Section 963
Superpave Mix Design
Verification with the IDEAL Test
Materials Manual of Instruction

UTAH DEPARTMENT OF TRANSPORTATION
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963.01 Introduction and Purpose

This procedure provides guidelines to determine resistance for cracking using the IDEAL-CT test for Asphalt Mixtures. The Supplier will perform and submit IDEAL-CT test results along with their mix design according to specification; the Department will verify the IDEAL-CT results.

The objective of this review is to check the asphalt mix design for cracking resistance for long-lasting performance as part of the pavement structure. Well-designed asphalt mixtures can be expected to serve successfully for many years.

This procedure also includes the protocol for running the IDEAL-CT test on asphalt-plant-mixed material.

963.02 References

AASHTO STANDARDS:

- M 323 Superpave Volumetric Mix Design
- R 30 Mixture Conditioning of Hot-Mix Asphalt (HMA)
- R 35 Superpave Volumetric Design for Asphalt Mixtures
- T 166 Bulk Specific Gravity of Compacted Hot-Mix Asphalt Mixtures Using Saturated-Surface Dry Specimens
- T 209 Theoretical Maximum Specific Gravity and Density of Asphalt Mixtures
- T 312 Standard Method for Preparing and Determining the Density Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor

ASTM D 8225-19 IDEAL-CT Test Procedure
UDOT Materials Manual of Instruction (MMOI)
UDOT Standard Specifications and Special Provisions

963.03 IDEAL Test Design Guidelines

The mix supplier will design the asphalt mixture for cracking performance using the IDEAL-CT test in addition to the requirements of MMOI 960.

The laboratory performing the IDEAL-CT test will be qualified in Asphalt Mixtures by the UDOT Laboratory Qualification Program (LQP). Personnel must be qualified in Transportation Technician Qualification Program (TTQP) with certificates in Asphalt Testing and Superpave Mix Design.

The gyratory compactor used to make the samples will be approved according to MMOI 961: Superpave Gyratory Compactor Protocol.

963.04 Supplier Submittals

The Supplier will submit the IDEAL-CT test results along with their Mix Design Report to the RME.

Pre-Blended Samples to UDOT for Verification

Submit pre-blended aggregate samples for IDEAL-CT testing with the Region lab along with the corresponding and separate RAP portions and hydrated lime to meet the final target gradation when combined. Provide these to the verification laboratory.

The pre-blended aggregate samples must be made at the required sample size by recombining the aggregate portions from individual sieve size fractions to meet the final target gradation when combined with the RAP and hydrated lime portions. Splitting larger combined samples down to sample size is not acceptable, and gradation may be verified for any sample.

The verification laboratory will obtain the approved binder from the Central Materials binder laboratory and combine the binder, aggregate, RAP, and hydrated lime from the supplier's portions.

963.05 IDEAL-CT Protocol

Laboratory-Mixed Sample Preparation

- Use the theoretical maximum specific gravity, (G_{mm}) of the mix determined in the testing laboratory during the mix design or verification, respectively.
- Use asphalt binder from a certified binder supplier meeting the requirements outlined in the UDOT Qualified Supplier Requirements, Section 509: Asphalt Binder. For mix design verifications, the verification laboratories will obtain the pre-qualified binder from the UDOT Binder Lab.
- Blend the asphalt mixture according to MMOI 988. Mixed material will be short-term aged for "Volumetric Mix Designs" as per AASHTO R 30 for only 2 hours at the compaction temperature.
- Prepare five test samples, using the UDOT-approved mixing temperatures for the approved binder.

Asphalt-Plant-Mixed Sample Preparation

- Split out the samples from each bucket using a riffle splitter or by quartering.
- If the sample has cooled, cover and heat the material until it is pliable enough to be split down for sample preparation. Do not exceed the compaction temperature when heating.
- Prepare two samples to determine G_{mm} of the mix and five test specimens. This may be done in conjunction with acceptance testing.

Compact Test Specimens

- Compact a trial test specimen according to AASHTO T 312 using the UDOT-approved compaction temperatures. Calculate the sample weight using the air voids target of 7% and measured G_{mm} to calculate the required mass.
- Measure the compacted trial specimen using T 166 and then prepare additional samples, adjusting the mass to compact the specimens to the target height of 62mm at 6.5 to 7.5% air voids. Reject any specimens outside these limits. Record the number of gyrations applied to each puck to reach the target height.
- Measure and record each of the specimen weights and air void content according to T 166.
- Dry the pucks overnight, (8-20 hours), with a fan before doing the IDEAL-CT test the next day.
- Measure the height and diameter in mm of each puck to two decimal places. Measure three locations on each specimen, each location approximately 120 degrees apart, using a template.

Note: If the number of gyrations required to compact the puck to 62mm exceeds 75, compact the specimens to a height of 75mm, performing the subsequent IDEAL-CT test and associated calculations according to ASTM D8225 for the taller specimen.

IDEAL-CT Test

Enter all required information into the software. Record all data necessary to calculate results according to ASTM D8225.

- Test Temperature: 25±0.5°C
- Test Speed: 50mm/min
- Determine and record the G_{mb} and the % air voids using the mix design or verification G_{mm} value.
- Determine and record the number of gyrations required to reach the target height.
- Compact on the first day. Break on the next day (no less than 8 hours, no greater than 20 hours).
- Condition the samples to temperature in an oven with the capability to maintain the target temperature of 25 ±0.5 °C
- Use an asphalt dummy puck of the same height and diameter of the test samples for temperature conditioning. Subject the dummy puck to all conditions related to sample preparation, before placing in the conditioning oven (62 and 75mm tall dummy pucks fitted with calibrated thermometers are required).
- A lab may avoid the use of the dummy puck by keeping the pucks in the conditioning oven for at least 3 hours prior to testing.

Report the following:

- The mixing and compaction temperatures used.
- The G_{mm} used to prepare the samples.
- The dates and times the samples were compacted and tested.
- The number of gyrations, air void content, and mass of each specimen.
- The IDEAL CT index value for each specimen.
- The brand and model of the IDEAL CT test equipment.

If you have any questions please call the UDOT Central Materials Laboratory.