acceptance, the central committee on lumber standards, which represents the industry in respect to this movement, estimates that more than 90 per cent of softwood lumber is manufactured to size, graded and shipped under association grading rules conforming to American Lumber Standards.

The preparation of commercial standards for articles made of wood, under the auspices of the Bureau of Standards, has been of great importance to the lumber industry. Of the 36 commercial standards developed through the cooperation of the bureau's division of trade standards, there are 5 in the field of lumber products, including Hickory Golf Shafts, Aromatic Red Cedar Closet Lining, Mopsticks, Red Cedar Shingles, and Plywood. The motivating influence behind the standardization of quality grading of hickory golf shafts was the trade organization formed by the manufacturers of this commodity known as the Hickory Golf Shaft Manufacturers Association—a small group of farseeing men who were firmly of the conclusion that inferior hickory shafts and not other competing materials were the cause of their diminishing business. They regarded well-selected hickory as the proper and time-tested material for the superior golf shaft. They claimed that hickory absorbed the shock created by the impact of the club head with the ball in the same manner that the wooden hammer handle absorbs the shock imparted to the hammer head with each blow. With the growing popularity of the game they observed the increased use of poor quality, soft, unresilient hickory shafts that came about chiefly through inability on the part of new inspectors to recognize good golf shaft material.

Visual inspection, together with a flexing of the shaft in the inspector's hand, was the only known manner of arriving at an opinion as to the quality of a shaft and quite often differences of opinion were registered by qualified inspectors. The chief requisites of a good hickory golf shaft are straight grain and stiffness. It is obvious that straight grain is essential because of the strength required to withstand the strain imposed by the impact of the club head with the ball, or perhaps with some more secure portions of the landscape. The other cardinal requirement is not resilience, nor is it exactly summed up in the term "stiffness," but is a measure of this property, for what a golfer really needs is a shaft with the property of a sudden return to its normal form after being bent. This characteristic is found in well-selected hickory grown under favorable conditions, which incidentally comprises only a rather small percentage of the total cut of the species. When the club is swung in the direction of the ball the force of the down swing causes a flexure of the shaft and the efficacy of the stroke depends upon the speed with which it returns to normal position.

Manufacturers recognized the fallacy of manual tests and accordingly devised a testing machine by which comparable results could be obtained by different manufacturers and by which golf-club makers could test the shafts they purchased. The shaft producers in cooperation with club markers, professionals, and others set up their own quality specifications in which all shafts are divided into four classes. The very finest can thus be selected for the top-flight golfers, who demand a very stiff shaft. The next grade is suitable for the player who prefers a shaft with a little more flexibility, while the two lower grades may be quite suitable for the clubs used by beginners.

Since lumber enters into construction to a very large extent, the adequacy of existing local legislation affecting its use is of vital importance to the industry. Many cities and towns have building codes which go into more or less detail when stating how various building materials may be used. The reason for doing this, briefly, is to prevent people from getting hurt. Experience has demonstrated that without such safeguards, the ignorant, the careless, and unscrupulous will erect, or will permit to remain, a certain proportion of unsafe structures whose collapse or destruction by fire will inevitably bring about suffering or loss of life. About 1,500 local codes now attempt to exercise this police power through the medium of building codes and with varying success. Some are based on accurate information and express their intent clearly. Others are well meant but fall short of handling the subject as it should be treated.

In the Department of Commerce building code committee, which functions through the Bureau of Standards, there has existed for some years a body organized for the expressed purpose of making available suggested minimum requirements based on the best information to be had. In dealing with minimum requirements for lumber, as in the case of other materials, the building code committee has been careful to scrutinize available test data, to collect the experience of architects and engineers, and to consult the representatives of the industry itself. It has issued a number of reports that have come to be accepted as standard works of reference wherever local codes are being adopted or revised.

Safe working stresses for structural timber and the relative fire hazard of frame construction as compared with other types are among the subjects that have been considered. Small house construction in particular has received attention and is the subject of a special report having the largest circulation of any thus far issued by the committee. It is the hope of the committee that its recommendations will tend not only to insure safety for the occupants of buildings, but will also operate to insure the maximum usefulness of various building materials, including lumber.

Active consideration is being given by the fire resistance section of the Bureau of Standards to the matter of increasing the fire resistance of constructions comprised wholly or partly of wood. Solid

partitions of wood 2¼ inches thick, chemically treated to reduce flammability, have been tested and found to withstand a severe furnace fire for one hour before burning through. Wood frame partitions covered with lath and plaster or other facings have withstood similar tests for periods from a half hour to an hour and a half. It has also been found in the tests made that the fire resistance of wood-bearing members, such as columns, can be greatly increased by relatively thin protective coverings applied over the column shaft and by metal caps connecting it to the floor members.

The cooperative services of the Bureau of Standards that have been extended to the lumber industry, as partially reviewed in this article, have also been extended to other industries in the controlled movement to eliminate avoidable industrial and commercial waste through the application of the principles of simplified practice and standardization.

INTERNATIONAL COMMISSION FOR UNIFORM METHODS OF SUGAR ANALYSIS

The International Commission for Uniform Methods of Sugar Analysis deals with all matters of international importance relating to the scientific and technical aspects of the world's sugar industry, including standards, physical constants, and analytical methods. It is especially concerned with those factors which enter into the technical aspects of the determination of value in the buying and selling of sugars. There have been seven previous sessions of the commission, the first being held in Hamburg in 1897, the last in New York in 1912. Owing to conditions which developed following the World War it was found impossible, despite many urgent questions pressing for solution, for the commission to be reconvened.

As a result of numerous requests, including an urgent one made shortly before his death by Dr. Alexander Herzfeld, president of the commission, the Bureau of Standards through Frederick Bates, chief of the bureau's polarimetric work, undertook the rehabilitation and reorganization of the commission. A comprehensive program was prepared covering 14 major subjects, and referees and associate referees from the world's leading authorities in each subject were appointed. After a year and a half of correspondence between these committees to eliminate minor international disagreements, the bureau made the announcement that the eighth session of the commission would be held in Amsterdam, the Netherlands, the week of September 5, 1932.

In order that the commission might function systematically a constitution and by-laws had become of fundamental importance, and especially was this the fact to determine the voting power of each of the nations in the commission. A suitable instrument was finally prepared at the bureau and Mr. Bates visited the principal European countries in advance of the session at Amsterdam and succeeded in eliminating practically all international objections. As a result of this procedure the constitution and by-laws were adopted immediately the session convened, and the commission for the first time in its history had a definite rule of procedure. In the 20 years that had passed since the seventh session many important changes had taken place in the world's sugar industries. New scientific methods had sprung into use in the different countries and a great mass of new information had been evolved as a result of intensive research following the war. With the assembly of the delegates at Amsterdam it became evident that the elimination of differences and the adoption of international agreements on the principal subjects of the agenda were imperative.

The sessions, lasting four days, were conducted in English, French, and German, with a member of the bureau's staff presiding. Approximately 50 delegates assembled for the sessions, representing most of the principal sugar-producing sections of the world and included many of the principal organizations from the different countries as well as representatives from the Physikalisch-Technische-Reichsanstalt, the National Physical Laboratory, the Czechoslovakian Sugar Institute, the German Sugar Institute, the British Government's chemical laboratories, and industries using sugar products.

In addition to the adoption of a constitution and by-laws, the sessions adopted the Bureau of Standards numerical values for the standardization of the saccharimeter, the presence of the error in all instruments on which the world's sugar is bought and sold gives results more than one-tenth of 1 per cent lower than they should be. Despite the fact that practically all buying and selling of sugars continued on the old basis, the error was ordered corrected by the Secretary of the Treasury in all instruments used in the United States customs laboratories for purposes of collecting import duties. The increased revenue resulting from imported sugars as a result of the correction of this error has been very large.

FEDERAL SPECIFICATIONS

Ten specifications were acted on by the Federal Specifications Board during the month of October. Of this number two proposed specifications and eight revisions have been sent out for official comment and criticism. Copies of these specifications are available in mimeographed form and further information can be obtained from the Federal Specifications Board, Bureau of Standards, Washington, D. C.

New designation	Specifications proposed	Old F. S. B. No.
	Pipe, clay, sewer	
	Dishwashing machines and dish racks or baskets	
	Specifications to be revised	
FF-H-101a	Hardware, builders' (nontemplate)	
FF-P-101a	Padlocks	
GG-E-671	Erasers, steel	539
GG-R-791	Rulers, desk	360
HH-I-531	Insulation, rubber, for wire and cable for general purposes	587
SS-C-571	Aggregate for Portland cement concrete	
SS-F-351	Aggregate for Portland cement concrete	
WW-C-623a	Couplings, hose, garden and water	
ZZ-C-222	Catheters, rubber	222

RESEARCH ON RUBBER

Work of Bureau of Standards on Electrical Properties of Rubber Will Save Considerable Money on Cable Purchases

By A. T. McPherson, *Bureau of Standards*

Research on rubber conducted by the Bureau of Standards has for its main purpose the development of basic scientific knowledge of the material—such knowledge as may come from preparing rubber of very high purity, from crystallizing and distilling it, and from measuring mechanical, optical, and electrical properties with high precision. Work of this character is important because rubber, though used extensively, is a material about which relatively little is known.

The unique property of rubber which virtually sets it apart from all other known substances is its remarkable ability to stretch, yet the reason for its stretching has not been fully or adequately explained. Even tables of engineering properties which are so commonly used for other materials are not available for rubber. In consequence, new uses and applications in large measure have to be developed by the tedious and costly method of trial and error. Practical applications have so far outstripped the progress of scientific study that the industry may derive a greater ultimate benefit from an increase in the store of basic knowledge about rubber than from direct assistance with practical technological problems.

This is the first of a series of three articles by Mr. McPherson showing the relation of certain portions of the work of the Bureau of Standards to the rubber industry and how it benefits not only the industry, but also the Government and the public as consumers of rubber products. In the December Commercial Standards Monthly, the author will discuss specifications and standards for rubber products.

A study of the electrical properties of rubber is an investigation which has been in progress at the Bureau of Standards for a dozen years. Rubber-sulphur compounds have been prepared in an unbroken series from soft to hard rubber, and electrical properties, such as dielectric constant, power factor, and conductivity, have been charted on all these compounds at temperatures from −100° F. up to as high as 450° F. and at frequencies of 60 cycles per second to 300 kilocycles per second.

Another investigation has for its purpose the purification of rubber. The highly purified rubber is a clear, colorless, transparent elastic solid, as clear and colorless, in fact, as the best plate glass. This pure rubber can be repeatedly crystallized, thus opening the possibility of successfully fractionating it into its constituent hydrocarbons and eventually of determining the formulas of their molecules.

The Bureau of Standards has also succeeded in distilling the purified rubber by heating it in a high vacuum to the temperature of boiling water. The rate of distillation, however, is not sufficiently great to make this process of value for purifying rubber in any quantity.

A study of the thermodynamic properties of rubber is now in progress, the immediate concern of which is the precise measurement of the specific heat of rubber from room temperature down to temperatures of liquid hydrogen near the absolute zero. These researches are typical of the fundamental work on rubber in which the Bureau of Standards is engaged. The major investigation frequently leads to many ramifications. For instance, studies on photoelastic effects necessitated the development of a gage by means of which sheets of rubber could be measured to a ten-thousandth of an inch without compressing them appreciably. The value of fundamental research in connection with rubber may be illustrated by reference to the work on the electrical properties of rubber.

In 1930 the United States Coast Guard approached the Bureau of Standards with a problem pertaining to telephone cables which were laid in shallow water to connect coast stations and lighthouses. Some of these cables were giving poor service and required replacing in the relatively short period of 10 or 15 years. In many cases failure was due to deterioration of the rubber, and in other cases to mechanical wear on account of pounding by the surf on a shallow coral bottom. Communication on some of the longer lines where failure had not occurred was unsatisfactory on account of the electrical characteristics of the rubber.

Some of the work which the Bureau of Standards had been doing in the study of the electrical properties of rubber was directly applicable to the problems involved, so that the Coast Guard engineers, together with the manufacturers, and the bureau staff, were able to design new types of cables having better and more durable insulation. The problem of abrasive wear on coral bottoms was solved by applying a tough rubber jacket which was capable of outlasting several times its thickness of heavy steel armor wires. The new type of cables have been in use now for two years and not only show much improved electrical performance, but give promise of long life as well.

While no attempt will be made to assign a definite value to this single application, it may be stated that submarine telephone cables cost $1,000 to $2,000 per mile, and annual purchases by the Coast Guard may amount to the order of $100,000. Consequently, if even only a small improvement is effected, the saving to the Government will more than compensate for the entire outlay for the investigation.

It is proper that the Bureau of Standards should engage in the development of new knowledge about rubber because it can conduct thorough investigations which are beyond the scope and facilities of most industrial laboratories. The results of such work have such broad and far-reaching applicability that they will be of ultimate benefit to producer, manufacturer, and consumer, alike.

STANDARD SPECIFICATIONS FOR ROAD CONSTRUCTION

American Association of State Highway Officials Has Developed Standards for Building and Marking Roads

By E. W. James [1]

The American Association of State Highway Officials is an organization composed of representatives of the State highway departments of the several States. These groups of administratives and engineers have many problems in common incident to operations under the Federal-aid highway act, and it was early apparent in the course of their operations that the adoption of standards established by this association would greatly facilitate the handling of plans and specifications involved in Federal-aid projects.

The fact that the Secretary of Agriculture is specifically required by the act to approve specifications for highways to which Federal aid is allotted makes the use of standard specifications extraordinarily convenient in the administration of the law, inasmuch as the use of standards once approved insures the expeditious approval of new projects.

Almost coincident with the organization of the association, a committee on standards was created and has been active in developing and producing specifications which are now generally accepted throughout the field of highway construction. Two volumes have been issued, of 294 and 233 pages, respectively, entitled "Tentative Standard Specifications for Highway Materials and Methods of Sampling and Testing" and "Standard Specifications for Highway Bridges and Incidental Structures."

The first volume contains tentative standards for 40 materials used in highway building. These specifications cover all of the common materials required for building macadam, Portland cement concrete, bituminous, and brick road surfaces and, in addition, many specifications for special materials, such as wire fabric for reinforcement, premolded expansion joint material, traffic paint; base metal for corrugated culverts, and asphalt emulsions.

The specifications for methods of sampling and testing run parallel with the materials specifications and include general methods for testing cement, stone, gravel, and sand. Besides these general tests there are many others, comprising 74 in all, which cover special details, such as the quality of soft pebbles in gravel destined for use as aggregate, the percentage of shale in aggregate, surface moisture in fine aggregate, wire rope for guard rail, and methods of taking samples of hardened concrete.

The standard specifications for highway bridges comprise a complete series of specifications for bridges and incidental structures, including general provisions of 21 materials; general construction of 18 items; special construction of 8 items; and a section on design establishing standard requirements for highway bridges. The design section of the bridge specifications provides for steel, timber, and reinforced concrete structures.

The volume on materials and testing is the first of its kind that has ever been issued to cover the highway field exclusively, and the volumes together, which were issued in 1931, constitute the most complete set of highway specifications so far produced.

The association has been active also in standardizing highway signs and markings, and has issued a manual covering the manufacture, display, and erection of standard road markers and signs. This manual is the outgrowth of an effort to systematize traffic control on rural highways, incident to the selection of a considerable mileage of interstate routes of primary character.

On February 20, 1925, the then Secretary of Agriculture, Henry M. Gore, pursuant to a resolution adopted by the American Association of State Highway Officials, appointed a joint board on interstate highways "to undertake immediately the selection and designation of a comprehensive system of through interstate routes and to devise a comprehensive and uniform scheme for designating such routes in such a manner as to give them a conspicuous place among the highways of the country as roads of interstate and national significance."

As the work devolving upon the board progressed, the need of expanding the scheme of appropriately designating the routes selected with identifying markers to include a series of standard warning, caution, and directional signs became more and more apparent. Keenly appreciating the opportunity afforded to promote safety on the highway by the adoption of signs of standard design, the joint board appointed a subcommittee on signs to consider the matter. The subcommittee was charged with the responsibility of developing a comprehensive series of signs of this character such as might be adopted as standard by all the States, and to replace as far as practicable the almost countless signs of miscellaneous design then in use. Many of these were "scare" signs, which by their legend, color, or shape induced reactions that defeated their object. Many carried advertising matter in letters more conspicuous than their warning, and others were of "freak" outline, such as the "skull and crossbones" or the outline of a coffin, more appalling than arresting. In another category are the signs conforming to State standards, adopted in many States, and the signs erected by well-intentioned safety organizations. These have had their part in promoting the safe use of the highways, but inasmuch as the design of the former invariably changed at State lines and the latter had even more restricted application, they were lacking in that coordination essential to efficient effort.

In investigating the situation, the subcommittee received enthusiastic cooperation from the Bureau of Standards, the National Conference on Street and Highway Safety, the National Safety Council, the Council of National Research, the American Engineering Standards Committee (now the American Standards Association), the Psychological Laboratory of Johns Hopkins University, the Bureau of Public Roads, the Westinghouse Co., and the General Electric Co.

[1] Chairman, committee on standards, American Association of State Highway Officials.

The signs recommended by the subcommittee and approved by the American Association of State Highway Officials are divided into three classes: (1) Route markers, carrying the identifying road number and State name; (2) caution and warning signs; and (3) directional and informational signs.

In addition to the legend carried, the character of information or warning is indicated by the shape of the sign. The road number is carried on a shield. For railroad grade intersections the circular disk with its appropriate legend previously adopted by the American Railroad Association is exclusively used to indicate approaches to the intersections. The "Stop" sign indicating the maximum degree of caution is octagonal. All legends for potential hazards existing within the road limits are carried on a diamond-shaped placque, and for those of more or less intermittent character attributable to sources outside the actual road limits a square placque is used. Directional signs are all rectangular, the dimensions varying with the wording. There are also several supplementary signs, for example, the R and L used in connection with the shield marker to indicate respective turns, and the directional, confirmational, and detour arrows.

All shield markers and their supplementary turn indicators have a black legend on a white background. Directional and informational signs are also of this combination. All caution and warning signs, including the railroad disk, carry a black legend on the "Federal yellow" ground color. This combination is also used for the octagonal "Stop" sign, although it is permissable to add a red band across the middle third of the placque at the option of the State highway department.

When designed for strictly rural use, all caution and warning signs are 24 by 24 inches over-all. When, however, these are designed to be erected in congested areas where there may be inherent objections to the larger size, it is permissible to reduce the over-all dimensions to 18 by 18 inches with a harmonious reduction in the size of the lettering. The railroad crossing disk and octagonal "Stop" sign are also 24 inches in diameter, but it is entirely permissible to increase the size at points where it is necessary to emphasize the hazard. These signs are all nonluminous, although the yellow background which conforms to rule 53 of the sectional committee on color code of the American Standards Association seems to have a high degree of reflecting of efficiency under automobile headlights.

The final recommendations of the joint board embodied the best thought on the subject, and its recommendations have been accepted by all the State highway departments. Obviously the erection of the standard road markers is restricted to the system of United States highways selected by the American Association of State Highway Officials to be systematically numbered. The caution and warning signs, however, are essentially safety devices of great value, and as such can and should be displayed at all hazardous points, whether on United States routes, State highways, local roads, or for that matter, in city streets.

A surprising degree of progress has been made in the erection of the signs not only by State highway departments, but also by counties and other political subdivisions, and the traveling public is rapidly being educated to recognize their purpose and utility. The experience of the past four years or since the work was actively inaugurated warrants the opinion that in a relatively short time practically all highways will be adequately signed with standard signs to the exclusion of the advertising media or other undesirable displays.

Efforts along this line have been greatly enhanced and encouraged by the publication by the American Association of State Highway Officials of a manual of specifications for the manufacture, display, and erection of United States standard road markers and signs. A great many copies of this manual have been distributed gratuitously to State highway departments, county engineers, sign manufacturers, unofficial local safety committees, and city engineers or municipal authorities charged with the regulation of urban traffic. The manual has also been accepted for suburban use, and as far as applicable for city use by the National Conference on Street and Highway Safety and the American Engineering Council.

As the title indicates, the manual also sets forth and illustrates by numerous diagrams the manner in which the signs should be erected at critical points so that the road user is not only educated to a quick recognition of the warning or direction, but also to a realization of the location of the hazard or directional change with respect to the indicating sign. The manual was made the basis of a similar handbook for municipal use which has been published by the National Conference on Street and Highway Safety. In 1931, it became evident that a sharp distinction could not wisely be drawn between a code of signs used for rural highways and a corresponding code for municipal use. In consequence, a movement was set on foot to combine the two existing manuals into a single standard.

A joint committee composed of representatives of the American Association of State Highway Officials and the National Conference on Street and Highway Safety is now engaged on this work.

RED CEDAR SHINGLES

In a recent visit, Arthur Bevan, secretary-manager of the Red Cedar Shingle Bureau, stated that as of September 15, the red cedar shingle industry was oversold to the extent of 226 carloads after clearing all stocks on hand. The mills are now operating at about 50 to 55 per cent of their full capacity and are realizing a profit. During the past three months employment in the shingle industry has almost doubled, the Red Cedar Shingle Bureau itself having added six new employees to its pay roll in the past two months.

Mr. Bevan indicated that the establishment of the Commercial Standard for Red Cedar Shingles, CS31–31, with the cooperation of the division of trade standards of the Bureau of Standards, together with the use of a certification label based on rigid inspection and backed by the Red Cedar Shingle Bureau, has been largely responsible for increased public confidence in the top-grade shingles and for the present improved condition of the industry.

STANDARDIZATION OF SHOES FOR TRUCKS AND TRACTOR SNOW PLOWS

The possibility of standardizing shoes or rollers for truck and tractor snow plows has been under study by a joint committee representing the American Association of State Highway Officials, and the American Road Builders Association. W. F. Rosenwald, maintenance engineer of the Minnesota department of highways, is chairman of this committee.

After studying the practice and equipment of the various highway departments and manufacturers of snow removal equipment, the committee has announced that it feels the time has not arrived to attempt a standardization recommendation of shoes or rollers. The committee, through its chairman, points out that there is absolutely no uniformity among the manufacturers and but very little among the States.

There appears to be a tendency to use rollers or short broad shoes on slow moving snow plows, but where the normal operating speeds are fast, to use longer shoes; the shoes being longer and narrower with the higher operating speeds. The longest and narrowest shoes are found in the West Central States, where apparently the highest operating speeds prevail. From this, states Mr. Rosenwald, it would seem that until more uniform operating speeds are possible, the standardization of shoes is probably out of the question; and operating speeds are largely governed by the physical nature of the highway, as to cross section, alignment, and drift forming obstructions at the roadside.

There is a feeling on the part of some of the members of the committee that it would be practical to standardize the hitch or method of hitching truck snow plows, particularly with a view to having blade and V plows quickly interchangeable and applicable to all truck units of a comparable capacity. This same view was expressed last winter by the Mississippi Valley Conference of State Highway Departments, and this matter is now being considered by the American Association of State Highway Officials and the American Road Builders Association, with the possibility of adding it to the program of the existing joint committee of these two organizations on the standardization of snowplow shoes.

SHOVEL AND CRANE MANUFACTURERS ADOPT STANDARDS

The Shovel and Crane Manufacturers Association recently adopted a set of standards, which became effective October 1, 1932, applying to the manufacture and sale of full-revolving crawler mounted types of shovels and drag-line excavators up to and including two cubic yard capacity and to full-revolving crawler mounted cranes up to and including a designated size of 50 tons.

These standards contain a guaranty clause which states that members of this association shall attach to their machines, in a conspicuous place inside the cab, a guarantee plate reading, as follows:

This machine with its rating is guaranteed by the manufacturer to conform to the standards adopted by the Shovel and Crane Manufacturers' Association and in effect at the time of manufacture. These standards are a matter of record and are on file with the American Society of Mechanical Engineers and the Associated General Contractors of America.

ELECTRICAL DEFINITIONS AVAILABLE

The report on the proposed American standard Definitions of Electrical Terms upon which the sectional committee on electrical definitions has been working for more than three years, is now available in pamphlet form (208 pages) from the headquarters of the American Institute of Electrical Engineers, 33 West Thirty-ninth Street, New York, N. Y., at $1 a copy.

The primary aim in compiling this glossary has been to express for each term the meaning which is generally associated with it in electrical engineering work in this country. When possible, the definitions have been generalized so as not to preclude the different specific interpretations which may be attached to the term in particular applications, the greatest weight naturally being given to the strictly engineering applications. In this glossary the field of electrical engineering is divided into various groups and subsidiary sections, and the terms arranged accordingly so as to permit ready comparison of closely related terms.

A unique feature of this glossary is a system of numbering which identifies each term. Similar glossaries in other languages are in preparation under the auspices of the International Electrotechnical Commission, and it is contemplated that the number assigned to each term will be the same in all languages.

IDENTIFICATION OF COTTON DUCK IN TRADE LITERATURE

All of the manufacturers that have accepted simplified practice recommendation No. 27, covering cotton duck (first revision), have expressed their intention to identify the simplified lines in new catalogue and trade lists.

Many national associations representing users of simplified commodities have for some time strongly urged that this policy be adopted by manufacturers who have accepted the various simplified practice recommendations. The general adoption of the identification plan will assist this industry in maintaining close adherence to the waste elimination program. Cooperation by purchasing agents, fabricators, and others will greatly increase the benefits and economies possible through simplified practice.

The cotton-duck recommendation, which was proposed and developed by the industry in 1924, and subsequently revised in 1927, has been instrumental in reducing the number of varieties of this commodity from 460 to 90, or an 80 per cent elimination.

This is the fifth simplified practice recommendation wherein all manufacturer acceptors have decided to identify their commodity as being in accordance with the industry's recommendation. In accepting others of the more than 130 programs, an increasing number of manufacturers are identifying their commodities as conforming to specific simplified practice recommendations. When the simplified lines are so identified in trade literature their selection can be made without difficulty and often much waste now incurred in checking files and auxiliary records for these data is eliminated.

BRITISH STANDARD FOR XYLOLS

One of the functions of the chemical section which has been formed in the reorganized British Standards Institution, has been to take over standard specifications which had been previously prepared by various sections of the chemical industry, and having considered them fully, from the point of view of users and manufacturers, to issue them as British standard specifications.

Under this scheme, the standard series of specifications prepared by the National Benzole Association are being reviewed by a representative committee of the institution. The first specification of the series is that (designated 458–1932) which lays down the composition and properties of xylol, a constituent hydrocarbon of coal naphtha which forms an important proportion of so-called solvent naphtha.

Copies of the specification may be obtained from the publications department of the British Standards Institution, 28, Victoria-Street, London, S. W. I.

ANNUAL MEETING OF THE A. P. I. HELD IN HOUSTON, TEX.

The annual sessions of the American Petroleum Institute are being held November 15, 16, and 17, in Houston, Tex. Forty working committees of the institute are holding meetings preliminary to the general sessions to consider a large range of diversified subjects.

The subjects being considered by these committees include uniform laws, testing methods, fundamental research on occurrence and recovery of oil, refinery technology, specifications and standardization, production records and nomenclature, fire prevention, car service and freight classification, etc.

WALNUT VENEERS

The American Walnut Manufacturers Association has requested the cooperation of the Bureau of Standards in the establishment of commercial standard grading rules for walnut veneers. The rules will cover the minimum sizes of flitches in the several grades, the percentage of clear cuttings and the size of the pieces, together with the defects that will be tolerated in each grade. The system will make it possible to sell veneers on the basis of grade rules and small swatches in place of the large expensive and cumbersome full-length samples as now used. A proposed commercial standard was developed by the association and was submitted on October 20 for consideration at a general conference. The action taken by that conference will be reported later.

BUREAU PUBLICATION ON PAINT

In response to demands from several branches of the Government service for information and specifications for priming paints for plaster surfaces, a number of commercial and experimental paints have been tested by the Bureau of Standards on plaster, concrete, and other porous surfaces.

The results of these tests are contained in Bureau of Standards Miscellaneous Publication No. 137, Paint for Priming Plaster Surfaces, which has just been made available to the public through the Superintendent of Documents, Washington, D. C., at 5 cents a copy. Several novel methods of test are described, and results obtained with 40 priming paints are recorded in this new pamphlet. It is found that a number of primers are commercially available which satisfactorily meet the requirements for a good material for this purpose with respect to hiding power, ability to so effectively seal a porous surface with one coat that the appearance of a second (finishing coat) of either flat or glossy oil or varnish paint will after drying have the same appearance as when applied to an impervious surface. It was found in the experimental work that the appearance or adherence of paint applied to any of the primers was materially affected by excessive moisture. A suggested specification based upon physical tests and comparison with a primer that can be readily mixed from specified materials is given in an appendix.

PAINTS, VARNISHES, AND CONTAINERS

Simplified practice recommendation 144–32 covering paints, varnishes, and containers has been accorded the required degree of written approval by all elements in the industry, and is to be effective from November 1, 1932.

This simplification program is the outgrowth of simplified practice limitation of variety recommendation No. 1, paints and varnishes, in which a definite maximum number of colors of paints and sizes of containers were recommended. Such maxima were recognized as limitations against further diversification, thus furnishing a basis from which the present simplified practice recommendation has been developed. The new schedule recommends several further reductions in the number of sizes and varieties of containers used in packing various kinds of paints and varnishes.

The table which provides for a maximum number of shades or tints to be produced or stocked by any one concern in the limitation of variety recommendation remains unchanged, and is included as a part of the present simplified practice recommendation.

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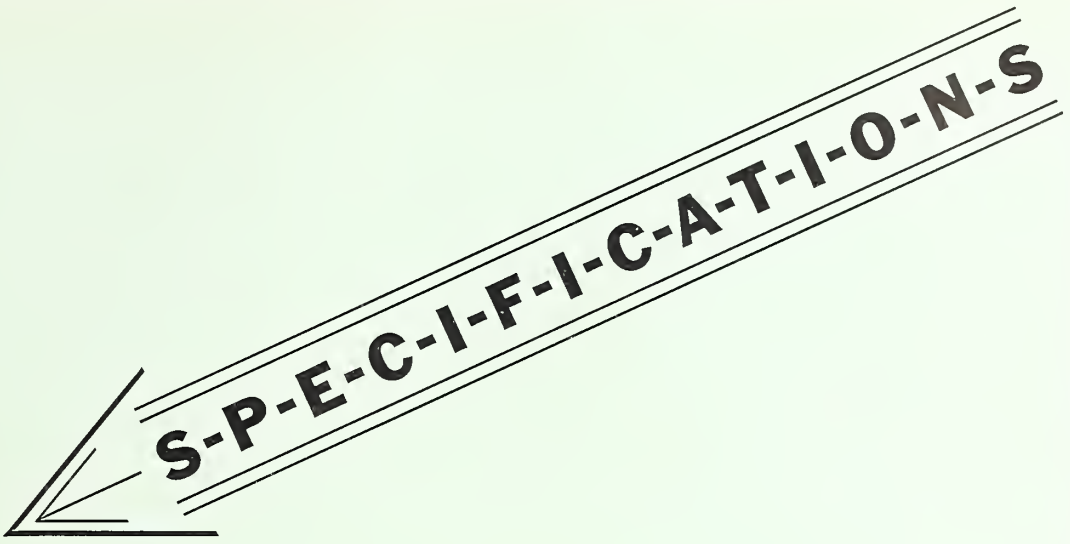

To determine whether an applicable specification exists for any commodity—consult—

National Directory of Commodity Specifications, 1932

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