

second, and must remain soft after heating for five hours at 400° F.

Kinds Admitted—*a.* Paraffine residuums shall have a specific gravity of .92 to .94 at 60° F. They shall not flash below 350° F. when tested in a New York State closed oil tester, and shall not lose more than 5 per cent. by weight when heated for 5 hours at 325° F. in a tin box 2½ inches in diameter after the manner officially prescribed. The residue after heating shall flow at 77° F.

*b.* Asphaltic residuums shall have the same general characteristics as paraffine residuums, except that they shall have a specific gravity between .98 and 1.04 at 60° F. When tested according to the method elsewhere herein prescribed for the examination of petroleum, the residue so obtained shall have a ductility at 77° F. of 25 cms. or over.

*c.* Semi-asphaltic residuums shall have the same general characteristics as paraffine residuums, except that they shall have a specific gravity between .94 and .98 at 60° F. When tested according to the method elsewhere herein prescribed for the examination of petroleum, the residue so obtained shall have a ductility at 77° F. of between 5 and 25 cms., and must have a bright and glossy surface which shows no signs of crystallization.

*d.* A natural Maltha may be used if it passes the heat and flash tests specified under "*a.*"

Binder Stone—This shall be clean, hard stone, free from any particles that have been weathered, or otherwise soft material. It shall all pass a 1¼-inch screen. Not less than 85 per cent. of the stone shall pass this screen in its largest dimensions, and of the remaining 15 per cent. no piece shall have a larger dimension than 2 inches. The stone shall be so graded from coarse to fine as to have the following mesh composition (sieves to be used in the order named):

Passing

10 mesh	10 to 35%	} Total, 25 to 50%	} Total passing 1 mesh, 45 to 85%
2 "	10 to 35%		
1-inch mesh	20 to 60%	} Total, 50 to 75%	
1 1/4 " "	15 to 55%		

The above limits as to mesh composition are intended to provide for such permissible variations as may be rendered necessary by the available sources of supply and the character of the work to be done. The mesh composition and character of the stone may be varied, within the limits above specified, at the discretion of the engineer, depending upon the kind of asphalt used and the traffic conditions upon the street or streets to be paved.

Sand—The sand shall be hard, clean grained and moderately sharp. On sifting it shall have the following mesh composition (sieves to be used in the order named):

Passing

200 mesh	0 to 5%	} Total passing 80 mesh and re- tained on 200 mesh, 20 to 35%
100 "	10 to 25%	
80 "	6 to 20%	
50 "	15 to 40%	
40 "	10 to 30%	
30 "	8 to 25%	
20 "	5 to 15%	
10 "	2 to 10%	
8 "	0 to 5%	

On very light traffic streets, a coarser sand may be used with the approval of the engineer, but in no case shall a sand be employed that contains less than a total of 15 per cent. passing an 80 mesh sieve, such total to contain not more than 5 per cent. (calculated on the original sand) passing a 200 mesh sieve.

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Filler—This shall be thoroughly dry limestone dust or Portland cement, the whole of which shall pass a 30 mesh per linear inch screen, and at least 66 per cent. of which shall pass a 200 mesh per linear inch screen. The surface mixture shall contain from 6 to 20 per cent. of this filler, depending upon the kind of sand and asphalt used and the traffic conditions upon the street or streets to be paved.

Samples—Samples of the refined asphalt, petroleum flux and asphalt cement that the contractor proposes to use in his work, together with a statement as to the source, character and proportions of the materials composing them, must be handed in with his bid and no contract shall be awarded to any bidder whose samples do not comply in every respect with these specifications. No asphalt other than that specified in his bid shall be used by any contractor except with the written consent of the engineer.

In addition to the samples submitted with the bids, other samples taken from and actually representative of the refined asphalt, petroleum flux, sand and filler to be used upon the street shall be submitted to the engineer before the use of such materials in the work is permitted. Except at his option, no work on binder or surface shall be commenced within three weeks from the date when such samples were submitted and in no case shall they be used until they have been examined and approved by him. Whenever, during the course of the work, new deliveries of paving materials are received by the contractors, samples of these shall at once be submitted to the engineer and their use in the work will not be permitted until they have been examined and approved by him.

#### Asphalt Cement.

Preparation—The asphalt cement shall be composed of refined asphalt or asphalts and flux, where flux is required, of the character elsewhere herein specified and must be of a suitable degree of penetration. The proportion of the refined asphalts comprising the cement shall in no case be less than 40 per cent. by weight. Only an asphaltic or semi-asphaltic flux shall be used in the preparation of these asphalt cements in which more than a total of 25 pounds of flux to every 100 pounds of solid natural asphalt are required

(Continued on page 630).

## Dutcher, Maxwell & Gregory

ENGINEERS AND SURVEYORS.

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