

## **320 HOT BITUMINOUS MIXTURES – PLANT, METHODS, AND EQUIPMENT.**

**(REV 12-19-01) (FA 1-4-02) (7-02)**

SECTION 320 (Pages 233-241) is deleted and the following substituted:

### **SECTION 320 HOT BITUMINOUS MIXTURES - PLANT, METHODS, AND EQUIPMENT**

#### **320-1 General.**

This Section specifies the plant and methods of operation for preparing all plant-mixed hot bituminous mixtures for surface courses and bases, and the requirements for the equipment to be used in the construction of the pavements and bases.

#### **320-2 Requirements for All Plants.**

**320-2.1 General:** Design, manufacture, coordinate, and operate the asphalt plant in a manner that will consistently produce a mixture within the job mix tolerances and temperatures specified.

**320-2.2 Electronic Weigh Systems:** Equip the asphalt plant with an electronic weigh system that: has an automatic printout, is certified every six months by an approved certified scale technician, and meets weekly comparison checks with certified truck scales as specified in 320-2.2.4. Weigh all plant produced hot mix asphalt on the electronic weigh system, regardless of the method of measurement for payment.

Include, as a minimum, the following information on the printed delivery ticket:

- (a) Sequential load number.
- (b) Project number.
- (c) Date.
- (d) Name and location of plant.
- (e) Type of mix.
- (f) Place for hand-recording mix temperature.
- (g) Truck number.
- (h) Gross, tare, and net weights (as applicable).
- (i) Accumulated total of mix.
- (j) Tons [metric tons].

Print the delivery ticket with an original and at least one copy. Furnish the original to the Engineer at the plant and one copy to the Engineer at the paving site.

Utilize any one of the following three electronic weigh systems:

**320-2.2.1 Electronic Weigh System on the Truck Scales:** Provide an electronic weigh system on all truck scales, which is equipped with an automatic recordation system that is approved by the Engineer. Use scales of the type that directly indicate the total weight of the loaded truck. Use scales meeting the requirements for accuracy, condition, etc., of the Bureau of Weights and Measures of the Florida Department of Agriculture, and re-certify such fact every six months, either by the Bureau of Weights and Measures or by a registered scale technician.

**320-2.2.2 Electronic Weigh System on Hopper Beneath a Surge or Storage Bin:** Provide an electronic weigh system on the hopper (hopper scales or load cells) beneath the surge or storage bin, which is equipped with an automatic recordation system approved by the Engineer.

**320-2.2.3 Automatic Batch Plant with Printout:** For batch plants, provide an approved automatic printer system which will print the individual or cumulative weights of aggregate and liquid asphalt delivered to the pugmill and the total net weight of the asphalt mix measured by hopper scales or load cell type scales. Use the automatic printer system only in conjunction with automatic batching and mixing control systems that have been approved by the Engineer.

**320-2.2.4 Weekly Electronic Weigh System Comparison Checks:** Check the accuracy of the electronic weighing system at the commencement of production and thereafter at least once a week during production by one of the following two methods:

**320-2.2.4.1. Electronic Weigh Systems on Truck Scales:**

(a) The Engineer will randomly select a loaded truck of asphalt mix and record the truck number and gross weight from the Contractor's delivery ticket.

(b) Weigh the selected truck on a certified truck scale, which is not owned by the Contractor and record the gross weight for the comparison check. If another certified truck scale is not available, the Engineer may permit another set of certified truck scales owned by the Contractor to be used. The Engineer may elect to witness the scale check.

(c) The gross weight of the loaded truck as shown on the Contractor's delivery ticket will be compared to the gross weight of the loaded truck from the other certified truck scale. The maximum permissible deviation is 8 pounds per ton [4 kg per metric ton] of load, based on the certified truck scale weight.

(d) If the distance from the asphalt plant to the nearest certified truck scale is enough for fuel consumption to affect the accuracy of the comparison checks, a fuel adjustment may be calculated by using the truck odometer readings for the distance measurement, and 6.1 miles per gallon [2.6 kilometers per liter] for the fuel consumption rate, and 115 ounces per gallon [860 grams per liter] for fuel weight.

(e) During production, when an additional certified truck scale is not available for comparison checks, the Engineer may permit the Contractor to weigh the truck on his certified scales used during production and then weigh it on another certified truck scale, as soon the other scale is available for the comparison checks.

In addition to the periodic checks as specified above, check the scales at any time the accuracy of the scales becomes questionable. When such inaccuracy does not appear to be sufficient to seriously affect the weighing operations, the Engineer will allow a period of two calendar days for the Contractor to effect the required scales check. However, in the event the indicated inaccuracy is sufficient to seriously affect the mixture, the Engineer may require immediate shut-down until the accuracy of the scales has been checked and necessary

corrections have been made. Include the cost of all scale checks in the bid price for asphaltic concrete, at no additional cost to the Department.

**320-2.2.4.2. For Electronic Weigh Systems on Hoppers Beneath a Surge or Storage Bins and Automatic Batch Plants with Printout:**

(a) The Engineer will randomly select a loaded truck of asphalt mix and record the truck number, and the net weight of the asphalt mix from the Contractor's delivery ticket.

(b) Weigh the selected truck on a certified truck scale, which is not owned by the Contractor and record the gross weight for the comparison check. If another certified truck scale is not available, the Engineer may permit another set of certified truck scales owned by the Contractor to be used. The Engineer may elect to witness the scale check.

(c) Deliver the asphalt mix to the project, then weigh the selected empty truck on the same certified truck scales. Record the tare weight of the truck.

(d) Compare the net weight of the asphalt mix from the delivery ticket to the calculated net weight of the asphalt mix as determined by the certified truck scale weights. The maximum permissible deviation is 8 pounds per ton [4 kg per metric ton] of load, based on the certified truck scale weight.

(e) Use the fuel adjustment as specified in 320-2.2.4.1(d), when the distance from the asphalt plant to the nearest certified truck scale is enough for fuel consumption to affect the accuracy of the comparison checks.

(f) During production, when an additional certified truck scale is not available for comparison checks, the Engineer may permit the Contractor to load a truck with aggregate from the pugmill, surge or storage bin, and follow the above procedures to conduct the comparison checks as soon as certified truck scale is available.

If the check shows a greater difference than the tolerance specified above, then recheck on a second set of certified scales. If the check and recheck indicate that the printed weight is out of tolerance, have a certified scale technician check the electronic weigh system and certify the accuracy of the printer. While the system is out of tolerance and before its adjustment, the Engineer may allow the Contractor to continue production only if provisions are made to use a set of certified truck scales to determine the truck weights.

**320-2.3 Equipment for Preparation of Bituminous Material:** Equip bituminous material storage tanks to heat liquid asphalt under effective and positive control to the temperatures required for the various mixtures. Heat using hot-oil, steam, electricity, or other means whereby no flame comes in contact with the tank. Use a circulating system of adequate size to ensure proper and continuous circulation during the entire operating period. Use steam or hot-oil jacketed pipe lines and fittings to prevent heat loss. Locate a thermometer, reading from 200 to 400°F [90 to 200°C], either in the storage tank or in the bituminous feed line. Locate a sampling device on the discharge piping exiting the storage tank or at a location as approved by the Engineer.

**320-2.4 Cold Feed:** Provide a separate cold bin for each component of the fine and coarse aggregates required by the design mix. Equip the cold bins with accurate mechanical means for feeding the aggregates uniformly into the dryer in the proportions required for the finished mix to maintain uniform production and temperature.

**320-2.5 Dryer:** Provide a dryer of any satisfactory design for heating and drying the mineral aggregates. Use a dryer capable of heating the aggregates to within the specified

temperature range for any mix, and equip the dryer with an electric pyrometer placed at the discharge chute to automatically register the temperature of the heated aggregates.

**320-2.6 Bituminous Control Unit:** Provide a satisfactory means, either by weighing, metering, or volumetric measuring, to obtain the proper amount of bituminous material in the mix, within the tolerance specified for the job mix. Provide either steam or hot-oil jacketing for maintaining the bituminous material at the specified temperature in the pipe lines, meters, weigh buckets, spray bars, and other containers of flow lines.

**320-2.7 Contractor's Responsibilities:** Acceptance of any automatic delivery ticket printout, electronic weight delivery ticket, other evidence of weight of the materials or approval of any particular type of materials or production methods will not constitute agreement by the Department that such matters are in accordance with the Contract Documents and it shall be the Contractor's responsibility to ensure that the materials delivered to the project are in accordance with the Contract Documents.

### **320-3 Special Requirements for Batch Plants.**

**320-3.1 Gradation Unit:** Provide plant screens capable of separating the fine and coarse aggregates and of further separating the coarse aggregate into specific sizes. (The coarse aggregate is defined as the aggregate retained on the No. 10 [2.00 mm] screen.) In addition, equip the gradation unit with a scalping screen to restrict the maximum size of the aggregates.

**320-3.2 Hot Bins:** Provide storage bins of sufficient capacity to supply the mixer when it is operating at full capacity. Provide hot bins with divided compartments to ensure separate and adequate storage of the appropriate fractions of the aggregate. Equip each compartment with an overflow chute of suitable size and location to prevent any backing up of material into other bins.

**320-3.3 Sampling of Hot Aggregate:** Provide a convenient and accurate means for obtaining samples of hot aggregates from each bin before the material enters the pugmill.

**320-3.4 Weigh Box or Hopper:** Equip the batch plant with a means for accurately weighing each bin size of aggregate and the mineral filler into the weigh box or hopper. Suspend the weigh box or hopper on scales. Use a weigh box or hopper of ample size to hold a full batch without running over. Support it on fulcrums and knife edges, so constructed that they will not be thrown out of alignment or adjustment during batching operations. Use gates both on the hot bins and on the weigh box or hopper that are constructed to prevent leakage.

**320-3.5 Pugmills:** For all pugmills, do not exceed a clearance of 1 inch [25 mm] between the paddle tips and the lining of the pugmill. For pugmills with both long and short paddle arms, apply this requirement to the long arms only. When any paddle is worn more than 3/4 inch [20 mm] from its original dimensions, replace or restore it to its original dimensions. Operate the pugmills in the manner recommended by the manufacturer. Use a plant with a batch mixer of the twin-shaft pugmill type, hot-oil or steam jacketed, and capable of producing a uniform mixture within the job mix tolerance specified. Set paddles to produce a circular or "runaround" action in the pugmill. Ensure that the depth of the material in the pugmill does not extend above the tips of the paddles. Use a pugmill with a capacity of at least 1 ton [1 metric ton] unless permission for lesser capacity is approved by the Engineer.

**320-3.6 Control of Mixing Time:** Use a plant that is equipped with a positive means to control the time of mixing and to ensure the completion of the mixing cycle designated by the

Engineer. Provide all timing devices and bypass switches with a means for being locked into the desired position as directed by the Engineer.

### **320-4 Special Requirements for Drum Mixer Plants.**

**320-4.1 Weight Measurements of Aggregate:** Equip the plant with a weigh-in-motion scale that is capable of measuring the quantity of aggregate (and RAP) entering the dryer.

**320-4.2 Synchronization of Aggregate Feed and Bituminous Material Feed:** Couple the bituminous feed control with the total aggregate weight device, including the RAP feed, in such a manner as to automatically vary the asphalt binder feed rate as necessary to maintain the required proportions.

**320-4.3 Hot Storage or Surge Bins:** Equip the plant with either a surge bin or storage silo that is capable of storing an adequate amount of material to assure a uniform and consistent product.

### **320-5 Paving Equipment.**

#### **320-5.1 Mechanical Spreading and Screeding Equipment:**

**320-5.1.1 General:** Provide mechanical spreading and screeding equipment of an approved type that is self-propelled and can be steered. Equip it with a receiving and distribution hopper and a mechanical screed. Use a mechanical screed capable of adjustment to regulate the depth of material spread and to produce the desired cross-section.

**320-5.1.2 Automatic Screed Control:** For all asphalt courses, placed with mechanical spreading and finishing equipment, equip the paving machine with automatic longitudinal screed controls of either the skid type, traveling stringline type, or non-contact averaging ski type. Ensure that the length of the skid, traveling stringline, or non-contact averaging ski is at least 25 feet [7.5 m]. On the final layer of base, overbuild, and structural courses, and for friction courses, use the joint matcher in lieu of the skid, traveling stringline, or non-contact averaging ski on all passes after the initial pass. Furnish a paving machine equipped with electronic transverse screed controls when required by the Contract Documents.

**320-5.1.3 Inflation of Tires:** When using paving machines equipped with pneumatic tires, the Engineer may require that the tires be ballasted.

**320-5.1.4 Screed Width:** Provide paving machines on full width lanes that have a screed width greater than 8 feet [2.5 m]. Do not use extendable screed strike-off devices that do not provide preliminary compaction of the mat in place of fixed screed extensions. The Contractor may use a strike-off device on irregular areas that would normally be done by hand and on shoulders 4 feet [1.2 m] or less in width. When using the strike-off device on shoulders in lieu of an adjustable screed extension, the Contractor must demonstrate the ability to obtain an acceptable texture, density, and thickness.

When using an extendable screed device to extend the screed's width on the full width lane or shoulder by 24 inches [600 mm] or greater, the Engineer will require an auger extension, paddle, or kicker device unless the Contractor provides written documentation from the manufacturer that these are not necessary.

**320-5.2 Motor Graders:** Provide two motor graders for spreading leveling courses. Equip them with a blade that is at least 2 feet [0.6 m] longer than the width of the lane being leveled. Use motor graders that are rated at not less than 6 tons [5.5 metric tons] and are self-

propelled and power-controlled. Mount them on smooth tread or rib-type tires (no lug types allowed) with a wheel base of at least 15 feet [4.5 m]. Equip the front motor grader with a spreader box capable of spreading the mix at the required rate.

### **320-5.3 Rollers:**

**320-5.3.1 Steel-Wheeled Rollers:** Provide compaction equipment capable of meeting the density requirements described in these Specifications. In the event that density testing is not required, provide a tandem steel-wheeled roller weighing a minimum of 8 tons [7 metric tons] for seal rolling, and for the final rolling, use a separate roller with a minimum weight of 8 tons [7 metric tons]. Variations from these requirements shall be approved by the Engineer.

**320-5.3.2 Traffic Rollers:** Provide compaction equipment capable of meeting the density requirements described in these Specifications. In the event that density testing is not required, provide a self-propelled, pneumatic-tired traffic roller equipped with at least seven smooth-tread, low pressure tires, equipped with pads or scrapers on each tire. Maintain the tire pressure between 50 and 55 psi [345 and 380 kPa] or as specified by the manufacturer. Use rollers with a minimum weight of 6 tons [5.5 metric tons]. Do not use wobble-wheeled rollers. Variations from these requirements shall be approved by the Engineer.

**320-5.3.3 Prevention of Adhesion:** Do not allow the mixture to adhere to the wheels of any rollers. Do not use fuel oil or other petroleum distillates to prevent adhesion. Do not use any method which results in water being sprinkled directly onto the mixture.

**320-5.4 Trucks:** Transport the mix in trucks of tight construction, which prevents the loss of material and the excessive loss of heat. Provide each truck with a tarpaulin or other waterproof cover mounted in such a manner that it can cover the entire load when required. When in place, overlap the waterproof cover on all sides so that it can be tied down.

**320-5.5 Coring Equipment:** Furnish a suitable saw or drill for obtaining the required density cores.

**320-5.6 Hand Tools:** Provide the necessary hand tools such as rakes, shovels, etc., and a suitable means for keeping them clean.