DUBAI ACCREDITATION DEPARTMENT

REPORT ON PTP – 171 INTER- COMPARISON "CONVENTIONAL MASS"

30 December 2009

1. INTRODUCTION

Since Inter-Laboratory Comparisons (ILC) for calibration laboratories are a valuable means for evaluating the quality of a lab's calibration results. Calibration laboratories usually welcome such ILC's as they offer a unique chance to verify their results together with their uncertainty calculation.

This strengthens the confidence among the national calibration services, the confidence of the laboratory in its own measurements and the confidence of the customers in the services offered by the lab.

This document presents the results of 171 inter-laboratory proficiency calibration program conducted during the year of 2009 involving the measured unit of mass. The participants were two laboratories accredited by Dubai Accreditation Department (DAC).

.2. GENERAL INFORMATION

2.1 Organization

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 calibration results of laboratories operating in Dubai as a requirement of the Local Order 52/1990 and ISO/IEC 17011: 2004.

2.2 Reporting

DAC has to evaluate the results and issuing the final report which will be published on its website and communicated to the participants.

2.3 Pilot / Reference laboratory

Dubai Central Laboratory was given the function of the reference laboratory (RL). The four weights were calibrated at DCL before and after circulation to the participants

2.4 Circulated Devices

DAC decided to circulate four weights of OIML class E2, of nominal values 5 mg, 500 mg, 1 g and 10 g.

2.5 Task

The task for the inter-comparison was the determination of the *Conventional Mass c m* or the *Conventional Mass error of the weight with respect to the nominal value* Δm_c of the four weight pieces.

The standard calibration procedure substitution method with air buoyancy correction was used by the reference laboratory and the participants, and accredited best measurement capability (BMC) should be used. The result, of the conventional mass and the uncertainty of the calibration had to be presented like in a regular calibration certificate.

2.6 Participants:

Dubai Central Laboratory was given the function of the reference laboratory (RL), two private registered calibration laboratories participated in this program which is organized for the first time one of the participants report was rejected because the laboratory failed to conduct the calibration for class E2, therefore, only one laboratory found to be capable to conduct the calibration of such artefacts.

3. EVALUATION OF LABORATORY PERFORMANCE

The results of the inter-comparison measurement, the conventional mass of the four weights and the uncertainties ($k = 2$), for the sets DCL 1 and DCL 2 are compiled in Table 1 and Table 2 respectively. For all results the E_n – value the standardize deviation has been calculated. For a result to be acceptable the E_n ratio (also called E_n number) should be between -1 and + 1 i.e. less than 1 (the closer to zero the better).

$$E_n = \frac{\Delta m_{c,L} - \Delta m_{c,RL}}{\sqrt{U^2_{lab} + U^2_{RL}}}$$

Where Δm_c are the measured Conventional Mass errors, U the 95-%- uncertainties and indices "L" for participating lab and "RL" for the reference laboratory.

4. SUMMARY OF RESULT VALUES IN DETAIL

4.1 5 mg - Piece

Lab	$m_{c,L} - m_{c,RL}$	U (k = 2)	E_n
DCL	0.000001	0.008	
INSP.	0.000006	0.009	0.0006
DCL	0.000001	0.004	

4.2 500 mg – Piece

Lab	$m_{c,L} - m_{c,RL}$	U (k = 2)	E_n
DCL	0.000011	0.009	
INSP.	- 0.000013	0.011	- 0.001
DCL	0.000016	0.005	

4.3 1 gm – Piece

Lab	$m_{c,L} - m_{c,RL}$	U (k = 2)	E_n
DCL	0.000001	0.011	
INSP.	- 0.000003	0.011	- 0.0002
DCL	0.000001	0.005	

4.4 10 g – Piece

Lab	$m_{c,L} - m_{c,RL}$	U (k = 2)	E_n
DCL	- 0.000004	0.012	-
INSP.	0.000012	0.017	0.0006
DCL	- 0.000004	0.010	-

5. GRAPHIC OF THE RESULTS

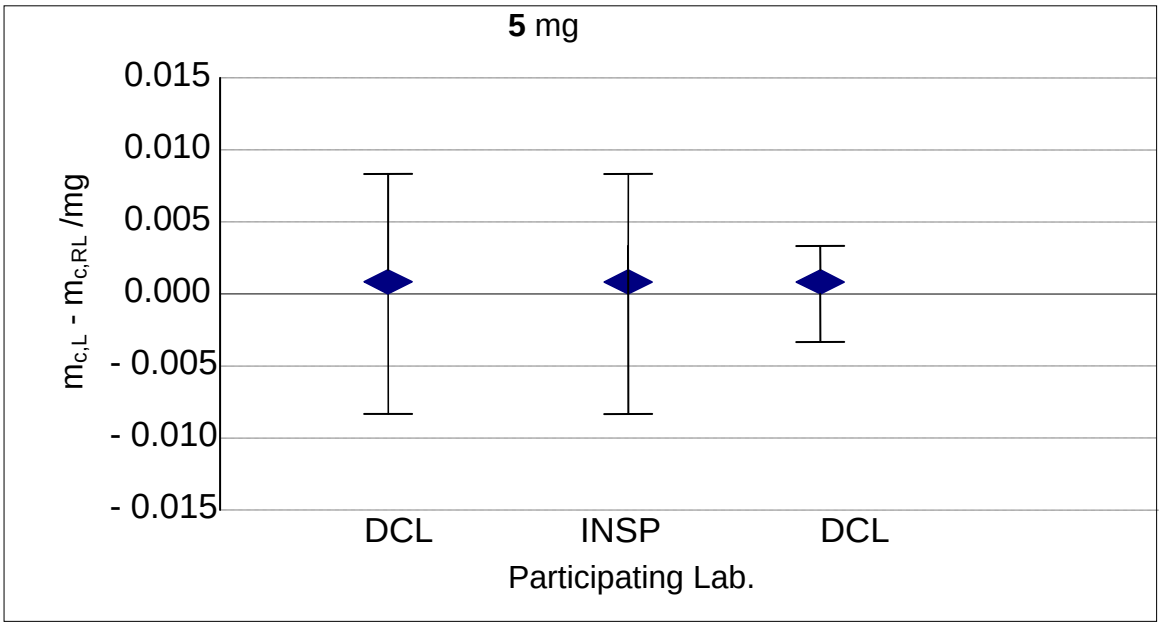

Figure 1: the result for the 5 mg - piece

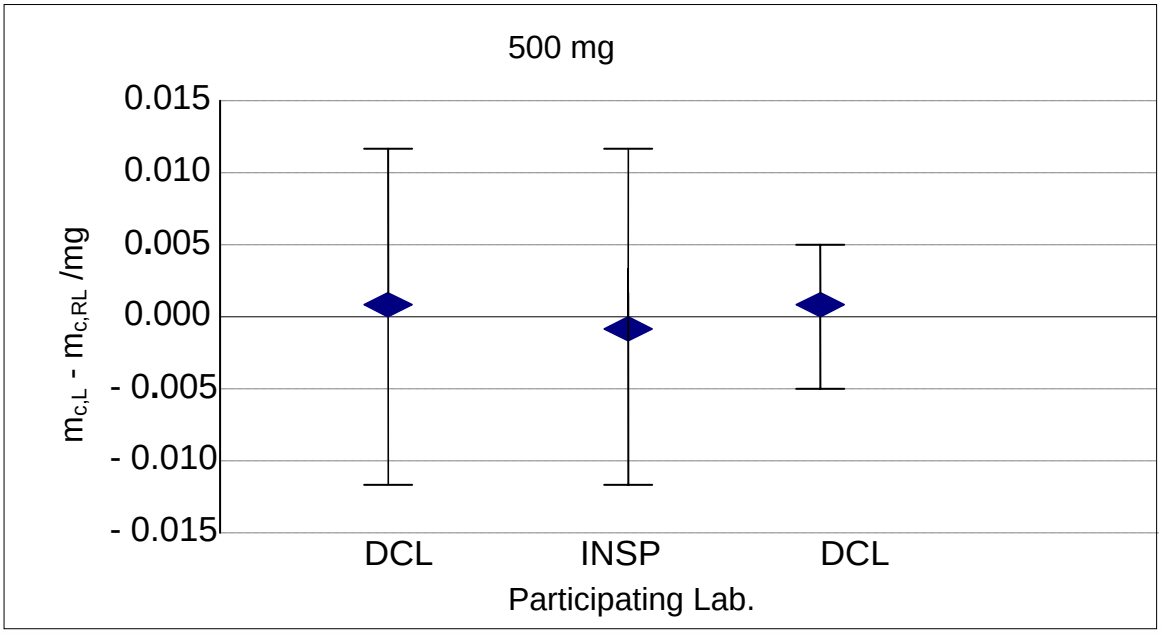

Figure 2: the result for the 500 mg - piece

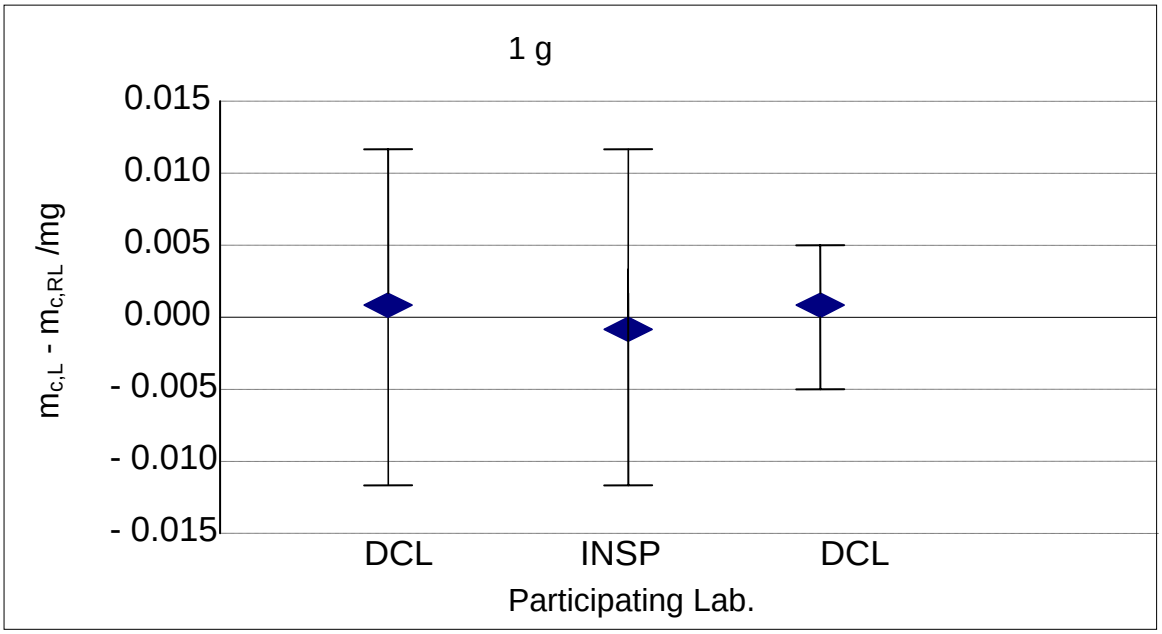

Figure 3: the result for the 1 g - piece

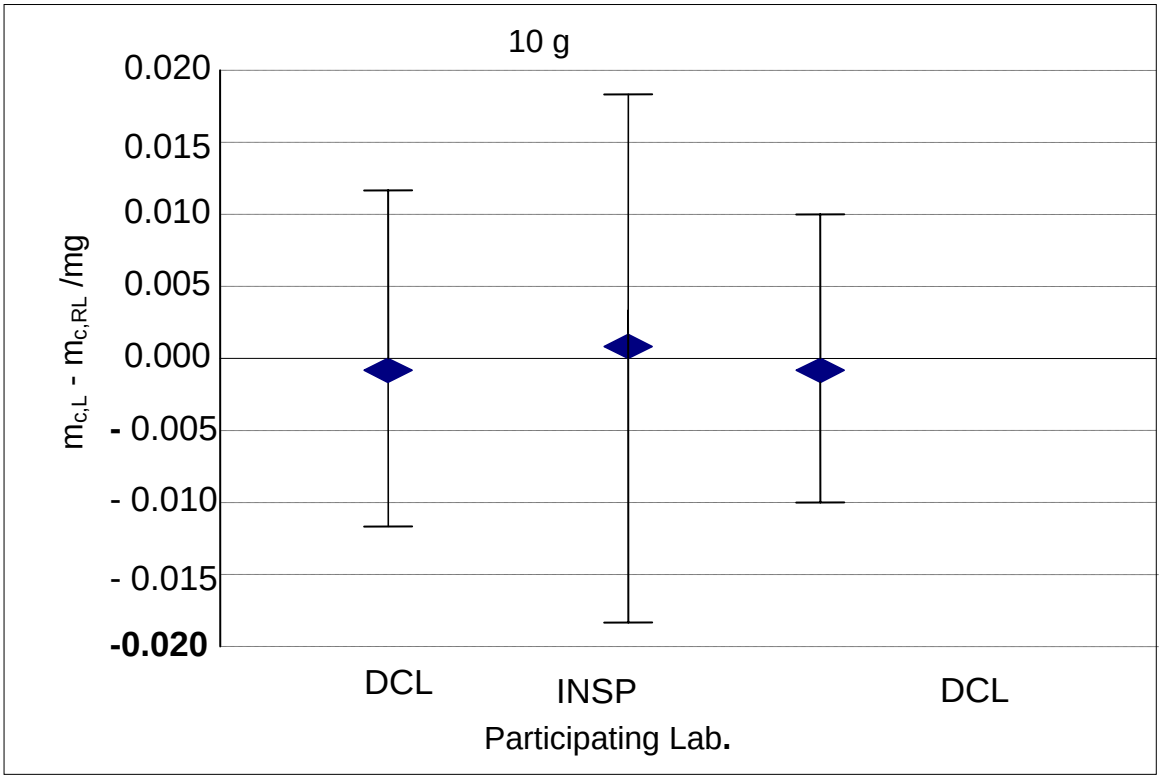

Figure 4: the result for the 10 g - piece

6. CONCLUSION

The results of deviation E_n are listed in the tables under summary of results, also measurement results are displayed in graphical form with bars displaying the uncertainty (k=2) in figure 1 through 4. None of the results is larger than the critical value of 1.0. Moreover, the values are very small which confirms excellent agreement of the results and this reflects the competence of both participating laboratories.

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