

1561 Note & return
Nash

INTER-SOCIETY COLOR COUNCIL

NEWS LETTER NO. 8

Notice from the Secretary

News Letter No. 7. issued April 9, 1935, carried certain definitions for gloss that will be proposed to the American Society for Testing Materials for acceptance at an early date. All comments or criticisms that may be offered by the members of the Council would be greatly appreciated by Sub-Committee XVIII of Committee D-1, responsible for the development of these definitions. In order that consideration may be given to all suggestions offered, it is requested that these be mailed to the office of the Secretary, not later than June 20th.

Before an election of officers can take place, it is necessary that each member-body appoint three voting delegates from among the official delegates now representing them on the Council. A letter has gone out to each member-body, requesting that they notify this office, at the earliest possible date, as to the three delegates they wish to appoint in a voting capacity. Anything that can be done by you, as a representative, to speed up this matter, would be appreciated.

M. R. P.

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H. P. Gage, Corning Glass Works -

SIGNAL GLASSES. During the March meeting of the Signal Section of the Association of American Railroads in Chicago, a proposed revision of the specification for colored signal glasses was presented and will be submitted to letter ballot. If so accepted it will become the official specification of the American Association of Railroads. This specification is the result of a long arduous detailed study by all concerned of the requirements for signaling under operating conditions, of manufacturing possibilities, and of methods of color specification. Previous important references to this work as it progressed are found in the Signal Section Proceedings of the American Railway Association, Vol. XXX No. 2, p. 373 - 443 which contains five detailed reports from the U. S. National Bureau of Standards on the study of Standard and Limit Glasses for railway signaling, Vol. XXXII No. 1, p. 251 - 261 which contains a preliminary specification, and Vol. XXXII No. 2, p. 435 - 450 which gives the discussion at Chicago and the Specification 69-35 which will go to letter ballot. It must be understood by all concerned that this specification does not ~~and~~ *yet* will not represent the Recommended Practice of the Signal Section. The specification will not become Recommended Practice until after it has been approved by letter ballot, by the General Committee of the Engineering Division, and officially approved by the Association of American Railroads. It probably will be October or November of this year before official approval is received.

It will be noted that the specification is based on the 1931 report of the I.C.I. (or C.I.E.) an account of which will be found in the Journal of the Optical Society for October 1933, Vol. 23, p. 23 - 374.

It is thought that the Council may be interested in a specification which is based on the newest methods of exact colorimetry and yet which in the hands of the inspectors should be simple enough to operate. This specification has resulted from the joint labors of the Subcommittee of Committee VI of the Association of American Railroads, the staff of Corning Glass Works, and the Colorimetry Department of the U. S. National Bureau of Standards. The work was seriously begun at a meeting of the Committee, June 18, 1931, in Corning to observe signals at long range, with two or three subsequent meetings of the Committee, and will end when the report is accepted by letter ballot. Reprint of the specification 69-35 is enclosed for your information.

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Deane B. Judd, National Bureau of Standards -

THE DEPENDENCE OF REFLECTANCE AND OPACITY ON THICKNESSES:

RELATION BETWEEN CONTRAST RATIO AND PRINTING OPACITY.

A family of graphs has been prepared from the Kubelka and Munk formula. The ordinate is reflectance, R_{∞} , for black backing, the abscissa is contrast ratio ($C_{0.89}$). Each curve of the family refers to different thicknesses of the same material; it shows the increase in opacity and in reflectance as thickness is increased. By means of these curves, measurements of reflectance of a single sheet of paper may be reduced so as to yield two fundamental constants of the material out of which the paper is made. These constants are reflectivity, R_{∞} , and scattering co-efficient, S .

(This is the abstract of a paper submitted for publication in the Paper Trade Journal and as a Technical Association Paper.)

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Dean B. Judd, National Bureau of Standards -

A METHOD FOR DETERMINING WHITENESS OF PAPER.

The "brightness" tester which measures reflectance for blue light gives results for yellowish papers that are in fair accord with visual whiteness grading, but it cannot be expected to do so for all colors, particularly for bluish papers. The method suggested is an extension of MacAdam's work on yellowish textiles. It makes use of a color diagram on which equal distances in any direction refer to equally perceptible color differences. Physical

measurements are made on the paper samples; these measurements are interpreted in a way which promises to accord with color-grading by the average eye. There remains yet to discover whether graders of paper use essentially these criteria.

(This is the abstract of a paper submitted for publication in the Paper Trade Journal and as a Technical Association Paper.)

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Deane B. Judd, National Bureau of Standards -

DISCUSSION OF GLOSS.

This will refer to the proposed gloss definitions worked out by the Sub-Committee XVIII, Committee D-1, American Society for Testing Materials. It seems to me a mistake to say that subjective gloss is a factor in determining the general appearance of the surface; rather is subjective gloss an appearance attribute. It likewise seems to be a mistake to define subjective gloss as some function of reflectances, diffused and specular, which are physical entities. A psychological entity cannot be set down as identical with any physical entity. The correct procedure is first to state the criterion for visual judgments of subjective gloss; then it would be in order to suggest physical entities which, by reason of high correlation with visual judgments of gloss, might be used as a measure of it. But, the function of reflectances proposed ($R_{\text{sub } s} + R_{\text{sub } d}$) divided by $R_{\text{sub } d}$, seems to promise neither convenience nor high correlation with visual judgments of gloss; it makes a matt surface have unit gloss and it would assign to two nearly identical "near-mirror" surfaces very different gloss values.

(I note in discussion of subjective gloss on page 4 that the function of reflectances referred to differs from that previously mentioned and from that mentioned at the bottom of page 4. I take the mention of the difference between specular and diffuse reflectance rather than the sum to be a mistake; it seems plain that the intention of the committee was to use the sum of these reflectances divided by the diffuse reflectance as the measure of gloss.)

I have used for subjective gloss the term, glossiness, originally proposed by Jones, and I have used the term, gloss, for objective gloss instead of the term, polish, proposed here by the A.S.T.M. The exact choice of terms is unimportant, but the concepts must not be allowed to become confused as they seem to have been.

My view of these concepts will be well indicated by the following extract from a memorandum on the subject which I prepared last January:

"Gloss.

"The gloss of a sample is its power to reflect light regularly (without scattering).

"Gloss is customarily defined relative to a perfectly reflecting, non-scattering (mirror) surface. It may be specified by the ratio of apparent reflectances of sample and standard when the angles of incidence and regard are equal in magnitude but opposite in sign provided the solid angles subtended by the source and viewing element are also given. Apparent reflectance of a sample is the reflectance which a perfectly diffusing sample would have if it yielded the same brightness under the same observing conditions. The size of the angles of incidence and regard must be included in the specification of gloss, but they are not so critical as the sizes of the source and viewing element.

"If samples of considerably different diffuse reflectance are to be compared as to gloss, it will be necessary to define the measure of gloss so as to take the difference in diffuse reflectance into account. A suitable definition might be:

Gloss equals the quotient obtained by dividing
(A sub 45 - A sub o) (sample) by (A sub 45 - A sub o) (standard).

where: A - apparent reflectance for a source subtending 0.0025 of the hemisphere at an angle of approximately - 45°, and with an angle of regard given by the subscript. If, as is usual, the standard is a non-diffusing surface, A sub o for the standard is zero.

"The appearance due to the gloss of a sample (called glossiness, Jones, J. Opt. Soc. Am. and Rev. Sci. Inst., 6, 140 (1922) is not in perfect correlation with its gloss. One factor in the lack of correlation is that gloss depends only on the luminous flux regularly reflected, and does not depend on the luminous flux diffusely reflected, but glossiness depends on both. Thus, a piece of polished white opal glass might have the same gloss as a piece of polished black glass, but in appearance the black glass is much more glossy; that is, its glossiness is much higher. Glossiness correlates closely with the ratio of the regularly reflected to the total reflected luminous flux, and this ratio is a more satisfactory measure of glossiness than the regularly reflected luminous flux, alone. This ratio is measured by the Ingersoll Glarimeter and the Keiser glossmeter".

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All notices, abstracts, and requests for further information regarding any of the items appearing in this letter, should be addressed to M. Rea Paul, 105 York Street, Brooklyn, N. Y.

June 15, 1935.