NAPA
NATIONAL ASPHALT PAVEMENT ASSOCIATION

ASPHALT MIX TEMPERATURE CATEGORIES

Agencies should not specify production temperature reduction, as there are numerous conditions outside a contractor's control that could impact the production temperature. Mixture quality must be ensured before temperature is considered.

Lower asphalt mix production temperatures help to reduce fuel consumption, CO_2 emissions, and Global Warming Potential (GWP) of an asphalt mix. The lowest possible mix production temperature should be used, given that production temperature is directly related to energy use during the production process, while ensuring that properties like in-place density can be met.

This table is not intended to be used as specification ranges. Rather, the ranges were developed to more effectively communicate industry efforts to reduce temperatures and implement technologies that allow asphalt plants to operate at lower temperatures and thereby reduce emissions.

These guidelines are reviewed annually by NAPA's Committee on Asphalt Research and Technology (CART) to include new research findings on plant operations and technologies that impact target production temperatures reductions.

This document is intended to be used as a communication tool. It categorizes average target production temperatures as a defining characteristic of the product from an asphalt plant, as outlined in Table 1.

Table 1: Production Temperature Categories

Category	Target Production Temperature [1,2]	
	Temp Low, °F[3]	Temp High, °F
0	≥305 See Ref (1)	
1	285	304
2	250	284
3	212	249
4		≤211 See Ref (2)

[1]Production temperature is defined as the temperature of the mix as it is introduced to the slat conveyor on a continuous flow drum plant.
[2]Production temperature is defined as the temperature of the mix as it is dropped from the batch or mixing unit.
[3]Temperature ranges were developed by the CART Temperature Reduction Task Force. 285F was selected due to 275-285F being the typical range of where particulate matter and emissions are no longer visible. 212F was chosen due to it being the boiling point of water.

Agencies can incentivize production at lower temperatures if a contractor is able to maintain all quality assurance requirements; however, it should not be mandated.

Many factors or conditions listed below can impact production temperatures, namely:

1. Performance grade and viscosity of virgin binder
2. Recycled material
   - ***a.*** Performance grade of recycled binder
   - ***b.*** Amount
   - ***c.*** Availability
   - ***d.*** Moisture content
3. Plant capability with respect to the use of RAP/RAS/recycled tire rubber and other additives
4. Type of WMA technology
5. Ambient weather conditions
6. Haul distance and/or time
7. Lift thickness
8. Specifications that limit rolling the mat below a certain temperature
9. Start and end of production day
10. Plant burner calibration
11. Visible emissions
12. Odor control requirements
13. Environmental Product Declarations (EPDs)
14. Plant location or geographic location
15. Plant permit restrictions
16. Market conditions
17. Baghouse impacts

Notes

1. The definition proposed above was modified from the definition of Warm-Mix Asphalt (WMA) in NCHRP 20-44, TASK 01 *Increasing WMA Implementation by Leveraging the State-Of-The Knowledge*, Myers, et. al, May 2018.
2. Mixtures in categories with lower temperatures does not mean WMA or a similar technology is used or is necessary. Reaching lower temperature production categories can be more challenging and could require use of one or more technologies in some geographic locations or markets.[4]
3. Very low production temps may require additional moisture sensitivity testing and/or higher quantities of antistrip depending on aggregates and asphalt binder used.

References

1. Quantification of Potentially Odorous Volatile Organic Compounds from Asphalt Binders using Head-Space Gas Chromotography. Lange, C R and Stroup-Gardiner, Mary. ASTM International, March 2005, Journal of Testing and Evaluation, Vol. 33, p. 8.
2. Warm-Mix Asphalt: Contractors' Experiences. National Asphalt Pavement Association, 2008. IS 134.

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[4]Asphalt mixtures can be produced within a temperature category with or without the assistance of various technologies while still achieving acceptable in-place density, and short- and long- term field performance.