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THE GRADE TERMINOLOGY PROBLEM

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ABSTRACT

This paper sets forth in digest form the grade terms, designations, and bases for grading or rating for 64 commodities and characteristics selected as broadly representative of the various grading and rating systems used in the United States. These terminologies and designations are compared in the light of the technical background for each commodity and impartially from the viewpoint of the buyer, seller, the inspection or testing agency, enforceability, and provisions for future improvement in a search for underlying principles and postulates as a general guide in the selection, formulation, or revision of grade designations in the future. Five general conclusions are drawn in order that grade terminology for the future may be further coordinated, simplified, and clarified.

I. INTRODUCTION

Much has been written on grade terminology, designations, and grading systems, some of it from a critical point of view deprecating the current complexity and advocating a single master grading system with a nonchalance that reflects superficiality.

Most of us work with a relatively small group of items or in areas where the products are related. In these areas we become familiar with the background, the terminology, the reasons for a particular terminology, and make necessary allowances for any peculiarities, or what might appear to others to be inconsistencies.

In fields outside our own work we are less inclined to be sympathetic or to make allowances for such peculiarities or inconsistencies, and we are quite prone to take the attitude that grade systems and grade terminologies for items in every field of work except our own could and should be made very simple.

No paper has come to our attention which attempts to examine impartially the various aspects and ramifications of the grading problem broadly from the several points of view of those most directly concerned to uncover the underlying facts or principles preparatory to the formulation and promotion of one or more simple, model systems of grade designation.

In an effort to throw more light on the subject, this paper attempts to examine, without prejudice, from the point of view of the consumer, the distributor, the manufacturer, the testing laboratory, and the policing or enforcing agency, the broad general aspects of the grade classification and the terminology problem for a representative number of commodities, and to record for future guidance such underlying principles as may be revealed.

For most of the commodities mentioned, only the current grading system or terminology is outlined. For a few products it is possible to review the evolution of the present grade terms to show the effects of time and successive improvements of the product on systems of grade designation, and to draw therefrom some conclusions or principles which deserve consideration in the selection or formulation of grade designations for a given commodity.

It is believed that a more thorough examination of the broader aspects of the problem and the enumeration of the resulting deductions or tests which should be fulfilled by an adequate grade-designation plan, making due allowance for future developments and improvements in the commodity itself, will bring about a better understanding of, a more wholesome respect for, and possibly a more simple and universal answer to this problem, which lies at the very core of commerce and which holds the brakes upon the flow of goods from seller to buyer.

It seems to be conceded that simple, informative, understandable grade terms or designations will inevitably light up the channels of commerce and guide the consumer through the markets' mystic maze of natural and synthetic materials, compounds, constructions, compositions, combinations, coatings, and containers; that such grade terms are destined to dispel the fog and fear of unknown qualities; and bring from the murky shadows of doubt into gleaming relief, a healthy, sturdy, uplifting confidence in our products and services where it is most urgently needed, at the point of sale.

Let us examine our grade terminology to learn, if we can, its whys and wherefores.

II. DEFINITIONS

The dictionaries give many definitions for the word "grade," depending upon the field in which it is used. Here we are concerned only with those connotations which pertain to the order, rank, degree, size, or quality to place the item in its proper rank according to one or more criteria.

According to Webster's New International Dictionary, second edition, unabridged, 1940, the noun "grade" is defined as "a position in any scale of rank, quality, or order; relative position or standing; hence a class constituted by things having the same relative position or standing or the same quality or value; as crimes of every grade." For the verb, this dictionary says "to arrange in order, steps, degrees or classes according to size, quality, rank, etc.; to class or sort; to assign to a grade or assign a grade to; as to grade pupils or lumber, to divide into grades as a graded school."

The word "grade" as a noun is defined by Funk & Wagnall's New Standard Dictionary, 1940, as "a degree, step, rank or division in any order, as of dignity, quality, proficiency or ability, in any series involving relative position or standing or in any course of instruction; quality; rank; standing." For the verb, this dictionary gives "to arrange or classify by grades or degrees as according to size or quality; arrange in successive departments, classes or grades, as according to attainments of ranks, as to grade sugar; to grade pupils."

For the instruction of its seventy-odd technical committees, the Federal Specifications Executive Committee states in its outline of form for Federal Specifications that "*Grade* implies differences in quality of a commodity. *Type* implies differences in like commodities as to design, model, shape, color, etc. *Class* implies differences in mechanical characteristics, weight, size, or other physical characteristics of commodities which do not constitute a difference in type, grade, or quality. *Composition*, like 'class,' is intended as a subdivision under 'type,' but is used in lieu of the former in classifying commodities which are differentiated strictly by their respective chemical compositions."

The word "quality" has many connotations and ramifications. Generally it applies to something other than size, even though many commodities are graded according to size, and in the case of an interchangeable part, a minute departure from the required size or tolerance limits may render it wholly unsatisfactory for use. The quality of many of the various items of commerce is measured by means of an amazing array of criteria and characteristics. New criteria are constantly being sought and properties previously unknown or undetermined for countless materials, both natural and synthetic, constitute the objectives of much of our research today.

As research reveals the significant properties, as methods for the reproducible measurement of these properties are devised, and suitable criteria limits are agreed upon, we may then proceed to establish one or more grades or ranks for the material or product.

III. EXAMPLES OF GRADING OR RATING SYSTEMS

One is quite amazed at the number of commodities today on which we have grading or rating systems either applicable to the commodity as a whole or to one or more criteria for that commodity. Sixty-four commodities and characteristics have been selected to illustrate the ramifications of grading or rating terminology. These are shown in tables 1 to 33.

1. Alphabetical Systems

Table 4 shows the high lights of the grading system for book cloths as recorded in "Book Cloths, Buckrams, and Impregnated Fabrics, CS57-40," as published by the National Bureau of Standards, effective from June 20, 1940.

Briefly, the over-all requirements are that book cloths shall be made from cotton free from waste, in plain weave, except that the warp shall be woven in pairs for grades E and F, without pinholes, which may affect the appearance or serviceability, and be reasonably free from other defects. Grading is based upon weight of fabric per square yard, number of warp and filling threads per inch, and breaking strength. The grade terminology is A, B, C, C-1, D, E, F.

House doors of Douglas fir are graded, see table 8, according to heartwood, grain direction and fineness, defects and repairs, on an ABC basis, with an added "mill run" grade in which the panels are the same as for B and/or C.

Hair for mattresses, as shown in table 20, is graded on an ABC basis, according to the source and percentage of the hair used.

Other ABC grading systems might be cited as examples, such as those for lima beans, dry and frozen; canned corn; peas and peaches; raw milk; pasteurized milk; and household insecticide, see pages 27 to 29.

Although the tables show only the highlights of the basis for grading or rating, it is quite obvious that even with these simple systems the technical details involved are beyond the knowledge and ability of the average purchaser. In other words, it is contemplated that a qualified technician or expert will be called upon to do the actual grading.

2. Numerical Systems

Cotton linters, table 8, are graded very simply by numbers from 1 to 7, with an additional grade known as hull fiber.

Wheat, table 31, is graded in numbers from 1 to 5, with the addition of a sample grade, except that in Class 1 only, Hard Red Spring Wheat, there is a grade No. 1 Heavy. Also, when dockage exceeds 1 percent the word "Dockage" and the percentage thereof is added to the grade designation. In certain special grades the words "Tough," "Light Smutty," "Smutty," "Light Garlicky," "Garlicky," "Weevily," and "Ergoty" shall be added to the grade designation. These terms are added to any of the regular grade numbers, if the wheat otherwise grades according to specifications. What may seem to be a simple numbering system is far from simple when these various terms are added.

For ignition quality of Diesel fuels, table 18, the cetane numbers now most commonly used run from about 70 down to about 30. They represent the percentage by volume of cetane in a mixture of cetane and alpha-methyl-naphthalene which the fuel matches in a direct-matching method on the basis of ignition delay.

Perhaps the inverted order of some of these numbering systems is puzzling. In an effort to place these grading terms, numbers, and symbols in a comparable order as far as practicable, it will be noted that the last argument in the left-hand column reads, "Present Top Grade, Remaining Grades Arranged In Descending Order." In other words, the ideal is in the upward direction, even though the present top grade may not represent the ideal. Sometimes there is a question as to which is the ideal, and in those cases a special note explains the exception or assumption.

In kinematic viscosity, table 30, one might assume that minimum viscosity is the ideal, but for purposes of comparison, this table assumes that when viscosity is the objective, the more the better, so maximum viscosity is placed at the top. For the benefit of those who may not be working with viscosity, the grade numbers represent the efflux time in seconds, corrected for the instrument in accordance with the formula shown, at the temperature of the test, or more correctly numbers represent kinematic viscosities at 210°F in this case. The ASTM table gives a total of 321 possible values.

Additional examples of numerical systems listed among the Sources of Material, page 27, include shrinkage in dry cleaning and corrosion-resistant steel bars and forgings.

3. Mixed Systems

The grades for pork carcasses, table 23, illustrate a mixed terminology, numbers combined with terms to indicate the grade. Although the grade and type are technically separate and distinct, in many cases the over-the-counter purchaser will find it difficult to understand just where and why grades leave off and types begin.

As one reads the grade terms, table 9, for shell eggs which follow Grade C, he realizes that there must be some trade reasons for the discontinuity of the alphabetical system.

Grades for potatoes, table 23, are combinations of words and numbers. It might be well to note that in the case of potatoes, the size is controlled by the grade, whereas for peas, U. S. Grade A may be any one of six different sizes, that is to say, the size of peas does not affect the grade.

The grading of American Upland Cotton, table 7, employs such terms as "middling fair," "strict good middling," and the like, formerly also tied to an alternate system of numbers from 1 to 9. However, it will be noted that six separate colors are recognized and that there is a grand total of 32 grades for American Upland Cotton.

For American Egyptian Pima Cotton (same table) it will be noted that there are 10 grades and the one-half numbers are recognized.

For glue, table 20, we have a combination of letters and numbers which depend upon viscosity and jelly strength and divide the glue into three different uses. Under hickory handles on the right of the same table, we have a combination of letters that are really quite simple, when one knows that W represents white, and R represents red, hickory.

4. Informative or Descriptive Adjectives

For fire-resisting safes, table 24, we have 4-hour, 2-hour, 1-hour, and insulated cabinets, based upon their ability to withstand fire of a described severity and endurance, impact after heating, and an explosion test.

In anthracite coal, the terms for size, table 6, are fairly descriptive. While looking at the table, it might be well to note the size designations for all coal except anthracite. No. 68 indicates coal that will pass through 6- to 8-inch screens. No. 24 likewise represents coal that will pass through 2- to 4-inch screens. It is not quite so obvious why the No. 13 represents coal passing through 1¼- to 2½-inch screens.

The terms for the rank of coal, table 5, represent technically the class and group, and are descriptive, whereas the grade designations are combinations of letters and numbers representing the percentage of ash, the softening point of ash and the percentage of sulfur—a possible total of 480 grades.

5. Confusing Terms

The grades for apples, table 2, are a bit confusing to the uninitiated, including such terms as "Fancy," "Commercial," "Utility," "Hail," "No. 1." They do not include three grades of cannery apples. It might be well to note that the size is independent of the grade. While the table is before us, it might be well to note that in canned asparagus there is no grade B, that is, grade C may score from 70 to 84.

No doubt the official grader of meat has no difficulty in distiguishing between prime, choice, good, commercial, utility, cutter, and canner. From the grade terms alone, it might be reasonable to assume that choice bull beef, table 3, corresponds in grade with choice steer beef, especially since there is no prime grade of either bull or stag beef.

6. Scoring

Although there are scoring systems as a basis for grading many food products, butter, table 4, is the chief recent instance in which the score number is used as the grade term. An ABC grading system for butter was proposed in 1936, starting with AA for 93 score or higher, which is now officially recognized in preference to the alternate score numbers.

7. Complex Systems

In most States, the grade designations for fertilizer, table 14, stand for the percentage by weight of nitrogen, phosphoric acid, and potash, in that order. In some States the first figure represents ammonia. South Dakota requires all three to be expressed as percentages of the elements, nitrogen, phosphorus, and potassium. A few years ago (prior to 1930) the order was P-N-K instead of, as now, N-P-K. At least 982 different grades were sold in the 1939 season.

The grading of ground feldspar, table 13, is also complex and is normally expressed by a series of numbers. 67-51 designates a feldspar of silica content 66.00 up to 67.99 percent and with 5 or more parts of potash to 1 part of soda. In the first group there is a total of 20 combinations, in the second, 5 ranges of soda; and in the third, a total of 60 combinations, all of these independent of 10 regular sizes, according to screen tests.

Many are familiar with the SAE system of numbering steels, table 27. There are the carbon steels in the ten-hundred series, the free-cutting (screw stock) steels in the eleven-hundred series, the manganese steels represented by the thirteen-hundred series, the nickel steels in the two-thousand series referring to nickel content, and so on for the other elements. The 1943 SAE Handbook lists 136 such steels. In this table, as well as in tables 13 and 14, the ideal depends upon the use or purpose, and until the use is known it is impracticable to arrange them in the order of the ideal.

IV. COMPARISON OF NATURAL WITH MANUFACTURED PRODUCTS

The plea is often presented that this product is the way nature made it, therefore it is more difficult to grade than a manufactured product. While this may be true as regards defects, size, and number of characteristics, on which grading is desired, there are many natural products which are sold on the basis of specific grades, and many more which are processed or partly manufactured that are graded prior to marketing.

Table 17, column 2, shows the grade terms for citrus fruits, including sweet oranges, grapefruit, and varieties of the Mandarin group except tangerines, and except California and Arizona citrus fruits. It will be noted in column 3 that the California and Arizona grapefruit grades are much simpler than for the rest of the country.

For mica, table 22, we have descriptive terms for the gradations of clearness and color, and numbers to indicate the size of the usable rectangle which can be cut from the specimen.

In flue-cured tobacco, table 28, the grades are divided into five groups. Sample designations are A1L, A1F, A1R, for the wrapper grades, and similarly for other grades, a total of 65 grades. Similarly, for fire-cured, there are somewhat similar designations for a total of 77 grades in 6 groups.

Burley tobacco, table 29, has 56 grades in 5 groups, whereas dark, air-cured tobacco is divided into 86 grades in 6 groups. There are 284 grades in the 4 major types.

The grades for wool, table 32, indicate an attempt to abandon eventually the older terms, "one-half blood," "three-eighths blood," "one-fourth blood," and the like, in favor of a grade number indicating fineness of the fiber and the dispersion of the fiber diameters. It will be noted that the grade numbers for wool top are not identical throughout with those for grades of wool.

Maple flooring, table 15, is a natural product finished to avoid as many defects as practicable. While the main grade terms are first, second, and third, it will be noted that there are a number of divisions under the first grade.

The grades of oak flooring, table 16, are divided into three general groupings, quarter-sawed, plain-sawed, and square-edged, with terms under each which are familiar to the lumberman but which are likely to leave the householder in doubt.

The hardwood lumber grades, table 21, start out bravely, first and seconds, but then revert to the more usual lumber terms.

Softwood yard lumber (same table) is divided into two groups, select and common, the first being graded according to letter, and the second, numerically.

Asbestos yarn, table 33, is an example of three hidden grades, that is, grades above grade A, based upon asbestos content by weight.

V. ORDER OF GRADES

Up to this point, with a few exceptions, the grade designations have started with the highest grade at the top and run downward to the lowest grade. It should be recalled that in order to obtain comparability in the tabulation, the normal listing of a few of the grade numbers has been reversed so that the present top grade would be in the direction of the ideal.

In table 25, screw-thread fits are arranged in order of decreasing desirability, assuming that the close fit is the ideal. Of course the actual desirability depends on the use or application.

In table 12, the rating designations are arranged in the same order, assuming that maximum resistance to yarn slippage is the most desirable. It will be noted that when a grading or rating system is arranged this way there is always room for improvement at the top.

In table 10, center column, we have colorfastness to laundering of cotton and linen fabrics. Class 1 is about the lowest acceptable grade of colorfastness, class 2 is the next step above, class 3 is above this, and class 4 is tested at the most severe conditions. If it is possible to improve dyestuffs and finishing methods to a point where higher degrees of colorfastness to laundering are available, it will be possible to extend this scale without interfering with the present classes or without inserting any hidden grades. This arrangement was deliberately chosen to provide for improvements.

In table 11, colorfastness to light is arranged in the same order. Class 1 represents fabrics which show no appreciable change in color after exposure in a Fade-Ometer for 10 hours; class 2, 20 hours; class 3, 40 hours; class 4, 60 hours; and class 5, 80 hours. As better degrees of colorfastness to light are available, the scale can be extended without disturbing the present grades or methods of tests. Most grading systems are worked out to take care of the current situation only, but these last two systems (colorfastness to laundering and to light) represent also provision for future improvement, even though the numbers may seem to run counter to the more common order.

Those who are working on pH research may possibly take some exception to the arrangement in table 1 of the pH scale as a method of rating acidity or alkalinity. For scientific and technical purposes it is a single continuous scale indicating a function of hydrogen-ion concentration. However, as a means of indicating acidity or alkalinity, from the lay point of view, the pH scale starts with water in the middle at 7.0 and runs both ways.

In table 19 we have two groupings of gasoline, one aviation and the other automotive. In aviation gas the octane number has been gradually improving. No. 91 octane represented the gasoline most frequently used in 1941 for commercial planes and 100 octane for fighter planes.

For automotive gasoline, strangely enough, type B is more volatile than type A, 50 percent being distilled over at 257°F, whereas in type A the 50-percent point is not reached until 284°F. Likewise, there is a difference in the 90-percent point. It is interesting to note that for automotive gasoline, the specifications provide for automatic variations in the 10-percent point by locality to suit the seasonal requirements, that is, in cold weather the gas contains more of the lighter ends to facilitate ignition.

VI. EFFECT OF TIME AND NEW DEVELOPMENTS

Along about 1916, the grades of gasoline were generally differentiated by specific gravity. From 1918 to about 1928, the almost universal method of differentiating gasoline was on the basis of volatility and flash point. About 1928 the Cooperative Fuel Research Committee, composed of representatives of the American Petroleum Institute, National Automobile Chamber of Commerce, Society of Automotive Engineers, and the National Bureau of Standards, began to study the problem of rating motor fuel, and there was developed the C.F.R. Motor Method to determine the knock characteristics. The octane number represents the percentage by volume of isooctane in a blend of isooctane and normal heptane, and we thought at that time that isooctane represented the 100 percent possibilities for antiknock characteristics. As far back as 1937 we learned how to produce fuel of 120 to 125 octane, and engines are being developed to suit these fuels. Tetraethyl lead is added to isooctane to measure the octane numbers of these super fuels.

In the right-hand column of table 26, there are shown the grade designations for silver-plated tableware, known in the trade as flatware. Quadruple, or XXXX, carries 8 ounces of silver per gross on teaspoons, with proportionally larger amounts on the larger items, such as dessert spoons, forks and knives. The next grade is Triple, or XXX, which carries 6 ounces of silver per gross on teaspoons; the next Double, or XX, 4 ounces; below that AA, 3 ounces. The "A1+" or "A1X" or "Extra" carries 2 1/2 ounces of silver per gross on teaspoons, with no overlay, or 2 ounces of silver per gross on teaspoons plus the overlay, whereas A1, or Standard, carries 2 ounces per gross.

The Federal specification for silver-plated hotel and cafeteria tableware requires 9 ounces per gross on teaspoons. In other words, it is a grade above all of the commercial grades.

The purchaser may be inclined to think that these grade designations were selected solely with the idea of confusing or beclouding the situation. Who would suspect that A1 grade would be the lowest of all the designated grades for a given commodity? The record, however, indicates that these terms or designations were introduced by a natural process during the evolution of silver plating.

According to the records, in 1847 the Rogers Brothers adopted the designation A1 for silverplated flatware. Silver was expensive in terms of purchasing power, and A1 quality was the best then produced. Advertisements in 1868 referred to a patented process taken out by the Meriden Britannia Co., then owners of the Rogers Brothers firm, in which an extra thickness of silver is deposited at the points of wear. The designation A1 XII was used to identify the superior product, which also has been called A1+, A1X, or Extra. The A1 grade then became known as Standard.

The trade reasons for the introduction of this new term illustrate an entirely natural process which has occurred in the grade terminology for many other items.

When the new process or new development is discovered, the manufacturer or seller selects descriptive terms or designations which will make clear to the buying public that this is a superior or super article as compared to what previously was considered best. It seems obvious that when a new process or a superior article is placed on the market, the seller wants to get full credit for that superiority, and he is not inclined to consider his old best grade just that much better than it was before. It is a new child and he gives it a new or different name.

When one looks at the underlying facts of the marketer's problem such as the thousands of catalogs which have been distributed, innumerable advertisements which have described the article by the old grade term, the familiarity of wholesale and retail sales people with that term and what it signifies, one then begins to appreciate what a Herculean task it would be to attempt to tell distributors and customers that the old A1 grade means something quite different than before. The average mind does not take kindly to changes. There is considerable inertia, even sluggishness, about the response to such changes; in fact, a major correction in the meaning of a grade term, like the correction of a newspaper item, never seems to quite catch up with all of the previous distribution and references. Therefore, when the seller contemplates the relative difficulty of changing the meaning of an established term and the confusion that would result, as compared to the easier and more attractive method of adopting a super term, his course is quite understandable.

So, by successive improvements and the introduction of super grades, a time finally arrives where the A1 or previously best grade is actually the lowest grade sold and is overshadowed by five or six higher grades. What was once best may even, in the course of time, pass out of the picture entirely.

Many will recall the days when the fabric tire was "tops" and when, with the introduction of the cord construction, the fabric tire became a very poor second. The manufacturers described the cord tire as a super grade, and rightly so in terms of mileage run and reduced trouble. Accordingly, in setting up new grade terminology systems or in revising previous systems, it is well to bear in mind the possible effect of new developments in the course of time. Even with natural products, new varieties may be developed, and new methods of processing or manufacturing may bring out grades of such superior merits as to justify the introduction of higher grade terms.

In this country, our education, study, and work are specialized to a point where many are unsympathetic, sometimes even intolerant, of other's point of view. This refers not merely to the point of view of another individual but the point of view of one industry toward another; research personnel toward production personnel; or both of these toward sales or marketing personnel; and all of these toward transportation and distribution personnel, even in the same industry or affecting the same commodity.

If we are to continue our progress and reach a higher degree of civilization, which means a higher degree of integration and interdependence, we must learn to be tolerant and we must learn better how to harmonize, cooperate, and coordinate our various specialties.

Many of these grade terms shown in the tables are confusing, some may seem deliberately to mislead, but, speaking broadly, the background of each commodity grading system is complex, and those in the individual industries who are responsible for the grade terms have had little or no other experience or guidance to point the way toward a preferred grading system. Some consumer groups advocate an ABC system for everything. While it might be possible to fit some of these grading systems into a few pigeonholes represented by letters, if one visualizes the 284 grades of tobacco, the 321 kinematic viscosity numbers, the 136 SAE steels, the many grades of beef, coal, pork, and so on down the list, he will doubtless admit that the job of telling the technicians and the leaders of these industries how to make such a change is not easy.

VII. NEED FOR SIMPLICITY AND UNDERSTANDABILITY

This hodgepodge of grade terminology cries out for leadership and long-range planning in order that our grade terms of the future may fulfill their mission of facilitating commerce more effectively, reducing misunderstandings, returns, rejections, law suits, and allow our commerce at home and abroad to go forward with greater confidence; to accelerate turnover and assist our Nation in the direction of real prosperity.

If an organization is to earn and deserve a position of leadership in grade terminology, it must study the larger aspects of this problem, it must consider not only the technical complexity of the commodity in question, the background of grade terminology in that field, but also its relationship to other grade terms, its general acceptability in relation to grade terms for other standards from the viewpoint of the seller, the buyer, the distributor, the technician, the testing laboratory or inspection agency, from the viewpoint of legal enforcement and last but not least, from the viewpoint of possible future developments in order that the grade terms may require as little change as possible.

VIII. CONCLUSIONS

No solution to the grade terminology problem is presented, but attention is invited to a few conclusions from this study, as well as a few principles which deserve consideration in the selection, formulation, or revision of grade designations.

1. It seems rather obvious that grade terminology and designations have been developed by specialists in their particular fields and that, broadly speaking, the grading systems are not coordinated.

2. There is an underlying complexity based on diverse methods of test, diverse criteria, characteristics and uses; and this complexity is real, deserving of respect, difficult to simplify, and may not lightly be brushed aside.

3. In setting up grade designations or terms, provisions should be made for future developments, even those unforeseen and unpredictable improvements which from time to time occur in most every field, and toward which we are constantly striving.

4. A master order of grade terms might well be considered, starting with the lowest present grade at the bottom and proceeding upward in the direction of the ideal, with plenty of room at the top for unforeseen developments. Possibly this could follow the order of numerical designations of types for colorfastness to light of woven fabrics. There will doubtless continue to be some products for which it is impracticable to make a general decision as to what is the ideal, such as in the SAE steels, in the fertilizers, or feldspar. But, perhaps, even for these commodities, the individual identification or designation for each criterion might be arranged in the order toward the ideal, with room at the top for unforeseen radical improvements.

5. In spite of the present confusion, complexity, or obvious absence of foresight in establishing grade terminologies, there seems to be room for considerable further coordination, simplification, allowance for future progress, and further study of the underlying principles for the formulation, selection, and revision of grade terminology systems to the end that they may be as simple, consistent, and understandable as may be practicable, as flexible for accommodation of future developments and as enforceable as possible.

Acknowledgment is gratefully extended to Kenneth A. Milliken for obtaining and arranging much of the original material contained in tables 1 to 33 on Grading and Rating Designation; and for the library research which brought to light the facts concerning the earlier records on silver-plated tableware.

TABLE 1.—*Acidity and alkalinity*

Commodity or characteristic	Acidity	Alkalinity
Source	"The Determination of Hydrogen Ions" (Clark, third edition, 1928).	
Over-all requirements	Concentration of H ions x concentration of OH ions $=10^{-14}$ @ 25°C. When both are equal Concentration of H ions $=10^{-7}$ Concentration of OH ions $=10^{-7}$	
Grading or rating based upon	The definition by Sorensen as follows: $pH = \log \frac{1}{[H^+]}$ Where $[H^+]$ = concentration of hydrogen ions. The single pH scale is divided into two parts below for convenient reference in the text.	
Optimum depends upon product and use	7.0 6.9 6.8 6.7 6.6 6.5 and so on 4.5 4.4 4.3 4.2 4.1 4.0 etc. to 0.0 A total of 70 steps as most commonly used today. Instruments are available which give results to 0.01 and even higher in some regions of the scale.	14.0 13.9 13.8 13.7 13.6 13.5 and so on 10.0 9.9 9.8 9.7 9.6 9.5 etc. to 7.0 A total of 70 steps as most commonly used today. Instruments are available which give results to 0.01 and even higher in some regions of the scale.

TABLE 2.—*Apples and asparagus*

Commodity or characteristic	Apples, fresh	Asparagus, canned
Source	United States Department of Agriculture, Bureau of Agricultural Economics, Service and Regulatory Announcements 154, effective September 1, 1937.	United States Department of Agriculture, Agricultural Marketing Service, United States Standards for Grades of Canned Asparagus, effective September 15, 1941.
Over-all requirements	Numerical count or minimum size on package.	Recommended drained weight and head space. Certificates of grade will indicate count and size. If not graded for size, certificates of grade will designate the product as "ungraded for size."
Grading or rating based upon	Maturity. Method of gathering. Cleanliness. Development. Color according to variety. Condition. Defects. Tolerances.	*Points* 1. Clearness of liquor....... 15 2. Color...................... 15 3. Absence of defects........ 30 4. Tenderness................ 40 Total score............... 100
Present top grade Remaining grades arranged in descending order	U. S. Fancy. U. S. No. 1. U. S. Commercial. U. S. No. 1 Early. U. S. Utility. U. S. Utility Early. Combination U. S. Fancy and U. S. No. 1. Combination U. S. No. 1 and U. S. Commercial. Combination U. S. No. 1 and U. S. Utility. U. S. Hail. Unclassified. (NOTE: Above does not include 3 grades of cannery apples.)	*Min. score* U.S.GRADE A or U.S.FANCY.. 85 U.S.GRADE C or U.S.STANDARD.............. 70 OFF-GRADE........less than.. 70

TABLE 3.—*Beef*

Commodity or characteristic	Beef carcass		
	Steer, heifer, and cow beef carcass	Bull beef carcass	Stag beef carcass
Source	United States Department of Agriculture—Agricultural Marketing Administration Service and Regulatory Announcements No. 99, issued June 1926, and Amendment No. 1, issued July 1939. Amendment No. 2, issued November 1941. Reprinted with amendments, May 1942. Official United States Standards for Grades of Carcass Beef.		
Over-all requirements	Grades based on characteristics of beef without sex identification. Beef produced from cows is not eligible for the two top grades.	Must be identified as bull beef in addition to grade.	Must be identified as stag beef in addition to grade.
Grading or rating based upon	Conformation. Finish. Quality and other minor characteristics. As defined.	Conformation. Finish. Quality and other minor characteristics. As defined.	Conformation. Finish. Quality and other minor characteristics. As defined.
Present top grade Remaining grades arranged in descending order	*U. S. Grades* Prime. Choice. Good. Commercial. Utility. Cutter. Canner.	*U. S. Grades* Choice. Good. Commercial. Utility. Cutter. Canner.	*U. S. Grades* Choice. Good. Commercial. Utility. Cutter. Canner.

TABLE 4.—*Beets, book cloths, and butter*

Commodity or characteristic	Beets, canned	Book cloths	Butter
Source	United States Department of Agriculture — Agricultural Marketing Service—United States Standards for Grades of Canned Beets, effective October 1, 1941	Book Cloths, Buckrams, and Impregnated Fabrics—Commercial Standard CS57–40, effective June 20, 1940.	United States Department of Agriculture—Food Distribution Administration — Official United States Standards for Grades of Creamery Butter,'effective February 1, 1943.
Over-all requirements	Recommended head space and drained weights. If packed whole the number of beets shall conform to a definite count. (As given in the table.) Possess normal flavor.	Cotton free from waste. Weave. Appearance. Freedom from defects.	Made exclusively from milk or cream or both, with or without common salt or additional coloring matter and containing not less than 80 percent by weight of milk fat.
Grading or rating based upon	*Points* 1. Color........ 20 2. Uniformity of size........ 20 3. Absence of defects....... 25 4. Texture...... 35 Total........ 100	Weight per sq.yd. No. of warp and filling threads. Breaking strength.	Flavor. Body. Color. Salt. Gradation of the above.
Present top grade Remaining grades arranged in descending order	U.S.GRADE A or U.S.FANCY (Not less than 85 points). U.S.GRADE C or U.S.STANDARD (Not less than 70 points). OFF-GRADE. Styles: WHOLE, SLICED, QUARTERED, DICED, SHOESTRING, CUT.	A B C C-1 D E F	U. S. Grade AA or U. S. 93 Score. U. S. Grade A or U. S. 92 Score. U. S. Grade B or U. S. 90 Score. U. S. Grade C or U. S. 89 Score. U. S. Cooking Grade. No Grade.

TABLE 5.—*Coal (rank and grade)*

Commodity or characteristic	Coal	
	Rank	Grade
Source	Classification of Coals by Rank, A.S.T.M. Designation D 388-38. Also Approved American Standard, A.S.A. No. :M20.1-1938.	Classification of Coals by Grade, A.S.T.M. Designation D 389-37. Also Approved American Standard, A.S.A. No. :M20.2-1937.
Over-all requirements		
Grading or rating based upon	The degree of metamorphism, or progressive alteration in the natural series from lignite to anthracite. The basic scheme of classification is according to fixed carbon and calorific value.	The quality as determined by size designation, calorific value, ash, ash-softening temperature, and sulfur.
Present top grade Remaining grades arranged in descending order	*Class* — *Group* I. Anthracitic — 1. Meta-anthracite. 2. Anthracite. 3. Semianthracite. II. Bituminous — 1. Low volatile bituminous. 2. Medium volatile bituminous. 3. High volatile A bituminous. 4. High volatile B bituminous. 5. High volatile C bituminous. III. Subbituminous — 1. Subbituminous A. 2. Subbituminous B. 3. Subbituminous C. IV. Lignitic — 1. Lignite. 2. Brown coal.	Symbols for grading coal according to ash, softening temperature of ash and sulfur: *Symbol* Ash: A4, A6, A8, A10, A12, A14, A16, A18, A20, A20 plus Softening point of ash: F28, F26, F24, F22, F20, F20 minus Sulfur: S0.7, S1.0, S1.3, S1.6, S2.0, S3.0, S5.0, S5.0 plus $10 \times 6 \times 8$ = 480 Grades

TABLE 6.—*Coal (size)*

Commodity or characteristic	Coal	
	Size (all coal except anthracite)	Size (anthracite)
Source	A.S.T.M. Designation D 431-38. Also Approved American Standard A.S.A. No. :M20.3-1938.	A.S.T.M. Designation D 310-34.
Over-all requirements	The designation indicates the size by giving lower and upper limiting screens between which 80 percent of sample is retained.	Round hole. Perforated plate. Screens.
Grading or rating based upon	Coal sizes from the results of screen analysis tests of samples taken to represent the coal as sold.	Size of round hole. Screen openings. Passed and retained on.
Present top grade Remaining grades arranged in descending order	Size designations shall be in terms of screens of the following series, which screens shall conform to the standard specification for sieves for testing purposes (A.S.T.M. Designation E 11). *Example of size designation* *Standard* — *Condensed* 6 to 8 in. — 68 3 to 6 in. — 36 2 1/2 to 3 in. — 3 2 to 4 in. — 24 1 1/4 to 2 1/2 in. — 13 3/4 to 1 1/4 in. — 1 Plus 2 in. (14 percent over 8 in.). — plus 2 Plus No. 8 (7 percent over 8 in.). — plus 0 No. 16—2 in. — 02 Total number of grades indeterminate.	Broken. Egg. Stove. Chestnut. Pea. No. 1 Buckwheat. No. 2 Buckwheat (Rice). No. 3 Buckwheat (Barley).

TABLE 7.—*Cotton*

Commodity or characteristic	Cotton	
	American Upland	American-Egyptian Pima
Source	United States Department of Agriculture, Agricultural Marketing Administration, Service and Regulatory Announcements 163, issued August 1942.	
Over-all requirements	Thirteen of these grades are represented in physical form by standard boxes and the other 19 are descriptive.	American-Egyptian cotton is of a deeper yellow color than that of upland cotton. The preparation is very different. It is ginned on roller gins and therefore looks more stringy and lumpy.
Grading or rating based upon	1. Color. 2. Foreign matter. 3. Ginning preparation. Gradations of the above	Standards for American-Egyptian cotton are prepared in physical form in 9 grades.
Present top grade Remaining grades arranged in descending order	Middling Fair. {Strict Good. {Middling. Good Middling. Strict Middling. Middling. Strict or Low Middling. Low Middling. Strict Good Ordinary. Good Ordinary. A total of 9 White. 7 Extra White. 5 Spotted. 5 Tinged. 3 Yellow Stained. 3 Gray. A grand total of 32 grades.	Grade No. 1. Grade No. 1 1/2. Grade No. 2. Grade No. 2 1/2. Grade No. 3. Grade No. 3 1/2. Grade No. 4. Grade No. 4 1/2. Grade No. 5. Below Grade No. 5. A total of 10.

TABLE 8.—*Cotton and doors*

Commodity or characteristic	American cotton linters	Doors, house
Source	(1) "Quality and Prices of Cotton Linters Produced in the United States, 1933-1938," Victor R. Fuchs, Washington, D. C., March 1940. United States Department of Agriculture—Agricultural Marketing Service. (2) "Development and Use of Standards for Grade, Color, and Character of American Cotton Linters," United States Department of Agriculture, Miscellaneous Publication 242, May 1936.	Old Growth Douglas Fir Standard Stock Doors, Commercial Standard CS73-43, effective June 15, 1943.
Over-all Requirements	The United States Department of Agriculture under the Cotton Standards Act has set up in physical form grades numbered from 1 to 7 of cotton linters. Also a descriptive grade for hull fiber. In each one of the standard boxes there are 12 samples representing ranges of sectional character and variations.	Material. Construction. Sticking. Workmanship. Thicknesses.
Grading or rating based upon	Proportionate amounts, or blends, of long and short fibers. Grade 1 consists chiefly of the longer fibers and grade 7 of the shorter fiber. In other words, the amount of long fiber decreases, and the amount of short fiber increases proportionately with each decrease in grade from 1 to 7.	Heartwood. Grain direction and fineness. Defects. Repairs.
Present top grade Remaining grades arranged in descending order	Grade 1 2 3 4 5 6 7 Hull fiber	A B C Millrun (Panels same as for B and/or C)

TABLE 9.—*Eggs*

Commodity or characteristic	Shell eggs
Source	United States Standards For Quality For Individual Shell Eggs, Order of Promulgation of Standards, United States Department of Agriculture, Office of the Secretary, effective January 2, 1943.
Over-all requirements	In shell. Edible. Product of domestic hen. Grade does not include color, size, weight, packing, treatment, or tolerance.
Grading or rating based upon	Cleanness. Soundness. Normality. Condition of: Shell. Air cell. Yolk. White.
Present top grade Remaining grades arranged in descending order	U. S. GRADE AA. U. S. GRADE A. U. S. GRADE B. U. S. GRADE C. U. S. LIGHT DIRTY. U. S. DIRTY. U. S. CHECK. U. S. LEAKER. No Grade. Loss.

TABLE 10.—*Fabrics (colorfastness to crocking and laundering)*

Commodity or characteristic	Fabrics		
	Colorfastness to crocking (rubbing)	Colorfastness to laundering of cotton and linen fabrics	Colorfastness to laundering of fabrics other than cotton and linen
Source	Woven Textile Fabrics—Testing and Reporting, Commercial Standard CS59-41, effective March 1941.		
Over-all requirements	Test specimen and Crock Meter.	Test specimen, Launder-Ometer, and Standard laundering procedures.	Test specimen, Launder-Ometer, and Standard laundering procedure.
Grading or rating based upon	No appreciable change in color. Appreciable change in color = Class 0.	No appreciable change in color. A different test for each class.	No appreciable change in color.
Present top grade Remaining grades arranged in descending order	"Class A colorfastness to crocking." "Class B colorfastness to crocking." "Class 0 colorfastness to crocking."	"Class 4 colorfastness to laundering." "Class 3 colorfastness to laundering." "Class 2 colorfastness to laundering." "Class 1 colorfastness to laundering."	"Class A colorfastness to laundering."

TABLE 11.—*Fabrics (colorfastness to light and perspiration)*

Commodity or characteristic	Fabrics	
	Colorfastness to light	Colorfastness to perspiration
Source	Woven Textile Fabrics, Testing and Reporting, Commercial Standard CS59-41, effective March 1941	
Over-all requirements	Test specimen and Fade-Ometer.	Test specimen, Standard acid solution, and Standard alkaline solution.
Grading or rating based upon	No appreciable change in color. A different number of hours exposure for each class.	No appreciable change in color. Appreciable change in color= Class 0.
Present top grade	"Class 5 colorfastness to light."	"Class A colorfastness to normal perspiration."
Remaining grades arranged in descending order	"Class 4 colorfastness to light." "Class 3 colorfastness to light." "Class 2 colorfastness to light." "Class 1 colorfastness to light."	"Class 0 colorfastness to normal perspiration."

TABLE 12.—*Fabrics (yarn slippage and thread count)*

Commodity or characteristic	Resistance to yarn slippage	Thread count
Source	Woven Textile Fabrics, Testing and Reporting, Commercial Standard CS59-41, effective March 1941.	(1) A.S.T.M. Designation D 39-39 General Methods of Testing Woven Textile Fabrics. (2) Clark's Weave Room Calculations—W. A. Graham Clark—Clark Publishing Co. Charlotte, N.C. (1920 edition).
Over-all	Test specimens, Sewing machine, and Motor-driven pendulum testing machine.	The actual number of— (a) Ends per inch (warp yarns) (b) Picks per inch (filling yarns) shall be counted at five or more places, and the average number per inch calculated.
Grading or rating based upon	Load per inch of width in pounds to the nearest whole number required to produce a prescribed slippage.	Number of yarns per inch of width.
Present top of scale	100 (about) 99 98 . 20 19 18 17 16 15 14 13 12 11 10 etc. to 2	*Warp or filling* *318 317 316 . 244 243 242 . 160 159 158 . 100 99 98 . 60 59 58 57 56 55 etc. to 3 *From (2)

TABLE 13.—*Feldspar (ground)*

<table>
<tr><td rowspan="2">Commodity or characteristic</td><td colspan="4">Feldspar, ground</td></tr>
<tr><td>Composition</td><td colspan="3">Fineness</td></tr>
<tr><td>Source</td><td colspan="4">Feldspar, Commercial Standard CS23-30, effective Sept. 1, 1930.</td></tr>
<tr><td>Over-all requirements</td><td>Group 1. Ceramic or body grades with less than 4 percent soda (Na_2O).
Group 2. Chiefly for glazing purposes with 4 percent or more of soda (Na_2O).
Group 3. For glass making.</td><td colspan="3">All screen tests shall be made on standard screens (U. S. Standard Sieve Series) by a standard method.</td></tr>
<tr><td>Grading or rating based upon</td><td>Chemical composition
Group 1. Silica content and alkali ratio.
Group 2. Soda content.
Group 3. Silica, alumina and iron content. (In each group, numbers represent fixed limits of the chief constituents except iron which is designated by X, XX, XXX.)</td><td colspan="3">Particle size.
Percentage remaining on the Standard 200 sieve and that remaining on the sieve designated.</td></tr>
<tr><td rowspan="3">Optimum composition and fineness depend upon use</td><td rowspan="3">Examples
Group 1. 65, 67, 69, 71, 73 (5 ranges of silica, SiO_2).
61, 51, 41, 31 (4 ranges of potash to soda ratio).
67-51 designates a spar of silica content 66.00 up to 67.99 percent and with 5 or more parts of potash (K_2O) to 1 part of soda (Na_2O).
A total of 20 combinations.
Group 2. 4, 5, 6, 7, 8 (5 ranges of soda, Na_2O).
4 represents a spar of 4.00 to 4.99 percent soda (Na_2O).
Group 3. 65, 67, 69, 71 (4 ranges of silica SiO_2).
15, 16, 17, 18, 19 (5 ranges of alumina Al_2O_3).
X, XX, XXX (3 ranges of iron Fe_2O_3).
69-17-X represents a grade of spar of 68.00 to 69.99 percent of silica, 17.00 to 17.99 percent of alumina, and a maximum of 0.15 percent of Fe_2O_3.
A total of 60 combinations.</td><td>United States Standard Sieve No.</td><td>Percentage remaining on No. 200 sieve</td><td>Maximum percentage on sieve designated</td></tr>
<tr><td>230
200
170
140
120
100
80
60
40
20</td><td>0.00- 0.35
0.35- 1.00
1.00- 2.50
2.50- 5.00
5.00- 9.00
9.00-14.00
14.00-21.00
21.00-30.00
30.00-42.00
42.00-62.00</td><td>1.0
1.0
1.0
1.0
1.0
1.0
1.0
0.6
0.3
None</td></tr>
<tr><td colspan="3">Example: 140 sieve product will have 2.5 to 5.0 percent remaining on the 200 sieve and not more than 1 percent on the 140 sieve.</td></tr>
</table>

TABLE 14.—*Fertilizer*

Commodity or characteristic	Fertilizer
Source	(1) A Survey of Plant-Food Consumption in the United States in the Year Ended June 30, 1939, the National Fertilizer Association. (2) Recent Developments in The Fertilizer Industry, Extract from the Proceedings of the Sixth Annual Convention of the National Fertilizer Association, 1930.
Over-all requirements	Minimum plant food 5 to 16 percent, according to the individual State law.
Grading or rating based upon	Available nitrogen, phosphoric acid, and potash in that order (known as N-P-K) order, in whole numbers representing percentage by weight of N, P_2O_5, and K_2O. Nitrogen usually expressed as the element N, but infrequently as ammonia, NH_3. South Dakota requires all three to be expressed as percentage of the element.
Optimum depends upon soil and crop	*Examples of Grades* 3 - 8 - 5 3 - 8 - 3 2 - 8 - 2 8 - 16 - 16 6 - 8 - 4 0 - 10 - 10 3 - 8 - 0 4 - 10 - 0 1 - 10 - 2 Some States require a guarantee in addition of minimum total plant food. At least 982 different grades were sold in the 1939 season.

TABLE 15.—*Flooring (beech, birch, and maple)*

Commodity or characteristic	Flooring		
	Beech	Birch	Maple
Source	GRADING RULES For Northern Hard Maple, Beech, and Birch Flooring, Adopted June 1, 1939—Copyright 1939 by Maple Flooring Manufacturers Association.		
Over-all requirements	All flooring except square-edged strips, shall be tongued, grooved, and end-matched in accordance with standard dimensions.		
Grading or rating based upon	Gradation of defects and increasing percentage of short lengths.		
	Beech	Birch	Maple
Present top grade Remaining grades arranged in descending order	*First Grade:* Special First Grade. Red Clear Beech. *Second Grade* *Third Grade*	*First Grade:* Special First Grade. Red Clear Birch. *Second Grade* *Third Grade*	*First Grade:* Special First Grade. White Clear Maple. Brown Clear Maple. Birds'-eye figured clear maple. *Second Grade* *Third Grade*

TABLE 16.—*Flooring (oak and pecan)*

Commodity or characteristic	Flooring	
	Oak	Pecan
Source	Oak Flooring, Commercial Standard CS56-41, effective February 1, 1941.	Official Pecan Flooring Grading Rules, effective April 19, 1939, National Oak Flooring Manufacturers' Association.
Over-all requirements	All flooring except square-edged strips shall be tongued, grooved, and end-matched in accordance with standard dimensions.	
Grading or rating based upon	Gradation of defects and increasing percentage of short lengths.	
	Oak	Pecan
Present top grade Remaining grades arranged in descending order	*Quarter-Sawed Grades* Clear. Sap Clear. Select. *Plain-Sawed Grades* Clear. Select. No. 1 Common. No. 2 Common. *Square-Edged Strip* Clear. Select. No. 1 Common.	*Plain-Sawed* *First Grade* Special First Grade. First Grade Red. First Grade White. *Second Grade* Special Second Grade. Second Grade Red. *Third Grade* *Fourth Grade*

TABLE 17.—*Fruits (citrus)*

Commodity or characteristic	Fruits, citrus (other than California and Arizona), sweet oranges, grapefruit, and varieties of Mandarin group except tangerines	Fruits, citrus, grapefruit, California and Arizona
Source	United States Department of Agriculture, Agricultural Marketing Service, U. S. Standards for Citrus Fruits, effective September 29, 1941.	United States Department of Agriculture, Agricultural Marketing Service, U. S. Standards for California and Arizona Grapefruit, effective March 15, 1941.
Over-all requirements	Container basis. Sample inspection.	Container basis. Sample inspection.
Grading or rating based upon	Color. Firmness. Formation. Maturity. Defects. Damage.	Maturity. Color. Firmness. Formation. Texture. Thickness of skin. Defects. Injury. Tolerance.
Present top grade Remaining grades arranged in descending order	U. S. Fancy. U. S. No. 1. U. S. No. 1 Bright. U. S. No. 1 Golden. U. S. No. 1 Bronze. U. S. No. 1 Russet. U. S. No. 2. U. S. Combination Grade. U. S. Combination Russet Grade. U. S. No. 2 Bright. U. S. No. 2 Russet. U. S. No. 3. Cull.	U. S. Fancy. U. S. No. 1. U. S. No. 2. U. S. Combination Grade. U. S. No. 3. Unclassified.

TABLE 18.—*Fuels (oil)*

Commodity or characteristic	Fuels, Diesel, ignition quality	Fuel oil
Source	A.S.T.M. Designation D 613-41T, Ignition Quality of Diesel Fuels.	Fuel Oils, Commercial Standard CS12-40, effective January 5, 1940.
Over-all requirements	C.F.R. Diesel Fuel Testing Unit.	Hydrocarbon oils free from acid, grit, and fibrous or other foreign matter likely to clog or injure the burner. Nos. 1, 2, and 3 are distillate oils, and 5 and 6 residual oils.
Grading or rating based upon	Ignition quality—percentage by volume of cetane in a mixture of cetane and α-methylnaphthalene which the fuel matches in a direct matching method on the basis of ignition delay.	Flash point. Distillation range. Viscosity. Pour point. Carbon residue. Ash.
Present top grade Remaining grades arranged in descending order	The cetane numbers now most commonly in use are from 30 to 70. 70 (about) 69 68 67 66 etc. to about 30	No. 1. No. 2. No. 3. No. 5. No. 6. (Assuming ideal is most volatile.)

TABLE 19.—*Gasoline*

Commodity or characteristic	Gasoline
Source	Army-Navy Aeronautical Specifications: Fuel; Aircraft-Engine, Grade 100 AN-VV-F-781, Sept. 26, 1940—Rev. June 6, 1941. Fuel; Aircraft-Engine, Grade 91 AN-VV-F-776, Oct. 15, 1940—Rev. June 6, 1941. Fuel; Aircraft-Engine, Grade 73 AN-VV-F-761, Oct. 15, 1940—Rev. June 6, 1941. Fuel; Aircraft-Engine, Grade 65 AN-VV-F-756, Oct. 15, 1940—Rev. June 6, 1941. A. S. T. M. Designation: D 439-40 T Tentative Specifications for Gasoline.
Over-all requirements	Hydrocarbon compounds. Volatility. Octane number. Vapor pressure. Corrosion. Odor. Sulfur. Freezing point. Specific gravity. Color. Water tolerance. Gum. Heat of combustion. Lead content. (All the above are not necessarily specified in all cases.)
Grading or rating based upon	Volatility. Octane number.
Present top grade Remaining grades arranged in descending order	*Aviation* 100 octane (number 100) 91 octane (number 91) 73 octane (number 73) 65 octane (number 65) *Automotive* — *50% point °F* / *90% point °F* Type B (70 or 77 octane .... 257 .... 356) Type A (70 or 77 octane .... 284 .... 392) Type C (50 octane .... 284 .... 392) In the A. S. T. M. Specifications there are provisions for automatic variations in the 10-percent point by locality to suit the seasonal requirements.

TABLE 20.—*Glue, hair, and handles*

Commodity or characteristic	Glue (animal)	Hair in mattresses	Hickory handles
Source	Glue; Animal (for) Woodworking, Federal Specification C-G-451, May 26, 1931.	Mattresses for Hospitals, Commercial Standard CS54-35, and Mattresses for Institutions, Commercial Standard CS55-35, both effective Sept. 6, 1935.	Hickory Handles, Simplified Practice Recommendation R77-39, effective Oct. 15, 1939.
Over-all requirements	Moisture content. Reaction pH. Foam. Odor and keeping quality.	Cleanliness. Sterilization. Freedom from offensive odors.	Covers long and short handles for striking tools.
Grading or rating based upon	Viscosity and jelly strength. Different grades are recommended for different uses and different service conditions.	Source of hair. Percentage of: Horse-tail, Cattle-tail, Horse-mane, and Hog hair.	Color of wood. Number of annual rings. Weight per cubic foot. Defects.
Present top grade Remaining grades arranged in descending order	V 1 For ve- V 2 neering. J 1 For edge J 2 joints in furniture. S 1 For warm, S 2 humid climates. (Assuming ideal is lowest viscosity.)	Grade A { 50% horse-mane hair. 50% horse-tail hair. Grade B 100% cattle-tail hair. Grade C 100% horse-mane hair. Grade D { 37.5% horse-mane hair. 37.5% horse-tail hair. 25.0% hog hair. Grade E { 75% cattle-tail hair. 25% hog hair. Grade F { 75% horse-mane hair. 25% hog hair.	A A W A A R A W A R B W B R C W C R

TABLE 21.—*Lumber (hardwood and softwood)*

Commodity or characteristic	Lumber	
	Hardwood (general)	Softwood (yard lumber)
Source	Rules for the Measurement and Inspection of Hardwood Lumber, issued January 1943 by National Hardwood Lumber Association.	Lumber, American Lumber Standards for Softwood Lumber, Simplified Practice Recommendation R 16-39, approved October, 1939.
Over-all requirements	Inspection to be made on the poorer side of the piece, except when otherwise specified.	Lumber intended for general building purposes. Grading based on use of entire piece.
Grading or rating based upon	The amount of clear usable lumber in the piece rather than upon the number and size of the defects present.	Finishing quality. Use.
Present top grade Remaining grades arranged in descending order	*Standard grades* Firsts. Seconds. Selects. No. 1 Common. No. 2 Common. Sound Wormy. No. 3A Common. No. 3B Common. There are numerous details, exceptions and special rules for certain species and uses.	*Select:* Grade A. Grade B. Grade C. Grade D. *Common:* No. 1 Common. No. 2 Common. No. 3 Common. No. 4 Common. No. 5 Common.

TABLE 22.—*Mica*

Commodity or characteristic	Mica	
	Classification	Grades
Source	Grading and Classification of Natural Mica, A.S.T.M. Designation D 351-38.	
Over-all requirements	Classification of quality.	Method of grading for size.
Grading or rating based upon	Gradations of clearness and color.	The area of the usable rectangle which can be cut from the specimen and the minimum dimension of one side.
Present top grade Remaining grades arranged in descending order	*Classification of quality of mica* Clear. Clear and slightly stained. Fair stained. Good stained. Stained. Heavy stained. Black stained and spotted.	*Grades* Extra special. Special. A-1 1 2 3 4 5 5 1/2 6

TABLE 23.—*Pork and potatoes*

Commodity or characteristic	Pork carcasses	Potatoes
Source	United States Department of Agriculture, Circular 288, Market Classes and Grades of Pork Carcasses and Fresh Pork Cuts, October 1933.	United States Department of Agriculture, Agricultural Marketing Administration, Service and Regulatory Announcements 151, United States Standards for Potatoes, Revised, effective June 1, 1942.
Over-all requirements		Container basis. Based on sample inspection.
Grading or rating based upon	Conformation. Finish. Quality: Color. Texture. Fats. Firmness. Skin.	Firmness. Color. Shape. Cleanness. Defects. Damage. Size. Weight.
Present top grade Remaining grades arranged in descending order	No. 1 Grade Fat-Type (Butcher). No. 2 Grade Fat-Type (Butcher). No. 3 Grade Fat-Type (Butcher). Cull Grade Fat-Type (Butcher). No. 1 Grade Meat-Type (Bacon). No. 2 Grade Meat-Type (Bacon). No. 3 Grade Meat-Type (Bacon). Cull Grade Meat-Type (Bacon). No. 1 Grade Sow-Pork. No. 2 Grade Sow-Pork. No. 3 Grade Sow-Pork. Cull Grade Sow-Pork. No. 1 Grade Shipper-Pork. No. 2 Grade Shipper-Pork. No. 3 Grade Shipper-Pork. Cull Grade Shipper-Pork. No. 1 Grade Roasting-Pork. No. 2 Grade Roasting-Pork. No. 3 Grade Roasting-Pork. Cull Grade Roasting-Pork. No. 1 Grade Stag-Pork. No. 2 Grade Stag-Pork. No. 3 Grade Stag-Pork. Cull Grade Stag-Pork.	U. S. Fancy. U. S. Extra No. 1. U. S. No. 1. U. S. Commercial. U. S. No. 2. Unclassified. (When size is above minimum requirements for grades other than U. S. Fancy and meets the requirements of either size A or B, the words "Size A" or "Size B" may be added to the grade designation.)

TABLE 24.—*Safes (fire-resisting)*

Commodity or characteristic	Safes, fire resisting
Source	Underwriters' Laboratories, Inc. Standard for Fire Resistance Classification of Safes and Insulated Cabinets, Subject 72, fifth edition, December 1941.
Over-all requirements	Insulated walls and doors. Substantial hinges and locking mechanisms. Practicability. Durability. Strength. Maximum interior temperature 300°F during fire exposure or 350°F after furnace fires have been extinguished without destroying usability of records stored inside.
Grading or rating based upon	Fire endurance test. Fire and impact. Explosion hazard tests.
Present top grade Remaining grades arranged in descending order	*Class A (Four-Hour) Safes* (1) To withstand a four-hour fire test reaching 2,000°F. (2) A drop of 30 feet after a heat exposure of 60 minutes, and reheating for 1 hour. (3) Explosion test. *Class B (Two-Hour) Safes* (1) To withstand a two-hour fire test reaching 1,850°F. (2) A drop of 30 feet after a heat exposure of 45 minutes, and reheating for 45 minutes. (3) Explosion test. *Class C (One-Hour) Safes* (1) To withstand a one-hour fire test reaching 1,700°F. (2) A drop of 30 feet after heat exposure of 1/2 hour, and reheating 1/2 hour. (3) Explosion test. *Cabinets, Insulated* (1) To withstand for 45 minutes, fire test reaching 1,640°F. (2) Explosion test.

TABLE 25.—*Screw threads and shafts*

Commodity or characteristic	Screw-threads	Hickory golf shafts
Source	National Bureau of Standards Handbook H28, Screw-Thread Standards for Federal Services, 1942. Screw Threads and Tap-Drill Sizes, Commercial Standard CS24-43, effective February 10, 1943.	Hickory Golf Shafts, Commercial Standard CS18-29, effective November 1, 1929.
Over-all requirements	Basic dimensions for two series, coarse-thread and fine-thread. Uniform minimum nut. Uniform minor diameter of nut. Length of engagement.	Material. Workmanship. Straightness. Grain. Moisture content. Dimensions and tolerances.
Grading or rating based upon	Fit, i.e., shake or play, and tolerances.	Stiffness (load to produce a given deflection).
Optimum fit depends upon use	Class 4, Close Fit. Class 3, Medium Fit. Class 2, Free Fit. Class 1, Loose Fit.	Goose. Owl. Lark. Falcon.

TABLE 26.—*Sheeting and silverware*

Commodity or characteristic	Rubber sheeting	Silverware
Source	Emergency Alternate Specification ZZ-S-311a for Sheeting; Rubber, June 5, 1943.	(1) Quality Standards applying to Plated Flatware, Hotel Flatware—Silverware Manufacturing Industry, approved Aug. 7, 1934, Amended and Approved Jan. 23, 1935. (2) Federal Specification RR-T-51a for Tableware; Silver-Plated, June 5, 1934.
Over-all requirements	Accelerated aging. Sterilization. Resistance to phenol. Resistance to alcohol (type C).	Plating of pure silver on 18 percent nickel-brass base.
Grading or rating based upon	The minimum rubber content by weight for type B. Number of sides coated. Thickness. Color.	The weight of silver per gross deposited and whether extra plate is, or is not deposited at points of greatest wear.
Present top grade Remaining grades arranged in descending order	Type B. Type C.	Quadruple XXXX. Triple XXX. Double XX. AA. "A1 +" or "A1X," or "Extra." "A1" or "Standard." (Federal Specification requires 9 oz. per gross on teaspoons as compared to 8 oz. per gross on teaspoons for XXXX.)

TABLE 27.—*Steels*

Commodity or characteristic	Steels
Source	The 1943 SAE Handbook, page 302.
Over-all requirements	The first digit indicates the type to which the steel belongs; thus '1-' indicates a carbon steel; '2-' a nickel steel, and '3-' a nickel-chromium steel. In the case of the simple alloy steels, the second digit generally indicates the approximate percentage of the predominant alloying element. Usually the last two or three digits indicate the approximate average carbon content in 'points' or hundredths of 1 percent.
Grading or rating based upon	Chemical Composition *Type of steel* — *Numerals (and digits)* Carbon steels....... 1xxx Plain carbon....... 10xx Free cutting (screw stock)............ 11xx Manganese........... 13xx *Type of steel* — *Numerals (and digits)* Nickel steels...... 2xxx 3.50% nickel...... 23xx 5.00% nickel...... 25xx And so on for other elements.
Optimum depends upon purpose or use	Carbon steels: 1008, 1010, 1015, 1016, 1020, etc., a total of 22. Free cutting steels: 1111, 1112, 1113, 1115, etc., a total of 10. Manganese steels: 1320, 1330, 1335, 1340. Nickel steels: 2317, 2330, 2340, 2345, 2515. Nickel-chromium steels, 3115, 3120, etc., a total of 10. Molybdenum steels, 4023, 4027, etc., a total of 22. Chromium steels, 5120, 5140, 5150, 52100. Chromium-vanadium steels, 6150. Silicon-manganese steel, 9260. And so on for other elements. A grand total of 136 compositions. 1943 SAE Handbook lists 136 steels.

TABLE 28.—*Tobacco (flue-cured and fire-cured)*

Commodity or characteristic	Tobacco	
	Flue-cured (U. S. types 11, 12, 13 and 14)	Fire-cured (U. S. types 21, 22, 23 and 24)
Source	United States Department of Agriculture, Agricultural Marketing Service, Official Standard Grades for Flue-Cured Tobacco (U. S. Types 11, 12, 13, and 14) Aug. 1936.	United States Department of Agriculture, Agricultural Marketing Service, Official Standard Grades for Fire-Cured Tobacco (U. S. Types 21, 22, 23, and 24) Dec. 1939.
Over-all requirements	Cured under artificial atmospheric conditions by the process of regulating the heat and ventilation without allowing smoke or fumes from the fuel to come in contact with the tobacco.	Tobacco cured under artificial atmospheric conditions by the use of open fire from which the smoke or fumes of burning wood are partly absorbed by the tobacco.
Grading or rating based upon	General quality of the tobacco including body, percentage of injury, color, tolerance and other characteristics.	
Present top grade Remaining grades arranged in descending order	*Wrapper Grades (A-Group)* United States Grades A1L A1F A1R etc. A total of 9 grades *Leaf Grades (B-Group)* United States Grades B1L B1F B1R etc. A total of 26 grades *Cutter Grades (C-Group)* A total of 10 grades *Lug Grades (X-Group)* A total of 18 grades *Nondescript and Scrap (N&S Groups)* A total of 2 grades A grand total of 65 U.S. Grades	*Wrapper Grades (A-Group)* United States Grades A1F A1D A2F etc. A total of 6 grades *Heavy Leaf Grades (B-Group)* United States Grades B1F B1D B2F etc. A total of 16 grades *Thin Leaf Grades (C-Group)* A total of 20 grades *Short Leaf or Tips (T-Group)* A total of 12 grades *Lug Grades (X-Group)* A total of 21 grades *Nondescript and Scrap (N&S Groups)* A total of 2 grades A grand total of 77 U.S. Grades

TABLE 29.—*Tobacco (burley and dark, air-cured)*

Commodity or characteristic	Tobacco: Burley (U. S. type 31)	Tobacco: Dark air-cured (types 35, 36, and 37)
Source	United States Department of Agriculture, Bureau of Agricultural Economics—Official Standard Grades for Burley Tobacco (U. S. Type 31) Promulgated 1936, amended 1938.	United States Department of Agriculture, Agricultural Marketing Service, Official Standard Grades for Dark Air-Cured Tobacco (U. S. Types 35, 36, and 37) January 1940.
Over-all requirements	Must be air-cured tobacco known as Burley, Burley Air-Cured, Red Burley, White Burley, or Light Air-Cured of Kentucky.	Must be tobacco known as Sucker, Green River, or Virginia Sun-Cured, which has been cured under natural atmospheric conditions.
Grading or rating based upon	General quality of the tobacco, including body, percentage injury, color, tolerances, and other characteristics.	
Present top grade Remaining grades arranged in descending order	*Wrapper or Fancy Cutter and Leaf Grades (A-Group)* United States Grades A1L A1F A1R etc. A total of 6 grades *Leaf and Filler Grades (B-Group)* United States Grades B1F B1R B2F etc. A total of 16 grades *Lugs and Cutter (C-Group)* A total of 16 grades *Granulators or Flyings (X-Group)* A total of 16 grades *Nondescript and Scrap (N&S Group)* A total of 2 grades A grand total of 56 grades	*Wrapper Grades (A-Group)* United States Grades A1F A1R A2F etc. A total of 6 grades *Heavy Leaf Grades (B-Group)* United States Grades B1F B1R B2F etc. A total of 19 grades *Thin Leaf Grades (C-Group)* A total of 20 grades *Short Leaf and Tips (T-Group)* A total of 15 grades *Lug Grades (X-Group)* A total of 24 grades *Nondescript and Scrap (N&S Group)* A total of 2 grades A grand total of 86 grades

TABLE 30.—*Varnish and viscosity*

Commodity or characteristic	Varnish, asphalt	Viscosity, kinematic
Source	Federal Specification TT-V-51 for Varnish; Asphalt, April 28, 1931, Amendment-2, October 21, 1941.	(1) Tentative Method of Test for Kinematic Viscosity, A.S.T.M. Designation D 445-42T. (2) Standard Method for Calculating Viscosity Index, A.S.T.M. Designation D 567-41.
Over-all requirements	Appearance. Color. Flash point. Action with linseed oil. Solubility in CS_2. Nonvolatile matter. Fatty matter. Set to touch. Drying time. Resistance to water and oil. Working properties.	Calibrated capillary viscosimeter. Thermometer. Bath. Timer.
Grading or rating based upon	Toughness. Resistance to mineral acids.	Efflux time in seconds at temperature of test $V = Ct - \frac{B}{t}$ t = efflux time in seconds, C and B = constants for the instrument, V = Kinematic viscosity, centistokes.
Present top grade Remaining grades arranged in descending order	Grade B (resistant to mineral acids). Grade A (normal).	Range of kinematic viscosity at 210°F in centistokes: 75.0 74.5 74.0 73.5 73.0 etc. in intervals of 0.5 to 30.0, and then in intervals of 0.2 to 20.0, and then in intervals of 0.1 to 2.0 A total of 321 possible values, (assuming ideal is maximum viscosity).

TABLE 31.—*Wheat*

Commodity or characteristic	Wheat
Source	United States Department of Agriculture, Agricultural Marketing Service Handbook of Official Grain Standards of the United States—Wheat, effective October 1, 1937.
Over-all requirements	50 percent or more of wheat. Not over 10 percent of other grains. Not over 50 percent of broken kernels. (Class I, Hard Red Spring; Class II, Durum; Class III, Red Durum; Class IV, Hard Red Winter; Class V, Soft Red Winter; Class VI, White; and Class VII, Mixed.)
Grading or rating based upon	Minimum weight per bushel. Damaged kernels. Foreign material. Wheats of other classes.
Present top grade Remaining grades arranged in descending order	Grade No. 1 Heavy (in Class I only). Grade No. 1. Grade No. 2. Grade No. 3. Grade No. 4. Grade No. 5. Sample Grade. When dockage exceeds 1 percent the word "Dockage" and the percentage thereof shall be added to the grade designation. In certain special grades: "Tough." "Light Smutty." "Smutty." "Light Garlicky." "Garlicky." "Weevily." "Ergoty." Kind of treatment shall be added to the grade designation.

TABLE 32.—*Wool and wool top*

Commodity or characteristic	Wool	Wool top
Source	United States Department of Agriculture, S.R.A. No. 135, issued September, 1932. Official Standards of the United States for Grades of Wool and Wool Top, Amendment No. 2, November 1942.	United States Department of Agriculture, S.R.A. No. 135, issued September 1932. Official Standards of the United States for Grades of Wool and Wool Top, and Amendment No. 1 to S.R.A. 135, issued December 28, 1939.
Over-all requirements		
Grading or rating based upon	Diameter of the fiber by visual comparison with practical forms of the Official Standards of the United States for Grades of Wool; or by measurement method.	Diameter of fiber as determined by (1) comparison, or (2) measurement. Dispersion of fiber diameter.
	Grades of wool	*Grades of wool top*
Present top grade Remaining grades arranged in descending order	Grade 80's or fine. Grade 70's or fine. Grade 64's or fine. Grade 60's or one-half blood. Grade 58's or one-half blood. Grade 56's or three-eighths blood. Grade 50's or one-fourth blood. Grade 48's or one-fourth blood. Grade 46's or low one-fourth blood. Grade 44's or common. Grade 40's or braid. Grade 36's or braid.	Grade 80's Grade 70's Grade 64's Grade 62's Grade 60's Grade 58's Grade 56's Grade 50's Grade 48's Grade 46's Grade 44's Grade 40's Grade 36's Grades 50 and above carry also a substandard grade in which the fiber diameter dispersion does not conform to the requirements of standard.

TABLE 33.—*Yarn (asbestos)*

Commodity or characteristic	Yarn, asbestos
Source	Standard Specifications and Methods of Test for Asbestos Yarns, A.S.T.M. Designation D 299-42.
Over-all requirements	Asbestos and other fibers. Standard condition.
Grading or rating based upon	Asbestos content by weight.
Present top grade Remaining grades arranged in descending order	Grade AAAA .... (99 to 100 percent, inclusive) Grade AAA.................... (95 to 99 percent, exclusive) Grade AA..................... (90 to 95 percent, exclusive) Grade A...................... (85 to 90 percent, exclusive) Underwriters' Grade.......... (80 to 85 percent, exclusive) Commercial Grade............. (75 to 80 percent, exclusive) (Cut designation varies from 5- to 35-cut, according to the nominal yards per pound divided by 100.)

IX. SOURCES OF MATERIAL FOR THE GRADE TERMINOLOGY PROBLEM

American Society for Testing Materials:

1. A.S.T.M. Designation D 388-38, Specification for Classification of Coals by Rank.
2. A.S.T.M. Designation D 389-37, Specification for Classification of Coals by Grade.
3. A.S.T.M. Designation D 431-38, Method for designating the Size of Coal from Its Screen Analysis.
4. A.S.T.M. Designation D 310-34, Method of Test for Size of Anthracite.
5. A.S.T.M. Designation D 39-39, General Methods of Testing Woven Textile Fabrics.
6. A.S.T.M. Designation D 613-41T, Fuels, Diesel.
7. A.S.T.M. Designation D 439-37T, Specifications for Gasoline (Tentative).
8. A.S.T.M. Designation D 351-38, Methods of Test for Grade and Classification of Natural Mica.
9. A.S.T.M. Designation D 445-42T, Method of Test for Kinematic Viscosity (Tentative).
10. A.S.T.M. Designation D 567-41, Standard Method of Calculating Viscosity Index.
11. A.S.T.M. Designation D 299-42, Standard Specification and Methods of Test for Asbestos Yarns.
    Philadelphia, Pa. American Society for Testing Materials.

American Standards Association:

12. A.S.A. No. M20.1-1938, Coal.
13. A.S.A. No. M20.2-1937, Coal.
14. A.S.A. No. M20.3-1938, Coal.
    New York, N. Y., American Standards Association.

Clark, W. A. Graham:

15. Clark's Weave Room Calculations. Charlotte, N. C., Clark Publishing Co., 1920.

Clark, W. Mansfield:

16. The Determination of Hydrogen Ions, Third Edition. Baltimore, Md. The Williams & Wilkins Co., 1928.

Joint Committee on Classification.
New York, N. Y.:

17. Methods of Testing Raw Silk, Part 3; Hosiery Classification, page 35, February 16, 1938.

Maple Flooring Manufacturers' Association.
Chicago, Ill.:

18. Grading Rules for Northern Hard Maple (Acer saccharum), Beech and Birch Flooring, adopted June 1, 1939.

National Fertilizer Association, The.
Washington, D. C.:

19. A Survey of Plant-Food Consumption in the United States in the Year Ended June 30, 1939.
20. Recent Developments in the Fertilizer Industry, Extract from the Proceedings of the Sixth Annual Convention of the National Fertilizer Association (1930).

National Hardwood Lumber Association.
Chicago, Ill.:

21. Rules for the Measurement and Inspection of Hardwood Lumber, Cypress, Veneers and Thin Lumber, issued January 1943.

National Oak Flooring Manufacturers' Association
Memphis, Tenn.:

22. Official Pecan Flooring Grading Rules, effective April 19, 1939.

Raw Silk Intelligence Bureau, The Japanese Government. New York, N. Y.:

23. Methods of Testing and Classification of Raw Silk of the Japanese Government. July 1, 1938.

SAE Handbook, The 1943:

24. SAE Numbering System, Steels, part II, page 302. New York City, Society of Automotive Engineers, Inc.

Searle, Anne Brohel, with Pauline Beery Mack:

25. A Study of the Incidence of Shrinkage in Women's and Children's Wearing Apparel Fabrics. American Dyestuff Reporter, Vol. 28, No. 16, August 7, 1939, p. 405. New York, N. Y., Howe Publishing Co.

Silverware Manufacturing Industry:

26. Quality Standards Applying to Plated Flatware, Hotel Flatware, approved August 7, 1934, amendments approved January 23, 1935.

Underwriters' Laboratories, Inc.:

27. Standard for Fire Resistance Classification of Safes and Insulated Cabinets, Subject 72, fifth edition, December 1941.
    Chicago, Ill. Underwriters' Laboratories, Inc.

U. S. Department of Agriculture,
Washington, D. C.:

Agricultural Marketing Service—

28. United States Standards for Grades of Canned Asparagus, issued August 5, 1941, effective September 15, 1941.
29. United States Standards for Beans, issued August 1941; as revised, effective September 1, 1941.
30. Official United States Standards for Grades of Carcass Beef, Service and Regulatory Announcements No. 99, Amendment No. 1 issued October 1942.
31. United States Standards for Grades of Canned Beets, issued September 9, 1941, effective October 1, 1941.
32. Tentative United States Standards for Grades of Canned Carrots, issued June 12, 1940, effective July 1, 1940.
33. United States Standards for Grades of Canned Corn—Creamed Style, Service and Regulatory Announcements No. 139, issued February 1933, reprinted April 1941.
34. Handbook of Official Grain Standards of the United States. Revised 1941. Washington, D. C., U. S. Government Printing Office, 1941.
35. Developments In Cotton Standardization and Related Services, Service and Regulatory Announcements No. 163, issued August 1942.
36. Quality and Prices of Cotton Linters Produced in the United States, 1933-38. Victor R. Fuchs, Marketing Specialist, Washington, D. C., 1940.
37. U. S. Standards for Citrus Fruits, issued September 22, 1941, effective September 29, 1941.
38. U. S. Standards for California and Arizona Grapefruit, issued March 1. 1941, effective March 15, 1941.

U. S. Department of Agriculture—Continued

39. United States Standards for Grades of Tomato Juice (Canned or Bottled), August 29, 1938.
40. Official United States Standards for Grades of Lamb Carcasses, Yearling Mutton, and Mutton Carcasses, Service and Regulatory Announcements No. 123, issued March 1931, effective February 16, 1931, reprinted December 1939. Amendment No. 1 issued October 1940.
41. U. S. Standards for Bermuda Onions, issued March 16, 1937, reissued August 11, 1939, effective March 29, 1937.
42. United States Standards for Grades of Canned Peas, issued April 4, 1942, effective May 1, 1942.
43. United States Standards for Grades of Canned Yellow Clingstone Peaches, issued June 5, 1942, effective July 1, 1942.
44. United States Standards for Grades of Canned Freestone Peaches, issued June 5, 1942, effective July 1, 1942.
45. U. S. Standards for Plums and Prunes (Fresh), issued May 28, 1937, effective June 3, 1937, reissued August 29, 1939.
46. United States Standards for Potatoes, Service and Regulatory Announcements No. 151, Revised, effective June 1, 1942.
47. Official Standard Grades for Dark Air-Cured Tobacco (U. S. Types 35, 36, and 37), January 1940.
48. Official Standard Grades for Flue-Cured Tobacco (U. S. Types 11, 12, 13, and 14), August 1936.
49. Official Standard Grades for Fire-Cured Tobacco (U. S. Types 21, 22, 23, and 24), December 1939.

Bureau of Agricultural Economics—

50. United States Standards for Apples, Service and Regulatory Announcements No. 154, issued October 1937, effective September 1, 1937.
51. Development and Use of Standards for Grade, Color, and Character of American Cotton Linters. Guy S. Meloy, Senior Marketing Specialist, Division of Cotton Marketing. Miscellaneous Publication No. 242, May 1936.
52. Market Classes and Grades of Pork Carcasses and Fresh Pork Cuts. W. C. Davis and B. F. McCarthy, Senior Marketing Specialists, and J. A. Burgess, Principal Associate Marketing Specialist, Division of Livestock, Meats, and Wool. Circular 288, October 1933.
53. Official Standard Grades for Burley Tobacco (U. S. Type 31), (May 1938), promulgated 1936, amended 1938.
54. Official Standards of the United States for Grades of Wool and Wool Top and Rules and Regulations for Distribution of Practical Forms of Wool and Wool Top Standards under Wool Standards Act of May 17, 1928, Service and Regulatory Announcements No. 135, issued September 1932, also Amendment No. 1 to S. R. A. 135, Amendment of Official Standards of the United States for Grades of Wool Top, December 1939, and Amendment No. 2 to S. R. A. 135, Amendment of Regulations of the Secretary of Agriculture relating to the Official Standards of the United States for Grades of Wool, November 1942.

U. S. Department of Agriculture—Continued

Bureau of Entomology and Agricultural Economics—

55. United States Grades, Color Standards, and Packing Requirements for Honey, Circular 24, issued December 1927, revised August 1933, and Supplemental Chart, Requirements for the More Important Grades of Honey (August 1933).

Food Distribution Administration—

56. Tentative United States Standards for Grades of Frozen Lima Beans, effective March 1, 1943, corrected March 15, 1943.
57. Official United States Standards for Grades of Creamery Butter, effective February 1, 1943.
58. Tentative U. S. Standards for Classes and Grades for Dressed Chickens, effective January 7, 1943, amended March 4, 1943.

Forest Service—

59. How Lumber is Graded. H. S. Betts, Senior Engineer, and R. K. Helphenstine, Jr., Associate Forest Products Statistician, Branch of Research. Department Circular 64, issued March 1920, revised, September 1933.

Office of the Secretary—

60. United States Standards for Quality for Individual Shell Eggs, effective January 2, 1943.

U. S. Department of Commerce:

National Bureau of Standards—

Commercial Standards

61. Book Cloths, Buckrams, and Impregnated Fabrics, CS57-40, effective June 20, 1940.
62. Old Growth Douglas Fir Standard Stock Doors, CS73-43, effective June 15, 1943.
63. Woven Textile Fabrics, Testing and Reporting, CS59-41, effective March 28, 1941.
64. Feldspar, CS23-30, effective September 1, 1930.
65. Oak Flooring, CS56-41, effective February 1, 1941.
66. Fuel Oils, CS12-40, effective January 5, 1940.
67. Mattresses for Hospitals, CS54-35, effective September 6, 1935.
68. Mattresses for Institutions, CS55-35, effective September 6, 1935.
69. Hickory Golf Shafts, CS18-29, effective November 1, 1929.
70. Household Insecticide (Liquid Spray Type), CS72-38, effective June 10, 1938.
71. Mirrors, Commercial Standard CS27-36, effective August 20, 1936.
72. Screw Threads and Tap-Drill Sizes, CS24-43, effective February 10, 1943.

Handbooks

73. Screw Thread Standards for Federal Services, 1942, Handbook 28, Washington, D. C., Government Printing Office, 1942.

Simplified Practice Recommendations

74. Hickory Handles, R77-39, effective October 15, 1939.
75. American Lumber Standards for Softwood Lumber, R16-39, approved October 1939.

U. S. Federal Security Agency,
Washington, D. C.:

U. S. Public Health Service—

76. Public Health Bulletin No. 220, 1939 Edition, Milk Ordinance and Code.

U. S. Treasury Department:

Procurement Division—

Federal Specifications

77. Asphalt; (For Use In) Road and Paving Construction, SS-A-706a, November 26, 1940.
78. Glue; Animal (for) Woodworking, C-G-451, May 26, 1931.
79. Roofing; Asphalt-Prepared, Smooth-Surfaced, SS-R-501, August 1, 1933.
80. Slate; Roofing, SS-S-451, July 26, 1932.
81. Sheeting; Rubber, Emergency Alternate Federal Specification E-ZZ-S-311a, June 5, 1943.
82. Tableware; Silver-Plated, RR-T-51a, June 5, 1934.
83. Bars; Reinforcement, (for) Concrete, QQ-B-71a, January 12, 1938; Amendment No. 1, December 3, 1940.

U. S. Treasury Department—Continued

84. Steel, Corrosion Resisting; Bars and Forgings, QQ-S-763, April 20, 1939.
85. Varnish; Asphalt, TT-V-51, April 28, 1931; Amendment No. 2, October 21, 1941.

U. S. War Department—Navy Department:

U. S. Army-Navy Aeronautical Specifications

86. Fuel; Aircraft-Engine, Grade 100 AN-VV-F-781, September 26, 1940—Rev. June 6, 1941.
87. Fuel; Aircraft-Engine, Grade 91 AN-VV-F-776, October 15, 1940—Rev. June 6, 1941.
88. Fuel; Aircraft-Engine, Grade 73 AN-VV-F-761, October 15, 1940—Rev. June 6, 1941.
89. Fuel; Aircraft-Engine, Grade 65 AN-VV-F-756, October 15, 1940—Rev. June 6, 1941.

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