

## 904-R-626 AGGREGATES

(Revised 11-09-16)

The Standard Specifications are revised as follows:

SECTION 904, BEGIN LINE 87, DELETE AND INSERT AS FOLLOWS:

Composite stockpiling of natural sand fine aggregate from multiple sources into one stockpile will be allowed provided the fine aggregates are within a range of ~~0.10~~ *0.030* for the bulk specific gravity (dry) and a range of ~~1.0%~~ *0.5%* for the absorption. The range of bulk specific gravity (dry) and absorption values shall be the difference between the ~~highest and lowest value, respectively,~~ *average values for each* of the fine aggregate sources within the stockpile *as determined by the Office of Materials Management*. A written request for the composite stockpiling shall be made to the Office of Materials Management.

SECTION 904, BEGIN LINE 123, DELETE AND INSERT AS FOLLOWS:

The fine aggregate angularity value of the total blended aggregate material from the fine and coarse aggregates, and recycled materials shall meet or exceed the minimum values for the appropriate ESAL category and position within the pavement structure as follows:

FINE AGGREGATE ANGULARITY		
TRAFFIC ESAL	DEPTH FROM SURFACE	
	≤ 4 in.	> 4 in.
< 300,000	(Note 1)	
<del>300,000 to</del> < 3,000,000	40 (Note 1)	40
3,000,000 to < 10,000,000	45	40
<del>≥ 10,000,000 to</del> < 30,000,000	45	40
<del>≥ 30,000,000</del>	45	45
Note 1: For 4.75 mm mixtures, the fine aggregate angularity shall be <del>40 for</del> <i>40 for</i> < 300,000 ESAL and <i>45 for</i> 300,000 to < 3,000,000 ESAL.		

Fine Aggregate Angularity, Method A .....AASHTO T 304

The fine aggregate angularity value shall not apply to OG mixtures.

~~The clay content of the blended aggregate material from the fine and coarse aggregates shall meet or exceed the minimum values for the appropriate ESAL category as follows:~~

CLAY CONTENT	
TRAFFIC ESAL	SAND EQUIVALENT, MINIMUM
< 300,000	40
300,000 to < 3,000,000	40
3,000,000 to < 10,000,000	45
10,000,000 to < 30,000,000	45
≥ 30,000,000	50

~~Clay Content, Sand Equivalency.....AASHTO T 176~~

SECTION 904, BEGIN LINE 156, DELETE AND INSERT AS FOLLOWS:

**(f) Mineral Filler for SMA**

Mineral filler shall consist of dust produced by crushing stone, portland cement, or other inert mineral matter having similar characteristics. Mineral filler shall be in accordance with the gradation requirements of 904.02(h) for size No. 16 *or as approved by the Engineer*. Mineral filler shall be in accordance with ITM 203 or from an ~~ABF~~ **ACBF** slag source. The sieve analysis of mineral filler shall be conducted in accordance with AASHTO T 37 except as noted in 904.06. Mineral filler shall be non-plastic in accordance with AASHTO T 90.

SECTION 904, BEGIN LINE 209, DELETE AS FOLLOWS:

**(a) Classification of Aggregates**

Characteristic Classes	AP	AS	A	B	C	D	E	F
<b>Quality Requirements:</b>								
Freeze and Thaw Beam Expansion, % max. (Note 1).....	.060							
Los Angeles Abrasion, % max. (Note 2).....	40.0	30.0	40.0	40.0	45.0	45.0	50.0	
Freeze and Thaw, AASHTO T 103, Procedure A, % max. (Note 3) .....	12.0	12.0	12.0	12.0	16.0	16.0	20.0	25.0
Sodium Sulfate Soundness, % max. (Note 3).....	12.0	12.0	12.0	12.0	16.0	16.0	20.0	25.0
Brine Freeze and Thaw Soundness, % max. (Note 3).....	30	30	30	30	40	40	50	60
Absorption, % max. (Note 4)	5.0	5.0	5.0	5.0	5.0			
<b>Additional Requirements:</b>								
Deleterious, % max.								
Clay Lumps and Friable Particles .....	1.0	1.0	1.0	1.0	2.0	4.0		
Non-Durable (Note 5).....	4.0	2.0	4.0	4.0	6.0	8.0		
Coke.....					(See Note 6)			
Iron .....					(See Note 6)			
Chert (Note 7).....	3.0	3.0	3.0	5.0	8.0	10.0		
Weight per Cubic Foot for Slag, lbs, min. ....	75.0		75.0	75.0	70.0	70.0	70.0	
<b>Crushed Particles, % min. (Note 8)</b>								
<del>Asphalt Seal Coats.....</del>			<del>70.0</del>	<del>70.0</del>				
Compacted Aggregates.....			20.0	20.0	20.0	20.0		
<b>Additional SMA Mixture Requirements:</b>								
<del>Micro Deval Abrasion, %, max.....</del>		(Note 9)						
<del>Aggregate Degradation, %, max.....</del>		(Note 10)						
<p>Notes:</p> <ol style="list-style-type: none"> <li>Freeze and thaw beam expansion shall be tested and re-tested in accordance with ITM 210.</li> <li>Los Angeles abrasion requirements shall not apply to BF.</li> <li>Aggregates may, at the option of the Engineer, be accepted by the Sodium Sulfate Soundness or Brine Freeze and Thaw Soundness requirements.</li> <li>Absorption requirements apply only to aggregates used in PCC and HMA mixtures except they shall not apply to BF. When crushed stone coarse aggregates from Category I sources consist of production from ledges whose absorptions differ by more than two percentage points, the absorption test will be performed every three months on each size of material proposed for use in PCC or HMA mixtures. Materials having absorption values between 5.0 and 6.0 that pass AP testing may be used in PCC. If variations in absorption preclude satisfactory production of PCC or HMA mixtures, independent stockpiles of materials will be sampled, tested, and approved prior to use.</li> <li>Non-durable particles include soft particles as determined by ITM 206 and other particles which are structurally weak, such as soft sandstone, shale, limonite concretions, coal, weathered schist, cemented gravel, ocher, shells, wood, or other objectionable material. Determination of non-durable particles shall be made from the total weight (mass) of material retained on the 3/8 in. (9.5 mm) sieve. Scratch Hardness Test shall not apply to crushed stone coarse aggregate.</li> <li>ACBF and SF coarse aggregate shall be free of objectionable amounts of coke, iron, and lime agglomerates.</li> <li>The bulk specific gravity of chert shall be based on the saturated surface dry condition. The amount of chert less than 2.45 bulk specific gravity shall be determined on the total weight (mass) of material retained on the 3/8 in. (9.5 mm) sieve for sizes 2 through 8, 43, 53, and 73 and on the total weight (mass) of</li> </ol>								

- material retained on the No. 4 (4.75 mm) sieve for sizes 9, 11, 12, and 91.
8. Crushed particle requirements apply to gravel coarse aggregates used in compacted aggregates, ~~and seal coats except seal coats used on shoulders.~~ Determination of crushed particles shall be made from the weight (mass) of material retained on the No. 4 (4.75 mm) sieve in accordance with ASTM D 5821.
  9. ~~Micro Deval Abrasion testing will be required for each coarse aggregate. A coarse aggregate or a blend of coarse aggregates shall have a maximum Micro Deval Abrasion loss value of 18.0% as determined in accordance with ITM 220.~~
  10. ~~A coarse aggregate or a blend of coarse aggregates shall have a maximum Aggregate Degradation loss value of 3.0% as determined in accordance with ITM 220.~~

### (b) Coarse Aggregate Angularity for HMA and SMA

The coarse aggregate angularity, CAA of the total blended aggregate, including recycled materials, shall meet or exceed the minimum values for the appropriate ESAL category and position within the pavement structure as follows.

COARSE AGGREGATE ANGULARITY		
TRAFFIC ESAL	DEPTH FROM SURFACE	
	≤ 4 in.	> 4 in.
< 300,000	55	
300,000 to < 3,000,000	75	50
3,000,000 to < 10,000,000	85/80*	60
≥ 10,000,000 to <= 30,000,000	95/90*	80/75* 95/90*
≥ 30,000,000	100/100*	100/100*

\* Denotes two faced crush requirements.

SECTION 904, BEGIN LINE 245, DELETE AND INSERT AS FOLLOWS:

#### 1. HMA Coarse Aggregate

Coarse Aggregate Type	Traffic ESALs		
	< 3,000,000	< 10,000,000	≥ 10,000,000
Air-Cooled Blast Furnace Slag	Yes	Yes	Yes
Steel Furnace Slag	Yes	Yes	Yes
Sandstone	Yes	Yes	Yes
Crushed Dolomite	Yes	Yes	(Note 1)
Polish Resistant Aggregates	Yes	Yes	(Note 1)
Crushed Stone	Yes	(Note 2)	(Note 2)
Gravel	Yes	(Note 2)	(Note 2)

Note 1. Polish resistant aggregates or crushed dolomite may be used when blended with ACBF or sandstone but cannot exceed 50% of the coarse aggregate by weight or cannot exceed 40% of the coarse aggregate by weight when blended with steel furnace slag.

Note 2. Crushed stone or gravel in accordance with ITM 221 may be used.

a. *ESAL Category 2 and type B surface mixtures. All coarse aggregate types including ACBF slag, SF slag, sandstone, crushed dolomite, polish resistant aggregate, crushed stone and gravel may be used.*

b. *ESAL Category 3 and type C surface mixtures. ACBF slag, SF slag, sandstone, crushed dolomite, polish resistant aggregate or any*

combination thereof shall be used. Crushed stone or gravel shall not be used unless the aggregate is classified as a crushed dolomite or polish resistant aggregate.

- c. *ESAL Category 4 and type D surface mixtures. High friction aggregates including ACBF slag, SF slag, sandstone or aggregates in accordance with ITM 221 shall be used.*

*Crushed dolomite and polish resistant aggregates may be used up to a maximum 50% by volume of material retained on the No. 4 (4.75 mm) sieve when blended with a high friction aggregate.*

*Crushed stone and gravel may be used up to a maximum 20% by volume of material retained on the No. 4 (4.75 mm) sieve when blended with a high friction aggregate.*

## 2. SMA Coarse Aggregate

Coarse Aggregate Type	Traffic ESALs		
	< 3,000,000	< 10,000,000	≥ 10,000,000
Air Cooled Blast Furnace Slag	No	No	No
Steel Furnace Slag	(Note 1)	(Note 1)	Yes
Sandstone	(Note 1)	(Note 1)	Yes
Crushed Dolomite	(Note 1)	(Note 1)	(Note 2)
Polish Resistant Aggregates	(Note 1)	(Note 1)	(Note 2)
Crushed Stone	No	No	No
Gravel	No	No	No
Notes: 1. Steel furnace slag, sandstone, crushed dolomite, polish resistant aggregates or any blend of these aggregates may be used provided the aggregates are in accordance with 904.03(a). 2. Polish resistant aggregates or crushed dolomite may be used when blended with sandstone but shall not exceed 50% of the coarse aggregate by weight (mass), or shall not exceed 40% of the coarse aggregate by weight (mass) when blended with steel furnace slag. The aggregates shall be in accordance with 904.03(a).			

*SF slag, sandstone, crushed dolomite and polish resistant aggregates in accordance with 904.03(a) may be used in SMA mixtures provided the mixture is designed in accordance with ITM 220.*