

Where mixtures of this kind are permitted, it is absolutely essential that the different asphalts used should be carefully examined and tested by a competent laboratory. Many of the larger cities now have such laboratories established, and smaller cities adopting these specifications should unquestionably employ competent expert advice in connection with them, as no city engineer is competent to decide upon the chemical and physical points involved in the examination of the different bitumens admitted under these specifications.

Some of the tests in the Chicago specifications which are of no value whatever have been cut out. It will be noted that the ductility requirements for asphalts produced by the distillation of asphaltic oils are higher than those called for in so-called natural asphalts. This is not intended as a discrimination against oil asphalts, but is due to the fact that, when properly prepared, they naturally possess a higher ductility than most of the so-called natural asphalts. Their ductility can be reduced by blowing during the process of distillation, but it is questionable whether this does not deleteriously affect the quality of the asphalt; and for this reason it was deemed best, for the present at least, to specify a minimum ductility such as would readily be complied with by asphalts of this class produced by the ordinary methods of distillation.

An attempt has been made to define asphaltic residuums and semi-asphaltic residuums, as without some such definition the terms themselves are meaningless.

#### SHEET ASPHALT PAVEMENT SPECIFICATIONS.

##### General Description.

Upon the foundation prepared and laid, as elsewhere herein specified, shall be laid the pavement proper. This shall consist of:

Binder—1. A binder course . . . inches in thickness when compressed.

Wearing Surface—2. An asphalt wearing surface . . . inches in thickness when compressed.

##### Materials.

The materials used must comply with the requirements of the specifications and be suitable for use upon the street or streets to be paved. They shall be mixed in definite proportions by weight, depending upon their character and the traffic upon the street and upon the character of the materials used, and such materials and proportions must be satisfactory to the engineer.

Definitions—Crude Natural Asphalt shall be construed to mean any natural mineral bitumen, either pure or mixed with foreign matter, from which, through natural causes in the process of time, the light oils have been driven off until it has a consistency harder than 100 penetration at 77° F.

Asphaltic Petroleum shall be construed to mean those petroleums which, when treated in the manner specified below, will give a residue having a ductility at 77° F. of 25 cms. or over.

Semi-asphaltic Petroleums shall be construed to mean those petroleums which, when treated in the manner specified below, will give a residue having a ductility at 77° F. of between 5 cms. and 25 cms., and this residue after being maintained at a temperature of not over 77° F. for 48 hours, must have a bright and glossy surface which shows no signs of crystallization.

Method for Examination of Petroleums—Two hundred grams of the petroleum is to be placed in an open dish and subjected to a temperature in an air bath of not to exceed 500° F. until the residue so obtained has a penetration at

77° F. of 50. This residue is then to be tested for ductility at 77° F.

Refined Asphalts—Asphalts whose value for making pavements has not been established in the judgment of the engineer by sufficient practical experience will only be accepted under such special bond and guarantee provisions as the engineer may prescribe.

The preparation and refining of all asphalts admitted under these specifications shall be subject to such inspection at the paving plants and refineries as the engineer may direct.

Subject to the preceding conditions and definitions, the following types of refined asphalts will be admitted under these specifications, provided that when made into asphalt cements by the use of such materials and methods as are described in these specifications they will produce an asphalt cement complying with the requirements elsewhere set forth herein for asphalt cements.

All tests herein specified must be conducted according to official methods on file in the office of the engineer. All penetrations at 77° F. are expressed in hundredths of a centimeter and are to be taken (except where otherwise specified) with a No. 2 needle acting for five seconds under a total weight of 100 grams.

Kinds Admitted—1. Refined asphalts prepared by heating crude natural solid asphalts without the addition of any other material to a temperature not exceeding 400° F. until all water has been driven off. Such asphalts must melt readily upon the application of heat.

2. Refined asphalts produced by the careful distillation of asphaltic petroleum until the resulting asphalt has a consistency not harder than 20 penetration at 77° F. Combinations of asphaltic and semi-asphaltic residues will also be admitted under this section. Such asphalts and combinations must comply with the following requirements:

a. They shall contain not less than 98.5 per cent. of bitumen soluble in cold carbon disulphide.

b. When 20 grams of the asphalt are heated for 5 hours at a temperature of 325° F. in a tin box 2½ inches in diameter after the manner officially prescribed, it shall not lose over 5 per cent. by weight, nor shall the penetration at 77° F. of the residue left after such heating be less than half the penetration at 77° F. of the original sample before heating.

c. When the asphalt is brought to a penetration at 77° F. of 50 by the use of the flux with which it is to be used, and then made into a briquette having a cross section of one square centimeter, it shall have a ductility of not less than 25 cms. at 77° F.

3. Refined asphalts produced by combining crude natural solid asphalt with either or both of the following:

a. Residuums obtained by the distillation of petroleum oils as specified under fluxes.

b. Asphalts obtained from the distillation of asphaltic petroleums as specified under paragraph 2 of this section.

Where more than 5 per cent. of flux is used in the preparation of refined asphalts of this class, only such fluxes shall be used as, when mixed with the solid asphalt or combination of asphalts employed, will produce an asphalt cement complying with the requirements hereinafter set forth under that head.

Fluxes—These shall be the residues obtained by the distillation of paraffine, asphaltic or semi-asphaltic petroleums, and shall be of such character that they will combine with the asphalt to be used to form a suitable asphalt cement complying with the requirements of these specifications.

All residuums must have a penetration greater than 350° with a No. 2 needle at 77° F. under 50 grams weight for one