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*Twelfth of the Series.*



A "CONSUMER'S RESEARCH"  
IN SCHOOL SUPPLIES

By

EDWIN J. BROWN

and

RUSSELL D. BYALL



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*Studies in Education has been discontinued as a separate publication, for economy reasons. Hereafter Studies in Education will appear as numbers of Kansas State Teachers College of Emporia Bulletin of Information.*

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# A "Consumer's Research" In School Supplies

By EDWIN J. BROWN and RUSSELL D. BYALL

## CHAPTER I INTRODUCTION THE PROBLEM

In recent years a large number of articles have been written on the subject of the purchase of school supplies. There is almost perfect agreement that every school should have a standard list of the supplies which are to be furnished to the teachers and pupils. It is agreed that the items on this list should be chosen according to the extent to which they satisfy educational needs. It is further agreed that if the schools are to purchase these items economically, they must be able to specify exactly the quality of the material they desire to purchase. But in very few cases do the writers give specifications which would compel the vendor to furnish the quality desired. Usually the specifications are so incomplete that goods inferior in quality to those desired can readily be substituted without actual violation of the specifications.

The problem then is to set up specifications for school supplies which are so rigid and so complete that substitution of inferior supplies will be impossible.

It is thought that such information will prove helpful to purchasing agents irrespective of their use of specifications. The purchasing agent who uses specifications will find such additional information as may be contained in this study useful for comparison in revising and strengthening the standards he now uses. The purchasing agent who buys in a less formal manner will find that the specifications in this study suggest points which must be watched when he makes purchases and when he evaluates the goods offered him by salesmen.

### PREVIOUS STUDIES

There are a large number of studies concerning the management of school supplies; accurate specifications are repeatedly mentioned as desirable;<sup>1</sup> but only in a few cases are accurate specifications given, and then they are only given as examples of what is needed for each item on the supply list. After a study on the subject of purchase of school supplies the National Association of Public School Business Officials reported,<sup>2</sup> "A study should be made to the

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1. The following list of references is only an example of the number of places where the need is mentioned:

J. G. Fowlkes, "School supplies." *Review of Educational Research*, 2:399, December, 1932.

C. V. Kelty, "Buying school supplies." *American School Board Journal*, 81:43, July, 1930.

H. W. Schmidt, "School supplies and equipment—sale and purchase." *American School Board Journal*, 83:76.

Harry P. Smith, *Business Administration of Public Schools* (Yonkers-on-Hudson, New York: World Book Company, 1929), p. 278.

Robert B. Taylor, *Principles of School Supply Management* (Teachers College Contribution to Education, No. 228, New York: Teachers College, Columbia University, 1926), p. 13.

"The weak link in school purchasing," *American School Board Journal*, 77:40, December, 1928.

2. *Selection, Purchase, Storage, and Distribution of Supplies* (Committee on Supply Research, National Association of Public School Business Officials, John S. Mount, secretary, Trenton, N. J., 1932), p. 13.

end that definite standards of quality, utility, and service of educational supplies and all other supplies and equipment will be set up." Better supplies and economy are the chief advantages mentioned by these writers. Possible economies are certainly worth consideration when the annual expense of the schools for supplies amounts to seventy-five million dollars.<sup>3</sup>

### SCOPE OF THIS STUDY

This study includes those supplies which are most important—importance being measured in terms of the yearly cost. There being no studies on the relative cost of the various school-supply items, a list sufficiently accurate for the purpose of this study was made up from the standard supply lists from several schools;\* one jobber was consulted;† and the subject was discussed with men having experience in school administration. The final list was as follows:

Blackboard crayon.	Paper; art, mimeograph, newsprint,
Blackboard erasers.	typewriter, and writing (ink and
Brooms and brushes.	pencil).
Floor oil, furniture polish, and	Paper towels.
similar finishes.	Soap; scrubbing and toilet, in liquid
Incandescent lamps.	and cake form.
Ink, hectograph, mimeograph, and	Sweeping compound.
writing.	Toilet paper.
Mimeograph stencils.	Typewriter ribbons, record and hecto-
Mucilage and paste.	graph.

Specifications were not found for all of these items, however; and in some cases complete specifications were found for other school supplies. These additional specifications were included with the rest. A complete list of the specifications obtained and an evaluation of each of them will be found in Chapter II.

### METHOD OF PROCEDURE

In this study information was drawn from a number of sources, each of which is described below. Material published by school men and vendors of school supplies was freely consulted. Several publications by the United States government, particularly the *Federal Standard Stock Catalogue*, were carefully studied. Letters were sent to a group of responsible vendors‡ giving them an opportunity to add any information they desired, and asking their reaction to the use of the *Federal Standard Stock Catalogue* by the schools. The information so obtained has been compiled in such a manner as to be readily accessible to the reader.

### SOURCES OF DATA

In order that the material obtained from the various sources may be correctly evaluated it is necessary to describe each source and the type of information obtained from it. These various sources may be divided into four groups:

1. School men and articles written by school men.
2. Commercial standardizing agencies.

3. *American School Board Journal*, 83:76, July, 1931.

\* The schools were Rochester, St. Louis, Berkeley, and Sand Springs (Oklahoma).

† Kansas School Purchasing Association, H. H. Hanlon, purchasing agent, Sterling, Kan.

‡ Their names were drawn from the appropriate sections of the "Directory" published in the *American School Board Journal*, 90:77, February, 1935.

### 3. Federal publications.

### 4. Manufacturers and jobbers of school supplies.

Current literature reveals that the schools are using four general methods of purchasing supplies; and from a review of these methods both the need for accurate specifications and the value of those specifications now available may readily be observed.

One method, used especially by the smaller schools, where the orders are small, is to buy on informal bids from such salesmen as may call and from local dealers. Under such circumstances the purchasing agent depends only on his general knowledge of the proper price, his ability to detect poor quality by observation, and the reputation of the vendor. He is easily tempted to buy the cheapest article if it appears to be good quality. In many cases the traveling salesman has no reputation to maintain. Charges of graft and corruption are easily made and are difficult to refute.

A second method is to invite bids, with the vendor furnishing a sample of the quality he offers with the bid. When it comes to making a choice the purchasing agent, or agents, have a number of prices and an equal number of samples of varying quality. The decision as to which combination of quality and price is the most economical is still difficult. At best the contract is awarded to the bidder who was most able to guess the combination which would suit the purchaser. Other bidders may have been able to furnish the identical quality at a lower cost, but had submitted some other combination of quality and price.

A third method is for the school to submit a sample of the supplies desired and ask for bids on goods of equal or better quality. If no specifications are available, this is probably the best method of securing bids. But the very fact that there are no specifications must indicate that there are no objective tests available to determine compliance. The goods delivered may only appear to match the school's sample; in actual use they may be much inferior. If objective tests are available, or the item purchased is of such nature as to be readily, accurately, and objectively tested by a short period of use, there seems to be no reason why these tests could not be written into a satisfactory specification. Under these conditions there would be no question on the part of purchaser or vendor concerning the quality of the goods desired.

The fourth method is to ask for bids on supplies meeting certain specifications as to quality and form. Many school systems are said to use this method. Great difficulty was met in obtaining any of the specifications which these systems used. Those which were obtained are included in this study along with the other specifications. From the emphasis placed in current articles on the need for accurate specifications one can readily conclude that most of the specifications now in use are not complete enough to be entirely satisfactory.

In this connection it is to be noted that purchase on competitive bids is the common practice among large business concerns. Taylor made a survey of the supply departments of fourteen business organizations.<sup>4</sup> He reports that each one of them used the competitive bid system in some form. Six of the fourteen used specifications, and all but one demanded that the vendor submit samples. The federal government makes all, or nearly all, of its pur-

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4. Robert B. Taylor, *op. cit.*, p. 138.

chases on competitive bids. In some cases it requires samples with the bid and in other cases it does not, depending, apparently, on the adequacy of the specification on the item in question.

In brief, the schools are purchasing on the basis of (1) informal bids, (2) formal bids on vendor's sample, (3) formal bids on school's sample, and (4) formal bids on specification with or without sample from the vendor.

It will be seen that the information from this source will be slight. Most specifications will not be complete. But those which are complete will be already adapted to the peculiar needs of the schools, as opposed to specifications drawn from business or government sources.

The question naturally arises, are there any commercial agencies in this field whose stamp of approval would at least make it probable that the goods are of good quality?

The National School Supply Association\* is one example of a commercial standardizing agency. Their standards cover disinfectants, deodorants, scrubbing soaps, and toilet soaps. Manufacturers whose products meet the standards set up are issued stickers to place on the containers. Apparently no serious attempt is made to see that the manufacturer continues to maintain these standards. At least, no method of checking is mentioned.<sup>5</sup> A similar service is rendered in connection with colors of school furniture.<sup>6</sup> The association also has a study on present practices in handling school supplies.<sup>7</sup>

Information was freely drawn from the publications of this association. But it must always be remembered that these specifications were produced by men interested in selling as large a quantity of supplies as possible.

Another commercial agency is Consumer's Research.† Inasmuch as their important bulletins are confidential, no use could be made of them in this study. An examination of one of the *Handbooks of Buying* reveals that whenever school supplies are also common household supplies, valuable information would be available in the publications of Consumer's Research. The only solution seems to be subscription to the service by the individual schools. It is not definitely certain that subscriptions would be issued to anyone but individuals. The subscription price is three dollars per year.

A third type of commercial standardizing agency is represented by Co-operative Distributors.‡ It is a mail-order concern which has appeared in the last two or three years as a result of the coöperative movement in the United States. It has prepared specifications for use in the purchase of household and office supplies. In most cases the important points in the specifications are mentioned in the catalogue. Frequently federal specifications are used. On the basis of these specifications high quality merchandise, which has been produced under fair labor conditions, is purchased and sold for cash. Members of the organization may purchase at a slightly lower cost than nonmembers. (The membership fee for nonprofit organizations is ten dollars.) The

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\* Address is: 176 W. Adams St., Chicago, Ill.

5. *Certified Janitor Supply Products*, issued free by the National School Supply Association, 176 W. Adams St., Chicago, Ill.

6. *Harmony in Color Finish of School Equipment*, free.

7. *A Study of Present Practices in the Selection, Purchase, and Distribution of School Supplies*, also free.

† Address is: Consumer's Research, Inc., Washington, N. J.

‡ Address is: Coöperative Distributors, Inc., 30 Irving Place, New York.

profits of the organization are paid to the members in proportion to the amount purchased by each.

No firsthand information was available concerning this organization. The possibilities of an organization of this type are obvious. But the reliability and stability of Coöperative Distributors has not been proven. It seems to be worth investigation on the part of anyone buying supplies which might be classed as office or household items.

The most useful source of information was the *Federal Standard Stock Catalogue*. This source is mentioned with approval by the *American School Board Journal*.<sup>8</sup> The origin, authority, and purpose of this catalogue is best shown by statements from the foreword of the November, 1932, issue:<sup>9</sup>

"For the purpose of coördination and economy in the procurement of material and services used by the government under specifications prepared in the various branches thereof, to avoid duplication of effort, and for the better utilization of resources and industries, there has been established a federal specifications board.

It is the duty of this board to compile and adopt standard specifications for materials and services and to bring specifications into harmony with the best commercial practice wherever conditions permit, bearing in mind the desirability of broadening the field of supply.

The specifications that are prepared, adopted by the board, and approved by the Director of the Bureau of Standards, shall, as far as applicable, be binding upon and govern all departments, bureaus, agencies, and offices of the government.

The specification is the common meeting ground for the producer, distributor, and consumer, and it is at once a statement of the consumer's needs and what the producer is required to supply. Purchase by competitive bids on specifications is preferable to purchase on sample. The latter method implies that each bidder's product must be considered independently, and it is often a very difficult matter to decide between different combinations of quality and price.

A proper specification is one which enables bidders to know exactly what is desired or required and what procedure the purchaser will follow to satisfy himself that the specification has been complied with.

A given purchaser, as the government, should so adjust requirements, when possible, as to meet current industrial practices, and the committees of the federal specifications board have been instructed to use existing commercial specifications in all cases in which the government's needs may be reasonably satisfied by this procedure.

In the selection of federal specifications, the federal specifications board is collaborating with industry and is coördinating these two interests in a manner which is considered best to meet the requirements of the government as a consumer."

In a portion of the *Catalogue*<sup>10</sup> called "Simplified Practice Recommendations" the following statement occurs:

"The government has also done much simplification on its own account. As a result, many of the lists of particular items in the Federal Standard Stock Catalogue will appear on first inspection to be incomplete, as they cover in some cases less than half of the usual stock range. Experience, however, has shown that these simplified lists will take care of every reasonable need and do it more economically by reducing stocks and facilitating replenishment."

8. "New standards for binder's board." *American School Board Journal*, 90:78, February, 1935.

9. *Federal Standard Stock Catalogue* (Superintendent of Documents, United States Government Printing Office, Washington, 1932), section IV, part 1, p. 1.

10. *Federal Standard Stock Catalogue*, *op. cit.*, (1931), section III, part 3, p. 1.

The advantages in the use of these specifications are evident. They have been compiled after examination of existing commercial specifications. They are adapted to common commercial practice so that their use will not result in the purchaser paying for unnecessary special work to fit peculiar requirements (*i. e.*, to specify one particular kind of wood in a broom handle might make it necessary for some bidders to purchase these separately and so charge more for their product, yet the handle obtained might be no better than the one they would have furnished). The specifications have been compiled in connection with the work of the Bureau of Standards, one of the most adequately equipped laboratories in the country. § A disadvantage is also evident. The specifications have been compiled to meet the requirements of the government. It is possible that in some cases the requirements of the schools may be slightly different, and adjustments will need to be made.

It is to be noted that an attempt has been made to set the standards low enough to admit a large number of bidders, but also to set them high enough "best to meet the requirements of the government as a consumer." These specifications will not insure the best quality of goods, but they should secure good quality.

The *Federal Standard Stock Catalogue* is issued in loose-leaf form and only parts of it apply to school purchases. Section IV, part 1, contains a description of the specifications and an index to them. Section IV, part 5, contains the individual specifications, which are issued separately and are arranged and sold according to their "symbol number." Section IV, part 6, contains changes—*errata*, minor revisions, and the like—in parts 1 and 5. Nearly all of the individual specifications sell for five cents each. ¶

Another service closely connected with the federal specifications is the "willing to certify" lists issued by the Bureau of Standards. A quotation from the *Federal Standard Stock Catalogue* furnishes a description of this service:<sup>11</sup>

"As a solution to some of the problems arising in connection with the use of specifications, there have been compiled by the National Bureau of Standards for distribution to all federal purchasing agencies lists of sources of supply of commodities covered by certain federal specifications. . . . These lists contain the names of firms who have indicated their willingness to certify to purchasers, upon request, that material supplied by them on contracts based upon the designated specifications and standards, *does actually comply with the requirements and tests thereof, and is so guaranteed by them.*

Up to the present there have been prepared such lists of sources of supply for nearly 450 federal specifications. . . . The compilation of additional lists is constantly going forward.

Copies of "willing to certify" lists have been distributed by the National Bureau of Standards to all governmental purchasing agencies, and are available to other organizations upon request."

And in the preface to the lists themselves the following description is found:<sup>12</sup>

". . . . The term, "willing to certify," as applied herein to a manufacturer of a given commodity, indicates that the manufacturer has expressed to the National Bureau of Standards his desire to be placed on our list of firms willing to certify to the purchaser, upon request, that material supplied

§ In many cases the specifications are adaptations of circulars previously issued by the Bureau of Standards.

¶ All used in this study sell for five cents.

11. *Federal Standard Stock Catalogue, op. cit.*, (1934), Section IV, part 1, p. 2.

12. *Sources of Supply of Commodities Covered by Federal Specifications* (Washington: National Bureau of Standards, 1934), Supplement No. 2 to Letter Circular 256a, p. i.

by him on contracts based on the federal specification for the commodity involved, does actually comply with the requirements and tests of this specification, and is so guaranteed by him.

Purchasers who might be inclined to do business with unknown or untried firms whose names appear on the "willing to certify" lists should not fail to insist upon receiving from such firms properly signed certificates guaranteeing compliance with the specification requirements.

It is to be definitely understood that the certificates are to be issued by the supplier to the purchasers, and not to the Bureau of Standards, which assumes no responsibility of any kind in connection with the transaction. The purchasers must take such steps as he considers desirable to determine whether or not the commodities delivered do actually comply with the specifications.

While safeguarding the interest of the federal government as a purchaser, the certification plan also conserves the interest of the producers. It is being so applied as (1) to bring the United States government master specifications to the attention of all interested responsible manufacturers throughout the United States and not merely to the attention of a favored few; (2) to list as sources of supply of commodities covered by these specifications all responsible manufacturers who have expressed their desire to be listed, even though some other manufacturers may not care to be listed, and notwithstanding the opposition of certain manufacturers who can obtain business satisfactory to them without being listed; (3) to distribute copies of the lists of "sources of supply" to all governmental and institutional buyers making purchases out of tax money; (4) to supply copies to nongovernmental purchasers when specifically requested to do so."

At the time of this writing it was not found possible to obtain copies of these "willing to certify" lists, because most of them were undergoing revision. Inasmuch as these lists are issued free to public institutions, any school desiring to examine them may obtain them from the Superintendent of Documents. The particular specifications in which the school is interested should, of course, be indicated. An example of the sort of information furnished in these lists is given in Appendix I.

Since these "willing to certify" lists were undergoing revision and thus were unavailable, it was thought desirable to consult various firms selling school supplies. They were asked if they were willing to certify on a purchaser's request that their products met the requirements of the *Federal Standard Stock Catalogue*. A list of the firms and a copy of the letter sent them appears in Appendix II.

The replies may be placed in three groups. The largest group consisted of those firms which were not acquainted with the publication mentioned—though some of them had sold to the government and therefore must have complied with the specifications. Most of these firms asked for more information or reported that they were writing for the specifications and would report as soon as possible. A typical letter is included in Appendix II. A second group thoroughly approved of the plan. One firm, Colgate-Palmolive-Peet, already has a booklet listing the federal specifications applying to their products, and indicating which ones of their brands meet the requirements, and, what is more surprising, also the ones which do not meet the requirements.<sup>13</sup> The letter from this company is also quoted in Appendix II. The third group, composed of only one firm, did not approve the federal specifications because they thought them inadequate for any purpose. This letter is also reproduced in Appendix II.

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13. *Soaps and Soap Products*, issued free by the industrial sales department, Colgate-Palmolive-Peet Company, Palmolive Building, Chicago, Ill.

Slight use was made of two other federal publications, *Circulars* from the Bureau of Standards, and *Farmer's Bulletins* from the Department of Agriculture. These two organizations are well enough known to need no comment on the reliability of their publications. Care should always be used, however, to see that the material drawn from these sources is actually applicable to school conditions.

#### TYPES OF DATA

From the above-mentioned sources the following types of information have been obtained:

1. Specific descriptions of good quality in the various school supply items.
2. Tests to be used to determine if the vendor has delivered the quality required by the specification.
3. General descriptions of the composition and method of manufacture of the various items.
4. Formulas for private production of suitable quality material.

However, all four types of data are not available for all of the items covered by this study; and in cases where the specifications and tests for compliance were available it was thought unnecessary to furnish general descriptions of the material and formulas for private production.

#### PRESENTATION OF DATA

This information is presented in two forms. In Chapter II there is an alphabetical index to the various school items which were treated, with cross references. Under each item the data concerning it are briefly summarized. In Chapter III the full text of the data on each item is presented.

## CHAPTER II

### SUMMARY OF SPECIFICATIONS

It is intended that this chapter serve as an index to the complete specifications which appear in the following chapter. The specifications are listed here in alphabetical order with cross references so that each one may easily be found. The page reference to the complete specification is given. Each specification is then briefly summarized, the summary evaluating it in terms of authority, completeness, and ease of use.

*Art paper.* See Paper.

#### BLACKBOARD CRAYON

The full text is found on page 17.

The information on this item is very incomplete. One study on chalk as used in the schools was found, but this study depended upon price standards, not quality standards, so little use could be made of it. A discussion on varying types of chalk is drawn from a letter by the Weber Costello Company. At best the information given is only sufficient to give the reader some idea what the differences are in the various grades of chalk offered on the market.

#### BLACKBOARD ERASERS

The full text is found on page 18.

The only information available is drawn from a letter by Weber Costello Company. Their statement is merely a classification of erasers according to types of construction and can serve only for general information, not for setting up specifications for purchase.

#### BROOMS AND BRUSHES

The full text for floor brushes of hair is found on pages 18 and 19.

This specification is from the *Federal Standard Stock Catalogue*. Comments are added from two school sources. The specification is not complete enough to entirely eliminate a sample, but most of the details are covered. The details mentioned are: dimensions of the brush; material from which brush is made; number, arrangement, and size of holes; weight of hair; and length of hair outside of block. No tests for compliance are given—most of them being obvious—though one for testing the quality of the hair used would be very desirable for the average person using the specification.

References for obtaining similar specifications for other brooms and brushes are given.

*Bulbs.* See Incandescent Lamps.

#### CARBON PAPER

The full text is found on pages 19 to 21.

This specification was drawn entirely from the *Federal Standard Stock Catalogue*. The requirements cover size of sheets, type of coating, weight and composition of the paper used, serviceability, and number of manifold copies.

Tests are given for most of the requirements and these tests can easily be carried out. By the use of some of these tests the writers and a number of students at the Kansas State Teachers College found that they could buy dime-store carbon paper which compared favorably with carbon paper selling at the book stores. The dime-store carbon paper cost only one sixth as much as the other.

*Chalk.* See Blackboard Crayon.

*Compound.* See Sweeping Compound.

*Crayon.* See Blackboard Crayon.

*Electric Lights.* See Incandescent Lamps.

*Erasers.* See Blackboard Erasers.

#### FLOOR OIL

The full text is found on page 21.

No specification of any sort is available in this field. The United States Department of Agriculture has two formulas which it recommends for home use. Both of them are given. One is for a high quality floor oil. The other produces an oil equal to ordinary commercial brands.

*Floor Sweep.* See Sweeping Compound.

*Furniture Polish.* See Floor Oil.

*Hectograph Ink.* Nothing found.

*Hectograph Paper.* See Paper.

*Hectograph Ribbons.* See Typewriter Ribbons.

#### INCANDESCENT LAMPS

The full text is found on page 21.

A summary of the highly technical specification from the *Federal Standard Stock Catalogue* is given. This specification is much too technical for common use.

#### INK

The full text is found on pages 22 to 24.

Specifications for writing and for record ink are given as found in the *Federal Standard Stock Catalogue*. The tests depend upon comparison with a standard ink which can be obtained from any prescription drugstore. The comparison involves absence of sediment; uniform color; amount of fading due to light, to water and alcohol, and to bleaching solution; amount of iron; freedom from mold; failure to corrode steel pens. A knowledge of qualitative analysis is needed to perform some of the tests.

*Letter Paper.* See Paper.

*Light Bulbs.* See Incandescent Lamps.

*Liquid Soap.* See Soap.

*Mimeograph Ink.* Nothing found.

*Mimeograph Paper.* See Paper.

*Mimeograph Stencils.* Nothing found.

#### MUCILAGE

The full text is found on pages 24 and 25.

This specification was found in the *Federal Standard Stock Catalogue*. The specification depends upon comparison with a standard sample which can be

made up at any prescription drugstore. The comparison involves adhesive strength at various intervals of time after use, and freedom from mold. The specification also covers the size and type of containers which are to be used. The tests can be performed by any person with a little laboratory experience in any science field, preferably biology.

*Notebook Paper.* See Paper.

*Oil.* See Floor Oil.

#### PAPER

The full text is found on pages 25 to 27. See, also, Carbon Paper and Toilet Paper.

The *Federal Standard Stock Catalogue* has a large number of specifications for various types of paper. But the requirements and tests for compliance are so technical that the average school is not equipped to make use of them. In addition most of the federal specifications for paper are so incomplete that a standard sample must be furnished by the purchasing agency. A summary of the points covered by the specifications is given.

In addition there is some information drawn from studies made by school men. These studies have to do with such points as economical sizes and qualities of paper, number of details which must be mentioned in a specification, and the need for additional specifications in this field.

#### PAPER TOWELS

The full text is found on pages 27 and 28.

The *Federal Standard Stock Catalogue* furnishes a specification for this item which is nearly complete enough to eliminate need for a sample with the bid. The requirements cover tensile strength, absorption, absence of odor, finish, and size. Ample tests are given which with one exception—that for strength—can be performed by anyone with laboratory experience. The results of two studies on economical sizes and types of towels for school use are also given.

#### PASTE AND PASTE BRUSHES

The full text is given on pages 28 to 30.

This specification is drawn almost entirely from the *Federal Standard Stock Catalogue*. The requirements cover freedom from mold, absence of discoloration of paper, consistency, adhesive power, noncorrodable containers, type of package, and form of guarantee. No sample is considered necessary with the bid. The tests are easily performed.

*Polish.* See Floor Oil.

*Record Ink.* See Ink.

*Ribbons.* See Typewriter Ribbons.

*Scratch Pads.* See Paper.

#### SOAP

The full text is found on pages 30 and 31.

The specification given is drawn from the *Federal Standard Stock Catalogue*, though a similar one is given by Engelhardt and Engelhardt. The specification given is for liquid toilet soap and covers the following requirements: clear solution, freedom from objectionable odor, percent of anhydrous soap, free alkali, matter insoluble in alcohol, and absence of certain specified im-

purities. The tests for compliance are given in detail in the original specification, but they are not quoted in this study because of length and technical language. The tester will need experience in quantitative analysis and considerable equipment to perform some of the tests. No sample with the bid is considered necessary.

The standards used by the National School Supply Association in issuing certificates are given also.

Following the specification there is a discussion of the value of disinfectants in connection with soap.

References are given to specifications for other kinds of soap.

*Stencils.* Nothing was found on mimeograph stencils.

#### SWEEPING COMPOUND

The full text is given on page 32.

The *Federal Standard Stock Catalogue* has a specification on this item, but it is not available from the Superintendent of Documents at this time.

For a number of years the federal government has mixed its own sweeping compound. This formula is given. There is also a general discussion of the usual ingredients in commercial brands of sweeping compound.

*Tablets.* See Paper.

#### TOILET PAPER

The full text is given on page 33.

The specification is drawn from the *Federal Standard Stock Catalogue*. The requirements cover size, strength, absorption, and general finish, the latter to be shown by a sample submitted with the bid. One of the tests is too technical for common use. The others can be easily performed.

*Toilet Soap.* See Soap.

*Towels.* See Paper Towels.

*Typewriter Paper.* See Paper.

#### TYPEWRITER RIBBONS

The full text is given on pages 33 to 35.

The *Federal Standard Stock Catalogue* gives specifications for both record and hectograph ribbons. The requirements cover length, uniformity of width, thread count, thickness, inking, character of the edges, character of the writing, freedom from tendency to fill type, permanence of writing, and, in the case of hectograph ribbons, production of satisfactory copies. The tests are such as to be readily performed. No samples are considered necessary with the bid.

*Writing Ink.* See Ink.

*Writing Paper.* See Paper.

## CHAPTER III

### SPECIFICATIONS IN DETAIL

In this chapter the information concerning each item investigated is presented under appropriate headings. The arrangement is alphabetical by the names of the items. But there are no cross references. The reader is referred to the previous chapter if he has difficulty in finding the discussion of the item in which he is interested.

#### BLACKBOARD CRAYON

No specifications were found for this item anywhere. A few of the schools called for bids on the basis of some brand which they had found satisfactory.

O'Dell made a comparison between the price of chalk and its service in the classroom.<sup>1</sup> Samples were obtained of the brands whose price fell in the third quartile of the distribution of prices. The price of the cheapest satisfactory one was chosen as a standard. The highest priced chalks did not seem to give better service than this standard one.

Obviously a price standard is not a satisfactory one, as prices change, and even the cheapest grades can be priced as high as the buyer will pay.

In reply to the letter sent to the various school supply concerns,\* Weber Costello Company sent a description of the various grades of crayon. Of course this letter must be classed as an advertisement, but it contains instructive and useful information:

"While there has been a great deal of effort spent in the standardization of some items such as floor oil and furniture finishes, we do not believe that this has applied to erasers and crayons, perhaps due to the fact that these items are already more or less standardized.

For example, in crayon there are three definite qualities which the majority of school men know, and specify the type they desire. There is a first-quality crayon, which includes Alpha (of our manufacture), Hygieia, Anti-Dust, etc., of competitive manufacture. First-quality crayon has more than ninety-five percent pure English whiting and only enough other ingredients to serve as a binder to hold it in stick form.

Second-quality crayon, such as our Webeo, and competitive brands of Anduseptic, Dovercliff, Omega, etc., have only fifty percent Whiting blended with a domestic clay. This is a very high grade clay, and the combination with English whiting makes a very desirable second-quality crayon that is preferred by some boards because of the differential in price, which amounts to around ten percent.

There is a third classification of crayon that goes out of the dustless field into what we term common chalk, that is, a molded product. We do not manufacture this grade of crayon as we have always concentrated our efforts on a strictly dustless crayon. Competitive types are Waltham, Sterling, and several other brands which we do not recall offhand."

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1. Clyde H. O'Dell, "Unit cost and standardization of elementary school supplies." *American School Board Journal*, 89:21, July, 1934.

\* A copy of the letter sent to the concerns appears in Appendix II.

## BLACKBOARD ERASERS

The only information in this field is drawn from the Weber Costello Company letter, which was quoted also in connection with blackboard crayon:

"In erasers the classification is not as marked [as in crayon], but there are certain types that more or less classify themselves and most manufacturers make comparable brands. The best eraser is our Costello Double-Sewed, which is made under a patent at the present time. This eraser has each strip of felt doubly sewed to a heavy, stiff back that is further reinforced by a three-sixteenth inch felt strip which prevents the eraser from curling and seals in the various stitches. This eraser is specified by a great many boards of education, because, although it costs a little more to begin with, it lasts a great deal longer.

The next classification is a single sewed eraser of the Dann type. Our trade name for this eraser is the Webco. This construction calls for the outside felt to be sewed to a one-fourth inch backing and four inner strips which are partly cut and folded over so as to require only one sewing. The cutting of the felt weakens it and there is a great deal more danger of it tearing out than in our first-quality eraser.

Then there is the glued type of eraser similar to our Universal that has erasing felts firmly cemented to a five-sixteenth inch rigid back. There is a variation of this type in the Tapebound, which adds the tape binding to hold the felts together more firmly.

The Weber eraser is of the same construction as the Universal, but is not an all-felt eraser, as it has a wood back. It is called a Noiseless due to the fact that there is a thin strip of felt around the wood block. This is a less expensive eraser because of the wood block used as the backing, and the erasing felts are thinner.

The least expensive eraser is the old Andrews Dustless, which we originally made over a half century ago. This has a rather heavy wood block that is formed to fit the hand and thin felt, approximately one fourth-inch thick, is cemented to this wood block. While in our opinion this is the least desirable eraser it does have one decided advantage over the more expensive type, due to the fact that the felts are set about one eighth-inch apart and it is much easier to clean."

This letter should be evaluated on the same basis as an advertisement. It was included in this study only because no discussion of the subject was available from any other source.

## BROOMS AND BRUSHES

The *Federal Standard Stock Catalogue* furnishes the following description of hair brushes for sweeping floors:<sup>2</sup>

"Hair floor sweeps shall be of but one type and grade, and . . . sizes as specified. . . .

*Stock.* Shall be best quality stiff, black or gray, live horsetail hair, thoroughly sterilized and equal to standard sample in stiffness.

*Block* shall be beech, birch, or maple, smoothly finished in transparent varnish or lacquer, solid in one piece or in two pieces for wire drawing, with two holes threaded for handle at proper angles for use. Blocks shall be bored for the number of holes specified in . . . [table below] three-sixteenth inch in diameter, and where the brushes are stapled, three-eighth inch deep. To accommodate existing equipment, however, a slight variation plus or minus in the number, provided the minimum amount of stock per brush as specified is not affected thereby.

2. *Federal Standard Stock Catalogue* (Superintendent of Documents, United States Government Printing Office, Washington, 1930), section IV, part 5, Specification No. H-B-651, pp. 1-5.

*Setting.* Stock shall be securely staple set or wire drawn with brass brush wire.

*Handle.* A smooth polished handle of beech, birch, or maple finished in transparent varnish or lacquer, six feet long, one end threaded for one and one-sixteenth inch with an Acme thread, five threads to the inch, three-fourths inch in diameter to fit holes in block, shall be furnished with each brush, unless otherwise specified.

*Standard sample.* Brushes as delivered shall be equal to standard sample in workmanship stiffness, and quality of material.

Detail requirements:

	<i>Size</i>		
Length of block, inches.....	14	18	24
Diameter of block, inches.....	2 1/2	2 1/2	2 1/2
Number of holes, inside rows.....	100	128	172
Number of holes, outside rows.....	62	80	106
Hair, minimum weight per brush, ounces.....	8 <sup>21</sup> / <sub>32</sub>	10 <sup>21</sup> / <sub>32</sub>	14 <sup>21</sup> / <sub>64</sub>
Length of hair outside of block, inches.....	3	3	3

NOTE.—Tolerance of 1/8 inch plus or minus in length of block, plus 1/8 inch in diameter of block, 1/32 inch in diameter of handle, and plus or minus 1 inch in length of handle will be allowed.

No special tests to determine compliance are given. The government furnishes a standard sample for examination by bidders.

The Rochester schools used specifications similar to this one.<sup>3</sup> Fewer, but larger, holes were required. Bristles were required to be four and one-fourth inches long and composed of a mixture of two thirds Superior Han Kow bristle and one third stiff mule hair.

Harap<sup>4</sup> states that animal hair brushes are more economical in the end than vegetable fiber brushes and the test is simple—vegetable fiber burns readily while hair burns with difficulty.

It will be preferable for the purchaser using this specification to either furnish a standard sample, or require a sample from the vendor with his bid.

Similar specifications to the one quoted above from the *Federal Standard Stock Catalogue* can be obtained from the Superintendent of Documents to describe almost any kind of broom or brush a school could possibly need. The following specifications are the ones which seem most likely to be useful:

- H-B-51 Corn brooms.
- H-B-56 Fiber brooms.
- H-B-111 Wire push brooms.
- H-B-201 Dust brushes for counters.
- H-B-591 Sidewalk brushes.

### CARBON PAPER

This specification was obtained from the *Federal Standard Stock Catalogue*:<sup>5</sup>

“Only one type, grade, and weight of carbon paper, for use in making from one to three carbon copies at a time, is specified herein.

Carbon paper, black, standard weight, shall be furnished in 8 x 7 inch, 8 x 10 1/2 inch, 8 1/2 x 11 inch, 8 x 13 inch, 8 x 14 inch, 8 1/2 x 14 inch, 14 x 17 inch, and 16 x 21 inch sizes, as specified in invitation for bids.

Carbon paper, black, standard weight, shall be furnished with hard, medium, or soft coating, as specified in invitation for bids.

Carbon paper, black, standard weight, shall have the following characteristics:

3. N. L. Engelhardt and Fred Engelhardt, *Public School Business Administration* (New York: Teachers College, Columbia University, 1927), p. 656.

4. Henry Harap, *The Education of the Consumer* (New York: The Macmillan Company, 1924), p. 153.

5. *Federal Standard Stock Catalogue* (1932), *op. cit.*, Specification No. UU-P-156, pp. 1-4.

*Stock.* Shall be free from ground wood pulp.

*Weight, uncoated.* Basis 20 x 30, 1,000 sheets, shall not exceed 18 pounds

*Coating.* The coating shall be composed of suitable waxes and other necessary ingredients to insure a hard, medium, or soft finish. It shall be coated with carbon black and shall make a permanent black record.

*Serviceability.* Shall make not less than twelve legible first carbon copies.

*Number of manifold copies.* Shall make not less than three legible carbon copies at a time, using elite type, a No. 32, fifty percent rag bond first sheet and No. 18, fifty percent rag manifold bond copy sheets, against a standard rubber platen.

Sampling shall be as specified in federal specification UU-P-31, general specification for paper.† From each delivery of 2,000 sheets or more, 25 sheets bearing the manufacturer's name on the wrapper should be sent to the testing laboratory by the receiving or purchasing officer."

*Tests for compliance:*

*"Weight uncoated.* For the determination of the weight of the basic paper used the carbon coating shall be removed by means of benzol or other suitable solvent, together with gentle scrubbing. After the coating has been removed, the paper shall be dried and the weight of decarbonized paper shall be determined in the usual way.‡

The carbon paper extractor and friction cleanser (*Paper Trade Journal*, March 19, 1925) was devised for this purpose. The sample is treated in the apparatus for five minutes. (Copies of the article may be obtained from the Bureau of Standards, Washington, D. C.)

*Serviceability.* Shall be determined on any standard typewriter having elite type, using a No. 32, fifty percent rag bond first sheet, a No. 18, fifty percent rag manifold bond copy sheet, and the sample to be tested, by securely fastening a piece approximately 1 by 2 inches of the sample with paper stickers to the back of the first sheet so that the coated side of the sample will come in contact with the copy sheet in the usual way. After placing the paper in the typewriter, the first sheet shall be fastened securely with pins or in any other suitable way to the back of the carriage in such a manner that it remains stationary while the second sheet can be moved with the platen as the platen rotates in spacing the lines. The same set of letters shall then be written, always in exactly the same order, on the same portion of the sample fifteen times, line-spacing the copy sheet each time for each writing. The first line on the copy sheet shall be distinct, and shall show no tendency to rub or smut. The twelfth line on the copy sheet shall be easily legible. Good carbon paper will give copies which show only a slight loss in intensity of color from one line to the next.

*Number of manifold copies.* Shall be determined on any standard typewriter having elite type and a standard platen.

A standard (so-called soft) rubber platen is one which is indented not more than 0.19 millimeter (0.008 inch) when tested with a suitable plastometer, in which a load of one kilogram (2.205 lbs.) is applied for one minute to a 3.2 millimeters (one-eighth inch) steel ball pressed against the platen.

Write the whole keyboard twice over in both capitals and lower case, taking care that the letters and numerals are not in alphabetical or numerical sequence, and changing the order of writing the second time. The third manifold copy shall then be examined. If any of the numerals, or more than 5 of the 104 letters, are illegible, the sample shall be rejected.

† "Not less than ten percent of the units in a delivery will be sampled, except when a delivery consists of more than 100 units, in which event at least ten units shall be sampled. The samples taken from each unit of a delivery shall be collated so that the test sample, which shall consist of not less than ten sheets, shall be representative of each unit sampled. Before rejection of any delivery, one or, if necessary, two additional samples from other units of the shipment will be tested." Quoted from the *Federal Standard Stock Catalogue* (1932), *op. cit.*, Specification No. UU-P-31, p. 7.

‡ "Samples for weight may be accurately cut to any convenient size, weighed, and calculated to the desired basis." Quoted from the *Federal Standard Stock Catalogue*, *op. cit.*, p. 11.

All tests not herein specified shall be made in accordance with Federal Specification UU-P-31, General Specification for Paper. . . ."

*Sample with bid:*

"It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary they should be specifically asked for in the invitation for bids and the particular purpose to be served by the bid samples should be stated."

It is to be noted that this specification is for carbon paper to be used to make one to three carbon copies at one time. If more copies are to be made light weight carbon paper should be used. The federal specification for this lighter quality has a number of slight changes in the requirements. Its number is UU-P-151.

#### FLOOR OIL

The federal government issues no specifications on this material, nor were specifications found in any other publication.

The United States Department of Agriculture advises<sup>6</sup> the use of home-mixed oil.

"Good floor oils can easily be mixed at home. One part boiled linseed oil thinned with three parts turpentine makes an excellent floor oil, while one part light motor oil or engine oil combined with four parts kerosene gives results similar to those from commercial kinds. The light motor oil recommended must not be confused with the heavy, less highly refined kinds that contain dark sediment."

#### INCANDESCENT LAMPS

The only specification available on this item is found in the *Federal Standard Stock Catalogue*.<sup>7</sup> The requirements and tests are highly technical. The specification covers absence of physical defects, "life to burn out," efficiency, and "lumen maintenance." The tests are designed to be carried out at the factory and only a person trained in the work could produce accurate results.

A discussion of the tests involved will be of some help to a purchasing agent when considering the claims of various salesmen.

The meaning of physical defects is obvious. Perhaps only a person thoroughly acquainted with the production of incandescent lamps would know where to look for defects.

"Life to burn out" refers to the number of hours of performance in the position and under the voltage for which the lamp was designed.

Efficiency refers to the amount of light produced compared with the amount of current used. Lamps are usually sold by the number of watts of current they consume each hour of use. Two lamps consuming the same amount of current do not necessarily produce the same amount of light, and lamps on the market at the present time do actually vary widely in this respect.

"Lumen maintenance" refers to the ratio between the mean amount of light produced during the life of the lamp and the amount produced initially.

6. *Floors and Floor Coverings* (United States Department of Agriculture), Farmers Bulletin, No. 1219, p. 17.

7. *Federal Standard Stock Catalogue* (1933), *op. cit.*, Specification No. W-L-101a, pp. 1-7. In addition one must obtain the annual supplement, which is issued for each fiscal year—July 1 to June 30.

## INK, COPYING AND RECORD

The only specification available on this item is found in the *Federal Standard Stock Catalogue*:<sup>8</sup>

"Record and copying ink shall be of the blue-black type.

The manufacturer is given wide range in the selection of raw materials and processes of manufacture, provided that the ink produced is of as high quality as the standard prescribed in the paragraph below.

Record and copying ink shall be iron gallo-tannate ink, not inferior in any essential to one properly prepared according to the following formula, in which all of the ingredients are of the strength and quality prescribed in the edition of the United States Pharmacopoeia which is current at the time bids are asked for.

	<i>Grams</i>
Tannic acid .....	23.4
Gallie acid crystals .....	7.7
Ferrous sulphate .....	30.0
Hydrochloric acid, dilute, U. S. P. ....	25.0
Carbolic acid (phenol) .....	1.0
Soluble blue (Brit. Col. Index No. 707; Schultz No. 539).....	3.5
Water to make a volume of 1 liter at 20° C.	

An original unopened bottle, bearing all of the manufacturer's marks, shall be sent to the testing laboratory, when such bottle contains not less than 16 fluid ounces (1 pint). When the ink is furnished in smaller bottles, enough of them to aggregate at least 16 fluid ounces shall be sent to the laboratory with all marks intact.

The 16-ounce bottle, or the combined contents of the smaller bottles, shall be allowed to stand undisturbed for twenty-four hours to allow any sediment to settle. Sufficient of the clear ink for all of the tests shall then be drawn off in a pipette. The bottle shall then be inverted slowly, and the amount and character of any sediment noted."

*Tests for compliance:*

"The sample shall be tested in comparison with standard ink made according to the formula (given above).

Streaks shall be made by allowing measured portions, of about 0.6 ml.\* . . . each, of the ink to flow freely across a sheet of white bond paper which is pinned to a board or clamped to a pane of glass, and held at an inclination of 45°. For better comparison, streaks of the standard ink shall be made on the same sheet as those of the sample.

When the streaks are dry, the sheet shall be examined on the front and the reverse sides. The streaks of the sample shall have the same general form as those of the standard, they shall be as uniform in color when viewed from the front and the back, and shall show no evidence of striking through the paper.

The paper shall be cut into inch-wide strips at right angles to the streaks. Some of the strips shall be kept away from light and fumes, and others shall be used for making the following tests, after they have been exposed to diffused daylight for one week.

After a week's exposure to diffused daylight, the streaks of the sample shall be as intensely black as those of the standard.

After exposure to direct sunlight for ninety-six hours, or at distance of about ten inches from an arc or ultra-violet light for forty-eight hours, the streaks of the sample shall show no more evidence of fading than those of the standard.

8. *Federal Standard Stock Catalogue* (1930), *op. cit.*, Specification No. TT-I-I-521, pp. 1-4.

\* Quoted from page 4 of same specification: "For making ink streaks, a piece of glass tubing about 3.5 mm. in bore and 250 mm. long is used. The ends can be fire-polished, but should not be constricted. A mark etched or scratched 62 mm. from one end indicates the required volume, 0.6 ml., of ink. By drawing the ink up to the mark, holding the tube vertically against the paper near the top, and allowing the ink to flow suddenly down across the paper, uniform streaks will be obtained. Separate clean, dry tubes should be provided for the standard and the sample."

Strips shall be soaked in water and in fifty percent alcohol for twenty-four hours at room temperature. The sample shall show no greater loss of color than the standard. NOTE.—*Ethyl alcohol denatured with methanol is suitable for this test.*

Strips shall be soaked in bleaching powder solution containing N/200 chlorine. The effect upon the sample, in comparison with the standard, shall be noted after fifteen minutes, one hour, and twenty-four hours at room temperature. The sample shall show no greater loss of color than the standard.

The content of metallic iron shall be determined in 10 ml. of the sample by any suitable chemical procedure. The content of metallic iron shall be not less than 0.58 g. nor more than 0.70 g. per 100 ml.

Twenty-five ml. each of the sample and of the standard shall be allowed to stand undisturbed in colorless glass vessels (50-ml. beakers) loosely covered with filter paper to keep out dust. After two weeks' exposure to diffused daylight and air, at ordinary room temperature, the sample shall be as free from mold and deposit upon its surface and upon the sides and bottom of the container as the standard.

The sample shall be no more corrosive to steel pens than the standard. For each sample under test, including the standard, select two new pens from the same box. Clean the pens with alcohol and then with ether, dry them in an oven at 105° C., and weigh each pair together to the nearest mg. Immerse each pair of pens in 25 ml. of the ink, contained in a small beaker or flask. After forty-eight hours remove the pens, wash and scrub them with water and a cloth to cleanse them thoroughly, rinse them with alcohol, dry them at 105° C., and weigh. If the pens in the sample lose more weight than those in the standard, the test shall be repeated with both the sample and the standard. If the loss in the sample is again greater than the loss in the standard ink, the sample shall be rejected."

*Sample with bid:*

"It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects."

It is to be noted that this ink is for permanent record purposes and is not adapted to use in fountain pens.

"The record and copying ink covered by this specification is suitable for writing permanent records. It is not recommended for making more than one press copy, nor for use in fountain pens, nor for other ordinary purposes."

Several ounces of the standard ink can be made up from the formula given at cost of a few cents by any prescription drugstore, according to the pharmacist of one of the Emporia drugstores.

## INK, WRITING

The only specification available on this item is found in the *Federal Standard Stock Catalogue*:<sup>9</sup>

"Writing ink shall be of the following types:

Blue-Black—

1. Fluid.
2. Concentrated.
3. Powder.
4. Tablets.

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9. *Federal Standard Stock Catalogue* (1930), *op. cit.*, Specification No. TT-I-563, pp. 1-5.

The manufacturer is given wide range in the selection of raw materials and in the processes of manufacture, provided the ink produced is at least as good in quality as that described in the paragraphs below.

The writing ink as received in type 1 or as prepared by diluting or dissolving the material in types 2, 3, and 4 in the amount of water stated on the label, shall be gallotanate of iron ink, not inferior in any essential to the ink properly prepared according to the following formula, in which all of the ingredients are of the strength and quality prescribed in the edition of the United States Pharmacopoeia which is current at the time bids are asked for:

	<i>Grams</i>
Tannic acid .....	11.7
Gallic acid crystals .....	3.8
Ferrous sulphate .....	15.0
Hydrochloric acid, dilute U. S. P. ....	12.5
Carbolic acid (phenol) .....	1.0
Soluble blue (Brit. Col. Index No. 707; Schultz No. 539).....	3.5
Water to make a volume of 1 liter at 20° C.	

A pint of ink from each delivery of 100 dozen quarts or less . . . [or] enough of the material to make sixteen fluid ounces of full-strength writing fluid shall be sent to the testing laboratory in an original unopened container bearing all of the manufacturers marks."

*Tests for compliance:* The tests are carried out exactly the same as the ones for copying and record ink.

*Sample with bid:* The statement made for copying and record ink is repeated exactly.

It is to be noted that this ink is suitable for ordinary writing purposes but not for permanent records.

"The writing ink covered by this specification is suitable for use with ordinary or fountain pens. It can not be used for making more than one press copy, and shall not be used for writing permanent records."

## MUCILAGE

The only specification available on mucilage is found in the *Federal Standard Stock Catalogue*:<sup>10</sup>

"Mucilage furnished under this specification shall be of one type only.

Mucilage furnished under this specification shall be so prepared and compounded as to provide a moderately quick-setting adhesive for general office use.

Mucilage furnished under this specification must be equal in adhesive qualities and quickness of set to a mucilage made of an aqueous solution of pure gum acacia, free from starch, dextrin, fillers, or other foreign substances, with thirty-five percent pure anhydrous gum solids; with the addition of one percent aluminum sulphate (anhydrous).\*

The mucilage shall contain sufficient preservative to prevent decomposition or growths of mold. Phenol (carbolic acid), thymol, beta naphthol (technical grade), sodium benzoate, benzoic acid or salicylic acid may be used for this purpose. An essential oil, such as cassia, wintergreen, clove, cinnamon, peppermint or sassafras, shall be added also if phenol is used, and may be added to the other antiseptics.

Mucilage furnished under this specification shall be guaranteed for one year from the date of actual receipt by the ordering office. During the guaranty period the successful bidder shall replace, without cost to the ordering office, any mucilage, which through mold, evaporation, sedimentation, or other causes, becomes unfit for use. The presence of mold, or the inability of the mucilage to successfully meet the requirements of the adhesion test specified in . . . this specification, shall be conclusive. Replacement mucilage shall also be

10. *Federal Standard Stock Catalogue* (1930), *op. cit.*, Specification No. JJJ-M-791, pp. 1-4 and errata sheet.

\* This standard mucilage can be made up by any prescription drugstore.

guaranteed for one year from date of receipt. The ordering office will store the mucilage in the original, unopened shipping containers, not subjected to a freezing temperature nor to excessive artificial heat."

*Tests for compliance:*

The mold test shall be performed as follows:

About ten grams of the mucilage to be tested shall be placed in an open receptacle, inoculated with the yellowish brown mold (*Penicillium divaricatum*),† and the whole placed in a desiccator with a little water in the bottom, or placed in a suitable moist chamber. The test specimen shall be kept in a dark closet or exposed only to diffused light at from 26° to 30° C. for ten days. At the expiration of this period the mucilage shall show no evidence of any type of mold growth.

The adhesive test shall be performed as follows:

Prepare a quantity of standard mucilage in accordance with formula indicated in [one of the above paragraphs] . . . :

Prepare twenty (20) strips of No. 2 kraft wrapping paper (federal specification UU-P-606, basis of weight 24 x 36, 1,000 sheets; 120 pounds). Each strip to be approximately 6 inches wide and 12 inches long. As one side of kraft paper is slightly rougher than the other, the adhesive test should be made on both sides of the paper. To avoid mistakes in testing on both sides of the paper the ends of each strip shall be folded back in opposite directions to the middle. This will allow ample space for applying both test and standard mucilage to each side of the paper and two gummed areas will not be directly opposite one another on the paper.

On approximately equal areas of each strip apply an even coating of the test mucilage and of the standard mucilage. Fold each strip on itself and rub firmly three (3) times with the hand. Allow a drying period of 2, 5, 10, and 30 minutes, and 24 hours for each set of two samples. At the end of the drying period for each set of test samples, pull apart the free ends of the strips with the same motion as in opening the pages of a book. To meet the requirements of this specification the fibers of the paper must be torn in the area covered by the test mucilage to as great an extent as in the area covered by the standard mucilage. Failure to meet this requirement shall cause rejection.

Should the test material fail to meet the adhesive requirements for a particular drying period, prepare five additional test samples and proceed as before, making adhesion tests on both sides of paper strips, a total of ten tests. Failure of the test material to equal the performance of the standard mucilage on at least six of the ten tests shall cause rejection."

Special requirements concerning packaging are included in this specification:

"Mucilage shall be furnished in self-closing containers, with spreaders, of approximately 1 ounce and 2½ ounces capacity; in 3 and 4 ounce bottles with suitable brush; in pint bottles; pint cans; in quart bottles; quart cans; and in 20-gallon kegs.

In the 3 and 4 ounce bottles where brushes are required there shall be attached thereto a brush approximately ¾ inch longer than the depth of the bottle. Each bottle shall have a metal cap perforated in the center to allow the handle of the brush to pass through readily and to hold same in any depth."

*Sample with bid:* Samples at the time bids are offered are not mentioned in this specification.

## PAPER

The *Federal Standard Stock Catalogue* gives specifications for a large number of types and qualities of paper. The general specification<sup>11</sup> gives very de-

† This is the yellowish-brown—not the blue or green—mold found on citrus fruits when they spoil.

11. *Federal Standard Stock Catalogue* (1932), *op. cit.*, Specification No. UU-P-31, pp. 1-13.

tailed descriptions of general requirements and specific laboratory directions for performing the tests. Many of these tests require experienced workers and the laboratory facilities are beyond the reach of practically all schools. In addition, specific specifications usually call for standard samples to be furnished by the purchasing agency. The only conclusion seems to be that these specifications are not particularly adapted to school needs.

Consideration of the points covered by the specifications may be of value to men buying paper for school use. In the case of mimeograph paper<sup>12</sup> the requirements mentioned are size of sheet, accuracy of trimming, fiber content, weight, bursting strength, thickness, opacity, sizing. In the case of writing paper<sup>13</sup> the requirements mentioned are size of sheet, accuracy of trimming, weight, color, finish, formation, cleanliness, ruling and writing qualities, fiber content, ash, folding endurance, and bursting strength.

One set of definitions of terms seems valuable and usable by any person.<sup>14</sup>

*"Ruling, writing, and erasing quality.* The terms "ruling quality" and "writing quality" shall be construed to mean that ruled lines or written characters shall be clear cut—that is, the ink shall show no tendency to spread or to penetrate unduly into the paper. By "erasing quality" is meant retention of good writing quality after erasing the ruled lines or written characters."

The subject of specifications for paper and of suitable types and sizes of paper appears frequently in articles on school supplies. But none of the articles covers the subject completely.

O'Dell<sup>15</sup> reports that twenty-pound newsprint is a satisfactory substitute for sixteen-pound mimeograph paper in hectograph and mimeograph work in elementary grades. The price is much lower.

Jenkins<sup>16</sup> had a number of reputable companies—those known to deliver fifty sheets of paper in a fifty-sheet package—submit samples of their construction paper. Each teacher was then asked to choose from among the various samples of some one color—red for example—the particular sheet which she thought best, and give the reason for her choice. From the reports of several teachers a choice of a company was made to furnish all of the colors.

Kelty<sup>17</sup> points out that specifications concerning more than the quality of paper is needed. For example, in ordering foolscap the size of the sheet; the width of the ruling, if the paper is ruled; the width of the margins at the top and sides, if there are any margins; all these must be definitely stated. Also the number of sheets—480 or 500—to a ream must be specified. Kelty further points out that the size of the paper has its effect on economy—the six inch by nine inch scratch pad being more economical than the nine by twelve in his experience.

Schmidt<sup>18</sup> emphasizes the need for accurate specifications, but he also says

12. *Federal Standard Stock Catalogue* (1932), *op. cit.*, Specification No. UU-P-388, pp. 1-4.

13. *Federal Standard Stock Catalogue* (1933), *op. cit.*, Specification No. UU-P-641, pp. 1-4.

14. *Federal Standard Stock Catalogue* (1932), *op. cit.*, Specification No. UU-P-31, p. 7.

15. Clyde H. O'Dell, *loc. cit.*

16. H. E. Jenkins, "Service v. price as a measure of economy." *American School Board Journal*, 89:41, July, 1934.

17. C. V. Kelty, "Buying school supplies." *American School Board Journal*, 81:43, July, 1930.

18. H. W. Schmidt, "School supplies and equipment—sale and purchase." *American School Board Journal*, 83:76, July, 1931.

that care must be used to see that specific requirements do not result in unnecessary expense. His illustration is the fact that three-eighths inch ruling is common commercial practice, while an order for paper ruled five sixteenths of an inch apart would require a special print job. The increase in cost more than offsets the saving due to more lines on a sheet of paper.

Altogether it seems that much study is needed to determine the quality and form of paper most adapted to the needs of the school.

### PAPER TOWELS

The *Federal Standard Stock Catalogue* furnishes the following description:<sup>19</sup>

Paper towels shall be of two types as specified. . . .

*Workmanship.* The towels shall be so constructed that they will not disintegrate rapidly when being used and absorbing water. Towels shall be well closed, free from lumps, slivers, dirt, breaks and wrinkles, and shall contain no holes. Perforations must be complete and regular in rolled towels, and folded towels must have uniform folds. All edges must be cut and towels must not have any ragged or uneven edges. The count must be full.

Towels shall be in rolls, with each towel perforated so as to be easily torn from the roll at the perforations only; or in packages with towels folded and/or interlocked to feed satisfactorily from towel-dispensing cabinet, as specified in invitation for bids.

*Size.* Length, thirteen inches; width, ten and three-fourth inches; tolerance plus one-fourth inch and minus one-eighth inch.

*Stock.* The towels shall be composed of clean, long fibers, reasonably free from lumps and shives.

*Odor.* The towels shall have no disagreeable odor when either wet or dry.

*Finish.* The towels shall be reasonably soft, have a medium rough surface such as produced by crepeing or embossing, and shall conform to accepted sample in finish, formation, and softness.

*Towels, paper, type A.—Tensile breaking strength.* Minimum each direction: 1.7 kilograms. *Absorption.*—Maximum time after heating one hour at 100° C., 50 seconds.

*Towels, paper, type B.—Tensile breaking strength.* Minimum each direction: 1 kilogram. *Absorption.* Maximum time after heating one hour at 100° C., 125 seconds."

#### *Tests for compliance:*

*General.* Not less than five towels, each from a different roll or package, shall be tested, and the average of the test results shall be compared with the requirements.

The test specimen for the tensile test shall be 15 millimeters wide and 100 millimeters between the jaws of the tester.

*Absorption.* Place one thickness of the towel on a four-mesh wire screen. Fill a one-milliliter measuring pipette with water (25° C.), hold at an angle of about 30° with the horizontal, the tip being very near the surface of the paper, and allow 0.1 milliliter of water to flow on the towel. While the water is flowing let the tip of the pipette remain in the drop as it forms on the surface of the towel. The absorption is the time in seconds from the contact of the water with the towel until the drop is completely absorbed, as indicated by no further reflection of light from it. The average of ten tests, five on each side of the towels, shall be reported as the absorption.

*Heat treatment.* The sample shall be exposed for one hour in an oven controlled to maintain a constant temperature of 100° C. ( $\pm 1^\circ$ ) and equipped with such means of circulating air that the temperature is uniform throughout the interior of the oven. The sample shall be suspended in the oven in such a way as to allow free access of air to all parts of it."

19. *Federal Standard Stock Catalogue* (1933), *op. cit.*, Specification No. UU-T-591, pp. 1-3.

*Sample with bid:*

"Samples are required with bid for the purpose of showing general character only."

In a study made in 1925 on standards for paper towels the Bureau of Standards recommended that towels for use in public places should be of the cheaper grades.<sup>20</sup> The reason given was that such towels are usually given such careless usage that high quality towels produce little better results than do cheaper ones. So it is reasonable to assume that the type B towel, described in the above specification, is the one which would be most suitable for school use.

The Rochester specifications<sup>21</sup> called for towels somewhat larger than those described in the federal specifications and forbid the use of old paper in the production of the towels. Rochester asked for a sample with the bid.

Several brands of towels were compared by use in the Girard (Kansas) school system.<sup>22</sup> The results indicate that roll towels were one fourth to one half as expensive as cut towels. But Jenkins himself points out that the number of samples and the length of the test were not great enough to produce very conclusive results.

The San Bernardino schools have found that the size of towels known commercially as "junior fold" are the most economical of the cut towels.<sup>23</sup> The pupil always uses at least two towels, regardless of size, and seldom uses three, was the reason for the decision.

## PASTE AND PASTE BRUSHES

The *Federal Standard Stock Catalogue* furnishes the following specification for office paste and paste brushes:<sup>24</sup>

"Office paste shall be of two types:

Type I. Hard white paste.

Type II. Semiliquid paste.

The paste shall contain sufficient preservative to prevent decomposition and mold growths. Phenol (carbolic acid), thymol, sodium benzoate or benzoic or salicylic acid may be used for the purpose. An essential oil, such as cassia, wintergreen, clove, cinnamon, peppermint, or sassafras, must be added also if phenol is used, and may be added when other antiseptics are used. Formaldehyde, owing to its volatility, will not be acceptable as a suitable antiseptic for use in paste.

The color or the chemical composition of the paste furnished under this specification shall be such as not to cause discoloration when used with the white bond paper described [below].

Paste furnished under these specifications shall be of even consistency throughout, and entirely free from lumps of undissolved material or grit.

Brushes for both types of paste shall comply with the requirements listed in the following subitems. Handles shall be of sufficient length to permit easy access to all parts of the container. Bristles shall be of a good grade of sterilized horsehair so fastened to the handle by a metal clamp as to prevent excessive loss of hair strands under ordinary usage. The brush end of horsehair shall not be less in width, thickness, and length than the following dimen-

20. *Standards for Paper Towels*. (Washington: National Bureau of Standards, 1925), Circular No. 294, p. 5.

21. N. L. Engelhardt and Fred Engelhardt, *loc. cit.*

22. H. E. Jenkins, *loc. cit.*

23. C. V. Kelty, *loc. cit.*

24. *Federal Standard Stock Catalogue* (1932), *op. cit.*, Specification No. N-P-101a, pp. 1-6.

sions: Width, inside ferule, seven-sixteenths inch; thickness, inside ferule, three thirty-seconds inch; length, outside ferule, five-eighths inch. The metal portions of the brushes shall be of aluminum, or if of other metal shall be so lacquered as to completely protect them from corrosion caused by contact with water or paste, or by extreme climatic conditions.

Metal tops and closures on all jar containers shall be of aluminum, or if of other metal shall be so lacquered as to completely protect them from corrosion caused by contact with water or paste, or by extreme climatic conditions. The collapsible metal tubes and caps thereon shall be of such material as to resist corrosion under the same conditions."

*Tests for compliance:*

"At least ten samples of each size shall be taken from an equal number of cases.

The mold test shall be performed as follows: About ten grams of the paste to be tested are placed in an open receptacle, inoculated with the yellowish-brown mold (*Penicillium divaricatum*),\* and the whole placed in a desiccator with a little water in the bottom, or placed in a suitable moist chamber. The test specimen is kept in a dark closet or exposed only to diffused light, at 79° to 86° F. for ten days. At the expiration of this period the paste should show no evidence of any type of mold growth.

The adhesive test shall be performed as follows: Evenly distribute a film of paste near the middle of strips of kraft and white bond paper, specified [below] in . . . this specification, fold each strip upon itself, rub three times with the hand and allow one group of samples to dry for one half hour, the other for two hours. At the end of the drying period, pull apart the free ends of the strips with the same motion as in opening the pages of a book. As there is some difference in the finish on the two sides of both bond and kraft papers, adhesive tests shall be made using both sides of the paper. To meet the requirements of this specification the fibers of the paper must be torn. If the break comes in the adhesive, the paste shall be rejected.

The pasted sides of bond-paper samples, prepared [as directed above], shall be examined for evidence of discoloration. Perceptible changes in the color of the samples shall cause rejection of the paste.

The adhesive power of the paste must be sufficient to hold securely the following described paper. No. 2 kraft paper, Federal Specification UU-P-606, basis of weight 24 by 36 (1,000 sheets), 120 pounds. White bond paper, Federal Specification UU-P-121, 50 percent rag, basis of weight 17 by 22 (1,000 sheets), 40 pounds.

At least six brushes shall be taken at random and examined for kinds and quality of bristles and measured to determine conformance with dimensions indicated in . . . this specification. Failure to equal any or all of the quality or dimensional requirements shall cause rejection.

The brushes and caps from at least six containers and at least six collapsible tubes shall be wrapped in a towel or other cloth which has been thoroughly moistened with saturated salt solution (NaCl) and allowed to remain at room temperature for twenty-four hours. At the expiration of this period, the test pieces shall be examined. The metal, if aluminum shall show no more evidence of corrosion than a slight whitish film or deposit. Other metals, if used, shall show no rust, and there shall be no evidence of the failure of the lacquer on them. Failure to meet this corrosion test shall cause rejection.

Four separate sheets of white bond paper, . . . shall be covered with a thin layer of paste from four separate containers, picked at random after which they shall be laid face down on a piece of plate glass, rolled with a paper or print roller sufficiently to eliminate air bubbles and wrinkling. Then each sheet shall be carefully gone over by hand for any surface unevenness caused by grit or undissolved matter. This test shall be repeated three times, once with paste from top of containers, once from middle of containers and once from bottom of containers. The paste shall be stirred into as even consistency

\* This is the yellowish-brown—not the blue or green—mold found on citrus fruits when they spoil.

as can be secured by reasonable effort with brush and water before applying this test. Presence of grit or lumps of undissolved matter as shown by surface irregularities and examination shall cause rejection. The paper used in this test shall be white bond paper, Federal Specification UU-P-121, 50 percent rag, basis of weight 17 by 22 (1,000 sheets), 26 pounds."

Special requirements concerning packaging are included in this specification:

"Type I paste shall be furnished in water-well jars with brushes; or in large containers in accordance with commercial practice. The paste in each container shall be covered with a sufficient coating of paraffin in such manner as to prevent air penetration. Paste of this type in jars nine ounces and smaller shall be furnished in water-well type containers. The water-well shall be of sufficient size to properly accommodate the brush furnished. Container shall be provided with a screw cover of such design as to permit tight closing of the container when the brush is in the water well. Pint, quart, and gallon containers shall be of the type ordinarily used by the trade, equipped with tightly fitting covers.

Type II paste shall be furnished in collapsible metal tubes with spreaders; in small jars equipped with brushes for desk use; or in large containers in accordance with commercial practice. Small jars for desk use shall be provided with screw covers of such design as to permit tight closing of the container with the brush in the jar. Brushes for this paste shall be fitted with a closure of some kind to cover the mouth of the jar when the brush is in the container."

*Sample with bid:* No mention of a sample is made in this specification. Evidently the specification is considered complete.

Attention is called to the type of guarantee suggested:

"Paste furnished under this specification shall be guaranteed for one year from the date of actual receipt by the ordering office. During the period of guaranty the successful bidder shall replace, without cost to the ordering office, any paste which, through mold, evaporation, or other causes, becomes unfit for use. The presence of mold or the inability of the paste to successfully meet the requirements of the adhesion test, provided in this specification, shall be conclusive. Paste replaced because of failure shall carry the original guaranty. The paste delivered under this specification to be stored by the ordering office or purchaser in the original unopened shipping containers, under reasonable office or warehouse conditions and not subjected to a freezing temperature nor to excessive artificial heat."

This federal specification also provided for an adjustment in the purchase price if the capacity of the containers delivered is below the amount stated in the bid. That is, the purchase is made on the basis of number of ounces, not on the basis of number of jars or tubes.

Schmidt<sup>25</sup> suggests that an important requirement is that the paste contain no poisonous nor harmful preservative. It is reasonable to suppose that this precaution has been taken into consideration in the federal specification. Some of the preservatives which are permitted are poisonous in large quantities, but perhaps not in the small quantities appearing in the paste.

#### SOAP

Engelhardt and Engelhardt<sup>26</sup> and the *Federal Standard Stock Catalogue* each furnish a specification for liquid soap. The requirements are nearly the same, and the one from the federal authority is given here:<sup>27</sup>

"Liquid toilet soap shall be of but one type. . . ."

25. H. W. Schmidt, *loc. cit.*

26. N. L. Engelhardt and Fred Engelhardt, *op. cit.*, p. 655.

27. *Federal Standard Stock Catalogue* (1930), *op. cit.*, Specification No. P-S-618, pp. 1-6.

Liquid toilet soap shall be a clear solution of pure vegetable oil potash (or potash and soda) soap with or without glycerol or alcohol, suitably perfumed, and free from all foreign matter. It shall quickly form a satisfactory lather and have no injurious effect and leave no objectionable odor on the skin.

The material shall be a clear solution, free from objectionable odor, other than from coconut oil, and shall form a satisfactory lather.

Total anhydrous soap shall be not less than the equivalent of fifteen percent potash soap.

Total matter insoluble in alcohol shall not exceed 0.5 percent.

Free alkali calculated as potassium hydroxide (KOH) shall not exceed 0.05 percent.

Chloride calculated as potassium chloride (KCl) shall not exceed 0.3 percent.

More than traces of sulphates and sugar shall not be present.

All constituents shall be calculated on the basis of the original sample."

#### *Tests for compliance:*

Specific laboratory directions are given for a chemical analysis of the soap. The length and technical nature of these directions make it inadvisable to include them here. The tests are of such nature as to be readily performed by any person who has done satisfactory work in a college quantitative analysis course. Expensive laboratory equipment is not required. Any person interested can obtain a copy of the complete specification from the Superintendent of Documents for five cents.

#### *Sample with bid:*

"Normally no samples will be necessary prior to award. . . . If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects."

The basis of purchase is worthy of note: "The material shall be purchased by volume. A gallon of soap shall mean 231 cubic inches at 15.5° C. (60° F.)."

The National School Supply Association certifies three standard grades of soap:<sup>28</sup> 10 to 12 percent pure soap; 15 to 18 percent pure soap; 38 to 40 percent pure soap. The medium grade is recommended. All three must be made from "pure Cochin coconut oil saponified with potash."

The value of soap as a disinfectant either with or without additional medicaments is frequently mentioned in advertisements. McGowan has made an intensive study of detergents. Although she finds some conflicting evidence, her conclusions may be summarized as follows:<sup>29</sup>

"Soap has disinfectant power, but time and concentration are required. Therefore ordinary hand washing does little good.

Added disinfectants and medicaments have absolutely no value. They may even reduce the detergent value of the soap.

The purest soap is the best disinfectant soap.

There is little danger of infection from the use of common bars of soap."

Specifications similar to the one quoted above from the *Federal Standard Stock Catalogue* may be obtained from the Superintendent of Documents to describe almost any kind of soap the schools can possibly need. The follow-

28. *Certified Janitor Supply Products*, issued free by the National School Supply Association, 176 W. Adams St., Chicago, Ill.

29. Ellen Beers McGowan, *A Comparative Study of Detergents* (Teachers College Contribution to Education, No. 441. New York: Teachers College, Columbia University, 1930), p. 80.

ing ones seems most likely to be useful: P-S-606, Soap-powder. P-S-616, Soap; toilet, floating, white. P-P-591, Powder; for scouring floors.

### SWEEPING COMPOUND

A specification on sweeping compound has recently been added to the *Federal Standard Stock Catalogue*.<sup>30</sup> But it is not available at the present time.

In 1930 the Bureau of Standards had something to say on the subject of sweeping compound which is of interest to users of the product.<sup>31</sup>

"Although there are many floor-sweeping compounds or preparations on the market made up of sawdust, sand, oil, coloring matter, disinfectant, etc., it is believed that in many cases fine, hardwood sawdust moistened with water at the time of use will prove satisfactory for this purpose."

In this connection a statement from the United States Department of Agriculture is applicable. Water is said to be harmful to oiled floors and should be used sparingly, followed by an oil mop.<sup>32</sup> One question then is if it would be desirable to use dampened sawdust on an oiled floor. It seems that it would not be desirable; though it may be that the water from the sawdust would not dampen the floor enough to be harmful.

The Bureau of Standards also states:<sup>33</sup>

"The Bureau of Standards has not issued any formulas or specifications covering such preparations. However, the Treasury Department uses a compound made up according to the following formula:

<i>Material</i>	<i>Parts (by weight)</i>
Sand .....	10.
Fine sawdust .....	3.5
Salt .....	1.5
Paraffin oil .....	1.
Mix thoroughly	

The Navy Department Specification No. 51-C-10 calls for a compound consisting of a uniform mixture of clean, fine sand and finely ground sawdust properly impregnated with a refined heavy mineral oil and water. Chemical analysis:

- Water, not more than 20 percent by weight.
- Oil, not less than 5 percent by weight.
- Sand, not more than 50 percent by weight.
- Sawdust, remainder.

Some of the commercial compounds are colored with iron oxide or other pigment and some contain naphthalene flakes, bran, paraffin wax, etc. Essential oils, such as oil of eucalyptus, oil of sassafras, etc., are frequently added to impart a pleasant odor to the compound or to mask any unpleasant odor of the ingredients used. Pine oil disinfectant, a small amount of creosote oil, and probably other materials, might be used as disinfectants. If made up in small lots such compounds could probably be mixed by hand.

30. *Federal Standard Stock Catalogue* (1933 or 1934), *op. cit.*, Specification No. P-C-591.

31. *Washing, Cleaning, and Polishing Materials* (Washington: National Bureau of Standards, 1930), Circular No. 383, p. 40.

32. *Floors and Floor Coverings*, *loc. cit.*

33. *Washing, Cleaning, and Polishing Materials*, *loc. cit.*

## TOILET PAPER

The *Federal Standard Stock Catalogue*<sup>34</sup> furnishes the following specification for toilet paper:

"Tissue toilet paper shall be of one type and weight only, perforated rolls.

*Weight.* Basis, 25 by 40, 1,000, not less than 28 pounds (24 by 36, 480-11.6 pounds).

*Bursting strength.* Average for five sheets tested together, not less than 12 points.

*Absorption.* Maximum time not more than 120 seconds.

*Finish and formation.* Shall be unglazed, soft, and flexible, and shall be free from visible wood slivers, specks, holes, wrinkles, and other imperfections.

*Size.* Paper shall be 4½ inches wide and perforated at 5-inch intervals so that sheets are easily detachable; tightly wound on stiff, round pasteboard core having an inside diameter of 1¼ to 1½ inches; outermost sheet to be pasted to roll to prevent unwinding; 1,000 sheets to roll as specified in invitation for bids."

*Tests for compliance:*

"All tests not herein specified shall be made in accordance with United States Government General Specification for Paper, Federal Specification UU-P-31.

Paper from not less than five rolls or packages shall be tested, and the average of the test results shall be compared with the requirements.

*Bursting strength.* The bursting strength test shall be made on a pack of five sheets stacked evenly.\*

*Absorption.* Place one thickness of the paper on a one-mesh wire screen. Fill a measuring pipette with water (25° C.), hold at an angle of about 30° with the horizontal, the tip being very near the surface of the paper, and allow 0.01 ml. of water to flow. This small amount of water will form a drop on the tip of the pipette. Touch the drop to the paper starting the stopwatch at the same time. The absorption is the time in seconds from the contact of the water with the paper until the drop is completely absorbed, as indicated by no further reflection of light from it. The average of ten tests, five on each side of the sheets, shall be reported as the absorption. A pipette for accurate delivery of small amounts of liquids in making absorption tests has been devised at the Bureau of Standards."

*Sample with bid:*

"Samples to show finish, softness, and formation only shall be submitted with bid. Five rolls will be furnished unless otherwise specified. . . . Samples are required with bid for the purpose of determining compliance with this specification only as to finish and formation the specification to apply in all other respects."

## TYPEWRITER RIBBONS

The *Federal Standard Stock Catalogue* furnishes the following specification for typewriter ribbons:<sup>35</sup>

"Typewriter ribbons shall be of the following types:

Type A. Single color:

Class (1), black record.

Class (2), black copying blue.

Class (3), blue record.

Type B. Two color:

Class (1), black and red record.

Class (2), black and red copying.

34. *Federal Standard Stock Catalogue* (1933), *op. cit.*, Specification No. UU-P-556, pp. 1-3.

\* A special and rather complex instrument is required for this test.

35. *Federal Standard Stock Catalogue* (1930), *op. cit.*, Specification No. DDD-R-311, pp. 1-5.

**Type C. Combined record and copying.**

Class (1), blue record and black copying blue.

*Fabric.* The fabric shall be made of cotton, thoroughly cleaned and combed and free from waste. It shall be evenly woven and free from an excessive number of avoidable imperfections of manufacture. The weave shall be plain and the yarn single ply.

*Inking.* All ribbons shall be nontype-filling, and all colors used in the ink shall be as permanent as possible. The ink shall be uniformly applied, and different weights of inking shall be furnished as required for elite or pica type and to produce satisfactory work on the different stroke machines. Copying ribbons shall give clear impressions and satisfactory press copies.

*Width.* Shall be uniform, and as required for the machine specified in ordering.

*Length.* (a) Ribbons wider than  $\frac{9}{16}$  inch. Shall be not less than nine yards.

(b) Ribbons  $\frac{9}{16}$  inch or less in width. Shall be not less than twelve yards.

*Thread count.* Warp, shall be not less than 135 threads per inch. *Filling,* shall be not less than 135 threads per inch.

*Thickness.* Shall be not more than 0.0057 inch.

*Inking.* Shall be uniform, of the color required, and otherwise as specified [above].

*Edges.* Shall be cut and properly gummed and shall not be wavy.

*Character of the writing.* Shall be satisfactory, as determined by tests given below.

*Type filling.* There shall be no filling of the type.

*Press copies.* Copying ribbons shall give clear and distinct press copies.

*Permanence of writing.*—*Black record ribbons.* There shall be no facing of the writing in 96 hours' exposure to direct, bright sunshine or 48 hours' exposure to arc or ultra-violet light. *Colored ribbons and press copies.* Writing done with these ribbons shall be easily legible after 48 hours' exposure to direct, bright sunshine or 24 hours' exposure to arc or ultra-violet light."

*Test for compliance:*

"One ribbon from each delivery of 200 dozen or less shall be sent to the testing laboratory in an original unopened container bearing all of the manufacturer's marks.

Visual examination of the sample shall be made to determine the nature of the edge and the character of the cloth in regard to its freedom from waste and avoidable imperfections of manufacture and to ascertain if the cotton had been combed.

The actual number of threads in one inch shall be counted in the filling direction at three different places and the results averaged. The total number of warp threads shall be counted and calculated to a basis of one inch.

The width shall be determined by laying the ribbon, without tension, on a flat surface and measuring the distance perpendicular to the length between the edges. Three measurements shall be taken at different places on the sample and the results averaged.

The thickness of the ribbon shall be measured at five different points, by means of any suitable gage, and the results averaged.

The ribbon as received shall be tested on a typewriter or a suitable automatic testing machine. If the ribbon as received is on a spool that will not fit the machine used in testing, it shall be transferred to a suitable spool.

Place the ribbon in the machine and wind two yards of its free end upon the empty spool. This is done so that the ribbon will shift a definite distance while making the following tests.

A sentence about thirty letters in length shall be written twenty-five times. At the beginning of each line the ribbon shall be reeled back to the starting point. (This is easily done by making a pencil mark across the ribbon at the point where it leaves the spool holder, or at any other convenient fixed point on the machine. The test can not be made by reversing the direction of the ribbon feed at the end of each line, because the ribbon will not travel the same distance in both directions. With some machines it is possible to prevent travel of the ribbon by raising the ribbon-feed pawl. If this can be done, it

is preferable to reeling back the ribbon each time.) The first line of the twenty-five shall be clear and clean, with no blurring of any of the letters. The last line shall be distinct and easy to read. The ribbon shall be allowed to stand at rest for one hour, after which another line shall be written. This line shall be as clear and distinct as the third line of the preceding twenty-five.

In testing copying ribbons, in addition to the above tests, press copies shall be made in the usual way. The copies shall be of good color, sharp, and easily legible.

The writing produced directly or by press copies . . . shall be half covered with black paper and exposed to direct, bright sunlight, or at a distance of about ten inches from an arc or ultra-violet light. Writing made with black record ribbons shall show no appreciable fading after exposure to direct sunlight for ninety-six hours or to arc or ultra-violet light for forty-eight hours. Writing made with colored ribbons or press copies therefrom, after exposure in a similar way to direct sunlight for forty-eight, or to arc or ultra-violet light for twenty-four hours, shall still be easily legible.

The small letter three shall be thoroughly cleaned and 800 impressions made with it with the normal feed of the ribbon. There shall be no evidence of filling of the type."

*Samples with bid:*

"It is believed that this specification adequately describes the characteristics necessary to secure the desired material, and that normally no samples will be necessary prior to award to determine compliance with this specification. If, for any particular purpose, samples with bids are necessary, they should be specifically asked for in the invitation for bids, and the particular purpose to be served by the bid sample should be definitely stated, the specification to apply in all other respects."

Two other details of the specification should be noted by anyone expecting to make use of it: Invitation for bids should state the type, class, and color of the ribbons, the make of machine on which they are to be used, and the kind of packaging desired. Only ribbons of type A class (1), should be used for writing permanent records.

The specification used by the federal government for the purchase of hectograph ribbons is substantially the same as the one given above. The following differences exist.<sup>36</sup>

Hectograph ribbons shall be of the following types:

Type A. Single color: purple.

Type B. Two colors: purple and red.

In place of the paragraph on inking (page 34) read:

*"Inking.* The ribbon shall be coated on one side only with ink suitable for typewriting on paper. The typed writing shall be transferable to a gelatin-glycerin film, or to hectograph clay so that copies on paper can be produced therefrom."

In place of requirements concerning permanence of the writing, requirements on the quality of the printed and hectographed writing are given. The writing produced when the sentence is written on the same spot on the ribbon for twenty-five times and the line written again after one hour, as directed in the first specification, "shall be transferred to a hectograph pad in the usual way, and twenty-five copies made from it. All of the copies of the first line of writing shall be easily legible." The requirement concerning tendency to fill type is omitted from this specification. All other requirements and tests are identical in the two specifications.

36. *Federal Standard Stock Catalogue* (1930), *op. cit.*, Specification No. DDD-R-291, pp. 1-4.

## CHAPTER IV

### CONCLUSION

It has been the purpose of this study to set up complete specifications for the purchase of the more costly school supplies. By a "complete specification" was meant one which not only completely described the item desired so that substitution of inferior goods was impossible without violation of the requirements, but also furnished tests to determine if the goods delivered actually were of the desired quality.

An examination of the two chapters immediately preceding shows that such specifications have been obtained for several of the items. In some cases these are so complete that no sample need be furnished by either bidder or purchaser until the goods are delivered. In other cases the purchaser furnishes a standard sample. In a few cases the bidder furnishes a sample of his goods with his bid to show certain particular qualities not objectively described in the specification.

#### INFORMATION OBTAINED

It is believed that the information obtained by this study will be of use to three types of persons: (1) The school purchasing agent who is not in a position to make use of specifications and competitive bids—the one in a small school system. Such a person still needs to know the important details to be considered in buying any particular item. These specifications furnish that information and, although the purchaser is not able to make the objective tests suggested, his knowledge of the points to be considered will enable him to avoid many of the low quality items offered him. (2) The purchasing agent who uses specifications, or who is considering their use. This person will find many suggestions for improving his own specifications by careful study of these. It must be remembered, however, that these specifications are presented solely on the authority of the source from which they were obtained. They have not been subjected to experimental use by the authors. (3) The person planning a study in school supplies. A number of problems raised by this investigation are mentioned below. No doubt there are several more which should receive attention.

From this study it will be seen that there are a number of commercial standardizing agencies which at least partly cover the school supply field. None of these seems to be complete enough to be dependable over much of the field.

The *Federal Standard Stock Catalogue* furnishes two services to the schools. (1) It offers a source of reliable specifications which are reasonably complete. The chief faults of the specifications from this source lie in the technical nature of the tests for compliance and the fact that the specifications are not particularly adapted to specific school needs. This last fault can be remedied by further study; perhaps the first cannot. (2) The "willing to certify" lists offer a means of selecting reliable firms to furnish school supplies. It is not clear just how much a school may relax its tests for compliance when buying from a firm on the "willing to certify" lists; probably not to any great extent.

## STUDIES NEEDED

To the best of the writers' information, this is the first study in which an attempt has been made to furnish specifications for the purchase of school supplies. As a result a number of problems have been raised which need further investigation:

1. A considerable number of schools over the country are using some sort of specifications at the present time. If these could be gathered together and edited into a consistent whole, using the best specifications from the various sources, the information now used by a few could be made available to all.

2. A similar study might be made by compiling those specifications used by big business concerns which also cover items used by the schools. Taylor's study<sup>1</sup> might furnish a starting point for this investigation.

3. A study should be made to the end that the normal cost per pupil of each of the school supply items shall be determined. Not only would this be of interest in itself, but it would tend to furnish a secure starting point for further investigation into the purchase of school supplies. At present there seems to be no information available which indicates the items on the supply list which are of major expense to the school and thus are most in need of investigation.

4. Each of the important items on this school supply list should be investigated with the object of producing the following information:

(a) The form and quality of supplies most adapted to school conditions.

A little work has been done along this line by Jenkins, Kelty, and O'Dell.<sup>2</sup>

(b) Specifications adequately describing this form and quality. It is thought that for some items this goal has been achieved in this study; but for many of the items it has not even been approached.

(c) Tests for compliance which require neither expensive apparatus nor extensive training on the part of the tester. In the case of some items—carbon paper, mucilage, paste, typewriter ribbons, and others—this goal has been reached by this study. For some other items, as writing paper and incandescent lamps, producing such a set of tests would seem impossible.

5. The possibility of some form of coöperative purchase or standardization of school supplies should be considered by state or national education associations. Perhaps a certification plan similar to the one used by the National School Supply Association<sup>3</sup> would be more suitable. Such an arrangement would not need to injure the present vendors who really have high quality goods to sell; and the elimination of poor quality goods would save the schools, and thus the taxpayers, a great deal of money.

This study then, furnishes additional information for the use of any school purchasing agent; but much additional study must be made before entirely satisfactory specifications will be found for school supplies.

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1. *Cf. ante*, p. 5.

2. *Cf. ante*, pp. 26, 28.

3. *Cf. ante*, p. 5.

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*Selection, Purchase, Storage, and Distribution of Supplies*. Committee on Supply Research, National Association of Public School Business Officials, John S. Mount, Secretary, Trenton, N. J., 1932. 58 pp.

A study on present practices in school supply management based on a questionnaire sent to member schools in 1930. Suggests a large number of problems which need study.

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Lists company's products and states whether or not they meet the appropriate federal specification. Discusses soap ingredients and tests for compliance. Nontechnical language.

*Sources of Supply of Commodities Covered by Federal Specifications*. Washington: National Bureau of Standards, 1934. Supplements Nos. 1 and 2 to Letter Circular 256a. 268 pp.

Contain a number of "willing to certify" lists and a description of this service.

*Standards for Paper Towels.* Washington: National Bureau of Standards, 1925. Circular No. 294. 6 pp.

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Need for clear specifications and adequate tests for compliance.

*Washing, Cleaning, and Polishing Materials.* Washington: National Bureau of Standards, 1930. Circular No. 383. 47 pp.

Discusses soaps, laundering and laundry aids, polishes of all sorts, sweeping compounds, and wall-paper cleaners. Designed primarily for home use.

## APPENDIX I

### A SPECIMEN "WILLING TO CERTIFY" LIST

In order to show the reader just what he may expect to find in the "willing to certify" lists, the list for fiber brooms\* is given here:<sup>1</sup>

Capitol Broom Co., Sigmund Eckstein, V.-Pres., Stokes Ave. & Reading R. R., Trenton, N. J.

Costello, J. S., & Son Brush Co., V. Brennan, Sec., 1108 Pine St., St. Louis, Mo.

Deshler Broom Factory, T. S. Struve, Treas., Deshler, Neb.

Empire Brush Works, A. Nellenberger, New York Representative, 130 W. Forty-second St., New York, N. Y.

Fuller Brush Co., W. F. Honer, Asst. Sec., 3580 Main St., Hartford, Conn.

Gardner Broom Co., Herbert P. Gardner, Mem. Firm, Chuctanunda Hill, Amsterdam, N. Y.

Indianapolis Brush & Broom Mfg. Co., R. C. Roberts, Sales Mgr., 26 Brush St., Indianapolis, Ind.

Lay, Joseph, Co., John E. Jellison, V.-Pres., P. O. Box 808, Portland, Ind.

Milwaukee Brush Mfg. Co., E. F. Streich, Pres., 2236 N. Thirtieth St., Milwaukee, Wis.

Osborn Mfg. Co., R. B. Jones, Sales Service Mgr., 5401 Hamilton Ave., Cleveland, Ohio.

Pioneer Broom Co. (Inc.), E. D. Blood, Sec.-Treas., 145 W. Main St., Amsterdam, N. Y.

Standard Brush & Broom Co. (Inc.), G. S. Schwartz, Pres., W. Water St., Portland, Ind.

One comment on the use of this list, and all the other "willing to certify" lists, should be noted:<sup>2</sup>

"In order to avoid delay and confusion, when placing orders and requesting certificates from "willing to certify" firms, the correspondence should always be conducted with the individual officer of the company whose name appears on the "willing to certify" list. This officer can be assumed to be familiar with the specification and with the plan for issuing certificates, whereas other officers of the same company may be unfamiliar therewith."

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\* *Federal Standard Stock Catalogue* (Superintendent of Documents, United States Government Printing Office, Washington, 1931), 4 pp.

1. *Sources of Supply of Commodities Covered by Federal Specifications*. (Washington: National Bureau of Standards, 1934), Supplement No. 2 to Letter Circular 256a, p. 7.

2. *Ibid.*, p. i.

## APPENDIX II

### TYPICAL LETTERS RECEIVED FROM VENDORS OF SCHOOL SUPPLIES

This appendix contains a copy of the letters sent to several vendors of school supplies, the names of the firms to which the letters were sent, together with a notation indicating the type of reply received, and copies of typical letters received from the firms.

The contents of the letters sent to each firm was as follows:

"In connection with the Kansas State Teachers College of Emporia we are doing some research into the purchase of school supplies. It is our intention to do one or more of the following three things: (1) Set up standards whereby the purchasing agent may personally evaluate the material offered him by salesmen. (2) Set up detailed specifications for use in purchasing supplies from responsible manufacturers. (3) Indicate where supplies of satisfactory quality may be obtained. It is our hope that the results of the investigation will be available to the public.

Do you have any literature on the subject which you would care to have us read? We assure you that any you may care to send will be given careful attention.

Are you acquainted with the specifications published by the United States Government in the *Federal Standard Stock Catalogue*, Section IV, Part 5? In many cases these specifications apply to items purchased by schools. Would you be willing to certify, when requested by a school purchasing from you, that your goods meet these specifications? If not always, would you so certify certain brands of your sales items?

The supplies which we are treating most completely are listed below, but information on any item used by the average school will be considered if obtained.

Blackboard crayon.	Mucilage and paste.
Blackboard erasers.	Paper; art, mimeograph, newsprint, typewriter, and writing (ink and pencil).
Brooms and brushes.	Paper towels.
Floor oil, furniture polish, and similar finishes.	Soap; scrubbing and toilet in liquid and cake form.
Fuel.	Toilet paper.
Ink; hectograph, mimeograph, printing, and writing.	Typewriter ribbons; record and hectograph.
Light bulbs.	
Mimeograph stencils.	

You will notice that only educational, janitorial, and office supplies are being considered. Equipment and building material are not included in this study.

Thank you for your attention to this matter. An early answer will be appreciated."

Copies of this letter were sent to the following firms—after the name of each is a statement concerning the reply received from the firm:

American Crayon Company.....	No answer.
American Floor Surfacing Machine Company .....	Not acquainted with federal specifications.
Anour Company .....	Do not handle any of the products mentioned in your letter.

Beckley-Cardy Company.....	Not acquainted with federal specifications.
Binney & Smith Company.....	Not acquainted with federal specifications.
Colgate-Palmolive-Peet Co.....	Consider federal specifications very usable.
A. B. Dick Company.....	No answer.
Ditto, Incorporated .....	Not acquainted with federal specifications.
Huntington Laboratories, Inc.....	There are no satisfactory specifications.
J. B. Ford Company.....	Answer ignores federal specifications.
L. C. Smith & Corona Typewriters, Inc.,	Not acquainted with federal specifications.
Palmer Products, Inc.....	Will guarantee our products to meet federal specifications.
Rowles Company .....	No answer.
Vestal Chemical Laboratories, Inc.....	Willing to certify.
Weber Costello Company.....	Not acquainted with federal specifications.

It will be seen that six of the fifteen firms replied that they were not familiar with the *Federal Standard Stock Catalogue*. All but one of this group either asked for further information or stated that they were sending for the federal specifications and would report on the matter at a later date. Thus far none of them has sent further information. The following letter from Beckley-Cardy Company is typical of the group.

"We thank you for your letter of February 27 with reference to our merchandise meeting government specifications. Offhand, we are quite sure that our products meet specifications; however, before stating definitely, we wish to consult the government specifications on the various items listed in your communication and to this end, we are writing to the Superintendent of Documents, Government Printing Office, Washington, D. C., for a number of the items in which you are particularly interested."

Three of the fifteen firms replied that they heartily approved of the use of federal specifications by the schools. Two merely stated that they would be glad to certify that their products met the federal requirements. The third, Colgate-Palmolive-Peet Company, sent a mimeographed booklet describing the federal specifications and indicating the trade names of their products which met the requirements. Their letter follows:

"This is in response to your letter of February 15 relative to your interest in research into the purchase of school supplies.

Answering your questions more or less in the order in which they appeared in your letter; first, we are sending you attached a copy of a bulletin on the subject of soap and soap products covering our recommendations on the development of specifications.

We are acquainted with the specifications published by the U. S. government and believe that if you will adopt them you will be able to purchase very satisfactory equipment and supplies of the type covered in those specifications. So far as soaps and soap products are concerned, we certify to the federal government that certain of our products, those marked in the bulletin attached, meet federal specifications as outlined.

So far as certifying to school boards that certain of our products meet specifications, we believe the procedure would be rather cumbersome. The better arrangement from the standpoint of convenience to all concerned would be to

ask for quotations on products meeting a specific federal specification, identified by number, and then hold the manufacturer or supplier to deliver a product meeting that specification.

We know that the above applies to soaps and soap products. However, we are not in a position to answer your questions in the matter of eraser, ink and other miscellaneous items you classify in your letter.

If you have any further questions relative to this work please do not hesitate to get in touch with us direct."

One firm thought the specifications inadequate for any purpose. Perhaps the sort of products—type, not quality—produced by them had something to do with their opinion of specifications. Their letter follows:

"Your letter of the 15th has been received and we are indeed pleased to send you some of our literature from which we hope you will be able to get some worthwhile information for your purpose.

One of the most difficult things we have to accomplish is to develop "bullet proof" specifications by which our products could be purchased, and, frankly, after twenty-four years of trying we have only succeeded in a mediocre way in this direction because it seems no matter how carefully a specification is drawn, it still leaves many loop holes for the unscrupulous dealer or manufacturer to crawl through. Another big drawback to standardized specifications is the fact that few purchasers have the proper facilities for checking up to see whether a product does or does not fully come up to the specifications, and this even applies on many of the federal government's own purchases.

We know of a case last week where the federal government purchased a cresol disinfectant which was supposed to meet U. S. P. requirements, and yet the product delivered doesn't even begin to come up to these requirements, but the possibilities are they will go on using it and nobody will know the difference, still those of us manufacturers who will not quote on anything excepting standard items get left out in the cold because our prices must of necessity be higher.

In the final analysis you want to remember that this is a business that lends itself readily to sophistication and the greatest security the purchaser can possibly obtain is by dealing with reputable firms who have a great deal at stake through their investment in their business and the reputation they have acquired over years of operation."