



REF: 812/02/02/1/548

DATE: 19 JULY 2006

ATTENTION: LAB MANAGER

SUBJECT: **141st INTER-LABORATORY PROFICIENCY TESTING PROGRAM**

We are pleased to present the results of the 141st Inter-laboratory Proficiency Testing Program involving the determination of paving block dimension & compressive strength.

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 141st Inter-Laboratory Proficiency Testing Determination of Compressive Strength and Dimension of Rectangular Paving Block

Date: 18 July 2006

1. INTRODUCTION

This document presents the results of the 141st Inter-Laboratory Proficiency Testing Program conducted during the months of May and June, involving the determination of the compressive strength and dimension of four samples of rectangular paving block according to BS 6717:1993 Part 1 Annex A & B for compressive strength and BS 6717:1993 Part 1 Annex for dimension of four samples of rectangular paving block.

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 fifteen laboratories participated in this program.

2.2 Samples tested:

The test items consist of four samples of rectangular paving block 200*100*60 mm size, black color, and each sample consisting of ten specimens. The sample specifications were such that the expected results of one batch are lower than the other.

From one set, 30 samples were randomly selected and similarly from the other set, another 30 samples were also selected. The samples were randomly distributed to the fifteen participating laboratories with each participant receiving four samples, two from each set. The samples were designated as Samples 1, 2, 3, and 4 with a unique identification number marked on each 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

Instructions were given to the participants to test the samples for:

4.1 BS 6717:1993 Part 1 Annex A & B.

4.2 BS 6717:1993 Part 1 Annex A.



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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	Labs outside the z-scores ± 3	Type of Outlier
Compressive Strength	Lab 4-2	Between Labs
	Lab 13-1	Within Labs
Average Thickness	Lab 13-2 Lab 9-1	Between Labs
	Lab 11-1	Within 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

Compressive strength, N/mm²

Sample 1

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab1	63.80	63.00	57.60	57.30	64.60	63.00	60.10	57.80	67.80	58.80	61
Lab2	60.00	62.20	69.60	69.20	63.80	60.40	68.20	56.40	57.50	62.20	63
Lab3	62.60	63.20	62.70	62.40	60.70	64.60	65.80	72.60	68.40	57.90	64
Lab4	61.50	61.00	57.00	58.20	61.50	61.80	64.20	58.80	57.90	59.90	60
Lab5	67.30	63.30	70.60	61.00	66.40	62.40	62.90	68.60	60.50	66.50	65
Lab6	65.00	64.00	65.60	65.60	63.20	65.20	64.60	64.20	67.50	63.00	65
Lab7	67.10	68.20	51.50	64.20	64.70	65.70	61.40	62.10	65.50	71.20	64
Lab8	72.60	63.10	62.20	66.60	66.90	62.40	65.40	58.90	64.10	69.10	65
Lab9	63.70	63.30	55.80	53.30	57.60	58.90	57.80	55.80	56.90	63.20	59
Lab10	59.50	59.90	55.30	55.20	57.50	61.30	58.10	56.30	53.20	58.60	57
Lab11	66.30	61.80	60.50	69.40	63.20	67.30	69.60	65.60	61.80	60.10	65
Lab12	67.70	64.70	66.90	69.70	69.30	67.90	65.00	65.40	64.00	64.90	67
Lab13	56.90	56.40	62.20	62.40	64.70	68.90	59.60	60.40	63.90	65.60	62
Lab14	66.70	65.20	65.50	59.90	63.00	65.30	62.40	61.90	63.60	62.00	64
Lab15	68.20	60.10	61.00	61.50	60.40	65.00	67.00	59.40	61.40	64.20	63

Sample 2

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab1	69.70	64.30	67.30	64.20	63.80	60.30	69.30	58.50	60.50	57.00	63
Lab2	65.80	62.00	59.10	59.80	60.10	61.10	60.70	60.10	54.60	65.20	61
Lab3	57.20	54.30	61.70	60.30	60.70	60.40	57.90	54.30	62.90	59.10	59
Lab4	64.40	59.40	66.10	62.40	50.40	41.60	68.20	52.70	52.90	51.50	57
Lab5	71.10	57.90	61.70	62.10	67.40	65.50	64.00	54.00	67.70	72.10	64
Lab6	64.20	63.50	64.50	63.10	63.50	63.50	64.20	63.70	63.30	62.40	64
Lab7	64.40	62.00	61.20	63.00	63.60	68.30	66.30	64.30	67.40	68.30	65
Lab8	59.80	63.00	64.30	67.10	68.90	71.30	66.80	61.20	59.00	60.00	64
Lab9	56.60	57.60	52.70	55.10	55.00	59.00	56.80	58.40	56.60	64.40	57
Lab10	56.30	58.20	57.10	58.70	61.20	61.00	56.80	62.20	58.60	60.50	59
Lab11	55.70	62.00	71.90	68.90	65.40	64.10	66.20	61.50	55.70	58.50	63
Lab12	76.00	70.20	69.00	69.20	69.40	68.50	65.40	65.70	62.20	64.70	68
Lab13	60.80	53.20	55.70	60.40	73.40	61.00	64.00	53.60	58.10	65.50	61
Lab14	64.50	67.70	66.30	66.60	68.60	64.10	63.70	64.30	62.60	64.00	65
Lab15	62.30	64.60	65.40	67.30	71.20	65.10	64.30	63.70	62.50	60.00	65

Appendix A: Raw results

Compressive strength, N/mm²

Sample 3

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab1	55.60	71.20	58.60	61.80	60.40	61.40	61.00	62.10	54.00	69.40	62
Lab2	54.50	56.00	62.90	60.50	67.40	66.70	69.30	66.70	56.90	58.50	62
Lab3	54.60	60.10	55.30	65.90	63.90	64.90	62.10	66.20	64.90	63.10	62
Lab4	45.50	62.00	59.70	46.00	54.70	41.10	36.90	62.30	62.40	67.30	54
Lab5	58.50	59.80	61.00	64.10	62.20	53.40	65.70	62.40	61.20	59.50	61
Lab6	66.00	66.90	69.00	62.00	61.60	57.00	58.10	66.60	54.40	55.40	62
Lab7	62.50	61.70	63.80	63.70	62.20	62.20	62.30	62.90	61.70	60.20	62
Lab8	63.30	62.50	61.50	60.80	62.10	60.70	61.40	62.10	61.40	58.40	61
Lab9	57.50	58.10	60.20	60.40	63.40	57.60	62.20	59.00	60.90	59.40	60
Lab10	56.40	55.90	61.00	61.40	56.90	60.00	64.30	61.80	61.00	64.60	60
Lab11	57.80	55.60	58.10	58.40	62.70	62.80	56.20	64.40	69.70	63.00	61
Lab12	62.10	57.60	59.60	60.10	63.70	56.80	59.60	64.50	63.10	57.90	61
Lab13	63.70	74.50	68.70	69.70	74.50	76.30	80.60	78.30	67.70	64.30	72
Lab14	63.60	67.80	70.50	70.00	73.60	68.90	61.00	59.10	69.80	66.00	67
Lab15	64.80	57.80	60.40	65.60	62.40	57.20	66.90	63.50	66.30	61.50	63

Sample 4

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab1	58.60	62.80	64.80	70.80	69.60	70.20	65.80	69.90	69.70	66.70	67
Lab2	57.00	54.80	53.60	58.60	64.20	59.10	65.50	62.00	63.30	54.50	59
Lab3	57.80	57.20	55.70	63.60	66.10	64.60	68.10	69.00	58.20	56.30	62
Lab4	46.00	43.90	42.40	48.00	56.20	42.80	57.10	45.20	54.70	49.70	49
Lab5	56.20	55.80	66.80	59.90	65.70	58.20	74.00	57.10	69.80	55.30	62
Lab6	63.00	62.20	60.20	67.10	61.10	66.20	61.40	60.10	64.10	62.20	63
Lab7	64.00	59.50	64.40	62.80	63.30	61.90	63.30	62.40	62.40	62.30	63
Lab8	61.40	65.10	62.60	63.90	62.50	62.20	62.80	63.70	62.90	61.30	63
Lab9	64.60	58.40	58.60	64.50	68.90	62.50	72.40	57.60	61.50	55.30	62
Lab10	64.20	66.90	71.60	59.20	60.60	62.40	58.00	64.10	62.00	67.60	64
Lab11	61.40	59.90	56.90	54.40	55.30	60.50	59.10	58.60	60.90	68.60	60
Lab12	61.90	70.20	70.80	69.40	72.70	67.30	74.00	73.20	60.30	62.90	68
Lab13	50.00	51.20	50.90	60.20	60.80	54.10	55.70	55.30	54.40	55.90	55
Lab14	64.00	70.30	63.50	68.40	68.70	70.40	65.00	71.80	59.00	54.20	66
Lab15	68.40	66.50	65.80	60.00	63.60	63.90	63.90	66.60	67.30	58.50	64

Appendix A: Raw results

Average thickness, mm

Sample 1

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab1	62.50	62.50	62.00	62.00	62.50	62.00	62.00	61.75	62.00	61.50	62
Lab2	61.75	61.25	61.25	61.25	61.25	61.75	61.75	61.25	61.75	61.25	61
Lab3	62.75	62.75	62.50	62.00	62.00	62.00	61.50	62.00	63.00	62.00	62
Lab4	61.25	61.25	61.50	61.25	61.25	61.25	61.25	61.50	61.50	61.25	61
Lab5	61.25	61.00	61.00	61.00	61.00	61.00	61.00	61.25	61.00	61.75	61
Lab6	62.00	62.00	62.75	62.75	62.50	62.50	62.75	63.00	63.00	62.00	63
Lab7	62.00	61.00	61.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62
Lab8	61.75	61.50	61.25	61.75	62.00	61.75	62.00	61.75	62.00	61.75	62
Lab9	63.00	62.75	62.00	62.75	63.00	63.00	63.00	63.00	62.50	62.75	63
Lab10	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	63.00	62
Lab11	62.75	62.50	62.75	62.75	62.00	62.00	62.75	62.50	62.75	62.50	63
Lab12	62.00	62.00	62.00	62.00	62.00	62.00	62.00	63.00	62.00	62.00	62
Lab13	63.00	62.75	62.50	62.75	62.50	62.75	62.75	63.00	63.00	62.75	63
Lab14	63.00	63.00	62.00	62.00	62.00	61.00	61.00	61.00	61.00	62.00	62
Lab15	62.00	62.00	62.00	61.00	62.00	62.00	62.00	62.00	62.00	62.00	62

Sample 2

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab1	63.00	62.50	62.75	62.00	62.00	62.00	62.50	62.00	62.00	62.50	62
Lab2	62.25	62.25	61.25	62.25	61.25	62.25	61.75	61.75	62.25	61.25	62
Lab3	62.00	62.00	61.75	61.00	61.00	61.25	61.25	62.00	61.75	62.00	62
Lab4	60.75	61.50	60.75	60.25	60.75	60.25	60.75	61.25	60.75	61.25	61
Lab5	61.25	61.00	61.00	61.00	61.00	61.00	61.75	61.75	62.75	62.00	61
Lab6	62.00	62.50	62.00	61.75	61.00	61.00	61.00	61.50	60.50	61.00	61
Lab7	62.50	62.00	62.00	62.00	62.00	62.00	62.00	61.00	62.00	62.00	62
Lab8	61.75	62.00	61.50	61.75	61.75	61.50	61.25	61.75	61.25	62.00	62
Lab9	62.00	63.00	61.50	62.00	62.00	62.00	62.00	62.00	62.00	63.00	62
Lab10	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.75	62
Lab11	62.25	61.75	61.50	61.50	61.25	61.25	61.25	61.50	62.00	63.00	62
Lab12	63.00	62.00	62.00	62.00	61.00	61.00	62.00	62.00	62.00	63.00	62
Lab13	63.00	63.00	62.75	63.00	63.00	62.50	62.75	63.00	63.00	63.00	63
Lab14	62.00	62.00	61.00	61.00	62.00	62.00	62.00	62.00	62.00	63.00	62
Lab15	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62

Appendix A: Raw results

Average thickness, mm

Sample 3

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab1	61.50	62.00	61.75	62.00	62.00	62.00	62.00	62.50	62.50	61.25	62
Lab2	61.50	61.75	62.00	61.25	60.75	61.25	61.75	62.75	62.00	61.50	62
Lab3	63.00	62.50	62.75	62.75	62.00	62.00	61.75	62.00	62.00	62.00	62
Lab4	61.25	61.25	61.50	61.25	61.25	61.50	61.25	61.50	61.25	61.50	61
Lab5	62.50	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62
Lab6	61.50	61.50	62.00	61.25	62.00	62.00	62.00	62.00	61.50	61.25	62
Lab7	61.00	61.00	61.00	60.50	61.00	60.50	61.00	61.00	61.00	61.00	61
Lab8	62.00	62.00	61.50	61.25	61.25	62.00	61.75	61.75	62.00	61.75	62
Lab9	63.00	63.25	63.00	63.00	63.00	63.00	63.00	63.00	63.00	63.00	63
Lab10	60.75	60.50	60.75	61.50	61.75	60.75	60.75	61.00	61.75	61.75	61
Lab11	60.50	60.00	60.00	60.00	60.00	60.00	60.00	60.50	60.00	61.50	60
Lab12	63.00	63.00	63.00	63.00	63.00	63.00	62.00	62.00	63.00	63.00	63
Lab13	62.25	62.00	61.75	62.00	62.00	62.00	62.00	61.75	62.00	62.00	62
Lab14	62.00	62.00	62.00	62.00	62.00	61.00	62.00	61.00	62.00	61.00	62
Lab15	60.00	60.00	61.00	61.00	60.00	60.00	61.00	60.00	61.00	60.00	60

Sample 4

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab1	61.75	62.00	61.50	61.50	61.00	61.00	61.00	61.00	61.00	61.25	61
Lab2	62.25	61.50	61.25	62.00	61.25	62.75	61.75	61.25	62.00	61.25	62
Lab3	62.00	62.00	61.25	61.25	61.75	61.25	61.75	61.25	61.00	61.25	61
Lab4	61.50	61.25	61.25	61.50	61.25	61.25	61.25	61.25	61.25	61.25	61
Lab5	61.75	62.00	61.75	61.75	61.50	61.50	61.75	61.75	61.50	60.75	62
Lab6	61.25	61.75	61.50	61.00	61.00	61.00	61.50	61.00	61.00	61.00	61
Lab7	62.50	62.00	62.00	61.50	61.25	61.25	61.00	61.00	61.00	61.00	61
Lab8	61.00	61.25	61.25	61.50	61.25	61.50	61.50	61.25	61.50	61.25	61
Lab9	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.00	62.25	62
Lab10	61.00	61.00	61.00	60.50	61.00	60.00	61.50	60.50	60.00	61.25	61
Lab11	62.00	62.00	61.25	61.50	61.00	61.00	61.00	60.50	61.25	61.25	61
Lab12	62.00	62.00	61.00	61.00	61.00	61.00	61.00	61.00	61.00	61.00	61
Lab13	63.75	63.00	62.50	62.50	62.50	62.50	63.00	62.50	62.50	62.50	63
Lab14	62.00	62.00	61.00	61.00	61.00	61.00	61.00	61.00	61.00	61.00	61
Lab15	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60

Appendix B: Calculation of z-scores

Compressive strength, N/mm²

Result#	S1 S2	S3 S4	S1+S3 S2+S4	S1-S3 S2-S4	Between Labs z- score	Within Labs z- score
Lab1-1	61	62	123	-1	-0.648	-0.674
Lab1-2	63	67	130	-4	0.863	-1.686
Lab2-1	63	62	125	1	-0.216	0.000
Lab2-2	61	59	120	2	-1.295	0.337
Lab3-1	64	62	126	2	0.000	0.337
Lab3-2	59	62	121	-3	-1.079	-1.349
Lab4-1	60	54	114	6	-2.590	1.686
Lab4-2	57	49	106	8	-4.317	2.361
Lab5-1	65	61	126	4	0.000	1.012
Lab5-2	64	62	126	2	0.000	0.337
Lab6-1	65	62	127	3	0.216	0.674
Lab6-2	64	63	127	1	0.216	0.000
Lab7-1	64	62	126	2	0.000	0.337
Lab7-2	65	63	128	2	0.432	0.337
Lab8-1	65	61	126	4	0.000	1.012
Lab8-2	64	63	127	1	0.216	0.000
Lab9-1	59	60	119	-1	-1.511	-0.674
Lab9-2	57	62	119	-5	-1.511	-2.023
Lab10-1	57	60	117	-3	-1.943	-1.349
Lab10-2	59	64	123	-5	-0.648	-2.023
Lab11-1	65	61	126	4	0.000	1.012
Lab11-2	63	60	123	3	-0.648	0.674
Lab12-1	67	61	128	6	0.432	1.686
Lab12-2	68	68	136	0	2.158	-0.337
Lab 13-1	62	72	134	-10	1.727	-3.710
Lab 13-2	61	55	116	6	-2.158	1.686
Lab 14-1	64	67	131	-3	1.079	-1.349
Lab 14-2	65	66	131	-1	1.079	-0.674
Lab 15-1	63	63	126	0	0.000	-0.337
Lab 15-2	65	64	129	1	0.648	0.000

No. of Results	30	30	30	30
Median	64	62	126	1
Q 1	61	61	122	-1
Q 3	65	63	128	3
Inter Q Range	4	2	6	4
Normalzsd IQR	2.97	1.48	4.63	2.97
Robust CV,%	4.67	2.39	3.68	296.52
Minimum	57.0	49.0	106.0	-10.0
Maximum	68.0	72.0	136.0	8.0
Range	11.0	23.0	30.0	18.0

Appendix B: Calculation of z-scores

Average Thickness (mm)

Result#	S1 S2	S3 S4	S1+S3 S2+S4	S1-S3 S2-S4	Between Labs z- score	Within Labs z- score
Lab1-1	62	62	124	0	1.3490	-0.6745
Lab1-2	62	61	123	1	0.0000	0.6745
Lab2-1	61	62	123	-1	0.0000	-2.0235
Lab2-2	62	62	124	0	1.3490	-0.6745
Lab3-1	62	62	124	0	1.3490	-0.6745
Lab3-2	62	61	123	1	0.0000	0.6745
Lab4-1	61	61	122	0	-1.3490	-0.6745
Lab4-2	61	61	122	0	-1.3490	-0.6745
Lab5-1	61	62	123	-1	0.0000	-2.0235
Lab5-2	61	62	123	-1	0.0000	-2.0235
Lab6-1	63	62	125	1	2.6980	0.6745
Lab6-2	61	61	122	0	-1.3490	-0.6745
Lab7-1	62	61	123	1	0.0000	0.6745
Lab7-2	62	61	123	1	0.0000	0.6745
Lab8-1	62	62	124	0	1.3490	-0.6745
Lab8-2	62	61	123	1	0.0000	0.6745
Lab9-1	63	63	126	0	4.0469	-0.6745
Lab9-2	62	62	124	0	1.3490	-0.6745
Lab10-1	62	61	123	1	0.0000	0.6745
Lab10-2	62	61	123	1	0.0000	0.6745
Lab11-1	63	60	123	3	0.0000	3.3725
Lab11-2	62	61	123	1	0.0000	0.6745
Lab12-1	62	63	125	-1	2.6980	-2.0235
Lab12-2	62	61	123	1	0.0000	0.6745
Lab13-1	63	62	125	1	2.6980	0.6745
Lab13-2	63	63	126	0	4.0469	-0.6745
Lab14-1	62	62	124	0	1.3490	-0.6745
Lab14-2	62	61	123	1	0.0000	0.6745
Lab15-1	62	60	122	2	-1.3490	2.0235
Lab15-2	62	60	122	2	-1.3490	2.0235

No. of Results	30	30	30	30
Median	62	61	123	1
Q 1	62	61	123	0
Q 3	62	62	124	1
Inter Q Range	0	1	1	1
Normalzd IQR	0.00	0.74	0.74	0.74
Robust CV,%	0.00	1.22	0.60	148.26
Minimum	61.0	60.0	122.0	-1.0
Maximum	63.0	63.0	126.0	3.0
Range	2.0	3.0	4.0	4.0



