

**CITY OF COLUMBUS, OHIO**

**SUPPLEMENT 1101  
ASPHALT CONCRETE MIXING PLANTS**

**October 31, 2011**

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**1101.01 Scope.** This supplement contains equipment requirements for asphalt concrete mixing plants performing work for City projects. This supplement also contains procedures required for performing an asphalt mixing plant calibration.

**1101.02 Requirements for All Asphalt Concrete Mixing Plants**

**A. General Computerized Plant System Requirements.**

Produce all asphalt concrete in a plant with a computerized plant system approved by the Laboratory.

Ensure that all printouts contain the following information:

1. Date.
2. Time.
3. JMF number.
4. Moisture content of the reclaimed pavement.
5. Percent asphalt binder in the reclaimed pavement to the nearest 0.1 percent.
6. Percent virgin asphalt binder to the nearest 0.1 percent.
7. Percent total asphalt binder calculated to the nearest 0.01 percent.

Ensure that all printouts are preapproved by the Laboratory and are turned over to the City Testing Engineer at the end of the project or the end of the production year.

Ensure that the computerized plant system has an audible alarm system that notifies the plant operator when the amount of asphalt binder, aggregate, or reclaimed pavement being mixed into the asphalt concrete is outside the tolerances established by the Contractor's Quality Control Manager. Make appropriate adjustments when production is outside the tolerances.

Use scales and test weights that conform to the regulations of the Ohio Department of Agriculture. Seal scales as often as the Laboratory directs to ensure their continued accuracy. Seal test weights at least every 3 years at places designated by the Ohio Department of

Agriculture. Equip the plant with one 50-pound (20 kg) test weight for each 400 pounds (200 kg) of the maximum batch weight with a minimum of ten test weights.

Provide a truck scale or recording batch plant scales for the purpose of obtaining the net weight of each load of asphalt mixture as required in 401.21. Use truck scales that indicate the total weight within 20-pound (10 kg) increments and have a rated capacity of at least 10 percent greater than the largest load weighed. Provide a platform large enough to receive the largest truck used for a single weighing.

Ensure that the adjustments for total and proportional feed are continuously variable and capable of being locked at any position.

**B. Mineral Filler and Dust Control.** Provide adequate dry storage for mineral filler, when required, and provide equipment for accurate proportioning. When mineral filler is specified, provide a separate bin and feeder with its drive interlocked with the aggregate feeders. Provide equipment for accurate proportioning of plant collected baghouse fines.

**C. Cold Aggregate and/or Reclaimed Asphalt Pavement Feeder.** Ensure the plant has mechanical means for uniformly feeding the aggregates into the dryer so that uniform production and temperature are assured. Ensure aggregates are blended from two or more bins at the cold feed to meet the requirements of the paving mixture specifications and that a synchronized proportioning method is provided. If recycling capability is required, ensure the plant is equipped with mechanical means for feeding the desired weight of reclaimed asphalt pavement into the mix.

**D. Emission Controls.** Provide a dust collecting system. Ensure the system is made to waste the dust collected and can return all or any part uniformly to the mixture.

**E. Thermometers.** Equip the plant with an adequate thermometric instrument, clearly legible from the mixer operator's station, to monitor the temperature of the asphalt binder. Locate the sensing element or unit in the feed line near the charging valve at the mixer. Where a pyrometer is used, connect the indicator to the thermocouple by a weatherproof extension wire.

Also, equip the plant with an approved dial-scale, infrared thermometer, mercury-actuated thermometer, electric pyrometer, or other approved thermometric instrument placed at the discharge chute of the dryer to register automatically or indicate the temperature of the heated material.

**F. Storage.** Provide storage bins capable of storing hot asphalt concrete mixtures up to 24 hours. Insulate or heat storage bins if mixtures are stored for more than 8 hours. Ensure that the system is capable of maintaining the required temperature without creating hot spots within the stored mixture. In addition, if hot asphalt mixtures are stored from 8 to 24 hours, introduce a silicone admixture into the asphalt binder at the rate of 1 fluid ounce per 5000 gallons (1 mL/640 L). Do not use silicone with warm mix asphalt mixtures.

**G. Asphalt Binder.** Provide a sampling valve between the last piping ‘tee’ and inlet into the plant for sampling asphalt binder.

If more than one kind of asphalt binder is to be used concurrently, store each kind separately. Equip storage tanks to heat the asphalt binder and effectively control the required temperature at all times. Ensure heating by steam or oil coils, electricity, or other means such that no flame contacts the binder.

Ensure the circulating system for the asphalt binder is of adequate capacity to provide proper **and continuous** circulation between the storage tank and proportioning units during the entire operating period. Keep the discharge end of the asphalt binder circulating pipe below the surface of the asphalt binder in the storage tank to prevent discharging the hot asphalt binder into the open air. Ensure all pipe lines and fittings are steam or oil jacketed or otherwise properly insulated to prevent heat loss. When the asphalt binder is emulsified asphalt, provide an asphalt binder transfer system that will enable the operator to turn off or reduce the heat media from all lines, pumps, and jacketed asphalt binder buckets as soon as the system is open and circulating properly.

**H. Safety Requirements.** Provide adequate and safe stairways to the mixer platform, if applicable. Locate guarded ladders to other plant units where required. Cover all gears, pulleys, chains, sprockets, and other dangerous moving parts. Provide a stable sampling platform of suitable size and capacity to support collection of all required samples in a safe manner and that provides safe viewing of asphalt mix in trucks.

### **1101.03 Requirements for Batch Plants**

**A. Computerized Plant System for Batch Plants.** In addition to the general computerized plant system requirements in section 1101.02, print the information on each weight ticket if the asphalt concrete is directly loaded into the truck. If the asphalt concrete is loaded into a storage silo, print the information for every 16 tons (15 metric tons) or less of production. Ensure printouts contain the following additional information:

1. Tare weight of the asphalt binder scale.
2. Tare weight of the aggregate scale.
3. Pounds (kilograms) of virgin asphalt binder.
4. Pounds (kilograms) of virgin aggregate.
5. Pounds (kilograms) of reclaimed asphalt pavement measured by a batch scale or Tons per hour (metric tons per hour) of reclaimed pavement measured by a belt scale.

**B. Plant Screens.** Equip plants with plant screens located between the dryer and hot aggregate bins. Ensure adequate screen 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. Determine the nominal maximum size aggregate in the fines bin. Determine the screen type and size so that no aggregate is larger than the maximum determined.

**C. Hot Aggregate Bins.** Provide hot bin storage of sufficient capacity to ensure uniform and continuous operation. Divide bins into the specified number of compartments arranged to ensure separate and adequate storage of appropriate fractions of the aggregate.

Provide each compartment 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.

Equip bins with “tell-tale” devices to indicate the position of the aggregate in the bins at the lower quarter points. Provide an automatic plant shut-off to operate when any aggregate bin becomes empty.

Use batch plant hot bins that have an oversized material discharge pipe of not less than 6 inches (150 mm) in diameter. Ensure pipes discharge material at points outside the plant operation and do not create a hazard or discomfort.

**D. Aggregate Scales.** Use batch plant scales that have a capacity at least 10 percent greater than the largest weight required for any one batch. Scales for any weighbox or hopper may be either beam, springless dial type, or load cells. Ensure the accuracy of the weighing device is within 1.0 percent of the actual weight being measured when that weight has been determined using another measuring device and is within 0.5 percent when that weight has been determined using test weights.

**E. Weighbox or Hopper.** Provide a means for weighing aggregate from each bin into a weighbox or hopper, suspended on scales, and of sufficient size to hold a full batch. Ensure gates, both on the bins and the hopper, do not leak.

**F. Asphalt Binder Bucket and Scales.** Use a non-tilting asphalt binder bucket with a loose sheet metal cover. Ensure that the length of the discharge opening or spray bar is not less than three-fourths the length of the mixer and that it discharges directly into the mixer. Ensure that the asphalt binder bucket, its discharge valve or valves, and spray bar are fully jacketed or heated. Use jackets that drain efficiently and ensure that all connections are constructed to not interfere with the efficient operation of the asphalt binder scales. Use an asphalt binder bucket with a capacity at least 10 percent greater than the weight of asphalt binder required in any batch. Ensure that the plant has an adequately heated, quick-acting, non-drip, charging valve directly over the asphalt binder bucket. The time required to add the asphalt binder shall not exceed 20 seconds.

Ensure scales for the weighing of asphalt binder meet the requirements for aggregate scales, except ensure a device to indicate at least the last 20 pounds (9.1 kg) of the approaching total load is provided. Ensure beam type scales are equipped with a tare beam or adequate counterbalance for balancing the bucket and compensating periodically for the accumulation of asphalt binder on the bucket.

**G. Mixer Unit.** Ensure the mixer is designed to provide means of adjusting the clearance between the mixer blades and liner plates to ensure proper and efficient mixing. If not enclosed,

ensure the mixer box is equipped with a dust hood to prevent loss of dust by dispersion. Ensure the mixer is constructed to prevent leakage of the contents.

Ensure the mixer is equipped with a positive means for governing mixing time and an accurate time lock to control the operation of a complete mixing cycle by locking the weighbox gate after the charging of the mixer until the closing of the mixer gates at the completion of the cycle. Ensure it locks the asphalt binder bucket throughout the dry mixing period and locks the mixer gate throughout the dry and wet mixing periods.

The dry mixing period is defined as the interval of time between the opening of the weighbox gate and the application of asphalt binder. The wet mixing period is the interval of time between the start of the application of asphalt binder and the opening of the mixer gate.

Ensure the timing control is adjustable and capable of being set at intervals of not more than 5 seconds throughout cycles up to 3 minutes.

**H. Maximum Aggregate Size.** Reject oversize aggregate by suitable methods or devices before the aggregate enters the cold feed or by plant screens.

**I. Accuracy.** Ensure the automatic proportioning system is capable of consistently delivering materials within the full range of batch sizes within the following tolerances:

	Total Batch Weight of Paving Mix, %
Batch aggregate component	± 1.5
Mineral filler	± 0.5
Asphalt binder	± 0.1
Zero return (aggregate)	± 0.5
Zero return (asphalt binder)	± 0.1

#### **1101.04 Requirements for Drum Mix Plants**

**A. Computerized Plant System for Drum Plants.** In addition to the general computerized plant system requirements in section 1101.02, print the information every 5 minutes during production. Ensure printouts contain the following additional information:

1. Tons per hour (metric tons per hour) of virgin asphalt binder.
2. Tons per hour (metric tons per hour) of virgin aggregate.
3. Tons per hour (metric tons per hour) of reclaimed pavement.
4. Moisture content of the virgin aggregate.

Make provisions for including the moisture content of the total cold feed in the belt weighing signal and correcting wet aggregate weight to dry aggregate weight. Adequate and convenient facilities shall be provided for diverting aggregate flow into trucks or other suitable containers to check the accuracy of the aggregate delivery system.

Ensure an automatic plant shut-off or alarm is provided to operate when any aggregate bin becomes empty or the flow from any bin gate becomes restricted.

**B. Asphalt Binder System.** Provide satisfactory means to assure positive interlock between dry weight of aggregate flow and the flow of asphalt binder through an approved meter. Ensure the interlock is capable of adjusting the flow of asphalt binder to compensate for any variation in the dry weight of aggregate flow.

Ensure an automatic digital record of the flow of asphalt binder is displayed, recorded, and totaled in appropriate units of volume or weight and time at least once every 5 minutes of plant operation, and on demand, at least once every minute of plant operation for a period of at least 5 minutes. Ensure the digital record of asphalt binder flow is coordinated with the digital record of dry aggregate flow at the point at which the asphalt binder is discharged into the aggregate.

#### **1101.05 Aggregate and Recycle Weighbridge Calibration.**

All safety procedures must be followed when performing plant calibrations. Notify the City Testing Laboratory 24 hours in advance of conducting a complete calibration for any City project. City's presence on site during calibration is not required. Check each virgin aggregate and recycle (material) weighbridge for compliance with the required tolerance in 402.02.

1. Construct and maintain the material weighbridge according to the manufacturer's recommendations.
2. Operate the conveyor belt empty, prior to calibration, for a length of time to ensure the belt is traveling at normal operating speed and to perform a zero belt function.
3. Ensure the plant control system is set to zero percent moisture or ensure the control system has an automatic function that sets moisture to zero or records the total material in actual tons during the weighbridge calibration.
4. Use a material that provides a uniform flow during the calibration procedure.
5. Record the gross, tare, and net weight of the weighing vessel (truck or silo) and record as the actual weight.
6. Convey material into a suitable weighing device or truck for weighing on truck scales. All weighing scales must be checked and approved by a qualified scale company that has performed a scale calibration prior to the calibration of the weighbridge.
7. Set the material feed to ton per hour (tph) to approximate the normal operating range.
8. Set the plant control material total counter to zero.
9. Ensure material runs across the weighbridge into a truck or silo weighing system. Avoid major changes in material flow.
10. Record the total amount of material displayed on the control system or counter after a sufficient amount of material (based on operator's experience with control system, the manufacturer's recommendation, and the vessel or silo capacity) has ran over the material weighbridge and the tph on the plant control display has gone to zero.
11. The percent error is calculated as the difference between the actual weight in tons or pounds (metric tons or kg) and the plant control displayed weight divided by the plant control displayed weight times 100. If the percent error is below the specification limit, then perform one additional test to verify. Both tests must be within specifications.

12. Perform a manual or automatic calibration procedure to adjust the accuracy of the system if the first test exceeds the specification limit. After the adjustment conduct another calibration test. Two consecutive tests must be within specification.
13. A change in the tph of the material delivery is permitted based on the control system requirements.
14. Document and maintain all calculations in the plant control room for review upon request from City personnel. Record or print out any plant calibration constants that the plant control system provides. Attach all plant control system printouts to the calculation form.
15. Ensure a test weight or calibration bar is configured to hang from the material weighbridge.

#### **1101.06 Asphalt Binder Metering System Calibration**

1. The calibration vessel may be a distributor or calibration tank equipped with load cells. All weighing scales must be checked and approved by a qualified scale company that has performed a scale calibration prior to the calibration of the asphalt.
2. Tare the calibration vessel.
3. Determine the accuracy of the binder control/delivery by pumping asphalt in the automatic mode into the calibration vessel.
4. Ensure a simulated aggregate tph is entered in the plant controls. This can be done electronically or by hanging a weight on the aggregate weighbridge. Set binder spray delay to as close to zero as controls permit.
5. Use a job mix formula of 5% asphalt and 95% aggregate. Enter these values into the plant computer.
6. Fill all connecting hoses with binder or use an acceptable method to account for the binder in the hoses (volumetric calculation) prior to calibration.
7. Ensure the plant is placed in “hot stop” mode after filling hoses so no pumping or aggregate tph will be recorded.
8. Set all counters to zero or record initial tonnage.
9. Activate plant control system to start the flow of asphalt binder.
10. Ensure plant is in “hot stop” mode after pumping a quantity of binder that the calibration vessel can accommodate or capture the initial and final plant control readings if in a continuous mode.
11. Record the plant control totals as the displayed value.
12. Record the calibration vessel gross, tare, and net weight. The net value will be the actual value.
13. The percent error is calculated as the difference between the actual weight in tons or pounds (metric tons or kg) and the plant control displayed weight (final minus initial weights if counter not zero) divided by the plant control displayed weight times 100. If not in tolerance investigate, correct, and re-calibrate.
14. Document and maintain all calculations in the plant control room for review upon request from City personnel. Record or print out any plant calibration constants that the plant control system provides. Attach all plant control system printouts to the calculation form.