



# Standard Specification for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures<sup>1</sup>

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*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This specification covers requirements for plants suitable for producing hot-mixed, hot-laid bituminous paving mixtures.

1.2 The values stated in inch-pound units are to be regarded as the standard.

## 2. Referenced Documents

### 2.1 ASTM Standards:

C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates<sup>2</sup>

D 8 Terminology Relating to Materials for Roads and Pavements<sup>3</sup>

D 140 Practice for Sampling Bituminous Materials<sup>3</sup>

## 3. Terminology

3.1 For definitions of terms see Terminology D 8.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *batch plant, n*—a manufacturing facility for producing bituminous paving mixtures that proportions the aggregate and bituminous constituents into the mix by weighed batches, adds bituminous material by either weight or volume, and mixes the blend.

3.2.2 *continuous mix plant, n*—a manufacturing facility for producing bituminous paving mixtures that continuously proportions the aggregate and bituminous constituents into the mix by a continuous volumetric proportioning system without definite batch intervals.

3.2.3 *drum mix plant, n*—a manufacturing facility for producing bituminous paving mixtures that continuously proportions aggregates, heats and dries them in a rotating drum, and simultaneously mixes them with a controlled amount of bituminous material. The same plant may produce cold-mixed bituminous paving mixtures without heating and drying the aggregates.

## 4. Requirements for All Plants

4.1 *Uniformity*—The plant shall be capable of uniformly combining and mixing various sizes of aggregate from stockpiles, reclaimed asphalt pavement, if required, and bituminous material.

4.2 *Equipment for Preparation of Bituminous Material:*

4.2.1 Tanks for storage of bituminous material shall be equipped for heating the material, under effective and positive control at all times, to the temperature required in the paving mixture specifications. Heating shall be by steam or oil coils, electricity, or other means such that no flame shall contact the heating tank.

4.2.2 The circulating system for the bituminous material shall be of adequate capacity to provide proper and continuous circulation between storage tank and proportioning units during the entire operating period.

4.2.2.1 The discharge end of the bituminous material circulating pipe shall be kept below the surface of the bituminous material in the storage tank to prevent discharging the hot bituminous material into the open air.

4.2.2.2 All pipe lines and fittings shall be steam or oil-jacketed or otherwise properly insulated to prevent heat loss. When the bituminous material is emulsified asphalt, provisions should be made in the bitumen transfer system that will enable the operator to turn off or reduce the heat media from all lines, pumps, and jacketed bituminous material buckets as soon as the system is open and circulating properly.

4.2.3 Storage tank capacity shall be such as to ensure continuous operation of the plant and uniform temperature of the bituminous material when it is introduced into the aggregate. Tanks shall be calibrated accurately to 100-gal (378.5-L) intervals and shall be accessible for measuring the volume of bituminous material at any time.

4.2.4 A sampling tap, complying with the requirements of Practice D 140, shall be provided in the bituminous material feed lines connecting the storage tanks to the bituminous control unit.

4.2.5 When filled or native bituminous materials are used, means shall be provided for agitation to maintain a uniform product.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 04.03.

4.3 *Mineral Filler*—Adequate dry storage shall be provided for mineral filler, when required, and provision shall be made for accurate proportioning.

4.4 *Cold Aggregate Feeder*—The plant shall be provided with mechanical means for uniformly feeding the aggregates into the dryer so that uniform production and temperature may be assured. When aggregates must be blended from two or more bins at the cold feed to meet the requirements of the paving mixture specifications, a synchronized proportioning method shall be provided.

4.4.1 If recycling capability is required, the plant shall be equipped with mechanical means for feeding the desired weight of reclaimed asphalt pavement into the mix. Facilities shall be provided for obtaining samples of the reclaimed asphalt pavement.

4.5 *Dryer*—A dryer of satisfactory design capable of drying and heating the aggregate to the moisture and temperature requirements of the paving mixture specifications shall be provided.

4.6 *Bituminous Control Unit:*

4.6.1 Satisfactory means, either by weighing or metering, shall be provided to obtain the proper amount of bituminous material. Accuracy of the metering devices shall be within 1.0 % of the actual weight being measured when that weight has been determined using another measuring device and shall be within 0.5 % when that weight has been determined using test weights. Bituminous material scales shall conform to 8.5.

4.6.2 Suitable means shall be provided, either by steam or oil jacketing, or other insulation, for maintaining the specified temperature of the bituminous material in the pipe lines, meters, weigh buckets, spray bars, and other containers or flow lines.

4.7 *Thermometric Equipment:*

4.7.1 An armored recording thermometer of suitable range shall be fixed in the bituminous material feed line at a suitable location near the discharge at the mixer unit.

4.7.2 Approved recording thermometers, pyrometers, or other recording thermometric instruments shall be fixed at the discharge chute of the dryer and, when applicable, in the hot fines bin to register and record automatically the temperature of the heated aggregate or heated mixture.

4.8 *Emission Controls:*

4.8.1 A dust collecting system shall be provided. The system shall be made to waste the material so collected, or to return all or any part uniformly to the mixture.

4.8.2 Other emissions, such as smoke but excepting water vapor, shall be controlled to be in compliance with applicable limits.

4.9 *Surge and Storage Bins*—If bins are used for surge or storage, they shall be such that mixture drawn from the bin meets the requirements of the paving mixture specification.

4.10 *Safety Requirements:*

4.10.1 Adequate and safe stairways to the mixer platform shall be provided if applicable. Guarded ladders to other plant units shall be located where required.

4.10.2 All gears, pulleys, chains, sprockets, and other dangerous moving parts shall be thoroughly protected.

4.10.3 Ample unobstructed space shall be provided on the mixing platform if applicable.

4.10.4 An unobstructed passage shall be maintained at all times in and around the truck-loading space. This space shall be kept free of drippings from the mixing platform. A ladder or platform shall be located at the truck-loading space to permit easy and safe inspection of the mixture as it is delivered into the trucks. Overhead protection shall be provided where necessary.

## 5. Significance and Use

5.1 This specification describes the various components of batch, continuous mix, and drum mix plants. This standard is useful to help evaluate existing plants and for specifying new plants to ensure the plant is capable of producing a quality product. This standard does not address plant operation and control or mixture production.

## 6. Requirements for Plants Controlling Gradation of Hot, Dry Aggregates

6.1 *Plant Screens:*

6.1.1 Plants shall be equipped with plant screens located between the dryer and hot aggregate bins and shall have adequate capacity and size range to separate the heated aggregate into the sizes required for proportioning so that they may be recombined consistently within the specification limits.

6.1.2 The nominal maximum size aggregate in the fines bin shall be specified. The screen type and size shall be determined by the operator. No aggregate shall be larger than the maximum specified.

6.1.3 Control shall be based on frequent bin samples tested in accordance with Test Method C 136. Aggregate in each bin, including mineral filler, shall be combined in proper proportions, and the composite shall be checked for compliance with the paving mixture specifications.

6.2 *Hot Aggregate Bins:*

6.2.1 Hot-bin storage of sufficient capacity to ensure uniform and continuous operation shall be provided. Bins shall be divided into the specified number of compartments arranged to ensure separate and adequate storage of appropriate fractions of the aggregate.

6.2.2 Each compartment shall be provided with an overflow chute of such size and at such a location to prevent any backing up of material into other compartments or into contact with the screen.

6.2.3 Bins shall be equipped with “tell-tale” devices to indicate the position of the aggregate in the bins at the lower quarter points. An automatic plant shut-off shall be provided to operate when any aggregate bin becomes empty.

6.2.4 Adequate and convenient facilities shall be provided for obtaining aggregate samples from each bin.

## 7. Requirements for Plants Controlling Gradation of Cold, Damp Aggregates

7.1 *Maximum Aggregate Size*—Oversize aggregate shall be rejected by suitable methods or devices before the aggregate enters the cold feed, or by plant screens complying with 6.1.

7.2 *Cold Feed Bins:*