

DUBAI ACCREDITATION DEPARTMENT

REPORT ON PTP 168th INTER-LABORATORY PROFICIENCY TESTING PROGRAM DETERMINATION OF WET SIEVE ANALYSIS IN SOIL

Date: 15 December 2008

1. INTRODUCTION

This document presents the results of the 168th inter-laboratory proficiency-testing program conducted during the month of October involving the determination of **Wet Sieve Analysis in Soil** with thirty three laboratories participating.

This program is part of the Inter-laboratory Comparison Programs organized by Dubai Accreditation Department (DAC) of Dubai Municipality (DM) for monitoring the validity of test results of laboratories operating in Dubai as a requirement of the Local Order 52/1990 and ISO/IEC 17011: 2004.

2. EXPERIMENTAL DESIGN

2.1 Homogeneity:

DAC had ensured the homogeneity of the samples prior to their distribution to the participating laboratories by conducting homogeneity test on six samples (randomly selected). Based on the test results the homogeneity is statistically evaluated as per *ISO 13528:2005 as explained in DAC-G3-03*.

2.2 Participants:

Thirty private laboratories and three governmental laboratories (fourteen of them are accredited by DAC for construction materials testing) participated in this program. A total of thirty three laboratories participated in this program.

2.3 Samples Tested:

One (1) Soil sample of approximately 2 kg consists of fine sand specimen had been distributed to all participating laboratories. With each participant being given one sample with a unique identification number provided during the time of collection.

3. CONFIDENTIALITY

Each laboratory is given a code number to maintain confidentiality of results and to protect their identities. Only the concerned laboratory knows its code number.

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4. TEST METHOD

- 4.1 Instructions were given to the participants to test the samples for Determination of wet sieve analysis as per (BS 1377: 1990 part 2, T 9.2 AMD 9027:1996)
- 4.2 Test Sieves to be used: 5 mm, 3.35 mm, 2 mm, 1.18, 0.600 mm, 0.425 mm, 0.300 mm, 0.212 mm, 0.150 mm, 0.063 mm.

5. TEST RESULTS

The test results submitted by the participating laboratories are presented in Appendix A. In order to protect the identity of the participating laboratories, each one was assigned a code number. The numbers in the column headings, Lab #, of the tables represents the code numbers for the participating laboratories.

6. EVALUATION OF RESULTS

6.1 Method of Analysis

The analysis of the participant's results is based on *ISO 13528:2005 (Statistical Methods for the Use in Proficiency Testing by Inter-laboratory Comparisons)*

6.2 Calculations of Z- Scores

Appendix B gives the details of the calculation of the laboratories results and their Z-Scores which are obtained from the raw data. Also Z- Score and participant's results are represented in a bar chart and X-Y scattered plots C. The Z-Score analysis is based on an international Standard (*ISO 13528:2005*).

6.3 Outlier Results

Test	Labs outside the z-scores ± 3
Sieve Analysis (0.150 mm)	Labs : 3 ; 5 ; 9 ; 11 ; 15 ; 26 ; 29
Sieve Analysis (0.063 mm)	Lab: 29

After evaluating the Z-Score the test results provided by the above mentioned laboratories are outside the Z - score limits of ± 3 , the above mentioned laboratories are requested to investigate the root cause of the outlier results, implement corrective action and a report shall be available for checking by the assessment team during the nearest assessment visit.



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Also other participating laboratories have showed Z-score values higher than **two** which representing **not outlier** but a warning limit, these laboratories are advised to investigate the potential root cause of such results.

7. APPENDICES

- 7.1 Appendix A: Raw Data
- 7.2 Appendix B: Calculation of z-scores and other statistics
- 7.3 Appendix C: Charts

---- End of Report ----

Determination of Wet Sieve Analysis in Soil

Appendix A:

Table - 1 (0.300 mm)

Lab #	Results
Lab 1	91
Lab 2	93
Lab 3	91
Lab 4	93
Lab 5	91
Lab 6	92
Lab 7	92
Lab 8	93
Lab 9	92
Lab 10	93
Lab 11	91
Lab 12	92
Lab 14	93
Lab 15	93
Lab 16	92
Lab 17	92
Lab 18	92
Lab 19	92
Lab 20	91
Lab 21	93
Lab 22	93
Lab 23	93
Lab 24	92
Lab 25	91
Lab 26	93
Lab 27	92
Lab 28	92
Lab 29	92
Lab 30	92
Lab 31	92
Lab 32	91
Lab 33	92
Lab 34	92

Table - 2 (0.150 mm)

Lab #	Results
Lab 1	67
Lab 2	65
Lab 3	60
Lab 4	64
Lab 5	62
Lab 6	67
Lab 7	66
Lab 8	67
Lab 9	60
Lab 10	67
Lab 11	34
Lab 12	67
Lab 14	67
Lab 15	70
Lab 16	67
Lab 17	67
Lab 18	65
Lab 19	67
Lab 20	67
Lab 21	67
Lab 22	69
Lab 23	67
Lab 24	66
Lab 25	64
Lab 26	70
Lab 27	65
Lab 28	67
Lab 29	59
Lab 30	67
Lab 31	64
Lab 32	66
Lab 33	64
Lab 34	67

Table - 3 (0.063 mm)

Lab #	Results
Lab 1	5
Lab 2	6
Lab 3	7
Lab 4	5
Lab 5	5
Lab 6	5
Lab 7	6
Lab 8	5
Lab 9	5
Lab 10	6
Lab 11	7
Lab 12	5
Lab 14	5
Lab 15	6
Lab 16	5
Lab 17	5
Lab 18	5
Lab 19	6
Lab 20	6
Lab 21	5
Lab 22	6
Lab 23	6
Lab 24	6
Lab 25	5
Lab 26	6
Lab 27	5
Lab 28	6
Lab 29	8
Lab 30	6
Lab 31	6
Lab 32	6
Lab 33	6
Lab 34	5

Table - 1 (0.300 mm)

Iteration	0	xi-x*	1	(xi-x*) ²	2	(xi-x*) ²	3	(xi-x*) ²	4	(xi-x*) ²	5	(xi-x*) ²	6	(xi-x*) ²	Z Score
$\delta = 1.5 s^*$	---		2.22		1.23		1.23		1.23		1.23		1.23		
$x^* - \delta$	---		89.78		90.86		90.86		90.86		90.86		90.86		
$x^* + \delta$	---		94.22		93.32		93.32		93.32		93.32		93.32		
Lab 1	91	1.00	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	-1.33
Lab 11	91	1.00	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	-1.33
Lab 20	91	1.00	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	-1.33
Lab 25	91	1.00	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	-1.33
Lab 3	91	1.00	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	-1.33
Lab 32	91	1.00	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	-1.33
Lab 5	91	1.00	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	91.00	1.19	-1.33
Lab 12	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 16	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 17	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 18	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 19	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 24	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 27	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 28	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 29	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 30	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 31	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 33	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 34	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 6	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 7	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 9	92	0.00	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	92.00	0.01	-0.11
Lab 10	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 14	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 15	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 2	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 21	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 22	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 23	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 26	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 4	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Lab 8	93	1.00	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	93.00	0.83	1.11
Average	92.09		92.09	16.73	92.09	16.73	92.09	16.73	92.09	16.73	92.09	16.73	92.09	16.73	
SD	0.72		0.72	0.52	0.72	0.52	0.72	0.52	0.72	0.52	0.72	0.52	0.72	0.52	
New x*	92	1.00	92.091	0.72	92.091	0.72	92.091	0.72	92.091	0.72	92.09	0.72	92.09	0.72	
New s*	1.48		0.820		0.820		0.820		0.820		0.82		0.82		

N 33

Target value	92.09
Low Acceptable	89.63
High Acceptable	94.55
Acceptable Range	89.63 - 94.55

Table - 1 (0.150 mm)

Iteration	0	xi-x*	1	(xi-x*) ²	2	(xi-x*) ²	3	(xi-x*) ²	4	(xi-x*) ²	5	(xi-x*) ²	6	(xi-x*) ²	Z Score
$\delta = 1.5 s^*$	---		2.22		2.29		2.12		2.05		1.85		1.70		
$x^* - \delta$	---		64.78		64.03		64.15		64.20		64.39		64.52		
$x^* + \delta$	---		69.22		68.61		68.38		68.30		68.09		67.92		
Lab 11	34	33.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-30.39
Lab 29	59	8.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-6.80
Lab 3	60	7.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-5.85
Lab 9	60	7.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-5.85
Lab 5	62	5.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-3.97
Lab 25	64	3.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-2.08
Lab 31	64	3.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-2.08
Lab 33	64	3.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-2.08
Lab 4	64	3.00	64.78	2.37	64.78	2.22	64.78	2.16	64.78	2.14	64.78	2.08	64.78	2.04	-2.08
Lab 18	65	2.00	65.00	1.73	65.00	1.60	65.00	1.55	65.00	1.53	65.00	1.49	65.00	1.45	-1.14
Lab 2	65	2.00	65.00	1.73	65.00	1.60	65.00	1.55	65.00	1.53	65.00	1.49	65.00	1.45	-1.14
Lab 27	65	2.00	65.00	1.73	65.00	1.60	65.00	1.55	65.00	1.53	65.00	1.49	65.00	1.45	-1.14
Lab 24	66	1.00	66.00	0.10	66.00	0.07	66.00	0.06	66.00	0.06	66.00	0.05	66.00	0.04	-0.19
Lab 32	66	1.00	66.00	0.10	66.00	0.07	66.00	0.06	66.00	0.06	66.00	0.05	66.00	0.04	-0.19
Lab 7	66	1.00	66.00	0.10	66.00	0.07	66.00	0.06	66.00	0.06	66.00	0.05	66.00	0.04	-0.19
Lab 1	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 10	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 12	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 14	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 16	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 17	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 19	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 20	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 21	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 23	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 28	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 30	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 34	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 6	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 8	67	0.00	67.00	0.47	67.00	0.54	67.00	0.57	67.00	0.58	67.00	0.61	67.00	0.63	0.75
Lab 22	69	2.00	69.00	7.20	68.61	5.47	68.38	4.56	68.30	4.24	68.09	3.49	67.92	2.94	2.64
Lab 15	70	3.00	69.22	8.46	68.61	5.47	68.38	4.56	68.30	4.24	68.09	3.49	67.92	2.94	3.58
Lab 26	70	3.00	69.22	8.46	68.61	5.47	68.38	4.56	68.30	4.24	68.09	3.49	67.92	2.94	3.58
Average	64.79		66.32	57.99	66.27	49.52	66.25	46.52	66.24	45.45	66.22	42.97	66.20	41.16	
SD	6.09		1.35	1.81	1.24	1.55	1.21	1.45	1.19	1.18	1.16	1.00	1.13	0.87	
New x*	67	1.00	66.316	1.35	66.267	1.24	66.246	1.21	66.239	1.09	66.22	1.00	66.20	0.93	
New s*	1.48		1.527		1.411		1.367		1.232		1.133		1.06		

N 33

Target value	66.20
Low Acceptable	63.03
High Acceptable	69.38
Acceptable Range	63.03 - 69.38

Table - 1 (0.063 mm)

Iteration	0	xi-x*	1	(xi-x*) ²	2	(xi-x*) ²	3	(xi-x*) ²	4	(xi-x*) ²	5	(xi-x*) ²	6	(xi-x*) ²	Z Score
$\delta = 1.5 s^*$	---		2.22		1.25		1.08		1.02		1.00		0.99		
$x^* - \delta$	---		3.78		4.41		4.55		4.59		4.61		4.61		
$x^* + \delta$	---		8.22		6.92		6.71		6.63		6.60		6.59		
Lab 1	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 12	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 14	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 16	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 17	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 18	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 21	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 25	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 27	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 34	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 4	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 5	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 6	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 8	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 9	5	1.00	5.00	0.44	5.00	0.40	5.00	0.37	5.00	0.36	5.00	0.36	5.00	0.36	-0.91
Lab 10	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 15	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 19	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 2	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 20	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 22	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 23	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 24	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 26	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 28	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 30	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 31	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 32	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 33	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 7	6	0.00	6.00	0.11	6.00	0.14	6.00	0.15	6.00	0.16	6.00	0.16	6.00	0.16	0.61
Lab 11	7	1.00	7.00	1.78	6.92	1.66	6.71	1.22	6.63	1.06	6.60	1.00	6.59	0.98	2.13
Lab 3	7	1.00	7.00	1.78	6.92	1.66	6.71	1.22	6.63	1.06	6.60	1.00	6.59	0.98	2.13
Lab 29	8	2.00	8.00	5.44	6.92	1.66	6.71	1.22	6.63	1.06	6.60	1.00	6.59	0.98	3.66
Average	5.67		5.67	17.33	5.63	12.99	5.61	11.51	5.60	10.99	5.60	10.80	5.60	10.73	
SD	0.74		0.74	0.54	0.64	0.41	0.60	0.36	0.59	0.34	0.58	0.34	0.58	0.34	
New x*	6	1.00	5.667	0.74	5.629	0.64	5.610	0.60	5.603	0.59	5.60	0.58	5.60	0.58	
New s*	1.48		0.835		0.722		0.680		0.664		0.659		0.66		

N 33

Target value	5.60
Low Acceptable	3.63
High Acceptable	7.57
Acceptable Range	3.63 - 7.57





