

Laboratory Sushma Industries Calibration Centre, Plot No. 18 E, Block-A, 1st "C"
Main Road, IInd Phase, Peenya Industrial Area, Bangalore, Karnataka

Accreditation Standard ISO/IEC 17025: 2005

Discipline Mechanical Calibration **Issue Date** 29.09.2014

Certificate Number C-0137 **Valid Until** 28.09.2016

Last Amended on - **Page** 1 of 6

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
I. PRESSURE AND VACUUM			
1. PRESSURE (PNEUMATIC AND VACUUM) BAROMETERS/ PRESSURE TRANSDUCER/ TRANSMITTERS/DEAD WEIGHT TESTER^S	100 mbar to 1000 mbar(g)	0.008% rdg.	DH Budenberg Pneumatic Dead weight tester By Direct Comparison for Pressure Measuring Devices & Cross Float method for Dead Weight Tester
	-950 mbar to -15 mbar (g)	0.01% rdg.	
	1 bar to 25 bar (g)	0.008 % rdg.	
	14 mbar to 1700 mbar (g)	0.0022% rdg.	
	14 mbar to 1700 mbar (abs)	0.002% rdg.	
	140 mbar to 70 bar (g)	0.002% rdg.	
2. PRESSURE (HYDRAULIC) BAROMETERS/ PRESSURE TRANSDUCER TRANSMITTERS/DEAD WEIGHT TESTER^S	140 mbar to 70 bar (abs)	0.002% rdg.	Using Ruska piston gauge (Pneumatic) and Manual/Auto float pressure controller By Direct Comparison for Pressure Measuring Devices & Cross Float method for Dead Weight Tester Using DH Budenberg Hydraulic Dual Range Dead Weight Tester. By Direct Comparison for Pressure Measuring Devices & Cross Float method for Dead Weight Tester (For both pressure and effective area determination)
	-950 mbar to -50 mbar	0.0023% rdg.	
	6 bar to 60 bar	0.008% rdg.	
	60 bar to 1200 bar	0.008% rdg.	

Laboratory	Sushma Industries Calibration Centre, Plot No. 18 E, Block-A, 1st "C" Main Road, IInd Phase, Peenya Industrial Area, Bangalore, Karnataka		
Accreditation Standard	ISO/IEC 17025: 2005		
Discipline	Mechanical Calibration	Issue Date	29.09.2014
Certificate Number	C-0137	Valid Until	28.09.2016
Last Amended on	-	Page	2 of 6

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
3.	CALIBRATION OF PRESSURE GAUGES IN UNITS PRESSURE TRANSDUCERS/ PRESSURE TRANSMITTER^s	upto 1200 bar upto 20 mV upto 10 V upto 20 mA	0.2 bar 0.005 mV 0.007 V 0.003 mA	Using DH Budenberg Digital Pressure Calibrator As per DKD R6-1
II. FORCE				
1.	LOADCELLS / FORCE PROVING INSTRUMENTS/ PUSH PULL GAUGES^s	0.01 N to100 N 100 N to 22 kN	0.02% rdg. 0.01% rdg.	Dead weight Force Calibration machine with stainless steel Newton weights. As per 4169: 2014, ISO 376 for Force Proving Instrument and as per guidelines VDI/VDE 2624 part 2.1 for push Pull Gauge
2.	DUROMETER^s	Shore A Shore D	0.58% rdg. 0.29% rdg.	Based on ISO 18898 : 2006 ASTM D 2240-05
3.	UNIAXIAL AND UNIVERSAL COMPRESSION TESTING MACHINES*	0 to 1000 kN (Compression)	0.12% **	Precision Load cell and Digital Load indicator As Per IS 1828:2005 ISO 7500
4.	UNIAXIAL AND UNIVERSAL COMPRESSION MACHINES*	0 to 20 kN (Compression & Tension)	0.12% **	Precision Load cell and Digital Load indicator As Per IS 1828:2005 ISO 7500

Laboratory	Sushma Industries Calibration Centre, Plot No. 18 E, Block-A, 1st "C" Main Road, IInd Phase, Peenya Industrial Area, Bangalore, Karnataka		
Accreditation Standard	ISO/IEC 17025: 2005		
Discipline	Mechanical Calibration	Issue Date	29.09.2014
Certificate Number	C-0137	Valid Until	28.09.2016
Last Amended on	-	Page	3 of 6

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
5.	VERIFICATION OF FORCE CALIBRATION MACHINES*	0 to 20 kN	0.025%	Transfer standard Reference Loadcells and Precision Calibrator DMP40- mV/V indicator. By Comparison Method
III.	TORQUE			
1.	TORQUE WRENCHES A. TORQUE TOOLS INDICATING TYPE I (A TO E) B. TORQUE SETTING TYPE II (A TO F) C. ROTARY TORQUE TOOLS^S	0.1 Nm to 3000 Nm	0.1%	Torque Wrench Calibration System (With Torque Sensors & Digital Torque Indicator) As per IS/ISO 6789: 2003 for Torque Tools and ISO 5393, ISO 6544 ISO 17104 for Rotary Torque Tools
2.	HYDRAULIC TORQUE WRENCHES^S	0.5 kNm to 5 kNm 5 kNm to 50 kNm	0.11% 0.1%	Hydraulic torque wrench calibrator (with Torque sensor & Digital Torque Indicator) As per ISO 6789: 2003
3.	TORQUE MEASURING DEVICES^S	0.001 Nm to 22 kNm	0.01%	Dead Weight Torque Calibration System consisting of Lever Arm and Stainless steel
	TORQUE MULTIPLIERS^S	0.1 Nm to 22 kNm	1.4%	Dead weights. As per BS: 7882: 2008 & DIN 51309

Avijit Das
Program Manager

R. Prakash
Convenor

Laboratory Sushma Industries Calibration Centre, Plot No. 18 E, Block-A, 1st "C"
Main Road, IInd Phase, Peenya Industrial Area, Bangalore, Karnataka

Accreditation Standard ISO/IEC 17025: 2005

Discipline Mechanical Calibration **Issue Date** 29.09.2014

Certificate Number C-0137 **Valid Until** 28.09.2016

Last Amended on - **Page** 4 of 6

	Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (±)	Remarks
4.	TORQUE MEASURING DEVICES^S	2 kNm to 20 kNm 20 kNm to 100 kNm	0.084% 0.081%	Torque Calibration System (Motorised) using Calibrated Arm with Force sensor and Digital Force indicator As per BS: 7882:2008 & DIN 51309
5.	VERIFICATION OF TORQUE CALIBRATION MACHINES*	0 to 2000 Nm	0.025%	Transfer standard Reference Torque Transducer and Precision Calibrator DMP40- mV/V indicator. By Comparison Method
IV.	DIMENSION			
1.	OPTICAL ANGLE MEASURING DEVICE^S	0.001 to 3000°	0.04°	Optical Encoder and Digital Display unit By Comparison
V.	ACCELERATION & SPEED			
1.	TACHOMETERS^S (Non Contact Type)	100 to 10,000 rpm 11550 to 20,000 rpm	1.06 rpm 2.26 rpm	Speed Calibration System with non-contact tachometer as reference along with servo speed controller
2.	SPEED CALIBRATION OF: ROTATING TRANSDUCERS^S	100 to 10,000 rpm	1.04 rpm	Speed Calibration System with servo control for Rotating transducers As per SANAS TR-45-01:2008

Laboratory	Sushma Industries Calibration Centre, Plot No. 18 E, Block-A, 1st "C" Main Road, IInd Phase, Peenya Industrial Area, Bangalore, Karnataka		
Accreditation Standard	ISO/IEC 17025: 2005		
Discipline	Mechanical Calibration	Issue Date	29.09.2014
Certificate Number	C-0137	Valid Until	28.09.2016
Last Amended on	-	Page	5 of 6

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
VI MASS			
1. WEIGHTS^s	1 mg	0.0007 mg	Using E1, E2, F1 Class Weights By sub-division method of calibration 1mg to 1kg , sub- multiple method above 1kg, substitution method of weighing, ABBA weighing cycle based on OIML R- 111:2004, OIML-D28:2004, PTB-Guide MA-40
	2 mg	0.0007 mg	
	5 mg	0.0007 mg	
	10 mg	0.0007 mg	
	20 mg	0.001 mg	
	50 mg	0.001 mg	
	100 mg	0.0017 mg	
	200 mg	0.002 mg	
	500 mg	0.0027 mg	
	1 g	0.003 mg	
	2 g	0.004 mg	
	5 g	0.005 mg	
	10 g	0.007 mg	
	20 g	0.008 mg	
	50 g	0.01 mg	
	100 g	0.017 mg	
	200 g	0.033 mg	
	500 g	0.083 mg	
	1 kg	0.17 mg	
	2 kg	0.33 mg	
	5 kg	2 mg	
	10 kg	5 mg	
	20 kg	10 mg	
2. ULTRA PRECISION WEIGHING BALANCE[#]	(0 to 2) kg	2.7mg/kg	Using Standard Weights Class - E1, E2 As per OIML R-76- 1:2006
3. WEIGHING BALANCE[#]	(0 to 75) kg	4.0 mg/kg	Using Standard Weights Class - E1, E2, F1 As per OIML R-76-1:2006

Avijit Das
Program Manager

R. Prakash
Convenor

Laboratory	Sushma Industries Calibration Centre, Plot No. 18 E, Block-A, 1st "C" Main Road, IInd Phase, Peenya Industrial Area, Bangalore, Karnataka		
Accreditation Standard	ISO/IEC 17025: 2005		
Discipline	Mechanical Calibration	Issue Date	29.09.2014
Certificate Number	C-0137	Valid Until	28.09.2016
Last Amended on	-	Page	6 of 6

Quantity Measured/ Instrument	Range / Frequency	*Calibration Measurement Capability (\pm)	Remarks
VII. VOLUME			
1. PIPETTE, BURETTE MEASURING CYLINDER, VOLUME JARS/FLASKS^S	0.01ml to 2 ml > 2ml to 1000 ml	0.03%	Using Weighing Balance (with readability 0.001 mg, 0.01 mg and 0.1 mg), Standard Weights Triple Distilled Water By Gravimetric Method. As per IS/ISO 4787:2010
2. MICRO PIPETTES^S	10 μ l to 100 μ l > 100 μ l to 5000 μ l	0.008%	Using Weighing Balance (with readability 0.0001 mg and 0.001 mg) By Gravimetric Method. As per ISO 8655-6: 2002 (E)
VIII. DENSITY			
1. DETERMINATION OF DENSITY OF SOLIDS AND LIQUIDS ^S			
Liquids	0.1 kg/m ³ to 15000 kg/m ³	0.063%	Using Comparator Range 210 g. Readability 0.01 mg and Density Kit with Triple Distilled Water By Gravimetric Method. As per OIML G-14:2011
Solids	0.1 kg/m ³ to 15000 kg/m ³	0.05%	

* Measurement Capability is expressed as an uncertainty (\pm) at a confidence probability of 95%.

^SOnly in Permanent Laboratory

*Only for Site Calibration

The laboratory is also capable for site calibration however, the uncertainty at site depends on the prevailing actual environmental conditions and master equipment used.

** Relative accuracy error has not been considered for CMC estimation.

Avijit Das
Program Manager

R. Prakash
Convenor