

Republic of the Philippines 4.2 DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS CENTRAL OFFICE

Manila

MAY 1 6 2019



SUBJECT: Revised Guidelines for the Calibration of Testing Equipment of the DPWH Implementing Offices

In order to ensure the accuracy of test results generated from testing equipment used in various DPWH Infrastructure Projects, testing equipment should be regularly calibrated based on the defined schedules and requirements for calibration as shown in Annex A.

Considering that some Regional Laboratories do not yet have the necessary calibration equipment, it is hereby directed that the Bureau of Research and Standards and those Regional Offices which have calibration equipment shall calibrate the laboratory testing equipment of the Implementing Offices of the Department indicated opposite its office as shown below, except their own laboratory.

DPWH Office to Conduct Calibration	DPWH Office/s Assigned for Calibration (including DEOs)
NCR	BRS and Region IV-A
Region I	CAR and Region III
Region II	Region I
Region III	NCR and Region II
Region V	Region VII
Region VI	, VIII
Region VII	Regions V and VI
Region X	Regions IX, XII and XIII
Region XIII	Regions X and XI
BRS	UPMO and Region IV-B

Calibration of laboratory testing equipment shall be conducted at least once a year or according to its manufacturer's operating instructions. The calibration procedures outlined in Annex B and the prescribed format (Annexes C-I), Calibration Verification Report, should be strictly observed. Only personnel with adequate training and experience in calibration works shall be assigned.

To maintain the efficiency and effectiveness of the testing equipment used in various DPWH Infrastructure projects, monitoring on the compliance to the regular calibration of all laboratory testing equipment should be performed by the concerned UPMO, Regional Office and its District Engineering Offices. The concerned UPMO, Regional and District Offices must submit to the

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respective assigned Office/s the request to conduct calibration of their laboratory testing equipment at least one (1) month before the expiration date.

This Order supersedes Department Order No. 118, Series of 2015 and shall take effect immediately.

(MARK A. VILLAR

Secretary

14.1.4 RGT/SMAV

Department of Public Works and Highways Office of the Secretary



LIST	OF EC	QUIPME	NT FOR	CALIBRA	TION
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APPARATUS	MODE OF CALIBRATION	FREQUENCY
Concrete Rebound Hammer	Using Anvil	Every 15,000
		Impact
Ultrasonic Tester For Concrete Cracks	Validation	Before Use
Skid Resistance And Friction Tester	Zeroing	Before Use
Profilometer	Self-Calibrating	Before Use
Falling Weight Deflectometer Trailer Mounted	Out-Source	Yearly
Universal Testing Machine	In-House	Yearly
Compression Machine	In-House	Yearly
California Bearing Ratio	In-House	Yearly
Balances	In-House	Yearly
Oven	In-House	Yearly
Abrasion Machine	In-House	Every Two Years
Hydrometer	In-House	Every Two Years
Furnace	In-House	Yearly
Temperature Measuring Devices	In-House	Twice A Year
Temperature Baths	In-House	Yearly
Caliper	In-House	Yearly
Sieves	In-House	Twice A Year
Viscometer	In-House	Every 3 Years
Penetrometer And Needles	In-House	Twice A Year
Ductility Apparatus	In-House	Yearly
Gyratory Compactor	Out-Source	Twice A Year
PH-Meter	In-House	Before Use
Speedy Moisture Tester	In-House	Twice A Year
Sand Cone Density Sand	In-House	As Necessary
Slump Cone Density Apparatus	In-House	Yearly
Slump Cone Apparatus	In-House	Yearly
Autoclave Apparatus	In-House	Yearly
Vicat Apparatus	In-House	Every Two Years
Mechanical Mixing Apparatus	In-House	Every Two Years
Length Comparator	In-House	Yearly
Molds	In-House	Yearly

CALIBRATION PROCEDURES FOR LABORATORY EQUIPMENT

1. PURPOSE

The purpose of this procedure is to provide a standard calibration procedure, schedule and requirements for calibration, performance verification, and maintenance of instruments and equipment.

2. SCOPE

This procedure applies to all the equipment used by the Bureau of Research and Standards (BRS); the Unified Project Management Office (UPMO); the Regional and District Offices of the Department.

3. DEFINITIONS

- **Calibration** Adjustment or standardization of the accuracy of the measuring instrument/equipment, usually by comparison with a certified reference or standard.
- **Equipment** Machines or tools used for testing construction materials incorporated in the implementation of DPWH infrastructure projects.
- **Frequency** The schedule of calibration of testing equipment.

4. FREQUENCY

Refer to Annex A.

5. EQUIPMENT

As defined on the calibration sheet and equipment specific Standard Operating Procedures for calibration. The specific equipment are listed in Annex A.

6. PROCEDURE

- 6.1 Operate the equipment in accordance with the relevant Operation Instructions.
- 6.2 Perform the equipment calibration according to the equipment specific Standard Operating Procedure.
- 6.3 Fill out form "Calibration/Verification Report" Sheet, see Annex C I.
- 6.4 Attach "Calibration Sticker" to the equipment, see Annex J and K.
- 6.5 The performance verification of the equipment (only where necessary) shall be repeated prior to routine laboratory use.
- 6.6 When external calibrations are performed, service providers that demonstrate competence, measurement capability, and traceability shall be used. Calibration certificates from the providers shall contain the measurement results, including the measurement uncertainty and/or a statement of compliance.

7. RE-CALIBRATION

- 7.1 If the calibration does not conform, repeat the procedure.
- 7.2 If the second calibration does not conform, clean and check the equipment according to the manufacturer's instructions. Then, repeat the procedure.

8. LIMITS

Calibration Instructions must be applied in accordance with the equipment specific Standard Operating Procedure. The general limit of accuracy and sensitivity will depend on the manufacturer's manual/instructions.

9. DOCUMENTATION

Document calibration results as per the attached "Calibration/Verification Report" Sheet, see Annex C – I. The Calibration records shall include:

- Identity of the item of equipment and software
- Name of manufacturer and model
- Serial number of unique Identifier (Calibration Sticker)
- Capacity, Loading range and/or sensitivity
- Date of calibration
- Current location
- Manufacturer's instructions or a reference to location
- Reference standard, certified reference material or reference material used for calibration
- Copies of all reports, results of calibration, and/or certificates of calibration
- Maintenance plan and due date for the next calibration
- Identity of the individual performing calibration

ANNEX "C"

Date:

Lab. Report No.:

CALIBRATION / VERIFICATION REPORT FOR COMPRESSION/FLEXURAL TESTING MACHINE

Name of Office:	Date of Calibration:
Office Address:	Valid Until:
Equipment/Apparatus:	Capacity:
Brand / Model:	Serial Number:

For (kN):

Calibration factor:

Applie	ed Force	Reading of Loadcell (Div) Average Reading of Loadcell		eading of Loadcell (Div) Average Reading of Loadcell (Div) Coadcell (0()		Error	Correc- tion Factor	Above 1%?	
TONS	KN	Trial 1	Trial 2	Trial 3	Div	KN	(70)	(CF)	Recommend

Remarks:

1. Calibration/verification was performed with the use of Controls Digimax Plus, Model 82-P080 I/E and a Load Cell with 2,000KN capacity in accordance to **ASTM E74 and E4.**

Calibration Performed by:		Reviewed by:		
NAME Designation	NAME Designation	NAME Designation		
Checked by:		Attested by:		
NAME Designation	n	NAME Designation Office		

ANNEX "D"

Date

Lab. Report No.:

CALIBRATION / VERIFICATION REPORT FOR CBR/MARSHALL STABILITY MACHINE

Name of Client:	Date of Calibration:	
Office Address:	Valid Until:	
Equipment/Apparatus:	Capacity:	
Brand / Model:	Serial Number:	
	Loading Range:	
For (kN):		
Calibration Factor:		

Machine Indicated	I	Reading of Loadcell (Div)				tion Factor	
Load, Div	Trial 1	Trial 2	Trial 3	Average	kN/Division	Lbs/Div	Average
						<u> </u>	
						· · ·	
		ľ				· · · · · · · · · · · · · · · · · · ·	lbs/div
						· · · · ·	1
						· · · · ·	
							1
							Kg/Div
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Remarks:

1. Calibration/verification was performed with the use of Controls Digimax Plus, Model 82-P080 I/E and a Load Cell with ____ KN capacity in accordance to **ASTM E74-06.**

Calibration Performed By:		Reviewed by:
NAME Designation	NAME Designation	NAME Designation
Checked by:		Attested by:
NAI Desigr	ME nation	NAME Designation Office

ANNEX "E"

Date:

Lab. Report No.:

CALIBRATION / VERIFICATION REPORT FOR ABRASION SPHERES

Name of Client:	Date of Calibration:
Office Address:	Valid Until:
Equipment/Apparatus:	Capacity:
Brand Model:	Serial Number:

Charges (No. of	STEEL SPHERES						
Charges (No. of Sphoros)	Diameter in M	illimeter (mm)	Weight in Grams (g)				
Splieles)	Actual	Standard (approx.)	Actual		Standard		
#1		46.80		Grading	# of Spheres	Weight:	
#2		46.80		A	12	5000±25 g	
#3		46.80		В	11	4584±25 g	
#4		46.80		С	8	3330±20 g	
#5		46.80		D	6	2500±15 g	
#6		46.80		Average mass	of individual:	416 g	
#7		46.80		Steel spheres or	ball bearings 46	.0 mm [113/16	
#8		46.80		in.] and 47.6 mm	1 [17/8 in.] in di	ameter, having	
#9		46.80		respectively are	readily available	a steel snheres	
#10		46.80		or ball bearings 46.8 mm [127/32 in.] diameter having a mass of approximately 420			
#11		46.80					
#12		46.80		may also be obta	inable.		
Ave size in mm		Total Weight in					
ave. size in mm:		Grams:					

Remarks:

1. Calibration/verification was performed by using the standard procedure based on **ASTM C535-89**.

Calibration Performed by:		Reviewed by:
NAME Designation	NAME Designation	NAME Designation
Checked by:		Attested by:
NAME Designat	ion	NAME Designation Office

ANNEX "F"

Date:

Lab. Report No.:

CALIBRATION / VERIFICATION REPORT FOR LABORATORY OVEN

Name of Client:	Date of Calibratic	on:
Office Address:	Valid Until:	
Equipment/Apparatus:	Capacity:	
Brand / Model:	Serial Number:	
-		

Oven Indicated Reading	Thermometer Reading	Temperature Error	Thermostat Reading	IMPORTANT:
°C	°C	°C	Correction (±)	If the thermometer reading is within
				± 5 °C of the thermostat reading, the
				calibration procedure is completed. If
				the thermometer reading differs from
				$5 ^{\circ}$ C, or if a more stringent calibration
				is desired, ASTM E145 is to be
				consulted.

Remarks:

1. Calibration/verification was performed with the use of Armoured Thermometer with a capacity of $_$ °C.

Calibration Performed by:		Reviewed by:
NAME Designation	NAME Designation	NAME Designation
Checked by:		Attested by:
NAME Designation		NAME Designation Office

ANNEX "G"

Date

Lab. Report No.:

CALIBRATION / VERIFICATION REPORT FOR LABORATORY SCALES/BALANCES

Name of Client:	Date of Calibration:	
Office Address:	Valid Until:	
Equipment/Apparat	Capacity:	
Brand / Model:	Serial Number:	

Standard / Test Weights	Actual Reading	Error	Error	
Gram (g)	Gram (g)	Gram (g)	Percent	Tolerance, g

Remarks:

1. Calibration/verification was performed with the use of a set of OHAUS standard weights as per ASTM E 1, E 145 and E617.

Calibration Performed by:		Reviewed by:	
NAME Designation	NAME Designation	NAME Designation	
Checked by:		Attested by:	
NA I Desigr	ME nation	NAME Designation Office	

ANNEX "H"

May 27, 2019

Lab. Report No.:

CALIBRATION / VERIFICATION REPORT FOR CALIPER

Name of Client:	Date of Calibration:	
Office Address:	Valid Until:	
Equipment/Apparatus:	Capacity:	
Brand / Model:	Serial Number:	
	Sensitivity:	

Standard Length	Measured Reading	Error	Percent	Max. Allow.
(mm)	Length (mm)	Gram (g)	(%)	Tolerance, mm

Remarks:

1. Calibration/verification was performed with the use of a set of Gauge Block as per ASME B89.1.14-2018 Standard.

Calibration Performed by:		Reviewed by:	
NAME Designation	NAME Designation	NAME Designation	
Checked by:		Attested by:	
NAME		NAME	
Designation		Designation Office	

ANNEX "I"

Date:

Lab. Report No.:

CALIBRATION/VERIFICATION REPORT FOR LOAD CELL

Date of Calibration:	
Valid Until:	
Capacity:	
Serial Number:	
	Date of Calibration: Valid Until: Capacity: Serial Number:

Calibration Factor:

Applie	Applied Force		Reading of Loadcell (KN)		Average Reading of Loadcell	Error	Error in Percent	Above 1%?
KN	DIV.	Trial 1	Trial 2	Trial 3	Average KN		Percent	Recommend

Remarks:

- 1. Calibration/verification was performed with the use of Morehouse Mother Calibration Apparatus: 500,000 lbs capacity in accordance to **ASTM E74.**
- 2. Error falls beyond \pm 1% should be interpolated to obtain the actual reading load of the load cell.

Calibration Performed by:		Reviewed by:
NAME Designation	NAME Designation	NAME
NAME Designation		Designation
Checked by:		Attested by:
NAME		NAME
Design	nation	Designation Office

ANNEX "J"

Republic of the Philippines Department of Public Works and Highways BUREAU OF RESEARCH AND STANDARDS
ISO 9001:2015 Certified Calibrated by:
Date of Calibration
Expiry Date:

ANNEX "K"

