

Asphalt Pavement Association of Indiana, Inc.

Indiana

**2018 RECOMMENDED GUIDE SPECIFICATION FOR ASPHALT PAVEMENTS FOR**

**LOCAL GOVERNMENTS AND NON-GOVERNMENTAL APPLICATIONS**

*This recommended specification incorporates the latest asphalt pavement technologies. It attempts to present the best practices, procedures and processes but is not intended to replace sound engineering knowledge, judgment and experience.*

The Indiana Department of Transportation (INDOT) Standard Specifications, Section 402 – Hot Mix Asphalt, HMA, Pavement dated 2018, shall apply with the modifications as noted herein. Section numbers refer to INDOT Standard Specifications.

**HMA.01 Description**

This work shall consist of one or more courses of Hot Mix Asphalt (HMA) base, intermediate, surface mixtures or other miscellaneous HMA application.

**HMA.02 Quality Control**

HMA shall be supplied from a Certified HMA Plant in accordance with *Indiana Test Method (ITM) 583 – Certified Volumetric Hot Mix Asphalt Producer Program*. HMA shall be transported and placed according to a Quality Control Plan (QCP) prepared by the Contractor in accordance with *ITM 803 – Contractor Quality Control Plan for HMA Pavement*. The QCP shall be submitted to the Contracting Agency five calendar days prior to commencing HMA paving operations.

**HMA.03 Materials**

PG binders for HMA shall be supplied by an INDOT approved supplier in accordance with *ITM 581 – Asphalt Supplier Certification (ASC) Program* and shall meet the requirements of Section 902.01.

Aggregate materials for HMA mixtures shall be supplied by an INDOT Certified Aggregate Producer (CAPP). The aggregates shall meet the requirements of Section 904.

The HMA fine aggregate materials shall meet the requirements of Section 904.02(b), except the fine aggregate angularity table shall be modified as follows:

|  |  |  |
| --- | --- | --- |
| FINE AGGREGATE ANGULARITY | | |
| Type | Depth from Surface | |
| ≤ 4 inches\* | > 4 inches |
| A |  |  |
| B | 40 | 40 |
| C | 45 | 40 |
| \*Note: For 4.75 mm mixtures, the fine aggregate angularity shall be 40 for Type A and 45 for Type B and C. | | |

The HMA coarse aggregate materials shall meet the requirements of 904.03(b), except the coarse aggregate angularity table shall be modified as follows:

|  |  |  |
| --- | --- | --- |
| COARSE AGGREGATE ANGULARITY | | |
| Type | Depth from Surface | |
| ≤ 4 inches | > 4 inches |
| A | 55 |  |
| B | 75 | 50 |
| C | 85/80\* | 60 |
| \*Note: Denotes two faced crushed requirements. | | |

HMA coarse aggregates for surface mixtures shall meet the requirements of Section 904.03(d), except they may be modified as follows when the design speed or posted speed limit is equal to or less than 45 mph.

|  |  |  |  |
| --- | --- | --- | --- |
| Coarse Aggregate Type | Traffic ESALs | | |
| < 3,000,000 | < 10,000,000 | ≥ 10,000,000 |
| Air-Cooled Blast Furnace Slag | Yes | Yes | Yes |
| Steel Furnace Slag | Yes | Yes | Yes |
| Sandstone | Yes | Yes | Yes |
| Crushed Dolomite | Yes | Yes | Yes |
| Polish Resistant Aggregates | Yes | Yes | Yes |
| Crushed Stone | Yes | Yes | \* |
| Gravel | Yes | Yes | \* |
| \*Note: Crushed Stone or gravel may be used in accordance with *ITM 221*. | | | |

**HMA.04 Design Mix Formula and Mixture Type**

The design mix formula (DMF) shall be prepared by an INDOT approved Mix Design Laboratory in accordance with Section 401.05 and submitted to the Contracting Agency in an acceptable format one week prior to use. The DMF shall be based on the mixture type (design ESAL) and mixture designation of the following tables.

|  |  |  |  |
| --- | --- | --- | --- |
| ***Mixture Type*** | ***Type A\**** | ***Type B\**** | ***Type C\**** |
| *Design ESAL* | *<300,000* | *300,000 to <3,000,000* | *≥3,000,000* |
| *AADT (Average Annual Daily Traffic)\*\*\** | *<4,000* | *4,000 - 15,000* | *15,000 - 30,000* |
| *AADTT (Average Annual Daily Truck Traffic)\*\*\** | *<50* | *50 - 1700* | *>1700* |
| *Commercial & Residential Application\*\*\** | *Passenger car parking with <500 stalls and*  *<20 heavy trucks\*\* per day, residential driveways* | *Parking Lots with*  *20-300 heavy trucks\*\* per day* | *Heavy commercial parking lots with*  *150-300 heavy trucks\*\* per day* |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Mixture Type*** | ***Type A\**** | ***Type B\**** | ***Type C\**** |
| ***Surface*** | | | |
| Nominal Maximum  Aggregate Sizes | 4.75 mm  9.5 mm  12.5 mm | 4.75 mm  9.5 mm  12.5 mm | 4.75 mm  9.5 mm  12.5 mm |
| Recommended PG Binder Grade | 64-22 | 64-22 | 70-22 |
| ***Intermediate*** | | | |
| Nominal Maximum  Aggregate Sizes | 9.5 mm  12.5 mm  19.0 mm  25.0 mm | 9.5 mm  12.5 mm  19.0 mm  25.0 mm | 9.5 mm  12.5 mm  19.0 mm  25.0 mm |
| Recommended PG Binder Grade | 64-22 | 64-22 | 64-22 |
| ***Base*** | | | |
| Nominal Maximum  Aggregate Sizes | 19.0 mm  25.0 mm | 19.0 mm  25.0 mm | 19.0 mm  25.0 mm |
| Recommended PG Binder Grade | 64-22 | 64-22 | 64-22 |

\* A higher category mix may be used for a lower category application at no additional cost to the agency.

\*\* Heavy trucks are commercial vehicles with normally 2 axles, six tires or larger.

\*\*\* This information is provided as an approximate comparison only.

Asphalt binder grades are recommended in the above table based on mixture type and designation. Adjustments to the binder grades may be required based on the amount of recycled materials used. Guidelines are contained in HMA.08. The plant discharge temperature for any mixture shall not be more than 315°F whenever PG 58-28, PG 64-22, PG 64-28, or PG 70-22 binders are used and not more than 325° F whenever PG 70-28 or PG 76-22 binders are used. HMA mixtures may be produced by using a water injection foaming device or additives as specified and according to the manufactures recommendations.

**HMA.05 Volumetric Mix Design**

Design Mix Formula (DMF) shall be determined for each mixture from a volumetric mix design by a design laboratory selected from INDOT’s list of Approved Mix Design Laboratories. A volumetric mixture shall be designed in accordance with Section 401.05 and AASHTO R 35 with the following tables and exceptions. All loose mixture shall be conditioned for four hours in accordance with AASHTO R 30 prior to testing. Material Adjustment Factor (MAF) shall not apply.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| GYRATORY COMPACTION EFFORT | | | | | |
| Mix Type | Nini | Ndes | Nmax | Max. %  Gmm @ Nini | Max. %  Gmm @ Nmax |
| A | 6 | 50 | 75 | 91.5 | 98.0 |
| B | 7 | 75 | 115 | 90.5 | 98.0 |
| C | 8 | 100 | 160 | 89.0 | 98.0 |

|  |  |
| --- | --- |
| VOIDS FILLED WITH ASPHALT, VFA, CRITERIA @ Ndes | |
| Type | VFA % |
| A | 70-80 |
| B | 65-78 |
| C | 65-75 |

**HMA.06 (intentionally left blank)**

**HMA.07 Mix Criteria**

HMA wedge and leveling mixtures shall consist of surface or intermediate mixtures in accordance with HMA.04. Aggregate requirements of 904.03(d) do not apply when the wedge and leveling mixture is covered by a surface or intermediate mixture.

Temporary HMA mixtures shall be the type specified in accordance with HMA.04. A MAF in accordance with 402.05 will not apply.

HMA curbing mixes shall be HMA surface type B in accordance with 402 except 402.05 shall not apply and RAP shall not be used. The binder content shall be 7.0% and the gradations shall meet the following:

|  |  |
| --- | --- |
| HMA Curbing Gradations | |
| Sieve Size | Percent Passing |
| 1/2 in. (12.5 mm) | 100.0 |
| 3/8 in. (9.5 mm) | 80.0 – 100.0 |
| No. 4 (4.75 mm) | 73.0 ± 5.0 |
| No. 30 (600 µm) | 20.0 – 50.0 |
| No. 200 (75 µm) | 6.0 – 12.0 |

**HMA.08 Recycled Material**

Recycled Materials shall meet the requirements of Section 401.06.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| MAXIMUM BINDER REPLACEMENT PERCENTAGE | | | | | | | |
| Mix Type | Base and Intermediate | | | | Surface | | |
| Dense Graded | | | | Dense Graded | | |
| 25.0 mm | 19.0 mm | 12.5 mm | 9.5 mm | 12.5 mm | 9.5 mm | 4.75 mm |
| A | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* |
| B | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* |
| C | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0/40.0\* | 25.0\* | 25.0\* | 25.0\* |
| \*Note: The contribution of RAS to any HMA mixture shall be ≤ 3.0% by total mass of mixture and ≤ 15.0% binder replacement. | | | | | | | |

*IMPORTANT NOTE: The above table gives the designer the option to specify a maximum binder replacement of either 25.0% or 40.0% for all dense graded asphalt mixtures, excluding Type C surfaces. In 2016, INDOT revised their specifications to reduce the maximum allowable binder replacement percentage from 40.0% to 25.0% for all dense graded asphalt mixtures. However, higher RAP/RAS mixtures are more sustainable and economical. It is NAPA (National Asphalt Pavement Association) and APAI’s positions that higher binder replacement percentages can be utilized without compromising durability and longevity of the asphalt pavement when properly designed. The Departments of Transportation for some surrounding states allow for higher binder replacement percentages than 25.0%. For asphalt projects using this Guide Specification, the Agency/Owner should use proper engineering judgement on a project-by-project basis to select the maximum binder replacement in the table above.*

HMA Mixtures with a binder replacement greater than 25.0% and less than or equal to 40.0% by weight of total binder content utilizing RAP or a blend of RAP and RAS shall use a binder grade with the upper and lower temperature classification reduced by 6° C from the specified binder grade as shown below.

|  |  |
| --- | --- |
| Specified Binder Grade for Binder Replacement ≤ 25.0% | Specified Binder Grade for Binder Replacement >25.0% and ≤40.0% |
| PG 64-22 | PG 58-28 |
| PG 70-22 | PG 64-28 |
| PG 76-22 | PG 70-28 |

**HMA.09 Acceptance of Mixtures**

Acceptance will be on the basis of a Type D Certification in accordance with Section 916(d). The HMA Certification shall be the quality control test representing the material and shall include air voids at Ndesign and binder content for material supplied to the project.Type D Certification shall be submitted to the Contracting Agency’s representative each day in which material is received.

The Minimum Testing Frequency for Type D Certification.

Base and Intermediate One sample for each 1,000 ton

Surface One sample for each 600 ton

***CONSTRUCTION REQUIREMENTS***

**HMA.10 General**

Shall be in accordance with Section 402.10.

**HMA.11 Preparation of Surfaces to be Overlaid**

Milling of an existing surface shall be in accordance with Section 306. Surfaces on which a mixture is placed shall be free from objectionable or foreign materials at the time of placement.

PCCP, milled asphalt surfaces and asphalt shall be tacked according to Section 406. Contact surfaces of curbing, gutters, manholes and other structures shall be tacked in accordance with Section 406.

**HMA.12 Weather Limitations**

HMA courses less than 110 lb/syd are to be placed when the ambient and surface temperatures are 60o F or above. HMA courses equal to or greater than 110 lb/syd but less than 220 lb/syd are to be placed when the ambient and surface temperatures are 45o F or above. HMA courses equal to or greater than 220 lb/syd are to be placed when the ambient and surface temperatures are 32o F or above. Mixture shall not be placed on a frozen subgrade. However, HMA courses may be placed at lower temperatures provided the density of the HMA course is in accordance with Section 402.16 or if approved by the Contracting Agency’s representative.

**HMA.13 Spreading and Finishing**

Shall be in accordance with Section 402.13.

**HMA.14 Joints**

Shall be in accordance with Section 402.14.

**HMA .15 Compaction**

The HMA mixture shall be compacted with equipment in accordance with 409.03(d) immediately after the mixture has been spread and finished. A roller application is defined as one pass of the roller over the entire mat. Compaction operations shall be completed in accordance with the following table or by the Low Temperature Compaction Requirements in HMA.16.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| NUMBER OF ROLLER APPLICATIONS | | | | | | | |
| Rollers | Courses < 440 lb/syd | | | | | Courses  > 440 lb/syd | |
| Option 1 | Option 2 | Option 3 | Option 4 | Option 5 | Option 1 | Option 2 |
| Three Wheel | 2 |  | 4 |  |  | 4 |  |
| Pneumatic Tire | 2 | 4 |  |  |  | 4 |  |
| Tandem | 2 | 2 | 2 |  |  | 4 |  |
| Vibratory |  |  |  | 6 |  |  | 8 |
| Oscillatory |  |  |  |  | 6 |  |  |

Rollers shall not cause undue displacement, cracking, or shoving. A reduced number of applications on a course may be approved if detrimental results are being observed.

**HMA.16 Low Temperature Compaction Requirements**

Shall be in accordance with Section 402.16. Density test reports shall be furnished to the Contracting Agency.

**HMA.17 Shoulder Corrugations**

Shall be in accordance with Section 402.17.

**HMA.18 Pavement Smoothness**

Shall be in accordance with Section 402.18.

**HMA.19 Method of Measurement**

Shall be in accordance with Section 402.19, except the Material Adjustment Factor (MAF) shall not apply.

**HMA.20 Basis of Payment**

The accepted quantities for this work will be paid for at the contract unit price per ton for HMA of the type and Nominal Maximum Aggregate Size (NMAS) specified, complete in place.

Pay Item\* Pay Unit

HMA Surface Type \_\_, \_\_mm Ton

HMA Intermediate Type \_\_, \_\_mm Ton

HMA Base Type \_\_, \_\_mm Ton

\* Pay item shall include the mixture type from the table in HMA.04 and the Nominal Maximum Aggregate Size (NMAS).

If the user has questions regarding this guide specification, APAI encourages you to contact the member asphalt producer or contractor in your local area. A membership directory can be downloaded to your phone from the Apple or Google app store by searching for Asphalt Pavement Association of Indiana.

Also, remember that government agency personnel are welcomed as our complimentary guests at the association’s annual Winter Conference and Trade Show held in December in Indianapolis. Please consult our website for details each fall regarding date and location.

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