Appendix

For several years a regular feature of ASTM's monthly publication *Standardization News* has been a short contribution called "Terminology Update." A collection of these informal articles follows. They appear in the chronological order in which they appeared in the magazine. The articles have not been subjected to the peer review process used for the papers in this volume. Nevertheless, they offer insights that have been of value to many ASTM members. They have been indexed in the back of the book for the convenience of the reader.

TERMINOLOGY UPDATE

The Standing Committee on Terminology (COT) is writing this column on a regular basis to communicate directly with ASTM members, to solicit comments and participation in terminology development. COT thanks the Translation Bureau of the Secretary of State, Canada, and its publication, L'Actualite Terminologique (Terminology Update) for the title of this column.

Just to refresh your memory: the discipline of terminology is the field of knowledge treating the formation and naming of concepts. The terminology document is the aggregate of terms, definitions, symbols, and abbreviations representing a system of concepts in a specific field according to *Special Technical Publication* (STP) 806, *Standardization of Technical Terminology: Principles and Practices*. Definitions are the most important phase of terminology in ASTM standards work. ASTM technical committees are encouraged to convert their current definitions standards into terminology standards. In the same spirit, the names of subcommittees engaged in terminology or definitions development should include the word terminology.

Most technical committees have such a function in subcommittees called variously: definitions; editorial and nomenclature; nomenclature and definitions; nomenclature and technical data; editorial; nomenclature; editorial and definitions; definitions and nomenclature; nomenclature; definitions, and editorial; nomenclature, significance, and statistics; classification and nomenclature. What's in a name? Well, you get the idea: we need standardization. Happily, a score of committees have decided that their terminology function is vested in a subcommittee called terminology. This decision seems both logical and progressive.

Now, about the organization of a terminology document. At its recent meeting, COT discussed proposed revisions to Part E of the *Form and Style for ASTM Standards* or Blue Book. It is intended that detailed rec-

ommendations for the form and style of a terminology standard will be provided. Such a standard, as a minimum, should include terms and their definitions. But it may contain also nomenclature, units and symbols, preferred terms and depreciated terms, grouping of terms and their definitions by broad classes, and a thesaurus of terms only. The last is a comprehensive inventory of terms available in the specific field.

Why a thesaurus? A thesaurus literally is a treasury or storehouse. The inventory consists of all the words or terms specific to the particular technology or discipline. It can provide the terms needed to be defined, the terms needed for indexing, the terms needed for reference and automated retrieval or keywords, the relationship between broader and narrower concepts, and can be the guide for standardization of a discipline or field.

No ASTM technical committee has yet developed such a thesaurus, although several are planning to do so. Committee E-38 on Resource Recovery has recently published STP 832, *Thesaurus on Resource Recovery Terminology*, an admirable document that includes a definition for each term entry. It was developed by Subcommittee E38.93 on Terminology. Committee E-38 thus provides its adherents with a firm terminology for future guidance.

Reprinted from the May 1984 issue of Standardization News, *p. 63.*

TERMINOLOGY UPDATE

Should ASTM establish a terminology bank of standard terms and definitions? A terminology bank is a machine-readable data base consisting of specific terminology existing in branches of science, technology, economics, language, and other disciplines. An ASTM terminology bank would be based upon the existing *Compilation of ASTM Standard Definitions*, all developed by ASTM technical committees. Ideally, the terminology bank would be another form of ASTM publication, accessible, and for a user fee, to any on-line computer terminal to provide immediate access to standard ASTM terminology.

As with great variety of on-line systems now available, computer research capability can expand greatly the user audience so that more frequent reference to standard terminology would result. Business, labor, economics, law, legislation, and education all are now accustomed to using data bases. Libraries in each area of use generally provide the access terminals and data base subscription service. Among the widely used data bases are such acronymic titles as DIALOG, ORBIT, BRS, MEDLINE, LEXIS, NTIS, CA SEARCH, NEXIS, and BIOSIS. ASTM standards have the potential to form a widely used data base. This potential is under study by the Committee on Publications and by the ASTM Publications and Marketing Division.

Terminology banks are less well known; but several are operating now, usually in conjunction with multilanguage interests. In Canada, the Transla-

tion Bureau of the Secretary of State sponsored, in mid 1983, an international meeting of terminology bank operators and managers. Presentations describing their operations were made by five banks: the Commission of the European Communities, Luxembourg (EURODICAUTOM); Bundessprachenamt, Government of West Germany (LEXIS); Siemens AG, West Germany (TEAM); Office de la langue francaise, Government of Quebec (BTQ); and Translation Bureau, Secretary of State Department, Government of Canada (TERMIUM).

An important coordinating organization in this whole area is TermNet, sponsored by The International Information Center for Terminology (INFOTERM), established in 1971, within the framework of the United Nations. It is affiliated with the Austrian Standards Institute, Vienna; and functions in close cooperation with the International Organization for Standardization (ISO) TC 37 on Terminology (principles and coordination). For greater detail on these organizations, see *Special Technical Publication* (STP) 806, *Standardization of Technical Terminology: Principles and Practices.*

Program 2 of TermNet is designed to stimulate cooperation between subject specialists and terminologists with a view to record in machine-readable form existing terminologies, to keep these terminologies up to date, and to elaborate terminologies that do not yet exist with due consideration of user needs. This is a comprehensive undertaking, and a long-term project. The importance of terminology to ASTM committees warrants the development of a terminology bank that can provide interface with TermNet and its cooperating organizations. The practical problem now inhibiting such development is the need to make it financially self-supporting, as are all ASTM publications.

Could an ASTM terminology bank become self-supporting? The needs of legislators and of the lawyers involved in litigation for reliable standard definitions adopted by broad consensus of all interests probably would provide much of the financial support through frequent consultation of the terminology bank. Business interests, primarily in advertising and marketing, have need for ASTM standard terminology. No doubt other users needs occur to you. Let us have your opinions.

W. Ellis

Reprinted from the June 1984 issue of Standardization News, *pp. 54-55.*

TERMINOLOGY UPDATE

Maybe Edgar A. Guest was before your time, but in a certain age his poems were quoted in most households. In 1916, he wrote a poem called "Home," in which he said "It takes a heap o'livin' in a house t' make it home." No doubt he had not intended this opinion as terminology, but it turned out to be so. The words house and home are used synonymously in the vernacular, but in technical terminology they should have quite different meanings.

What called this recollection out of the memory bank is a recent activity by the Manufactured Housing Institute, whose adherents produce mobile homes.

That is, they used to, but now they are termed manufactured homes. This change in terminology was recognized in the Federal 1980 Housing and Community Development Act. Committee E-6 on Performance of Building Constructions has a standard definition for a mobile home, and was asked to change the term to manufactured home, using the same definition.

Now, a mobile home/manufactured home is defined by E-6/Housing and Urban Development (HUD) as "a structure built on a permanent chassis- . . . transportable. . . " But in considering the request to change the name, E-6 realized that there are other types of manufactured housing not built on a permanent chassis. It considered that the broad term, manufactured home, covers more than one type and, therefore, could not be defined in the restricted sense of 'permanent chassis.' Subcommittee E06.94 on Terminology of Building Constructions is attempting to change its mobile home terminology to accommodate the industry need.

To get back to Edgar Guest, technically speaking, homes are not manufactured; although houses certainly are. Houses may be "stick-built," constructed on site, or partially or wholly constructed in a factory and transported to the ultimate site. But homes come into being when people occupy houses as dwellings. A home does not have to be a structure. A home can be a cave, a boat, a tent, or a truly mobile home such as a motor home.

The point in bringing up these examples is to indicate the need to examine related terms when defining a concept for standardizing purposes. Perusal of that oldest thesaurus, Roget's, reveals that the broad term for a house is structure, while for a home it is habitation; two related but quite different concepts. This little exercise emphasizes the usefulness of a thesaurus in designing not only terminology standards, but also in picking the right term and the right definition in standardization. An earlier column touched on this theme. A specialized thesaurus as an inventory of terms explicit to each ASTM technical committee could be most useful in planning standardization of terminology.

For example, the *Thesaurus of Engineering and Scientific Terms**, lists:

(Broad term)	Residential buildings
(Use for)	Dwellings
	Housing
	Housing Projects
	Residences
(Narrower terms)	Apartment buildings
	Hotels
	Houses (use for Homes)
	Motels
(Related terms)	Buildings
	Garages
	Urban planning

Wayne Ellis

*Engineers Joint Council, New York, NY, 1967.

Reprinted from the July 1984 issue of Standardization News, *p. 48.*

TERMINOLOGY UPDATE

In 1914, a carload of shooks was quite a common railroad shipment. "Shooks?" you say. Yes, just part of the jargon of shipping containers. ASTM Committee D-10 on Shipping Containers was organized in 1914, when most shipping containers were wood barrels, kegs, crates, and boxes. The intermodal container was decades in the future, as were the concepts of packaging and the distribution environment. More jargon? Not exactly.

The terminology of packaging today is expressed in D 996, Definition of Terms Relating to Packaging and Distribution Environments. Once you could find therein definitions for shooks, kits, demijohns, magnums, and rock fasteners. But as such terms passed out of common use because of the onset of newer technology, D 996 was updated, the usual practice in keeping ASTM standards alive and current.

The first edition of D 996 was 48T, consisting of 132 terms and definitions relating to shipping containers. Many of them explained the jargon of the trade to those not conversant with the field; still a proper function of a terminology standard. In his classic, *Word Play* (Knopf, New York, 1974), Peter Farb said, "The argot of criminals and the jargon of lawyers, doctors, and professors differ from one another and from all other kinds of speech, but they share a similar function: to display in-group solidarity and to maintain a boundary against outsiders." Although those who employ the specialized vocabulary of jargon signal to others in their subgroup that they belong, such jargon does achieve economy of effort in speaking by using abbreviated versions of longer utterances. However deprecated, we will have jargon always with us. Standard terminology provides the medium to remove its mystery.

When Committee D-10 became the Committee on Packaging in 1968, reflecting its already *de facto* broader scope and the broadening of the whole technology, D 966 changed its title accordingly. But no change of content was necessary, because it contained the newer terminology of packaging. Currently, D 996-83a includes 214 terms and definitions. Subcommittee D10.11 on Terminology is now redrafting it in a new format in which related terms are grouped, while careful cross-referencing guides the searcher to the right group. This serves to bring together related and narrower terms of a given genus.

Probably the largest single user of packaging and shipping is the U.S. Department of Defense (DOD), (as you will note from other accounts of D-10 activities in this issue). For that reason, DOD is well represented on D-10, and it takes a lively interest in terminology standardization. A common difficulty here is to provide an ASTM standard definition of a concept, while retaining harmony with a necessarily "legalistic," military definition. Yet, the informal discussions within the consensus process usually lead to agreement on language acceptable to all interests.

As a major member of the North Atlantic Treaty Organization (NATO), DOD wishes to adopt international standards acceptable to NATO. Although there is not yet an International Organization for Standardization (ISO) standard terminology of packaging, it appears that D 996 is acceptable. The *Glossary of Packaging Terms*, American National Standards Institute (ANSI) Stan-

dard MH 15.1 has not been updated since 1979. It has the nature of an unabridged dictionary containing many entries not explicit to the packaging field.

Oh yes, about shooks, D 996-48T says they are, "the unassembled but completely fabricated parts of a box or crate." Glad you tuned in?

Wayne P. Ellis

Reprinted from the August 1984 issue of Standardization News, *p. 47.*

TERMINOLOGY UPDATE

As a sport, wrestling continues to be popular in school and college athletic programs; but wrestling with terminology commands attention not only in ASTM committees but in professional technical societies too. The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) established a terminology committee in 1983. It is a standing general committee, reporting to its board of directors through the Publishing Council. Its scope and purpose are to provide a central source and a coordinating body for all ASHRAE matters concerning terminology, including metric, and to oversee ASHRAE participation in the terminology work of other organizations, such as ASTM and the International Organization for Standardization (ISO).

The ASHRAE terminology committee has undertaken a major project to consolidate its terminology into a single comprehensive "Terminology of Air Conditioning, Heating, and Refrigeration." The current working draft (the seventh) runs to more than 200 pages of terms and definitions, and is fully entered on word-processing equipment. Publication is planned for 1985.

As for the wrestling, "standard air" is the term and definition currently on the mat. In a survey of ASHRAE publications, at least 14 definitions of standard air turned up. Probably they all intended to say the same thing, and none differs from any other by more than 0.38 percent, but they are not identical. So ASHRAE's Terminology Committee has prepared a proposed standard definition in both inch-pound and metric SI terms, as follows.

Standard Air, I-P: dry air at 70°F and 14.696 psi—70° was chosen because it is the temperature customarily used over many years. 14.696 psi is the equivalent of the standard atmospheric pressure, which is defined in SI units. At these conditions, dry air has a mass density of 0.075 lb/ft^3.

Standard Air, SI: dry air at 20°C and 101.325 kPa—20° was chosen because it is the reference temperature for a number of physical measurements, 101.325 kpa is the standard atmospheric pressure. At these conditions, dry air has a mass density of 1.204 kg/m^3.

ASTM has only one term and definition in this field, that of Committee F-11 on Vacuum Cleaners for standard air density found in F 558, Measuring Air Performance Characteristics of Vacuum Cleaners. It is consistent with the ASHRAE definition for standard air.

The ASTM Committee on Terminology (COT) is wrestling with the 31 standard definitions for density and 38 density related terms and their definitions. This is a dilemma of long standing. Former Committee E-8 on Nomenclature and Definitions sought to resolve the problem through the adoption, in 1925, of E 12-25, Definitions of Terms Relating to Density and Specific Gravity of Solids, Liquids, and Gases. Although it still exists as E 12-70 (1981), it is largely ignored by other committees. COT is trying to persuade committees to adopt uniform definitions for density, but the outcome of the wrestling match is still in doubt.

Of course, the density problem is only one of the many redundancies evident in the *Compilation of ASTM Standard Definitions*. Should our COT be authorized to referee the match by adopting a single ASTM standard definition for such a fundamental concept? Write!

Wayne P. Ellis

Reprinted from the September 1984 issue of Standardization News, *p. 48.*

TERMINOLOGY UPDATE

Legal Definitions?

"ASTM standards shall use terminology that is clear, explicit, and not liable to misinterpretation or misconstruction when referred to in technical operations, commercial contracts, or legal proceedings." So states the *Form and Style for ASTM Standards* (*Blue Book*), E1.2. Earlier editions suggested that standard definitions should be "correct to the point of legal interpretation," but the vagueness of this admonition led to its demise. What is the difference between a standard definition and a legal definition?

In some ASTM technical committees there have been opinions that a legal definition, one that appears in a code or regulation, could be adopted as an ASTM standard definition. One example is the definition for "manufactured housing" referred to in a previous *Terminology Update*. This definition is written in a narrower sense (restricted to a building on a permanent chassis, than the term implies), and thus does not meet the *Blue Book* rule that an ASTM standard definition should be written in the broadest sense of the term.

Another example comes from STP 834, *Definitions for Asbestos and Other Health-Related Silicates*. Therein, standard asbestos fiber is defined by a government agency as "any standard fiber of a regulated mineral." Plainly this example is at variance with the conceptual definition for asbestos fiber shown in the same publication.

When Committee E-40 on Technical Aspects of Products Liability Litigation attempted to write a standard definition for defect, ignoring the eight definitions for the term already existing in the *Compilation of ASTM Standard Definitions*, there was overwhelming objection on the part of members. The proposed definition was cast in the concept mode, but with a tinge of products liability use. It was defeated because of a sense that, although an engineering type definition might be suitable for nonlegal

uses, a definition in the legal area would be a problem in the courts. It was believed that the definition of defect in the legal sense should be a decision of the court concerned in a specific case.

A fourth example concerns the definition of standard. In attempting to write a conceptual definition, in contrast to the existing definition of an ASTM standard, the subcommittee balloted on the legal definition in the Office of Management and Budget (OMB) *Circular A-119 on Federal Participation in the Development and Use of Voluntary Standards*, a 49 word description that includes seven kinds of standards. The item failed acceptance because it was perceived to be unnecessarily wordy, not all-inclusive, and going beyond description of the concept.

These examples indicate that there can be a difference between legal definitions and ASTM standard conceptual definitions. In some discussions both types are recognized as needed, and there is opinion that both a conceptual definition and a legal definition for the same term should be included in terminology standards, with proper source attribution for the latter.

Such dual listing should be an exception. The clear and explicit terminology required by ASTM policy can best be achieved in a one sentence description of the concept, capable of standing alone. Legal definitions should be derived from conceptual definitions so that consistency in meaning is maintained. What do you think?

Wayne Ellis

Reprinted from the October 1984 issue of Standardization News, *p. 43.*

TERMINOLOGY UPDATE

Aqua unique est, Marcus Vitruvius Pollo might have said of water, one of the four primordial substances of Greek antiquity (water, fire, air, earth). He did say, "Water, filling an infinite number of practical needs, does us services which make us grateful because it is gratis." This first century B.C. architect and engineer understood well the terminology of water, both liquid and vapor, for in his ten books of architecture, he detailed the then current technology of how to find and handle it.

Professor John Tyndall's 1872 classic treatise, *The Forms of Water in Clouds & Rivers, Ice & Glaciers*, covered in greater detail than Vitruvius the origins and earth cycle of water in its several physical forms. Sadly, neither author prepared a glossary or vocabulary of water terms upon which later hydrologists (or is it aqualogists?) could expand or expound. No doubt the technical literature of water is extensive, and, given the ubiquitous presence of water, some such vocabulary should exist. Terminologists to the rescue!

The terminology of water in the common language is, of course, far-reaching because water has been talked and written about in most areas of society for ages. The *Oxford Dictionary of Quotations* at one time cited more than 100 memorable quotations on water (none of which is apropos here). My *Webster's Collegiate Dictionary* lists at least 129 water-related terms, to say nothing of the

hydro (Greek) and aqua (Latin) derivations. In all of this background of water terminology, why is there no single word in English for water in its three forms, solid, liquid, and vapor?

This question has been posed for a long time by Everett Shuman (see October *Standardization News*, p. 80), ASTM terminologist, engineer, and authority on problems of unwanted water in buildings. The three forms of water behave differently in their degradation of building constructions. To speak of the effect of water alone seems to Shuman not to be suitably explicit.

To beg the question, technologists talk of moisture problems in buildings. But Webster defines moisture as "liquid diffused or condensed in relatively small quantity," hardly encompassing the general inference of current usage. Shuman suggests *water-all* as a possibility. But, surely, ASTM linguistic experts can do better.

ASTM Committee D-19 on Water apparently has not defined the term; probably because water is both a general term, part of the common language, and a broad technical term covering many fields, and its meaning is well understood and not subject to dispute (*Blue Book*, E2.3). But would it be useful in a future edition of ASTM standard D 1129, Definitions of Terms Relating to Water, to include a thesaurus of water terms? Such a thesaurus could list the broad terms, the narrower terms, and the related terms associated with water. Those "not conversant with the field" (*Blue Book* language) could be instructed readily.

The terminology of water cuts across many of the disciplines represented by ASTM technical committees. A cursory review of scopes discloses that water is an essential component in materials standardized by 16 committees; and is itself a substance (wanted or unwanted) affecting the operations or services of 25 other committees. The terminology of water, therefore, is of interest to at least 41 ASTM committees. But the number of ASTM standard definitions concerning water is small indeed. Is there a terminology water gap here?

I am not suggesting that the Committee on Terminology needs to convene a coordinating group on this topic; but are there some water buffs in ASTM who need a terminology outlet?

Wayne P. Ellis

Reprinted from the November 1984 issue of Standardization News, p. 56.

TERMINOLOGY UPDATE

Probably the first engineering project to run into trouble because of language problems was the Tower of Babel, but it was not the last one. Although great progress has been made, misunderstandings because of the inaccurate use of words has not disappeared. It is the major function of the Committee on Terminology (COT) to help in minimizing this problem by promoting the writing and use of standard definitions in all ASTM methods and specifications. These definitions should conform to the requirements of Part E of the *Form and Style for ASTM Standards*. The *Compilation of ASTM Standard Definitions* is a record of what has been accomplished so far.

Ideally every technical term should have one standard definition. This however, is not realistic because many words have acquired quite special meanings in various technical fields. In this case, to avoid confusion, such terms should be delimited to the fields in which they are applicable. The related situation in which the same term has a number of essentially identical definitions is clearly undesirable.

In my capacity as chairman of Working Group 3 on the ASTM *Compilation*, I have become aware of the extent of this problem of redundant definitions. One example, mentioned by Wayne Ellis in his "Terminology Update" for August 1984, is the term "density" for which 31 definitions are listed in the *Compilation*. Many other horrible examples of unnecessary redundancy could be cited. In some cases two subcommittees of the same technical committee have different definitions of the same term. It is my goal to improve this situation and I ask for cooperation from the technical committees and particularly their terminology subcommittees in reaching this goal. In the near future I will make specific suggestions to some committees for the minor, essentially editorial, changes needed to eliminate the most glaring redundancies. **E. J. Rosenbaum**

Reprinted from the January 1985 issue of Standardization News, *p. 23.*

Terminology Update

Reducing Redundancies

Before World War II the field of molecular spectroscopy was practiced by a small number of dedicated specialists who were thoroughly familiar with their subject. They communicated easily with each other and terminology was considered of minor importance. This situation changed radically after the war due to the almost explosive development of analytical applications and instrumentation for molecular spectroscopy. Large numbers of chemists with no spectroscopic background began to apply the new methods of chemical analysis. The need for authoritative and clearly written standard practices was recognized. The correct use of technical terms became important in minimizing misunderstanding.

It was at this time that Committee E-13 on Molecular Spectroscopy had its beginning. One of the first subcommittees of E-13 was E13.05 on Terminology. For over 30 years this subcommittee and E-13 have had a healthy influence on the terminology of molecular spectroscopy. An early accomplishment was the depreciation of the terms "optical density" and "specific extinction coefficient" and their replacement by "absorbance" and "absorptivity," which have won almost universal acceptance. More recently, the development of applications of newer branches of molecular spectroscopy, such as nuclear magnetic resonance spectroscopy and internal reflection spectroscopy, has led to the writing of standard practices for these fields and the needed standard definitions. Subcommittee E13.05 has made important contributions to good terminology for these very useful methods of chemical analysis.

Good terminology requires that each technical term, to the extent possible, should have one definition. Of course, some terms have acquired different definitions in different contexts. In this case such terms should be delimited to their fields of application. However, the existence of nearly identical definitions for the same term can lead to confusion. The term absorbance can be cited as an example.

The *Compilation of ASTM Standard Definitions* includes eight definitions of absorbance from seven different technical committees. All of these definitions are essentially the same and only editorial changes are needed to write a single, common definition. The basic definition of absorbance, consistent with all of the definitions in the *Compilation* is: the logarithm to the base ten of the reciprocal of the transmittance.

$$A = \log_{10}\left(\frac{1}{T}\right)$$

If any technical committee desires additional explanatory material, this can be put into a discussion section, which would appear in the committee's standards but would not be included in the *Compilation*.

This example of redundancy is far from the worst. The *Compilation* includes 31 definitions of "lot," 30 definitions of "density," and 23 definitions of "sample." It is evident that such redundancy is undesirable. With the cooperation of the technical committees, the number of redundant definitions can be greatly reduced.

E. J. Rosenbaum

Reprinted from the February 1985 issue of Standardization News, p. 19.

TERMINOLOGY UPDATE

Dictionaries

NID3, OED, ACD, MW9, RHCD, AHD—all are abbreviations[1] representing dictionaries of the English language, 53 of which are critically reviewed in Sydney I. Landau's new work, *Dictionaries: The Art and Craft of Lexicography*, (New York: Charles Scribner's Sons, 1984). In the terminology activities of ASTM technical committees, members make frequent reference to common language dictionaries. So these workers will find ample interest in Landau's comprehensive treatment of the broad field; although they are not likely to encounter more than ten of the 53 referenced works.

In a review of Landau's book, Laurence Urdang, a distinguished professional lexicographer and publisher, said "As to content, Landau does an excellent job of revealing to the reader many aspects of dictionaries and of dictionary making that will be of interest to those who are unfamiliar with the art and craft of lexicography" (*Verbatim, The Language Quarterly*, Autumn 1984). "Dictio-

naries is the most informative and useful book on the subject that has come to my attention."

Readers of *SN* will recall the article, "Standard Terminology: Is Webster Adequate?" in the April 1984, issue. Therein I commented on the need for caution in assuming that common language dictionary definitions can be adopted, out-of-hand, by reference, as ASTM standard definitions. This is because of possibly confusing multiple concepts or meanings, or too broad usage. I further recommended that acceptable *Webster* definitions be quoted, rather than just cited, so that as a dictionary definition changes with changing word usage, the standardized definition would not be lost.

Landau devotes a whole chapter to the subject of usage, and confirms that usage dictates meaning; for example, meanings can change as usage mutates. He seems to deplore such changes in the meaning of scientific terms, but only if not properly labeled: "It is of great practical importance to label archaic and obsolete usages to alert the user that these terms should not be naively employed in a present day scientific paper. One must therefore rely on the rather subjective and variable experience of experts and try the best one can to convey a consistent message regarding what constitutes obsoleteness and archaism. When dealing with a large number of specialists, some of whom have only a primitive grasp of dictionary practice and little intuitive feeling for the use of language, uniformity of treatment of currency is impossible." This is a philosophy not inconsistent with discussions within the ASTM Committee on Terminology (COT).

COT's concern with its *Compilation of ASTM Standard Definitions*, wherein multiple definitions of the same term need delimitation (also known as field labeling), is addressed too by Landau: "In technical dictionaries, the broader the scope of the work, the easier—and more essential—is the application of field labels . . . The more specialized the work and the more professional the intended audience, the more difficult it is to label by field . . . The more specific and fuller definitions of a professional dictionary tend to branch out and intersect with other subdisciplines."

So, ASTM is not alone in its terminology complexities. It is useful to learn how others operate. Thus, Landau's *Dictionaries* is recommended reading for ASTM terminologists.

W. P. Ellis

[1]*Webster's Third New International Dictionary, Oxford English Dictionary, American College Dictionary, Webster's Ninth New Collegiate Dictionary, Random House College Dictionary, American Heritage Dictionary*

Reprinted from the March 1985 issue of Standardization News, p. 15.

TERMINOLOGY UPDATE

More on Calibration/Standardization[1]

Do these two terms have the same meaning? The *Compilation of ASTM Standard Definitions* lists quite a few definitions of the terms calibrate/calibration

and standard/standardization as they pertain to measurement instruments or devices. Examples are: "calibration—determination of the values of the significant parameters by comparison with values indicated by a reference instrument or by a set of reference standards," and "standardization—the procedure used to verify or adjust instrumental response to conform to the analytical curve established during calibration." These indicate that calibrate and standardize mean pretty much the same thing.

Indeed, Merriam-Webster's Eighth *New Collegiate Dictionary* (MW8) said as much in introducing another meaning for calibrate: "1) to determine, rectify, or mark the graduations of (as a thermometer), 2) to standardize (as a measuring instrument) by determining the deviation from a standard so as to ascertain the proper correction factors." (MW9 carries the same two definitions.) But in MW7 (1976) the second definition did not appear. What caused the addition? Is it possible that the editors recognized the congruous ASTM definitions as representing current usage. Dictionary definitions change, as language usage changes.

The original meaning of calibrate was "to mark or correct units of measurement on a gauge." Standardized meant "to bring to a specified standard as to quality or ingredients." Has usage created a paradox by merging the concepts?

In the Committee on Terminology (COT), the task group on the *Compilation* has encountered this question in its review of redundancies therein. One view is that calibration should mean only the establishment of measurement units for an instrument or device; and standardization would mean only the establishment of conformity to a reference standard. What do you think?

Have you ever compared the definitions in your committee's standards with their equivalents in *Webster's* or in the *Compilation*? This is a recommended terminological catharsis that sometimes results in improved standard definitions. Such an exercise continues the age old debate in ASTM on the validity of adopting dictionary or textbook definitions of technical terms, compared to the development of explicit definitions differing from them. Vague or multiple, confusing definitions from common language dictionaries call for clarification as an ASTM standard definition. Very often, however, the dictionary definition is quite acceptable; then it is desirable to include it (with credit) in the ASTM terminology standard.

These and similar topics were discussed during the COT meeting February 27 and 28. Planning for another terminology symposium, and the development of terminology assistance projects and procedures to help technical committees that want advice or assistance were other agenda items. If you can attend a future meeting to present problems or helpful experiences in terminology, COT will be most interested. If not, please send in your terminology questions. The new chairman of COT is James R. Gaskill, 875 Estates St., Livermore, CA 94550.

Wayne Ellis

---

[1]A follow-up to W. R. Kennedy's article "Calibration—Standardization," *SN*, February 1985, p. 37.

Reprinted from the April 1985 issue of Standardization News, p. 19.

TERMINOLOGY UPDATE

Tribology Terminology

Tribology has been defined as the science and technology of interacting surfaces under relative motion. It is, in other words, the study of friction, lubrication, and wear. Practitioners have entered tribology from a wide variety of technical backgrounds and consequently, the field is plagued with numerous inconsistencies in its operational definitions. Obtaining consensus definitions even within Committee G-2 on Erosion and Wear's subcommittee on terminology is a very slow process involving protracted discussions, and attempting to obtain consensus agreement across the society from other committees whose work involves some aspect of tribology could extend the process still further.

In attempting to develop test methods and failure criteria in tribology, unambiguous definitions are of course essential. Without being clearly defined, a certain type of wear damage cannot be tested. Consider, for example, the concept of galling. This term is frequently encountered in connection with failure analysis, and some laboratories have developed galling tests. When pressed to define in words just what galling is, even experienced tribologists may have trouble, despite their claims that they know it when they see it.

Terms such as galling, scuffing, and adhesive wear have been used interchangeably in many instances even though many will argue that they are hardly the same thing. There is often no hesitancy for creating new hyphenated terms when examining component failures in the field. For example: fretting-abrasion, erosion-corrosion, fretting-fatigue, and scuffing-abrasion. This obviously leads to even more confusion and inconsistency.

Many of the current working definitions for tribological terms have come about as a result of the scale of magnification used to examine the wear surfaces. A machine operator, having just removed a failed bushing, may squint at the surface, mutter "scuffed," and loft the part into the scrap bin. On the other hand, a tribology consultant may place the same part into a scanning electron microscope and prepare a detailed report on the fine details of the damaged surface using terms like microscoring, surface excrescences, and others without mentioning an all encompassing term.

In 1985, the ASTM Committee on Terminology (COT) created Terminology Coordinating Group 7 on Tribology. One major goal of the group is to reduce the redundancies and multiple definitions for tribological terms across the society. For example, the 1982 edition of the *Compilation of ASTM Standard Definitions* contains six definitions for abrasion, six for abrasion resistance, two for abrasive wear, four for erosion, four for friction, seven for coefficient of friction, and five for wear. As Eugene Rosenbaum pointed out in this column (February 1985), reducing redundancies is a key concern for any society that promotes standards. As he also indicated, sometimes several meanings are necessary depending on the context of usage, but these can and should be handled through the judicious use of delimiting phrases ahead of the definitions.

Clearly, tribology terminology presents some of the greatest challenges to the terminology standardization process, but these challenges must be met if testing and evaluation in this multidisciplinary field are to develop fully.

Peter J. Blau

Reprinted from the May 1985 issue of Standardization News, *p. 15.*

TERMINOLOGY UPDATE

Bar; Bar: Who's Got the Bar?

In the metal products industries, fabricators use large quantities of bars, strips, sheets, and plates of steel and other metals. The nonexpert would accept the common language definitions of these terms without a second thought, but buyers and sellers of such materials need standard specifications and tests to define them in specific language. In the *Compilation of ASTM Standard Definitions, 5th ed.*, there are seven definitions for bar, 12 for strip, 11 for sheet, and six for plate. These come from 34 different ASTM standards distributed among seven ASTM committees. It should be emphasized that each of these definitions appears in standard specifications, and not in a general terminology standard. It can be rationalized that each is really a "description of a term specific to the standard," and thus can be anomalous. But does this help the nonexpert?

This disturbing disparity came to light in Subcommittee E06.56 on Performance of Railing Systems and Rails for Buildings, which is developing a new standard on definitions of terms relating to permanent metal railing systems. In seeking existing standard definitions for plate and sheet in the *Compilation*, the task group was frustrated by the variety of standards.

There seems to be general agreement in the metals industry on the broad meanings of these basic product terms. A bar is an elongated product of uniform cross section, usually rectangular, circular, or hexagonal. A strip is a flat product, approximately rectangular in cross section, in which the thickness is small relative to the width, and the length is very great, so that the product is normally coiled up after the last rolling pass. A sheet is understood to be a flat product usually not over 1/8 in. thick, although some classifications include the 3/16 in. thickness. Note here the essential introduction of dimensions.

A plate is a flat product usually over 1/8 in. thick, but in some classifications, sheet includes the 3/16 in. thickness, plate starting at 1/4 inch. These definitions come from Osborne's *Encyclopaedia of the Iron and Steel Industry* (1967), a British publication, and are not necessarily accepted in U.S. practice.

None of these general meanings is adequate for the purpose of specifying materials for purchase or for product design. It becomes essential, then, that specific dimensions be stated. It is in defining these four terms by dimensions that the ASTM committees have adopted different standard meanings. The experts participating in the development of these standards have no difficulty in interpreting them. As always, it is the nonexpert who needs help because of the legitimate need to know. E06.56 is in the category of nonexpert.

How can this difficulty be resolved? Subcommittee E06.56 has sought advice from the committees that originated the various and conflicting definitions. But, it is not likely that a clear consensus can emerge. Probably E06.56 will adopt standard definitions acceptable for its own purposes, suitably delimited of course, and the *Compilation* will duly include them.

This example of terminological difficulties in standardization has been reported here because it is typical of many others that result in redundant entries in the *Compilation*. The Committee on Terminology (COT) has reviewed this problem on many occasions. Indeed, it actively seeks to minimize and to reduce redundancies through its coordinating groups. There are at present eight terminology coordinating groups established in fields of fire terminol-

ogy; physical/mechanical terminology; statistical and sampling terminology; viscosity terminology; environmental effects terminology; tribology terminology; heating, ventilating, air conditioning, and refrigerating terminology; and computer related terminology. Each group is composed of liaison people from concerned committees. Their goal is to agree on specific definitions, which then are offered to the committees for their adoption as coordinated definitions.

The first level of terminology coordination should be within the committee. In the example cited, incongruent definitions exist within committees. It should be the responsibility of terminology planning to inventory a committee's terms and definitions, and then, to develop one or more terminology standards to document a coherent and consistent terminology. **Wayne Ellis**

Reprinted from the June 1985 issue of Standardization News, *p. 21.*

TERMINOLOGY UPDATE

Is a Definition Needed?

Certainly the first and possibly the hardest question a nomenclature subcommittee needs to address is, "Does this term need a definition?" The ASTM style guide offers both general and specific criteria that can assist the subcommittee in deciding about need, but in the last analysis it is a judgement call. One emphasis in the style guide concerns the potential audience or users of the definition.

There is an obligation to help ensure that standards will be properly understood and precisely interpreted. This would have a term defined if it might minimize the possibilities of confusion or error. The objective might, therefore, be to emphasize that terms like viscosity or softening point are being used precisely and as measurable quantities, rather than in merely a general sense. When such an emphasis is needed can be debated, but does seem to be a worthy basis for justifying a definition. Those responsible for definition writing in ASTM are always advised to check the *Compilation of ASTM Standard Definitions* and, if at all possible, select a definition to adopt word-for-word. It will lead to an enhancement of the value of all standards if terminology is standardized as much as possible.

The dictionary generally lists several possible definitions for a term. The selection of the particular sense in which a term is used could cause ambiguity or, at the least, cause someone to waste time contemplating the meaning to be attached to a term. Specifying which of several possible senses is to be associated with a term is, therefore, a reason for defining it.

Those who read and use standards include many who are unfamiliar with the particular language of the field. Many of the usages in a field started as local jargon that later became normal use. This third justification serves the newcomer to a field as well as the broader community of the interested or occasionally concerned public. The noun, fly, associated with textiles as fibers that fly into the atmosphere during textile processes, might be comprehensible as an

attributive sense of the verb, to fly, but it clearly simplifies comprehension of the reader to have it spelled out in a definition.

The three principal reasons to define a term are: to emphasize the precision of usage, to specify which of several dictionary senses are intended by a term, and to inform the reader of unusual senses of a term.

A final, crucial point in considering the need for a definition is associated with terms like: stainless, safe, vapor barrier, and pure. If these or similar qualitative adjectives are needed in a standard and might be taken to mean an absolute, unqualified, or unconditional property, a carefully crafted definition is essential. Questions of liability or adherence to governmental regulations can rest on issues of meaning for such terms.

Richard Strehlow

Reprinted from the July 1985 issue of Standardization News, *p. 28.*

TERMINOLOGY UPDATE

Definitions and the Desire to Write an Essay

Oh, it is so tempting to write at length when writing a definition. Experts enjoy telling others of the complex wonders and sophistication of their specialty. It is fun to teach and, yes, to show off a little cleverness and thoughtfulness. However, yielding to this pleasure can ruin a definition.

By indulging in the joy of analysis, a cumbersome paragraph can result, filled with the detail of a definition. When this happens, the essence of the term's meaning is obscured or lost. The reader wastes time and energy interpreting the purported definition. In this case, the job is really left half done or rather, not done at all.

Analysis of the full set of meanings and significance is an important first step in defining a term. But, the object of the work is to produce a crisp, clear, and concise definition. Start with a book or a paragraph, but the objective is to produce one simple and clear declarative statement that says what a term means. In the *Compilation of ASTM Standard Definitions* there are many definitions that violate the simple precept that brevity is a virtue.

Statistical concepts are especially vulnerable to wordiness. Of the eight technical committees of ASTM that have defined the term bias as reported in the ASTM *Compilation*, only three were able to define the term without requiring added sentences or expressions to clarify and elaborate the definition.

The term variance has several standard definitions as listed in the *Compilation*. Committees C-26 on Nuclear Fuel Cycle, D-1 on Paint, and Related Coatings and Materials, D-5 on Coal and Coke, D-11 on Rubber, E-4 on Metallography, E-15 on Industrial Chemicals, and F-10 on Meat and Poultry have all attempted to define the term. Only one of the two definitions by D-11 is contained in a single statement, and it refers to standard deviation. None of the others have been so condensed.

A perusal of the term standard deviation, reveals nine definitions that are

standard, four of which are expressed in simple form without added comment, elaboration, or explanation. Committee D-11, in one of its two efforts at definition, had one that seemed quite useful from a laymen's viewpoint, "a measure of the dispersion of a series of values about their average, expressed as the square root of the variance." The operational definition of C-26 as "the positive square root of the variance" also presents a clear and succinct statement.

A final statistical term, "lot" is represented by almost 40 standard definitions many of which are not brief because they are extended descriptions of a lot for a particular standard, rather than definitions of the concept. For example, there are lots of pipe, wood units, asbestos fiber, and thermal insulation; all of which lack brevity.

When a definition is not brief, it is well to ask if there is not a better way to handle a needed explanation. If the term is not actually being defined, the explanation may better be labeled as a description rather than a definition in the terminology section of the standard. However, when providing a needed definition, brevity should always be one principal goal.

Richard A. Strehlow

Reprinted from the August 1985 issue of Standardization News, p. 26.

TERMINOLOGY UPDATE

Alligators and fish mouths and shark fins, oh my!

No, they are not the dangers in the Black Forest in the magic Land of Oz; they are some conditions found on roofs. Sentences like: "I saw alligatoring, fish mouths, and shark fins on a cricket," or "there is a holiday in the headlap and the surface has strawberries and a mole run," might be totally incomprehensible to you, if you are outside the roofing industry, and did not have a copy of D 1079, Definitions of Terms Relating to Roofing, Waterproofing, and Bituminous Materials, available at the moment.

The first publication of D 1079, in 1950, contained relatively few terms. The inadequacies of this first effort were identified in the late 1970s, and a massive effort by many ASTM members resulted in the greatly expanded 1979 edition of the standard.

Since the 1979 edition, there has hardly been a year without some revision, usually additions, to the standard. The edition published as D 1079-84, in Volume 04.04, 1985, has over 200 terms defined.

The revision and constant updating of D 1079 differs from the periodic revisions of most standards, and reflects the dedication and responsiveness of the editorial subcommittee, and the interest of most of the members of D-8 on Roofing, Waterproofing, and Bituminous Materials.

The ongoing revision process has the following general pattern: suggestions for new or revised terms are obtained from the members of D-8. The proposed terms are separated into terms with clear meaning, terms that are clearly defined in most currently used dictionaries, and obscure terms or terms that have special meanings within the roofing, waterproofing, and bituminous materials segments of industry.

Self-evident terms or terms that are adequately defined in currently used dictionaries are dropped from further consideration, because there is no desire to reproduce an unabridged dictionary as a standard.

The remaining terms proposed are looked up in the *Compilation of ASTM Standard Definitions* to see if any have been defined by other ASTM committees. If the term is not yet defined, a definition is proposed, modified, and polished until it passes subcommittee ballot in D08.01 on Nomenclature, Definitions, and Editorial, D-8 main committee ballot, and is added to D 1079.

If the term has one previous definition in ASTM, the published definition is reviewed for its adequacy for D-8's interests. If adequate, the published definition is balloted in D08.01 and D-8. If the published definition is clearly inadequate for the special needs of D-8, a new definition is proposed, modified, polished, and finally added to D 1079.

Sometimes, terms have several different definitions in various ASTM standards. In that case, the definition previously accepted by the largest number of ASTM committees is usually accepted. The members of D08.01 try to avoid adding a new definition for terms previously defined by other committees, unless absolutely necessary.

D08.01's work is complicated by regionally different terms with the same definition such as blueberries, raspberries, and strawberries, which all mean the same thing. Some terms, if used without modifiers, could be misunderstood, such as "square," 100 $ft.^2$; "factory square," 108 $ft.^2$; and "sales square," enough roofing to cover 100 $ft.^2$ of substrate.

In short, to know "asphaltite" from "holiday," refer to D 1079. Anyone interested in this work, should join D-8 and ask for assignment to D08.01.

Carl G. Cash

Reprinted from the September 1985 issue of Standardization News, *p. 20.*

TERMINOLOGY UPDATE

A Few Pet Peeves

As one who has a profound respect for the precision of language, I always have a few pet peeves about usage that have gone astray. These peeves change with time. Perhaps I become accustomed or perhaps jaded to the misusage and no longer care. Here are a few from the current crop.

Conformance or Compliance

As an outgrowth of American industry's rush to improve the quality of its products, the trade literature is being filled with articles dealing with the need for specifications. As defined in ASTM, specifications are usually expressed numerically.

Some authors call for conformance to specifications while others call for compliance. For maximum understanding, the two terms should not be used interchangeably. A good rule of thumb to distinguish between the two is to use conformance only in referring to number systems and compliance in referring to prose. Thus, one conforms to specifications and one complies with federal regulations.

Imply or Infer

Correct usage of these terms depends on the type of action and who is acting. To imply is to suggest or to make a less than forthright statement. To infer is to draw conclusions from a less than forthright statement. Thus, I infer from what I thought you implied and you infer from what you thought I implied. It is highly probable that there is great difference between what you said and what I thought you said and vice versa. Thus, the need for ASTM's consensus process, agreement on the meanings of terms before work is started on any standard, and publication of key definitions in each standard.

Less or Fewer

A number of years ago, a television commercial claimed that children who used a certain toothpaste got "less cavities." Eventually, the commercial was changed to "fewer cavities" but the damage was already done. The latest editions of the *Merriam Webster Collegiate Dictionary* show fewer and less as synonyms. Historically, less has referred to an abstract amount, degree, or value, whereas fewer has referred to number, items that could be counted. For example, I have less time to sleep than formerly. Therefore, I sleep fewer hours.

Assure, Ensure, Insure

I assure you that you did right to ensure that the clerk will insure the package before shipping it. In this sentence the words assure, ensure, and insure convey razor sharp meanings assuming one understands the differences among them. For the record, assure gives confidence, ensure makes certain that something happens, and insure deals with financial renumeration in case of loss. Yet so frequently these words are used one for the other, that their dictionary meanings are becoming blurred and eventually will be indistinguishable. In a 1975 survey of 136 distinguished authors, editors, columnists, and other wordsmiths, only 62 percent knew the differences, and worse yet, many did not care.*

Language changes, we cannot stop it. But when, by ignorance or indifferences, we abuse and misuse words, our ability to communicate is diminished and we all are the poorer for it.

Herbert T. Pratt

*William and Mary Morris *Harper Dictionary of Contemporary Usage*, Harper and Row, 1975, pp. 218–219.

Reprinted from the October 1985 issue of Standardization News, p. 20.

TERMINOLOGY UPDATE

Fatigue and Fracture

As is widely recognized in the ASTM technical community, an ASTM terminology standard is a useful reference for technical work such as standards development and report writing. What is frequently overlooked is the breadth of the possibilities that exist for expanding the usefulness of these already useful desk side references.

Part E of the *Form and Style for ASTM Standards* gives guidelines for the "Preparation and Use of Terminology in ASTM Standards." In E 2.6.1, it is recommended that "Each ASTM technical committee should maintain a terminology standard containing all definitions, abbreviations, symbols, etc., developed by that committee. This terminology update is mainly concerned with the "etc." of that recommendation.

In this issue on Fatigue and Fracture, it is worth identifying the pertinent ASTM terminology standards for these two committees. Committee E-24 on Fracture Testing has a single terminology standard, E 616, Terminology Relating to Fracture Testing. Committee E-9 on Fatigue has four separate terminologies for each of four closely related fields involving fatigue: E 206, Definitions of Terms Relating to Fatigue Testing and the Statistical Analysis of Fatigue Data; E 513, Definitions of Terms Relating to Constant-Amplitude Low-Cycle Fatigue Testing; E 742, Definitions of Terms Relating to Fluid Aqueous and Chemical Environmentally Affected Fatigue Testing; and E 912, Definitions of Terms Relating to Fatigue Loading. Each of these is a useful guide for part of the field.

The Part E recommendation suggests that a multiplicity of separate terminology standards will have greater value if they are combined to form a single terminology standard for a technical committee. One clear benefit of the single terminology standard is that it provides workers in the technical committee an opportunity to observe the state of their terminology. A unified standard also reveals nonuniformities, conflicts, and redundancies.

Commonly, a terminology standard is regarded to be a compilation of definitions and descriptions of terms used in a given document, in a set of documents developed by a subcommittee or committee, or in a technical field. In addition, a terminology standard can serve other roles for those both within and outside the field for which the terminology is developed. Thus, the possibility of expanding a terminology standard in ways that will benefit other potential users should be kept in mind. The fact that such a standard is used by workers other than the technical specialists in the particular field for which it is written should not be overlooked. Other potential users include students, workers in related fields, specialists in legal matters, and linguists making translations. It is this breadth of users and uses that should prompt a want to expand the usefulness of the core of a terminology standard, which is the standard definitions. In this way, the many hours of technical work involved in the ASTM consensus process used to develop definitions will have the greatest impact.

One of the possibilities for a terminology standard is that it can be an ele-

mentary, tutorial guide to understanding. Committee E-24 has chosen to structure its terminology relating to fracture testing with this idea in mind. E 616 presents its standard definitions in an unconventional sequence, with the most basic definitions appearing first and definitions presented later calling on those given earlier. Alphabetical lists near the beginning of the document assist the reader in locating any definition. One list gives the term and the section where it is located. The other gives symbols and the terms that they represent.

Illustrations and tables can be very effective in condensing a great amount of information and for establishing conventional usage. They can be referenced in definitions and notes, and used to present complex concepts and relationships. For example, E 616 uses a figure to illustrate the customary coordinate system and designations for components of stress at a crack front; E 912 has two figures that clarify the meanings of basic terms used in fatigue loading.

Both an annex and an appendix may provide an additional means of expansion of the usefulness of a terminology standard. The possibilities are numerous; a thesaurus of terms used in a given technical field; a bibliography indicating useful supplementary works; supplementary information that explains concepts and practices developed within the documents developed by the technical committee responsible for preparation of the terminology; a section titled "Units," can be especially helpful for fields, such as fracture mechanics, in which units can be somewhat confusing; an "Abbreviated Metric Practice Guide" specialized to the field of terminology. For example, an annex of E 616 incorporates "Designation Codes for Specimen Configurations, Loading, and Orientation."

Two examples of the Society's intention to expand the usefulness of standard definitions are: the practice of containing these standard definitions in a context called a terminology standard, which contains information for a given technical committee; and the existence of the *Compilation of ASTM Standard Definitions*, which contains definitions of 138 committees. The Committee on Terminology (COT) participates in the development of this *Compilation*.

The ASTM Board of Directors established COT to promote uniformity and to minimize conflicts and redundancies in ASTM terminology through voluntary cooperation with the technical committees. Submit new definitions and imaginative approaches to COT and let them assist in making that terminology as powerful as it can be.

Charles Interrante

Reprinted from the November 1985 issue of Standardization News, pp. 28-29.

TERMINOLOGY UPDATE

To differentiate an inherent property of a material from its performance in service, whether used as a single material or as part of a construction, is clearly a need for authors. Properties are often expressed in unit values related to area, thickness, density, or in comparison with other standard materials, whereas

performance values are expressed for actual dimensions and stated exposures. Many years ago, scientists and engineers from ASTM cooperated with those at the National Bureau of Standards to adopt the terminology that inherent properties of materials would be described with words ending in "ivity," while performance in service would be described with works ending in "ance" to correspond with performance.

In some materials, properties change after manufacture as a time effect of short or long-term aging, or from the effects of field exposures. For example, a newly manufactured and literally untouched sheet of aluminum of a specific composition will reflect heat energy to an extent inherent to that material. But after it is used in a process and the surface touched, even though cleaned thoroughly, its reflectance will never return exactly to the original value. Therefore, the reflection of heat energy from the surface of an aluminum sheet that was uncontaminated would be its inherent reflectivity, the highest reflectance the composition will have. After the sheets are handled and exposed to air and dust, the reflection would be designated reflectance.

A thermal insulation will have inherent thermal resistance, but in service it will be used in many thicknesses under various exposures. The resistance to heat flow by a material of unit thickness and unit area would be its inherent thermal resistivity. In-service, the material is used in thermal insulating systems of one or more thermal insulations with systems of support and protection from environment. In each case, the system operator would be interested in the performance of each material used in a construction, because the thermal resistance of a system is the resistance of all of the materials, and may or may not include air films.

When water vapor or liquid migrates through a material, permeability is the property expressed for unit area of unit thickness. Seldom are materials used in unit thickness, so the time rate of moisture flow through a construction involves the permeance of each material.

Ev Shuman

Reprinted from the December 1985 issue of Standardization News, *p. 23.*

TERMINOLOGY UPDATE

The Language of Laboratory Accreditation

Accreditation, adequate accreditation, laboratory accreditation, pseudo accreditation, accreditation program, accreditation scheme, national accreditation scheme, credible system, ideal system, unified system, capability, competency of testing laboratory, level of confidence, license to practice, proficiency, proficiency testing, proficiency testing program, technical soundness, verification—these arè some of the terms used by authors of the articles in this issue of *SN*. What do they mean? Do they have the same meaning for each expert? For the nonexpert?

Fortunately, the standardization of the terminology of laboratory accredita-

tion is keeping abreast of the accreditation debate in this country. The International Organization for Standardization (ISO) is in the forefront, along with the International Laboratory Accreditation Conference (ILAC), as Stanley Warshaw points out. ISO/STACO, the Committee on Standardization Principles, together with Task Force C of ILAC, have completed work on a draft revision of ISO Guide 2, *General Terms and Their Definitions Concerning Standardization, Certification, and Testing Laboratory Accreditation*. It is a joint ISO/IEC (International Electrotechnical Commission) publication that proposes to guard against terminological inconsistencies by establishing "a clear understanding of basic concepts," and providing "unambiguous general terms and definitions."

Section 8, Assessment of Conformity, defines terms under the conceptual classes of conformity, certification, arrangements, and accreditation of testing laboratories. In the latter class are nine terms and definitions specific to accreditation, including system, body, criteria, assessment, and assessor. But proficiency is not treated, except as laboratory proficiency testing, in Section 7 on Testing. Concepts of program and scheme seem to be included in the definition of laboratory accreditation system. Perhaps ISO Guide 43 will include more detailed terms and definitions relating to proficiency and proficiency testing.

In the ASTM standards system, Committee E-36 on Criteria for the Evaluation of Testing and Inspection Agencies' standard E 548, Practice for Generic Criteria for Use in the Evaluation of Testing and Inspection Agencies, did include a section on definitions. Many of the supplemental ASTM standards on testing and inspection agencies developed by the individual technical committees also included definitions, but not always identical in scope or content. E-36's standard E 994, Generic Guidelines for Laboratory Accreditation Systems, does not include a terminology section. It would be useful for E-36 to prepare a terminology standard compatible with ISO Guide 2, and in harmony with the family of other ASTM standards treating the evaluation and accreditation of testing and inspecting agencies.

That the language of laboratory accreditation is still evolving was emphasized in the Hyer Report, *Principal Aspects of U.S. Laboratory Accreditation Systems* (NBS-GCR-84-472) 1984. It said ". . . the broadening definition of the term 'accreditation,' which in our judgement is coming to be defined as 'a more or less formal recognition, based on some more or less formal assessment of a laboratory's competence.'" While this may be a tongue-in-cheek definition, there is no doubt of the need for standard terminology in this field. It should be noted that many compound terms or multiple word terms are an important part of the special language here. Some of them were cited in the lead paragraph. To aid understanding, and to harmonize usage, compound terms need specific definition. Often it is easier to do so than to define single word concepts.

While the debate goes on about the [ideal], [credible], [unified], [national] laboratory accreditation system, let us make sure that we agree upon the meanings of the terms in this special language.

Wayne Ellis

Reprinted from the January 1986 issue of Standardization News, p. 15.

TERMINOLOGY UPDATE

Symbols Mean Specific Terms

In order to minimize the need for expressing a thought that is applicable to a physical thing or relationship with all of the necessary words each time reference to the relationship is made, symbols have been developed and defined. There are many more items to be identified in short form than there are letters, digits, marks, or configurations, even when used in combinations. Consequently, one needs to become familiar with the symbols usually used in a particular field of communication. When letters, marks, and words are combined as a symbol the words become part of the symbol rather than retaining the dictionary definition, and the combination is given a definition of its own.

Symbols of a letter-hyphen-word have been used for years to indicate properties and performances of thermal insulations. For many years, the symbols k-factor (now λ), C-factor, and U-factor have been used to indicate thermal conductivity, thermal conductance of a construction, and thermal conductance of a construction from air-to-air as in a wall. It became clear to the thermal insulation industry that while the three conductance factors were easily usable by technical people, they were confusing to the people to whom the materials and thermal insulating systems were being sold. For example, an insulated wall or ceiling might have a U-factor of 0.03 or 0.04. These values look like three cents and four cents to most people, which to them is not a great difference, but even more confusing is that smaller is better. In terms of a specific insulating material or construction, this difference might be 1 to 2 in. of materials. Moreover, in trying to evaluate the performance of material combinations, conductances must not be added because the sum would have no physical meaning.

The use of the thermal resistance concept, which really was quite old, was brought to the attention of the building industry because resistances are additive, and larger is better. The symbol R-value, resistance value, corresponding to the U-factors of 0.03 and 0.04 are R-33 and R-25. Obviously, R-33 provides more resistance to heat flow than R-25. Since symbols for conductances had been designated for years as "factors" and are used as multipliers in calculations, it was desirable to use some well-known word to become part of the symbol for thermal resistance. To invent a new term was considered undesirable, so the expression R-value was adopted.

While all numerical evaluations are values, it was recognized that a letter-hyphen-word was a specific symbol for a specific item. R-value has become a common term because it is a convenient expression for the thermal resistance of either property of material or of the potential performance of a construction. There was no need to differentiate property and performance by separate symbols. A subscript to R could be used to identify the thermal resistance of the item being evaluated, and could include all of the materials in a construction with or without air films, reflecting or emitting surfaces, and air space effects. Because C-factor and U-factor have been used for decades, and R-value seems new, some assume that the R-value is the reciprocal of C- and U-factors. While this is true as abstract numbers, in fact, neither the C-factor nor the U-factor can be determined without first determining the R-value because by definition, C

and U are the reciprocals of the R for the material or the construction being evaluated. Since symbols define specific items, it is highly confusing to use "U-value" unless verbally it is said in a way by tonal inflection that it is a particular value of U that is being indicated. But to write U-value, never! Always use U-factor and C-factor, as these have been published for decades.

To keep the terms clear, recall that "thermal factors" are conductances, while "thermal values" are resistances. In computation, C- and U-factors are multipliers, whereas R-values are divisors. To minimize unwanted heat flow either from indoors to outdoors or outdoors to indoors, divide them by an appropriate resistance to heat flow. In refrigerators, the intent is to keep heat out, and in furnaces, the intent is to keep heat from escaping, so use the R-value that gives the economic performance desired.

Ev C. Shuman

Reprinted from the February 1986 issue of Standardization News, p. 22.

TERMINOLOGY UPDATE

Heat Flow or Heat Transfer?

For people who are not experts in thermal insulation performance to understand why thermal insulations will accomplish energy cost savings to them when installed in the home, it is helpful to be aware that heat moves continually with time when there is a temperature difference between indoors and outdoors. Some experts refer to heat flow as heat transfer, but transfer does not denote continuity with time. When something is transferred, the action stops when the movement has been completed. Years ago, in Committee C-16 on Thermal Insulation, and with some members of the American Society of Heating, Refrigerating and Air-Conditioning Engineers participating, it became desirable to describe heat flow through specific constructions by specific terms. Heat flow from a hot (or to a cold) surface, with or without protective jackets, directly to (or from) the ambient is designated heat transference. If the concern is heat flow from (or to) a room through a wall of several components to (or from) outdoor air, the heat flow is designated heat transmittance.

While experts understand what is meant when the terms heat transfer and heat transmission are used as general terms, it would be helpful to those nonexperts trying to understand the effects of thermal insulation in the home if the nice, short, descriptive term heat flow is used. Heat flow should be used by everyone when referring to the movement of heat energy regardless of the mode: conduction, radiation, or convection. Reserve heat transfer and heat transmittance for the specific constructions for which the terms were invented and used for decades in ASTM standards.

When buyers and sellers use the same terminology that is described in technical publications, disputes that involve misunderstandings will be virtually eliminated. That is the aim of consensus standards. **Ev Shuman**

Reprinted from the March 1986 issue of Standardization News, p. 22.

TERMINOLOGY UPDATE

Using Absolute Terms: Boon or Bane?

Things that are essential or perfect are either essential or perfect, or not; since nothing can be more important than that which is essential, or more faultless than that which is perfect. These are absolute terms, so-called because they are indivisible: They do not exist in degrees. Examples of other absolutes are: impossible, round, empty, matchless, excellent, equal, true, fatal, universal, final, and absolute itself.[1]

To these examples, ASTM policy has added waterproof, stainless, unbreakable, vapor barrier, gas free, flat, safe, rigid, and pure—with the priviso that such terms shall not be used in ASTM standards unless actually used and defined in their absolute sense.[2]

Heeding this admonition, Committee C-16 on Thermal Insulation has discarded the term vapor barrier, because most so-called vapor barriers only impede the passage of water vapor and do not prevent it. The term vapor retarder has been adopted as more accurate and perceptive of the usual behavior of such materials.

Within ASTM a mild controversy has surfaced at the level of the Board of Directors (no less) in the case of the example term, "waterproof." This term has traditionally been used to describe materials of construction precluding passage of significant amounts of water, but not necessarily preventing any passage, if small or insignificant. Committee D-8 on Roofing, Waterproofing, and Bituminous Materials adopts this traditional view of waterproofing materials or treatments; although terminology purists regard such tolerance as a breach of the ASTM policy ban on improper use of absolute terms.

In short, proponents of waterproofing consider it a boon to continue using the term in the traditional sense. Opponents find such usage a bane to the ASTM policy.

Dictionaries recognize that "absolute" has three principal conceptual meanings: complete, conclusive, and ideal. Plainly, the second and third meanings are intended in the policy statement. Burton's *Legal Thesaurus*[3] lists 39 synonyms for "conclusive:" accurate, actual, axiomatic, beyond doubt, categorical, certain, clear, clearly defined, decided, decisive, definite, definitive, determinate, exact, explicit, express, final, fixed, inalienable, indisputable, indubitable, obvious, positive, precise, real, settled, straightforward, true, unconditioned, undoubted, unequivocal, unerring, unimpeachable, unmistakable, unmitigated, unmixed, unquestionable, veritable, and well-defined. For "ideal," Burton lists 35 synonyms: best, beyond compare, champion, consummate, crowning, defectless, excelling, exemplary, faultless, flawless, highest,

[1]Freeman, M. S., *A Treasury for Word Lovers*, iSi Press, Philadelphia, n.d.
[2]*Form and Style for ASTM Standards*, Part E, ASTM Policy Concerning Clarity and Precision of Terminology, 1983.
[3]Burton, W. C., *Legal Thesaurus*, Macmillan, New York, NY, 1980.

immaculate, impeccable, incomparable, matchless, model, *ne plus ultra*, paramount, peerless, perfect, preeminent, pure, spotless, stainless, superior, superlative, supreme, taintless, unblemished, unequaled, unexcelled, unrivaled, unsurpassed, untainted, and untarnished.

Given an abundance of absolute synonyms like these, who but practitioners of waterproofing might not be misled in the use of that term outside of that special field? Perhaps an appropriate new ASTM standard describing the performance expected of waterproofing materials or treatments could be accepted as the definition and use that as ASTM policy requires.

In litigation involving the performance of waterproofing materials or treatments, would the courts accept that form of definition? Boon or bane? What is your choice?

Wayne Ellis

Reprinted from the April 1986 issue of Standardization News, p. 19.

TERMINOLOGY UPDATE

ASTM's Tower of Babel

And the Lord said, "Behold, they are one people, and they have all one language; and this is only the beginning of what they will do; and nothing that they propose to do will now be impossible for them. Come, let us go down, and there confuse their language, that they may not understand one another's speech"—Genesis 11.

I believe it was Eugene Rosenbaum who first used the Tower of Babel analogy to point out the confusion in ASTM standards development work caused by the existence of redundant and conflicting definitions of terms in the *Compilation of ASTM Standard Definitions* (Terminology Update, January and February 1985).

There are indeed many such redundancies, the most obvious being the more than 40 definitions for "density." During discussion of the matter at the recent meeting of the Committee on Terminology (COT), there were differing opinions on whether the redundancies are an embarrassment to ASTM or are, in fact, a desirable demonstration of the diversity among ASTM technical committees—considered by some to be a strength.

Those holding the first view believe that in a credible standards organization such as ASTM, there should be only one standard definition for a concept; that differing definitions should be resolved, and that the *Compilation* should carry only one standard definition for a concept. Those of the second viewpoint hold that since each ASTM technical committee is free to adopt its own standard definitions, within the *Regulations* procedures (including Part E of the *Blue Book*), exposing differing nuances and interpretations of concepts as they relate to different disciplines helps understanding and proper usage of terms.

COT would be interested in suggestions for constructive measures to aid in formulating future terminology policy from those interested in this dilemma.

Be aware that for several years COT has been testing the use of coordinating groups to resolve committee differences that resulted in redundant standard definitions. Some coordinating groups have been very successful in intercommittee discussions, resulting in consensus on single definitions for concepts. Coordinating Group-01 on Fire Terminology has coordinated many terms in this way. These are signaled and highlighted in the current edition of the *Compilation*. A few other coordinating groups are making headway. But technical committees are reluctant to give ground where definitions are concerned, so several coordinating groups have been discontinued. Is there another way?

It has been suggested that the example of E 12, Definitions of Terms Relating to Density and Specific Gravity of Solids, Liquids, and Gases, originally issued in 1925, might be studied and adopted. E 12 resulted from recognition by the Committee on Nomenclature and Definitions (superseded, in 1976, by COT), that the many definitions for those terms, originating in different committees, needed explanation to the nonexpert. E 12 adopted as standard a single definition for each concept within its scope; but then appended an explanatory discussion of definitions and their relationships to scientific terms. Therein, recognition of the other ASTM standard definitions for the same terms is found with a rationale or judgment on the intent or usage of each. This treatment of redundant terminology harmonizes the intended meanings of the differing standard definitions and, thus, helps the (confused?) reader to adopt the particular definition that suits the intended use.

Standard E 12 is now under the jurisdiction of Committee E-15 on Industrial Chemicals because ASTM standards can be developed only by technical committees, not by standing committees such as COT. Nevertheless, only a standing committee broadly representing the Society could logically develop a terminology rationale document, in the spirit of E 12. Should COT undertake to apply this treatment to other groups of redundant standard definitions? Would it clarify ASTM's Tower of Babel? Please comment.

Wayne Ellis

Reprinted from the May 1986 issue of Standardization News, *p. 19.*

TERMINOLOGY UPDATE

Another "Hen and Egg" Complex

When evaluations are made of the time rate of heat flow through a material or a construction, the habit has been to consider the procedure a determination of the thermal conductance because heat is applied to one surface while the opposite surface remains cooler. It is obvious that heat flows out of the cooler surface in a steady flow after the system has come to dynamic equilibrium.

Consider the contrary proposal that the determination is really of thermal resistance. Review the procedure for flat materials in simple terms. In ASTM C 177, Test Method for Steady-State Thermal Transmission Properties by Means of the Guarded Hot Plate, two flat specimens are mounted in an apparatus constructed so that the measured heat flow will be perpendicular to the principal surfaces. A two surfaced heat source contacts one principal surface of each specimen, and heat sinks contact the opposite principal surfaces. Means for measuring temperatures are placed throughout, and means for measuring the heat that flows from the hot plate into the two specimens is provided. At the start of testing, following the time required to bring the whole system into equilibrium thermally, initial readings are made, manually or automatically. After the electricity is turned on to the hot plate, temperatures rise promptly at the heated surfaces, but no change occurs at the cold surfaces, sometimes for many minutes. Why not? Because thermal resistance exists between the hot and cold surfaces.

Gradually, the applied heat increases the temperature throughout the system with part absorbed by the material. If moisture is present, some of the heat converts the liquid into vapor until it is dried, while the remainder flows through the material into the heat sinks. After a relatively long time, a steady state is established, and at this stage the data determine the thermal resistance that prevents the temperature at the colder surfaces from equalling that at the hotter surfaces. All that is really measured is the rate of heat generation in the hot plate, and the temperatures at several locations to obtain mean or 'average" surface values.

For years these data have been used to compute the time rate of heat flow through the specimens for a specific temperature gradient, whereas the actual physical performance being observed has been to establish the temperature gradient that was necessary to drive the heat through the specimens at the observed rate.

For a given material, *thermal conductance* involves the time rate of heat flow induced by unit temperature gradient (1° F/in. for I-P), whereas *thermal resistance* involves the temperature gradient required to induce a unit of heat to flow in unit time. Since specimens are seldom exactly 1 in. thick, and the hot plates are seldom exactly 1 ft^2 in area, the data are computed for unit area and unit thickness, either as thermal conductivity or as thermal resistivity at the mean temperature of the test. In some materials the properties vary with thickness, so the expression "apparent thermal conductivity" or thermal resistivity is used.

In a building wall, and other constructions, several thermal resistances are present so that the temperature difference between indoors and outdoors determines the time rate of heat flow into or out of a room. The higher the total resistance value, that is, the R-value, of the construction, the less heat flow.

In housing and other constructions in which heat conservation is of concern, the overall R-value is determined. While in the past it has been the practice to use the overall heat conductance or U-factor, it is interesting that U-factors can not be determined directly, but only by first determining the R-value, from which, by definition, the U-factor is the reciprocal of the R-value. So which came first, resistance or conductance?

Ev Shuman

Reprinted from the June 1986 issue of Standardization News, p. 23.

TERMINOLOGY UPDATE

Heat Flow or Heat Flux or Heat Transfer

Terminology Update in the March *SN*, by Ev Shuman, was on heat flow or heat transfer. Shuman and I usually agree, and we do this time, but an expansion of the subject appears to be in order. Heat flux should be added to Shuman's discussion and heat transfer should be considered in a lexical meaning as to convey a quantity of heat from one place to another. The dictionaries studied define flux as "the state of flowing, *constant* change or movement,...." Flow is defined as "movement in or as a stream, a *continuous* movement...." With these definitions considered, ASTM should adopt the following.

- **Heat Flow**—A statement of the instantaneous rate of movement of heat. Expressed as, J/s, W, or Btu/h. Flow may be either a dynamic or steady state movement but, if dynamic flow is being considered, additional information is needed to show rate and magnitude of change.
- **Heat Flux**—A statement of the constant or steady state movement of heat. Flux is used by different schools to also consider area and this has caused a great deal of confusion in some ASTM committees. It is suggested that in ASTM, flux always means flow through unit area under steady state or equilibrium conditions. Expressed as $J/s \cdot m^2$, W/m^2, or $Btu/h \cdot ft^2$.
- **Heat Transfer**—A statement of how much heat was moved from one location to another. Expressed as; Wh, kWh, or Btu.

Statements or terms such as rate of heat transfer or heat flow through an area may be used, but when such phrases are used, the text should define the meaning. Considering these definitions and their relationship to the compound units used, the following is offered.

Thermal conductivity (λ or k) is an expression of the basic thermal property of a thermally homogenous material or substance that allows heat flow by conduction only. When heat flow is by modes other than conduction, a modifying word should be used, such as apparent or effective thermal conductivity. Thermal conductivity is a statement of the heat flow rate, through unit area, when the temperature gradient is unity, or it is the heat flux when the temperature gradient is unity. Note that there is no mention of surfaces, shape, or size. The number used to express λ or k is either the heat flow rate or flux (the rate of heat flow per unit area). When heat flow is used in a text, the number relates to W or Btu/h but, if the text uses heat flux, the number relates to W/m^2 or $Btu/h \cdot ft^2$.

The other thermal terms used to present values describing thermal properties of materials or assemblies of materials differ only in that the thermal driving force is a temperature difference across a described material or assembly. These terms do not apply to a basic thermal property of a substance independent of its size and shape. The proposed terms can only be used when there is a full description of the materials, spaces, assemblies, and in some cases, surfaces that lay between the points used to obtain the temperature difference.

The thermal terms of conductance, transmittance, surface factor, and thermal resistance all involve temperature difference. It is recommended that ASTM establish a standard form or order for presenting compound terms. This standard should specify that all units having a relationship one to another always be presented with the relationship involved clearly shown. For thermal

conductivity, the heat flow rate would be the first unit presented (W or Btu/h) and if the unit is already a compound of other units, they should not be separated. Therefore, the temperature gradient in λ or k should always appear as a unit (K/m or F/in.). The degree sign should not be used. The thermal driving force involved is a scale step in either the K or F systems.

Therefore, λ is W/m^2 (K/m) and if it is used in the reduced form, as it is in SI units, someplace in the text both should be presented. Those who have not learned that $W/m \cdot K$ is the nickname for W/m^2 (K/m) will then understand. $W/m \cdot K$ means nothing if literally interpretated, it does not describe λ. Btu/h · ft^2 (F/in.) for k maintains the correct relationships of units, such as, heat flow rate (Btu/h), unit area (ft^2), and temperature gradient of unity (F/in.).

It is time to standardize the units and terms used by ASTM in a rational and meaningful way. **Charles F. Gilbo**

Reprinted from the July 1986 issue of Standardization News, p. 18.

TERMINOLOGY UPDATE

Calibration/Standardization/Verification

Charles Gilbo's letter in the May *SN* regarding calibration/standardization gives me a chance to both give a rebuttal and an update as far as Subcommittee E02.13 on Terminolgy's additions to standard E 135-86, Terminology Relating to Analytical Atomic Spectroscopy, are concerned.

It is my guess the emf/temperature tables as used in C 177, Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus, are some of the most accurately recorded relationships in science. Let me digress.

When I went to school in 1942, I had a course in physical chemistry, which involved a laboratory experiment to determine molecular weight with a boiling point rise method. This method used a differential thermometer. I had never seen one of these before and my reference, given by a wise old teacher, led me to the library only to find the article in German. In six weeks I learned all about the thermometer and a lot about German. The remarkable thing about the thermometer was that it was capable of 0.01° resolution; it used a very fine mercury thread. I successfully completed the experiment, accurately identifying the unknown, but received a low grade because it took me so long. The fact that it was a strange instrument and its description in German, was no excuse!

I only relate this story to give some feel for how far we have come today. There is a company today that markets a chip capable of giving temperature resolution to 0.0001°C.

Now, Gilbo cited C 177, and says it is not calibrated. As I read C 177, it very definitely is calibrated, as given in Note 13 and Section 5.8 where it references E 230, Temperature Electromotive Force (EMF) Tables for Standardized Thermocouples. Section 10.4 also specifically implies that automatic instruments should be calibrated. The calibration is very subtly hidden in the emf/°C tables

and, in automatic instruments (either analog or digital), in the circuitry or algorithms used. The fact that thermocouples are so stable and reproducible makes it appear there is no calibration.

Gilbo, in his letter, also used another term, "verified." Committee E-2 on Emission Spectroscopy believes verification is a passive act; it tells you whether something else needs to be done, or not, such as standardization, or calibration. The latter two acts are unit operations and are active; each causes changes. Verification only tells whether the system needs changing.

To this end, E02.13 passed terms relating to materials used for these operations. Calibrants are materials that define a calibration. Standardants are materials that standardize a calibration. Verifiers are materials used to determine whether standardization is required.

One other term that might be considered in this system terminology is "validation." My concept of validation, from the literature, is one of a test to determine if a method is acceptable (calibrated, standardized) for all items covered by the scope of the method. To this end, we would validate methods; calibrate instruments for one or more items; standardize calibrations; and verify standardizations or calibrations.

My knowledge of cryogenics is nil. Method C 177 is very difficult to read, as I presume it is designed for the expert. I would suggest it needs a section at least on verification or, in view of Section 10.4, one on calibration. Section 10.4 implies that somewhere there might be a reference material to use in verifying, standardizing, but there is no mention of one.

It is very poor manners to criticize a method such as C 177, which is far out of my jurisdiction. I am sure that in competent hands it produces excellent results.

W. R. Kennedy

Reprinted from the August 1986 issue of Standardization News, *p. 18.*

TERMINOLOGY UPDATE

Fire or Flame—What's the Difference?

Thirteen years ago, the ASTM Board of Directors, responding to a complaint of a government agency, established a Fire Policy, later revised, in which a number of definitions were set forth. One of these was for fire as follows:

> "the process of unwanted ignition and consumption or destruction by burning, combustion, or rapid chemical reaction [usually involving oxygen] accompanied by generation of heat, smoke, flame, liberation of possibly toxic combustion byproducts, or any combination which can present a life or property hazard within an environment."

At that time, the Board gave to the new Committee E-39 on Fire Hazard Standards authority "to review all fire-related terminology used in ASTM stan-

dards towards the end of eliminating descriptive terms which can be used in an inappropriate and misleading manner . . ."

When this definition was balloted for inclusion in the committee's terminology standard, objections were voiced: the definition is too complicated, legalistic, and inaccurate because not all fire(s) is unwanted, for example, campfires, those in a fireplace or stove, or under a boiler or a hotwater heater. When the "unwanted" category was removed, and the definition was simplified somewhat, objections arose that the committee could not change the definition given in the Board policy. Committee E-5 on Fire Standards, reformed under the revised policy, has been wrestling with this ever since. Now, however, it is balloting the following definition with a good chance of consensus:

> "destructive burning manifested by all or any of the following: light, flame, heat, smoke."

During these interim years ancillary fire terms were balloted and approved, and appear in the committee's terminology standards, E 176, Terminology Relating to Fire Standards. Of these, flame is defined as: "a zone of hot, usually luminous gas, of particulate matter in gaseous suspension, or both, that is undergoing combustion."

Note that in regard to flame, it may be small as from a match, or large as that emanating from an industrial burner. The word flame implies that there are multiple hot zones involved. Also, flame(s) may be controlled or uncontrolled. The same is true of fire. It can be small, as in a campstove, or large, as in a gasoline truck fire. Similarly it can be wanted, as is evident from these two examples. An arsonist wants an uncontrolled fire; society, in general, does not. Implicit in these definitions are understandings of terms addressed and put into D 176 by the consensus method. These include pyrolysis-irreversible chemical decomposition caused by heat, ignition-initiation of combustion, combustion-exothermic chemical oxidation, and smoke-airborne gases and/or particulate matter emanating from pyrolysis or combustion. These are cross-referenced to aid the readers' understanding of what is meant. The start of an unwanted fire can be a glowing piece of bread in a malfunctioning toaster located underneath kitchen curtains. The start of a wanted fire can be a struck match igniting a gas heater. In the first case there is no flame initially; in the latter case there is.

These remarks are intended to suggest that there is more to a technical definition than meets the eye. A definition can be scientifically precise and so complex that it is understandable only to specialists in a particular discipline. If is too general, it can be misinterpreted, especially by nontechnical people who depend on labels or cautions in instructions as to the use of products in regard to their use or safety. Definitions must be carefully crafted to steer the tortuous path between general understanding and precision of meaning. This is especially true when an emotionally charged word such as fire or flame is used.

James R. Gaskill

Reprinted from the September 1986 issue of Standardization News, *p. 20.*

TERMINOLOGY UPDATE

Ratio Versus Quotient: *Quo Vadis*?

Another of those debates that terminologists enjoy came up in one of the metals committees. It concerns the meanings and usages of the terms, "ratio" and "quotient," in developing an ASTM standard definition. An existing definition, explaining the concept of an electrical property, describes the relation of the number of turns in the winding of an inductor to the path length of the inductor, by calling it a ratio. It is proposed to change the definition to call that relation a quotient, because the quantities are not expressed in like units.

The terminological question is, when is a ratio not a ratio, but a quotient? When in doubt, consult the authoritative references. Right? Webster's Ninth *Collegiate Dictionary* (1983) says: ratio—

a the indicated quotient of two mathematical expressions.

b the relationship in quantity, amount, or size between two or more things.

And for quotient:

1 the number resulting from the division of one number by another.

2 the numerical ratio . . . between a test score and a measurement on which that score might be expected largely to depend. Confusion arises. Webster's says a ratio is a quotient, and a quotient is a ratio! Are they synonyms? Webster's is silent.

Now, if we back up a few years to Webster's New *International Dictionary, Unabridged, Second Edition* (1943), we find: ratio—

5 Math. The quotient of one magnitude divided by another of *the same kind** . . . Ratio was formerly regarded as different from quotient or a fraction, but no distinction is now ordinarily recognized.

Here, *Webster's* seems to speak from both sides of the mouth!

Let us browse further among the common language dictionaries. Here is the view of *The Heritage Illustrated Dictionary* (1979): ratio—1 Relation in degree or number between *two similar things.** 3 Mathematics. The relative size of two quantities expressed as the quotient of one divided by the other. . .

And from *The Scribner-Bantam English Dictionary* (1977):

ratio—1 relation of number, degree, or quantity . . . 2 math, quotient of one quantity divided by another *of like kind.*

Then, from *The Random House Dictionary* (1973):

ratio—1 the relation between two *similar magnitudes** in respect to the number of times the first contains the second. . .

Again, it is clear from these authorities that, mathematically, a ratio is a quotient; but is a ratio different in some way? And how does it differ? Let us see if the specialized dictionaries can answer these questions.

McGraw-Hill *Dictionary of Scientific and Technical Terms* (1974):

ratio (math)—A ratio of two quantities or mathematical objects A and B is their quotient or fraction A/B.

Not much help there. How about *International Dictionary of Physics and*

*Emphasis added

Electronics (1956):ratio—The indicated quotient of two number frequently expressed as a fraction. . .

And a different view from Barnes & Noble *Thesaurus of Science* (1981):
ratio—the relation between two number or two measurements, usually with the *same unit*. . .*
rate—the relation between two measurements *with different units*. . .*

What can we conclude from all these "authorities?" "You pays your money and you takes your choice!" Usage and custom have so blurred any distinction between ratio and quotient that they have become synonymic.

Advice to the concerned technical committee chairman was to determine a consensus policy on the concept meaning best suited to their use; then to adopt that meaning as a standard definition. This action would "freeze" the chosen definition, so that users of the related standards could understand exactly what is meant. Language usage does indeed change term meanings. To avoid unwanted change in the meaning of scientific and technical terms, which should remain constant, the best safeguard is to standardize the definition. *Quo Vadis? Eo procedamus!* **Wayne Ellis**

Reprinted from the October 1986 issue of Standardization News, p. 20.

TERMINOLOGY UPDATE

Managing Terminology—1

Several ASTM publications tell much about the development of technical terminology in standards. These include STP 806—*Standardization of Technical Terminology*, the *Compilation of ASTM Standard Definitions*, and *Form and Style for ASTM Standards (Blue Book)*, Part E, *Preparation and Use of Terminology in ASTM Standards*. Part E gives chapter and verse on how to do it; and because the *Blue Book* is a part of the *ASTM Regulations*, it carries mandatory information.

The Committee on Terminology (COT) is responsible for maintaining Part E. After more than two years of reviewing and revising, COT has approved draft number 11 as a submittal to the Committee on Standards (COS) for acceptance as a *Blue Book* revision. Several changes are proposed in the revision, reflecting practices successfully used by several technical committees that improve understanding of terminology in standards and promote standardization of terminology. In this column, and in a later one, the major changes will be described. Remember, at this stage they are proposed changes. Comments are solicited. Address them to the editor.

- A new concept, terminology management, is being introduced to give terminology development within technical committees more coherence and understanding: "For terminology to be effective, it must be used consistently at every opportunity. It shall, therefore, be the responsibility of each technical committee to manage terminology usage in all standards over which it has jurisdiction to ensure that usage is consistent both within the committee and the Society."

A whole chapter can be written about terminology management (look for it!), but the intent of the language quoted is to minimize redundant definitions and improve intercommittee coordination of terminology. Those familiar with the richness of definitions in the *Compilation of ASTM Standard Definitions* will understand this mandate.

- Another change: "Each technical committee shall publish and maintain a general standard that contains all terminology published in all standards under the jurisdiction of the committee (including terminology standards on specific topics). This standard becomes a tool for subcommittee and committee use in managing terminology, and reducing redundancies." Currently there are 148 terminology standards.

This mandate replaces E2.6.1 of the current *Blue Book*. Its intent is to provide a concentration of terminology for each committee so that searchers not conversant with terminology within individual standards may locate well-defined sources in pertinent fields.

- A further change related to this one is: "The various ASTM committee terminology standards shall be the basic documents used in publishing the *Compilation*." Bear in mind that entries in the current *Compilation* cover every standard definition from every ASTM standard, whether or not it appears in a terminology standard. If the only source of standard definitions for the *Compilation* is terminology standards, the size of the book could be significantly reduced. Another effect would be to eliminate many redundant definitions. This may be desirable—or not, depending upon how your use of terminology is affected.
- "Technical committees shall submit proposed new or revised definitions to COT for review and comment before, or concurrently with, main committee ballots. No standard shall be sent to Society ballot unless the terminology has been submitted to COT for review." This proposed requirement is a stiffening of E2.8.2 of the current *Blue Book*. COT has observed that in the past fewer than half of committee ballots on definitions have been offered to COT for review. COT has no oversight authority, and seeks none. It would like the opportunity to offer terminology advice on definitions in ballot concerning form, style, and redundancy.

A future column will conclude this review of proposed Part E changes. These will affect notes and discussions in definitions, improve delimitation, and provide a format for a terminology standard.

Wayne Ellis

Reprinted from the November 1986 issue of Standardization News, *p. 19.*

TERMINOLOGY UPDATE

Managing Terminology-II

Continuing the review of proposed changes to Part E of the *Form and Style for ASTM Standards*, 1986 (Blue Book): here are five more proposed changes intended by the Committee on Terminology (COT) to aid committees in managing their technical terminology.

ASTM policy . . . "presumes that a section on terminology shall be a part of every standard, classification, guide, practice, specification, and test method." [Section E1.1 of the proposed revision to Part E]. The ASTM policy concerning clarity and precision of terminology, adopted by the Board of Directors in 1980, (and quoted in the *Blue Book*) mandates that certain significant terms used within a standard be defined. This has been the practice for many years. The effect of the proposed language is to ensure that a section on terminology appears in every ASTM standard. This section can include definitions and descriptions of terms; or, if desirable, only a reference to other standards in which definitions appear.

"To facilitate word processing and computer typesetting, the section on terminology shall be section 3 of the standard." [E1.1.1] This is the usual practice but it is sometimes ignored. This requirement will ensure editorially the correct location of the section on terminology.

Delimitation of special concept definitions is practiced by most technical committees. That is, the inclusion in the definition of a phrase indicating the specific field or context is done to orient the nonexpert. However, a wealth of such definitions in a terminology standard or terminology section need not require the repetition of the delimiting phrase within each definition. Yet, when such definitions are separated from the group and appear in the *Compilation of ASTM Standard Definitions*, delimitation is needed. Hence, the proposed *Blue Book* Part E change [E14.5]: "When a delimiting phrase must be repeated in a terminology standard to the point of triteness, a delimiting statement may be published instead in the Scope of the standard . . ." (an example is given).

A proposed new practice in writing ASTM definitions concerns explanatory statements, formerly called notes. "The section on terminology in a technical standard, a terminology standard, or the *Compilation of ASTM Standard Definitions* shall not contain any notes. Notes shall be text notes only." [E22.2]. "When a definition is very broad in the application of principles, explanatory statements in the past have been added as Notes. Now, such statements will be designated Discussion while Notes will be limited to footnotes in the text." [E4.2.1]. This instruction replaces E4.5.2 and 4.5.3 of the current Part E.

And: "In the terminology section of an individual standard, to fill in more detail of the concept being defined, supplementary information may be added as a separate numbered paragraph headed Discussion, immediately following the definition. The discussion will not be included in the *Compilation* . . . ." [E22.1]. The rationale for this change is found in [E4.2](currently E4.14): "Each definition shall be capable of standing alone and shall be intelligible and tech-

nically correct when removed from the context of its originating standard." Hundreds of current ASTM standard definitions are supplemented with extensive notes. Under the proposed change, these should become discussions, and not an integral part of the basic one sentence definition.

Finally, (for this column), a useful change is proposed to reduce redundancies and other differing wording for the same concept: "If the new definition conflicts with a definition under the jurisdiction of the technical committee, the letter ballot shall state that approval of the new definition will result in its substitution in all documents. . . which contain the old definition." [E5.4]. This practice will avoid definition anomalies within committees.

To obtain a copy of the COT draft revision to Part E of the *Blue Book*, or if you want a section by section comparison of the proposed revision of Part E with the current version, request it from the editor. The Committee on Standards is now considering approval. **Wayne Ellis**

Reprinted from the December 1986 issue of Standardization News, *p. 18.*

TERMINOLOGY UPDATE

Managing Terminology—III

In the coming months you will be hearing more about managing terminology in ASTM technical committees. The objectives of terminology management include: to ensure that ASTM standards will be properly understood and precisely interpreted; to promote standardization of terminology in standards, reports, and other technical writings; and to explain the meanings of technical terms for the benefit of those not conversant with them and for the nonexpert: the newsman, law clerk, student, translator, judge, or jury.

Within each technical committee the subcommittee having jurisdiction over the terminology standard(s) is responsible for managing terminology. These are designated variously as terminology, definitions, editorial, and nomenclature subcommittees. No matter what the title may be, the function is clear and terminology management is inherent.

The most comprehensive presentation in the ASTM literature of basic principles and methods of terminology standardization was the paper by éminence grise Helmut Felber in *STP 806—Standardization of Technical Terminology*. His first recommendation in standardizing terminology in a particular field is to make an inventory of the terms available; that is, the terms in the field of interest have to be collected and recorded. At the same time, terms assigned to general concepts of science and technology that might be useful should be included. Afterwards, the collected terms are examined with respect to their compliance with terminology principles.

These principles in general form are explained in the Felber paper; but they are further refined and discussed with particular attention to ASTM standardization requirements in *Form and Style for ASTM Standards*, Part E *(Blue Book)*.

More specifically, following the collection of field terms, the next step is to collect standard definitions from all standards of the committee of jurisdiction. When these are compiled in alphabetic order and compared with the term inventory, needed definitions and redundant definitions are easily identified. Terminology management then requires that needed definitions are developed, and that redundant definitions (differing wordings for the same concept) are resolved.

In standardizing and managing its terminology, the subcommittee should make frequent reference to the *Compilation of ASTM Standard Definitions*. Therein are hundreds of standard definitions for reference and comparison in the definitions development process. Also, there are numerous examples of definitions that do not conform to basic principles in the *Blue Book*. These examples provide a very interesting study for the terminologist, who will find them valuable in instructing task groups on what to do, and not to do, in composing standard definitions.

When a terminology standard evolves into several printed pages, good terminology management suggests that classification of related terms and definitions into subgroups is advisable. This technique is encouraged by the *Blue Book*, although not many committees have adopted it. When group classifications are used, it usually is desirable to cross-reference terms within a class to the general alphabetic sequence to expedite search and retrieval by the nonexpert. An alternative is to provide an alphabetic index to locate classified terms.

Subcommittees should explore the need and usefulness of preparing a thesaurus of field terms. A thesaurus word is a term or a name that is used for indexing and retrieval of information in systems of information, such as, computerized terminology banks, often called key words. The thesaurus entries indicate the relationships in word groups by showing broader or narrower concepts, as well as preferred and deprecated terms. Logically, entry to computer data banks can best be provided by a carefully composed thesaurus. Good terminology can develop useful thesauri.

This discussion has not plowed very deeply the subject of terminology management. The Committee on Terminology is sponsoring a symposium on June 24, 1987, at which several papers will address this field. Please come!

Wayne Ellis

Reprinted from the January 1987 issue of Standardization News, *p. 18.*

TERMINOLOGY UPDATE

I applaud the efforts of ASTM Committee E-5 on Fire Standards to revise the definition of "fire"[1] as described in September's Terminology Update. It is not

[1]Terminology Update, "Fire or Flame—What's the Difference?", *SN*, Vol. 14, No. 9, ASTM, p. 20. Proposed definition of "fire"—destructive burning manifested by all or any of the following: light, flame, heat, smoke.

easy to arrive at consensus for a phenomenon as old as fire. Isaac Newton queried, "Is not fire a body heated so hot as to emit light copiously? Is not flame a vapor, fume, or exhalation heated red hot, that is, so hot as to shine?" The ASTM redefinition avoids the negative connotations and judgmental phrases, that is, "unwanted ignition and consumption" and "liberation of possibly toxic by-products."

My plaudits are tempered, however, by the lingering and undue emphasis placed on destructive burning. Creation of desirable products by constructive burning is ignored! Pliny observed with great wonder, that fire is, almost everywhere, the active ingredient. "O fire, thou measureless and implacable portion of nature, shall we rightly call thee destroyer or creator?" Glass, cement, metals, pigments, and medicinals are cited as ancient examples of thermally produced materials. Matter is neither created nor destroyed by the actions of normal (nonnuclear) fires, but it is constructively transformed in combustion of fuels, cracking of oil, gasification of coal, synthesis of products, and destruction of wastes.

Fire, in its diverse guises, provides many benefits. Too often it is perceived as uncontrolled, uncontained, low-temperature partial destruction, with liberation of toxic combustion by-products. There is little appreciation of the detailed designs, sophisticated controls, redundant safeguards, and costs of large thermal processing facilities used for various purposes at high efficiencies.

ASTM and other scientific bodies need to properly explain fire and its processes to the nontechnical members of the public. ASTM has active committees in many diverse thermally related areas. This internal diversity, however, can lead to difficulty in differentiating between combustion and destruction. Some within ASTM may consider them synonymous when they are not. Others may view boilers, furnaces, and incinerators as equals, simply because they are all thermal processes. The Dow Chemical Co. feels so strongly about the positive attributes of incineration that it has established a Combustion Technology Research Laboratory whose charter is to provide technical support for all types of combustion facilities. This is in addition to large rotary kiln incinerators, which Dow has operated for over 30 years.

Wastes are minimized before they are generated through recycle and after they are generated through treatment. Thermal processes should be encouraged as environmentally preferable alternatives to land disposal of untreated wastes. Negative perceptions act as disincentives by precipitating excessive regulation and polarizing public opinion against further applications of thermal processes.

"There is no fire without some smoke" (John Haywood, Proverbs 1546). Combustion, in the purely chemical sense, implies essentially complete reaction of a substance with oxygen at elevated temperature to form terminal oxidation products, that is, carbon dioxide, water vapor, and inorganic ash. Destruction, however, can imply disappearance of a substance and transient formation of products of incomplete combustion, including particulate carbon and carbon monoxide. It can also imply the reduction of all combustible compounds to acceptably low, but nonzero levels. What controls should be applied to thermal processes if risks have not been justified, or if benefits cannot be assessed because imposed performance standards cannot be quantified?

There is indeed more to a technical definition than meets the eye. ASTM can contribute to the public dialogue by providing sound technical definitions, methods, and interpretations. As charged by Michael Faraday in his Christmas

lectures to young people, "Be fit to compare to a candle; that you may, like it, shine as lights to those about you; that in all your actions, you may justify the beauty of the taper by making your deeds honorable and effectual in the discharge of your duty to your fellow men." **Stacy L. Daniels**

Reprinted from the February 1987 issue of Standardization News, *p. 20.*

TERMINOLOGY UPDATE

Ensuring Homogeneity

"Specimens should be homogeneous"—is an often used sentence in many ASTM tests methods. How do we ensure homogeneity?

Standard E 135, Terminology Relating to Analytical Atomic Spectroscopy, has for *standardize* (in part), "using one or more known homogeneous specimens or reference materials." What does that mean?

Dictionary definitions of homogeneity and inhomogeneity are no help. Homogeneity is defined as the quality of being homogeneous, or consisting of like parts; inhomogeneity as, "not homogeneous."

Last year, in revising the *Form and Style for ASTM Standards (Blue Book)*, ASTM ran into a hornet's nest in mandating bias instead of accuracy. The word bias has so many negative aspects, which irritated Committees E-2 on Analytical Atomic Spectroscopy and E-3 on Chemical Analysis of Metals that the *Blue Book* committee looked again.

I researched the term accuracy because of the *Blue Book* stance. I came across a treatise in which the concept of accuracy was put forth as a qualitative aspect, while inaccuracy bore the quantitative aspect of the term. In the same light, precision was given as the qualitative, and imprecision as the quantitative, aspect of the word. Suddenly, I began to feel that homogeneity was very similar.

I saw homogeneity as a qualitative term and inhomogeneity as a quantitative one. I began to teach my subcommittee about this concept. They seemed to agree. We talked more and then we balloted our conceptions. As a result, we have a definition of homogeneity in E 135-86a thus:

homogeneity, n—a description of uniformity of distribution of chemical composition or physical property (such as particle size).

We labored over inhomogeneity with the concept well in mind, but not conceiving the words well on the ballot. We received many negative votes on the first try and only four on the second. On the latter, inhomogeneity appeared as:

n—a description of material variability of chemical composition or physical property (such as particle size).

One of the commenters related that our definition was not conveying our intent. "Material variability" was a statistical measure in my mind, but not everyone is statistically minded. He suggested the following:

inhomogeneity, *n—the degree to which* material varies in either chemical composition or physical property (such as particle size) [compare "homogeneity"].

While we wanted to convey the quantitative nature, we did not intend to indicate how a measure of such would be made. We can conceive of many ways. Indeed, in National Bureau of Standard—Standard Reference Material (NBS-SRM) certificates, several appear. Perhaps NBS will standardize on its certificates.

Reflecting on our term homogeneity and the one currently being balloted for inhomogeneity, perhaps the concept was there all the time, merely unstated. I reread the symposium proceedings on SRMs and Meaningful Measurements presented in 1973, at NBS. In every case of the use of these two terms, different authors used them in the correct aspect as we have now presented them in E-2.

Will the term inhomogeneity show up on future NBS-SRM certificates? It might be a standard deviation of a particular element denoting the material variability. I can conceive that a material can have homogeneity for some elements and have inhomogeneity for others.

True, our definitions do not reveal how they depend on the mass of material being considered and how it is viewed. Certainly as increasingly smaller amounts of material are viewed, inhomogeneities increase. On an atomic scale, all is inhomogeneous. The recent discovery that it takes 60 atoms to make a "metal" may keep us out of the chaotic atomic region!

William R. Kennedy

Reprinted from the March 1987 issue of Standardization News, *p. 20.*

TERMINOLOGY UPDATE

Indexing from Keywords and Index Terms

In terminology discussions, one word often invites particular debate, "indexing." Individuals creating documents, indexers processing them, and information searchers all have ideas on what constitutes acceptable indexing. On-line searches present a multifaceted array of indexing choices, combining both free text and controlled vocabularies for document accessing. Printed indexes, on the other hand, challenge the user to match their searching strategies with the internal organization of the index.

There is a common ground, however, to the indexing and retrieval of documents: keywords and index terms. Is there a difference? Some would argue no, and use these words interchangeably; others seek guidance. Yes, there is a difference that is especially evident with printed and on-line indexes. Two definitions for document indexing and searching of these two media are proposed:

KEYWORDS—words/phrases freely chosen from text (standards)
INDEX TERMS—words/phrases that fit into the controlled vocabulary of an index.

Read through any standard and note the keywords that immediately jump out: words dealing with materials, equipment, test names, applications, and the like. A rather long list can usually be created very quickly. A brief example:

Gas chromatography
Liquid chromatography

Keywords, however, have one limitation: they simply cannot bring together all related expressions. For this the greater vocabulary control of index terms is required, as in:

Chromatographic techniques/procedures (index term)
gas chromatography (keyword)
liquid chromatography (keyword).

This difference is especially critical when analyzing print and on-line indexes. Printed indexes, presenting a visual display of information, depend heavily on index terms to do their work. The technology of on-line indexes, on the other hand, makes free-text (keyword) searching routine. Since ASTM is committed to both back of the book and on-line indexes, it is clear that a combination of keywords and index terms is required.

In the past several years, an increasing number of ASTM technical committees have formed task groups dedicated to the indexing of their standards. The indexing of standards is enhanced when technical input is contributed by these committees. Committee D-1 on Paint and Related Coating and Materials has been active in this area. Committee D-13 on Textiles ballots index terms as the final section of new and revised standards. Also, I frequently receive suggestions from committee members that deal with both keywords and index terms.

ASTM technical committees now stand on both sides of the indexing process. They are encouraged to assign keywords freely (at the end of documents), or delve into both areas, assigning keywords and searching the index's vocabulary for index terms.

As in most areas of ASTM, indexing is a partnership of staff and volunteers. ASTM committees are guardians of their standards and indexes, while the indexer is responsible for maintaining both print and on-line indexes. This indexer hopes that more committees will become involved in the indexing process, and provide technical input to facilitate the indexing of standards.

Harris Shupak, senior indexer

Reprinted from the April 1987 issue of Standardization News, p. 15.

TERMINOLOGY UPDATE

The Buck Stops Here

"Buck—a dead plate," is a definition in the *Compilation of ASTM Standard Definitions*. Within the standard from which it was taken, it probably makes sense. But, taken out of the standard and inserted in the *Compilation*, it makes little sense. Yet, one of the basic precepts of an ASTM standard definition is that it "shall be capable of standing alone as a technically correct definition."

How can this happen? Most likely, a subcommittee's task group that develops a new or revised standard has little awareness of either how to write good ASTM definitions or that there may be existing ASTM definitions for the same term in question. The task group's expertise and interest is undoubtedly centered on the particular technical specialty involved, and the development of any terminology necessary to achieve the main objective—a new or revised standard—may seem like an incidental task.

This scenario probably explains how the majority of poor ASTM definitions come about—but what steps should be taken to correct similar problems?

One approach that appears promising is to reduce the problem areas to a manageable size. The *Compilation*, which includes definitions from all ASTM standards, dramatically portrays the various problems with ASTM definitions. For example, the redundancy problem, such as 34 definitions for density or 12 definitions for flash point, is painfully clear. At the other end of the scale is the subcommittee that has responsibility for only a few ASTM standards. A management tool is needed between the individual standards at the subcommittee level and the *Compilation* at the Society level. The first level is extremely limited in scope where the second level is overwhelmingly large.

Committee D-2 on Petroleum Products and Lubricants has developed a *Compilation of D-2 Terminology* that contains just the definitions within standards under its jurisdiction. On a much lesser scale than the *Compilation of ASTM Standard Definitions*, this document highlights a number of obvious terminology problems within D-2. The chairman of Subcommittee D02.91.0E on Terminology can now use this document to guide the various subcommittee chairmen in eliminating redundant definitions and improving the structure of existing definitions. It should be possible, using this tool effectively, to emerge with a D-2 terminology standard, which satisfies most of the guidelines for ASTM terminology. If each main committee would undertake a similar compilation, and similar cleanup activities, then the overall *Compilation of ASTM Standard Definitions* could be based on these terminology standards and would be an outstanding terminology reference.

In short, the terminology buck stops at the committee level.

Lyle O. Bowman

Reprinted from the May 1987 issue of Standardization News, *p. 22.*

TERMINOLOGY UPDATE

A Latin Lover's Lament

Latin, ancient mother of tongues, is still admired by devoted enthusiasts, even in this irreverent age of neolatry (neologism: worship of the new). Those who know and respect Latin's proper forms are not amused by the many abuses the vernacular heaps on the matriarch of Western languages. This column will

attempt to correct one small insult: an incorrect plural formation in a common ASTM word that passed directly from Latin into English. While presenting 2000 year old information as an "update" may seem presumptuous, Latin's current unpopularity leaves few options. Those of you who have passed Latin 1 are excused.

The point is: never use "symposia" as a singular word, nor ever write or utter the execrable nonword, "symposias." The singular is symposium; the plural, symposia or symposiums. A brief explanation of cases and declensions of nouns would help to explain why this is so.

In English, nouns appear in three cases: subjective, as subject of a sentence or phrase; objective, as direct or indirect object of a verb, or object of a preposition; and possessive, indicating possession, relation, or ownership. Subjective and objective case are designated by word order; possessive, by changing the form of the word, usually, adding 's.

In Latin there are six cases and, unlike English, nouns change form to designate case. A typical noun will take distinctive endings depending on its gender and the number and case indicated by context. English pronouns act somewhat like Latin nouns, also taking different forms depending on case. The subjective, objective, and possessive of some pronouns are, for example, I/me/mine; she/her/hers; who/whom/whose; they/them/theirs. Latin words usually migrate to English in the nominative case, equivalent to the English subjective.

Declensions are groupings of Latin nouns that share the same case endings. There are five declensions in Latin. The nominative case endings for the first two Latin declensions are as follows. First declension feminine nouns end in "a" for singular, "ae" for plural, such as: alumna, alumnae; antenna, antennae; formula, formulae. Second declension masculine nouns end in "us" for singular, "i" for plural: alumnus, alumni; bacillus, bacilli; locus, loci; radius, radii. Second declension neuter nouns end in "um" for singular, "a" for plural: vacuum, vacua; continuum, continua; datum, data; and symposium, symposia.

If you do not like Latin grammar, the Anglicized plural form, symposiums, is an acceptable substitute for symposia, although the *Merriam Webster Third New International Dictionary* prefers the latter. Be careful, though, to add the English plural suffix to the singular form of the Latin word. Some people mistake the second declension neuter plural noun symposia for a first declension feminine singular noun, since the nominative case of both end in "a." Thus, the erroneous form "symposias" arises by mistaking symposia for a singular word and then redundantly pluralizing it. Now you know enough to avoid this error.

There is no space to cover irregular or third, fourth, or fifth declension nouns. Anyone interested can find an edifying discussion in the "Latin Plurals" entry of Fowler's *A Dictionary of Modern English Usage*, Oxford University Press, 1965.

Matthew Lieff

Reprinted from the June 1987 issue of Standardization News, p. 17.

TERMINOLOGY UPDATE

Writing Good (and Bad) Definitions

Most ASTM standards contain definitions of one or more technical terms. This means that any member who drafts a standard, or a revision of a standard, has the task of devising definitions. How does one go about it?

The ASTM publication, *Form and Style for ASTM Standards, (Blue Book)*, provides useful guidance. Part E of the Blue Book, entitled "Preparation and Use of Terminology," has been prepared by the ASTM Committee on Terminology (COT) to address this task. Of course, it is not possible to reproduce all of those six closely printed pages here. Let us just say that a good definition is clear, concise, and explicit. It is clear if it can be understood by an intelligent nonexpert. It is concise if the essence of the meaning is expressed in one sentence of reasonable length, and if there are no superfluous words. It is explicit if it provides—at least by implication—a way to distinguish the defined word from words of broadly similar meaning.

Here are some examples:

nub head—head with protruding knob.

Verdict: not clear, since it is unintelligible to a nonexpert. It could refer to my own head, for all I know. I have a nose that might qualify as a knob.

A better definition is:

nub head—nail head with protruding knob.

This is certainly clear; the nonexpert at least knows the field to which the definition applies. It is concise—only five words—and it is explicit, since one can look at the nail head, decide whether it has a knob, and hence whether or not it is a nub head.

Here is another example:

engineer—the engineer in responsible charge of the work or his duly recognized or authorized representative.

Verdict: Perfectly dreadful. Not clear, because it uses the word to define itself. "A rose is a rose is a rose" may be interesting poetry, but it tells nothing about what a rose is. Not concise, because of the expression "responsible charge." Is it possible to imagine someone being in charge who is *not* responsible? I hope not. Lastly, the definition fails on a criterion not mentioned before; namely, it uses gender related language where it is not essential to do so. With just a little care that could have been avoided. Why not:

engineer—for the purposes of this standard, the person in charge of the work, or that person's recognized or authorized representative.

The first definition of engineer is a "description" (a definition applicable only within a single ASTM standard) taken from a real ASTM standard. It is a case of experts writing for experts, with less than fortunate results. COT has under consideration a proposal to eliminate "descriptions" in favor of definitions delimited by expressions such as "for the purposes of this standard" or "in the field of paving materials." While such a change will undoubtedly promote clarity, it is still up to the individual standards writers and task forces to choose their words carefully. Unlike Humpty Dumpty in "Through the Looking Glass," we cannot have words mean whatever we want them to. We can only let them mean what other reasonably intelligent people will understand.

Robert Saxon

Reprinted from the July 1987 issue of Standardization News, *p. 18.*

TERMINOLOGY UPDATE

Fire Resistance versus Fire Endurance

During the past year, I suggested that certain standard terminology that had been developed by one consensus making body, be adopted by other consensus organizations. The terminology in question is contained in ASTM E 176, Terminology Relating to Fire Standards.

In this standard, fire resistance, a noun, is defined as the "property of a material or assemblage to withstand fire or give protection from it." Fire endurance, also a noun, is defined as "a measure of elapsed time during which a material or assemblage continues to exhibit fire resistance." Both definitions are condensed from those appearing in earlier issues of the standard, but it should be noted from these that the term fire endurance is measured by the criteria defined in ASTM E 119, Method for Fire Tests of Building Construction and Materials.

Model building codes (consensus organizations) in the United States usually contain a table describing fire resistance ratings of structural elements in hours or fire resistance requirements in hours for types of constructions. From the E 176 definitions, it would appear that a more technically correct title for such tables might be "The Fire Endurance Ratings of Structural Elements (In Hours)."

Therefore, during the past year, such a change was proposed in two of three U.S. Model Building Codes. The suggestion seemed like an easy matter based on the technical correctness of the change.

The suggested change was recommended for rejection by the code change committees of both model codes. In one case, because the committee felt its code uses the latest issue of ASTM E 119 as a guide and that E 119 does "not appear to use one term or the other consistently," and until terms in E 119 are consistent, a code change would not be "appropriate." The second code change committee recommended rejection because the change was only to the table and if the term were to be changed in one location of the code, it would require changing wherever the term appears. In rejection case one, there does appear to be some inconsistency although fire endurance test appears more frequently throughout the standard and terms such as periods of fire resistance are the same as fire endurance. In this case, if the concept of the change had merit, word processing equipment easily could make the change throughout the code to achieve consistency.

Technical correctness was the major intent for the change, but building materials manufacturers should have concern for product liability when describing fire performance characteristics of their products in promotional literature.

Brochures incorrectly describing fire resistant products appear frequently, and a major testing laboratory describes tests for fire resistance of roof covering materials. These descriptions, while correct in terms of E 176, are easily misinterpreted when taken in context of the wording in the model codes.

It is human nature to resist change, whether the change is for good or bad.

In the above example, there is obviously resistance to accepting the more technically correct term to describe periods of fire resistance, which should be fire endurance. How long such **resistance** to change will endure remains to be seen. Hopefully, there are two **terms** with which we can come to **terms.**

Henry J. Mader

Reprinted from the August 1987 issue of Standardization News, *p. 19.*

TERMINOLOGY UPDATE

Ductile Cast Iron

Ductile cast iron accounts for almost all of the pressure pipe made in the world today. Its importance to our well-being is widely accepted. Without such pipe, homes would be without water.

The discovery of ductile cast iron and its implementation into production is an interesting story.[1] It was in its infancy in 1950.

By lowering the sulfur content in the molten cast iron to 0.01 percent or less, and inoculation with such materials as magnesium, calcium, rare earths or combinations of these, the carbon in the cast iron is prompted to form a spherically shaped graphite when the cast iron solidifies. Its normal shape in untreated cast iron is as graphite flake. The treated cast iron is three times stronger than regular cast iron.

In 1950, ductile cast iron was such a new product it caused nomenclature problems. Initially, it was called "nodular iron." People who like words and meanings they convey argued that it was not the iron that was nodular. It was the graphite in the cast iron that was spherical or nodular in shape. So, some called it nodular graphite iron. The name never really stuck, probably because it was three words long. The British went to spheroidal graphite iron, even worse, but to my knowledge the term is still valid in Britain.

During early physical tests of the new material, it was shown to have remarkable ductility, comparable to steel rather than to gray cast iron. A 1/2 in. transverse bar taken from a pipe wall can be twisted around 3000° or bent double without breaking. It soon was noted that the material met all the metallurgical conditions for a ductile material. This gave birth to the name ductile iron, the term prominent today, and appears in the A-4 on Iron Castings standard, A 644, Definitions of Terms Relating to Iron Castings.

However, the term should be ductile cast iron. My efforts to persuade Committee A-4 to change its terminology terms to gray cast iron, white cast iron, ductile cast iron, compacted graphite cast iron, and malleable cast iron were fruitless. My point is that pure iron (99.99 percent iron) is very ductile and would qualify as a ductile iron, but not as a ductile cast iron. Since pure iron is already ductile, the term ductile iron, in this case, is redundant. In all the aforementioned terminologies of A-4, we are talking about varieties of cast iron, which is the A-4 jurisdiction. Perhaps A-4 feels that is reason enough not to change. Yet, these terms, being in a terminology standard, will be picked up by

other dictionaries and compilations, which will have nothing to do with cast iron. Terminology must stand the test outside our committees as well as inside the committee activities.

Regardless of the correctness of the terminology, one group calls itself The Ductile Iron Society (and it is about ductile *cast* iron). In addition, ductile iron is recognized today as a quality cast iron product equal to the task it is called on to perform.

W. R. Kennedy

---

[1]Acipco Back Then, W. R. Kennedy, *ACIPCO NEWS*, July–Nov. 1985. Merl DeMoll, editor.

Reprinted from the September 1987 issue of Standardization News, p. 20.