

Highway Materials Research Laboratory  
132 Graham Avenue, Lexington 29, Ky.

January 29, 1948

File: S-3-2  
D-1-2

Memo to: Mr. D. H. Bray  
Director of Design

Subject: Reflectorizing Surfaces for Signs and Markers

The attached copy of a proposed special specification for reflectorizing surfaces for signs and markers is submitted with the recommendation that this be considered by the specification committee, and furthermore that it be considered tentative. The specification was drawn up at the request of the Division of Maintenance in order that they would have some basis for differentiating materials offered by different vendors when invitations for bids are taken. I am sure that Mr. Palmer and Mr. Ringo consider the matter urgent.

A tentative specification is offered because of this urgency, for during the past several weeks we have experimented with materials from different sources and with different methods for analyzing these materials, and as a result have drawn up a classification which we feel can cover the entire range of reflectorizing materials, thus giving the Traffic Engineer leeway in selecting and specifying the type surface most suitable for his needs at given situations. Accordingly, the entire group has been divided into four types according to their reflectorizing qualities, which are:

- Type I. Diffuse Reflector - paint, enamel, or similar finish to which no auxiliary material has been added for the purpose of increasing the reflectance value of the surface coating. Such finish materials shall be of a quality and character to permit baking.
- Type II. Reflex Reflector, Class I - paint, enamel, or similar finish to which beads or other reflecting aids have been added either integrally or by a separate application. Such finish materials shall be of a quality and character to permit baking.
- Type III. Reflex Reflector, Class II - single sheet coating or decalcomania for application to the primed metal by means of a liquid adhesive.

Type IV. Reflex Reflector, Class III - button inserts of glass or other suitable material or a single sheet coating or decalcomania with a physical composition similar to that of Type III coatings but having extraordinary reflectance characteristics.

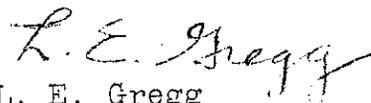
Requirements for the performance of these plus new requirements for primer coats on metal and other things taken collectively would constitute a revision of Article 7.34 of the 1945 Standard Specifications.

Lack of control over light sources for long distance projection, and more so the fact that the sample form selected for this type of test could not be made at the LaGrange Reformatory because of temporary difficulties with equipment, have made it necessary for us to abandon the permanent specification for immediate needs and draw up this tentative arrangement which would apply only to the Type III surface since these are the ones urgently needed. Naturally this proposed specification should be given careful attention, particularly with regard to things that may be too difficult to accomplish in the actual production of the finished signs. One of these in particular is on Page 2, under the heading "Sampling", in the last paragraph where it is stated that "each roll or shipping unit" shall be sampled and those samples tested. That may be impractical and perhaps one set of samples should represent the entire shipment. On the other hand, we do know that at least the reflectance values can vary to some degree even throughout one sheet of rather limited size, and with that in mind we inserted a requirement for sampling and testing each roll or shipping unit.

So far as we can tell, the test for bonding characteristics would eliminate only those signs in which the adhesion is very poor. However, there would not be sufficient time to run the samples through accelerated weathering tests as we have done in arriving at the permanent specification. Also this would necessitate the cutting of signs into smaller samples to fit into the machine and that operation always damages the edges of the cut specimens. With regard to the reflectance test, this too is inferior to the one which we feel should be permanently established because it represents close viewing conditions at best, which, of course, are not very representative of circumstances under which the use of reflectorizing materials are justified. A reflectorized surface is of little value unless it can be seen at a relatively great distance. On the other hand, the test for reflectance which we are recommending here is simple and can be made with equipment that the Department has and which can be easily obtained by the vendors. Instead of using the direct scale for comparison as is done in the case of button inserts we have made the rating one of comparison between the material under

test and a plain white surface of bond paper. The reason for this is the fact that measurements on the machine give values of reflected light from the surface of the sheets being tested that are so low it is difficult to differentiate between different sheets. On the other hand, if the readings are compared with those for sheets of white paper the resulting value is large enough to show the differences on a magnified basis.

I am sure that if this recommended specification is acceptable to the specification committee it will serve the immediate needs of the Division of Maintenance quite well even though we are certain that we can improve upon it in the near future.



L. E. Gregg  
Associate Director of Research

LG:mbm

Attachment

cc: W. P. Ringo  
H. H. Palmer  
L. E. Oberwarth  
J. A. Bitterman