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Road construction and road maintenance machinery and equipment - Asphalt mixing plant

道路施工与养护机械设备

沥青混合料搅拌设备

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Table of Contents

Road construction and road maintenance machinery and equipment - Asphalt mixing plant

1 Scope

This standard specifies the classification, technical requirements, test methods, inspection rules, marking, packaging, transportation, storage, quality assurance requirements and complete supply of road construction and maintenance machinery and equipment - Asphalt mixing plant (hereinafter referred to as asphalt mixing plant) .

This standard applies to asphalt mixing plant.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB 150 Steel pressure vessels

GB/T 1955 Construction winch

GB/T 3766 General rules for hydraulic system (GB/T 3766-2001, eqv ISO 4413:1998)

GB 5226.1 Safety of machinery - Electrical equipment of machines - Part 1: General requirements (GB 5226.1-2002, IEC 60240-1: 2000, IDT)

GB 7258 Safety specifications for power-driven vehicles operating on roads

GB/T 7920.11 Road construction and maintenance equipment - Asphalt mixing plants - Terminology and commercial specifications (GB/T 7920.11-2006, ISO 15642:2003, IDT)

GB/T 7932 Pneumatic fluid power - General rules relating to systems (GB/T 7932-2003, ISO 4414:1998, IDT)

Fixed asphalt mixing plant

The asphalt mixing plant which uses fixed installation, all or part of which needs the support from transportation means during relocation.

3.2

Movable asphalt mixing plant

The asphalt mixing plant, all or most of which are equipped with walking devices, that use the traction mechanism as the main means of transport during relocation.

3.3

Standard operating mode

The condition of medium-grain ordinary asphalt mixture at which the ambient temperature is 20 °C, it is at the standard atmospheric pressure, the average moisture content of the cold aggregate is 5%, the diesel fuel is used, the hot aggregate temperature is 160 °C or the finished material temperature is 140 °C.

3.4

Fuel consumption rate

Under standard operating conditions, for every ton of finished material produced by continuous asphalt mixing plant or for every ton of hot aggregate produced by intermittent asphalt mixing plant, the amount of diesel fuel consumed by the drum burner.

Note: The calorific value of diesel is calculated at 46055 kJ/kg.

3.5

Static calibration measurement accuracy (abbreviated as static accuracy

It is the calibration accuracy of the standard weight, expressed as a percentage, as the relative error of the difference between the value of the standard weight and the indicated value to the agreed value of the standard weight.

3.6

Dynamic batching measurement accuracy (abbreviated as dynamic accuracy)

5.3.2 The weld shall be flat, well-proportioned, free from defects; meet the requirements of JB/T 5000.3.

5.3.3 The surface of the castings shall be clean, free of pores, looseness and other defects; meet the requirements of JB/T 5000.4 and JB/T 5000.6.

5.3.4 Piping and joints shall be clean and unobstructed, sealed reliably; meet the requirements of JB/T 5000.11.

5.3.5 The hydraulic system shall meet the requirements of GB/T 3766.

5.3.6 The quality of the paint film shall meet the requirements of JG/T 5011.12.

5.3.7 The equipment shall be easy to transport; the hoisting and transportation shall comply with the requirements of relevant standards.

5.4 Towing performance requirements of movable mixing plant

5.4.1 When each transport unit is towed by a wheeled tractor, the driving speed shall not be higher than 20 km/h. The components are connected reliably, without loosening, deformation or damage.

5.4.2 The size limits of each transport unit during towing are as follows: total height 4.5 m, total width 3 m, total length 20 m.

5.4.3 The minimum turning diameter is not more than 60 m; the minimum ground clearance is not less than 265 mm.

5.4.4 The axle load of the transport unit shall meet the requirements of relevant specifications and shall not deviate from the design value by ±2.0%.

5.4.5 When driving at a speed of 20 km/h, the maximum braking distance shall meet the requirements of GB 7258.

5.5 Assembly technical requirements

5.5.1 Cold material supply system

5.5.1.1 The cold material supply system consists of cold material silos, feeders, aggregate belt conveyors, inclined belt conveyors.

5.5.1.2 The cold material silo's volume and material supply capacity shall meet the requirements of the maximum production capacity of the asphalt mixing plant; the material supply shall be stable and reliable.

5.5.1.3 The cold material silo adopts a multi-silo structure; its quantity shall meet the grading requirements of the mixture. The fine material silo shall be equipped with an arch breaking device.

5.5.2.8 There shall be no leakage of material at the material outlet and material inlet & outlet boxes.

5.5.3 Burner

5.5.3.1 The burner is composed of air supply system, fuel supply system, nozzle, proportional adjustment device, ignition and electrical control system.

5.5.3.2 The heating capacity shall meet the needs of the maximum production capacity of the mixing plant.

5.5.3.3 The ignition shall be rapid; the safety devices such as flame monitoring and flameout protection shall be installed, which is stable and reliable.

5.5.3.4 It shall be able to stably burn; the air-fuel ratio shall be easily adjusted.

5.5.3.5 The flame shape shall be well matched with the drum; the flame rigidity is good; no obvious deviation is allowed.

5.5.3.6 The high-temperature zone shall be made of heat-resistant steel plates; if refractory materials need to be installed, they shall be easily replaced.

5.5.3.7 Filters, overflow valves and pressure gauges shall be installed in the oil supply pipeline.

5.5.3.8 The heavy oil burner shall be equipped with heavy oil storage, heating, filtering and light-heavy oil switching devices.

5.5.3.9 The pulverized coal burner shall be equipped with pulverized coal conveying and light oil ignition system. The pulverized coal has good adaptability, less slagging in the furnace and easy to clean.

5.5.4 Hot aggregate hoist

5.5.4.1 It is composed of shell, chain, sprocket, hopper, power device.

5.5.4.2 The lifting capacity shall meet the requirements of the maximum production capacity of the mixing equipment.

5.5.4.3 It shall be completely sealed; there shall be no leakage or dust emission during work.

5.5.4.4 It shall meet the relevant requirements of JB/T 3926.2; be equipped with tensioning and anti-reverse devices; run smoothly.

5.5.4.5 The service life of chains and sprockets shall not be less than 5000 h.

5.5.4.6 The hopper shall be made of wear-resistant steel plate and be easy to

5.5.7.1 The measurement capability shall meet the maximum production capacity requirements of the equipment; its accuracy shall meet the requirements of Table 2.

5.5.7.2 The minimum display inductance value of aggregate measurement is 1 kg.

5.5.7.3 The minimum display sensitivity value for the measurement of powder, asphalt and additives is 0.1 kg.

5.5.7.4 There shall be a protective device to prevent dust from overflowing; there shall be no jamming in the vertical direction.

5.5.7.5 The asphalt weighing barrel shall be equipped with heating and heat preservation devices and devices to prevent asphalt overflow.

5.5.8 Agitator

5.5.8.1 The agitator is a compulsory type, consisting of a shell, a mixing shaft, a mixing blade, a mixing arm, a liner, a power device.

5.5.8.2 The mixing capacity shall meet the production capacity requirements of the mixing equipment under standard working conditions.

5.5.8.3 The volume and speed shall meet the requirements of maximum mixing capacity.

5.5.8.4 The mixing blades, mixing arms, lining plates are made of wear-resistant materials for easy replacement; the service life of the blades and lining plates shall be not less than 50000 batches; the service life of the mixing arm shall be not less than 80000 batches.

5.5.8.5 The discharge door shall be opened and closed flexibly; there is no leakage of material or ash after being closed.

5.5.8.6 Ventilation ducts, inspection doors and safety protection devices or warning signs shall be provided.

5.5.8.7 The opening height of the lower part is not less than 3.3 m; the opening width is not less than 3 m.

5.5.9 Powder supply system

5.5.9.1 The powder supply volume of the powder supply system shall meet the requirements of various asphalt mixture gradations.

5.5.9.2 The storage capacity of the powder tank shall ensure that the mixing equipment works continuously for not less than 6 hours under standard

5.5.12 Finished material hoist

5.5.12.1 According to the conveying mode, it can be divided into two modes: scraper conveyor and transportation trolley.

5.5.12.2 The lifting capacity shall meet the requirements of the maximum productivity of the mixing equipment.

5.5.12.3 The scraper conveyor is completely sealed; the working surface shall be covered with wear-resistant steel plates, which are easy to replace; the bottom is equipped with a heating device.

5.5.12.4 The scraper conveyor shall be equipped with a tensioning device and an anti-reversal device; run smoothly without jamming.

5.5.12.5 The service life of the chain and sprocket of the scraper conveyor hoist is not less than 5000 h.

5.5.12.6 The scraper of the scraper conveyor shall be made of wear-resistant steel plate and be easy to replace.

5.5.12.7 The working surface of the trolley track shall be equipped with wear-resistant steel plates. The trolley runs smoothly and is positioned accurately. Derailment or jamming is not allowed.

5.5.12.8 The trolley's discharge door opens flexibly and does not leak when closed; it can discharge cleanly within the specified time.

5.5.12.9 The traction wire rope, reel, brake, etc. of the trolley shall be safe and reliable; meanwhile it shall meet the requirements of GB/T 1955.

5.5.13 Finished product silo

5.5.13.1 The storage capacity of the silo shall ensure that the mixing equipment works continuously for at least 30 minutes under the maximum production capacity.

5.5.13.2 The silo shall have a device to prevent segregation of the well-mixed asphalt mixture.

5.5.13.3 Insulation measures shall be provided; at least a heating device shall be provided at the discharge bin door.

5.5.13.4 The temperature drop of the asphalt mixture in the silo shall not exceed 10 °C within 12 hours.

5.5.13.5 The high material level indicator shall be set.

5.5.16 Pneumatic control system

5.5.16.1 The system pressure and air supply volume shall match the maximum production capacity of the mixing plant and meet the requirements of GB/T 7932.

5.5.16.2 The air path system shall be equipped with filters, lubricators, pressure reducing valves, oil-water separators; it shall be easy to maintain.

5.5.16.3 The air path system shall be equipped with a gas storage tank and a safety valve. The opening pressure of the safety valve shall not be greater than the safety setting value of the device.

5.5.17 Safety and environmental protection

5.5.17.1 Asphalt mixing plant shall be affixed with safety warning signs at suitable locations; the signs shall be clear and easy to understand.

5.5.17.2 Working platforms, staircases, railings, etc. shall meet the requirements of relevant specifications and be safe and reliable.

5.5.17.3 Rotating parts such as exposed couplings and belt drives shall be equipped with protective devices.

5.5.17.4 Safety devices such as pressure gauges, thermometers, safety valves shall be complete, sensitive and reliable; the pressure vessels shall meet the requirements of GB 150.

5.5.17.5 The fuel tank shall be equipped with flame arrester and rainproof facilities.

5.5.17.6 When a system fails during the production process of the mixing plant, the corresponding system shall be able to perform chain protection.

5.5.17.7 All parts of the asphalt mixing plant shall be equipped with effective dust spill protection devices.

5.5.17.8 Asphalt mixing plant manufacturers shall remind users to equip fire extinguishers and have lightning protection measures; the lightning protection facilities and grounding grids shall be designed and constructed by qualified professional organizations, meanwhile meet the relevant requirements of GB 50057.

6 Test method

6.1 Test preparation and requirements

6.1.1 Test site:

equipment shall be debugged and run-in; the run-in time shall not be less than 50 h. After the run-in is over, perform maintenance according to the requirements of the product manual. Fill in the equipment run-in status and test records in Table A.2.

6.2 Axle load measurement of movable mixing plant

6.2.1 Test conditions:

a) All the assemblies, parts, accessories and auxiliary devices (including vehicle-mounted tools) of the prototype must be fully equipped according to requirements and installed on the prescribed devices. The adjustment status shall meet the requirements of the equipment technical conditions; the lubricant shall be applied as required.

b) The tire pressure shall meet the requirements of the instruction manual; the error shall not exceed ±10 kPa.

c) All parts of the prototype shall be clean and free of oil stain, mud or other dirt.

d) Movable accessories or attachments on the outside of the prototype shall be in normal working conditions (such as towing hooks, etc.).

6.2.2 Test equipment:

Wagon balance (accuracy 0.5%), level, steel tape (range 30 m).

6.2.3 Test method:

a) The front wheel of the tested unit of the prototype is stopped outside the wagon balance; the rear wheel stays on the wagon balance and keeps the prototype leveling. The measured value is the load distribution of the rear axle in this state.

b) The rear wheel of the prototype is stopped outside the wagon scale; the front wheel is left on the wagon scale and keeps the prototype leveling. The measured value is the load distribution of the front axle in this state.

6.2.4 Test results:

The test results are recorded in accordance with Table A.3.

6.3 Towing test of movable mixing plant

6.3.1 Minimum turning diameter test

6.3.1.1 Test conditions:

6.4.2.1 Test conditions:

a) The preparation of raw materials shall meet the requirements of 6.1.3;

b) The prototype of the mixing equipment operates stably; the burner may not work;

c) The dynamic accuracy measurement must be performed after the static accuracy calibration.

6.4.2.2 Test equipment:

Wagon balance (accuracy 0.5%), secondary scale or secondary dynamometer, hauling truck, hopper, asphalt barrel, etc.

6.4.2.3 Test method:

a) According to the batching scales with different functions, the batching test is carried out at 50% and 100% full scale, respectively; record the set value and actual measured value of each material. The test is repeated three times and the average is taken. The interval between two tests shall be greater than 15 minutes.

b) For continuous mixing plant, carry out batching test at 50% and 100% of full scale, respectively; receive the material at the material outlet; use a stopwatch for timekeeping. Aggregate's receiving time is not less than 5 minutes each time, whilst asphalt and powder's receiving time are not less than 10 seconds each time. Record the actual measured value and set value each time. The test is repeated three times and it takes the average value as the result. The interval between two tests is not less than 10 min.

6.4.2.4 Test results:

a) The test results are recorded in accordance with Table A.8.

b) The measurement accuracy is calculated according to formulas (2) and (3), but m_i is the actual measured value of the material and m_i' is the set value.

6.5 Measuring accuracy of thermometers

6.5.1 Test conditions:

Test conditions: No rain, wind speed not greater than 3 m/s.

6.5.2 Test equipment:

Thermometer, stopwatch.

a) Cold aggregate moisture testing: When the equipment is under the rated production state, take a sample at the outlet of the aggregate belt conveyor. The sample weighs about 8 kg. After mixing, use the quarter method to take 2 kg as a sample. Place it in an oven at 105 °C ± 5 °C to bake it for 8 h. Weigh the mass of the sample before and after drying. The test is carried out 5 times. Take the average value as the result.

b) Hot aggregate residual moisture testing: When the equipment is under rated production state, take a sample at the outlet of the drying drum. The sample weighs about 8 kg. After mixing, use the quarter method to take 2 kg as a sample; bake it at 160 °C for 8 hours; weigh the mass of the sample before and after drying. The test is carried out 5 times. Take the average value as the result.

6.8.1.4 Test results:

The test results are recorded according to Table A.13 and Table A.14.

6.8.2 Temperature stability test

6.8.2.1 Test conditions:

The mixing equipment works continuously under standard conditions.

6.8.2.2 Test equipment:

Thermometer, timer.

6.8.2.3 Test method:

It is carried out at the same time as the productivity test. During the test, samples are taken at the discharge port of the drum. The forced gap asphalt mixing plant uses the dried hot aggregate, whilst the continuous drum asphalt mixing plant uses the mixed finished material. The testing of material temperature is completed within 2 minutes after sampling. Take sample for testing once every about 3 min; perform 20 consecutive times.

6.8.2.4 Test results:

a) The test results are recorded in accordance with Table A.15 and Table A.16.

b) The test data is calculated according to formula (4) ~ formula (9).

Temperature stability is calculated according to formula (4):

It shall meet the requirements of 6.8.3.1.

6.9.2 Test equipment:

Bench scales, balances, standard sieves, sampling boxes, etc.

6.9.3 Test method:

According to the production mix ratio, take samples from the outlets of each silo. Use the quarter method to take about 2 kg of sample, to perform the screening test; separate the material groups of various particle sizes and list them after weighing. For drum-type mixing equipment, take samples from the outlet of the cold material silo; for forced mixing equipment, take samples from the outlet of the hot material silo.

6.9.3.1 Test results:

a) The experimental results are recorded in accordance with Table A.20;

b) Draw a gradation curve.

6.10 Analysis of finished material quality indicators

6.10.1 The test conditions shall meet the requirements of 6.8.3.1.

6.10.2 Test equipment:

Extraction instrument, bench scale, balance, centrifuge, thermometer, sampling box, etc.

6.10.3 Test method:

a) In the finished product silo or the agitator's discharge port, use a special container to directly collect the material sample. Collect more than 5 kg of test material each time. Take the material once every 3 minutes; sample 20 times continuously. Take about 2 kg from each specimen by the quarter method. Carry out an extraction and screening test on the finished material according to the requirements of JTJ 052. Analyze the deviation of the asphalt content and the aggregate gradation composition in the finished material;

b) If the material is taken from the finished product truck, sampling shall be at 2/3 of its stacking height; the depth of the sampling point shall not be less than 20 cm. The sampling weight method is the same as above.

6.10.4 Test results and data processing:

a) The test results are recorded in accordance with Table A.21, Table A.22,

6.12 Determination of environmental protection parameters

6.12.1 Noise test

6.12.1.1 Test conditions:

a) The weather is no rain; the wind speed is not more than 3 m/s;

b) The test shall be carried out in an open field; there shall be no large reflectors (such as buildings, fences, etc.) within 50 m from the maximum noise source; the background noise shall be more than 10 dB(A) lower than the noise of the tested prototype;

c) Except for the person measuring the noise near the sound level meter, other people shall be behind the person measuring the noise;

d) The mixing equipment operates stably under rated conditions; other auxiliary equipment equipped is also a source of noise. Whether it is activated during measurement shall be determined according to normal use.

6.12.1.2 Test equipment:

Sound level meter, tape measure.

6.12.1.3 Test method:

a) When measuring environmental noise, first equally divide 8 measuring points on a circle with a radius of 30 m from the largest noise source and mark them as A, B, C, D, E, F, G, H; then place the test pickup on the measuring point at 1.2 m above the floor; use a tripod to fix it and make it parallel to the bottom surface, aiming at the largest noise source;

b) When measuring the noise of the operating station, close the doors and windows; arrange the measuring point 100 mm from the operator's ear; aim the pickup at the largest noise source;

c) The test method is carried out in accordance with the relevant requirements of JG/T 5079.2.

6.12.1.4 Test results and data processing:

a) The test results are recorded in accordance with Table A.25 and Table A.26;

b) The test data processing is carried out in accordance with the relevant requirements of JG/T 5079.2.

b) The sampling pipeline shall be as short and straight as possible; the necessary dust filtering device shall be installed;

c) The sampling pipe shall be inclined along the flue gas's flow direction; the entire sampling pipe shall be tight and leak-proof;

d) After the mixing equipment is operating stably under rated conditions, according to the above distribution principle, perform multi-point sampling on the same cross-section, to calculate the average;

e) Each point uses 0.5 min ~ 2 min; the test is repeated 3 times; take the average value as the result.

6.12.4.4 Test results:

The test results are recorded in accordance with Table A.29.

6.13 Reliability test

6.13.1 Test purpose

Through the 200 h reliability test of the mixing equipment prototype, to assess the reliability of the prototype operation under the specified conditions.

6.13.2 Test site

The test site shall meet the requirements of 6.1.1a).

6.13.3 Test conditions

The reliability test conditions are as follows:

a) The reliability test time is not less than 200 h, which does not include the equipment running-in, no-load operation, performance test time;

b) During the test, the average load rate of the equipment is not less than 85% of the rated productivity; the working time under the rated load is not less than 30% of the test time;

c) The asphalt mixture produced by the prototype equipment must meet the requirements of JTG F40;

d) During the prototype operation, the equipment must be in good condition; the cumulative operation time per operation shift shall not be less than 5 h;

e) During the test, experienced technicians shall operate and maintain in strict accordance with provisions, to prevent illegal operations and faulty

c) Products remanufactured after being discontinued for more than two years;

d) Products with serious accidents or failing to pass sampling inspections;

e) When the national quality supervision agency conducts a comprehensive quality inspection.

7.3.2 Type inspection is sampling inspection.

7.3.3 The inspection items for type inspection shall be inspected and judged according to all the contents as specified in the technical requirements.

7.3.4 The test items for type inspection shall be in accordance with Table 8.

7.3.5 In the type inspection, the conditions a) and b) belong to appraisal inspection, which is performed on one unit as randomly selected from the trial prototype; the conditions c) ~ e) belong to quality consistency inspection, which is performed by using a random sampling method, to take one unit from the products which were produced in the same year or recently and had passed the exit-factory inspection.

7.3.6 Judgment rules

7.3.6.1 If the inspected mixing equipment does not meet the requirements of any one of the main performance indicators of this standard (category A items in Table 8), it is judged as unqualified.

7.3.6.2 If there are more than three items (including three) of category B items in Table 8 that are unqualified, the products that are sampled are allowed to be re-inspected after rectification. If there are still three unqualified items in the re-inspection, they will be judged as unqualified.

7.3.6.3 The category C items in Table 8 have little impact on the performance of the equipment; or items that are affected by materials and operating levels and are not fully controlled by the equipment, are not used as the basis for determining the qualification of the equipment. They are only used as a reference for the excellent and good equipment.

8 Marking, packaging, transport, storage

8.1 Marking

The markings shall be set in a position that is easy to observe; the text content and graphic prompts shall be easy to identify.

8.1.1 The product marking shall include the following:

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