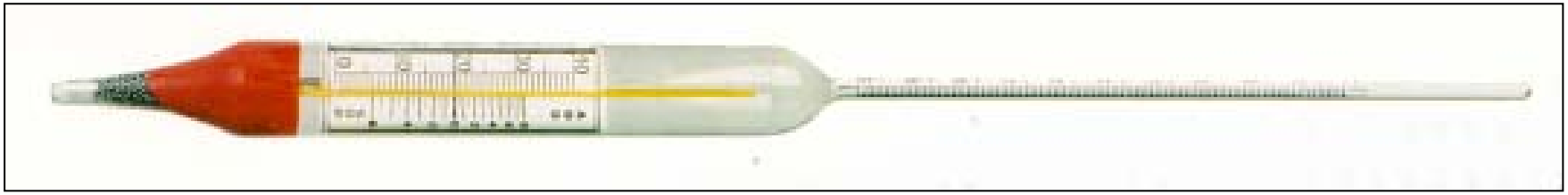
COMPARISON OF CALIBRATION OF HYDROMETERS FOR LIQUID DENSITY DETERMINATION BETWEEN SIM LABORATORIES



CENAM
CENTRO NACIONAL DE METROLOGÍA

Luis Omar Becerra

Workshop on Hydrometer Calibration
21 -23 November, 2006

CCM KEY COMPARISONS ON DENSITY FIELD

CCM.D.-K1	Density measurement of a silicon sphere 2001-2003
CCM.D-K2	Liquid density standards 2004 – 2005
CCM.D-K3	Density of solids, volume of stainless steel weights (planned)
CCM.D-K4	Calibration of Hydrometers (planned)

EUROMET SUPPLEMENTARY AND KEY COMPARISONS ON DENSITY FIELD

EUROMET.M.D-K1	Volume and density of three ceramic spheres 1998-1999
EUROMET.M.D-K2	Density of Liquids 2001-2002
EUROMET.M.D.K4	Comparisons of the calibrations of high resolution hydrometers for liquid density determination 2003-2005
EUROMET.M.D.K4. PREV	Hydrometers comparison for liquid density determination 1993-1994

SIM SUPPLEMENTARY AND KEY COMPARISONS ON DENSITY FIELD

SIM.7.? Density of Solids, volume of stainless steel weights (planned)

SIM.7.? Calibration of Hydrometers (planned)

COMPARISON OF THE CALIBRATIONS OF HYDROMETERS FOR LIQUID DENSITY DETERMINATION BETWEEN SIM LABORATORIES

The comparison is intended to be a regional key comparison according to the Mutual Recognition Arrangements. It should also support provisional entries for the CMC tables in this sub-field and anticipate the planned CMC key comparison on hydrometers CCM.D.K-4.

The protocol of this comparison is following the guidelines of the Euromet project 702 “Comparison of the calibration of high resolution hydrometers for liquid density determinations” carried out in 2003-2004.

TRANSFER STANDARDS (HYDROMETERS)

	Hydrometer 1	Hydrometer 2	Hydrometer 3	Hydrometer 4
Manufacturer	Stevenson Reeves Ltd	Stevenson Reeves Ltd	Stevenson Reeves Ltd	Stevenson Reeves Ltd
Serial Number	06/346039	06/346044	06/346047	06/346048
Range	0,600 0 g/cm^3 - 0,610 0 g/cm^3	0,800 0 g/cm^3 - 0,810 0 g/cm^3	0,990 0 g/cm^3 - 1,000 0 g/cm^3	1,290 0 g/cm^3 - 1,300 0 g/cm^3
Resolution	0,000 1 g/cm^3	0,000 1 g/cm^3	0,000 1 g/cm^3	0,000 1 g/cm^3
Surface Tension:	15 mN/m	25 mN/m	35 mN/m	55 mN/m
Reference temperature	20ºC	20ºC	20ºC	20ºC
Hydrometer weight (approx.)*:	82,71 g	108,87 g	136,46 g	188,45 g
Hydrometer Length:	400 mm	400 mm	400 mm	400 mm
Diameter of the steam (approx.)*:	5 mm	3 mm	3 mm	3 mm
Diameter of the bulb (approx.):	28 mm	28 mm	28 mm	28 mm

Travelling standards - Set of hydrometers

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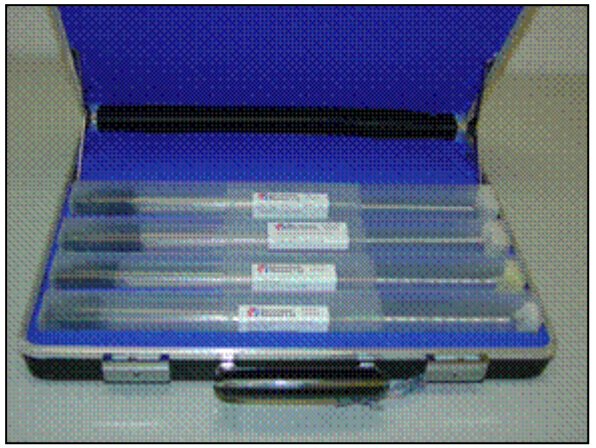
TRANSPORTATION

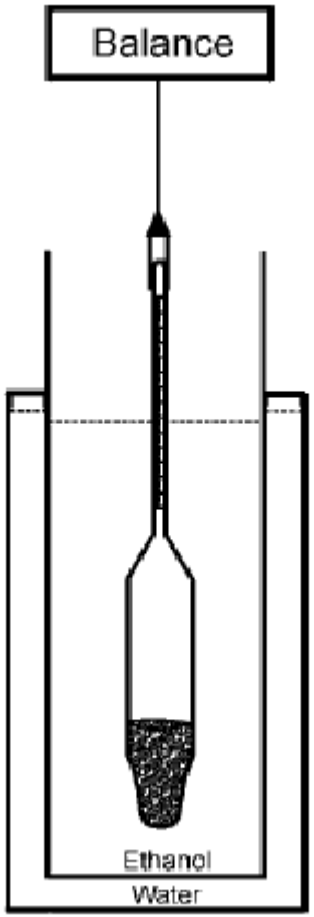
For transportation of the set of four hydrometers will be packed into a suitable container. the individual hydrometer is separately put into its original case.

The package will be transported by the personnel of the last laboratory.

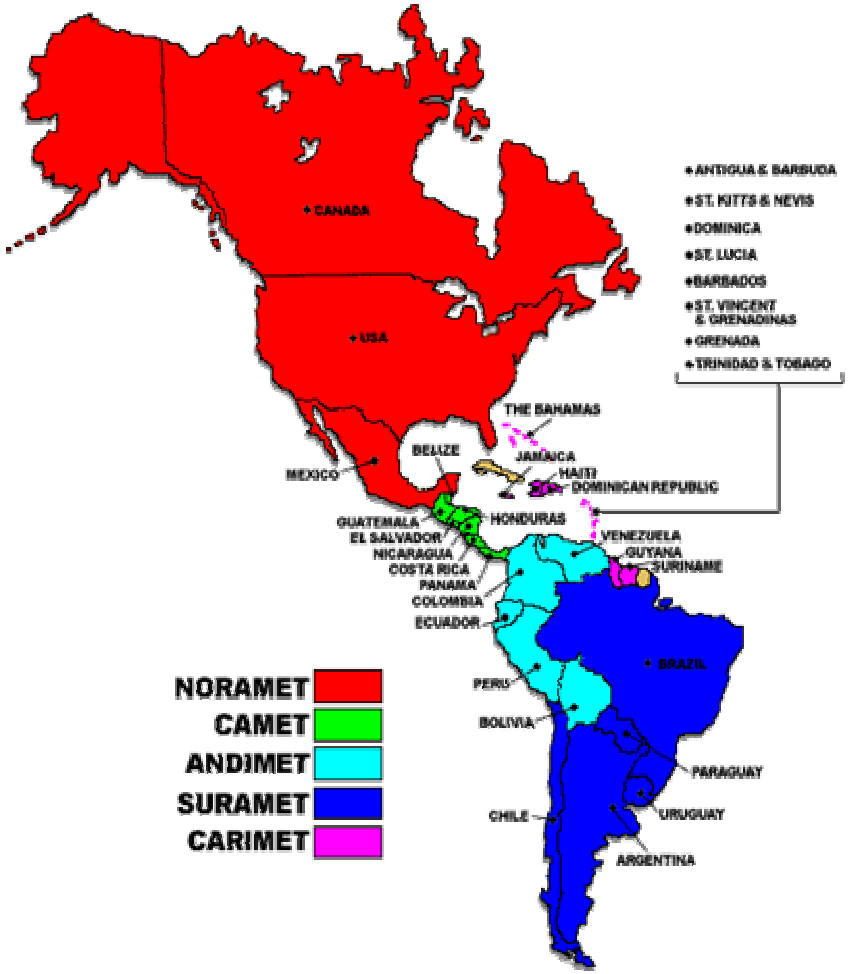


MEASUREMENTS

To determine the corrections for each individual hydrometer, the participants will be free to perform all measurements using their own procedure based on Cuckow Method



NMIs that have showed their intention to participate in the SIM Hydrometer Comparison



CENAM-Mexico

NRC-Canada

NIST-United States

CENAMEP- Panama

LACOMET-Costa Rica

INDECOPI-Peru

IBMETRO-Bolivia

LATU-Uruguay

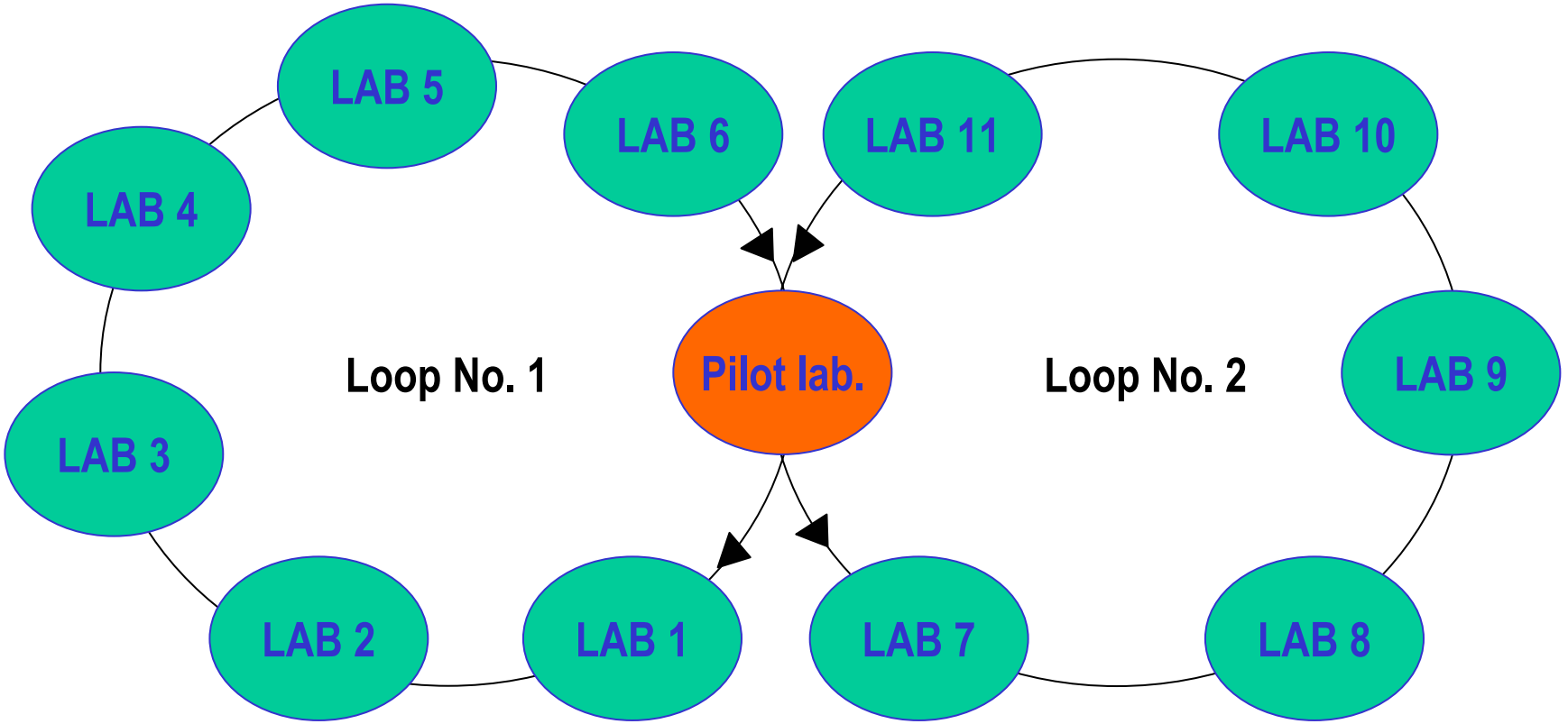
INTI-Argentina

CESMEC-Chile

INMETRO-Brazil

BSJ-Jamaica

Proposed Scheme for the hydrometers comparison



Main Problem: Fragile Travelling standards

Timetable for the comparison

February 2005	Answers to questionnaire
To be defined	Agreement on Technical Protocol
To be defined	Registration of the SIM Density Comparison
To be defined	Start of measurements (Pilot Laboratory)
To be defined	Start of measurements by all participants and Reports from all participants
To be defined	End of measurements (Pilot Laboratory)
To be defined	Draft A of comparison report: end of comparison
To be defined	Draft B of report

Circulation scheme for the comparison

Loop 1

Laboratory	Date
Pilot Lab.	To be defined
Lab 1	To be defined
Lab 2	To be defined
Lab 3	To be defined
Lab 4	To be defined
Lab 5	To be defined
Lab 6	To be defined
Pilot Lab.	To be defined

Loop 2

Laboratory	Date
Pilot Lab.	To be defined
Lab 7	To be defined
Lab 8	To be defined
Lab 9	To be defined
Lab 10	To be defined
Lab 11	To be defined
Pilot Lab.	To be defined