MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
PRICE ADJUSTMENTS ON PERFORMANCE GRADE ASPHALT BINDERS

a. Description. This special provision provides the pay adjustment process for HMA pay items regarding the performance grade (PG) asphalt binder. The project specific PG asphalt binder(s) are listed in the HMA Application Estimate Table found on the plans. Provide the PG binder in accordance with the requirements of the standard specifications, except where modified herein.

b. Terminology.

Asphalt Binder Sample. The Asphalt Binder Sample is obtained by the Contractor once per day for every asphalt binder grade that is being incorporated into any HMA mixture. Submit the Asphalt Binder Sample to the Engineer. The specification testing will be performed by the Construction Field Services (CFS) HMA Laboratory or a third party *AASHTO* accredited asphalt binder laboratory, other than the laboratory potentially designated as the dispute laboratory.

Base Price. Price established by the Department to be used in calculating incentives or adjustments to pay items and shown in the contract.

c. Materials. Ensure the PG asphalt binder(s) meets the requirements of the standard specifications.

The following note (g) has been added to the 2020 Standard Specifications for Construction, Table 904-1, Table 904-2, and Table 904-3 Pressure Aging Vessel Residue Dynamic Shear: (g) The maximum intermediate temperature stiffness, G* sinδ, is 5000 kPa. If the intermediate phase angle is greater than or equal to 42 degrees, the maximum intermediate temperature stiffness, G* sinδ, is 6000 kPa.

Asphalt binder prepared with reclaimed engine oil based products is prohibited.

Direct in-line blending of polymer at the hot mix plant is allowed if the Contractor is one of the approved manufacturers listed in the MDOT Materials Source Guide.

Ensure the modified asphalt binder complies with the requirements shown in Table 6 or Table 7.

If polymers and modifiers other than styrene-butadiene-styrene (SBS) or styrene-butadiene rubber (SBR) are used for asphalt binder modifications, approval from MDOT is required before they are used.

The Contractor may substitute a better asphalt binder grade at no cost to the Department. Notify the Department of this substitution at the pre-production meeting. The Contractor may substitute

an asphalt binder grade that is higher on the high temperature end and/or lower on the low temperature end. For example, if the project requires PG 58-22 in the base course, the Contractor could use PG 64-22, PG 58-28, or PG 64-28. Specification testing will pertain to the actual asphalt binder grade used in the HMA mixture.

d. Asphalt Binder Samples. Obtain the Asphalt Binder Sample, correctly label the sample container, and complete a Sample Identification (Bituminous Material) (Form 1923B). Ensure the form is filled out correctly and completely and signed before the sample is given to the Engineer. Ensure the Asphalt Binder Sample is taken from a sampling spigot located on the pipeline supplying asphalt binder to the plant, in a position between the asphalt binder pump and the point where the asphalt binder enters the mixture. Personnel safety is critical in selecting the position of the sampling spigot.

Collect the Asphalt Binder Sample in three one-pint (16 ounce), slip top, seamless ointment tins. Ensure the tins are at least three quarters full. The Contractor will keep possession of one tin and the Engineer will take possession of two tins. If the Asphalt Binder Sample has the "P" designation (e.g., PG 70-28P), obtain six one-pint containers. The Contractor will keep possession of two tins, and the Engineer will take possession of four tins. Label all tins in a legible format with the following information:

- MDOT control section and job number
- Binder grade
- Binder supplier certifier number
- Date sampled

The Engineer may request to witness the sampling of the asphalt binder upon any visit to the HMA plant. The Engineer will complete the 1923B form for the witness sample. The witness sample will become the Asphalt Binder Sample of record for that specific asphalt binder grade. Any other asphalt binder sample of that grade taken that same day will be discarded.

The Contractor is responsible for keeping the MDOT Binder Certification Documents on file for a period of 3 years after the project completion date. The Engineer may request a copy of the MDOT Binder Certification Documents at any time. If requested, ensure these copies are presented to the Engineer. The Engineer will review these documents and communicate any problems that may arise.

e. Price Adjustments.

1. Ensure Asphalt Binder Samples are taken daily prior to incorporation into the HMA mixture. The Engineer will witness and obtain a minimum of one Asphalt Binder Sample for every PG asphalt binder grade being supplied to the project except for HMA mixtures that are used for temporary pavement or accepted by visual inspection criteria. When the witnessed Asphalt Binder Sample of a specific PG binder grade falls within the ranges shown in Tables 1 through 5, the contract base price for the HMA mixture containing the out of specification binder will be reduced by the percentage shown in the table for that days production represented by the sample. If multiple tests on an Asphalt Binder Sample are out of specification, the greatest price reduction from Tables 1 through 5 will apply. If the price reduction is 50 percent, the day of production will be evaluated by the Engineer. If the Engineer determines that removal is warranted, the Contractor must remove and replace the pavement at the Contractors expense. The CFS HMA Laboratory will continue testing to determine the extent of the non-specification asphalt binder.

2. The Engineer may test any Asphalt Binder Sample to ensure it meets the requirements of the standard specifications. When the Asphalt Binder Sample of a specific PG binder grade falls within the ranges shown in Tables 1 through 5, the contract base price for the HMA mixture containing the out of specification binder will be reduced by the percentage shown in the table for that days production represented by the sample. If multiple tests on an Asphalt Binder Sample are out of specification, the greatest price reduction from Tables 1 through 5 will apply. If the price reduction is 50 percent, the day of production will be evaluated by the Engineer. If the Engineer determines that removal is warranted, the Contractor must remove and replace the pavement at the Contractors expense.

3. When the HMA Application Estimate Table specifies a polymer modified PG asphalt binder, they will be identified by the suffix “P” at the end of the grade (e.g., PG 70-28P). In addition to subsections e.1. and e.2. of this special provision, the polymer modified PG asphalt binder must also meet the criteria shown in Tables 6 or 7. If the polymer modified PG asphalt binder fails to meet the criteria shown in Tables 6 or 7, the contract base price for the bituminous mixture containing the out of specification asphalt binder will be decreased by 25 percent for the day of production represented by the sample. This 25 percent will be in addition to any price reductions incurred from Tables 1 through 5.

4. If any of the following four situations occur, the Engineer will evaluate those days of production. The Engineer will require the Contractor to remove and replace the pavement at the Contractors expense, or if the pavement is not removed, a 50 percent reduction in the contract base price will be imposed on the HMA mixture.

- Asphalt binder supplier is not on the approved certifier's list or has not been approved through acceptance testing for this project.
- The Certification Document states less than the minimum grade of binder, as specified by the contract, is used in the HMA mixture.
- An Asphalt Binder Sample is not taken.
- Any of the specified one pint sample tins are less than three quarters full.

f. Dispute Resolution Process for Asphalt Binder Samples. If the asphalt binder test results performed by CFS HMA laboratory fall within the ranges shown in Tables 1 through 5, and/or fail to meet the criteria shown in Tables 6 or 7, the Asphalt Binder Sample is eligible for Dispute Resolution. The Dispute Resolution process is as follows:

1. The Contractor must send their corresponding retained asphalt binder sample to an *AASHTO* accredited asphalt binder laboratory for PG Binder Grade Verification. These results must verify the disputed PG asphalt binder grade.

2. Submit a request for Asphalt Binder Dispute Resolution testing electronically to the Engineer, within 15 working days of being notified of Asphalt Binder Sample failing to meet specification. The request must include the test results that verify the disputed corresponding PG asphalt binder grade. A signed statement certifying that the test results represent the disputed corresponding PG grade is required.

3. The Engineer will document receipt of the request for Dispute Resolution and test results from the Contractor. The Engineer will notify MDOT CFS Laboratory within 2 working days of the receipt of the request.

4. The CFS HMA Laboratory will send the Dispute Resolution asphalt binder sample to a third party *AASHTO* accredited asphalt binder laboratory for PG Binder Grade Verification.

5. All Dispute Resolution results will replace the original Asphalt Binder results.

6. If any of the Dispute Resolution results fall within the limits shown in Tables 1 through 5, and/or fail to meet criteria in Tables 6 or 7, all costs associated with completing the Dispute Resolution sample will be borne by the Contractor.

7. If the Dispute Resolution results do not fall within the limits shown in Tables 1 through 5, and/or meet criteria in Tables 6 or 7, all costs associated with completing the Dispute Resolution sample will be borne by the Department.

g. Measurement and Payment. Payment for this work is considered included in the price bid for the applicable HMA items of work.

Table 1: Dynamic Shear Rheometer Original Material

% Reduction	Spec. Range (kPa)
2.5	0.98 - <1.00
5	0.93 - <0.98
10	0.88 - <0.93
15	0.83 - <0.88
20	0.78 - <0.83
30	0.73 - <0.78
40	0.68 - <0.73
50	less than 0.68

Table 2: Dynamic Shear Rheometer RTFO Material

% Reduction	Spec. Range (kPa)
2.5	2.08 - <2.20
5	1.98 - <2.08
10	1.88 - <1.98
15	1.78 - <1.88
20	1.68 - <1.78
30	1.58 - <1.68
40	1.48 - <1.58
50	less than 1.48

Table 3a: Dynamic Shear Rheometer PAV Material

% Reduction	Spec. Range (kPa)
2.5	>5000 - 5350
5	>5350 - 5600
10	>5600 - 5850
15	>5850 - 6100
20	>6100 - 6350
30	>6350 - 6600
40	>6600 - 6850
50	greater than 6850

Table 3b: Dynamic Shear Rheometer PAV Material (Intermediate Phase Angle ≥ 42 Degrees)

% Reduction	Spec. Range (kPa)
2.5	>6000 -6350
5	>6350 - 6600
10	>6600 - 6850
15	>6850 - 7100
20	>7100 - 7350
30	>7350 - 7600
40	>7600 - 7850
50	greater than 7850

Table 4: Bending Beam Rheometer Stiffness

% Reduction	Spec. Range (MPa)
2.5	>300 - 309
5	>309 - 324
10	>324 - 339
15	>339 - 351
20	>351 - 369
30	>369 - 384
40	>384 - 399
50	greater than 399

Table 5: Bending Beam Rheometer M-Value

% Reduction	Spec. Range
2.5	0.292 - <0.300
5	0.285 - <0.292
10	0.270 - <0.285
15	0.255 - <0.270
20	0.240 - <0.255
30	0.225 - <0.240
40	0.210 - <0.225
50	less than 0.210

Table 6.Requirements for Styrene-Butadiene-Styrene (SBS) Modified Binders

Test	Asphalt Grade PG 58-34(P), PG 64-28(P) PG 70-22(P), PG 70-28(P)	Asphalt Grade PG 64-34(P), PG 76-22(P), PG 76-28(P)
Tests On Original Binder, (a)		
Separation of Polymer *ASTM D7173* 163°C, 48 hours, (R & B, *ASTM D36/D36M*, difference between top and bottom), Maximum	2	2
Force Ratio *AASHTO T300* 4°C, 50 mm/min.; 300 mm elongation, Minimum	0.30	0.35
Tests On Residue From Rolling Thin Film Oven, (a)		
Elastic Recovery *AASHTO T301*, 25°C 100 mm elongation, and cut immediately, % Minimum	60	70
a. Report DSR values for G*/sin delta, and the phase angle at the high-grade temperature on the original and on the RTFO residue for informational purposes.		

Table 7. Requirements for Styrene-Butadiene-Rubber (SBR) Modified Binders

Test	Asphalt Grade PG 58-34(P), PG 64-28(P) PG 70-22(P), PG 70-28(P)	Asphalt Grade PG 64-34(P), PG 76-22(P), PG 76-28(P)
Tests On Original Binder, (a)		
Separation Of Polymer *ASTM D7173* 163°C, 48 hours, (R & B, *ASTM D36/D36M*, difference between top and bottom), Maximum	2	2
Toughness *ASTM D5801* 25°C, 500 mm/min Newton-Meters (inch-pounds), Minimum	12.5 (110)	12.5 (110)
Tenacity *ASTM D5801* 25°C, 500 mm/min, Newton-Meters (inch-pounds)	8.5 (75)	8.5 (75)
Tests on Residue from Rolling Thin Film Oven, (a)		
Elastic Recovery *AASHTO T301*, 25°C 100 mm elongation, and cut immediately, %minimum	40	50
a. Report DSR values for G*/sin delta, and the phase angle at the high-grade temperature on the original and on the RTFO residue for informational purposes.		