




**Calibration**

**Classes of Test**

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# Calibration

## Classes of Test

Accreditation in the Calibration field is described by classes and subclasses of test. The classes of test shown in this section are a first order description of a facility's accreditation. Most Scopes of Accreditation are described in more detail (refer to Expressing the Scope of Accreditation below).

The Scope of Accreditation serves two functions. Firstly, it defines exactly which calibrations, measurement and tests the facility is accredited for. NATA endorsed test reports or calibration certificates can only be issued for the accredited tests. Secondly, it provides potential clients with information about available test or calibration services.

Tests and calibrations performed in mobile laboratories, field laboratories or in-situ will also be described separately in the Scope of Accreditation. Where a facility seeks to be accredited for tests and calibrations not covered by the existing classes of test, due to new technologies, changing regulatory requirements and client needs, the Accreditation Advisory Committee (ACC) would consider creating new classes of test and developing new technical criteria for accreditation of such tests.

### Expressing the Scope of Accreditation

For all Scopes of Accreditation, the description will be comprehensive and concise without omitting essential information. The accredited service is a calibration activity and the Scope of Accreditation encompasses the item types as listed below.

#### 1. Calibration

Under the classes/subclasses for calibration facilities, the following elements are covered:

- lists of parameters which can be measured;
- measurement ranges for each parameter;
- S.I. Units must be used. Other units (such as Imperial) may also be stated in (brackets);
- a statement of least uncertainty of measurement (this is usually at a 95% confidence level);
- when requested, reference to a standard or to a specification. Listing a test method is optional in calibration scopes; and
- for facilities performing AC electrical calibrations, the frequency or frequency range is listed for each measurement type to help define the facility's capability in the scope.

## Classes of test

- 1. 01      Limit gauges
  - .01   Plain plug gauges
  - .02   Plain ring gauges
  - .03   Plain gap gauges
  - .04   Taper plug gauges
  - .05   Taper ring gauges
  - .11   Parallel screw plug gauges
  - .12   Parallel screw ring gauges
  - .13   Adjustable thread calliper gauges for parallel threads
  - .21   Taper screw plug gauges
  - .22   Taper screw ring gauges
  - .23   Adjustable thread calliper gauges for taper threads
  - .31   Profile gauges
  - .41   Position and receiver gauges
  - .42   Micrometer setting gauges
  - .61   Spline and serration gauges
  - .99   Other limit gauges
  
- 1. 02      Jigs, fixtures, cutting tools and components
  - .01   Jigs and fixtures
  - .02   Alignment of large scale assemblies
  - .10   Crimp tools
  - .11   Cutting Tools
  - .21   Components
  
- 1.03      Engineering metrology equipment
  - .01   Surface plates
  - .02   Toolmakers' flats
  - .03   Straight edges
  - .04   Squares
  - .05   Angle plates
  - .06   Bevel protractors
  - .07   Engineers' parallels
  - .08   Precision spirit levels
  - .09   Micrometer water levels
  - .10   Precision vee blocks
  - .11   Optical flats
  - .12   Optical parallels
  - .13   Thread measuring accessories
  - .14   Sine bars and sine tables
  - .15   Dividing heads and tables
  - .16   Eccentric mandrels
  - .21   Micrometer heads
  - .22   External micrometers
  - .23   Internal micrometers
  - .24   Depth micrometers
  - .25   Electronic indicators, dial gauges and test indicators
  - .26   Bore gauges

- .27 Electronic and vernier callipers
- .28 Electronic and vernier height and depth gauges
- .29 Feeler gauges
- .30 Extensometers
- .31 Steel rules and measuring tapes
- .32 Micrometer setting gauges
- .99 Other measuring instruments and tools
  
- 1.04 Machine tools
  - .01 Geometric features
  - .02 Positioning accuracy
  - .03 Performance tests
  
- 1.05 Surface topography
  - .01 Surface texture
  - .02 Roundness
  - .03 Roundness standards
  
- 1.06 Gears, splines and serrations
  
- 1.07 Hardness of metal products
  
- 1.08 Length and angle standards
  - .01 Angle gauges and precision polygons
  - .02 External cylindrical standards
  - .03 Internal cylindrical standards
  - .04 Gauge blocks and accessories
  - .05 Length bars and accessories
  - .09 Precision circular scales
  - .10 Precision graticules
  - .11 Precision linear scales
  - .12 Surface finish reference standards
  - .13 Screw pitch reference standards
  - .14 Spherical standards
  - .15 Laser length standards
  - .16 Calibration gauges for coordinate measuring machines
  - .17 Area standards
  - .18 Step and check gauges
  - .20 Polarimeter tubes
  - .99 Other length and angle standards
  
- 1.09 Precision instruments
  - .01 Auto collimators
  - .02 Theodolites
  - .03 Alignment telescopes
  - .04 Optical plumb lines
  - .05 Optical levels
  - .06 Photogrammetric cameras
  - .07 Laser alignment and leveling equipment
  - .08 Laser length interferometers
  - .09 Wavemeters
  - .21 Electronic levels

- .26 Engineers' comparators
- .31 Height setting micrometers
- .32 Length measuring machines
- .33 Coordinate length measuring machines
- .34 Screw diameter measuring machines
- .35 Screw pitch measuring machines
- .36 Gear and hob measuring equipment
- .37 Precision projection apparatus
- .38 Dial gauge calibrators
- .39 Extensometer calibrators
  
- 1.10 Survey and alignment equipment
  - .01 Theodolites
  - .02 Optical plumb lines
  - .03 Optical levels
  - .04 Laser alignment and leveling equipment
  - .05 Survey staffs
  - .06 Survey tapes
  - .07 Tape testing benches
  - .08 Electronic distance measuring equipment
  - .09 Baselines
  - .10 Position
  
- 1.11 Masses
  - .01 Mass standards
  - .02 Industrial mass standards
  - .03 Determination of mass
  - .04 Determination of mass for use with pressure calibrators
  
- 1.12 Weighing devices
  - .01 Precision laboratory balances
  - .02 Industrial balances
  - .03 Industrial weighing appliances
  - .04 Hopper Weighing Systems
  
- 1.13 Volumetric equipment
  - .01 Volumetric glassware
  - .02 Special laboratory volumetric apparatus
  - .03 Industrial volumetric proving measures
  - .11 Standard measures
  - .12 Pipe provers
  - .13 Industrial storage tanks
  - .14 Road and rail tankers
  - .15 Piston Operated Volumetric Apparatus, pipettes (POVAS)
  - .99 Other equipment
  
- 1.14 Density
  - .01 Density of solids
  - .02 Density of liquids
  - .03 Density of gases
  
- 1.15 Hydrometers

- .01 Density hydrometers
- .02 Alcoholmeters
- .03 Brix hydrometers
- .04 LPG hydrometers
- .99 Other hydrometers
  
- 1.16 Densitometers
  - .01 Liquid densitometers
  - .02 Gas densitometers
  
- 1.17 Flow measuring devices
  - .01 Anemometers
  - .02 Sonic nozzles
  - .03 Orifice meters
  - .04 Gas meters
  - .05 Flow hoods
  - .06 Wind direction devices
  - .07 Air sampling pumps and meters
  - .11 Liquid meters
  - .13 Cryogenic flow meters
  - .14 High pressure gas meters
  - .21 Current meters
  - .22 Open channel water meters
  - .23 Weir type structures
  - .99 Other devices
  
- 1.18 Oil and gas measurement systems
  
- 1.19 Barometers
  - .01 Aneroid barometers
  - .02 Barographs
  - .03 Mercury barometers
  - .04 Gauge barometers
  - .11 Altimeters
  - .99 Other barometers
  
- 1.20 Pressure and vacuum measuring devices
  - .01 Pressure gauges
  - .02 Vacuum gauges (bourdon tube)
  - .11 Pressure transducers
  - .12 Pressure calibrators
  - .13 Pressure recorders
  - .21 Mercury manometers
  - .22 Other liquid manometers
  - .23 Digital manometers
  - .31 Pressure control devices
  
- 1.21 Pressure balances
  - .01 Air operated piston gauges
  - .02 Oil operated piston gauges
  - .03 Pressure gauge calibrators
  - .04 Determination of mass for dead weight testers

- 1.23 Force measuring devices
  - .01 Calibrating devices
  - .02 Elastic force measuring devices
  - .04 Load cells
  - .05 Force gauges
  - .99 Other devices
  
- 1.24 Speed measuring devices
  - .01 Doppler radar equipment
  - .02 Laser equipment
  - .05 Fixed detector installation
  - .07 In vehicle data loggers
  - .09 Digital ammeters
  - .11 Speedometers
  - .12 Vehicle speed dynamometers
  - .13 Inductive loop devices
  - .15 Piezo electric devices
  - .20 Verification of traffic signal phase timing systems
  - .21 Infrared systems
  - .99 Other devices
  
- 1.25 Torque measuring devices
  - .01 Torque wrenches
  - .02 Torque transducers
  - .03 Torque multiplying gearboxes
  - .04 Torque calibrating devices
  - .05 Indicators, recorders and controllers
  
- 1.26 Testing machines
  - .01 Tension and universal machines in tension
  - .02 Compression and universal machines in compression
  - .11 Vickers hardness machines
  - .12 Rockwell hardness machines
  - .13 Brinell hardness machines
  - .14 Rockwell superficial hardness machines
  - .15 Vickers low-load hardness machines (HV 0.2 to HV 5)
  - .16 Vickers micro-hardness machines (less than HV 0.2)
  - .21 Izod impact machines
  - .22 Charpy impact machines
  - .25 Resilience testing machines
  - .31 Deadweight rubber hardness testers
  - .32 Deadweight micro-hardness rubber testers
  - .33 Rubber hardness meters (durometers)
  - .34 Plastics hardness testers
  - .41 Torsion machines
  - .42 Tension-torque machines
  - .43 Hydraulic rams and jacks
  - .70 Surface friction testers
  - .71 Road friction testers
  - .99 Other testing machines



- 1.27 Ancillary mechanical testing equipment
  - .01 Portable Brinell measuring microscopes
  - .02 Indenters for hardness machines
  - .11 Hardness blocks for metals testing
  - .12 Hardness blocks for rubber and plastics testing
  - .21 Thickness gauges for textiles, rubber and plastics
  - .22 Specimen cutters for rubber and plastics
  - .31 Paper products testing equipment
  - .99 Other equipment
  
- 1.28 Ancillary testing equipment for construction materials
  - .11 Test sieves
  - .21 Ovens
  - .25 Dial gauges and other displacement measuring devices
  - .31 Vicat apparatus
  - .35 Penetrometers and penetration cones
  - .36 Penetration needles
  - .41 Nuclear moisture/density gauges
  - .42 Gyropac angle calibrator
  - .99 Other equipment
  
- 1.29 Ancillary testing equipment for paints and petroleum products
  - .11 Wet film thickness gauges
  - .12 Fineness of grind gauges
  - .13 Viscometers
  - .14 Flow cups
  - .15 Scratch needles
  - .21 Ovens
  - .83 Pensky-Martens apparatus
  - .99 Other equipment
  
- 1.32 Resistors, resistance boxes and potential dividers
  - .01 Precision resistors, resistance boxes and conductance boxes
  - .02 Volt ratio boxes and potential dividers
  - .03 DC shunts
  - .04 AC shunts
  - .99 Other tests
  
- 1.33 Capacitors
  - .01 Precision capacitors
  - .02 Capacitance attenuators
  - .03 Capacitance potential dividers
  
- 1.34 Magnetic Instruments and Equipment
  - .02 Magnets, solenoids and Helmholtz coils
  - .03 Magnetic permeameters
  - .04 Magnetic frames and squares
  - .05 Fluxmeters
  - .06 Magnetometers and search coils
  - .07 Hibbert magnetic standards and other flux linkage generators
  - .08 Flux density meters

- 1.35 Inductors and Instrument Transformers
  - .01 Inductors, self and mutual
  - .02 Ratio transformers
  - .03 Current Transformers
  - .04 Voltage Transformers
  
- 1.36 Voltage standards
  - .01 Standard cells
  - .11 Electronic e.m.f. reference devices
  
- 1.37 Precision transfer instruments
  - .01 A.C./D.C. transfer instruments
  
- 1.38 Instrument calibrators
  - .01 D.C. voltage
  - .02 A.C. voltage
  - .11 D.C. current
  - .12 A.C. current
  - .51 Resistance
  - .61 Capacitance
  
- 1.39 Indicating and recording instruments
  - .01 D.C. voltmeters
  - .02 A.C. voltmeters
  - .03 D.C. ammeters
  - .04 A.C. ammeters
  - .05 Wattmeters
  - .06 Varmeters
  - .07 Phase angle indicators
  - .08 Power factor meters
  - .09 Ohmmeters
  - .10 LCR meters
  - .11 Galvanometers and null detectors
  - .12 Capacitance meters
  - .20 Power Supplies
  - .21 Electricity meters
  - .30 Insulation resistance test equipment
  - .81 Graphic recording instruments
  - .82 Digital storage recorders
  - .83 Instrumentation tape recorders
  - .84 Electric field strength meters
  
- 1.40 Bridges, potentiometers, test sets
  - .01 D.C. bridges
  - .02 D.C. potentiometers
  - .11 A.C. bridges
  - .12 A.C. potentiometers
  - .21 Ratiometers
  - .31 Current transformer testing sets
  - .32 Voltage transformer testing sets
  - .33 Partial discharge test equipment
  - .41 High voltage test sets

- 1.41 Frequency and time measuring instruments and standards
  - .01 Frequency meters
  - .02 Wavemeters
  - .11 Counters
  - .12 Time interval meters
  - .13 Clocks and watches
  - .14 Stroboscopes
  - .15 Tachometers
  - .21 Frequency standards
  - .31 Calibration of frequency
  - .32 Time interval calibration
  - .33 Coordinated Universal Time (UTC)
  
- 1.42 Frequency analysers and waveform measuring instruments
  - .01 Frequency characteristics
  - .02 Input characteristics
  - .03 Timing characteristics
  - .04 Distortion
  - .99 Other characteristics
  
- 1.43 Signal sources
  - .01 Frequency characteristics
  - .02 Output characteristics
  - .03 Modulation characteristics
  - .04 Sweep characteristics
  - .05 Distortion
  - .99 Other characteristics
  
- 1.46 Power rectifiers
  - .01 Rotary, vibratory and other mechanical types
  - .02 Silicon controlled rectifiers and allied control devices
  - .03 Vacuum tube rectifiers
  - .04 Semiconductor rectifiers
  
- 1.47 Communications equipment
  - .01 Line transmission measuring equipment
  - .02 Radio transmission measuring equipment
  - .03 Field intensity measuring equipment
  - .04 Electrical noise and interference measuring equipment
  - .05 Impedance and reflection measuring equipment
  - .06 Spectrum analysis measuring equipment
  - .07 Data transmission equipment
  - .08 Power measuring equipment
  - .09 Attenuators and amplifiers
  - .11 Waveguide and coaxial components
  - .12 Communications systems
  - .13 Data acquisitions systems
  - .14 Processor controlled systems
  - .99 Other equipment
  
- 1.51 Electronic equipment

- .01 High voltage impulse and disturbance tests
  - .10 Transducer indicators and calibrators
  - .11 Charge amplifiers
  - .22 Doppler Radar equipment
  - .30 Miscellaneous equipment and tests
- 1.52 Calibration of electromagnetic field strength transducers and indicators
- .01 Antennas
  - .02 Field strength probes
  - .03 Broadband transducers and indicators
  - .10 Electric field strength
  - .11 Power density
- 1.54 EMC test equipment
- .01 Pulse characteristics of Electrostatic Discharge (ESD) generators
  - .02 Pulse characteristics of Electrical Fast Transients (EFT) and surge generators
  - .03 Voltage division factor, impedance and isolation characteristics of Artificial Mains Networks (AMN)
  - .04 Insertion loss and common mode impedance characteristics of Coupling/Decoupling networks (CDN)
  - .05 Absorbing clamps
  - .06 Voltage dips, short interruptions and voltage variation equipment
  - .07 Harmonic emission compliance test systems
  - .08 Voltage fluctuation and flicker compliance systems
  - .09 Flicker harmonics load unit
- 1.55 Calibration of polarimetric instruments
- .01 Polarimeters
  - .02 Saccharimeters
  - .03 Quartz control plates
- 1.56 Precision and reference optical equipment
- .01 Calibration of Abbé refractometers
  - .02 Focimeters
  - .03 Lens, refractive and prismatic power
- 1.57 Radiant flux (radiant power)
- .01 Radiant power of laser line sources
  - .02 Radiant power of incoherent line sources
- 1.58 Calibration of irradiance measuring instruments
- .01 Pyrgeometers
  - .02 Pyranometers
  - .03 Ultraviolet pyranometers
  - .04 Pyrradiometers
  - .05 Albedometers
  - .06 Pyro-albedometers
  - .07 Calibration of ultraviolet radiometers

- .08 Calibration of infrared radiometers
- .09 Calibration of ultraviolet dosimeters
  
- 1.59 Broad-band irradiance
  - .01 Measurement of ultraviolet irradiance
  - .02 Measurement of infrared irradiance
  
- 1.60 Distribution temperature
  - .01 Incandescent lamps
  
- 1.61 Luminous intensity
  - .01 Incandescent lamps
  - .02 Other sources
  
- 1.62 Luminous flux
  - .01 Incandescent lamps
  - .02 Other sources
  
- 1.63 Luminance
  - .01 Measurement of luminance
  - .02 Calibration of luminance meters
  
- 1.64 Illuminance
  - .01 Measurement of illuminance
  - .02 Calibration of illuminance meters
  
- 1.65 Broad-band visible light measurements
  - .01 Transmittance
  - .02 Reflectance
  - .03 Luminance factor
  - .04 Chromaticity
  - .05 Correlated colour temperature
  - .06 Haze
  - .07 Gloss
  - .08 Calibration of transmittance densitometers
  - .09 Calibration of reflectance densitometers
  - .10 Calibration of incident light tricolorimeters
  - .11 Calibration of reflectance tricolorimeters
  - .12 Calibration of colour temperature meters
  - .13 Calibration of hazemeters
  - .14 Calibration of gloss meters
  
- 1.66 Retroreflection
  - .01 Reflex reflectivity
  - .02 Chromaticity
  
- 1.67 Luminance factor
  - .01 Broad-band measurements
  
- 1.68 Spectral measurements of light sources
  - .01 Spectral radiance
  - .02 Spectral irradiance

- .03 Chromaticity
- .04 Correlated colour temperature
- .05 Distribution temperature
- .06 Calibration of spectroradiometers
  
- 1.69 Spectrophotometry
  - .01 Spectral transmittance
  - .02 Spectral reflectance
  - .03 Chromaticity
  - .04 Calibration of spectrophotometers
  
- 1.70 Optical and radiation detectors
  - .01 Broad-band responsivity
  - .02 Response linearity
  - .03 Spectral responsivity
  - .04 Cosine correction
  - .05 Wavelength
  - .06 Spectrum
  
- 1.72 Ionising radiation
  - .01 Measurement of alpha, beta, gamma, neutron radiations
  - .02 Calibration of ionising radiation survey instruments
  - .03 Measurement of X-rays
  - .04 Calibration of dosimeters
  
- 1.73 Calibration of nuclear moisture and density equipment
  - .01 Density blocks
  - .02 Nuclear gauges
  
- 1.75 Optical fibre systems
  - .01 Optical power
  - .02 Optical attenuation
  - .03 Optical wavelength
  - .04 Optical time-domain reflectometry
  - .05 Optical bandwidth
  - .06 Optical fibre systems components
  - .07 Fibre and core geometry
  - .99 Other tests
  
- 1.76 Particle measurement devices
  - .01 Particle size counters
  
- 1.80 Calibration of temperature measuring equipment
  - .01 Rare metal thermocouples
  - .02 Base metal thermocouples
  - .03 Temperature fixed points
  - .05 Metallic resistance thermometers
  - .06 Semi-conductor thermometers
  - .07 Surface probes
  - .08 Extension wires for rare metal thermocouples
  - .09 Extension wires for base metal thermocouples
  - .11 Liquid-in-glass thermometers

- .12 Optical pyrometers
- .13 Radiation pyrometers
- .14 Thermal imaging systems
- .21 Vapour pressure thermometers
- .22 Filled metal systems
- .23 Bimetallic systems
- .31 Digital quartz frequency units
- .41 Digital temperature indicator systems
  
- 1.81 Calibration of ancillary temperature measuring instruments
  - .01 Portable potentiometers
  - .02 Digital voltmeters
  - .03 Resistance bridges
  - .04 Indicators, recorders and controllers
  - .05 Transmitters
  - .11 Strip lamps
  - .12 Blackbody sources
  - .90 Other equipment
  
- 1.82 Calibration of clinical thermometers
  - .01 Liquid-in-glass
  - .02 Disposable
  - .03 Electronic
  - .04 Clinical infrared thermometers
  
- 1.83 Hygrometry
  - .10 Calibration of humidity measuring devices
  - .20 Measurement of relative humidity
  - .25 Measurement of dew point
  
- 1.84 Testing of controlled enclosures
  - .01 Ovens and furnaces
  - .02 Incubators
  - .03 Autoclaves and sterilising ovens
  - .04 Industrial freezers
  - .05 Dry block calibrators
  - .06 Baths
  - .07 Environmental Chambers (Temperature)
  - .08 Environmental Chambers (Humidity)
  - .09 Environmental Chambers (IR, VIS, UV)
  - .10 Thermocyclers
  - .15 Medical refrigeration equipment
  
- 1.90 Acoustic measuring and calibration equipment
  - .01 Microphones
  - .02 Sound level meters
  - .03 Sound analysers
  - .04 Band pass filters
  - .05 Acoustic calibrators
  - .06 Reference sound sources
  - .07 Sound level recording systems
  - .08 Signal recorders

- .09 Audiometers
- .10 Dose meters for sound
- .99 Other acoustic measuring equipment
  
- 1.91 Vibration measuring and calibrating equipment
  - .01 Vibration transducers
  - .02 Vibration measuring systems
  - .03 Vibration analysers
  - .04 Vibration filters
  - .05 Vibration recording systems
  - .06 Vibration calibrators
  - .07 Shock measuring systems
  - .08 Mechanical impedance transducers
  - .09 Artificial mastoids
  - .99 Other vibration measuring equipment
  
- 1.92 Dynamic balancing machines
  
- 1.93 Ultrasonic measuring and calibration equipment
  - .01 Ultrasonic transducers
  - .02 Ultrasonic power meters