

A number of these tests can be cited as illustrations of the absurdity of the present method of specifying, the necessity for a reasonable amount of investigation, and a determination to drop out of the specifications, all tests which cannot show at least a reasonable relation to road building value.

It has been customary to refer to asphalt as either natural asphalt or oil asphalt. Since both asphalts which are found in deposit, and asphalts which are manufactured from the crude petroleum, are originally, (according to present theories), formed by the reduction of the oil, there would seem to be no reason for differentiating between the two, except that the asphalts which are taken from deposits have been reduced with the variations always to be found in any deposit, and are consequently not of uniform value. Whereas, the asphalt produced from the crude asphaltic petroleum can be manipulated scientifically so as to provide a uniform material in which the variations are so slight as to be negligible. To attempt, however, to say that because an asphalt has been mined or taken from a deposit, it is superior to a material manufactured from the crude petroleum, is an evident absurdity. It has always been found possible by scientific manufacture, to produce from the raw materials, a better, more uniform and more valuable product, than is possible when it is produced in the haphazard fashion of nature.

It is no uncommon thing to find in specifications for asphaltic binders for macadam road work, a reference to the percentage of dirt, etc., which will be allowed in the material, and a further percentage allowance for material not soluble in carbon bi-sulphide. Inasmuch as carbon bi-sulphide is the only solvent at present in use for extracting the bitumen from any compound, it is evident that one statement as to the allowable insoluble matter, whether dirt or anything else, would sufficiently answer the purpose and prevent the confusion which is bound to occur in the consideration of two such contradictory tests.

A high flash point and an evaporation test in which a very small percentage of material is to be allowed to evaporate at a certain temperature, (frequently 325 or 500°) when subjected to a high temperature for a period of several hours, is frequently required in specifying a binder for macadam road. The absurdity of this is readily seen when it is understood that all materials for use with macadam roads, are either liquid or semi-liquid bituminous materials, and are consequently in their initial state too soft to prove valuable binding materials, the object being to produce a material which will mix with the cold stone and afterwards change its consistency so as to set up to the proper hardness of the road. If the material, however, is a semi-liquid and will not evaporate under a high temperature for several hours, it is evident that it will not set up rapidly to the proper degree of hardness on a road under ordinary atmospheric temperatures.

In a paving cement where it is necessary that the material should not change its consistency an evaporation test of the kind mentioned, is a valuable indication of the unchangeable character of the material. In a binder for macadam road, however, the test is unnecessary and contrary to the requirements. The fact of the matter is that the residual oils while they may be reduced from the crude asphaltic petroleum, are loaded up with a heavy end consisting of tarry residues and heavy lubricants so that they contain a comparatively small percentage of the true asphalt for their body. In addition to this, the lubricants are distinctly a detriment to the necessary adhesive quality of the binder, and will not hold the stone of the road together with the same degree of strength as the materials which are made so that they are not loaded up with a heavy end.

Further tests which are frequently specified, such as the flow test and the viscosity test where these state a maximum and minimum viscosity, are evidently made without any real investigation of the subject and any proper consideration of the qualities which are necessary in a bituminous binder for macadam roads.

All these ill-considered tests and specifications which do not show the value of the material in relation to road building, and are frequently contrary to the considerations involved, are merely a burden and do not allow of the engineer securing the best possible material. When it is evident that we know little about these values, the purpose would seem to be best served by admitting as much and not by specifying where the value is not ascertained. Comparatively little attention has been paid to this subject of bituminous binders for macadam road work until the last few years, and in the absence of any knowledge on the subject, it seems to have been customary to take the specifications issued by producers of different materials and use them as a basis when their value is still to be discovered.

The same thing is true in a lesser degree in the specifying of asphalt for paving purposes. It has been customary, and is still customary, in a good many cities, to specify the refined asphalt and the flux, frequently specifying the origin of these materials, when as every engineer knows, the material which enters into the pavement and which it is really valuable and necessary to test, is the asphaltic cement which may, or may not be made with asphalt and flux as it can be made at the proper consistency without the use of flux if it is scientifically manufactured from the crude petroleum.

The introduction into asphaltic specifications, particularly for binder macadam roads, of tests which have no translatable relation to road value, and which cannot be supported on assumptions other than the merest theory, has made an investigation of the practical requirements necessary. The question is one of elimination rather than of anything else, and by consideration of the tests demanded in various specifications, it appears that for the most part they are either unnecessary or of little value.

After the elimination of the unnecessary specifications and the consideration of the proposition from a practical standpoint, the following specifications together with the qualities which they are intended to define, were suggested by Dr. Albert Sommer, in the early part of this year, and are given here as an attempt to reduce the specifications for asphaltic binders for Macadam road building to only such requirements as can at present be considered as of value in the practical construction of macadam roads.

Further discussion of these will doubtless be necessary, and it is invited in the hope that such discussion will result finally in some agreement as to the necessary qualities in an asphaltic binder and the elimination of much in the present specifications which is of dubious value:

(A) It shall contain as much as possible of asphalt of suitable consistency for building the road.

(B) It shall be as fluid as possible in order to enable it to be properly applied by the method proposed.

(C) For this reason all products must be eliminated "a priori" which would increase the viscosity without increasing the percentage of asphalt.

(D) A compound, therefore, must be chosen which has been made from a solid asphalt by using a rather light flux. The flux shall contain no lubricating or paraffine oils and shall be used only as a carrier. It should either evaporate or seep into the stone or mineral aggregate upon application, thus making the compound set up rapidly after it is on the road.