Version: V03.40

# Oklahoma Department of Transportation Mix Design Report

Asphalt Concrete, Type S4 (PG 64-22 OK) Mat'l. Code: asco012
*(Material Full Name and Material Code)*

Binder - Recycled ID: B2
*(Design Type and Design Type ID)*

Cummins Const Co P/S # m00556
*(Producer/Supplier Name and Producer/Supplier Code)*

WS4qc0101495800
*(Mix ID)*

Cummins Const Co (Enid, OK) - 400TPH PLANT ID # m00556-06
*(Plant Name and Plant ID)*

| Aggregate | Producer/Supplier | % USED |
|---|---|---|
| 5/8" Chips | Dolese Co. (Richards Spur, OK) P/S # m002761601 | 35 |
| 3/8" Chips | Dolese Co. (Richards Spur, OK) P/S # m002761601 | 10 |
| Stone Sand | Dolese Co. (Richards Spur, OK) P/S # m002761601 | 8 |
| Scrns. | Dolese Co. (Richards Spur, OK) P/S # m002761601 | 20 |
| Sand (Unlisted Source) | Lightle Sand (Hennessey, OK) | 12 |
| Fine R.A.P. | Contractor / Project Site P/S # Contractor | 15 |

Warm Mix Asphalt (WMA) Technology: TEREX (Foaming Process) qual028 Terex Roadbuilding m00801
*(Product Name, Material Code, Producer/Supplier Name, Producer/Supplier Code)*

**Asphalt Cement:** Asphaltic Cement Type PG 64-22 OK, acem003, HollyFrontier (Catoosa, OK), m01028
*(Material Full Name, Material Code, Producer/Supplier Name, Producer/Supplier Code)*

Requires Form 93-E0 signed by the Department for production use. -Oklahoma D.O.T. Materials-

| Sieve Size | Producer/Supplier: Dolese Co. (Richards Spur, OK) P/S # m002761601 | Dolese Co. (Richards Spur, OK) P/S # m002761601 | Dolese Co. (Richards Spur, OK) P/S # m002761601 | Dolese Co. (Richards Spur, OK) P/S # m002761601 | Lightle Sand (Hennessey, OK) | Contractor / Project Site P/S # Contractor | | | Comb. Agg. | JMF | Min. | Max. | % Tol. (±) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5/8" Chips | 3/8" Chips | Stone Sand | Scrns. | Sand (Unlisted Source) | Fine R.A.P. | | | | | | | |
| 3/4 in (19 mm) | 100 | 100 | 100 | 100 | 100 | 100 | | | 100 | **100** | 100 | 100 | 0 |
| 1/2 in (12.5 mm) | 96 | 100 | 100 | 100 | 100 | 99 | | | 98 | **98** | 91 | 100 | 7 |
| 3/8 in (9.5 mm) | 64 | 97 | 100 | 100 | 100 | 98 | | | 87 | **87** | 80 | 94 | 7 |
| #4 (4.75 mm) | 8 | 20 | 97 | 90 | 100 | 84 | | | 55 | **55** | 48 | 62 | 7 |
| #8 (2.36 mm) | 4 | 6 | 62 | 53 | 100 | 70 | | | 40 | **40** | 35 | 45 | 5 |
| #16 (1.18 mm) | 2 | 3 | 32 | 36 | 99 | 53 | | | 31 | **31** | 27 | 35 | 4 |
| #30 (.600 mm) | 1 | 2 | 17 | 24 | 77 | 45 | | | 23 | **23** | 19 | 27 | 4 |
| #50 (.300 mm) | 1 | 1 | 8 | 18 | 30 | 27 | | | 12 | **12** | 8 | 16 | 4 |
| #100 (.150 mm) | 1 | 1 | 3 | 14 | 7 | 17 | | | 7 | **7** | 4 | 10 | 3 |
| #200 (.075 mm) | 0.7 | 0.8 | 2.4 | 11.5 | 1.2 | 9.5 | | | 4.4 | **4.4** | 2.4 | 6.4 | 2 |
| AC Content % | | | | | | 5.0 | | | 4.9 | **4.9** | 4.5 | 5.3 | 0.4 |

Warm Mix Asphalt (WMA) Additive % 2.0

| | °F (°C) | Required |
|---|---|---|
| Mix temperature @ discharge from mixer: | 275 (135) | ± 20 °F (± 10 °C) |
| Optimum roadway compaction temperature: | 260 (127) | |
| Laboratory mixing temperature: | 300 (149) | |
| Laboratory compaction temperature: | 300 (149) | |

| Tests on Asphalt Cement | Found |
|---|---|
| Specific Gravity @ 77 ° F | 1.0100 |

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| Tests on Aggregates | | Required | | Units |
|---|---|---|---|---|
| Durability Index | 79 | 40 | min. | % |
| F.A.A. %U | | N/A | | % |
| Flat and Elongated | 0 | 10 | max. | % |
| Fractured Faces | 100/100 | 85/80 | min. | % |
| Insoluble Residue | 3.2 | N/A | | % |
| LA Abrasion | 24.3 | 40 | max. | % |
| Micro-Deval | 12.2 | N/A | | % |
| Permeability | 0.4 | 12.5 | max. | $10^{-5}$cm/s |
| Sand Equivalent | 68 | 40 | min. | % |
| Pba | 0.44 | | | |
| IOC | 0.25 | | | % |
| Gse | 2.688 | | | |
| Gsb | 2.657 | | | |
| Specimen Weight | 4800 | | | g |

**Tests on Compressed Mixtures (@ Design AC)**

| | # Gyr. | % Density of Gmm | % Density Required |
|---|---|---|---|
| Nini | 6 | 87.7 | 85.5 - 91.5 |
| Ndes | 50 | | 96.0 |

**Tests on Compressed Mixtures**

| %AC | Gmb | Gmm | % Density of Gmm | % Density Required Design / Field | % VMA | % VMA Required Design / Field | % VFA | % VFA Required |
|---|---|---|---|---|---|---|---|---|
| 4.4 | 2.334 | 2.505 | 93.2 | 96.0 / 94.5 - 97.4 | 16.0 | 14.5 / 14.0 | 57.5 | 72 - 77 |
| 4.9 | 2.387 | 2.486 | 96.0 | | 14.6 | | 72.6 | |
| 5.4 | 2.400 | 2.467 | 97.3 | | 14.6 | | 81.5 | |

| Dust Prop. | Dust Prop. Req. |
|---|---|
| 1.1 | 0.6 - 1.6 |
| 1.0 | |
| 0.9 | |

ITS (PSI) 168.9 N/A min.
TSR 0.89 0.80 / 0.75 min. (Design / Field)
Compacted Wt. (lbs/sy/1" thick) = 109.3 @ 4.9 % Asphalt Cement
4.1 % New Asphalt Cement

**Hamburg Rut Test Depth (mm)** 3.86 12.50 max. @ 10,000 cycles

**MEETS SPECIFICATION REQUIREMENTS PER SPECIAL PROVISION 708-26(a-f) 09**

**Comments:**

**Last Modified By:** Schratwieser, Edward P. eschratw
*(User Name and User ID)*

**Date:** 2/23/2016
*(mm/dd/yyyy)*