New AASHTO Practice
Accelerated Lab Friction Testing

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PAPA January 2020
Accelerated Lab Friction Test

- Value
- What is measured
- Sample options
- Equipment
- Case Studies
W8-9 HFST Test Sections

W9F - Taconite, MN
W9E – Al-Fe Oxide, OR
W9D – Slag, PA
W9C – Silica, OH
W9B – Basalt, WA
W9A – Chert, OK
W8B – Bauxite, China
W8A – Granite, WI
W8-9 HFST Test Sections

Friction Ranking

HFS Aggregate Type
- Field DFT
- Lab-1 DFT
- Field Skid
- Field Skid (projected)
- Field Skid projected (Slag-2)
Friction Performance Curves

Average Fn @ 40 kph

conditioning cycles

Avg Fn

0 20000 40000 60000 80000 100000

0.50 0.45 0.40 0.35 0.30 0.25 0.20

Control  25% Crushed Gravel  50% Crushed Gravel

National Center for Asphalt Technology
at Auburn University
Terminal Friction Testing

Laboratory Friction Performance
(TWPD polishing and DFT friction)

- RK bauxite
- 47 - 4x20
- 60 - 4x20
- 70 - 4x20
- Flint Rock
- Armor Stone
- Copper Slag
- Basalt
- Traction Control
- Best Sand
- EP5 MOD

Friction DFT(40)

TWPD Conditioning cycles

0 cycles 70,000 cycles 140,000 cycles
Old Standard – British Pendulum
NCAT Three Wheel Polishing Device
Specimen Preparation 20x20 slab

Figure 1 Modified Hamburg Slab Compactor
6” Gyratory Ring Specimen (IN)

DFT / CTM measurement diameter 284 mm = 11.18 in
Aggregate Ring Specimen (MD)
NCAT Three Wheel Polishing Device
ASTM Dynamic Friction Tester
Alternative Friction Aggr. Studies

- OK DOT Optimize OGFC Aggregate
  - 4 aggregates, lab selection, TT performance
  - Sandstone on TT, N9, Sep-2015
- MI DOT Classify HFST Aggregates
  - 11 aggregates, lab TWPD/DFT
  - 2016
OK DOT Aggregate Selection Using Accelerated Lab Friction

DFT(40) Measurements

- Flint OK slab 2
- Flint OK slab 3
- Hanson OK slab 1
- Hanson OK slab 2
- Sawyer OK slab 1
- Sawyer OK slab 3
- Snyder OK Slab 1
- Snyder OK Slab 2
Other OK Pavement Surfaces

OK DOT Sections Comparison

- N9 2006 SMA granite
- E1 2012 PFC lms/ granite
- W9A 2012 HFST flint
- N9 2015 OGFC sandstone

Friction (SN40R)

Cummulative Traffic (ESALs) Millions

0 10 20 30 40 50 60 70

0 2 4 6 8 10 12
MI Terminal Friction Testing

Laboratory Friction Performance
(TWPD polishing and DFT friction)

Friction DFT(40)

0 cycles 70,000 cycles 140,000 cycles
TWPD Conditioning cycles

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Friction Aggregate Studies

- **MS DOT Improving Thin Asphalt Surfaces**
  - Thin AC surfaces, 2 aggregates, lab TWPD/DFT
- **WV DOT Use of Local Friction Aggregate**
  - Aggregate proportion, Lab TWPD & TT
  - 50% dolomite std, study 70% and 90%
  - Placed Oct-2018
MS DOT – Lab Test Thin-lift Mix

Average Fn @ 40 kph

Avg Fn

conditioning cycles

Control  25% Crushed Gravel  50% Crushed Gravel
WV Study – Test Track

NCAT Test Track WV Friction Sections

Traffic (ESALs) Millions

SN40R

DFT(40)

W4 SN40R
W5 SN40R
W4 DFT(40)
W5 DFT(40)
Standard Practice for

Sample Preparation and Polishing of Asphalt Mixture Specimens for Dynamic Friction Testing

AASHTO Designation: R XX-XX

Technical Section: 2c, Asphalt–Aggregate Mixtures

/Standard Practice for

Sample Preparation and Polishing of Unbound Aggregates for Dynamic Friction Testing

AASHTO Designation: R xx-xx

Technical Section: 1c, Aggregates
THANKS!

Any questions? Reach me at mah0016@auburn.edu