



REF: 812/02/02/1/546

DATE: 19 JULY 2006

ATTENTION: LAB MANAGER

SUBJECT: 140th INTER-LABORATORY PROFICIENCY TESTING PROGRAM

We are pleased to present the results of the 140th Inter-laboratory Proficiency Testing Program involving the Determination of Particle Size Distribution & Specific Gravity and Absorption.

As in previous programs, we have assigned code numbers to participating laboratories in order to protect their identities. For this particular program please contact Dr. Yaser (Tel. No. 3027074) or Ms. Fatima (Tel. No. 3027071) to inform you which code number has been assigned to you.

You are also requested to pay to Dubai Accreditation Centre (DAC), an amount of (Dhs 418) in return for your participation in the Inter-laboratory Proficiency Testing Program (please note that the governmental laboratories are exempted from participation fees). We would like to draw your attention that payment can be made through DCLD counter- ground floor by credit card. Should you intend to pay by cheque please address the cheque to Dubai Municipality. After payment, please submit a copy of the invoice to the Accreditation Center (Ms. Fatima in the administration building on the second floor office no. 314B).

You are kindly requested to pay the amount within one month from the date in which the result is posted on our website.

We thank you for your participation and we would welcome any comments or suggestions on this and on future programs. Please do not hesitate to contact us if you need any clarification on the report.

*Kind Regards***ENG. LINA QUDAH****HEAD OF ACCREDITATION DECISIONS SECTION-DAC**

رؤيتنا: بناء مدينة متميزة تتوفر فيها رفاهية العيش ومقومات النجاح

Our Vision : To create an excellent city that provides the essence of success and comfort of living



DUBAI ACCREDITATION CENTER

Report on 140th Inter-Laboratory Proficiency Testing Determination of Particle Size Distribution & Specific Gravity and Absorption

Date: 22 July 2006

1. INTRODUCTION

This document presents the results of the 140th inter-laboratory proficiency-testing program conducted during the months of May and June 2006, according to BS EN 933-1: 1997: and ASTM C128: 2004.

This program is part of the Interlaboratory Comparison Programs organized by Dubai Accreditation Center of 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 Participants:

A total of fourteen laboratories participated in this program.

2.2 Samples tested:

Four (4) samples consisted of crushed rock sand, approximately 5 Kg each in plastic bags, are distributed to all participating laboratories.

From one portion, 28 test samples were randomly selected and similarly from the other portion, another 28 test samples were also selected. The test samples were randomly assigned to the fourteenth participating laboratories with each participant being assigned four test bags, two from each side. The test samples were designated as Samples 1 to 4 with a unique identification number marked on each test sample.

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.

4. TEST METHOD

- 4.1 Instructions were given to the participants to test the samples as per BS EN 933-1:1997 (Seive size to be used in mm: 10, 5, 2.36, 1.18, 0.600, 0.300, 0.150 &0.075),
- 4.2 Specific Gravity and Absorption of Fine Aggregate as per ASTM C128: 2004.



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5. TEST RESULTS

Test results submitted by the participating laboratories are presented in Appendix A. The numbers in the column headings of the table represent the code numbers of the participating laboratories.

6. EVALUATION OF RESULTS

6.1 Please refer to the document **DAC-G3-03** Robust Z-Score Analysis for the methodologies of analysis.

6.2 Calculations of z-scores from the results

Appendix B gives the details of the calculation of the Z-Score. The Z score analysis is based on an internationally accepted procedure being used by accreditation bodies implementing Interlaboratory comparison programs.

6.3 Outlier results

After evaluating the Z-Score, the following results were considered outliers:

Test Parameter	Labs with outlier results	Type of Outlier
Particle Size Distribution 0.300 mm	Lab 3-2 Lab 8-2 Lab 9-1 Lab 9-2	Between labs
	Lab 6-1 Lab 9-1	Within labs
Particle Size Distribution 0.075 mm	Lab 9-1	Within labs
Relative Density (OD)	Lab 8-1 Lab 8-2 Lab 9-1 Lab 9-2	Between labs
Relative Density (SSD)	Lab 1-1	Within labs
	Lab 9-1 Lab 9-2	Between labs



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Test Parameter	Labs with outlier results	Type of Outlier
Apparent Relative Density	Lab 9-1 Lab9-2	Between labs
	Lab 1-1 Lab1-2	Within labs
Water Absorption	Lab 8-1 Lab 8-2 Lab 12-1 Lab 12-2	Between labs

The test results provided by the abovementioned laboratories are outside the Z score limits of ± 3 , the abovementioned laboratories are requested to investigate the root cause of the outlier results, implement corrective action and email a report within 2 weeks to Accreditation Decisions Section of the Dubai Accreditation Center to the following address lmqudah@dm.gov.ae.

7. APPENDICES

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

Appendix A: Raw results

Table 1: Summary of results for Sample 1

Participant Labs.		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Grading	0.300 mm	14.0	16.0	15.0	15.0	16.0	14.0	14.0	15.0	15.0	15.0	15.0	14.0	15	15
	0.150 mm	10.0	11.0	11.0	11.0	11.0	11.0	10.0	10.0	10.0	10.0	11.0	9.0	10	11
	0.075 mm	7.0	8.1	8.0	8.0	8.0	8.1	7.0	8.0	8.4	8.0	8.0	7.0	8	8
Rel Den. (OD)		2.70	2.69	2.70	2.70	2.70	2.70	2.71	2.74	2.80	2.69	2.71	2.73	2.68	2.7
Rel Den (SSD)		2.75	2.72	2.73	2.73	2.73	2.73	2.73	2.77	2.84	2.73	2.74	2.76	2.72	2.73
App Rel Den		2.81	2.78	2.79	2.79	2.79	2.79	2.78	2.81	2.90	2.79	2.79	2.80	2.79	2.79
Water Absorption		1.1	1.3	1.2	1.2	1.2	1.2	1.0	0.8	1.2	1.2	1.2	0.9	1.5	1.2

Table 2: Summary of results for Sample 2

Participant Labs.		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Grading	0.300 mm	15.0	14.0	16.0	15.0	16.0	15.0	14.0	14.0	13.0	14.0	15.0	15.0	15	15
	0.150 mm	11.0	10.0	12.0	10.0	11.0	11.0	10.0	10.0	9.7	10.0	10.0	10.0	10	10
	0.075 mm	8.0	7.5	9.0	8.0	8.0	6.0	7.0	7.0	8.1	8.0	8.0	8.0	8	8
Rel Den. (OD)		2.72	2.67	2.70	2.71	2.70	2.71	2.71	2.74	2.79	2.70	2.72	2.72	2.68	2.7
Rel Den (SSD)		2.76	2.70	2.74	2.74	2.73	2.74	2.74	2.76	2.82	2.74	2.74	2.75	2.72	2.73
App Rel Den		2.82	2.78	2.79	2.80	2.79	2.80	2.79	2.80	2.89	2.80	2.80	2.80	2.79	2.79
Water Absorption		1.1	1.4	1.2	1.2	1.2	1.2	1.0	0.8	1.2	1.2	1.2	1.0	1.5	1.2

Appendix A: Raw results

Table 3: Summary of results for Sample 3

Participant Labs.		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Grading	0.300 mm	25.0	26.0	26.0	25.0	25.0	27.0	25.0	24.0	22.0	25.0	25.0	25.0	26	24
	0.150 mm	18.0	18.0	18.0	18.0	17.0	20.0	19.0	16.0	15.0	18.0	18.0	18.0	18	17
	0.075 mm	12.0	12.9	13.0	12.0	12.0	14.0	12.0	11.0	11.0	13.0	12.0	12.0	13	12
Rel Den. (OD)		2.81	2.78	2.85	2.84	2.81	2.83	2.82	2.89	2.94	2.84	2.84	2.86	2.83	2.84
Rel Den (SSD)		2.84	2.82	2.88	2.88	2.86	2.86	2.86	2.91	2.98	2.88	2.88	2.88	2.87	2.88
App Rel Den		2.92	2.92	2.94	2.96	2.94	2.92	2.93	2.95	3.06	2.94	2.93	2.93	2.94	2.95
Water Absorption		1.4	1.7	1.0	1.3	1.5	1.1	1.3	0.6	1.3	1.3	1.1	0.8	1.3	1.4

Table 4: Summary of results for Sample 4

Participant Labs.		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Grading	0.300 mm	25.0	26.0	27.0	25.0	24.0	25.0	24.0	23.0	21.0	24.0	25.0	25.0	26	25
	0.150 mm	18.0	18.0	19.0	17.0	17.0	17.0	18.0	16.0	14.0	17.0	18.0	17.0	18	17
	0.075 mm	13.0	12.9	14.0	12.0	12.0	12.0	12.0	11.0	11.0	12	13.0	12.0	13	12
Rel Den. (OD)		2.84	2.80	2.85	2.82	2.81	2.84	2.83	2.89	2.94	2.85	2.86	2.87	2.84	2.84
Rel Den (SSD)		2.87	2.84	2.88	2.88	2.86	2.88	2.87	2.91	2.98	2.87	2.90	2.89	2.87	2.88
App Rel Den		2.94	2.93	2.93	2.95	2.94	2.95	2.94	2.94	3.06	2.95	2.94	2.93	2.94	2.95
Water Absorption		1.3	1.6	1.0	1.3	1.5	1.3	1.3	0.6	1.3	1.4	1.1	0.7	1.3	1.4

Table 1: Particle size distribution, 0.300 mm

Lab#	S1 S2	S3 S4	Between Labs S1+S3 S2+S4	Within Labs S1-S3 S2-S4	Between Labs z-score	Within Labs z-score
Lab1-1	14	25	39	-11	-1.0792	-1.0792
Lab1-2	15	25	40	-10	0.0000	0.0000
Lab2-1	16	26	42	-10	2.1584	0.0000
Lab2-2	14	26	40	-12	0.0000	-2.1584
Lab3-1	15	26	41	-11	1.0792	-1.0792
Lab3-2	16	27	43	-11	3.2376	-1.0792
Lab4-1	15	25	40	-10	0.0000	0.0000
Lab4-2	15	25	40	-10	0.0000	0.0000
Lab5-1	16	25	41	-9	1.0792	1.0792
Lab5-2	16	24	40	-8	0.0000	2.1584
Lab6-1	14	27	41	-13	1.0792	-3.2376
Lab6-2	15	25	40	-10	0.0000	0.0000
Lab7-1	14	25	39	-11	-1.0792	-1.0792
Lab7-2	14	24	38	-10	-2.1584	0.0000
Lab8-1	15	24	39	-9	-1.0792	1.0792
Lab8-2	14	23	37	-9	-3.2376	1.0792
Lab9-1	15	22	37	-7	-3.2376	3.2376
Lab9-2	13	21	34	-8	-6.4751	2.1584
Lab10-1	15	25	40	-10	0.0000	0.0000
Lab10-2	14	24	38	-10	-2.1584	0.0000
Lab11-1	15	25	40	-10	0.0000	0.0000
Lab11-2	15	25	40	-10	0.0000	0.0000
Lab12-1	14	25	39	-11	-1.0792	-1.0792
Lab12-2	15	25	40	-10	0.0000	0.0000
Lab13-1	15	26	41	-11	1.0792	-1.0792
Lab13-2	15	26	41	-11	1.0792	-1.0792
Lab14-1	15	24	39	-9	-1.0792	1.0792
Lab14-2	15	25	40	-10	0.0000	0.0000

No. of Results	28	28	28	28
Median	15.0	25.0	40.0	-10.0
Q 1	14.0	24.0	39.0	-11.0
Q 3	15.0	25.3	40.3	-9.8
Inter Q Range	1.00	1.25	1.25	1.25
Normalzd IQR	0.74	0.93	0.93	0.93
Robust CV,%	4.9	3.7	2.3	-9.3
Minimum	13	21	34	-13
Maximum	16	27	43	-7
Range	3	6	9	6

Table 2: Particle size distribution, 0.150 mm

Lab#	S1 S2	S3 S4	Between Labs S1+S3 S2+S4	Within Labs S1-S3 S2-S4	Between Labs z-score	Within Labs z-score
Lab1-1	10	18	28	-8	0.0000	-0.6745
Lab1-2	11	18	29	-7	0.6745	0.0000
Lab2-1	11	18	29	-7	0.6745	0.0000
Lab2-2	10	18	28	-8	0.0000	-0.6745
Lab3-1	11	18	29	-7	0.6745	0.0000
Lab3-2	12	19	31	-7	2.0235	0.0000
Lab4-1	11	18	29	-7	0.6745	0.0000
Lab4-2	10	17	27	-7	-0.6745	0.0000
Lab5-1	11	17	28	-6	0.0000	0.6745
Lab5-2	11	17	28	-6	0.0000	0.6745
Lab6-1	11	20	31	-9	2.0235	-1.3490
Lab6-2	11	17	28	-6	0.0000	0.6745
Lab7-1	10	19	29	-9	0.6745	-1.3490
Lab7-2	10	18	28	-8	0.0000	-0.6745
Lab8-1	10	16	26	-6	-1.3490	0.6745
Lab8-2	10	16	26	-6	-1.3490	0.6745
Lab9-1	10	15	25	-5	-2.0235	1.3490
Lab9-2	9.7	14	23.7	-4.3	-2.9003	1.8211
Lab10-1	10	18	28	-8	0.0000	-0.6745
Lab10-2	10	17	27	-7	-0.6745	0.0000
Lab11-1	11	18	29	-7	0.6745	0.0000
Lab11-2	10	18	28	-8	0.0000	-0.6745
Lab12-1	9	18	27	-9	-0.6745	-1.3490
Lab12-2	10	17	27	-7	-0.6745	0.0000
Lab13-1	10	18	28	-8	0.0000	-0.6745
Lab13-2	10	18	28	-8	0.0000	-0.6745
Lab14-1	11	17	28	-6	0.0000	0.6745
Lab14-2	10	17	27	-7	-0.6745	0.0000

No. of Results	28	28	28	28
Median	10.0	18.0	28.0	-7.0
Q 1	10.0	17.0	27.0	-8.0
Q 3	11.0	18.0	29.0	-6.0
Inter Q Range	1.00	1.00	2.00	2.00
Normalzd IQR	0.74	0.74	1.48	1.48
Robust CV,%	7.4	4.1	5.3	-21.2
Minimum	9	14	23.7	-9
Maximum	12	20	31	-4.3
Range	3	6	7.3	4.7

Table 3: Particle size distribution, 0.075 mm

Lab#	S1 S2	S3 S4	Between Labs S1+S3 S2+S4	Within Labs S1-S3 S2-S4	Between Labs z-score	Within Labs z-score
Lab1-1	7	12	19	-5	-0.7008	-0.1349
Lab1-2	8	13	21	-5	0.7008	-0.1349
Lab2-1	8.1	12.9	21	-4.8	0.7008	0.1349
Lab2-2	7.5	12.9	20.4	-5.4	0.2803	-0.6745
Lab3-1	8	13	21	-5	0.7008	-0.1349
Lab3-2	9	14	23	-5	2.1023	-0.1349
Lab4-1	8	12	20	-4	0.0000	1.2141
Lab4-2	8	12	20	-4	0.0000	1.2141
Lab5-1	8	12	20	-4	0.0000	1.2141
Lab5-2	8	12	20	-4	0.0000	1.2141
Lab6-1	8.1	14	22.1	-5.9	1.4716	-1.3490
Lab6-2	6	12	18	-6	-1.4015	-1.4839
Lab7-1	7	12	19	-5	-0.7008	-0.1349
Lab7-2	7	12	19	-5	-0.7008	-0.1349
Lab8-1	8	11	19	-3	-0.7008	2.5631
Lab8-2	7	11	18	-4	-1.4015	1.2141
Lab9-1	8.4	11	19.4	-2.6	-0.4205	3.1027
Lab9-2	8.1	11	19.1	-2.9	-0.6307	2.6980
Lab10-1	8	13	21	-5	0.7008	-0.1349
Lab10-2	8	12	20	-4	0.0000	1.2141
Lab11-1	8	12	20	-4	0.0000	1.2141
Lab11-2	8	13	21	-5	0.7008	-0.1349
Lab12-1	7	12	19	-5	-0.7008	-0.1349
Lab12-2	8	12	20	-4	0.0000	1.2141
Lab13-1	8	13	21	-5	0.7008	-0.1349
Lab13-2	8	13	21	-5	0.7008	-0.1349
Lab14-1	8	12	20	-4	0.0000	1.2141
Lab14-2	8	12	20	-4	0.0000	1.2141

No. of Results	28	28	28	28
Median	8.0	12.0	20.0	-4.9
Q 1	7.9	12.0	19.1	-5.0
Q 3	8.0	13.0	21.0	-4.0
Inter Q Range	0.13	1.00	1.93	1.00
Normalzd IQR	0.09	0.74	1.43	0.74
Robust CV,%	1.2	6.2	7.1	-15.1
Minimum	6	11	18	-6
Maximum	9	14	23	-2.6
Range	3	3	5	3.4

Table 4: Relative Density (O.D.)

Lab#	S1 S2	S3 S4	Between Labs S1+S3 S2+S4	Within Labs S1-S3 S2-S4	Between Labs z-score	Within Labs z-score
Lab1-1	2.7	2.81	5.51	-0.11	-1.0792	1.3490
Lab1-2	2.72	2.84	5.56	-0.12	0.7195	0.8993
Lab2-1	2.69	2.78	5.47	-0.09	-2.5181	2.2483
Lab2-2	2.67	2.8	5.47	-0.13	-2.5181	0.4497
Lab3-1	2.7	2.85	5.55	-0.15	0.3597	-0.4497
Lab3-2	2.7	2.85	5.55	-0.15	0.3597	-0.4497
Lab4-1	2.7	2.84	5.54	-0.14	0.0000	0.0000
Lab4-2	2.71	2.82	5.53	-0.11	-0.3597	1.3490
Lab5-1	2.7	2.81	5.51	-0.11	-1.0792	1.3490
Lab5-2	2.7	2.81	5.51	-0.11	-1.0792	1.3490
Lab6-1	2.7	2.83	5.53	-0.13	-0.3597	0.4497
Lab6-2	2.71	2.84	5.55	-0.13	0.3597	0.4497
Lab7-1	2.71	2.82	5.53	-0.11	-0.3597	1.3490
Lab7-2	2.71	2.83	5.54	-0.12	0.0000	0.8993
Lab8-1	2.74	2.89	5.63	-0.15	3.2376	-0.4497
Lab8-2	2.74	2.89	5.63	-0.15	3.2376	-0.4497
Lab9-1	2.8	2.94	5.74	-0.14	7.1946	0.0000
Lab9-2	2.79	2.94	5.73	-0.15	6.8348	-0.4497
Lab10-1	2.69	2.84	5.53	-0.15	-0.3597	-0.4497
Lab10-2	2.7	2.85	5.55	-0.15	0.3597	-0.4497
Lab11-1	2.71	2.84	5.55	-0.13	0.3597	0.4497
Lab11-2	2.72	2.86	5.58	-0.14	1.4389	0.0000
Lab12-1	2.73	2.86	5.59	-0.13	1.7986	0.4497
Lab12-2	2.72	2.87	5.59	-0.15	1.7986	-0.4497
Lab13-1	2.68	2.83	5.51	-0.15	-1.0792	-0.4497
Lab13-2	2.68	2.84	5.52	-0.16	-0.7195	-0.8993
Lab14-1	2.7	2.84	5.54	-0.14	0.0000	0.0000
Lab14-2	2.7	2.84	5.54	-0.14	0.0000	0.0000

No. of Results	28	28	28	28
Median	2.70	2.84	5.54	-0.14
Q 1	2.70	2.83	5.53	-0.15
Q 3	2.72	2.85	5.57	-0.12
Inter Q Range	0.02	0.02	0.04	0.03
Normalzd IQR	0.015	0.019	0.028	0.022
Robust CV,%	0.549	0.653	0.502	-15.885
Minimum	2.670	2.780	5.470	-0.160
Maximum	2.800	2.940	5.740	-0.090
Range	0.130	0.160	0.270	0.070

Table 5: Relative Density (SSD)

Lab#	S1 S2	S3 S4	Between Labs S1+S3 S2+S4	Within Labs S1-S3 S2-S4	Between Labs z-score	Within Labs z-score
Lab1-1	2.75	2.84	5.59	-0.090	-0.6348	3.3725
Lab1-2	2.76	2.87	5.63	-0.110	0.6348	2.0235
Lab2-1	2.72	2.82	5.54	-0.100	-2.2219	2.6980
Lab2-2	2.7	2.84	5.54	-0.140	-2.2219	0.0000
Lab3-1	2.73	2.88	5.61	-0.150	0.0000	-0.6745
Lab3-2	2.74	2.88	5.62	-0.140	0.3174	0.0000
Lab4-1	2.73	2.88	5.61	-0.150	0.0000	-0.6745
Lab4-2	2.74	2.88	5.62	-0.140	0.3174	0.0000
Lab5-1	2.73	2.86	5.59	-0.130	-0.6348	0.6745
Lab5-2	2.73	2.86	5.59	-0.130	-0.6348	0.6745
Lab6-1	2.73	2.86	5.59	-0.130	-0.6348	0.6745
Lab6-2	2.74	2.88	5.62	-0.140	0.3174	0.0000
Lab7-1	2.73	2.86	5.59	-0.130	-0.6348	0.6745
Lab7-2	2.74	2.87	5.61	-0.130	0.0000	0.6745
Lab8-1	2.77	2.91	5.68	-0.140	2.2219	0.0000
Lab8-2	2.76	2.91	5.67	-0.150	1.9044	-0.6745
Lab9-1	2.84	2.98	5.82	-0.140	6.6656	0.0000
Lab9-2	2.82	2.98	5.8	-0.160	6.0307	-1.3490
Lab10-1	2.73	2.88	5.61	-0.150	0.0000	-0.6745
Lab10-2	2.74	2.87	5.61	-0.130	0.0000	0.6745
Lab11-1	2.74	2.88	5.62	-0.140	0.3174	0.0000
Lab11-2	2.74	2.90	5.64	-0.160	0.9522	-1.3490
Lab12-1	2.76	2.88	5.64	-0.120	0.9522	1.3490
Lab12-2	2.75	2.89	5.64	-0.140	0.9522	0.0000
Lab13-1	2.72	2.87	5.59	-0.150	-0.6348	-0.6745
Lab13-2	2.72	2.87	5.59	-0.150	-0.6348	-0.6745
Lab14-1	2.73	2.88	5.61	-0.150	0.0000	-0.6745
Lab14-2	2.73	2.88	5.61	-0.150	0.0000	-0.6745

No. of Results	28	28	28	28
Median	2.740	2.880	5.610	-0.140
Q 1	2.73	2.87	5.59	-0.15
Q 3	2.75	2.88	5.63	-0.13
Inter Q Range	0.020	0.012	0.043	0.020
Normalzd IQR	0.015	0.009	0.032	0.015
Robust CV,%	0.54	0.32	0.56	-10.59
Minimum	2.70	2.82	5.54	-0.16
Maximum	2.84	2.98	5.82	-0.09
Range	0.14	0.16	0.28	0.07

Table 6: Apparent Relative Density

Lab#	S1 S2	S3 S4	Between Labs S1+S3 S2+S4	Within Labs S1-S3 S2-S4	Between Labs z-score	Within Labs z-score
Lab1-1	2.81	2.92	5.73	-0.110	0.0000	5.3959
Lab1-2	2.82	2.94	5.76	-0.120	2.0235	4.0469
Lab2-1	2.78	2.92	5.7	-0.140	-2.0235	1.3490
Lab2-2	2.78	2.93	5.71	-0.150	-1.3490	0.0000
Lab3-1	2.79	2.94	5.73	-0.150	0.0000	0.0000
Lab3-2	2.79	2.93	5.72	-0.140	-0.6745	1.3490
Lab4-1	2.79	2.96	5.75	-0.170	1.3490	-2.6980
Lab4-2	2.8	2.95	5.75	-0.150	1.3490	0.0000
Lab5-1	2.79	2.94	5.73	-0.150	0.0000	0.0000
Lab5-2	2.79	2.94	5.73	-0.150	0.0000	0.0000
Lab6-1	2.79	2.92	5.71	-0.130	-1.3490	2.6980
Lab6-2	2.8	2.95	5.75	-0.150	1.3490	0.0000
Lab7-1	2.78	2.93	5.71	-0.150	-1.3490	0.0000
Lab7-2	2.79	2.94	5.73	-0.150	0.0000	0.0000
Lab8-1	2.81	2.95	5.76	-0.140	2.0235	1.3490
Lab8-2	2.8	2.94	5.74	-0.140	0.6745	1.3490
Lab9-1	2.9	3.06	5.96	-0.160	15.5133	-1.3490
Lab9-2	2.89	3.06	5.95	-0.170	14.8388	-2.6980
Lab10-1	2.79	2.94	5.73	-0.150	0.0000	0.0000
Lab10-2	2.8	2.95	5.75	-0.150	1.3490	0.0000
Lab11-1	2.79	2.93	5.72	-0.140	-0.6745	1.3490
Lab11-2	2.8	2.94	5.74	-0.140	0.6745	1.3490
Lab12-1	2.8	2.93	5.73	-0.130	0.0000	2.6980
Lab12-2	2.8	2.93	5.73	-0.130	0.0000	2.6980
Lab13-1	2.79	2.94	5.73	-0.150	0.0000	0.0000
Lab13-2	2.79	2.94	5.73	-0.150	0.0000	0.0000
Lab14-1	2.79	2.95	5.74	-0.160	0.6745	-1.3490
Lab14-2	2.79	2.95	5.74	-0.160	0.6745	-1.3490

No. of Results	28	28	28	28
Median	2.79	2.94	5.73	-0.15
Q 1	2.79	2.93	5.73	-0.15
Q 3	2.80	2.95	5.75	-0.14
Inter Q Range	0.010	0.020	0.020	0.010
Normalzd IQR	0.007	0.015	0.015	0.007
Robust CV,%	0.27	0.50	0.26	-4.94
Minimum	2.78	2.92	5.7	-0.17
Maximum	2.90	3.06	5.96	-0.11
Range	0.12	0.14	0.26	0.06

Table 7: Water absorption

Lab#	S1 S2	S3 S4	Between Labs S1+S3 S2+S4	Within Labs S1-S3 S2-S4	Between Labs z-score	Within Labs z-score
Lab1-1	1.10	1.40	2.50	-0.30	0.000	-0.830
Lab1-2	1.10	1.30	2.40	-0.20	-0.450	-0.415
Lab2-1	1.30	1.70	3.00	-0.40	2.248	-1.245
Lab2-2	1.40	1.60	3.00	-0.20	2.248	-0.415
Lab3-1	1.20	1.00	2.20	0.20	-1.349	1.245
Lab3-2	1.20	1.00	2.20	0.20	-1.349	1.245
Lab4-1	1.20	1.30	2.50	-0.10	0.000	0.000
Lab4-2	1.20	1.30	2.50	-0.10	0.000	0.000
Lab5-1	1.20	1.50	2.70	-0.30	0.899	-0.830
Lab5-2	1.20	1.50	2.70	-0.30	0.899	-0.830
Lab6-1	1.20	1.10	2.30	0.10	-0.899	0.830
Lab6-2	1.20	1.30	2.50	-0.10	0.000	0.000
Lab7-1	1.00	1.30	2.30	-0.30	-0.899	-0.830
Lab7-2	1.00	1.30	2.30	-0.30	-0.899	-0.830
Lab8-1	0.80	0.60	1.40	0.20	-4.946	1.245
Lab8-2	0.80	0.60	1.40	0.20	-4.946	1.245
Lab9-1	1.20	1.30	2.50	-0.10	0.000	0.000
Lab9-2	1.20	1.30	2.50	-0.10	0.000	0.000
Lab10-1	1.20	1.30	2.50	-0.10	0.000	0.000
Lab10-2	1.20	1.40	2.60	-0.20	0.450	-0.415
Lab11-1	1.20	1.10	2.30	0.10	-0.899	0.830
Lab11-2	1.20	1.10	2.30	0.10	-0.899	0.830
Lab12-1	0.90	0.80	1.70	0.10	-3.597	0.830
Lab12-2	1.00	0.70	1.70	0.30	-3.597	1.660
Lab13-1	1.5	1.3	2.80	0.20	1.349	1.245
Lab13-2	1.5	1.3	2.80	0.20	1.349	1.245
Lab14-1	1.2	1.4	2.60	-0.20	0.450	-0.415
Lab14-2	1.2	1.4	2.60	-0.20	0.450	-0.415

No. of Results	28	28	28	28
Median	1.20	1.30	2.50	-0.10
Q 1	1.10	1.10	2.30	-0.20
Q 3	1.20	1.40	2.60	0.13
Inter Q Range	0.10	0.30	0.30	0.33
Normalzd IQR	0.0741	0.2224	0.2224	0.2409
Robust CV,%	6.18	17.11	8.90	-240.92
Minimum	0.80	0.60	1.40	-0.40
Maximum	1.50	1.70	3.00	0.30
Range	0.70	1.10	1.60	0.70













