

DUBAI ACCREDITATION DEPARTMENT

REPORT ON 206TH LABORATORY PROFICIENCY TESTING

DETERMINATION OF COMPRESSIVE STRENGTH OF PAVING BLOCKS

Date: 28 April 2010

1. INTRODUCTION

This document presents the results of the 206th inter-laboratory proficiency-testing program conducted during the month of March – April involving the determination of **Compressive Strength of Paving Blocks** with twenty two 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 and to ensure the competent of accredited and registered laboratories operating in Dubai as a requirement of the law no. 2/2010 and ISO/IEC 17011: 2004. Also laboratories from other emirates and from GCC were participated in this scheme.

2. EXPERIMENTAL DESIGN

2.1 Reliability of Samples:

DAC had ensured the reliability of the samples prior to their distribution to the participating laboratories by taking the paving blocks from the same lot to ensure that all samples are from the same source and having similar conditions, moreover, the samples/specimens were taken from the lot number 11630118, this lot has been certified by Dubai Central Laboratory as per the report no.195021 and certificate no. 2011006156 dated 27/03/2011.

2.2 Participants:

Thirty one laboratories were participated in this scheme including:

- Two governmental laboratories.
- Fourteen are private laboratories operating in Dubai including accredited and registered laboratories.
- One private laboratory is from other Abu Dhabi.
- Two laboratories are from Qatar.
- Two laboratories are from Oman.
- One laboratory is from Bahrain

رؤيتنا: بناء مدينة متميزة تتوفر فيها الرفاهية العيش ومقومات النجاح.
Our Vision : To create an excellent city that provides the essence of success and comfort of living.

ص.ب. 67 ، دبي، إ.ع.م ، Dubai, UAE هاتف : +9714 221 5555 ، فاكس : +9714 224 6666 ، تليكس: 45688 بلدية إم ، Telex: 45688 Baladya EM
E-mail : info@dm.gov.ae / Website : www.dm.gov.ae

DUBAI ACCREDITATION DEPARTMENT

2.3 Samples Tested:

One (1) sample of Rectangular Shape Paving Block red color 200*100*60 mm size consists of 10 specimens were distributed to all participating laboratories

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 as per: BS 6717:1993 Part 1 Annex A & B), also all participants were instructed to conduct the test in the same day to ensure that the conditions of the tested specimens are the same.

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 average of 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

After evaluating the Z-Score, the test results from all participating laboratories are found within the Z-score limits of ± 3 , therefore, all the results are acceptable.

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 DEPARTMENT

However, participating laboratories which 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 ---

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.

ص.ب. 67 ، دبي، إ.ع.م ، Dubai, UAE هاتف : +9714 221 5555 ، فاكس : +9714 224 6666 ، تليكس: 45688 بلدية إم . Telex: 45688 Baladya EM
E-mail : info@dm.gov.ae / Website : www.dm.gov.ae

Determination of Compressive Strength of Paving Blocks

Appendix A: Raw Data

Compressive Strength of Paving Blocks

Lab #	1	2	3	4	5	6	7	8	9	10	Ave
Lab G01	52.30	53.50	54.80	50.60	58.10	57.30	50.70	49.10	53.10	61.10	54
Lab EX17	56.40	65.00	70.20	56.80	48.40	58.80	48.40	54.50	58.90	50.40	57
Lab 39	48.90	61.30	45.20	50.20	62.00	60.80	54.90	52.50	49.60	55.70	54
Lab 21	58.80	69.40	59.00	48.40	57.30	63.20	59.50	52.20	50.90	58.50	58
Lab 9	63.60	53.60	51.10	68.30	54.90	55.20	55.80	54.60	53.70	52.60	56
Lab 28	56.40	56.20	55.30	55.30	56.60	56.90	55.20	55.30	55.90	56.50	56
Lab 23	45.00	50.50	62.90	58.40	60.40	52.70	49.50	47.30	53.90	46.90	53
Lab 57	62.19	52.88	51.77	56.77	52.13	58.32	59.83	53.37	57.25	56.34	56
Lab EX14	49.60	55.60	44.30	57.80	57.20	58.80	58.40	62.70	60.60	51.30	56
Lab 58	62.60	46.20	70.10	69.20	56.90	53.50	56.40	47.40	56.20	59.90	58
Lab EX16	61.30	46.00	56.60	47.70	55.00	45.90	45.80	51.80			51
Lab 84	57.20	66.40	51.20	44.00	48.90	52.60	55.00	49.70	56.00	62.00	54
Lab 66	55.00	63.00	64.00	62.00	58.00	55.00	56.00	59.00	56.00	59.00	59
Lab 67	59.00	55.00	61.00	51.00	47.00	55.00	51.00	58.00	52.00	52.00	54
Lab 74	54.10	55.30	54.30	59.40	56.20	55.50	54.30	61.20	60.10	59.90	57
Lab 79	57.80	53.50	59.20	58.20	55.60	54.30	59.30	53.50	56.40	54.90	56
Lab EX10	54.50	60.20	60.80	67.00	61.50	52.10	47.60	53.50	55.10	60.40	57
Lab 89	58.10	56.20	59.00	56.10	57.10	53.90	52.00	57.00	58.10	58.10	57
Lab 2	53.90	47.60	50.30	61.70	57.00	47.90	49.20	43.10	48.50	51.40	51
Lab EX18	66.00	54.80	57.20	55.60	63.00	55.60	56.10	64.00	55.90	66.60	59
Lab EX1	57.20	60.70	62.20	54.90	54.60	53.70	53.20	56.20	54.30	58.50	57
Lab EX4	51.30	54.90	58.80	51.30	56.00	52.30					54

Determination of Compressive Strength of Paving Blocks

Appendix B: Calculation of z-scores and other statistics

Iteration	0		1		2		3		4		5		6		Z Score
$\delta = 1.5 s^*$	---	xi-x*	4.45	(xi-x*) ²	3.66	(xi-x*) ²	3.52	(xi-x*) ²	3.47	(xi-x*) ²	3.45	(xi-x*) ²	3.44	(xi-x*) ²	
$x^* - \delta$	---		51.55		52.02		52.21		52.28		52.30		52.31		
$x^* + \delta$	---		60.45		59.35		59.25		59.22		59.20		59.20		
Lab 2	51	5.00	51.55	17.10	52.02	13.74	52.21	12.52	52.28	12.08	52.30	11.92	52.31	11.86	-2.07
Lab EX16	51	5.00	51.55	17.10	52.02	13.74	52.21	12.52	52.28	12.08	52.30	11.92	52.31	11.86	-2.07
Lab 23	53	3.00	53.00	7.22	53.00	7.45	53.00	7.54	53.00	7.58	53.00	7.59	53.00	7.59	-1.20
Lab 39	54	2.00	54.00	2.84	54.00	2.99	54.00	3.05	54.00	3.07	54.00	3.08	54.00	3.08	-0.77
Lab 67	54	2.00	54.00	2.84	54.00	2.99	54.00	3.05	54.00	3.07	54.00	3.08	54.00	3.08	-0.77
Lab 84	54	2.00	54.00	2.84	54.00	2.99	54.00	3.05	54.00	3.07	54.00	3.08	54.00	3.08	-0.77
Lab EX4	54	2.00	54.00	2.84	54.00	2.99	54.00	3.05	54.00	3.07	54.00	3.08	54.00	3.08	-0.77
Lab G01	54	2.00	54.00	2.84	54.00	2.99	54.00	3.05	54.00	3.07	54.00	3.08	54.00	3.08	-0.77
Lab 28	56	0.00	56.00	0.10	56.00	0.07	56.00	0.06	56.00	0.06	56.00	0.06	56.00	0.06	0.11
Lab 57	56	0.00	56.00	0.10	56.00	0.07	56.00	0.06	56.00	0.06	56.00	0.06	56.00	0.06	0.11
Lab 79	56	0.00	56.00	0.10	56.00	0.07	56.00	0.06	56.00	0.06	56.00	0.06	56.00	0.06	0.11
Lab 9	56	0.00	56.00	0.10	56.00	0.07	56.00	0.06	56.00	0.06	56.00	0.06	56.00	0.06	0.11
Lab EX14	56	0.00	56.00	0.10	56.00	0.07	56.00	0.06	56.00	0.06	56.00	0.06	56.00	0.06	0.11
Lab 74	57	1.00	57.00	1.73	57.00	1.61	57.00	1.57	57.00	1.56	57.00	1.55	57.00	1.55	0.54
Lab 89	57	1.00	57.00	1.73	57.00	1.61	57.00	1.57	57.00	1.56	57.00	1.55	57.00	1.55	0.54
Lab EX1	57	1.00	57.00	1.73	57.00	1.61	57.00	1.57	57.00	1.56	57.00	1.55	57.00	1.55	0.54
Lab EX10	57	1.00	57.00	1.73	57.00	1.61	57.00	1.57	57.00	1.56	57.00	1.55	57.00	1.55	0.54
Lab EX17	57	1.00	57.00	1.73	57.00	1.61	57.00	1.57	57.00	1.56	57.00	1.55	57.00	1.55	0.54
Lab 21	58	2.00	58.00	5.35	58.00	5.16	58.00	5.08	58.00	5.05	58.00	5.04	58.00	5.04	0.98
Lab 58	58	2.00	58.00	5.35	58.00	5.16	58.00	5.08	58.00	5.05	58.00	5.04	58.00	5.04	0.98
Lab 66	59	3.00	59.00	10.98	59.00	10.70	59.00	10.59	59.00	10.55	59.00	10.53	59.00	10.53	1.41
Lab EX18	59	3.00	59.00	10.98	59.00	10.70	59.00	10.59	59.00	10.55	59.00	10.53	59.00	10.53	1.41
Average	55.64		55.69	97.42	55.73	90.03	55.75	87.35	55.75	86.37	55.75	86.02	55.76	85.89	
SD	2.26		2.15	4.64	2.07	4.29	2.04	4.16	2.03	4.11	2.02	4.10	2.02	4.09	
New x*	56	2.00	55.69	2.15	55.73	2.07	55.75	2.04	55.75	2.03	55.75	2.02	55.76	2.02	
New s*	2.97		2.44		2.35		2.31		2.30		2.30		2.29		

N 22

Target value	56
--------------	----

Low Acceptable	49
----------------	----

High Acceptable	63
-----------------	----

Acceptable Range	49 - 63
------------------	---------

Determination of Compressive Strength of Paving Blocks

Appendix C:Charts

