In addition to these general instructions the points to be watched in preparing the mixtures may be set forth briefly as follows:

In the preparation of the asphaltic cement it is essential that the refined asphalt and flux be weighed into the kettles in such proportion as to produce the desired consistency. The temperature of the kettles must be regulated by the inspector within the limits which the asphalt cement in question can properly sustain. In combining, the flux and asphalt should be sufficiently agitated to produce thorough solution, and with asphalts containing much mineral matter, to avoid settling out of such, with consequent lack of homogeneity in the cement and resulting mixtures.

The consistency of the asphalt cement is varied to produce a hard or soft pavement, or to meet the requirements of a fine or coarse mineral aggregate. It is desirable, other conditions being the same, that for any piece of work the consistency be uniform to a standard which experience with each asphalt has demonstrated to be satisfactory. Consistency is determined by the penetration machine, which operates by measuring in tenths of a millimeter to depth of penetration into a sample of the cement at 77 degress F. of a No. 2 needle under a weight of 100 grams for five seconds. Where there are facilities for testing at the plants it is the duty of the inspector to test each kettle before use. When there are no such facilities an experienced inspector can determine an approximate consistency by chewing a sample of the cement. In any case, samples of each kettle are sent in daily to the laboratory for checking, and close control and record are kept of them.

Two kinds of binder are in use at present in the paving industry, an open and a closed binder, or asphaltic concrete. The open binder is made of well graded stone one and one half inch to quarter inch limiting sizes coated with asphalt cement. Asphaltic concrete, as the term implies, differs from the open binder in having the voids of the stone filled with an asphaltic mortar of sand and fine screenings, making a dense and compact medium. This is much superior to the open binder in its ability to support the surface rigidly and to prevent crushing of the top into the interstices of the binder under heavy traffic.

The main cause of trouble with open binder is overheating—not necessarily on account of injury to the cement, but because of the fact that the coating of cement will run off hot stone to such an extent that at the end of a long haul the top three-quarters of a load will be so devoid of cement as to be insufficiently bonded when laid, while the material in the bottom of the wagon contains an excess of "juice," making it difficult to rake, and forming, when rolled, "a grease spot."

(To be Continued.)

SOME CHARACTERISTICS OF CEMENT BRICK

Although cement brick (or concrete brick) construction is still in its experimental stage enough is known to demonstrate that under favorable conditions it may be a strong competitor of clay brick in both price and appearance.

The extensive use of cement brick by the Plymouth Cordage Company, Plymouth, Mass., has demonstrated several valuable facts. For the construction of their new mill having an aggregate wall length of nearly one fifth of a mile, almost two and one-half million cement bricks were made upon the ground.

The mixture used in the major part of the work was 3 parts sand to 1 part cement. A few bricks were made of 4 parts sand to 1 cement for lightly loaded walls. The brick used on the outside of the buildings had a facing (⅛ inch thick after compression) of 2 parts fine sand and 1 part cement, with the addition of 2 per cent. waterproofing (by weight) to the cement. Enough water was used to make a mortar of such consistency that it would hold its shape under compression, without flushing water to the surface so as to cause the mortar to stick to the plates. No definite percentage can be given as to the amount of water, as that is governed largely by temperature and atmospheric conditions, but the average amount was about 8 per cent.

Table 1. Absorption of Cement Bricks.

Brick	Weight. Dry. lbs.	oz.	Saturated. lbs.	oz.	Absorption. oz.
Face	5	8½	5	10	1½
Common inside	5	8	5	11	3
Facing material*	5	9½	5	10	½
Hard burned body clay brick	4	11	5	7	12

Table 2. Tests of Cement Bricks.

Test "A". Face brick; body 3 parts sand to 1 part cement; facing, 2 parts fine sand to 1 part cement; 2 per cent. waterproofing compound added to cement by weight. Facing ⅛ inch thick after compression.

Age, days	1st Crack, lbs.	Ultimate strength, lbs.	Per sq. in., lbs.
56	87,100	87,100	2,730
120	100,900	108,650	3,400
239	128,500	132,650	4,145
Test "B". Common brick; 3 parts sand to 1 part cement.			
56	69,750	71,200	2,215
92	95,000	99,100	3,080
120	119,700	119,700	3,735
239	129,000	134,100	4,095
275	162,100	164,600	5,160
Test "C". Common brick; 4 parts sand to 1 part cement.			
56	74,150	76,500	2,390
120	89,050	91,450	2,810
239	119,500	126,400	3,905
Test "D". Common brick; 5 parts sand to 1 part cement.			
56	72,150	72,150	2,240
120	80,700	86,650	2,675
239	110,000	119,950	3,710
Test "E". Two hard-burned "body" clay bricks.			
...	101,000	150,000	4,770
...	94,000	162,000	5,470

Care in curing the brick (that is, constant wetting), will overcome to a large degree any minor weakness which is theoretically developed by a "dry mix."

To the uninitiated, the small quantity of water used would seem likely to produce a porous brick having a strong attraction for water, with damp buildings as the result of their use. As a matter of fact, these bricks do not absorb water to any great extent. Bricks 30 days old, carefully dried and then submerged in water for 16 hours, showed the results given in Table No. 1.

Table No. 2 shows the results of tests made under the direction of the Ordnance Department of the United States Army at the Government Arsenal in Watertown, Mass. The figures are averages unless otherwise noted.

*Brick made entirely of the material used for facing the outside brick.

(Continued on Page 672.)