



REF: 812/02/02/1/692 .

DATE: 14 December 2006

ATTENTION: LAB MANAGER

SUBJECT: 146th INTER-LABORATORY PROFICIENCY TESTING PROGRAM

We are pleased to present the results of the 146th Inter-laboratory Proficiency Testing Program involving the determination of Dry Density Moisture Content relationship in sand samples.

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 Mrs. Raniah (Tel. No. 3027069) 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 (Mrs. Raniah El Dili in the administration building on the second floor office no. 310).

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

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 146th Inter-Laboratory Proficiency Testing Dry Density-Moisture Content Relationship

13 December 2006

1. INTRODUCTION

This document presents the results of the 146th inter-laboratory proficiency-testing program conducted during the months of September - October 2006, involving the determination of the dry density-moisture content relationship of sand samples according to BS 1377:1990:Part 4: clause 3.5.4.2, AMD 13925-2002.

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 samples consisted of sand materials collected from two different sources. The sample specifications were such that the expected test results from one source is different than that of the other. The samples were thoroughly mixed using mechanical means in order to ensure homogeneity.

From one source, 30 samples of approximately 25 kg each were collected using standard sampling procedure for sand. Similarly from the other source, another 30 samples were also collected. The samples were randomly distributed to the fifteen participating laboratories with each participant receiving four samples, (two from each source). 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:

- BS 1377:1990: Part 4: clause 3.5.4.2, AMD 13925-2002.



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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

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

6.2 CALCULATIONS OF Z- SCORES

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

6.3 OUTLIERS RESULTE

After evaluating the z-scores, the following results were considered outliers:

Test Parameter	Labs with outlier results	Type of Outlier
1. Optimum moisture content	Lab 2-2 Lab 3 -1 Lab 3 -2 Lab 6 -2 Lab 8 -1 Lab 8 -2 Lab 11-2 Lab 13 -1 Lab 13 -2 Lab 14 -2	Between Labs
2. Maximum Dry Density	Lab 1 -2 Lab 3 -1 Lab 3 -2 Lab 8 -1 Lab 8 -2	Between Labs
	Lab 2 -1 Lab 2 -2	Within Labs



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The test results provided by the above mentioned laboratories are outside the Z-score limits of ± 3 and identified as outliers. The above mentioned laboratories are requested to investigate the root cause of the outlier results, implement corrective action and email a report within 2 weeks to the head of the Accreditation Decisions Section of 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 data

Optimum moisture content,(%)

Lab#	Sample1	Sample2	Sample3	Sample4
Lab 1	10.20	10.20	12.00	12.00
Lab 2	11.00	11.00	11.00	12.00
Lab 3	10.00	9.80	11.00	11.00
Lab 4	9.90	9.70	12.00	12.00
Lab 5	10.00	10.00	12.00	12.00
Lab 6	10.00	11.00	12.00	12.00
Lab 7	10.00	10.00	12.00	12.00
Lab 8	10.00	10.00	11.00	11.00
Lab 9	10.00	10.00	12.00	12.00
Lab 10	10.00	10.00	12.00	12.00
Lab 11	10.00	11.00	12.00	12.00
Lab 12	10.00	10.00	12.00	12.00
Lab 13	11.00	11.00	12.00	12.00
Lab 14	10.00	11.00	12.00	12.00
Lab 15	9.80	10.00	12.00	12.00

Maximum dry density,(%)

Lab#	Sample1	Sample2	Sample3	Sample4
Lab 1	1.96	1.97	1.83	1.83
Lab 2	1.94	1.93	1.84	1.83
Lab 3	1.97	1.96	1.84	1.84
Lab 4	1.95	1.94	1.82	1.82
Lab 5	1.95	1.95	1.82	1.82
Lab 6	1.95	1.95	1.81	1.81
Lab 7	1.95	1.95	1.82	1.82
Lab 8	1.94	1.93	1.80	1.81
Lab 9	1.95	1.95	1.81	1.81
Lab 10	1.95	1.95	1.82	1.82
Lab 11	1.95	1.95	1.82	1.82
Lab 12	1.95	1.95	1.82	1.82
Lab 13	1.95	1.95	1.82	1.82
Lab 14	1.96	1.95	1.82	1.81
Lab 15	1.95	1.94	1.82	1.82

Appendix B: Calculation of z-scores

Optimum moisture content,(%)

Result#	S1 S2	S3 S4	S1+S3 S2+S4	S1-S3 S2-S4	Between Labs z- score	Within Labs z- score
Lab1-1	10.20	12.00	22.20	-1.80	1.7986	0.2698
Lab1-2	10.20	12.00	22.20	-1.80	1.7986	0.2698
Lab2-1	11.00	11.00	22.00	0.00	0.0000	2.6980
Lab 2-2	11.00	12.00	23.00	-1.00	8.9932	1.3490
Lab 3-1	10.00	11.00	21.00	-1.00	-8.9932	1.3490
Lab 3-2	9.80	11.00	20.80	-1.20	-10.7919	1.0792
Lab 4-1	9.90	12.00	21.90	-2.10	-0.8993	-0.1349
Lab 4-2	9.70	12.00	21.70	-2.30	-2.6980	-0.4047
Lab 5-1	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 5-2	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 6-1	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 6-2	11.00	12.00	23.00	-1.00	8.9932	1.3490
Lab 7-1	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 7-2	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 8-1	10.00	11.00	21.00	-1.00	-8.9932	1.3490
Lab 8-2	10.00	11.00	21.00	-1.00	-8.9932	1.3490
Lab 9-1	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 9-2	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 10-1	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 10-2	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 11-1	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 11-2	11.00	12.00	23.00	-1.00	8.9932	1.3490
Lab 12-1	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 12-2	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 13-1	11.00	12.00	23.00	-1.00	8.9932	1.3490
Lab 13-2	11.00	12.00	23.00	-1.00	8.9932	1.3490
Lab 14-1	10.00	12.00	22.00	-2.00	0.0000	0.0000
Lab 14-2	11.00	12.00	23.00	-1.00	8.9932	1.3490
Lab 15-1	9.80	12.00	21.80	-2.20	-1.7986	-0.2698
Lab 15-2	10.00	12.00	22.00	-2.00	0.0000	0.0000

No. of Results	30	30	30	30
Median	10.00	12.00	22.00	-2.00
Q 1	10.000	12.000	22.000	-2.000
Q 3	10.200	12.000	22.150	-1.000
Inter Q Range	0.200	0.000	0.150	1.000
Normalzd IQR	0.148	0.000	0.111	0.741
Robust CV,%	1.483	0.000	0.505	-37.065
Minimum	9.70	11.00	20.80	-2.30
Maximum	11.00	12.00	23.00	0.00
Range	1.30	1.00	2.20	2.30

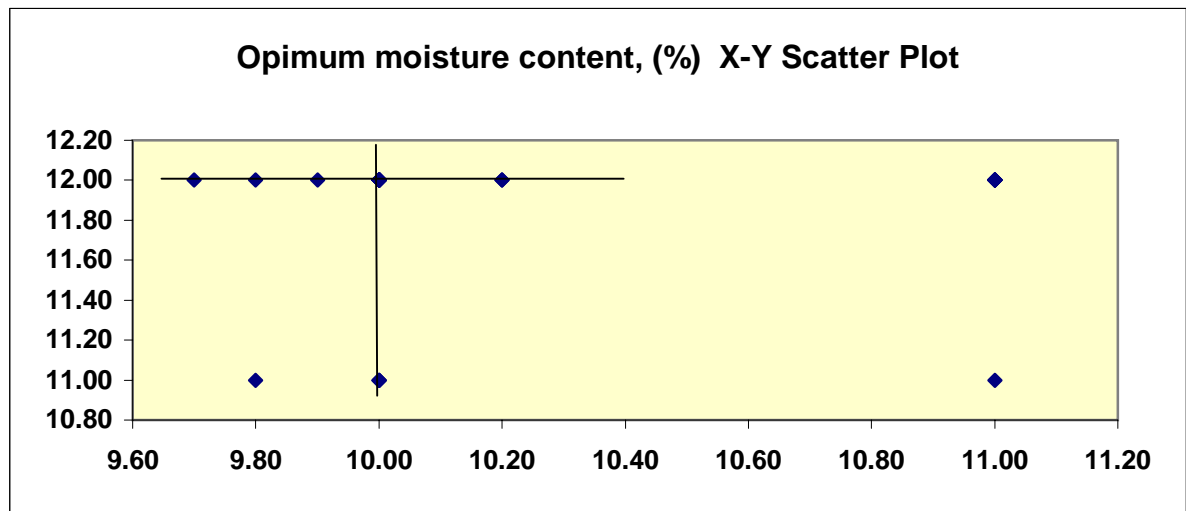
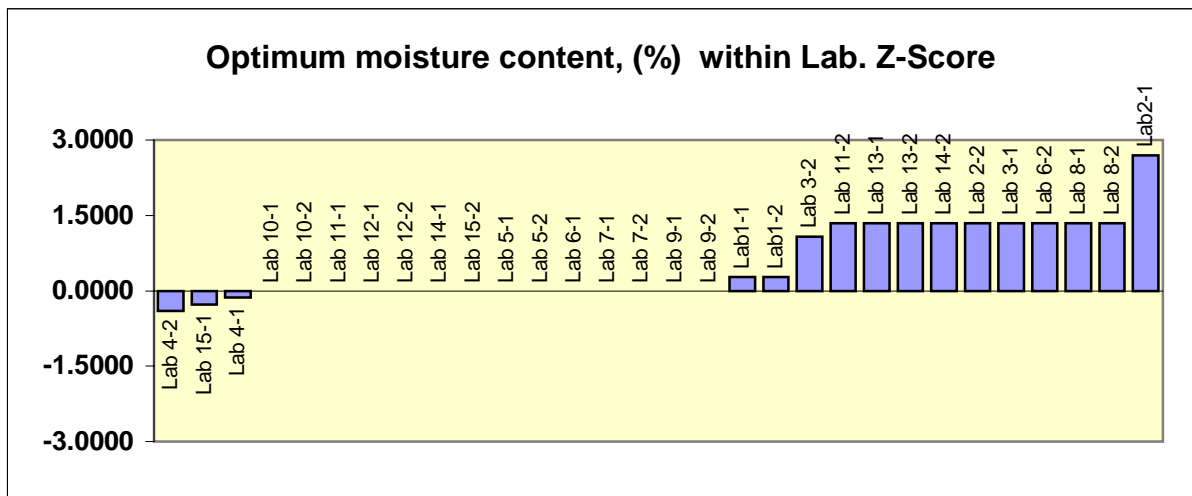
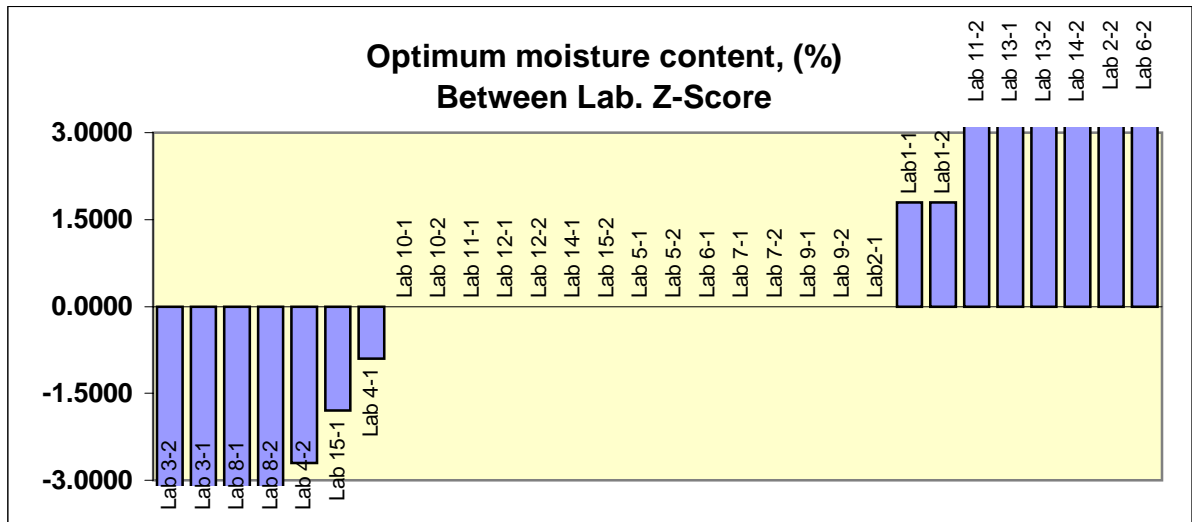
Appendix B: Calculation of z-scores

Maximum dry density , (%)

Result#	S1 S2	S3 S4	S1+S3 S2+S4	S1-S3 S2-S4	Between Labs z- score	Within Labs z- score
Lab 1-1	1.96	1.83	3.79	0.13	2.6980	0.0000
Lab1-2	1.97	1.83	3.80	0.14	4.0469	1.7986
Lab 2-1	1.94	1.84	3.78	0.10	1.3490	-5.3959
Lab 2-2	1.93	1.83	3.76	0.10	-1.3490	-5.3959
Lab 3-1	1.97	1.84	3.81	0.13	5.3959	0.0000
Lab 3-2	1.96	1.84	3.80	0.12	4.0469	-1.7986
Lab 4-1	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 4-2	1.94	1.82	3.76	0.12	-1.3490	-1.7986
Lab 5-1	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 5-2	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 6-1	1.95	1.81	3.76	0.14	-1.3490	1.7986
Lab 6-2	1.95	1.81	3.76	0.14	-1.3490	1.7986
Lab 7-1	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 7-2	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 8-1	1.94	1.80	3.74	0.14	-4.0469	1.7986
Lab 8-2	1.93	1.81	3.74	0.12	-4.0469	-1.7986
Lab 9-1	1.95	1.81	3.76	0.14	-1.3490	1.7986
Lab 9-2	1.95	1.81	3.76	0.14	-1.3490	1.7986
Lab 10-1	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 10-2	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 11-1	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 11-2	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 12-1	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 12-2	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 13-1	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 13-2	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 14-1	1.96	1.82	3.78	0.14	1.3490	1.7986
Lab 14-2	1.95	1.81	3.76	0.14	-1.3490	1.7986
Lab 15-1	1.95	1.82	3.77	0.13	0.0000	0.0000
Lab 15-2	1.94	1.82	3.76	0.12	-1.3490	-1.7986

No. of Results	30	30	30	30
Median	1.95	1.82	3.77	0.13
Q 1	1.950	1.820	3.760	0.130
Q 3	1.950	1.820	3.770	0.138
Inter Q Range	0.000	0.000	0.010	0.008
Normalzd IQR	0.000	0.000	0.007	0.006
Robust CV,%	0.000	0.000	0.197	4.277
Minimum	1.93	1.80	3.74	0.10
Maximum	1.97	1.84	3.81	0.14
Range	0.04	0.04	0.07	0.04

Appendix C: Charts



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