

(2) It shall have a penetration of between 50 and 70 per cent. at 77° F.

(3) When 20 grms. of asphalt are maintained at a temperature of 150° C. for five hours in a cylindrical vessel 2½ in. in diameter there must not be volatilized more than 5 per cent. by weight, nor shall the original penetration be reduced thereby over 50 per cent.

(4) The asphaltic cement shall not be so susceptible to changes in temperature as to have a penetration varying more than 125 between 0 and 45° C., and it shall have a ductility of not less than 5 cms. at 25° C., and not less than 2 cms. at 0° C. (Dow Standard).

**Squeegee Coat—H-11.**—Immediately after rolling, and while the pavement is still warm, a thin coat of pure bituminous cement shall be spread over the surface by means of rubber squeegees, and upon this shall be spread a thin layer of stone chips or other suitable material, dry and free from dust, and containing no particles which shall be less than ¼-in. ring nor greater than ½-in. ring. After applying dressing the surface shall be again rolled until it presents a smooth and finished appearance, subject to the approval of the Engineer.

#### Sheet Asphalt Pavement.

**Subgrade and Drainage.**—[The Subgrade and Drainage and the Foundation Requirements are the same as those given above for asphaltic concrete.—Ed.]

**Binder Course—C-3.**—The binder course shall consist and be made up and laid of what is known to the asphalt trade as "compact," or "coles" binder, and shall be composed of hard, clean broken stone (no gravel will be allowed or used in the mixture), which shall pass an opening 1 in. in diameter, the voids in which are filled with finer stone passing an opening ¾-in. in diameter, while the voids in the mixed stone shall be filled with a well-graded sand.

To the stone and sand aggregate (after thorough mixing) sufficient asphalt cement shall be added to thoroughly coat the mineral aggregate with bitumen without showing any excess on compression with a hot tamper.

The stone and the asphalt cement shall be heated separately to such a temperature as will give, after mixing, a binder of the proper temperature for the material employed. The stone when used must be at a temperature between 200 and 335° F. The asphaltic cement when used must be at a temperature between 250 and 350°. The asphaltic cement and stone shall be thoroughly mixed by machinery in such proportions that the resulting binder shall have life and gloss without an excess of asphaltic cement, and the mixing shall be continued until a homogeneous mixture is produced in which all the particles are thoroughly coated with asphaltic cement.

**Asphaltic Cement for Binder—C-4.**—The asphaltic cement for the binder course shall have a consistency of at least 20 points, as indicated by the Bowen machine, higher than that in use in the surface.

**Laying—C-5.**—The binder mixture, prepared in the manner described, shall be brought to the street in wagons at a temperature between 200 and 325° F., and shall be covered with canvas covers while in transit. The temperature of the binder mixture within these limits shall be regulated according to the temperature of the atmosphere and the working of the binder. On reaching the street it shall at once be dumped on the concrete, and then be deposited roughly in place by means of hot shovels, after which it shall be uniformly spread by means of hot iron rakes, and then at once be thoroughly compacted by tamping or rolling. The depth of the finished binder shall average not less than 1 in. in thickness, and its upper surface shall be parallel to the surface of the pavement to be laid. The surface, after compression, shall show at no place an excess of

asphalt cement, and any spot covering an area of 3 sq. ft. or more showing an excess of asphalt cement shall be cut out and replaced with other material. All binder which shows lack of bond, or that is in any way defective, or which may become broken up before it is covered with wearing surface, must be taken up and removed from the street and replaced by good material properly laid in accordance with these specifications at the expense of the contractor. Binder when laid shall be followed and covered with wearing surface as soon as is practicable in order to effect the most thorough bond between the binder and the wearing course. The binder course shall be kept as clean and free from traffic as is possible under working conditions. If necessary it must be swept off immediately before laying the wearing surface on it.

No binder shall be laid when in the opinion of the Engineer the weather conditions are unsuitable, or unless the concrete on which it is to be laid is dry and has set a sufficient length of time.

**Wearing Surface—C-6.**—The wearing surface shall be composed of sand, filler and asphaltic cement, as hereinafter specified, mixed in the proper proportions.

**Sand.**—The sand must be clean, moderately sharp, and having a grading not varying more than 5 per cent. from the following limits; i.e., 5 per cent. from the three combined gradings:—

#### Standard Grading.

Bitumen . . . . .	12.0%	
Passing 200-mesh . . . . .	14.0%	.0000%
Passing 100-mesh . . . . .	12.6%	0.1702%
Passing 80-mesh . . . . .	10.4%	0.1405% = 31.7%
Passing 50-mesh . . . . .	23.0%	0.3108%
Passing 40-mesh . . . . .	10.0%	0.1351% = 44.6%
Passing 30-mesh . . . . .	9.0%	0.1210%
Passing 20-mesh . . . . .	5.0%	0.0620%
Passing 10-mesh . . . . .	4.0%	0.0540% = 23.7%

**Filler.**—The filler must be thoroughly dried limestone, or other inorganic dust, or Portland cement. The whole of it shall pass a 30-mesh screen, and at least 70 per cent. of it shall pass a 200-mesh screen. From 5 to 15 per cent. of dust shall be added to the surface mixture, depending upon the kind of dust used, grading of sand, and traffic conditions of the street.

**Asphaltic Cement.**—[Same as for asphaltic concrete, given above.—Ed.]

**Preparation—C-8.**—The wearing surface shall be composed of sand, filler and asphalt cement of the character elsewhere specified, and mixed in proper proportions. The sand and asphaltic cement shall be heated separately to such a temperature as will give, after mixing, a surface mixture of the proper temperature for the materials employed. The sand when used must be at a temperature between 250 and 375° F. The asphalt cement when used must be at a temperature of between 250 and 350° F. The filler shall be added to the hot sand in the required proportions and the two thoroughly mixed. The asphalt cement in the proper proportions shall then be added, and the mixing continued for at least one minute in a suitable apparatus until a homogeneous mixture is produced in which all particles are thoroughly coated with asphalt cement. The weights of all materials entering into the composition of the wearing surface shall be varied in the presence of inspectors as often as may be required, and the Engineer or his representative shall have access to all parts of the plant at any time.

**Laying—C-9.**—The surface mixture, prepared in the manner above described, shall be brought to the street in wagons at a temperature between 230 and 350° F., and shall be covered with canvas covers while in transit. The temperature of the surface mixture within these limits shall be