

Aggregate Gradation and Gravity - AGG 3/4
Final Report Date: 9/28/2023

PSP Enrollment #6391
WSP Peru S.A.
Lima, Peru Peru

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The Z-Score indicates the number of standard deviations from the average value. The Z-Score is determined by the following calculation:

$$\text{Z-Score} = (\text{Laboratory Test Result} - \text{Average Value}) / (\text{Standard Deviation})$$

The laboratory Rating calculation is based on the absolute value of the Z-Score (or number of standard deviations from the average). The following describes the laboratory Rating system:

If Z-Score <= 1 Then Rating = 5
If Z-Score > 1 And <= 1.5 Then Rating = 4
If Z-Score > 1.5 And <= 2 Then Rating = 3
If Z-Score > 2 And <= 2.5 Then Rating = 2
If Z-Score > 2.5 And <= 3 Then Rating = 1
If Z-Score > 3 Then Rating = 0

For reporting purposes, the average and z-score values have been truncated. When the data analysis is conducted, the values used to determine participants' z-scores and ratings are not rounded.

A negative sign on a Z-Score or Rating indicates that the laboratory's result was below the average, while a positive Z-Score or Rating indicates that the laboratory's result was above the average.

Material Finer Than 75-µm (No. 200) Sieve

Percentage Finer than the 75-µm sieve by washing (0.01 percent) - T11/C117

[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
1	1971	1.44	1.125	0.241	1.31	4	1.59	1.363	0.241	0.94	5	0.137	-0.45	-5

Sieve Analysis of Aggregates

Total Material Passing the 25.0-mm (1-in.) Sieve (0.1 percent) - T27/C136

[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
2	1979	100	100.00	**	**	**	100	100.00	**	**	**	**	**	**

Sieve Analysis of Aggregates

Total Material Passing the 19.0-mm (3/4-in.) Sieve (0.1 percent) - T27/C136

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Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
3	1983	100	99.86	**	**	**	100	99.87	**	**	**	**	**	**

Sieve Analysis of Aggregates

Total Material Passing the 12.5-mm (1/2-in.) Sieve (0.1 percent) - T27/C136

[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
4	1987	72.8	72.14	0.72	0.92	5	73.3	72.78	0.74	0.71	5	0.50	-0.19	-5

Sieve Analysis of Aggregates

Total Material Passing the 9.5-mm (3/8-in.) Sieve (0.1 percent) - T27/C136

[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
5	1988	55.6	54.58	0.69	1.48	4	54.5	54.53	0.70	-0.04	-5	0.53	-1.40	-4

Sieve Analysis of Aggregates

Total Material Passing the 4.75-mm (No. 4) Sieve (0.1 percent) - T27/C136

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Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
6	1988	25.0	25.15	0.33	-0.47	-5	24.9	25.04	0.37	-0.39	-5	0.28	0.03	5

Sieve Analysis of Aggregates

Total Material Passing the 2.36-mm (No. 8) Sieve (0.1 percent) - T27/C136

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Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
7	1988	20.2	19.31	0.25	3.51	0	19.2	19.30	0.30	-0.34	-5	0.22	-3.24	0

Sieve Analysis of Aggregates

Total Material Passing the 1.18-mm (No. 16) Sieve (0.1 percent) - T27/C136

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
8	1987	11.9	11.21	**	**	**	12.4	12.27	**	**	**	**	**	**

Sieve Analysis of Aggregates

Total Material Passing the 600-µm (No. 30) Sieve (0.1 percent) - T27/C136

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
9	1987	6.9	6.39	**	**	**	8.1	7.82	**	**	**	**	**	**

Sieve Analysis of Aggregates

Total Material Passing the 300-µm (No. 50) Sieve (0.1 percent) - T27/C136

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Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
10	1986	4.1	3.63	0.52	0.90	5	5.2	4.91	0.38	0.77	5	0.38	-0.33	-5

Sieve Analysis of Aggregates

Total Material Passing the 150-µm (No. 100) Sieve (0.1 percent) - T27/C136

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
11	1987	2.4	1.98	0.37	1.15	4	3.0	2.69	0.30	1.06	4	0.26	-0.30	-5

Sieve Analysis of Aggregates

Total Material Passing the 75-µm (No. 200) Sieve (0.01 percent) - T27/C136

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
12	1986	1.65	1.296	0.222	1.60	3	1.76	1.592	0.194	0.87	5	0.150	-0.88	-5

Coarse Aggregate Specific Gravity and Absorption

Bulk Specific Gravity [or Relative Density, OD for C127] - T85/C127

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
13	1769	2.814	2.8196	0.0103	-0.55	-5	2.821	2.8178	0.0104	0.31	5	0.0078	0.80	5

Coarse Aggregate Specific Gravity and Absorption

Bulk Specific Gravity, SSD [or Relative Density, SSD for C127] - T85/C127

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
14	1766	2.827	2.8324	0.0094	-0.58	-5	2.832	2.8301	0.0092	0.21	5	0.0075	0.69	5

Coarse Aggregate Specific Gravity and Absorption

Apparent Specific Gravity [or Apparent Relative Density for C127] - T85/C127

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
15	1768	2.850	2.8563	0.0091	-0.70	-5	2.854	2.8532	0.0087	0.09	5	0.0074	0.68	5

Coarse Aggregate Specific Gravity and Absorption

Absorption (0.01 percent) - T85/C127

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
16	1768	0.45	0.454	0.079	-0.05	-5	0.41	0.441	0.077	-0.40	-5	0.038	-0.51	-5

Fine Aggregate Specific Gravity and Absorption

Bulk Specific Gravity [or Relative Density, Oven Dry for C128] - T84/C128

View Youden Diagram| View Performance Chart

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
17	1698	2.766	2.7537	0.0163	0.75	5	2.772	2.7542	0.0164	1.08	4	0.0077	0.50	5

Fine Aggregate Specific Gravity and Absorption

Bulk Specific Gravity, SSD [or Relative Density, SSD for C128] - T84/C128
[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
18	1697	2.776	2.7673	0.0130	0.67	5	2.781	2.7684	0.0132	0.96	5	0.0066	0.42	5

Fine Aggregate Specific Gravity and Absorption
Apparent Specific Gravity [or Apparent Relative Density for C128] - T84/C128
[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
19	1697	2.795	2.7920	0.0111	0.27	5	2.798	2.7940	0.0109	0.37	5	0.0060	0.11	5

Fine Aggregate Specific Gravity and Absorption
Absorption (0.01 percent) - T84/C128
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Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
20	1696	0.38	0.475	0.143	-0.66	-5	0.34	0.498	0.146	-1.08	-4	0.064	-0.70	-5

Sand Equivalent Test
Sand Equivalent Value (whole number) (whole number) - T176/D2419
[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
21	915	81	82.0	3.7	-0.28	-5	81	83.5	3.3	-0.74	-5	1.5	-0.66	-5

Uncompacted Void Content of Fine Aggregate
Uncompacted Voids, Test Run # 1 (0.01 percent) - T304/C1252
[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
22	697	—	47.811	0.696	—	--	—	47.812	0.706	—	—	—	—	—

Uncompacted Void Content of Fine Aggregate
Uncompacted Voids, Test Run # 2 (0.01 percent) - T304/C1252
[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
23	697	—	47.780	0.714	—	--	—	47.796	0.712	—	—	—	—	—

Uncompacted Void Content of Fine Aggregate
Uncompacted Voids, Average of Two Runs (0.01 percent) - T304/C1252
[View Youden Diagram](#) | [View Performance Chart](#)

Sample 3							Sample 4					Repeatability(within-lab)		
	Total Labs	Lab Data	Avg	1S	Z-Score	Rating	Lab Data	Avg	1S	Z-Score	Rating	1S	Z-Score	Lab Rating
24	697	—	47.795	0.700	—	--	—	47.798	0.701	—	—	—	—	—

- ** Identifies a suppressed parameter and the explanation for the suppression can be found below.
- Indicates that data was not submitted or fell outside of the accepted range of the analysis.

**** Suppressed Items:**

Sieve Analysis of Aggregates (*Total Material Passing the 25.0-mm (1-in.) Sieve*) - For informational purposes only.

Sieve Analysis of Aggregates (*Total Material Passing the 19.0-mm (3/4-in.) Sieve*) - For informational purposes only.

Sieve Analysis of Aggregates (*Total Material Passing the 1.18-mm (No. 16) Sieve*) - Verification of the data suggests inhomogeneity for this test property.

Sieve Analysis of Aggregates (*Total Material Passing the 600-µm (No. 30) Sieve*) - Verification of the data suggests inhomogeneity for this test property.