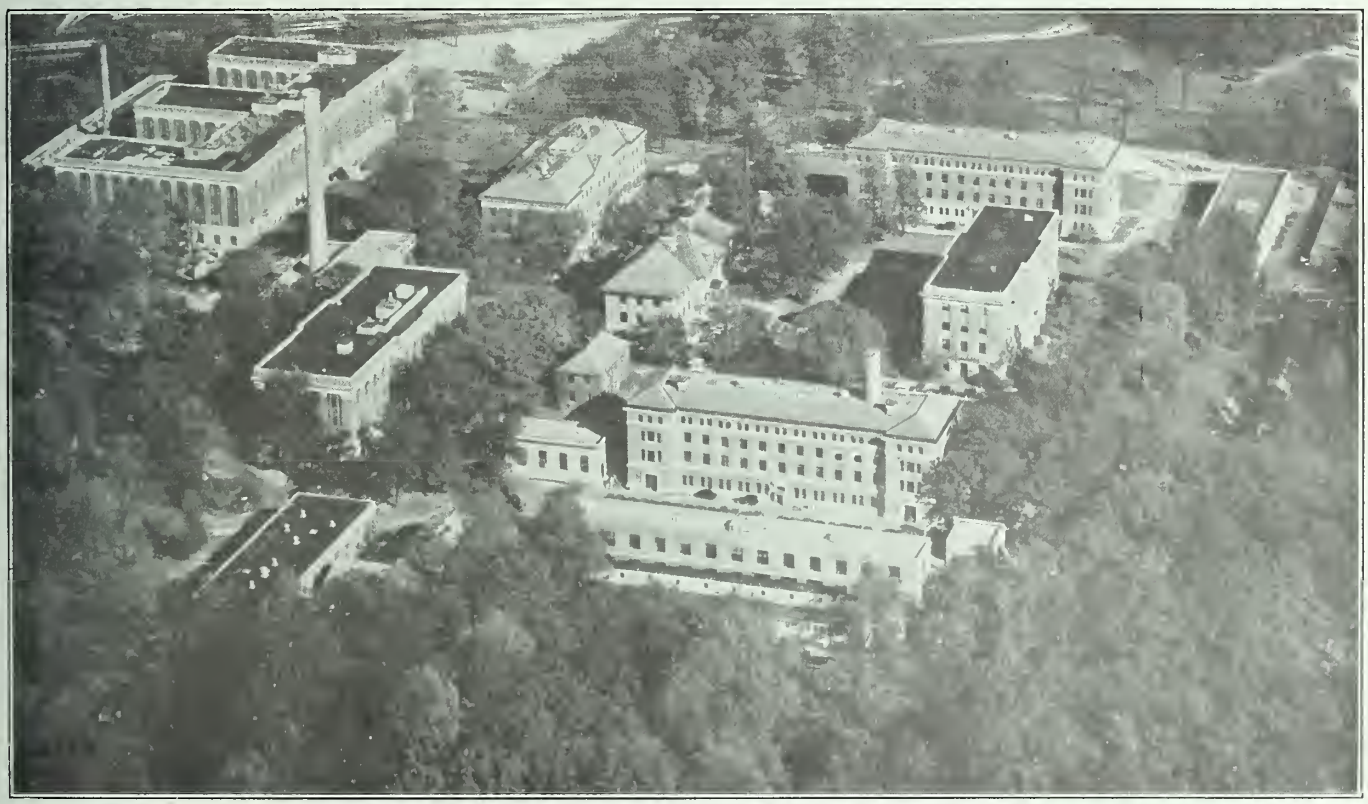
COMMERCIAL STANDARDS MONTHLY

A Review of Progress in Commercial Standardization and Simplification



AIRPLANE VIEW OF NATIONAL BUREAU OF STANDARDS

ISSUED BY THE NATIONAL 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
R. P. LAMONT, Secretary
NATIONAL BUREAU OF STANDARDS
GEORGE K. BURGESS, Director

COMMERCIAL STANDARDS MONTHLY
S. F. TILLMAN, Editor

DIVISIONS OF THE COMMERCIAL STANDARDIZATION GROUP

DIVISION OF SIMPLIFIED PRACTICE, EDWIN W. ELY.

The division of simplified practice was formed in November, 1921, to provide a clearing house or centralizing agency through which the manufacturer, distributor, and consumer groups could meet to discuss their common problems and decide upon eliminations which would prove of mutual benefit to all concerned. The activities of the division are purely cooperative in character. It orders nothing; it dictates nothing; the initiative must come from business itself. It has no regulatory nor police powers to enforce adherence to the simplified-practice recommendations that industry develops under the auspices of the United States Department of Commerce. Its chief function is to serve as a neutral meeting ground for the purpose of bringing together producers, distributors, and consumers, whose aims are sometimes divergent and possibly antagonistic, and who would be unwilling to cooperate, except through some unbiased central agency. Following the approval of the tentative simplified-practice recommendation by a general conference of all interested elements thereof, the project is then presented to the entire industry by letter referendum for its approval and written acceptance, the publication and indorsement of the recommendation on the part of the Department of Commerce being dependent upon acceptance of the program by at least 80 per cent, by volume, of the manufacturers, distributors, and users concerned.

BUILDING AND HOUSING DIVISION, J. S. TAYLOR.

The division of building and housing cooperates with business, technical, and professional groups in practically all its undertakings on building and housing. Its work to modernize building codes and to encourage improved standards for the quality of building construction promotes the practical application of the latest development in design and use of building materials. This division was also formed in 1921.

In furthering home ownership, an effort is made to develop an enlarged, steadier, more intelligent, and more discriminating demand for soundly built dwellings, the largest single class of buildings which the construction industries provide. The division also cooperates with many 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 in mind the broad objective of buildings made more useful because well located with respect to other buildings, a well-coordinated street system, and appropriate public works. Good city planning and zoning likewise encourages stability in land values and property uses, and thereby contributes to the demand for durable structures.

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. The cooperation with technical societies and trade associations includes ascertaining the standardization and specification promoting activities of these organizations, and bringing to their attention the work being done by the commercial standardization group. The cooperation with governmental agencies and other consumers includes the bringing of Federal specifications and commercial standards to the attention of the maximum number of producers and the maximum number of users of commodities complying with these specifications and standards, thereby assisting in broadening the field of supply. The cooperation with producers involves the compilation and distribution of lists of manufacturers who have expressed their willingness to certify to purchasers, upon request, that material supplied by them on contracts based on certain Federal specifications or commercial standards comply with the requirements thereof. The cooperation with distributors involves bringing to their attention the benefits to be derived by them as both buyers and sellers from handling nationally specified, certified, and labeled commodities. The division prepares the directories of governmental and nongovernmental testing laboratories; the Directory of Specifications; and is working on an encyclopedia of specifications, the first volume of which, Standards and Specifications in the Wood-Using Industries, has been issued. It also aids in preparing the Standards Yearbook.

DIVISION OF TRADE STANDARDS, I. J. FAIRCHILD.

The commercial standards unit, now known as division of trade standards, was created on October 1, 1927, for the purpose of aiding those industrial and commercial groups desiring to establish standards of grades, quality, or measurements for their products or their purchases on a purely voluntary basis.

The division functions only at the direct request of the industry concerned. Its procedure is similar to that of the division of simplified practice, except that at least 65 per cent of the industry, by volume of annual production, must accept the commercial standard in writing before it is published by the Department of Commerce. A certification plan is applied on request as a means of increasing the effectiveness of such standards. 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.

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CONTENTS

AN INVITATION TO VISIT THE BUREAU OF STANDARDS

An interesting fact in the growth of the bureau is the steady increase in the number of visitors. From all over the world experts come to see the work in progress in many specialties. Not alone the experts but in growing numbers many of our people visit the bureau from a public-spirited desire to acquaint themselves with its research work. All visitors, from the newspapermen, who have called the bureau a "house of wonders," to the specialists, who use its services, are welcome, for it is their bureau in a very real sense. They are the owners of the business and its beneficiaries. The annual per capita cost of 2 cents which the average citizen pays toward the operation of the bureau yields returns sometimes a hundredfold or a thousandfold. How science turns wastes into profits, increases the useful life of materials, adds new efficiencies to industry, advances new arts, such as aviation and radio, by research and discovery—these are to be seen first-hand in the scientific and technical laboratories of the bureau.

A cordial invitation is extended to all citizens 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.

GEORGE K. BURGESS, *Director.*

10178—30——1

CONFERENCE ON HOME BUILDING AND HOME OWNERSHIP

The presidential announcement on home building and home ownership, made August 1, 1930, is as follows:

After wide consultation with interested leaders, I have decided to undertake the organization of an adequate investigation and study on a nation-wide scale of the problems presented in home ownership and home building, with the view to the development of a better understanding of the questions involved and the hope of inspiring better organization and removal of influences which seriously limit the spread of home ownership, both town and country.

The conference will be organized by a planning committee comprised of representatives of the leading national groups interested in this field, under the chairmanship of Secretary Lamont. This planning committee will in turn set up nation-wide subcommittees to determine the facts and to study the different phases of the question. The conference will deal with the whole broad question of home construction and home ownership. It will embrace such questions as finance, design, equipment, city planning, transportation, etc.

One of the important questions is finance. The present depression has given emphasis to the fact that the credit system in home building is not as soundly organized as other branches of credit. Commerce, industry, installment buying, and to a large extent farm mortgages, all have more effective financial reservoirs. There have been months during this depression when shortage of capital available for home-building purposes has been so acute that this branch of construction has fallen off greatly, while other forms of credit have been available throughout the depression. In order to enable the purchase of homes on what amounts to the installment plan, it is necessary to place first and, often enough, second mortgages.

The building and loan associations have performed a great service in this field, but they can not, without assistance, carry the burden. First mortgages, carried so largely by the savings banks and insurance companies, have been affected by competition with bonds and other forms of investment. Second mortgages, which are also necessary to many people, have, if we take into account commissions, discounts, and other charges, risen in rates in many cities to the equivalent of 20 or 25 per cent per annum, all of which not only stifles home ownership, but has added to the present depression by increasing unemployment in the trades involved

The finance question, however, is only one of many. Greater comfort and reduction in cost of construction in many parts of the country through improved design, the better layout of residential areas are all of first importance. The expansion and betterment of homes in its bearing upon comfort, increasing standards of living, and economic and social stability, is of outstanding importance.

It is not suggested that the result of the conference will be recommendations for legislation but rather a coordination, stimulation, and larger organization of the private agencies. There, however, needs to be a study of the mortgage laws of many States with view to more intelligent attitude to the home builder. The heads of the following associations have been asked to act as initial members of a planning committee for the conference: American Civic Association, American Farm Bureau Federation, American Federation of Labor, American Home Economics Association, American Institute of Architects, Associated General Contractors, Association of Life Insurance Presidents, Better Homes in America, Chamber of Commerce of the United States, General Federation of Women's Clubs, National Association of Builders' Exchanges, National Association of Real Estate Boards, National Congress of Parents and Teachers, National Farmers' Union, National Grange, Russell Sage Foundation, Savings Bank Division American Bankers' Association, United States League of Building and Loan Associations, and the Women's National Farm and Garden Association. Others will be added.

The date of the conference will be determined by the planning committee. Funds have been provided privately to cover the entire research and other activities of the conference.

John M. Gries, who several years was chief of the division of building and housing in the Department of Commerce, will act as executive secretary.

STANDARDIZATION IN THE ARMY AIR CORPS

Aerial Superiority Dependent on Available Aircraft; Interchangeability of Parts, Through Simplification and Standardization, Makes This Possible

By F. Trubee Davison, *Assistant Secretary of War for Air*

The interest of the Air Corps in standardization of parts and of accessory equipment for airplanes dates from the very inception of the aircraft manufacturing industry. With its large number of planes, engines, and accessories, drawn from widely separated and generally competitive production agencies, the advisability of standardization from the viewpoint of commercial efficiency alone is at once apparent.

The foregoing is emphasized when military considerations are brought forward. The Air Corps is one of the Nation's principal elements of defense, and as was demonstrated in the World War, superiority in the air is of the utmost importance to the success of a campaign. Aerial superiority is dependent, not upon airplanes in stock, but upon airplanes that are in condition to fly. The number of aircraft that can be kept in action is largely dependent upon the availability and ease of replacement of parts required in their maintenance. In the future the traditional horseshoe nail, for lack of which the battle was lost, may well be supplanted by the outside hose connection which kept the plane on the ground.

Because of the necessity for the interchangeability of utility parts and accessories the Air Corps has proceeded to establish standards for the important replacement parts of aircraft. Such standardization is necessarily a slow process, as development of new aircraft and accessories would be retarded if standardization were established prematurely. In this respect the Air Corps has carefully weighed the merits of each item subject to standardization. Generally speaking, the process has involved three distinct phases.

Utility standards.

The first phase of standardization was to establish what are termed utility standards; these being such items as bolts, nuts, clevis pins, washers, turnbuckles, shackles, grommets, union connections, tank flanges, and water, fuel, and oil hose. With these standards established, it is possible for the Air Corps to carry in stock one item which can be used for replacement on a standard airplane procured from any source. In addition to simplifying replacement, standardization has enabled the Air Corps to save considerable money in the amount of stocks and of replacement tools which it is required to have on hand in order properly to maintain aircraft.

The second and probably the greatest phase of standardization was to establish standard mounting dimensions for such accessories as generators, starters, propellers, instruments, landing and tail wheels, carburetors, fuel pumps, throttle controls, and batteries. With the establishment of limiting and mounting dimensions of such accessories it has been possible to replace one manufacturer's article with that of another without the use of an adapter.

The third phase, but by no means the least important, was the establishment of standard specifications covering requirements and test procedure for materials. Whenever an article or material is considered for standardization, existing data prepared and published by recognized standards societies, the Federal Specifications Board, and other Government department specifications, are considered. In this manner, there is no duplication of effort by the Air Corps, and standards which are suitable for use in military aircraft are adopted without change.

Example of standardization.

One of the best examples of standardization may be seen in the manner in which the Air Corps standardized metal propellers. During the war, and for a considerable time thereafter, the tapered shaft was used on aircraft engines. The propeller hub with a flange and bolts around the edge of the flanges secured the wooden propeller to the outer flange. The assembled propeller was keyed and fastened to the tapered extension of the crank shaft of the engine in a manner similar to the practice used in mounting the rear wheels on the axle of an automobile.

When the metal propeller had passed through the experimental stage and proved its worth, the Air Corps set up requirements and dimensions for a number of sizes of straight spline crank-shaft ends for engines. At the same time, standardization was effected in regard to the propeller hub spline which was to fit the crank-shaft spline. The propeller hub of metal propellers is machined from forgings and is made of two pieces and these two halves of the metal propeller secure the detachable blade in place at the desired pitch angle by means of clamp rings and bolts.

The clamp rings and bolts of various sizes were standardized. The end of the propeller blade which fits into the hub was also standardized and dimensions and tolerances established for the various sizes. The propeller hub is a chrome vanadium steel forging, while the detachable blade is fabricated from an aluminum alloy forging. Materials for both are standard. These two items are invariably procured from separate sources and in order that the blades would fit the various hubs it was to the best interests of the Air Corps to establish this series of standards.

Standardization in general has been greatly facilitated by the annual Army-Navy standards conference, the purpose of which is to promulgate standards which are required for, and common to both services and at the same time obtainable from the manufacturer. About six months before each conference, Army and Navy Air Service representatives hold a preliminary conference to consider the subjects to be standardized and the revision of standards previously accepted. In this manner both services are in harmony as to the requirements they desire.

Drawings and specifications are prepared to cover the requirements for the subjects selected to be standardized and circularized among the interested indus-

tries. This gives the manufacturers an opportunity to study the requirements and to determine whether they are reasonable, easy to produce in quantity, and the cost of production not excessive.

The sixth and most recent of these annual conferences was held at the matériel division, Air Corps, Wright Field, Dayton, Ohio, on May 5, 1930. It was attended by approximately 200 aircraft and aircraft accessory manufacturers and their representatives, in addition to a large number of Army and Navy officials. Altogether 67 subjects were considered. These subjects were divided into 9 groups and a subcommittee appointed to handle each group. The airplane subcommittee considered such subjects as brake pedals, arrangement of the cockpit, seats, standard form for recording detail and group weights, landing wheels, control pulleys) spacing of rib lacing cord, engine and fuselage cowling hinge, fasteners and pins, determination of air loads in dives, and tolerances for aircraft bolts.

Standardizing the cockpit.

In standardizing the arrangement of the cockpit of airplanes an attempt has been made to locate instruments, refueling pump, throttle control, stabilizer adjustment, and fire-extinguisher control in the same relative position for all aircraft. The completion of the standard arrangement for the equipment in the cockpit of an airplane will necessarily be slow as the requirements for seaplanes and landplanes are different. However, such portions of the recommendation as can be used by both the Army and Navy Air Services will be standardized with a view to bringing the other requirements gradually into agreement and thereby completing the standardization.

The committee recommended favorable action on airplane seats, and the only question affecting their standardization was whether or not they were strong enough to withstand the loads imposed upon them when the airplane is catapulted into the air from a battleship. Standard specifications setting forth the requirements and methods of tests for landing wheels of airplanes received favorable action. Control pulleys furnished another problem. The original control pulley was a plain bearing pulley and was satisfactory for the purpose for which designed. Since the plain bearing pulley was standardized, the ball and roller bearing manufacturers have developed a light, strong, reliable antifriction bearing for use in the place of the plain bearing.

This, of course, necessitated a change in the standard specification for control pulleys; and requirements and test procedures were established to cover the new antifriction bearing pulleys in such a manner that the latter are interchangeable with plain bearing pulleys. This method of bringing into being another standard resulted in a considerable saving, as the old pulleys in stock are satisfactory for replacement and can be used; while new airplanes will be equipped with the antifriction bearing type pulley.

With the increase in performance of airplanes, especially in regard to their high speed, it became necessary to establish a minimum allowable distance between the lacing cord for securing the fabric to the wings. This was accomplished by standardizing the spacing according to the limiting diving speed of the airplane. Cowling hinges, fasteners, and pins were adopted as standard in order that replacement of these parts in the field could be done with more ease. Due to the new methods of producing aircraft bolts and the desire to reduce the clearance between bolts and fastenings of aircraft structural parts, the tolerance of bolts was reduced approximately one-half without appreciably increasing their cost.

Other standards adopted.

The clothing and parachute subcommittee adopted standard dimensions and requirements for the different sizes of flying jackets, flying helmets, and summer flying suits required by both the Army and Navy. This subcommittee also agreed to a standard procedure for recording data accumulated in testing parachutes. The electrical subcommittee successfully accomplished the standardization of aircraft storage batteries, high tension ignition cable, and power and lighting cable. The instruments subcommittee completed the standardization of inclinometers for aircraft, and adopted definite tolerances for altimeters, air-speed indicators, fuel and oil pressure gauges, tachometers, and thermometers. The materials subcommittee adopted as standard requirements and test procedure for chrome vanadium steel (6,150), and for chrome vanadium steel (6.135), both of which are used in the manufacture of propeller-hub forgings, for chrome nickel sheet steel, for chrome molybdenum sheet steel, for medium carbon (1.025) sheet steel for stream-line tie rods, for aluminum alloy forgings, for aluminum alloy sheets, for bars and tubes, for brass used in the manufacture of turnbuckles, for spruce lumber for aircraft, for 7 by 19 extra-flexible cable, for copper tubing, for spring steel wire, and for steel tubing.

Corrosion of metals in aircraft, especially in the vicinity of salt air, is one of the problems which has confronted the Air Corps for years, and the materials subcommittee adopted as standard a new high nickel chromium steel which has shown exceptional resistance to corrosion. Tie-rod specifications were revised to include a type of tie rod which is interchangeable with the old type tie rod and which is fabricated from this new high nickel chromium material. Requirements for aluminum alloy, which has the physical properties of mild carbon steel and weighs approximately one-third as much as steel, were adopted as standard. Standardization of these materials has been in process for the last two or three years, and at this conference aluminum alloy was considered to have developed to the point where standard requirements and test procedures could be established for the material.

The subcommittee on paint and dope adopted standard requirements for aircraft dope, and also established a definite viscosity for dope. It is extremely difficult to match the colors of dope and assure the proper shade by comparison with a varnished color chip and this committee adopted wet colors as standard for dope to be used by both the Army and Navy Air Services.

The power-plant subcommittee adopted a revision of the standard specification for the acceptance test of aircraft engines in production to provide for testing engines which use ethylene glycol as a cooling medium. There had been previously adopted as standard by the Army and Navy standards confer-

ence a radiator core and this subcommittee adopted as an addition to the present standard a one-half section radiator core. Engine utility parts and lubricating fittings, such as bolts, nuts, etc., were recommended for adoption as standard. The safety clip of the spark-plug terminal was revised and approved as standard, and cotter pins were modified to include the extended prong type. Standard mounting dimensions and dimensions for the meshing parts between the engine and aircraft starters were adopted. This standard also conforms to the standard recommended by the Society of Automotive Engineers.

The textiles and tire subcommittee approved for standardization requirements pertaining to linen webbing, which is used in the manufacture of harnesses for parachutes, and revised the specification for aircraft inner tubes to bring it up to date with the latest developments of the rubber industry. The propeller subcommittee recommended for standard a revision of the propeller hub clamp ring standard and also recommended a revision of the propeller hub splines to include more elaborate and definite requirements as to the location and tolerance of the hub. The propeller hub spline standard is a very important step forward making the complete propeller interchangeable on the engine and providing interchangeability of the metal detachable blade in the propeller hub.

Of the 67 subjects considered, favorable action was recommended on 65; the 2 subjects which were not recommended for standardization were to be studied further with the view to submitting them to the next conference.

CHANGES MADE IN CLAY TILE SIMPLIFICATION

Recommendation To Be Known As Clay Tiles for Floors and Walls

After September 15, 1930, simplified practice recommendation No. 61, White Glazed Tile and Unglazed Ceramic Mosaic, will assume a new designation "Clay Tiles for Floors and Walls," if the action of the reorganized standing committee is accepted and approved by the industry.

For the past year and a half the tile industry has been endeavoring to work out a revision of this recommendation so as to bring it up to date and abreast of current practices. The first step in this direction was the reorganization of the standing committee originally appointed at the inception of the recommendation. The new committee met under the auspices of the National Bureau of Standards on July 29, and the enlargement of the scope of the recommendation to cover all classes of wall and floor tiles, excepting faience, necessitated a change in name, and the name was changed. Reducing the grades of tile from 3 to 2, the committee discarded the terms "selected" and "commercial" and recommended the adoption of "standards" and "seconds" as the only two grades of tile to be produced and marketed.

Package grade certificates were also eliminated, as it was felt the master grade certificate would serve the purpose for identification and grading. New minimum-grade specifications for colored glazed tile, as well as tentative revised minimum-grade specifications for ceramic mosaic, accompanied by tentative definitions of terms resulted from the deliberations of this committee. Other minor changes to bring the recommendation in accord with this major revision completed the work of the committee.

DENTAL SUPPLIES SIMPLIFIED

Industry Has Promulgated Several Dental Simplifications; Others Under Consideration

Several years ago the American Dental Trade Association recognized the benefits of simplification. This association is composed of manufacturers and distributors of dental supplies and equipment, and its members, doing an annual business estimated at $100,000,000, represent an estimated capital of $50,000,000.

The association appointed a simplification and standardization committee to make a study of current conditions, having in view the elimination of superfluous varieties of the commodities made and distributed by its members, and used by the dental profession. For this study the commodities in the industry were classified as teeth, sundries, cements and plasters, equipment, gold, and instruments. Each member of the committee was assigned one of these groups for simplification purposes.

As a result of the preliminary work of the committee, a number of items were selected for simplification, and association recommendations were approved for some. Recognizing the need for the cooperation of all concerned in order to derive the maximum benefit from the movement, the association in March, 1928, requested the assistance of the National Bureau of Standards, through its division of simplified practice, to enlist the support of all elements of the industry in the development of definite simplified practice recommendations.

Dental hypodermic needles first project.

The first program was for dental hypodermic needles. This has been indorsed by the industry and will soon be available in printed form, as simplified practice recommendation R108–29. The second program, for dental brush wheels, has likewise been approved by the industry and will be printed and issued as simplified practice recommendation R116–30.

A general conference of the industry recently approved a recommended practice for the packaging of dental plaster and investment, and this plan is now before the industry for acceptance. Another project being developed is for dental lathe grinding wheels and it is expected that a simplified schedule for this commodity will be approved before the end of the current year. It is the plan of the association to undertake the simplification of other items as rapidly as conditions will permit.

The wide diversification which existed in the dental brush wheel industry illustrates the opportunity for simplification in the dental supply field. One company in 1902 listed 86 different varieties of these wheels and within that year eliminated 26 numbers. On July 1, 1929, this company found it possible to eliminate 50 additional numbers and is now cataloguing the 10 sizes listed in the simplified practice recommendation.

SIMPLIFICATION AND STANDARDIZATION IN PROCUREMENT AND STORAGE

Standard Specifications in Government Services Improves Purchasing; Federal Standard Stock Catalogue Includes Systematized Storing, Inventorying, and Issuing of Supplies

By Capt. Charles Conard, *Supply Corps, United States Navy*

The principle of standardization has been gradually permeating both commercial and governmental activities in this country for a number of years. This has expressed itself in a variety of ways. Individual cases of the application of the standardization principle have become common in many instances, such as adoption of standard screw threads. Buying in quantity under standard specifications was, perhaps, the first important manifestation of the general urge toward simplification and standardization of business practice, although the primary object here was to effect a saving of cost through the widening of competition.

Generally speaking, the efforts toward simplification and standardization which have been made throughout the Government services and in commercial life have been directed along the special lines and in the particular instances which have called for study from time to time as the necessity for correction or improvement became manifest. Thus, in connection with the procurement and storage of supplies individual items have been the object of intensified research in numerous instances. It is only comparatively recently, however, that the subject as a whole has received the intelligent study necessary to place it in the status of an important branch of industrial practice. It will be of interest to indicate briefly the steps which are being taken in this direction.

Buying under standard specifications presupposes that the utilizer of the article to be bought knows precisely what he wants and the conditions which must be met in its use. It is just as important that the quality of the purchased article should not be too good as it is that it should not be inferior. Both departures from the acceptable standard result in excessive cost. Where no standard specification exists for the article of the quality best suited for the purpose in hand, a description must be prepared at the time of purchase or reliance must be placed on standard brands.

The first alternative is laborious and often unsatisfactory, the second is expensive and generally unfair to possible competitors. The preparation of standard specifications is nothing more nor less than the application of the well-known planning system which has been so successful in industrial life. So much has been written in connection with this subject, and so general has been the acceptation of the principle of standardization in the preparation of specifications that further comments as to its advantages is unnecessary.

One of the elements frequently necessary for the success of a general standardization program is the elimination of excessive sizes, dimensions, and varieties. The division of simplified practice of the National Bureau of Standards is engaged in this phase of standardization. Considerable progress has been made in the direction of simplification and standardization of sizes, types, and similar characteristics of commodities both on the part of the Government and of commercial producers, distributors, and consumers. More than 110 simplified practice recommendations covering specific commodity lines have been developed and accepted by industry, with the cooperation of the Department of Commerce.

As fast as the fundamental idea here expressed becomes accepted throughout industry the results in the way of economy and abolition of lost motion promise to exercise a marked influence on the commercial life of the country. This work, of course, goes hand in hand with the standard specification efforts and, as will be shown later, is an important element in the complete scheme of standardization.

Standardization in special fields is exemplified by the work of the American Marine Standards Committee made up of representative interests of the marine and allied industries. Its purpose is to unify practice and eliminate waste in the construction, equipment, and operation of ships and port facilities in the interest of good economy. Membership representing the Navy and War Departments, Coast Guard, and bureaus concerned with shipping and ship building indicates the Government's interest, which is also evidenced by the facilities and services furnished by the Department of Commerce through the National Bureau of Standards and by the United States Shipping Board. About 65 series of items have been standardized and are designated by the standard numbers for purposes of reference.

Scientific storage.

The problem of scientific storage and issue of supplies and materials has long been studied by leading industrial corporations of the country. Systematic arrangement of stock in such manner as to be readily accessible and with proper records to enable replenishment to be made at proper times so as to avoid both overstocking and running out of stock was found necessary in most commercial undertakings. As far as the Government is concerned, the leader in this phase of standardization has been the Navy Department.

After some years of experience in the handling of consolidated stocks of materials there was begun in 1914 the Navy Department Standard Stock Catalogue. Rear Admiral T. H. Hicks, Supply Corps, United States Navy, now chairman of the Federal Standard Stock Catalogue Board, was responsible for the initiation and compilation of the Navy catalogue. So much success has attended the introduction and use of the Navy catalogue that it has recently been decided to expand the principle into the adoption of a stock catalogue for the entire Government service, and the publication of the Federal Standard Stock Catalogue, now in the course of preparation under the direction of Admiral Hicks, is the result of this determination.

The catalogue.

The catalogue is being prepared in four sections, of which the following is a general description:

I. General index of Federal property.—The index lists in alphabetical arrangement each item of supplies regularly procured, stored, and issued by or for the various departments and establishments. Opposite the items appear three columns, the first showing the class for storage and issue, the second showing the groups for procurement, and the third, the Federal specification symbol number for each item for which a Federal specification has been prepared. The general index, of course, is for the purpose of enabling one to locate any item for which information as to class, group, or specification is desired. This portion of the catalogue has already been printed and issued and there will be found listed therein the names of practically all items of material in industrial and commercial use.

II. Classes for storage and issue.—This section of the catalogue carries full information as to how supplies should be arranged for storage and the methods which should be followed in their issue. The basis for classification for stores is similarity of application of the materials named and the simplicity of storage arrangements. Every item of supplies has been placed in a class of items of similar nature. The nomenclature of items has been definitely fixed under a scientific system so that all concerned may invariably mention the item under the same name. In each class the items are listed in alphabetical arrangement, and the plan of storage described in this section contemplates that the items themselves shall also be placed in the storehouses in the same alphabetical order.

A stock number has been assigned to each item, which simplifies the business of handling stores. We are all familiar with the fact that catalogues issued by commercial establishments usually have numbers assigned to the various items dealt in for purposes of ready identification. However, no scientific or carefully thought out system of numbering has been devised commercially so far as is known. In the Federal catalogue, however, a principle has been adopted which is believed to be entirely new in this connection.

By the adoption of an ingenious system, the items, being arranged alphabetically in their respective classes, are so numbered that they run in numerical sequence throughout the class. This numerical sequence is not an unbroken one; that is, numbers are skipped from time to time, but proceeding alphabetically the numbers are always of an increasing order. In the storehouses the articles are also arranged alphabetically in each class. Consequently, with the stock number of an item in hand one can readily proceed directly to the storage class and thence by numerical sequence of the stock number arrive at the precise location of the item desired. The reason for skipping numbers intermittently is to allow for the insertion of new items from time to time. This is in effect similar to the system by which the postman delivers letters to you at your home. He knows where your house must be by the street and house number on the address of the letter. Numbers not used are similar to vacant lots on the street not yet occupied by houses.

In this section (Sec. II) in columnar arrangement are given data as to departments which use the various items in order to facilitate interdepartmental transfer of supplies. There also appear approximate prices for items, and a code word for each to facilitate placing orders by radio or telegraph. In this section are also included notes on storage and storage precautions with instructions as to the proper methods to be followed in taking of inventories.

III. Groups for procurement.—The object of this section is to provide information regarding the source of every item of supplies used not only by the Government but by industry as a whole. Each group represents a major division of productive industry and these groups are in turn subdivided into divisions conforming to the general trend of specialization in industry. The central idea here lies in the fact that although articles may be classed for storage for reasons of various kinds, such as similarity of application and use, yet when procurement of items is in view, consideration must be given to the source of supply rather than to the method of storage and issue.

This section (Sec. III) includes detailed information as to the geographical distribution of sources of supplies, variation in practices as to production or marketing, and other data requisite for economical and expeditious procurement. In the procurement of supplies, it is important to know all details relative to the source so far as may be possible, and to give full consideration to the total demands which are likely to be made upon this source. These demands may arise through a great variety of dissimilar uses of the same basic product. All items which derive from the same source should consequently be considered together at the time of procurement. This naturally brings together for procurement purposes items which for storage and issue purposes are maintained and handled under widely separated conditions.

Section III in course of preparation.—Section III of the catalogue is in course of preparation and will require intensive study on the part of governmental agencies preceding its issue, and the information relating to items will be published, as fast as it is compiled, in loose-leaf form to be inserted in the catalogue. This section of the catalogue is divided into seven parts, which are as follows:

Part I. List of groups (alphabetical).—All materials and supplies are arranged in such manner as to locate the diverse products of industry in major groups which cover, generally, items originating from the same or similar sources, or the production of which is a branch of fundamental or key industries. Thus, we have group A, aircraft, boats, and ships; group H, brooms and brushes; group QQ, metals, etc. The group symbols are arranged in alphabetical order, and under each group are shown the divisions into which the group is subdivided for purposes of more definite location and reference. For example, under group HHH, vegetables, appears (*a*) beans (lima), (*b*) beans (string), (*aa*) root type, etc. Thus, each material, or product of industry, is located in a definite division of an appropriate group. A complete list of groups with all divisions follows the explanatory manner in Part I of Section III of the catalogue. The basis used for determining divisions has been primarily differentiation in production. This differentiation may apply to (*a*) material, (*b*) processes of fabrication, or (*c*) the derivation of various products at successive stages of a single process. It will be necessary to read very carefully the description of Section III, Part I, in order to obtain a comprehensive idea of the scope and purpose of this part of the catalogue.

Part 2. Procurement categories.—In this part are outlined the general principles and basic policy applicable to coordinating the purchasing of the various Government activities with a view to synchronizing demands, consolidating requirements, utilizing land-grant freight rates, etc. For its procurement studies the Federal Purchasing Board has adopted category symbols to be assigned to commodities by the board to indicate in condensed form its decision as to the procurement arrangements believed most advantageous to the Government as a whole.

Part 3. Simplified practice recommendations.—A foreword, describing briefly the purpose of the simplified practice division of the National Bureau of Standards, is followed by an alphabetical list of simplified practice recommendations and a numercial index of the same. These have covered more than 110 specific products and commodities up to the present time, and have proved to be of practical value to industry. The general aim of the division of simplified practice is to assist industry in reducing varieties in shape, size, dimensions, or immaterial differences in products. These recommendations of the respective industries, as published in the Elimination of Waste Series of the Department of Commerce, are considered by the Federal Specifications Board in the writing of Federal specifications.

Part 4. United States Government interdepartmental standards.—In this part is outlined the steps which are being taken to establish standards to be followed in matters of routine administrative business by all activities of the executive branches of the Government. Simplicity and uniformity are the objects in view. There has been formed an Interdepartmental Board on Simplified Office Procedure, under the supervision of the Chief Coordinator, whose duty, among others, is to standardize in the use of office equipment, materials, and supplies. Each interdepartmental standard is assigned an identifying number, given a descriptive subheading, and marked with the appropriate group and division symbol described in Part I above. An alphabetical index of the adopted standards is followed by a numerical index in the usual manner.

Part. 5. American marine standards.—Mention has already been made of the field covered by the American Marine Standards Committee. Its scope is national, as has been indicated. In order to bring into convenient reference form the results of its studies, there is published in this part of Section III, an alphabetical index of the standards adopted, showing opposite each item the American Marine Standards Committee's series

number, the "standard number" assigned, and the group and division to which it pertains. The same information is then repeated, arranged by American Marine Standards Committee's series numbers.

Part 6. Reserved.—Various activities of the Government are making studies of industry, etc., along lines not definitely covered by parts of Section III herein described. This part is, therefore, reserved for the purpose of including standards which may be agreed upon in the future, but not assignable to any of the other parts of this section.

Part 7. Groups A to LLL, detailed data.—The purpose and scope of these groups have been described in the foregoing part of this article. (Sec. III, Groups for Procurement, above.) This part commences with explanatory notes relative to the publishing of data for the procurement of commodities. The information will be arranged as follows: (*a*) Plan for Federal procurement, embodying recommendations as to the plan of procurement considered most generally adaptable to the needs of the Federal departments and establishments; (*b*) sources of supply, covering number and location of such sources; (*c*) production process, covering the general subject of methods of production; (*d*) marketing, competition and prices, descriptive of the general practices ordinarily followed in procuring items; (*e*) uses giving information regarding the general uses of the commodity; (*f*) substitutes noting possibilities of satisfactory substitution; (*g*) simplified practice recommendations, giving the result of any study which had been made by the simplified practice committee of industry, working through the division of simplified practice of the National Bureau of Standards, as a neutral centralizing agency.

The above is a brief résumé of the purpose of Section III, groups for procurement of the Federal standard stock catalogue. The information to be included in this section will be so comprehensive in its character that it is impossible to describe it more definitely in the scope of a brief article. Enough has been said, however, to stress the idea of the extent to which standardization is being carried in this catalogue.

IV. Federal specifications.—The fourth section, Federal specifications, is included as part of the catalogue owing to the intimate relation which exists between specification work and the other portions of the catalogue. The actual formulation and promulgation of the Federal specifications are being carried on by the Federal Specifications Board, which turns its completed work over to the Federal Standard Stock Catalogue Board for publication.

The standardization idea has been efficiently promoted by the work of this board. Where, formerly, official Government specifications were issued by each department and independent establishment of the Government for items of supplies used by each, the plan has now been adopted of issuing all specifications by the Federal Specifications Board alone. The result will be that whereas, formerly, Government specifications for the same item were issued by separate departments—sometimes conflicting in their requirements—in future, all such conflicts will be eliminated and but one Government specification for a given item will exist.

From the above it will be seen that various efforts of the Government toward standardization of many elements entering into procurement and storage are finally converging and coalescing at one point, and that the publication of the Federal Standard Stock Catalogue will locate in one place the results of many varied efforts along these lines.

It does not appear at all improbable that industry and commerce outside of the Government service will quickly appreciate the advantages of a publication which standardizes information in regard to practically all known materials and articles in use in this country in an almost encyclopedic manner, besides furnishing detailed instructions regarding the best methods for storing, inventorying, and issuing supplies.

The adoption of a common nomenclature for all articles used in commercial life would be of immense benefit to industry. So strong is the impression of those responsible for the catalogue that a demand for it will be expressed by those outside the Government, that a definite arrangement for sale of copies through the Superintendent of Documents, Government Printing Office, Washington, D. C., has been made.

S. A. E. MOTOR-COACH SPECIFICATIONS DISCONTINUED

Present Specifications Eliminated As Being Out of Date; New Code Under Consideration

In 1925 the present motor-coach specifications of the Society of Automotive Engineers were adopted as a guide to State officials in formulating regulations that would be sufficiently uniform in their requirements to place no serious handicap on motor-coach manufacturers or operators, and not restrict proper development of this class of vehicles.

In 1926 an informal committee, appointed by the motor-truck committee of the National Automobile Chamber of Commerce, drafted a uniform motor-coach specifications code that included all items of motor-coach construction that would ordinarily be included in State regulations and indicated those which the committee felt are the only ones that should be governed by State regulations. The final draft of the code was approved by a general conference of manufacturing and operating interests in Washington, D. C., in June, 1929, and referred to the Society of Automotive Engineers, among others, for supporting action.

The transportation and maintenance committee of the S. A. E. studied the code and at its meeting, held in Detroit in January, recommended that the present S. A. E. motor-coach specification be discontinued. It was felt that the old S. A. E. specification had served its purpose. The S. A. E. now has under consideration the new specification as published by the motor-vehicle conference committee and may either adopt this proposed specification as a whole or in part or indorse it without actually adopting it as an S. A. E. specification.

BRITISH STANDARD FOR RAILWAY AXLES

There is an increasing tendency on the part of British engineers to adopt tramway axles with higher tensile strength. This demand, according to the British Engineering Standards Association, has been met by providing for axles of high carbon steel and nickel-chromium steel, in its specifications for tramway axles. These specifications, which have recently been revised, now contains separate specifications for axles of three different qualities of material.

According to the announcement of the association, the specifications, as revised, will meet the requirements of all tramway undertakings. Through this revision the association has undertaken to bring the original specifications more into line with requirements of present-day operation and maintenance.

STANDARDIZATION OF CRUISING MOTOR BOATS

Through Standardization Boat Builders Aim to Produce More Satisfactory Cruisers

By H. R. Stutphen, *president National Association of Engine and Boat Manufacturers*

Boats of various forms have been in use since the beginning of known history and, in their commercial sense, are among the most essential means of transportation available in modern times. Standardization, likewise, is of no modern origin, although lately undergoing an intensive development, and was applied to boats, in a more or less meager way, a great many years ago.

However, the small cruising boat is but a comparatively recent development and standardization is bound to play a pronounced and beneficial part in its further development. But the term "standardization," in that it should imply the fact of extensive and continued production without change, is perhaps nowhere so incorrectly applied or abused as in connection with a great majority of our present so-called standardized boats, for unfortunately, only a very few of the builders now listing them have actually reached this happy condition.

The evolution of the modern motor boat, although not as rapid as some other of our present-day conveniences, has been constant, and if the records and designs of the last 35 years are inspected, it will be at once apparent that the results have been very great indeed.

The cruising motor boat is a very intricate structure, and a complicated piece of mechanism, yet must be capable of being operated and cared for without trouble by the average owner. The cruiser is not only a "home afloat," including all living accommodations found in the modern house, but it must stay afloat, be capable of withstanding wind and wave without danger, and is fitted with power plant and other necessary apparatus to enable it to move from place to place at the will of its owner, and usually at a speed which only a few years ago was unattainable.

Many trades participate in construction.

In its construction it necessarily, therefore, involves a large number of trades or professions, including several varieties of woodworkers and about a dozen distinct trades of other kinds. This is one of the reasons why it is most difficult to obtain standardization of these boats.

Although the various materials used by these trades have been largely standardized as relating to ordinary commercial use, yet many difficulties are encountered when it is atempted to use these same materials in the boats. Lumber has been quite thoroughly standardized and graded as regards the building trades and for other purposes, yet very little of this regular material is applicable to boat construction, it usually being necessary to go into the woods and have nearly all of the lumber used cut especially to suit.

And so on, through the various materials, such as plumbing, electrical fixtures, hardware, and even paint, they must practically all be made to suit this particular work, owing to the nature of the boats, the confined spaces embodied, and the extraordinarily severe conditions encountered, due to the remarkably corrosive effects of salt water and salt air.

All of this, of course, tends to standardization of materials along special lines suitable for marine use, both by regular manufacturers and by specialists who devote their entire output to marine purposes. Heretofore the quantity of production has not allowed of thorough standardization of these materials, although the recently increased use of boats due to the public becoming "water minded" should result in more intensive application along these lines. In this connection, it should be pointed out that this process of becoming "water minded" on the part of the public is largely due to improvements in the boats, which in turn is aided by standardized production and lowering of costs.

Difficulties of mass production.

Another of the main difficulties encountered in mass production of cruising boats lies in the size and weight of the product, requiring an exceptionally large amount of space for storage of the finished product as well as extensive building floors. Special means are required for handling and moving the boats, and shipment, if by rail or by steamer, requires special planning.

Wood is, in some ways, a much more difficult material to use in manufacturing than is steel or other metal, owing to what may be called its changeable nature and inequalities of grain or texture. It can hardly be depended upon to be just the same on any two successive days, as it swells, shrinks, and warps, according to weather conditions, so that different kinds must be selected and treated differently for various purposes. Yet there is nothing which can compare with wood as a material for building the smaller yachts and motor boats, and it is far superior to steel, for many reasons.

Woodworkers from the building and other trades can not be well assimilated into boat construction, because this construction is an art of its own, as the methods are different, the shapes are not square, practically every piece entering into a hull is bent, tapered, curved, or beveled. Also the workmanship must be of the very highest grade.

As an illustration of the life of these boats, it might be interesting to note that several of the original boats built by the author and used at the Chicago World Fair in 1892 are still in service as pleasure boats, and in many respects are just as sound as when originally built. Since that time a very great deal has been done along the line of standardization, and while, as stated above, the nature and bulk of a cruising boat will perhaps never permit the use of quantity production methods as now practiced by, say, automobile manufacturers, some of the open-boat builders have approached these methods, and the cruiser builders, al-

though faced with a much more difficult problem in this respect, are in some cases, where possible sales will warrant, beginning to work out real production methods.

One of our popular models of small cruiser has continued in unbroken line each year since 1920, so that there are now many hundreds of them afloat. Although there has been steady improvement in this model, the fundamental construction and arrangement remains the same, and in appearance the boats of the original series can be instantly recognized as being of the same model as the latest edition. For these boats, as well as for other standardized models, replacement parts are kept in stock and all vital parts, or at least those at all liable to wear, or damage, can be promptly supplied.

In the field of service, which is, of course, all important, progress has been made toward standardization, and the owner is now able to secure from the builder or distributor, regular standardized storage and overhaul service, so that the annual reconditioning and outfitting is done on a regular schedule of work, at predetermined prices. This is not only of great assistance to the owner, relieving him of much trouble and worry in having this work done, but is of material assistance to the sales department, in as much as it enables them to intelligently inform the prospect as to this upkeep expense.

THE ASSOCIATION FRANCAISE de NORMALIZATION

French Association Encourages Economic Expansion Through Standardization

By R. Girardeau, *Director General Association de Normalization*

The Association Francaise de Normalization (AFNOR) was founded in 1926, in cooperation with the principal French industrial associations and authorities. The association is a private organization. A State subsidy was recently granted it, but its principal source of income is its membership subscription.

The aim of the association is to encourage French economic expansion and to develop the domestic market, both through the reduction of the number of machines and machine parts used in manufacture and through the reduction of the number of types of finished products and manufactured articles. Such reduction should have, as a result, a decrease in manufacturing costs and floating capital, by reducing stocks and the quality of unsold merchandise. In one way or another, the work of the association concerns every branch of industry.

The association collects and distributes information. It groups together and centralizes all French organizations which have to do with standardization, and coordinates their work. It represents the French organizations at international standards meetings, and acts as an intermediary between them and the Comite Superieur de Normalization (C.S.NOR), formerly known as the Commission Permanente de Standardization (C.P.S.), constituted in the Ministry of Commerce. Although in the future this committee will undertake the preliminary work on standards only in exceptional cases, yet it remains the only body with the power to give official sanction to standards established or to be established.

Scope of activities.

One of the rôles of the AFNOR, and not its least important function, is to encourage the various industries to work out the standards which seem to the association to be necessary and which are called for by the higher committee. For this purpose, the AFNOR appoints competent committees in those industries which do not possess a standardization association, composed of representatives of the various groups interested (producers, distributors, and consumers), to whom the technical preliminary work on the standards is entrusted.

The association has to see that the general instructions of the Comite Superieur de Normalization are carried out, the whole work of standardization being based upon such general instructions. It has to help, even to direct, the work of the bureau and standardization committees created, and publishes their findings. The association, furthermore, has been authorized by the higher committee to bring up to date the standard specifications established by the former Comite Permanente de Standardization and to carry on the work undertaken by that committee.

Accomplishments.

In the course of the year 1929 and the first months of 1930, the association appointed about 20 committees in various industries, both for the completion of certain specifications worked out by the Comite Permanente de Standardization, and to follow the work on the international agenda, and study certain projected national standardization and simplification work. Other committees are about to be appointed and will shortly begin to operate.

Among the committees already appointed, the following may be mentioned: (1) The committee on hydraulic presses (revision of publication B. I, "General Conditions Applicable to Markets Supplying Hydraulic Presses"); (2) the committee on iron and steel products (completion of series A, specifications for iron and steel products); (3) the committee on the standardization of liquid measures; (4) the committee on test pressures for land boilers; (5) the committee on naval construction (completion of 14 C. P. S. specifications. "Standardization of Naval Construction Equipment," and study of naval construction questions on the international agenda); (6) committee on steel shapes (revision of F. I–I, unification of steel shapes); (7) committee on the simplification of preserve cans; (8) committee on the simplification of roofing sizes; (9) committee on the simplification of drawn-wire products (tacks, nails, shoe nails); (10) committee on the simplification of ballast forks; (11) committee on the simplification of hand-tool equipment, including ordinary spades, scythes, axes, hatchets, and trowels.

The association also submitted for official approval by the Comité Supérieur de Normalization the standards established by the Mechanical, Electrical, and Automobile Standardization Bureau.

QUIETING THE AIRPLANE CABIN

Research Conducted to Solve Problem of Eliminating Noise in Airplane Cabins

By H. L. Dryden, *National Bureau of Standards*[1]

The problem of silencing the airplane is one of great current interest. The noise nuisance is generally considered as one of the most potent influences tending to discourage the use of airplanes by the general public. Editorials are written about it, some people think there ought to be a law prohibiting airplanes from making noise, and directors of research look with longing eyes toward the problem, the solution of which would bring fame and fortune to them and to their organizations. Unfortunately, the problem is not a simple one, and no master key to its solution has been discovered.

The aeronautics branch of the Department of Commerce through its research division in the National Bureau of Standards is greatly interested in the possibility of developing practicable methods for the reduction of the noise of airplanes and has already carried out investigations in two directions, namely, on the theory of engine mufflers and on the sound proofing of airplane cabins. The work on sound proofing is conducted in the sound laboratory of the bureau by V. L. Chrisler and W. F. Snyder under the general direction of Dr. Paul R. Heyl, and some of the results have been published in the May, 1929, issue of the Bureau of Standards Journal of Research. The remarks on sound proofing in this article are based on the work of Chrisler and Snyder.

In this article the author tells how sound is produced and defines intensity. Experiments and investigations made by the Aeronautics Branch of the Department of Commerce are described. These deal with the theory of engine mufflers and sound proofing of airplane cabins. There appears to be no prospect that a device will be developed which at the cost of a pound or two of additional weight will eliminate the noise.

The purpose of this article is not to announce a complete solution of the problem, but rather to present from the viewpoint of a physicist a more or less ordered analysis and a statement of the ideas guiding the work at the National Bureau of Standards. In the working out of this analysis the author wishes to acknowledge the wholehearted cooperation and assistance of Dr. L. J. Briggs, assistant director, and chief of the aeronautical research division.

Producing sound.

The sensation of sound is produced by the presence in the air of compressional waves set up by some vibrating body. It is found by experiment that if the motion of the vibrating body is periodic, a musical sensation is produced and the pitch of the sound may be correlated with the number of vibrations of the source in unit time. If the vibrations are not periodic, a sensation of noise is produced. In the case of an airplane, several sources are present, and the resulting motion of the particles of air is an exceedingly complicated one. While it is possible to recognize certain predominant frequencies in the noise of an airplane, and while it is always theoretically possible to consider any complex vibration as the result of a large number of simple vibrations, this article will be limited for the most part to the second attribute of sound, namely, the loudness.

Experiment shows that when the loudness of a sound increases, the amplitude of the vibration of the source and of the compressional waves in the air also increases. In any small volume of the air through which sound waves are passing there is a certain amount of energy which can be measured by suitable instruments. The amount of energy per unit volume is a measure of the intensity of the wave motion. (The exact definition of intensity is the amount of energy transmitted by the wave motion in unit time through a unit area in a plane normal to the direction of travel of the wave.)

If the intensity increases, the loudness also increases, but since loudness is a sensation, the loudness can not, strictly speaking, be measured. No meaning can be given to the statement that one sound is twice as loud as another. Nevertheless it is easily recognized that while the loudness increases with increasing intensity, a given increase in intensity by no means produces equivalent effects on the ear when starting from different levels of intensity. This has led to the construction of a scale of loudness on an "ear scale" which must be understood to obtain the proper perspective on the problem of silencing the airplane.

Minimum intensity required.

A certain minimum intensity is required before any sound can be heard. While the magnitude varies considerably from ear to ear and depends to some extent on the frequency, acoustical engineers have determined an average value applicable to the average ear. When the intensity approaches a value in the neighborhood of 100,000,000,000 times the threshold value, the sensation becomes exceedingly painful, and the ear begins to feel the sound rather than hear it. Thus to reduce the most intense sound to inaudibility would require the reduction of the intensity in this ratio.

For intensities between the limits given, the ear is not equally sensitive. We may imagine an experiment in which two sources of sound A and B of the same character are connected alternately to the ear, and the intensities so adjusted that the two seem equally loud to the ear. Then suppose the intensity of A is

[1] Paper presented at the Fourth National Aeronautic Meeting of the American Society of Mechanical Engineers, Dayton, Ohio.

increased until the ear can just detect that it sounds louder than B. By measuring the change in the intensity, the sensitivity of the ear can be determined. To a first and sufficiently good approximation for most purposes it is found that the intensity must be increased by a certain percentage, approximately 26 per cent, no matter whether the original intensity is 1, 1,000, or 1,000,000. The mathematician expresses this observation by the statement that the response of the ear is proportional to the logarithm of the intensity

Suppose then that a start is made with the threshold intensity which is called 0 loudness and that the experiment progresses in steps such that the intensity of A is increased until a difference is heard; that is, by a factor 1.26; B is now made equal to A, and the process is continued until the entire range of intensities is covered. The threshold loudness is called 0, the first step 1, the second 2, etc., and thus the ear or loudness scale of units known as sensation units is built up. It is found that approximately 110 units cover the scale, the exact number being dependent on the frequency.

Some of the consequences of the facts which have been briefly reviewed are not very well known. Let us suppose that the intensity of the sound produced by the airplane engine is equal to the intensity of the sound produced by all other sources, including the propeller, vibration of wires, etc. The complete elimination of the engine noise would reduce the physical intensity in the ratio of 2 to 1, but so far as the ear is concerned the decrease is only 3 sensation units. Unfortunate, but true. The perfect engine muffler under these same conditions would improve conditions very little. Of course, the assumption as to the relative intensities may be greatly in error, and the fact has been neglected that certain frequencies may produce more uncomfortable sensations than other frequencies.

The second consequence is that if the sound is once produced, the use of absorption as a remedy means that all but a small fraction of the energy must be eliminated. To reduce the sound by 20 sensation units means that 99 per cent of the energy must be eliminated, 30 sensation units 99.9 per cent, 40 sensation units 99.99 per cent, etc. The moral is that the sound should be eliminated at the source, if possible.

The vibrating body.

The source of sound has been stated to be a vibrating body. The vibrating body may be a column of air confined within more or less rigid walls or even unconfined air flowing in such a manner as to produce pressure changes of appreciable magnitude. The whistle of a bullet traveling at or above the speed of sound is produced by pressure changes in the turbulent flow of the air closing in behind the bullet. In this case the control of the sound is intimately related to the development of forms giving smooth air flow, a point that will be referred to later. The noise produced by a source of this type is usually not very intense unless the air speeds approach or exceed the speed of sound. The sources of sound of this type on an airplane are in the flow around the tips of propellers and in the flow of the exhaust gases from the engine. The only known method which is effective in dealing with sources of this type is to reduce the speed of the flowing air to well below the speed of sound.

In many instances, pressure waves, which in themselves are of small amplitude, produce much greater effects through the phenomenon of resonance. Any thin diaphragm, such as the engine cowling; the fabric or plywood covering of a fuselage; any air column, as for example, the air intake pipe to the carburetor; or any stretched wire has a large number of natural periods of vibration which, in general, are not greatly damped. Any small pressure fluctuation tends to set up vibrations in these resonating bodies which result finally in building up the intensity to a large value.

This procedure may be illustrated by an ordinary tuning fork and resonator. It will be found that it is not necessary that the resonator be tuned to the fork frequency to produce a large effect. The flat top of an ordinary desk serves equally well. Attack on the source is most effective when the trouble is due to resonators, for with patience some of these may be discovered and removed or provided with sufficient damping.

Propeller noise.

For several years the National Bureau of Standards in cooperation with the National Advisory Committee for Aeronautics has been engaged in a study of the air flow about airfoil sections such as are used for propeller design. These experiments have been conducted at speeds from one-half the speed of sound to about 1.08 times the speed of sound. At some speed in the region from 0.7 to 1 times the speed of sound, depending on the thickness, the flow about the airfoil begins to change from the smooth flow characteristic of good efficiency to the burbling type of flow which ordinarily occurs only at large angles of attack.

The air no longer follows the upper curved surface nearly to the trailing edge, but breaks away from the surface to form a region of violently eddying flow. In the model tests the change in flow is accompanied by a great increase in the noise. Under the conditions of the set-up, the thin airfoils spanning the stream serve as resonators which amplify the sound considerably. In this case noise is a direct evidence of inefficiency, for the lift is greatly decreased and the drag greatly increased when this type of flow begins.

The onset of the burbling flow depends primarily on the thickness of the section as compared to its chord length. The greater the thickness ratio, the lower the speed at which the inefficient flow begins. The shape of the section seems to be a far less important factor, though not without appreciable effect. The bearing of these facts on propeller noise is somewhat as follows: For a given propeller the noise will increase as the tip speed increases. This is perhaps an obvious fact, but it is to be observed further than when the tip speed approaches the speed of sound the noise will increase at a rapid rate to an unbearable din. So far as any given propeller is concerned, it is advantageous to keep the tip speed as low as practicable from the standpoint of noise as well as of the efficiency of the propeller. Gearing may be said to be desirable, provided the gears are efficient and comparatively silent.

For propellers of varying thickness it may be expected[2] that at a given tip speed the thicker propeller will give greater noise, at least if the propellers are

[2] In the absence of measurements of propeller noise, the following statements must be in the form of speculations.

constructed of the same material. The blade of the propeller in most instances serves as a resonator, and the material of which the propeller is made together with the thickness determines the resonant frequencies and the magnitude of the damping. It is commonly believed that metal propellers make more noise than wooden propellers, but the question may be raised as to whether the metal propellers are or are not generally operated at higher tip speeds than wooden propellers. We know of no comparisons in which two propellers of identical design but of different materials are operated at the same tip speed. It is in this unsatisfactory state that the question of propeller noise must be left with the only conclusion that the tip speed should be kept as low as possible. It is interesting to speculate as to the part played by the vibration of the propeller blades and to wonder whether a blade so constructed that these vibrations were heavily damped would give considerably less noise.

Engine noise and muffling.

It has always been a debatable question as to whether an engine muffler absorbs sound energy produced by the explosions in the engine cylinders or whether the muffler acts by modifying the flow of the exhaust gases so that the pressure changes set up are much less intense; in other words, as to whether the muffler takes a sound already existing and dissipates its energy or modifies the source so that a sound of lower intensity is produced. Some experiments have been made at the National Bureau of Standards to obtain information on this point. A noise was set up in an air stream passing through a siren, the intensity being comparable with the noise of an airplane somewhat throttled. Mufflers of the several common types were introduced, but no appreciable change could be made in the noise unless a muffler of high resistance was used, and even then the reduction in loudness was small. While the apparatus available did not permit the simultaneous matching of air volume, frequency of impulses, and air pressure with the volume of exhaust gases, frequency, and exhaust pressure of an airplane engine, the results indicate that the muffler of an airplane engine functions primarily by so regulating the outward flow of exhaust gases that less sound is produced.

There are two well-recognized and effective principles on which mufflers may be operated, and a third principle is sometimes suggested but which is less effective than the other two. The first is the brute-force method of inserting resistance in the exhaust line so that pressure pulsations and hence the noise are reduced. Most mufflers do function somewhat in this manner, but the method is objectionable since resistance means a back pressure on the engine and hence reduced power. Practically all automobile mufflers are of this type. They are all heavy and impracticable for airplane use.

Most of the successful airplane mufflers, if any may be regarded as successful, operate on the second principle, namely, by reducing the speed of discharge of the exhaust gases. It has already been mentioned that this method is the most successful one for dealing with sources in an air stream traveling near the speed of sound. In practice the muffler utilizes some form of expansion chamber which serves to damp pressure fluctuations to some extent, but more important to cool rapidly the exhaust gases. In some designs the cooling is facilitated by providing devices to introduce a considerable amount of air which is mixed in thoroughly with the exhaust gases. It may be readily seen that the cooling of the exhaust gases produces an increase in density, and hence a given quantity (mass) of exhaust gas is expelled at a lower velocity. If sufficient cooling can be obtained, the velocity may be reduced by a factor of 2 or more. Since the speed of sound in the gas is also reduced in proportion to the square root of the absolute temperature, the ratio of the speed to the speed of sound is reduced in the ratio $\sqrt{2}$.

The third principle often advocated is to apply the methods of interference. In the laboratory, with pure tones it is sometimes possible to divide the sound path and produce at some specified location a low level of intensity. A fact often forgotten is that somewhere the intensity is twice as great. Furthermore a consideration of the relation between loudness and intensity shows that the intensity at the minimum must be of the order of one one-thousandth of the intensity at the maximum, a task which demands an almost perfect match of the amplitudes of the interfering tones.

With complex sounds, the method of interference gives extremely unsatisfactory results in the laboratory. If the first thesis is granted—namely, that the larger part of the sound is set up in the air stream discharging from the end of the exhaust pipe—the use of branched pipes could not affect the major part of the sound. The only part of the sound that could be affected is the large and relatively low-frequency pressure changes due to the individual explosions. The adjustment depends on the temperature of the gases, since the speed of sound depends on the temperature, and can be correct for only one engine speed. Attempts to use the principle of interference on the note from a siren met with failure. There appears to be no successful application of this principle to engine muffling, and there are many reasons for believing that success is not likely to be encountered along this path.

Certain auxiliary matters in connection with engine muffling deserve mention. In the first place there are many sources of sound in the engine besides the exhaust. The gears, cams, valves, and other moving parts set up considerable vibration of metal parts leading to diverse kinds of noise. If care is not taken, the engine cowling and even the muffler itself, if made of thin unsupported sheet metal, may be set in vibration, leading to still further noise. In the second place, it is possible in certain types of airplanes to locate the exhaust above the upper wing so that a large mass is interposed in the direct line between the exhaust and the passenger cabin. Such a location leads to a very considerable reduction in noise.

Sound proofing the cabin.

The last problem to be considered is that of the sound proofing of the airplane cabin, in which field Chrisler and Snyder, of the National Bureau of Standards, have carried out an extensive series of measurements. It must be recognized at the start that the problem is not alone one of sound transmission through the cabin walls, but also one of sound absorption. No matter how low the transmission of sound

through the walls, the sound within the cabin will eventually build up to the same intensity as the sound outside if there is no absorption within the cabin. The low transmission simply delays the attainment of the final intensity for a short time after the starting of the engine.

Consider an airplane cabin of exposed surface area A_w placed in a field of sound energy such that the energy striking the surface per unit area per unit time is E_o. When equilibrium has been established, suppose that the energy striking any surface in the interior of the cabin per unit area per unit time is E. The condition for equilibrium is that the amount of energy entering the cabin per unit time by transmission through the walls equals the amount leaving the cabin by transmission through the walls added to the amount absorbed within the cabin. Obviously, if there is no absorption, the intensity within the cabin must equal the intensity on the outside of the cabin. If the transmission of the wall is t, the amount of energy entering per unit time tE_oA_w. Similarly the amount leaving per unit time by outward transmission through the walls is tEA_w. If the average absorption coefficient of the exposed surface within the cabin is a, and the area of the exposed surface is A_a, the amount of energy absorbed per unit time is aEA_a. Therefore when equilibrium is reached

$$tE_oA_w = tEA_w + aEA_a$$

or

$$E = \frac{E_o}{1 + \frac{A_a a}{A_w t}}$$

The preceding elementary exposition, which is far from rigorous and contains several assumptions, will serve to give the general relationships. While without absorption there is no reduction of energy within the cabin, no matter how small the transmission, absorption alone can accomplish little. Thus if the absorbing area equals the area of the walls, and if $a=1$, so that all energy striking the absorbing surface is absorbed, and if $t=1$ so that the walls are transparent, the reduction in loudness is only three sensation units. In any practical case some absorption is always present from the passengers themselves if from no other source. Each passenger has an absorption equivalent to a little less than 5 square feet of surface having 100 per cent absorption. Because absorption is always present, a reduction in the transmission can accomplish a great deal.

When the transmission of single sheets of material is investigated, it is found that the intensity on the physical scale of the sound received on the side opposite the source is approximately proportional to the reciprocal of the 0.73 power of the weight per unit area; in other words, to the reciprocal of the product of the density of the material and the thickness raised to 0.73 power. Because of the relation of the ear scale to the physical scale, the reduction of loudness in sensation units plotted against the logarithm of the weight per square foot gives a straight line. To obtain a reduction of 10 sensation units requires a material weighing 0.1 pound per square foot, 20 sensation units 0.5 pound per square foot, 30 sensation units about 3 pounds per square foot. It may be recalled that a material giving a reduction of 30 sensation units transmits only 0.001 of the energy falling on it.

Results found by Chrisler and Snyder.

The relation between the transmission and the weight was found by Chrisler and Snyder to hold for wrapping paper, airplane fabric, glass, plywood, aluminum, and building board. The prospect of securing a satisfactory reduction of loudness by simple sheets of a single material is not very bright, and attention was turned to composite structure. In the sound insulation of buildings, air spaces prove to be of great value so that one of the first attempts was to use two sheets with an air space between. With light materials, as, for example, sheets of aluminum, the transmission through two sheets separated by an air space was greater than through a single sheet. The use of air spaces is entirely ineffective in the sound insulation of airplane cabins.

The next trial was the use of absorbent material between the two panels, a process that is not very effective in building construction. For the much lighter panels which must be used on airplanes, actual test showed that the use of absorbent material between the panels was very effective. With balsam wool, cotton, or hair felt as the filling materials, composite panels were built which gave a reduction as great as for a homogeneous material of twice the weight or more. With a blanket made from kapok fibers, such as are used in life preservers, a panel was constructed which gave a reduction as great as for a homogeneous material of three times the weight. This sound absorbent weighs only 1.14 pounds per cubic foot. A reduction of 30 or 35 sensation units is obtained with a wall weighing about 1 pound per square foot.

The area of the walls of the cabin of modern commercial airplanes is usually from 30 to 50 square feet per passenger. The casual reader might then suppose that 30 to 50 pounds per passenger additional weight would be required to provide the sound protection for each passenger weighing, say, 150 pounds and thus that about one-fifth the useful passenger load must be devoted to sound insulation. This is far from the case. In the first place the cabin must have some kind of walls in any case. If they are of airplane fabric, they will weigh only 0.1 pound per square foot; if of plywood about 0.5 pound per square foot; if of aluminum, about 0.3 pound per square foot. In the second place a modern cabin has some type of interior finish or lining for appearance sake. The weight of the wall that would be provided in any case without thought of sound insulation should be subtracted from the 1-pound per square foot of the sound-insulating construction.

Experience has shown that the additional weight is likely to be of the order of only 10 to 15 pounds per passenger; say, about 0.3 pound per square foot. At this price the noise in the cabin may be reduced to about that in a railway coach in motion, so that conversation may be carried on with ease.

This concludes the brief résumé of the present situation with regard to silencing the airplane. There appears to be no prospect that any single device will be developed, which, at the cost of a pound or two of additional weight, will eliminate the noise. The imagination of the inventor is to be envied who proposed to have the sound actuate a loud speaker in such a way as to produce a new noise of equal amplitude to

the original, but of opposite phase so that by interference no sound at all would be heard, but there appears no hope of progress along this line.

By the same token it is unnecessary to resort to ear plugs, telephone sets, or speaking tubes. At the present time a great deal can be done by careful attention to detail to provide greater comfort to the passenger, and at a moderate increase in weight. It will prove more profitable to carry 8 passengers in comfort than 9 or 10 in conditions almost unbearable.

STANDARDIZATION BRIEFS

Leaders in the hospital field, medical, nursing, and allied groups will assemble in Philadelphia at the Bellevue-Stratford Hotel, the week of October 13, for the Thirteenth Annual Hospital Standardization Conference of the American College of Surgeons.

A meeting of manufacturers of metal windows, held in Washington, D. C., July 29, took initial steps looking toward the formulation of a simplified practice recommendation covering masonry openings for metal windows. This recommendation will cover copper, bronze, and steel windows. A second meeting of these manufacturers will be held on or about September 15. It is expected that at this meeting final steps will be taken in the drafting of a simplified practice recommendation.

Three documents covering standardization activities of the American Society for Testing Materials are in the course of preparation. The 1930 issue of the book of A. S. T. M. standards will again appear in two parts. Part I will contain the standards relating to metals, and Part II the standards relating to nonmetallic materials. The two parts will comprise approximately 2,300 pages and will contain all of the standards of the society (numbering 426) in their latest revised form. Probably the volumes will be ready for distribution about October 15. The special volume containing all of the tentative standards (numbering 152) in their latest revised form, is now in preparation. A combined index of all standards and tentative standards will again be issued complete, with references to the publications in which the standards appear. It is expected that this index will be available early in November.

The Federal Trade Commission has approved a resolution adopted May 26, 1930, at a trade practice conference of the knit-underwear industry, covering the use of the word "wool" in advertising and selling garments. The rule, which will become effective January 1, 1931, provides that the word "wool" shall not be used in any way in the labeling, advertising, merchandising, or selling of knit underwear unless the percentage by weight of wool contained in the garment is stated. Garments with percentage of wool content named may contain not less than the stated percentage of wool by weight with the allowance of a flat tolerance of 3 per cent plus or minus, on any labeled percentage. Thus, the permissible range of wool content by weight for a garment identified as having 50 per cent wool content is from 47 to 53 per cent.

A survey has recently been completed among some 2,250 canners throughout the country with regard to No. 2 and No. 1¼ cans. In the original recommendation which was proposed at the National Canners Association last year, there were two No. 2 cans and two No. 1¼ cans, varying in size by only one-sixteenth of an inch. It was decided to eliminate one can under each size heading, and thus further reduce the proposed list. The results of the survey which has just been completed have been turned over to officials of the National Canners Association for their information in order to facilitate the consideration of the standard list of sizes.

Nineteen manufacturers of mercerized cotton yarns were circularized regarding adherence to the commercial standard for Regain of Mercerized Cotton Yarns, CS11–29, for the year ended June 30, 1930, and replies received from 15 of the manufacturers indicated that adjustments on regain were called for in comparatively few cases, but wherever adjustments were made the commercial standard was used as the basis therefor. Those who have had no occasion as yet to make regain adjustments state that they intend to use the commercial standard as a basis for such adjustments when occasion arises.

A survey of adherence to the commercial standard for Staple Porcelain (All-Clay) Plumbing Fixtures, CS4–29, covering production for the year ended June 30, 1930, indicates that the average adherence to the commercial standard requirements for regular selection ware is 95 per cent. Those who sell culls report that the culls are marked in accordance with the rules of the commercial standard. The average adherence to standard types and sizes is 85.8 per cent, the deviation being due either to old stock on hand which is still salable, to old molds which have not yet worn out, or to demands from purchasers for nonstandard items. The figures reported by each company were averaged without weighting them according to the production represented.

Figures received from manufacturers of brass pipe nipples in reply to a questionnaire regarding adherence to commercial standard CS10–29, Brass Pipe Nipples, for the year ended June 30, 1930, indicate that adherence to the requirements regarding grade of pipe stock, thread dimensions, and inspection tolerances is 100 per cent. Some slight deviation is reported, however, from the recommended stock sizes and lengths because of demand from purchasers for special sizes and lengths. The average of the figures reported, not

weighted according to individual production, is 95 per cent. Ten replies have been received from 18 manufacturers circularized.

The dimensions and weight of the tennis ball are now standard the world over. The recent adoption of larger standard dimensions for the golf ball in the United States is a break with standard practice elsewhere.

The division of specifications of the National Bureau of Standards is in correspondence with more than 66,000 firms, associations, and societies, and individuals, of whom 26,000 are public purchasing agents; that is, purchasing out of tax money; 2,600 are nongovernmental purchasing agents; 22,000 are manufacturers; 15,000 are distributors; 700 are technical and trade associations.

The present list of testing laboratories in the United States, officially compiled by the National Bureau of Standards, now contains reference to 383 laboratories.

More than 600 manufacturers of softwood lumber are now on the "willing-to-certify" list of the National Bureau of Standards. Work on the hardwood list has just begun.

The following rules, edited by the Verband Deutscher Elektrotechniker (VDE), the German Association of Electrical Engineers, have now been printed in English. Standards for the classification and testing of electrical machines. Standards for the classification and testing of transformers. Rules for lead-covered cables in power plants. Rules for insulated conductors in heavy-current installations. Rules for sheathed conductors.

STANDARD FOR STAPLE VITREOUS-CHINA PLUMBING FIXTURES AVAILABLE IN PRINTED FORM

Standard Representative of More Than Five Years' Cooperative Work on Part of Industry

As a culmination of more than five years of cooperative effort, a printed pamphlet entitled "Staple Vitreous China Plumbing Fixtures, Commercial Standard CS20–30" has recently been released by the National Bureau of Standards for general distribution.

The commercial standard covers nomenclature, definitions, grading rules, types, sizes, dimensions, and general practices, including marking of culls and labeling for water-closet bowls, tanks, lavatories, and urinals, recommended as standard by the industry. The standard recognizes the fact that minor blemishes and defects in the material, from which vitreous china plumbing fixtures are made, are unavoidable, and within certain limitations, do not affect the value or utility of the fixture. Methods of grading are given for each type of ware and the maximum blemishes allowable on "regular selection" ware are listed. Besides quality of ware as determined by appearance, finish, and freedom from defects, the commercial standard establishes standard roughing-in measurements in order to assist in the design and construction of buildings and to relieve many difficulties surrounding the installation of fixtures by the plumber. These dimensions are shown on sketches in the printed pamphlet.

Through the medium of the commercial standard, the industry has established standard measurements for the more important dimensions of these fixtures in order that the architect, the plumber, and the consumer may become familiar with the sizes and types regularly available with full competition and be enabled to complete detailed plans for bathrooms, kitchens, and laundries prior to making a decision as to what company's ware is to be installed.

All fixtures specifically mentioned in the standard are to have the trade-mark or name of the actual manufacturer applied in such manner as to be permanent. Labels, applied at the factory only, are to be used only on such ware as conforms to the requirements for "regular selection" as set forth in the grading rules. "Labels for regular selection" ware are worded as follows:

> This is a high-class and valuable piece of vitreous china and should be handled as such. This piece has been classified as "regular selection" after a thorough inspection by competent and experienced men. The term "regular selection" does not mean that this article is without blemish. It is impossible to make vitreous china plumbing fixtures without flaws of some kind and these have not been overlooked in the grading of this article.
>
> This piece has been graded in accordance with uniform grading rules adopted by the Sanitary Potteries in conjunction with the United States Bureau of Standards of the Department of Commerce.

No labels are used on "culls" (ware grading below "regular selection"), but such ware is marked by the maker with two parallel lines cut through the glaze into the body of the ware at locations recommended by the advisory committee so that they may be found readily after installation of the fixture. These cuts are filled with a bright-red varnish or enamel which is resistant to the action of hot water. Crates containing "culls" are also marked with two splashes of red on one end of the crate so as to be visible without tearing down stacks for identification purposes during shipment or inventory of the ware.

This commercial standard is not meant to interfere with the manufacture or sale of special sizes and types of vitreous china plumbing fixtures sometimes required, but is intended to aid commercial progress toward ideals of plumbing fixture quality and performance and as a basis for marketing.

As stated above, copies of the pamphlet may be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10 cents per copy.

STANDARDIZATION AND IMPROVEMENT OF TEXTILES

Control of Textiles Based on Federal Research; Bureau of Standards Aided in Perfecting Army Uniform Cloth

By Henry D. Hubbard, *National Bureau of Standards*

Textile research is a shining example of the control of quality through measurements. The bureau's chief interest is in those measurable factors which predetermine the quality or fitness for a given use. As every dimension of a key fits a corresponding recess in a lock, so every dimension or magnitude of property in a textile must meet the conditions of service required. Such one-to-one correspondence of measured production to measured need is the basis of successful research.

The potential field for research is unlimited. Textiles, for example, assume an infinite variety of forms—rugs, carpets, garments, bags, flags, sails, plane wings, curtains, handkerchiefs, towels, hosiery, ribbons, surgical bandages, parachutes, and even shoes and hats. Each must pliably adapt itself as drapery covering, container, adornment, health, comfort, protection, and whatnot. Each use presents its problems to the technician for research, the solution of which means progress in the arts. Their solution creates new utilities and promotes human well-being.

Research possibilities.

Textile laboratories of all grades find their hands full of research possibilities. In one research, a cotton fabric was developed for mail bags, where the high quality demanded was duplicated at a great saving. The ultimate fiber strength, the length of the individual fiber, the number and twist of the yarn, when suitably embodied in the design of a fabric, give predictable quality.

As the criteria become known, it is possible to set these measured data into the spinner and loom, and thus invariably reproduce the high quality which the designer made possible. Such high quality is made possible by standardizing the quality produced on the basis of the measurements which first produced it. Now comes the next stage—to design predictably on the basis of data accumulated as the result of each productive factor.

Cotton.

To set gears for beating raw cotton in cleaning it, we have had an unwritten art dependent on the opinion and judgment of the man in charge. To free it from guesswork, a bureau research was completed and the results published by the bureau as computing graphs. These give automatically the set of gears suited to effective beating for each case. Such computing graphs and nomograms are fast becoming aids to the control of process in industry. They embody the skill of the mathematician and the data of research, and they permit the novice to apply both in solving his problems.

A most important factor in most of the researches at the Bureau of Standards is the cooperation of the industry in maintaining research workers on problems of mutual interest.

Standardization of hosiery boxes.

A related problem was the standardization of hosiery boxes. Eighty thousand tons of box board and cover paper are used annually in packing hosiery. An astonishing variety of hosiery boxes were collected—58 for children, 39 for men, and 98 for women. Chaos dominated the sizes and varieties. It was found possible to reduce the variety to 80 per cent; thereby saving 5,000 tons of box board and cover paper annually, and giving a better assortment of boxes. A new method was devised for folding hosiery which saves 14 per cent of the box space, and also strengthens the package.

The many resulting economies save the industry $3,000,000 annually. At the same time, the total savings on textiles at that time were estimated as having netted the textile industry $28,000,000.

Nine systems of measuring hosiery.

Nine systems for measuring hosiery were found in another bureau research. The same number assigned to a size might apply equally to other sizes, and in different places the same size was designated by various numbers. Much confusion prevailed. By cooperation, a scientific method was devised and tested; and is now standard for the industry. A single method, replacing the nine originally used, proves a gain both to the public and to the industry.

The bureau was able to cooperate in perfecting textile specifications for Army uniforms. Existing specifications included requirements not encountered in service. Tests which do not reproduce conditions of wear tend to limit the dyer in his choice of dyes without advantage to the service.

Laundering tests.

Preliminary to such recommendations, the expected life of garments was studied in laundering tests. The fastness to laundering was measured. Meantime a test for light fastness was introduced which immediately reduced unsuitable deliveries. In the development of Army fabric, the bureau duplicated the injurious effects of perspiration in discoloring the cloth by the use of organic acids.

A visit to the textile section laboratory of the National Bureau of Standards is illuminating even to the expert. Here is a full experimental mill equipment, where fibers may be spun, blended, and woven into fabric; and also be subjected to service tests or laboratory research with the object of continued progress in minimizing waste, reducing wear, and prolonging the useful service life of textile products.

Test laboratory.

In order that all tests and researches may be comparable, the test laboratory is controlled at standard constant temperature and humidity. The characteristics of a yarn as to length, strength, and the like

might, in the course of daily moisture variations of natural humidity be altered by as much as 10 per cent. Measured controls of the atmospheric humidity and temperature now make it possible to compare tests and research results on the same uniform basis, with correspondingly greater confidence in the scientific value of results.

A current problem of the bureau is its cooperation in the standardization of sizes of ready-to-wear garments. For example, minimum measurements for boys' blouses, waists, shirts, and junior shirts have been adopted by the industry at a general conference called by the bureau and under bureau procedure. Similar minimum measurements for sizes A, B, C, and D have been adopted for men's pyjamas. The elimination of the E size will simplify stocks.

Similar projects are in process of formulation in cooperation with the International Association of Garment Manufacturers for women's wash dresses, men's shirts, overalls, leather-lined and leather coats. Such standardization establishes a national basis for checking sizes of garments as purchased and will become a uniform guide to production. In the retail trade there will be fewer returns for incorrect sizes and far less confusion as to size designation.

Another measurement problem is illustrated by the adoption of size designations and basic body measurements for dress patterns, the results of which are published by the National Bureau of Standards under the title "Dress Patterns—Commercial Standards CS13–30."

APPOINTMENTS MADE TO BUILDING CODE COMMITTEE

H. L. Whittemore, of National Bureau of Standards, and W. A. Payne, of New York, New Members of Committee

Two new appointments to membership on the Department of Commerce Building Code Committee, have been announced. These are: Herbert L. Whittemore, chief of the section of engineering mechanics of the National Bureau of Standards, and William Arthur Payne, vice president of Charles T. Wills (Inc.), New York, N. Y.

The history of the building code committee extends back to 1921, at which time President Hoover, then Secretary of Commerce, appointed a body of seven nationally known architects and engineers to suggest more logical building regulations. At that time investigations of the housing situation had brought out the fact that building activities in some localities was seriously handicapped by antiquated and illogical requirements. Many differences in such requirements were brought to light, and the confusion which this caused to architects, contractors, and others engaged in the industry was held responsible for much lost motion and waste.

During the past nine years the committee has continued to function, bringing out successively recommended minimum requirements for small dwelling construction, masonry walls, live-load assumptions, code arrangement, and working stresses in building materials. Other subjects have been partially covered, and specific recommendations will be published from time to time as investigations reach the point where it is possible to state with some exactness what is the best practice. These recommendations have been widely utilized in the preparation of local building codes throughout the country and have won an established place in the respect of those engaged in promoting better and more uniform building requirements.

Mr. Whittemore was educated at the University of Wisconsin from which he was graduated in the mechanical engineering course, receiving the degree of bachelor of science, and mechanical engineer. Since 1917 he has been a member of the staff of the National Bureau of Standards, where he serves as chief of the engineering mechanics section, whose work lies in determining the strength and other properties of various materials. He is a member of numerous scientific societies, and has been honored by appointment to many committees engaged in standardization work.

Mr. Payne was graduated from Lehigh University with the degree of bachelor of science in architecture and took postgraduate work in architectural history and design at Columbia University. He is now vice president of Charles T. Wills (Inc.), New York builders. In addition to his broad experience as an architect and builder, he has distinguished himself as chairman of the standards committee of the New York Building Congress, under which standard specifications for building construction have been prepared.

REVISION OF FEDERAL SPECIFICATIONS

Specifications Proposed for Revision Submitted for Comment and Criticism

Eighteen revised specifications, proposed for the National Government, are now before the departments and others interested for comment and criticism. These specifications also bear the new designation in accordance with the scheme used with the Federal Standard Stock Catalogue. For copies of the proposals or for further information pertaining to the specifications, address the Federal Specifications Board, the National Bureau of Standards, Washington, D. C.

F. S. No.	Commodity	New designation
Ia.	Cement, Portland	SS–C–191.
112a	Packing, rubber, wire-insertion	HH–P–161.
217	Ice bags, rubber	ZZ–I–121.
218	Bags, Politzer	ZZ–B–71.
248	Gypsum, calcined	SS–G–901.
249	Lime, hydrated, for structural purposes	SS–L–351.
267	Fowl (fricassee), dressed	PP–F–611.
267	Turkeys (provisions), fresh	PP–M–191.
267	Chickens, dressed, broilers, fryers, and roasters.	PP–C–251.
310	Ether, petroleum	O–E–751.
356	Alloy, dental, amalgam	U–A–451.
389	Coconut, prepared	Z–C–571.
389	Hops	HHH–H–491.
577	Acetone	O–A–51.
	Hair, horse, curled	C–H–111.
	Flavoring extracts and nonalcoholic flavors (proposed).	
	Asphalt emulsion for repair work (proposed.	
	Motor trucks, classes AA, A, B, and C	

STANDARDIZATION OF MAIL CARS AND TERMINAL RAILWAY POST OFFICES

Standard Specifications for Postal Cars and Post Offices Increase Operating Efficiency of System and Personnel

By W. Irving Glover, *Second Assistant Postmaster General*

The history of mail-car standardization commences with the appointment on September 13, 1911, of the Standard Car Committee for the Post Office Department. Prior to the date mentioned, specifications of a limited scope had been issued by the Post Office Department for the construction of full railway post-office cars in 1891, 1904, and early 1911, but it remained for the standard car committee to formulate the first complete specifications for both construction and fixtures.

After several months of deliberation and conferences with railroad and car-building officials, the first specifications for construction of steel and steel underframe full postal cars and standard fixtures for such cars were prepared by the committee and issued under date of March 28, 1912. These specifications have been revised from time to time to keep pace with changing conditions, and have exerted quite an influence on construction of car equipment generally throughout the United States. In so far as we are advised, the specifications of the Post Office Department were the first car construction standards printed and are believed to be the only ones extant.

The issuance of our specifications in March, 1912, was followed by legislation in August, 1912, and July, 1916, which required the elimination of wooden cars from full railway post office service; and regulations promulgated by the Postmaster General in May, 1927, and October, 1929, governing the operation of mail-apartment cars, have further restricted the use of wooden and steel underframe equipment.

Enforcement of laws prove beneficial.

Enforcement of these laws and regulations and the application of standards required in our specifications have materially changed the mail-car situation during the past 18 years. On June 30, 1912, there were in railway post-office service 726 steel, 403 steel underframe, and 4,288 wooden full postal cars and apartments of nondescript types. On June 30, 1930, there were approximately 3,105 steel, 575 steel underframe, and 865 wooden mail cars, 90 per cent of which conform to our specification standards.

The importance of this mail-car standardization is admitted by all. It has aided the railroad companies owning the cars to use them interchangeably on different lines, to economize in operation and maintenance, and by the stronger construction requirement has undoubtedly obviated large payments for personal injury and loss of life. The benefits to the Post Office Department have been the safety and comfort of railway postal clerks, the protection of mails, uniform working conditions, and a general higher efficiency in the performance of the service. In addition to these things, the entire question of compensation to railroads for service performed depends on the standards enumerated in the specifications of the Post Office Department.

Marked progress toward a full standardization of full postal cars and apartments has been made each year since the readjustment following the World War, and it is expected that a complete standardization will be accomplished within a very few years. This goal will be reached, unquestionably, if the favorable conditions of the past decade continue.

Standard terminals.

With the establishment of the parcel-post system on January 1, 1913, there was immediately a tremendous increase in the volume of packages of merchandise to be handled in the mails, and this resulted in so much congestion in railway post-office cars that it became necessary to provide extra facilities for making distribution of such matter in transit. There were already in existence a few of the so-called "terminal railway post offices," located in or adjacent to railroad stations, and the logical solution of the distribution problem presented by the parcel-post system seemed to rest in an expansion of these terminal railway post-office activities. This was accomplished by establishing additional terminals at strategic points of accumulation throughout the country in such buildings and quarters as were available, but there was not time or opportunity then to select quarters or fixtures best adapted to the needs of the service.

However, with the benefit of experience and the stabilization of the flow of mails, certain standards for distribution facilities have been formulated and certain stipulations in the matters of heating, lighting, ventilation, sanitation, and floor construction have been required of lessors of quarters in which terminal railway post offices are located. The Post Office Department now furnishes its own standard terminal distribution equipment and has gradually replaced the obsolete fixtures formerly used, thereby increasing the distributing efficiency and economizing in clerical force.

Lessors have been required from time to time to make improvements in old quarters and to equip new quarters according to the other standards mentioned. The result is that quarters and facilities have been materially improved and made to meet accepted standards at nearly all of the sixty-odd points where terminal railway post offices are located, and the very few which have not been so standardized are being brought up to requirements as existing leases expire.

The terminal railway post offices now perform an important function in the scheme of distribution and transportation of mail matter and provide an excellent training school for railway postal clerks, who graduate from the terminals to road positions in order of fitness and seniority.

The standardization of terminal quarters and facilities has, therefore, raised the efficiency not only of the terminals but of the entire Railway Mail Service of which they are a part.

STANDARDIZATION OF MILITARY MOTOR TRUCKS

Standardization a Medium to Improve Military Transportation

By Col. Edgar S. Stayer, *Quartermaster Corps, United States Army*

In the development of military transportation, standardization is taken into consideration from all angles. It is a subject that has rightfully earned for itself an enviable position in the United States Army. After more than 10 years' study of this subject, it is possible to express certain prognostications, the background for these thoughts being the existence of data obtained from more than 1,500,000 miles of exhaustive road tests, in which were employed vehicles and drives of every description.

Standardization results in, and may be considered as analogous to, simplification. It is not always accorded the place in the field of endeavor that it deserves, yet simplification is responsible for mass production and the resultant monetary savings, which go a long way toward counteracting the cry of the depreciating dollar. It is the basis for the tremendous mergers which occur daily in the commercial world of our Nation. It has myriads of possibilities and benefits are derived in direct proportion to the prominence which it is accorded. Therefore, every effort should be made toward furthering it in every field of military endeavor.

During the World War military effort was confronted with the dire necessity of equipping itself with the intricacies of 12 different cargo chassis. The units which compose and go into the make-up of these vehicles differed to such an extent that no similarity or standardization existed. There were 27 assemblies classed as major units in a single cargo vehicle. This, by ordinary mathematical calculation, would indicate that 342 major units alone had to be maintained; this raised a serious maintenance problem due to the vast amount of diversified supplies and equipment needed at every repair center.

Changes since the war.

During the years that have ensued since the war, many additional classifications have come to the front. If the number of chassis to be adopted is not limited in some manner, it is reasonable to suppose that these additional classifications will find some necessity for their existence in the Army, and should this occur, the maintenance problem will grow beyond the power of anyone or anything to control it.

Standardization upon a special type and make of vehicle, so far as military motor transportation is concerned, is not considered as the proper method of standardization. The proper method is rather to standardize through written specifications describing the units which will be used to build this transportation, and which are known by service and testing experience to be of sufficient durability and ability for military needs. In furtherance of the unit replacement system, the ideal way would be for the military service to follow the plan of certain large users of cargo transportation by not purchasing vehicles complete, but by purchasing units and building the vehicles with them.

There is a marked tendency in the development of mechanical transport at the present time toward multiple drive for cargo purposes and single drives on the front end of the vehicle for passenger service, getting as near to the former animal-drawn vehicle as possible by having the power of pulling instead of pushing. The development in commercial life tends toward larger vehicles and the towing of trailers with large capacities. The problem of cargo transportation now is one of capabilities for distribution rather than suitability for production.

In these days of mass production, mass distribution must go parallel with it. The chain store, with its vast distribution, has called for developments in transportation which will no doubt be applicable to some of the problems of military distribution. However, no development can be of great benefit to military life unless it is accompanied by standardization.

Utilizing engines of greater power.

In cargo transportation there is a decided trend toward utilizing engines of greater power and displacement. The demand for high vehicle speed is rapidly leading the vehicle manufacturer to utilize larger engines in all forms of transportation. Not many years ago a 4-cylinder engine of 60-horsepower peaking at 1,400 r. p. m. was considered not only a powerful one, but a high-speed one as well. To-day the same cargo vehicle which utilized that engine would probably be powered with a 6-cylinder 112 horsepower engine, peaking at about 2,200 r. p. m., and an 8-cylinder engine designed for cargo truck purposes has recently appeared on the market.

There recently appeared a series of 6-cylinder engines suitable for cargo transportation of from 130 to 175 horsepower output. These are internal-combustion engines of standard construction, all in production, up to a bore of 5¼ inches and a stroke of 6 inches. Utilizing engines of greater displacement than has usually been deemed necessary will result in more assurance of sustained continuous performance under the gruelling work that military transportation must be subjected to. This trend toward the production of larger engines should assist in the standardization of units between vehicles. It permits a greater number of types from which to select an engine suitable for use in a maximum number of types of vehicles.

In simplifying cargo transportation for the military service there appear to be three salient factors: (1) The number of different vehicles that is required, (2) the types or capacities that will be adopted, and (3) the interchangeability of units among the different types of vehicles.

It can readily be seen that the answer to the first factor, to a great extent, is dependent upon the solution of the second; the answer to the second factor depends entirely upon the cooperation and determination of essentials by the using services and the procuring service. If the using service will express its need

for vehicles in capacities and ability, rather than type or make, it will be easy to coordinate requirements and permit some definite number of classifications to be determined.

A review of the situation will generally bring forth certain requirements that may readily be met with by a vehicle of perhaps slightly greater capacity and ability and will undoubtedly reduce the total number of different chassis required. If cooperation can be obtained in this manner, the reduction of types will be very appreciable. The third factor belongs to the realm of engineering and can be solved in that field.

Military needs can be simplified.

Each of these factors has been accorded a proper weight, and it is indeed fortunate that the Army now has available information relative to the ability of many different forms of chassis from the lowly 1,000-pound pay load 2-wheel drive to the very large and powerful 50,000-pound pay load 8-wheeled vehicle. There is on hand a wealth of data on this subject, which it is believed can not be duplicated. In addition, the War Department has had the cooperation of the entire automotive industry to almost unbelievable extent, including participation in the very notable transportation exposition recently staged under the auspices of the War Department.

From practical experience and the data obtained by experimental research it is believed that military transportation can be standardized. It is evident that every phase of military transport activity must be satisfied in an efficient and appropriate manner. This can be done only through the medium of suitable transportation and standardization will be an important factor in securing this end. (*Quartermaster Review.*)

INTERNATIONAL ROAD BUILDERS TO MEET

Standardization of Road Materials and Utilization of Successful Methods of Road Construction Among Objects of Congress

By Thomas H. MacDonald, *Chief, United States Bureau of Public Roads*

To bring about the adoption of uniformly successful methods of road construction is one of the important objects of the Permanent International Association of Road Congresses. It is also concerned with the standardization and improvement of materials and the development of tests to determine qualities of materials.

As an aid to this end, the association, at the Fifth International Road Congress held in Milan, Italy, September, 1926, created, by resolution, an International Committee on Nomenclature and Tests. It was the duty of the committee to establish a standard nomenclature or glossary of road construction materials and methods, and to unify the testing methods for tars, bitumens, and asphalts. The committee has held three meetings, one in 1927, one in 1928, and the third in June, 1930. It will report the progress it has made at the Sixth International Road Congress to be held in Washington, D. C., October 6 to 11, 1930.

The congress will be held under the general auspices of the Permanent International Association of Road Congresses, with headquarters in Paris. Details of arrangement are being cared for by the American Organizing Commission, appointed by the Secretary of State, and with headquarters at 1723 N Street NW., Washington, D. C. Some 500 foreign delegates will attend, representing more than 50 of the 77 foreign nations to whom invitations were sent by the State Department. In addition to the foreign and diplomatic participants, about 1,000 American delegates are expected to be present.

Congress divided into two sections.

The congress will be divided into two sections, one dealing with construction and maintenance of highways, the other with traffic and administration. Each section has been allotted three questions for discussion. The first section will consider questions regarding the results obtained by use of cement, bricks, or other artificial paving, the use of tar, bitumen, and asphalt in road construction, and the construction of roads in new countries. The second section will discuss ways and means of financing highways, coordination of highway transport with other forms of communication, and traffic regulations in large cities and their suburbs, and parking and garaging of vehicles. All reports to the congress will be interpreted in four official languages, English, French, Spanish, and German, by use of microphones and earphones.

The first plenary session, to which the public is invited, will be held in Continental Hall, Monday afternoon, October 8. All other sessions will convene in the auditorium of the Chamber of Commerce of the United States Building.

The Permanent International Association of Road Congresses was organized in Paris in 1908. Its present membership is about 2,000. Its primary function is to act as a clearing house for distribution of results of research and experience bearing upon all phases of highway development and use.

PROGRAM FOR SOLID SECTION STEEL WINDOWS

The revised simplified practice recommendation No. 72, Solid Section Steel Windows, may now be considered as in effect, the National Bureau of Standards announces. A sufficient number of signed acceptances have been received from manufacturers, distributors, and users of steel windows to insure the general adoption of the program by the industry as a whole.

The most important changes made in this revised program were the discontinuance of the "dealer stocks" classification and the addition of "commodity products" in lieu thereof; several sizes in both the pivoted and projected windows were added, and some changes of types and eliminations in projected architectural window groupings were made.

STANDARDIZATION OF TESTS FOR FASTNESS OF COLORED TEXTILES

Research Resulted in Practical Laboratory Methods for Evaluating Degrees of Fastness of Colors in Textiles

By William D. Appel, *National Bureau of Standards*

The National Bureau of Standards has been working for about six years in cooperation with the American Association of Textile Chemists and Colorists on the development of standard tests for fastness of colored textiles. The problem was found to be much more involved than anticipated and extensive technical investigations have had to be conducted. The work is now well advanced, and although the final selection of standards has not been made, most of the methods of test have been tentatively agreed upon.

It was recognized at the beginning of this work that the fastness of textiles to each of the important color-destroying agencies—light, laundering, perspiration, rubbing, weathering, sea water, etc.—must be considered separately. Even with the many dyes of unusual fastness that are now available, it is not possible to dye all types of textiles in all colors and to have them " fast color " in the strict sense.

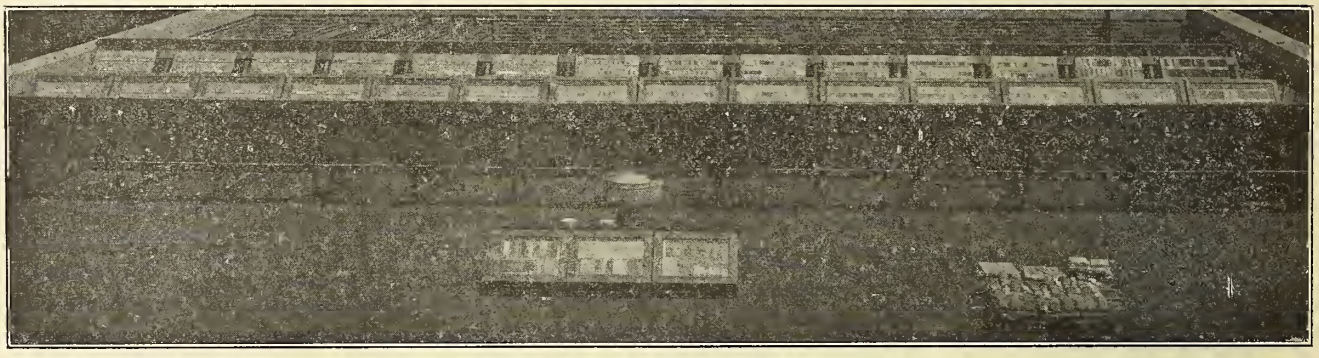
Standard tests were needed, not only to distinguish " fast " colors from fugitive but to differentiate between different degrees of fastness, for the fastness required by the various uses of textiles is different. Thus, evening gowns, awnings, hosiery, draperies, and men's shirting are only a few of the uses requiring quite different degrees of fastness to light, laundering, perspiration, and weather.

Fastness can not be satisfactorily standardized on the basis of the dyestuff used to produce the color because the method of application and the finishing treatments as well as the nature of the fiber, whether it is cotton, wool, silk, or one of the rayons, all influence fastness. It was, therefore, necessary to devise tests which simulate the action of the various color-destroying agencies.

The object of the work, then, was to develop practical laboratory methods for evaluating all of the different kinds and degrees of fastness which are of interest to manufacturer or user of textiles. It should be pointed out that the development of trade standards for the fastness of specific commodities does not lie within the scope of this project. However, when established, the standard methods should form a very satisfactory basis for such trade standards.

Fastness to light.

Colored textiles range in fastness to light from extremely fast to fugitive, and all degrees of fastness have their use. The great difficulty in the way of developing a standard test for fastness to light is that dyeings do not fade in the same way under different conditions of natural light exposure. Direct sunlight and north skylight, for example, are different in their fading action. Not only are the character and intensity of the light important factors but the atmosphere about textiles influences the rate and nature of their fading. It was found that some dyeings fade three times faster in moist air than in dry, while the fading in others is not nearly so much affected by atmospheric humidity. All of these factors were studied. Typical dyeings were exposed in different parts of the country and at different seasons of the year and the observed fading was compared with that of duplicate samples exposed to the various artificial sources of light. A whole series of reports have been published.[1]



Light exposure racks at the Bureau of Standards

The daylight exposure frames on the roof of the Industrial Building, National Bureau of Standards are shown in the illustration.

One result of the work is a standard sunlight exposure test which gives duplicable results as to relative fading in a series of dyeings over a considerable part of the year.[2] Another result is a careful comparison of the fading of over 1,200 dyeings when exposed to the radiation from the inclosed carbon-arc lamp, the most useful of the artificial light sources and under various sunlight and daylight exposure conditions.[3]

In order to make possible a direct correlation of the results obtained by different testing laboratories

[1] See especially the reports of the Subcommittee on Light Fastness, Am. Dyestuff Reporter, **16**, pp. 707–715; **17**, pp. 410–422; **18**, pp. 407–446.

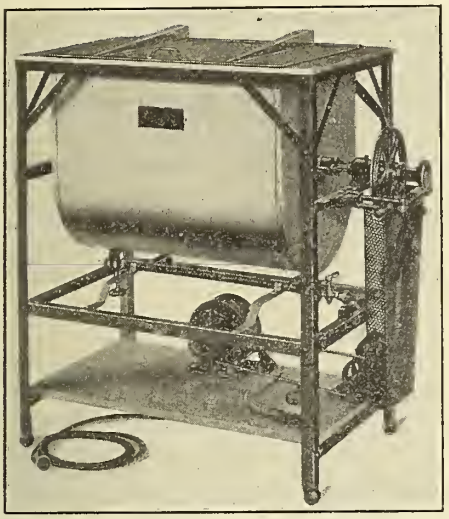
[2] 1929 Yearbook of the American Association of Textile Chemists and Colorists, pp. 108–109.

[3] Am. Dyestuff Reporter, **18**, pp. 407–446.

and by sunlight, daylight, and carbon arc lamp tests, all of which have merit, the American Association of Textile Chemists and Colorists has undertaken to prepare and to make available sets of dyeings representing the different degrees of fastness to light. This should go a long way toward overcoming the difficulties of this important test.

Fastness to laundering.

One of the first steps in the development of standard tests for fastness to laundering was the building of a machine in which a number of samples can be washed simultaneously each in its own soap solution.



Commercial form of standard machine for testing fastness to washing

In this machine the temperature at which the samples are washed can be held constant and mechanical action corresponding to that in a home washing machine or a commercial laundry wheel can be provided.

Dyed textiles are laundered in different ways, depending on their nature. Silk and wool are usually laundered at low temperatures with neutral soap and little or no mechanical action. Colored cotton goods are often washed at a higher temperature. If the colored cotton is combined with much white cotton, as in men's shirts, then a moderately high temperature, alkali, possibly some bleach, and considerable mechanical action may be required to produce satisfactory work. Because of these facts it was found necessary in standardizing the laboratory tests to establish different methods for testing silk and wool and to have two tests for cotton, one corresponding to home laundering and the other to commercial laundering. These tests are given in their latest form in the Yearbook of the American Association of Textile Chemists and Colorists.[4]

Sets of dyeings representing the different degrees of fastness to washing for the different fibers are being developed and will be available through the association. These dyeings will serve as very practical standards with which dyeings of unknown fastness can be compared. Later on it may be possible to work out an optical method for evaluating the fading of dyeings in the laboratory test, but this does not appear to be practicable at present.

Other fastness considered.

Although fastness to light and fastness to laundering are perhaps the most important to the user of textiles, a number of other types of fastness have to be considered. Fastness to perspiration, rubbing, weather, dry cleaning, sea water, and to various mill treatments or chemicals with which textiles come in contact in the mills, such as scouring, fulling, stoving, carbonizing, acid, alkali, and chlorine, all have been studied and methods of test developed.[5] A special study of the composition of perspiration is in progress in England.[6] The fastness to dry cleaning of a considerable number of representative colored textiles has been studied at the National Bureau of Standards.[7]

International cooperation.

Active studies of textile fastness are in progress in Germany and England as well as in this country. The German "Fastness Commission" published the latest revision of its tests and standards in 1928.[8] The Society of Dyers and Colourists and affiliated societies in England have been conducting researches for several years. Reports of this work appear at frequent intervals in the Journal of the Society of Dyers and Colourists. These groups are in correspondence with one another and all have expressed the hope and belief that this work will eventually lead to international standards of fastness.

[4] Obtainable from the association, A. Morrison, secretary, 5 Canterbury Street, Andover, Mass.
[5] See the yearbook of the association.
[6] McSwiney, B. A., Physiology and industry, J. Soc. Dyers Colourists, 45, pp. 167–170; 1929.
[7] B. S. Jour. of Research, 3 (R. P. 80), pp. 39–51.
[8] Verfahren Normen and Typen für die Prufung der Echtheitseigenschaften von Färbungen auf Baumwolle, Wolle, Seide, Viscosekunstseide und Azetatseide. Vierte Ausgabe, 1928, Verlag Chemie, G. m. b. H., Berlin W 10.

BOOKS OF INTEREST TO HOME OWNERS LISTED

A list of titles of publications intended to be of assistance to home owners, home builders, and others interested in materials, equipment, and practices employed in dwelling construction, and in keeping up and improving home properties, has been compiled by the division of building and housing, and issued in form of a mimeographed letter circular obtainable on request.

The list includes both Federal Government publications, and those issued by national trade associations, in which their products, and recommended methods of applying and installing them, are described.

The publications listed are devoted to such matters as structural materials, heating equipment, electrical appliances, plumbing, water supply, sewage disposal, insulating, roofing, and painting as well as household helps, house plans, and landscaping. In addition to the sources mentioned in the list, it is pointed out that various universities and colleges, through their engineering experiment stations, agricultural extension divisions, and other departments, publish pamphlets of interest to home owners.

STANDARD RULES GUARD SCHOOL CHILDREN

School Boy Patrols Guide Playmates to Safety

By Thomas P. Henry, *President American Automobile Association*

Standardization has now been extended to the rules and regulations under which, during the school year, more than 2,500,000 school children are daily guided through the maze of vehicular traffic on the streets and highways. With more than 175,000 school boy patrolmen in A. A. A. units alone, these standard rules will go far in increasing the morale, as well as the efficiency, of the youths engaged in this field of safety.

Less than 10 years have passed since the first patrol was formed by the A. A. A. as an experiment in protecting children crossing streets en route to the class room. This program is no longer an experiment. Instead of children rushing pell mell through the streets, where there are patrolmen, they now await their signal, and cross in an orderly manner.

The results have been told in the preservation of the lives of the youngsters of school age. The remarkable decrease in the number of fatal accidents to school children, while the number involving adults increased, was only recently pictured by the Secretary of Commerce as one of the high spots at the sessions of the National Conference on Street and Highway Safety. He said that "this improvement is largely attributable to safety education in the schools and to the successful operation of the schoolboy patrols."

Standard rules will be of help.

Adoption of standard rules to govern this important safety activity will go far in providing uniformity throughout the country in the conduct of the patrols. In the past, the work was greatly retarded by diverse methods of instructing the boy patrolmen and a certain confusion as to their proper function. Realizing the need of uniformity, a group of experts, representing the American Automobile Association, the National Safety Council, and the National Congress of Parents and Teachers, met recently and adopted a set of nine rules which will universally guide the young patrolmen in the future.

These rules are based on experience and careful observation of patrol operation in approximately 1,000 cities, in several of which this work has been carried on for from 5 to 10 years with outstanding success in the practical elimination of accidents and the improvement of morale. The rules also are in harmony with the best legal advice and court decisions on questions of authority and responsibility. These rules are as follows:

Function.—The function of the school boy patrol is to instruct, direct, and control the members of the student body in crossing the streets at or near schools. Patrols should not be charged with the responsibility of directing vehicular traffic, nor be allowed to do so, other than signaling to a motorist who approaches the crossing after the student pedestrians have left the curb. (Patrols need not and should not, therefore, be recognized by city ordinances. They must not be termed "police" nor recognized as such. When a patrol member raises his hand to warn a motorist approaching a group of children who are crossing the street, he is not directing or controlling the motorist but merely calling his attention to his obligation under the law to respect the rights and safety of pedestrians at crosswalks. An important function of school boy patrols is to instruct the school children in safe practices in their use of the streets at all times and places.)

Selection.—Patrol members should ordinarily be appointed either by the principal or by the officers and faculty advisor of the authorized student organization. These members are ordinarily boys but girls may be appointed in certain cases. They should be selected from the seventh and eighth grades, or from the sixth grade if that is the highest in the school. Patrol members should be selected for leadership and reliability. Their service should be voluntary and approved by parent or guardian. Officers should serve for at least one school term; other members may be changed at intervals of about six weeks. Any officer or member should be removed for cause.

Size and officers.—The size of the patrol varies with street conditions and size of school. The average patrol has 10 to 12 members, including officers. Every patrol should have a captain. Lieutenants and sometimes sergeants may also be appointed.

Training of patrolmen.

Instruction and supervision.—These are essential if the patrol is to be efficient and permanent. In general, the best results have been obtained where the patrols operate under immediate instruction and supervision of police officers detailed for that purpose, and acting under general supervision of the school authority and the sponsoring body which may be the motor club, safety council, or other civic body. New members of the patrol should, where practicable, serve with and under the guidance of experienced members for at least a week.

Insignia.—The standard insignia for patrol members is the white Sam Browne belt made of 2-inch material. This must be worn at all times while on duty. Special badges for officers may be worn on the left breast or left arm. Auxiliary equipment, if any, should be standard throughout the community. (If local bodies or individuals wish to encourage the patrols by furnishing raincoats or slickers, or any other additional equipment, this should be done in consultation with the sponsoring body. In general, black raincoats are to be preferred, the white belt being worn over the coat.)

Flags and whistles.—Patrol members while on duty shall not have in their possession any signs, signals, flags, sticks, or whistles. (Whistles have no place in the type of patrol here outlined. Flags of small size have been successfully used in some cities to control and direct the children, but the use of them is generally objected to because of the danger that it will lead both the patrol boy and the motorist to feel that the former is controlling traffic.)

Position and procedure.—The patrol member should stand on the curb, not in the street, and hold back the children until he sees a lull in traffic. When this occurs, he motions for the children to cross the street in a group. He still keeps his position on the curb, except that if his view of traffic is obstructed by parked cars or otherwise, he may step into the street a sufficient distance to obtain a clear view, but not more than three paces; after the children have crossed, he returns to his station on the curb. Where the street is wide or the traffic heavy, there should be two patrol boys at the crossing. One operates as described in the preceding paragraph, on the side from which the children are coming. The other operates similarly on the opposite curb, giving attention to possible traffic approaching

on that side and assisting the group of children to reach that curb in safety. (This practice is recommended in preference to having the patrol boy escort the group of children across the street.)

Hours on duty.—The patrol members should reach their posts 10 or 15 minutes before the opening of school in the morning and at noon and should remain until after the last bell. At noon and afternoon dismissal they leave their classes two or three minutes before the dismissal bell and remain on duty for 10 or 15 minutes while children are leaving. If any classes are dismissed earlier than the others, it is essential that patrols be on duty at all times while children are crossing the streets. (From the standpoint of safety and of efficient patrol operation, therefore, it is preferable that all classes be dismissed at the same time. If not, the size of the patrol should be increased and the groups rotated so that no one member will be absent too long from his class.)

Relation to police officers.—At intersections when traffic is controlled by an officer or a traffic signal or both, the patrols will direct the crossing of the children in conformity with the directions of the signal or the officer. At intersections without regular traffic control, the traffic may be sufficiently heavy to require the special assignment of a police officer at the times when children are going to or from school. When this is done, it is recommended that the police officer should not stand in the intersection but at the curb, and, when a group of children has been collected, escort them across the street, stopping vehicular traffic for this purpose if necessary. The function of the patrol boys is then to hold the children at the curb until the police officer is ready to take them across.

ZINC-COATED PRODUCTS IMPROVED BY STANDARDIZED BUYING PRACTICE

Benefits of Close Cooperation Between Shop Superintendent and Purchasing Agent

By Wallace G. Imhoff, *President The Wallace G. Imhoff Co.*

Close cooperation between the practical man in charge of the galvanizing department and the purchasing agent can be reflected in the gradual development of a standardized practice of buying of raw materials, the result of which will be to actually decrease purchase costs per unit of product, and at the same time to increase production records in the shop.

The question might be asked, "How is this brought about?" The first esential to standardization is the selection of those raw materials which give the highest quality of product with the lowest costs, and the smallest number of seconds and rejections, together with the minimum amount of labor, and number of operations in processing of these raw materials. The foreman, or galvanizing department superintendent, is the only man who really knows whether it is cheaper to use a high-priced raw material, and have the fabrication go through swiftly and accurately from the start to finish, as compared to the results obtained when using low-priced raw material, with a high percentage of waste, lots of scrap, poor inefficient results at all stages of operations in fabrication, trouble and loss of time and labor in forming or drawing, and a high percentage of rejections and seconds, with the final aftermath of much returned product from the customers, entailing the additional expense of freight and other incidentals.

Constant alertness on the part of the galvanizing superintendent as to the results he is getting from his raw materials, together with frequent checkups on prices with the purchasing agent, will eventually lead to a standardization of raw materials purchased, and the price paid may not by any means be the cheapest price.

Raw materials used.

The raw materials in the galvanizing process are usually fuel, zinc, fluxes, the steel or iron base, and other incidental materials necessary to operate, such as tools and equipment of various kinds and descriptions. The basis of purchase should be performance. A higher priced raw material may give a much lower cost per unit of finished product. The first cost is not always to be considered as the most important feature in a program to reduce factory costs, improve the quality of the product, or increase the production.

In order to actually obtain results, the purchasing agent and the shop superintendent must have perfect confidence in the ability of each other to handle his job. Nothing will so quickly wreck a program of standardization as a lack of confidence, integrity, and sincerity of purpose. On the other hand, with confidence the purchasing agent can readily see where the savings made in efficient processing, may more than offset a slightly higher increased first cost.

Standardization of materials for galvanizing involve: (1) The selection of the right kind of raw materials for the purpose, (2) the selection of the best quality raw materials for the purpose, and (3) the determination of the proper price to pay for the best raw material suitable for the purpose.

In standardization of the raw materials for galvanizing it is not necessary to pay the highest prices for the raw material, although in some specific cases the highest priced raw material may actually give the lowest cost per unit of product. Continued study in practice soon brings out the good and bad points of all the materials that are used.

Cooperation between buyer and seller.

There are still other angles also to be considered as the result of standardizing the purchase of the raw materials. One of the angles is the cooperation between buyer and seller to fit the requirements closer to what is actually needed. When confidence is also established between buyer and seller, there is a frankness which appears that is not ordinarily present on sharp, close buying. The lack of this frankness may cost the buyer far more than a higher priced material, but the purchasing agent, being out of touch with the shop also, can not see it. and his saving in buying is only apparent. and not real. Waste, breakage, loss

of time, loss of labor, and poor quality product may more than offset the gain of low first cost.

Still another angle of standardization is the increase in production likely to result from buying good quality raw material. It machines well, it presses well, there is little waste, little trouble, and the delays are natural delays, rather than time losses due to trouble which is not present with a uniform, standard material of good quality. Constant change upsets schedules, produces irregular results, loses time, produces seconds, increases waste, and lowers the morale of the men. All these factors give a final result of slow down to production.

Standardization stabilizes things, makes things uniform, produces uniform results, and raises the morale of the workers, with the result that the quality of the product is not only better, but an increase in production usually results as well.

CURRENT ACTIVITIES OF THE AMERICAN STANDARDS ASSOCIATION

Specifications Under Consideration

There is given below up-to-date information relating to developments taking place in certain standardization projects being carried forward under the auspices and procedure of the American Standards Association.

Insulator tests.

The American Institute of Electrical Engineers and the National Electrical Manufacturers Association have submitted for approval by the American Standards Association, the final draft of the proposed standards for insulator tests prepared by the sectional committee on power-line insulators for voltages exceeding 750.

These standards are not to be interpreted as forming complete insulator specifications, but rather as defining the method of making the various tests described when they are required. The standards are divided into the following divisions: Scope and purpose; definitions; payment for material tested; testing equipment and methods; design tests, pin insulators; design tests, suspension insulators; routine tests, pin insulators; routine tests, suspension insulators; appendix, variation of wet flashover voltage with water resistance.

All of the material contained in these standards is based upon and is a complete revision of the A. I. E. E. standard No. 41, Insulator Test Specifications. The standards have been referred to the electrical advisory committee of the ASA, which will submit its recommendations on approval to the standards council.

Importance of safety codes.

The importance of nationally recognized safety codes in the national safety movement was emphasized at the convention of the Association of Government Officials in Industry, held in May, 1930. A report, unanimously approved by the convention, said in part:

> It is very evident that no State legislature will be induced to enact safety laws of the right kind unless there is presented to it some definite, logical, and workable plan to be adopted and followed, which would make the laws effective. Therefore, the officials of each State are urged to study the procedure in all of the States, and out of the fund of practical experience, formulate a plan that will make effective its own safety program. In the formulation of safety regulations and the adoption of specific safety devices, your committee suggests and urges the consideration of the various safety codes adopted by the American Standards Association, known as the National Safety Codes. These constitute the best thought and judgment of the foremost safety engineers and experts in accident prevention work in the United States. Sixteen of these codes have been published as bulletins by the Bureau of Labor Statistics and are available upon request.

Transmission roller chains, sprockets, and cutters.

A new American standard for transmission roller chains, sprockets, and cutters has been approved by the American Standards Association. The roller chains, sprockets, and cutters included in the report, which is subject to periodic revision, are those commonly used for the transmission of power in industrial machinery, machine tools, motor trucks, motor cycle and tractor drives and similar applications. The sizes, dimensions, and other data are for standard steel chains that are considered suitable for all usual applications. Adoption of the standard does not indicate that other chains will not be obtainable for use where they may be required. It is recommended by the sectional committee that chain manufacturers be consulted by users in their selection of chains for given applications in order to obtain the best results in operation.

The new standard was prepared under the joint sponsorship of the Society of Automotive Engineers, the American Society of Mechanical Engineers, and the American Gear Manufacturers Association.

Pressure piping.

Copies of the proposed standard for fabrication of hangers, supports, anchors, sway bracings, and vibration dampeners, are being circulated for review and may be obtained through the ASA information service, 29 West Thirty-ninth Street, New York, N. Y. The project is under the sponsorship of the American Society of Mechanical Engineers.

Navigational and topographical symbols.

The American Standards Association has just approved as American tentative standard and American standard, respectively, the projects for navigational and topographical symbols and for symbols for photometry and illumination. The American Association for the Advancement of Science, American Institute of Electrical Engineers, American Society of Civil Engineers, Society for the Promotion of Engineering Education, and the American Society of Mechanical Engineers, are joint sponsors for the projects, and recommended their adoption by the ASA.

The navigational and topographical symbols submitted by the sectional committee on scientific and engineering symbols and abbreviations are a slight revision of the symbols used by the Federal Board of Surveys and Maps, and those shown in the War Department Training Regulations for 1924, while the symbols for photometry and illumination are a modification of those given in the American standard illuminating engineering nomenclature and photometric standards.

These symbols are part of a comprehensive program for unification of graphical symbols, symbols for quantities in equations and formulas, and of abbreviations as used in engineering and scientific reports, tables, publications, and so forth, but not including definitions of terms used in engineering and scientific practice.

To date, the following proposals developed by the sectional committee have been approved as American standard or as American tentative standard: Symbols for hydraulics, symbols for telephone and telegraph use, symbols for photometry and illumination, aeronautical symbols, mathematical symbols, and letter symbols for electrical quantities. There is also pending before the association a proposed standard on Graphical Symbols for Use in Radio Communications.

Foundry equipment.

A request for the organization of a technical committee to undertake the standardization of foundry equipment under the auspices of the American Standards Association will be acted upon at the next meeting of the ASA standards council. The request was made jointly by the American Foundrymen's Association, and the American Society of Mechanical Engineers.

The subjects to be included in the project, according to the American Foundrymen's Association's request, would be the standardization of such foundry equipment as pattern and molding machine parts affecting interchangeability of patterns, flask pins and holes, general dimensions of flasks for jobbing work, ladle and ladle shank sizes, ladle sleeves, stoppers and nozzles, stock core print sizes, shapes and finish allowances, pattern markings, rapping plates, fillet sizes, and dowel pins for metal patterns and metal core boxes.

The American Foundrymen's Association has already standardized the color markings for foundry patterns. Its report on this subject, published in 1926, has been widely accepted.

The American Foundrymen's Association has, in the past, sponsored two projects under ASA procedure. There were the safety code for the protection of industrial workers in foundries, and the standards for outside dimension of plumbago crucibles for nonetilting furnaces in nonferrous foundry practice. A number of projects for the standardization of foundry products have been approved or are now under way under American Standards Association procedure. Among these are projects covering cast iron pipe, and manhole frames and covers.

New member bodies.

The announcement has just been made by the American Standards Association of the affiliation of the Radio Manufacturers Association, and the Manufacturers Standardization Society of the Valve and Fittings Industry, with the American Standards Association as member bodies.

The establishment of authoritative national standards for radio apparatus, it is expected, will be considerably aided by the affiliation of the Radio Manufacturers Association with the ASA. The Manufacturers Standardization Society of the Valve and Fittings Industry, whose work since its organization in 1910 has been devoted almost exclusively to standardization, has been active in many ASA projects in its field. The membership of the society includes 41 companies manufacturing valves and fittings.

BRITISH STANDARD FOR FLAME-PROOF SWITCHES

The British Engineering Standards Association has just issued revisions of specification No. 126, for flame-proof air-break switches, with or without fuses, and specification No. 127, for flame-proof air-break circuit breakers. These specifications, which are suitable for use with alternating-current and direct-current voltages not exceeding 660 volts, have been reviewed by the colliery committees of the association, with the object of making them suitable for the latest requirements of the coal-mining industry in England.

Provisions are included dealing with design, construction, rating, sizes, and marking. The question of tests is fully dealt with, type tests being laid down for mechanical strength, breaking capacity, flame proofness, and temperature rise; special dieletric and performance tests are also incorporated. A useful addition has been made to the specification by the inclusion, in the form of an appendix, of some notes on the problems of flame-proof inclosures, which have been based upon the reports of the safety in mines research board.

STANDARDS DEVELOPED FOR KNIT UNDERWEAR

Standard measurements for the following types of knit underwear were worked out during the past year by the research associate of the Associated Knit Underwear Manufacturers of America, cooperating with the National Bureau of Standards, and have been adopted by the industry.

New standard measurements cover men's ribbed and flat knit cotton, worsted-merino wool and wool-cotton drawers; men's ribbed and flat knit cotton knee length drawers, regular; men's flat knit athletic "shorts"; men's Swiss ribbed athletic shirts; women's flat knit rayon union suits; women's rayon bloomers; women's rayon vests; children's ribbed cotton vests; children's flat knit cotton pants; children's flat knit cotton vests; children's and misses' ribbed worsted, worsted-merino wool, and wool-cotton union suits; men's rayon track pants; and men's knitted polo shirts, which include ribbed cotton, flat knit cotton, flat knit rayon, flat knit wool-cotton and flat knit all-wool polo shirts.

STANDARDIZATION AS APPLIED TO SIGNAL-CORPS EQUIPMENT

Signal Corps Adopts Commercial Types When Feasible in Order to Simplify Procurement Problem

By Lieut. Thomas H. Maddocks, *Signal Corps, United States Army*

Standardization, as applied by the Signal Corps in its development of photographic, meteorological and communications equipment, naturally divides itself into two distinct phases, which for convenience may be referred to as "exterior" and "interior" standardization.

"Exterior" standardization involves a continuous study of specifications prepared by other branches of the Army and by the Navy; other Government agencies, particularly the Federal Specifications Board; commercial operating and manufacturing organizations; and civilian standardizing agencies, such as the A. S. T. M., the A. W. P. A., A. I. E. E., etc., with a view to incorporating in the specification program of the Signal Corps such existing specifications as are found to meet military requirements. This is accomplished either by making use of a suitable specification directly in the procurement of the article, raw material, or manufacturing process covered by the specification, or by including it as a subsidiary requirement of those Signal Corps specifications covering special units of equipment to which it is applicable.

"Interior" standardization involves a study of the component parts of Signal Corps units of noncommercial equipment, with a view to obtaining the maximum possible use of each particular component in the various complete units. This study is of the utmost importance in the radio field, in which new development, involving circuit refinements and methods of assembly, is constantly taking place.

Design not affected.

This development in many cases does not necessarily affect the design and construction of the various component parts of a unit, such as capacitors, resistors, transformers, tube sockets, etc., but merely their arrangement in the completed circuit. For this reason, standardization of these parts is highly desirable, not only from the standpoint of securing interchangeability of parts in concurrent standard units, but also in view of their probable continued use in future developments, thus permitting the assembling of war reserve stocks of such parts without fear of undue wastage of funds, and also the salvaging of such parts from units which have been rendered obsolete and their continued use in newly developed units.

In order to insure the maximum possible "interior" standardization, each component of a unit of equipment, as well as the unit itself, is assigned a Signal Corps "type number" immediately upon adoption of the unit as standard equipment. This type number definitely places each component in the same class as all similar items or parts which have already been adopted, and simplifies the study required in determining whether or not an item or part already adopted will not be suitable for use in a new unit of equipment, rather than undertake the development and adoption of a new item or part.

This idea is carried still further by the assembly on one drawing of all standard "active" items or parts of the same type. Thus, if in the development of a new radio set certain fixed mica condensers are required, it is only necessary to refer to the drawing covering condensers of this type to determine whether suitable condensers are already incorporated in other standard units, and to the type number descriptive file to determine whether or not suitable condensers of this type have been adopted in the past, and consequently may be available from stock in sufficient quantities.

When to standardize.

Another phase of standardization which is of primary importance to the Signal Corps is the question of "when to standardize." This is brought about by the fact that not only are many Signal Corps items of equipment entirely different from anything procurable in the commercial field, but, in addition, even amongst certain items of standard commercial design, development is moving so rapidly that an article, such as a fixed station radiotransmitter, purchased to-day may be superseded by a superior article in the course of six months or a year's time.

To overcome this difficulty, the Signal Corps definitely standardizes on an article only when it has proven its worth by extended service in the field when applied to combat equipment, and only when commercial development stability has been attained in the case of articles of standard commercial manufacture. This means that a noncommercial article passes through a considerable period of procurement under "tentative specifications." Once the worth of the item of equipment has been proven, the last revision of the "tentative specification" is given a final overhauling, renumbered in its proper Army specification class, and placed in the usual channels for procurement clearance and adoption.

In a similar manner, commercial items whose development has not yet stabilized are as a rule procured under a "tentative performance specification." Such articles are assigned a distinctive type number for each procurement, in order that the "replacement-of-parts" problem may be simplified and accurate records of relative performance under the various procurements may be kept. When development stabilization is attained, a specification and the necessary drawings are prepared and routine procedure is adopted with respect to procurement clearance and adoption.

One might gather the impression from the above that the Signal Corps is continually confronted by special situations delaying, if not preventing, standardization. While this is true of certain items of a special nature, there are hundreds of items which the Signal Corps procures, stores, and issues to the Army as a whole which present no such problem. In all such cases the policy has been to follow as closely as possible commercial practice, particularly on articles,

such as linemen's equipment, tools, commercial types of communication wires, etc.

It has been found that, in general, the practices of the large communications companies are based on long experience and much careful test work, and that, in addition, the problem of war-time procurement is greatly simplified by adopting the identical articles used by these organizations.

NEW AND REVISED A. S. T. M. STANDARDS

Membership to Ballot on 55 Revisions, 45 Tentative Standards, Proposed as Standard, and 21 New Tentative Standards

Revisions of 55 existing standards have been submitted to letter ballot by the membership of the American Society for Testing Materials, according to a recent announcement of the society. In addition, the membership is balloting on 45 tentative standards proposed for advancement to the status of standards, and 21 new tentative standards. The proposals comprise the following:

Open-hearth carbon-steel rails.
Billet-steel concrete reinforcement bars.
Carbon-steel and alloy-steel forgings.
Welded and seamless steel pipe.
Steel plates of structural quality for forge welding.
Lap-welded and seamless steel and lap-welded iron boiler tubes.
Steel plates of flange quality for forge welding.
Commercial quality hot-rolled bar steels.
Commercial cold finished bar steels and cold-finished shafting.
Refined wrought- iron bars.
Wrought-iron plates.
Welded wrought-iron pipe.
Wrought iron rolled or forged blooms and forgings for locomotives and cars.
Staybolt, engine bolt and extra-refined wrought-iron bars.
Hollow rolled staybolt iron, malleable castings.
Bronze trolley wire.
Round and grooved hard-drawn copper trolley wire.
Portland cement.
Building brick (made from clay or shale), hollow burned-clay load-bearing wall tile.
Hollow burned-clay floor tile.
Calcined gypsum.
Gypsum plasters.
Gypsum plastering sand
Gypsum plaster board.
Gypsum molding plaster.
Gypsum pottery plaster.
Lampblack.
Bone black.
Structural wood joist, planks, beams, stringers, and posts.
Tolerances and test methods for tire fabrics other than cord fabrics.
Tolerances and test methods for cord tire fabrics.
Standard methods of determining weight of coating on zinc-coated articles.
Testing gypsum and gypsum products.
Routine analysis of white pigments.
Distillation of gasoline, naphtha, kerosene, and similar petroleum products.
Test for viscosity of petroleum products and lubricants.
Test for water in petroleum products and other bituminous materials.
Test for water and sediment in petroleum products by means of centrifuge.
Test for cloud and four points of petroleum products.
Test for burning quality of kerosene oils.
Test for carbon residue of petroleum products (Conradson carbon residue).
Test for distillation of natural gas gasoline.
Test for burning quality of long-time burning oil for railway use.
Test for burning quality of mineral seal oil.
Test for loss on heating of oil and asphaltic compounds.
Laboratory sampling and analysis of coal and coke.
Sampling and analysis of creosote oil.
Test for coke residue of creosote oil.
Test for distillation of creosote oil.
Testing molded insulating materials.
Testing insulating oils.
Rules governing the preparation of micrographs of metals and alloys.
Standard definitions of terms relating to wrought iron.

Tentative standards to be advanced to standards are as follows:

Tentative specifications for steel tie plates.
Iron and steel chain.
Gray-iron castings for valves.
Flanges and pipe fittings.
Zinc-coated iron or steel telephone and telegraph line wire.
Zinc-coated iron or steel tie wires.
Zinc-coated wire fencing.
Zinc-coated chain-link fence fabric galvanized after weaving.
Zinc-coated barbed wire.
Zinc-coated steel wire strand.
Zinc coatings on structural steel shapes, plates, and their products.
Seamless copper tubes.
Paving brick.
Sand-lime building brick.
Hollow burned-clay fireproofing.
Partition and furring tile.
Keene's cement.
Calcined gypsum for use in the preparation of dental plasters.
High-carbon tar for surface treatment, cold application.
Low-carbon tar for surface treatment, cold application.
High-carbon tar for surface treatment, hot application.
Low-carbon tar for surface treatment, hot application.
High-carbon tar cement.
Low-carbon tar cement.
Coal-tar pitch for stone block filler.
Gravel for bituminous concrete base.
Acid-resisting asphalt mastic.
Tentative methods of sampling rolled and forged steel products for check analysis.
Testing zinc-coated iron and steel wire and wire products.
Test for change of resistance with temperature of electrical heating materials.
Test for approximate apparent specific gravity of fine aggregate.
Test for approximate percentage of voids in fine aggregate.
Test for field determination of surface moisture in fine aggregate.
Analysis for color of paints in terms of physical units.
Test for detection of free sulphur and corrosive sulphur compounds in gasoline.
Test for melting point of petroleum.
Test for the determination of autogenous ignition temperatures.
Distillation of bituminous materials suitable for road treatment.
Test for fineness of powdered coal.
Test for sieve analysis of crushed bituminous coal.
Testing electrical porcelain.
Test for toluol insoluble matter in rosin.
Tentative definitions of terms relating to heat treatment operations (especially as related to ferrous alloys.)
Coal and coke.
Timber.
Textile materials and methods of testing.

New tentative standards are as follows:

Specifications for austenitic manganese-steel castings.
Open-hearth iron plates of flange quality.
Method of test for thermoelectric power.
Aluminum-alloy (duralumin) sheet.
Aluminum-manganese alloy sheet.
Magnesium-base alloy castings.
Reinforced-concrete pipe.
Reinforced-concrete culvert pipe.
Laboratory method of making flexure tests of concrete using a simple beam with center loading.
Gypsum sheathing board.
Glazier's putty.
Amyl acetate (synthetic).
Amyl alcohol (synthetic).
Butyl propionate (90 to 93 per cent grade).
Ethyl lactate (synthetic).
Method of test for dilution of crankcase oil.
Method of test for determination of vapor pressure of natural gasoline (Reid method).
Timber piles.
Method of test for specific gravity, 38°/15.5° C., of creosote fractions.
Definitions of terms relating to timber preservatives.
Method of test for comparing the thermal conductivity of solid electrical insulating materials.

TO DEVELOP STANDARD FOR PRESSURE AND VACUUM GAUGES

Upon the request of the American Standards Association, the American Society of Mechanical Engineers recently accepted sole sponsorship for the development of an American standard for pressure and vacuum gauges. Invitations have been addressed to 55 societies and associations, requesting them to appoint representatives on this committee, which will hold its first meeting early in the fall.

The tentative scope outlined for this project is: Nomenclature and definitions of pressure and vacuum gauges; capacity ratings; case sizes and mounting holes with a view to obtaining maximum interchangeability; dials and graduations and designations of units; indicator hand and bushing; zero stop pins, bezel rings, and their attachment to the gauge; connections to the gauge; method of expressing allowable errors or accuracy of the gauge; requirements for accuracy in so far as establishment of such requirements proves to be feasible; methods of testing; rules and specifications for installation and use of pressure and vacuum gauges.

FLOUR STANDARDS ADOPTED BY DEPARTMENT OF AGRICULTURE

Definitions and standards for flour and whole-wheat flour have been adopted by the Secretary of Agriculture as a guide to the industry and to aid in enforcing the food and drugs act, announces the Department of Agriculture.

Whole-wheat flour, entire-wheat flour, or graham flour is the clean, sound, product made by grinding wheat, and contains, in their natural proportions, all of the constituents of the cleaned grain. Flour, wheat flour, or white flour is the clean, sound, fine-ground product, obtained in the commercial milling of wheat, and consists essentially of the starch and gluten of the endosperm. It contains not more than 15 per cent of moisture, not less than 1 per cent of nitrogen, not more than 1 per cent of ash, and not more than 0.5 per cent of fiber.

BRITISH SPECIFICATION FOR ELECTRICITY METERS

Although a revision of the British standard specification for electricity meters was issued as recently as April, 1929, a further revision has now been published by the British Engineering Standards Association. The new edition, however, differs from the 1929 edition only in the addition of a clause relating to standard terminal conditions, and a series of diagrams illustrating these connections.

These terminal connections are a mandatory feature of the specification, and therefore constitute a very important addition which is of interest to both manufacturers and users of meters. The specified limits of error, which were appreciably reduced by the 1929 edition, remain unchanged, and meters having an accuracy within the limits laid down by the specification would be classed as Grade I, if the proposals recently made by the International Electrotechnical Commission became effective.

CANADIAN STANDARD FOR STEEL STRUCTURES

An increase is reported in the allowable stress for axial tension from 16,000 to 18,000 pounds in the second edition of the Canadian standard covering steel structures for buildings. The announcement of the Canadian Engineering Standards Association also states that other allowable stresses have been correspondingly increased.

The column formula has likewise been revised, and certain changes have been made in the allowable stresses for bending, shearing, and bearing. The specification now conforms to the latest Canadian Engineering Standards Association specifications for steel railway and highway bridges. Recommendations are given in the appendix regarding live loads, snow loads on roofs, and wind loads.

TO CONSIDER FURTHER STANDARDIZATION OF BALL-BEARING LOCK NUTS AND WASHERS

Standardization of the boundary dimensions of several types of ball bearing, especially those used by the automotive industries, was effected by the standards committee of the Society of Automotive Engineers nearly 20 years ago. These standards, which have been refined by the ball and roller bearings division of the standards committee a number of times since then, were the basis of the present American standard for the single-row annular bearings in the light, medium, and heavy series.

At a recent meeting of the ball and roller bearings division of the S. A. E., it was indicated that the bear-

ing locking nuts and washers made by several of the bearing manufacturers are so nearly alike that the manufacturers, as well as the bearing users, would be greatly benefitted by more complete standardization of these nuts and washers. Accordingly, a subdivision committee has been appointed to study the subject.

STANDARD RURAL MAIL BOXES

New Type of Box Designed to Facilitate Delivery

A new standard rural mail box has been adopted for use by new patrons of rural delivery, or those who are under the necessity for any reason of replacing their boxes, or who desire to avail themselves of a receptacle of sufficient capacity to hold the parcel-post packages ordinarily received by them, according to a recent announcement of the Post Office Department.

By furnishing the new large-size boxes, patrons will avoid the necessity of meeting the carriers to receive parcel post of a size too large to be contained in the smaller boxes, or of authorizing the delivery of such parcels outside of the boxes at the risk of the addressee, should loss or damage result from such delivery.

More than 5,300,000 boxes are located on rural routes, and as the smaller or older types of boxes may be continued in use, so long as they remain serviceable, it will be some time before they are supplanted by the new type. The advantages of the boxes of the greater capacity may be readily appreciated when it is known that from estimates made from an actual count of mail last year, it was determined that in excess of 15,300,000 parcels were collected by rural carriers from the patrons of their routes, and more than 129,600,000 were delivered by carriers to their patrons.

With the object of standardizing, without specifying the type of supports that shall be used in connection with the erection and maintenance of the boxes of patrons on rural routes, and to the end that these supports shall be suitable for the purpose and more in keeping with other objects along improved highways, the Postmaster General recently ordered that these supports shall be of neat design, and shall be painted white.

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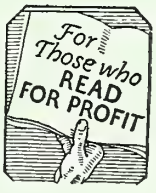

COMMERCIAL STANDARDS MONTHLY

This new governmental periodical is a review of progress in commercial simplification and standardization. It is the only journal of its kind. It covers the national movement initiated by President Hoover for the reduction of needless sizes and varieties of products and the promotion of voluntary commercial standardization by industry.

The Secretary of Commerce in the first issue of this new journal said: "Certain standards, such as those used for weights and measures, * * * have been fixed by legislative enactment. Mandatory standards of this character, however, are few in number when compared with the large and steadily growing volume of standards developed by industry and commerce and voluntarily maintained. * * * The activities of the Commercial Standardization Group of the Bureau of Standards are concerned with standards adopted by voluntary agreement."

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—President Hoover, at the laying of the corner stone of the new building of the U. S. Department of Commerce, June 10, 1929

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The study of the processes of domestic trade and commerce.

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BUREAU OF LIGHTHOUSES, GEORGE R. PUTNAM, Commissioner

Maintenance of lighthouses and other aids to water navigation. Establishment and maintenance of aids to navigation along civil airways. Publication of Light Lists, Buoy Lists, and Notices to Mariners.

COAST AND GEODETIC SURVEY, R. S. PATTON, Director

Survey of the coasts of the United States and publication of charts for the navigation of the adjacent waters, including Alaska, the Philippine Islands, Hawaii, Porto Rico, the Virgin Islands, and the Canal Zone; interior control surveys; magnetic surveys; tide and current observations; and seismological investigations. Publication of results through charts, coast pilots, tide tables, current tables, and special publications.

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Superintendence of commercial marine and merchant seamen.

Supervision of registering, enrolling, licensing, numbering, etc., of vessels under the United States flag, and the annual publication of a list of such vessels.

Enforcement of the navigation and steamboat inspection laws, including imposition of fees, fines, tonnage taxes, etc.

STEAMBOAT INSPECTION SERVICE, DICKERSON N. HOOVER, Supervising Inspector General.

The inspection of merchant vessels, including boilers, hulls, and life-saving equipment, licensing of officers of vessels, certification of able seamen and lifeboat men, and the investigation of violations of steamboat inspection laws.

UNITED STATES PATENT OFFICE, THOMAS E. ROBERTSON, Commissioner.

The granting of patents and the registration of trade-marks, prints, and labels after technical examination and judicial proceedings.

Maintenance of library with public search room, containing copies of foreign and United States patents and trade-marks. Recording bills of sale, assignments, etc., relating to patents and trade-marks. Furnishing copies of records pertaining to patents. Publication of the weekly Official Gazette, showing the patents and trade-marks issued.

RADIO DIVISION, W. D. TERRELL, Chief

Inspection of radio stations on ships; inspection of radio stations on shore, including broadcasting stations; licensing radio operators; assigning station call letters; enforcing the terms of the International Radiotelegraphic Convention; and examining and settling international radio accounts.

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