

NJDOT Survey On Dust to Binder Ratio for Superpave

NJ asked the following question:

AASHTO M 323 (Superpave Volumetric Mix Design) allows an agency to modify the required dust to binder ratio from 0.6-1.2 to 0.8-1.6 if the aggregate gradation passes beneath the PCS Control Point. Does your agency allow (or require) a dust to binder ratio of 0.8 - 1.6? If so, when is this allowed/required?

| State | Response |
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| Tennessee | Tennessee does not utilize AASHTO M 323, but rather R 12 (Marshall Method). Regardless, our DAR specification calls for 0.6-1.2 on surface mixes and allows up to 1.5 for base and binder mixes |
| Oklahoma | Our specs meld the two together for a 0.6 - 1.6 allowable dust to effective binder ratio. There are no requirements that the gradation follow a specific path within the allowable broad band |
| South Carolina | South Carolina requires all Gyrotory (Superpave) designed mixes to have a dust-to-asphalt ratio between 0.6 - 1.2. We had this requirement in the early 90's when we were designing mixes using the Marshall mix design procedure. Prior to this requirement we had mixes that had too much dust which increased our binder content therefore causing rutting and flushing on some of our high volume roads. Some of our fines from the baghouses were acting as an asphalt extender too. Doug Hanson with NCAT @ Auburn University did a SPR research study for us entitled "Baghouse Fines in Asphalt Mixes". This study was completed in 1997. Let me know if you would like a copy. |
| California | Our current specs does not have dust to binder ratio requirement. However, we are in the process of rewriting our specs, and we are proposing for a dust to binder ratio of 0.60 to 1.2 in our rewrite. |
| Virginia | Virginia does not allow a dust to binder ratio of 0.8 to 1.6. Virginia allows a dust to binder ratio for 9.5, 12.5 and 19.0 mm mixes of 0.6 to 1.2. On fine surface mixes 9.0 mm the range is 0.6 to 1.3 and on base mixes 25.0 the range is 0.6 to 1.3 |
| Nebraska | In NE we specify 0.7 to 1.70. Our requirement of 1.0% hydrated lime in all roadway mixtures is why we specified these values. We know varying amount of lime become "dust" and the PG Binder "absorbs" some lime also. |
| Minnesota | Minnesota uses a dust to effective binder content ratio of 0.6-1.2 regardless of where the gradation passes. |
| Maryland | Maryland uses 0.6 to 1.6 D/B ratio for all mixes (except there is no restriction on 4.75 mm mix). The ratio is calculated using total AC not effective AC. The PCS Control Point is not applied |

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| Kansas | Kansas follows AASHTO M-323 fairly closely when specifying our Dust to Effective Binder ratio (D/B ratio). We specify a range of 0.8-1.6 for those mixes that pass beneath the PCS Control Point. All other mixes except the SM-4.75A have the D/B ratio range of 0.6-1.2. The SM-4.75A mix has a D/B ratio range of 0.9-2.0. Where we deviate from AASHTO M-323 is we use the 2.36 mm sieve to define the PCS Control Point for our SM-19 mixes since the 4.75 mm sieve is not a control sieve for mixes larger than 9.5 mm NMAS. We use a value of 35% passing the 2.36 mm sieve for the SM-19 PCS Control Point. |
| Mississippi | The Miss Dept of Transportation specifies a D/B ratio of 0.8-1.6 for 9.5, 12.5, 19.0, and 25.0 mm mixtures. For 4.75 mm mixtures the D/B ratio is 0.9 to 2.0 |
| Ohio | No, we have had bad experiences with ratios above 1.2 in the past and stay with 1.2 regardless. In fact, for all volumetric mixes if the F/A is over 1.0 we require it be calculated using the effective asphalt content. We do use a lot of limestone prone to high dust and also we use a lot of RAP and contractors are able to meet this. I think opening it up leads to poorer dust control at plants and poorer RAP control |
| West Virginia | We do require the dust to binder ratio adjustment of 0.8 - 1.6 for mix designs having a gradation that passes beneath the PCS Control Point. Most often we don't see values over 1.2 regardless of which range is used, but the adjusted range is in place if needed. This is a design requirement only. We do not have a QC/QA requirement for the dust to binder ratio at this time |
| Illinois | Illinois uses a max dust to binder ratio of 1.0 in design and a range of 0.6 – 1.2 during mix production. |
| Kentucky | Since nearly all of our Superpave HMA gradations pass below the PCS control point, Kentucky requires a dust-to-binder ratio range of 0.8 to 1.6 for all mixes. |
| North Dakota | NDDOT requires a 0.6 to 1.3 for top lift and a 0.6 to 1.4 for lower lifts. We do not change the specification depending on gradation. |
| Oregon | Oregon specifies a ratio of 0.8 - 1.6 as part of our standard Specification for paving. |
| Florida | FL does require dust to binder ratio of 0.8 to 1.6 for coarse graded mixes. |
| Louisiana | We allow 0.6 to 1.6 on dust ration for all situations |
| Canada | The Ministry of Transportation of Ontario (MTO) requires the dust binder ratio to be in the 0.8-1.6 range when the aggregate gradation passes beneath the PCS control point. |
| Pennsylvania | For most situations PA is not encouraging the design of coarse-graded mixtures (except for SMA); and if some coarse-graded mix designs are approved and performing satisfactorily, it is doubtful that the higher dust-to-binder ratio is evident. Pennsylvania wouldn't recommend changing to the optional dust-to-binder tolerance in M 323 Note 8, without a thorough review of specific mixture designs in PA with performance documented |
| Idaho | Yes, our agency allows a dust to binder ratio of 0.8 - 1.6 As you mentioned, we allow it when the aggregate gradation passes beneath the PCS control point. Our typical requirement for dust to binder still is 0.6-1.2 |

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| Washington | WSDOT specifies a Dust/Asphalt Ratio of 0.6 - 1.6 on Superpave HMA mix designs. The Dust/Asphalt specification is only required on the HMA mix design and is not part of our QA process. We have used the 0.6 - 1.6 ratio since fully implementing Superpave in 2004 and for several years prior to that on trial projects |
| Rhode Island | Regarding the 0.8 - 1.6 dust to binder ratio, we never allow the contractors to use this provision, stipulating in our contracts that the D/A ratio must be 0.6 - 1.2. I believe 1.2 may actually be too high for many applications. A recent study we completed shows that each additional 1% of baghouse fines increases the stiffness of the binder, on both the high and low end, by one full grade (e.g. PG64-22 becomes PG70-16). In addition, the contractors know that dust is cheaper than asphalt and may try to maximize profits by minimizing binder content. I've coined a new term, VFD (voids filled with dust). Anyway, watch your VMA's closely to make sure you're leaving enough room for asphalt, and for most applications I would avoid going up to 1.6. |
| Conn. | We require that all Superpave mixes be fine graded (above the PCS) for Design levels 1 thru 3 and that the D/PBe ratio be 0.6 to 1.2. We only monitor this requirement for information since we do not perform Wash Sieve Analysis of the gradations in the field. In spite of that, we do get very good compliance for the D/Pbe ratio mainly due to the overall low dust content in many of our Fine Aggregates |
| Texas | Our requirement is 0.6 - 1.6 and we do not have any stipulations based on control points etc |
| Nevada | does not have a specification on the "dust to binder ratio." At this time we use the Hveem mix design system and not the Superpave System |
| Utah | UDOT Currently uses a Dust/Binder ration of 0.6 to 1.4. We also have a target of 3.5% air voids at Ndes, a non-plastic requirement and a SEQ of 60%, with the intent of qualifying the dust that is present |
| Alabama | If the mix is fine or through the restricted zone Alabama uses 0.6-1.2. If the mix is coarse we use 0.6-1.6. For the superfine 4.75 mm mixes proposed by NCAT we use 0.9-2.0. If you look at our specifications on line, please remember that Alabama designates mixes by the Maximum size not the Nominal size (i.e. Superpave 4.75 mm = Alabama 3/8" {9.5 mm}). We allow up to 1.6 for coarse Superpave |
| Maine | Maine does not currently allow the higher dust to binder ratio of 0.8 - 1.6 in any of our HMA mixes |
| New Mexico | In New Mexico, we require that mixes be developed with a dust/binder ratio between 0.6-1.4. However, once the mix design has been accepted, then the contractor must stay within +/- 0.3 of the approved value on the mix design. Therefore, in the field it would be possible to see dust/binder ratios between 0.3 and 1.7, depending on what the approved lab values are |
| New Hampshire | NHDOT DOES NOT ALLOW 0.8 - 1.6 DUST TO BINDER RATIO |
| Georgia | Fines to effective asphalt binder ratio (F/P _{be}) 9.5 mm Type 1 0.6 to 1.4 all other types 0.8 to 1.6 These requirements are for mix design only, we do not use volumetric requirements in acceptance. All other types include: 9.5 mm Type II, 12.5 mm, 19 mm and 25 mm. |

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| South Dakota | <p>South Dakota DOT requires a dust to binder ratio of 0.6 to 1.2 unless the gradation passes below the PCS Control point and then South Dakota allows a 0.8 to 1.6 dust to binder ratio. On South Dakota Projects, the specification is out for review with a change of allowing the dust to binder ratio to be 0.6 to 1.4 when above the PCS Control Point in the field and from 0.8 to 1.6 if below the PCS Control point.</p> |
| Arkansas | <p>Arkansas has used Superpave mixes exclusively since January 1, 1998. Currently, the Department does not follow M 323 on dust to asphalt ratio. The Department's Standard Specifications were changed in early 1997 to allow a dust to asphalt ratio of 0.6 to 1.6 in all ACHM Base, Binder, and Surface Courses used on Department projects. This was based upon the Department's experience with performance of Superpave mixes during 1995 and 1996. The mix designs are designed with the ratios within the 0.6 to 1.6 range. While gradation is not an acceptance criteria, production mix is required to fall within the grading limits of the design, dust to asphalt ratio included. If the plant is unable to produce the mix design (for instance if the dust to asphalt ratio falls outside of either the upper or lower limit), production is discontinued and a new mix design is developed before production is allowed to resume.</p> |
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