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OF

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STANDARDIZATION

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VITREOUS CHINA PLUMBING FIXTURES

By

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STANDARDIZATION SETS NO BRAKES
BUT RELEASES
POWER
TIME
MATERIALS
MONEY
AND
MEN
FOR MANKIND.
IT IS THE KEY TO FREEDOM.

STANDARDIZATION OF VITREOUS CHINA PLUMBING FIXTURES.

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STANDARDIZATION OF VITREOUS CHINA PLUMBING FIXTURES

Foreword.

Standardization is the keynote of the decade. Simplification, one of the phases of standardization now in the spotlight, is receiving serious attention in countless industries which, spurred by competition, are striving to eliminate waste in production and distribution.

Successful methods of achieving maximum results in this work are little understood and it is believed a detailed review of the problems of an industry and the methods used for their satisfactory solution will be of value to the business or engineering executive.

It is interesting to note that the former tendency on the part of industry to deal with standardization problems in an offhand or haphazard manner is giving way to a conviction that the aid of a specialized standardization and simplification agency is just as essential to success in this field, as the services of a lawyer when drafting articles of incorporation, or a physician when treating disease.

This thesis reviews the standardization problems of the Vitreous China Plumbing Fixtures Industry and their treatment through the Division of Simplified Practice and the National Bureau of Standards of the United States Department of Commerce.

I. DEFINITIONS AND GENERAL STATEMENTS

Simplification is the elimination of superfluous variety. It should not be confused with the more comprehensive term, standardization, which is the art of conforming to any measure, quantity, quality, performance or practice. Simplification is usually based on sales records while standardization involves technical consideration of physical or chemical characteristics of the product, the process of its production and performance in service.

Contrary to a common impression, both are flexible and must be kept in step with progress in the industry involved in order to develop their maximum value.

Many of the benefits of standardization in the immediate foreground of our daily lives, are overlooked, and without proper perspective we might agree with those who have said that standardization fetters individual expression and if pursued will lead ultimately to a drab and stagnant existence. However, the stumbling block in the path to proper appreciation of standardization is not a result of actual experience with standards, but lies rather in the mental concept or the definition of the term.

For purposes of illustration, consider standardization in nature. It has been aptly stated that nature has not only developed types which can be readily enumerated and classified, but she has standardized for each a multitude of organs and functions. Individuals of the same species

of plants, fishes, birds, or animals, resemble each other in the minutest details of structure and function. Identity of structure is particularly marked in the chemical and mineralogical species of the mineral kingdom. If this were not so, civilization would be practically impossible. Every item in existence would present an individual problem with no possibility of generalization and therefore no possibility of knowledge which is based on generalization. There could be no organized life, no institutions, no customs, no laws for these depend upon an underlying limitation of action and reaction. There could be no medicine and no surgery for how could it be predetermined where to look for the heart or the stomach or if you please, whether or not a given body contained such organs.

The behavior of materials is highly standardized. Boiling and freezing points, elasticity, strength, electrical conductivity, heat conductivity, hardness, ductility, viscosity, refractivity, permeability, and many other properties have been measured and listed as constant in the International Critical Tables.

And yet, we hear no complaints that nature has carried standardization to extremes, that life is dull, drab or stagnant as a result of standardized chemical elements, standardized crystalline growth, wave lengths, as in sound, radio, light, and X-rays. All of the variations of color available to the painter are confined to a narrow band of

spectral wave lengths and all of the artistry in music is conveyed through another small group of frequencies.

The tennis player is confined to standards such as the size, weight and resilience of ball, dimensions of court, racquet and net, rules of the game, etc. The same is true of any organized sport or athletic event.

The architect may be limited to two sizes of face brick but he has a choice of color, texture and arrangement sufficient to produce an unlimited variety of structures and effects, while the accomplished limitation of dimensions gives him a basis upon which to start, and relieves his mind altogether of the problem of the size of brick to be employed.

In every direction we find standardization, whether we look to the orbits of the electrons about the atom, the constellations of the stars, the microcosm or the macrocosm, commerce or the arts, industry or sport. The air we breathe is standardized for our health and our conversation is governed by standardized pronunciations and accent. Even this poor effort is broadcast to you on a band of twenty-six letters, supplemented by standardized dictionaries.

Let us have no fear of standardization but rather let us cultivate and irrigate it that we may advance in civilization, knowledge and culture. For standardization is at once the only solid ground on which we stand, the ratchet

which holds each advance step in the march of progress, and the tool which releases time and sets us free.

II. PROBLEMS AND SUGGESTED REMEDIES.

1. Grading and Nomenclature.

The vitreous-china plumbing-fixture industry, along with other industries supplying plumbing goods have their distribution system confined to very definite channels. In general these goods pass through the hands of jobbers or wholesalers, who distribute to the plumber and he, in turn, to the builder or owner.

The plumber, through the various plumbing codes which prohibit installations by non-plumbers, and through the labor unions, exerts considerable control over the kind of goods in general use and the prices charged to the ultimate consumer. The plumber is the neck of the distribution bottle and any problems of the industry must be considered in their relation to the plumber and his probable reaction toward a given change.

The mail-order house and the direct-to-consumer jobber are factors on the market just beginning to make themselves felt, but handle no great volume of business compared to the total.

Vitreous china plumbing fixtures were formerly marketed in two grades, grade A being first quality ware and grade B serviceable seconds usually commanding a price about 1/3

less than grade A. In some cities, including New York, many grade B items, particularly water-closet bowls and lavatories, were resold without representation as to grade, or under definite misrepresentation, with the result that many otherwise fine buildings are equipped with grade B ware.

This led to unfavorable comparisons with enameled iron and porcelain ware and resulted in a general storm of protest from the makers of vitreous china plumbing fixtures. The situation seemed to be beyond the control of the makers against unscrupulous jobbers or plumbers, and in July, 1925, they appealed to the Department of Commerce for assistance.

The method of grading the ware then employed was found to be partly responsible for the above situation and was the cause of another evil, namely, excessive claims for a downward change in grading to reduce the price to the jobber. Verbal instructions on grading were given by the manager to the sorters in each plant and no two sorters seemed to have the same ideas about grading, so that even in one factory a given piece of ware might fall in either class according to the sorter who happened to inspect it. In fact, it was not uncommon for the executive officers of a given plant to disagree on grading some one piece. It was quite natural, therefore, that a common practice should develop, whereby claims from important jobbers for a down-

ward change in grading were allowed without protest, since the maker seemed to have neither weapon nor ammunition with which to combat the evil.

It can be readily understood that without a definite set of rules a constantly growing proportion of the ware was being marketed as grade B. The sale of run-of-kiln ware was on the increase and there seemed to be little incentive for the makers to improve the product, from the want of sure reward.

At the time assistance was requested, the manufacturers suggested that samples of the ware from all plants be assembled in Trenton for inspection by a committee of manufacturers looking toward a unification of grading methods. This was arranged as suggested, with some misgivings, and the ware was inspected and graded as planned. There were several conflicts of grading but the chief difficulty was to establish rules which could be understood and followed by anyone so as to make unified grading methods available for practical application.

The manufacturers were thoroughly skeptical concerning the practicability of reducing the grading rules to writing and several went so far as to state that it could not be done. Nevertheless, it was suggested that all the samples be forwarded to the Bureau of Standards for a detailed inspection and the compilation of records of the character and dimensions of defects discovered, to serve as the

groundwork for written grading rules.

Accordingly, samples of vitreous sanitary ware were shipped to the Bureau of Standards where they were inspected and a careful record made of the character, size and number of the blemishes found. With this information as a basis a tentative nomenclature with limiting definitions and dimensions was drawn up and tentative grading rules were prepared covering vitreous china water-closet bowls and tanks.

Copies of the nomenclature and grading rules were mailed to each interested manufacturer with an invitation to attend a meeting for the purpose of rounding the recommendations into satisfactory form. At the first meeting of this character an advisory committee was formed to be known as the Manufacturers Advisory Committee on Vitreous China Plumbing Fixtures, with a membership which automatically included every manufacturer in this field whether present or not. Several producers complimented the Bureau of Standards on this first attempt to reduce the grading rules to writing but considerable revision was required before they could be said to fairly represent the group opinion. This was in full accord with the general plan which contemplated the use of the tentative grading rules merely as a target to draw the fire of the manufacturers.

A single full-day conference was sufficient to make the necessary changes and secure approval of the industry. No attempt was made to cover all the defects which may be found on this ware but it seemed best to keep the rules as simple

and practical as possible and to enumerate only the more common defects giving dimensional limits and maximum number permitted, as a guide in grading the ware. Thirty-four terms were defined to provide a standard nomenclature for the defects encountered, and to render the rules intelligible.

The grading rules employed the term"regular selection" in place of "grade A" to designate first class ware, and the term "cull" in place of "grade B" to designate seconds. This was done to accentuate the difference between the grades, to lower the rating of seconds and thus give the manufacturer an incentive for improving processes so as to produce a greater proportion of first quality ware.

2. Marking and Labeling.

As insurance against changes in grading subsequent to shipment from factory, it was proposed that two parallel lines be ground through the glaze of culls into the body of the ware at a definite location for each type, and that these cuts be filled with a bright red varnish or enamel which is resistant to the action of hot water. The location of these cuts for each type is such as to be out of sight of the casual observer, after installation, but readily available to an inspector without disconnecting the fixture. In this way culls are given a permanent marking which permits identification at any time and successfully prevents misrepresentation as to grade.

Crates containing culls are marked with two splashes of

red on one end of crate so as to be visible without tearing down stacks.

Regular selection ware is marked by sticker labels bearing a standardized wording referring to grading rules. These labels are applied only to such ware as conforms to the requirements for regular selection as set forth in the grading rules.

3. Dimensional Standards.

It was found that the industry suffered much confusion and misunderstanding from the wide dimensional diversity. The roughing-in dimensions, those required by the plumber for location of supply and waste lines at the fixture, were most troublesome, frequently requiring the procurement of a special blue print from the maker before installation of roughing-in work.

Dimensional diversity was also a decided obstacle to replacement, often necessitating the purchase of identical fixtures from the producer of the original equipment, whether current or not in order to provide similarity of appearance and to suit the alloted space.

In this industry there is also a need for intermembering of products of two or more industries, for example, faucet shanks, waste and overflow plugs, floor flanges and closet "spuds" produced in the brass foundry must suit dimensions of the vitreous china ware, and the hinge posts of water closet seats must have the proper diameter, length and spacing to fit

the seat post holes cast in water closet bowls.

A survey of the more important dimensions of water closet bowls, tanks and lavatories was made and definite dimensions were suggested as standard wherever it seemed to be helpful. Non-essential dimensions affecting neither interchangeability nor intermembering of parts were not considered.

For water closet bowls it seemed necessary to compromise on two roughing-in dimensions, namely, 12 and 14 inches, to take care of present designs, but it is hoped that the 14 inch roughing-in may be eliminated eventually as designs of bowls are brought out to suit the predominating 12 inch roughing-in dimension.

Other dimensions, such as height of bowl, width, length, location of inlet, seat post holes, diameters of horn and recesses in foot, etc. were included in the proposed standards, as well as the size of ball which should pass through the trapway.

Standardized dimensions of vitreous china plumbing fixtures seemed at first to be an unattainable goal owing to the diverse designs. However, by concentrating attention on the small differences in dimension, the lack of definite reasons for these differences and the advantages available to the industry through dimensional standards, all resistance to the plan was removed. Such standards permit the design of bathrooms and lavatories without first deciding whose product shall be used; they permit wider competition and ready re-

placement, and give the buyer the benefit of accumulated experience as to the most desirable dimensions.

All dimensions involving other industries were referred to the proper association or group for comment and approval. It was discovered that flush valve outlets, which must suit the size of closet "spuds," were furnished in both 1 1/4 and 1 1/2 inch sizes which required each flush valve manufacturer to produce two styles of flush valves for water closet bowls. Both industries were thoroughly canvassed for opinion and suggestions with the result that the 1 1/2 inch size spud was recommended for all flush-valve and high tank installations.

In considering dimensions for adoption as standard there is also an unconscious or at least an unstudied tendency among a group of manufacturers to select the best available dimension whether it represents majority practice or not, and thus an improvement of product invariably occurs. There seems to be no logical reason for such improvement other than the natural human tendency to select what appears to be the best whenever a choice is granted.

4. Reduction of Variety.

A survey of variety indicated that 441 separate items of closets, tanks and lavatories were regularly manufactured, that the maximum variety indicated by catalogues was 2560 items, and that only 58 items were required to answer every need. As usual this was an astounding revelation to those

most closely connected with the industry and when once discovered could be tolerated no longer by progressive executives. Accordingly, it was suggested that types and sizes should be confined to 58 items or a reduction of 87 per cent from those regularly produced.

Up to this time the necessary conferences were confined to the manufacturing group, since this group usually has available at its finger tips data on all the elements of the problem together with a national and frequently an international point of view which is essential.

Following the formulation of recommendations generally satisfactory to the manufacturers, the Advisory Committee voted that they be compiled and submitted to the regular procedure of the Division of Simplified Practice with a request for a general conference of producers, distributors, and consumers.

III. GENERAL CONFERENCE AND PUBLICATION

1. General Conference.

The Division of Simplified Practice quietly obtained, from various sources, a comprehensive list of all organizations of producers, distributors and consumers of this commodity as well as a number of outstanding individual distributors and users, in order that a completely representative cross-section of all interested groups might be invited to attend the conference. The preparation of this list is of vital importance, as experience indicates that much poten-

tial criticism vanishes with an invitation to present it, and since it is imperative that the final recommendations shall faithfully represent the national consensus of opinion affecting the industry.

Upon completion of the list, which included all known manufacturers and such organizations representing the consumer as the American Institute of Architects and the American Railway Association, individual invitations to a general conference were issued inclosing a copy of the recommendations.

At the general conference a Commerce Department representative presided and full discussion was encouraged. As usual, the conference served to harmonize conflicting tendencies; to promote a better understanding of all angles of the problem; to arouse a genuine enthusiasm for the entire project; and to record officially the general approval of the recommendations as amended.

A standing committee representing all interested groups was appointed to consider future revisions which are to be submitted annually, and the date was set upon which the recommendations were to be made effective.

2. Broadcasting for Acceptance.

Following the general conference the revised recommendations were disseminated to all interested companies and organizations with a request that the acceptance sheet, enclosed for that purpose, should be signed by the proper official and returned to the Department of Commerce. The

form used for acceptance follows: -

"Note. - You are urged to detach this sheet and mail it to the Secretary of Commerce as an evidence of your intention to cooperate in the national effort to eliminate waste through simplified practice.

ACCEPTANCE OF SIMPLIFIED PRACTICE
RECOMMENDATION

Date_ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

The Secretary of Commerce,

Washington, D. C.

Sir: We, the undersigned, hereby accept the simplified practice recommendation on Vitreous China Plumbing Fixtures as our standard of practice beginning _____ (Date) _____ in the production,[1] distribution,[1] and consumption of the simplified line.

We will use our best effort to secure the general adoption of the simplified types, sizes, and styles.

Signed _

Title _

Company[2] _

Street address[2] _

City and State[2] _

---

[1]Please designate by drawing lines through those which do not apply.

[2]Please print or type."

Signed acceptances covering 80 per cent of production are considered as a prerequisite to publication. This requirement is considered essential to the success of the project and may not be waived, since it is well understood that in the excitement and enthusiasm of a general conference an

individual may voice approval for his company or organization which may not be supported upon further reflection in the home office under the light of cold judgment. The signed acceptances also serve to prevent controversy as to who may be listed as officially accepting the recommendations. No definite percentage of distribution or consumption is required as it is practically impossible of determination. However, all projects finally promulgated must have the general approval of organized distributors and consumers.

3. Selling the Proposals.

At the stage where acceptances are pending, it frequently becomes necessary to explain essential parts of the recommendations, method of handling "specials," legality, probable general adoption, and answer many diverse questions in order to allay all manner of fears which arise in the minds of the skeptical to sell the proposal.

A usual question is "What police power has the division of simplified practice to enforce the recommendations?" The division, of course, has no such power and desires none. The simplified practice recommendations are developed by the industry, not by the Government; hence adherence to the program is a problem for industry to solve. The acceptance indicating the good faith of the signer is the moral force which makes the recommendations effective and which stimulates a moral and economic pressure for adherence. Some groups assume the task

of policing for adherence, using, such moral suasion as may be indicated, with the result that little difficulty is experienced from willful violation of the recommendations.

4. Publication.

Following the receipt of signed acceptances covering at least 80 per cent of total production in the industry the recommendations are printed by the Government Printing Office and a small number (usually about 2500) of copies are distributed free of charge to those cooperating in the work, to public libraries, and to industrial or trade papers. The industry may, if it wishes, purchase additional copies at cost (usually 3 or 4 cents per copy) for further distribution. In this instance over 50,000 copies of Simplified Practice Recommendation No. 52 were purchased by the manufacturers and distributed to every plumber, plumbing jobber and architect in the United States. Such a wide distribution with the attendant publicity is an excellent guarantee of adherence.

Annually the division canvasses the industry for estimated adherence to the recommendations at definite intervals to determine the effectiveness of the work.

5. Revision

At predetermined intervals, frequently one year, the recommendations are considered for revision or extension, to keep abreast of progress in the art and to follow changes in

the trend of sales. Revisions may be suggested by anyone at any time or may be proposed by the Standing Committee itself. Minor revisions may be accepted from the standing committee representing producers, distributors and consumers, or in the event any controversy is anticipated, another general conference is called. However, prior to incorporating changes in the printed copies, an additional set of written acceptances covering a cross section of the industry (production, distribution, consumption) is required. This prevents the adoption of unwise or premature suggestions, sustains the interest and keeps the recommendations current.

The Advisory Committee on Vitreous China Plumbing Fixtures holds at least two meetings yearly to extend the standardization work to other items made for stock, and to keep in step with progress in the art.

IV. RECAPITULATION OF METHOD.

1. Request from Industry.

A definite suggestion or request in writing from some part of industry, such as a trade association, organized distributors or consumers or outstanding individual producers, is received. No standardization or simplification work is undertaken by the Department of Commerce without such request.

2. Fixing the Facts.

A preliminary conference or a series of conferences is called to provide for cooperation of all manufacturers; to

arrange for an organization to carry out the work, if none exists; to survey the field for the facts; and to formulate the recommendations.

3. General Conference.

A general conference of producers, distributors, organized users, and general interests is called to revise and endorse the recommendations; to determine effective date and revision period; and to appoint the standing committee.

4. Written Acceptance.

In the event the general conference develops no pronounced opposition to the recommendations among the distributors and organized consumers, the amended recommendations are disseminated to all interests for written acceptance.

5. Selling the Proposals.

During the acceptance period every effort is made to explain and clarify all phases of the work since written acceptances covering 80 per cent of production by volume are required prior to final approval.

6. Publication.

Following procurement of prescribed percentage of acceptances, publication by the Public Printer is authorized. This step includes distribution to as great a number of interested producers, distributors and users as possible. It also includes a periodical survey to determine actual extent of adherence to the recommendations.

7. Revision.

Revision or extension of the work to keep abreast of progress in the art is not left to chance but is considered by the standing committee at prescribed periods.

V. ADVANTAGES ASSURED BY METHOD.

1. Legality of Action.

Since all interests affected by the action, that is, a vertical cross section of the industry, approve the recommendation and are a party to it, no question of legality can arise.

2. Intelligent Cooperation of All Interests.

This is obvious as the entire plan in full detail is presented at least twice to all interests, once for comment and once for written acceptance.

3. Coordination of Allied Projects.

Allied projects are naturally brought to light and carefully considered due to the wide distribution and publicity given the proposals.

4. Systematic Follow Through.

A step not previously emphasized is the periodical survey to determine actual adherence in practice. Reports of these surveys are published and serve as a check on the value of the work as well as to stimulate further interest.

5. Regular Revision.

Frequent revision is not always required, however the possible need for revision is considered at frequent intervals to prevent any trend away from the recommendations.

6. National Prestige.

The wide dissemination of the recommendations with full opportunity for comment and criticism from all quarters; with the prerequisite of signed acceptances covering 80 per cent of production by volume; and with uniform publication in a governmental series command a national respect which is not duplicated elsewhere.

7. Improvement of Product.

While there is seldom any studied attempt to improve product, the usual result from concentrated attention on a given commodity by both producers and consumers is a marked improvement in quality.

8. Preservation of Self Government in Industry.

The entire plan provides a service to encourage industry to work out its own problems with the buyer and seller cooperating to prevent misunderstandings and to keep commerce flowing in a smooth, steady stream for the good of the entire community. Such self governed industries never provoke governmental investigations or interference and help to preserve the ideal of industrial autonomy.

VI. ECONOMIC AND INDUSTRIAL SIGNIFICANCE.

The important role which standardization plays in industrial evolution is not generally appreciated. Following are significant aspects of standardization, when carried out on a sound engineering basis:

1. It enables buyer and seller to speak the same language, and makes it possible to compel competitive sellers to do likewise.

2. Better quality of product through ability of manufacturer to concentrate on better design and through the reduction of manufacturing expense.

3. It lowers unit cost to the public by making mass production possible, as has been so strikingly shown in the unification of incandescent lamps.

4. By simplifying the carrying of stocks, it makes deliveries quicker and prices lower.

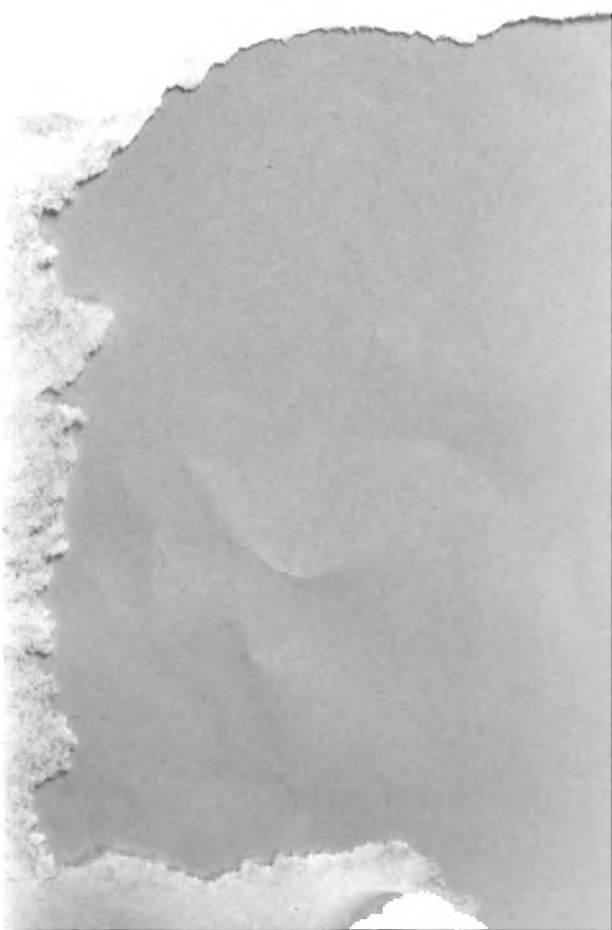
5. It decreases litigation and other factors tending to disorganize industry, the burden of which ultimately falls upon the public.

6. It eliminates indecision both in production and utilization, a prolific cause of inefficiency and waste.

7. It stabilizes production and employment, by broadening the possible market, and by making it safe for the manufacturer to accumulate stock during periods of slack orders to an extent which would not be safe with an unstandardized product.

8. By focusing on essentials, it decreases selling expense, one of the serious problems of our economic system.

Attached:
Copy of Simplified Practice Recommendation No. 52 - Vitreous China Plumbing Fixtures.



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