PARTICULAR SPECIFICATION PS.G07

Supply of Inspection, Measuring and Testing Equipment

Particular Specification for Supply of Inspection, Measuring and Testing Equipment

The Contractor shall supply calibrated equipment as the attached within one month from the commencement of the contract. The equipment together with the relevant documentation shall conform to the requirements as set out in the following :-

1. The equipment shall be calibrated by laboratories accredited by the Hong Kong Laboratory Accreditation Scheme (HOKLAS) or other recognised accredited laboratories. The calibration shall be made against certified equipment having a known valid relationship to internationally or nationally recognized standards. Where no such standards exist, the basis used for calibration shall be documented. In such cases, the laboratories shall provide satisfactory evidence of correlation of results, for example, by participation in a suitable programme of inter-laboratory comparisons or proficiency testing.

2. The calibration and acceptance of the calibration of the equipment shall comply with the requirements as set out in the schedule.

3. The Contractor shall define and document the process employed for the calibration of the equipment including details of equipment type, unique identification, location, frequency of checks, check method, acceptance criteria and the action to be taken when results are unsatisfactory.

4. The Contractor shall maintain and submit calibration records of the equipment to the Architect which include :-

    (a) The description and unique identification of equipment.

    (b) The date on which each calibration was completed.

    (c) The calibration results obtained after and, where relevant, before any adjustment and repair.

    (d) The assigned calibration interval.

    (e) Identification of the calibration procedure.

    (f) The designated limits of permissible error or accuracy of equipment.

    (g) The source of the calibration used to obtain traceability.

    (h) The relevant environmental conditions and a statement about any corrections thus necessary.

    (i) A statement of the uncertainties involved in calibrating the equipment and of their cumulative effect.

    (j) Details of any maintenance such as servicing, adjustment, repairs or modifications carried out.

    (k) Any limitations in use.

    (l) Identification of the person(s) performing the calibration.

    (m) Identification of person(s) responsible for ensuring the correctness of the recorded information.

    (n) Unique identification (such as serial numbers) of any calibration certificates and other relevant documents concerned.

5. Calibration shall be carried out under suitable environmental conditions considering the conditions under which the equipment is used for inspections, measurements and tests.

6. The Contractor shall identify the equipment with a label marked "calibrated" and approved identification record to show the calibration status and the next due date.

7. The Contractor shall re-calibrate the equipment at intervals as shown in the Schedule, or at shorter periods when the Architect has doubt on the accuracy of the equipment.

General Inspection, Measuring and Testing Equipment

Equipment	Quantity (nr.)	Limits of Permissible Error of Equipment	Environmental Conditions of Use	Frequency of Re-calibration	Specification of Equipment if Applicable
100mm concrete cube moulds and accessories	16	See Construction Standard - CS1	Construction Site Condition	1 year	Construction Standard - CS1 and Note 1
Set of slump testing equipment	2	See Construction Standard - CS1	Construction Site Condition	1 year	Construction Standard - CS1 and Note 2
Curing tank	1	See Construction Standard - CS1	Construction Site Condition	1 year	Construction Standard - CS1 and Note 3
Elcometer	1	5% or ± 3 microns whichever the greater	0 degrees celsius to 40 degrees celsius	1 year	Range : 0-1000 microns for measuring thickness of coating on ferrous or non-ferrous metal
Measuring tape 3.5m	2	± 2mm for every 1 m interval of tape	0 degrees celsius to 40 degrees celsius	1 year	
Measuring tape 30m	1	± 10mm	0 degrees celsius to 40 degrees celsius	1 year	
Sound level meter including the sound level calibrator	1	As manufacturer's specifications	Construction Site Condition	2 years	IEC 651:1979 (Type 1) and IEC 804:1985 (Type 1)

Note 1 : The moulds shall be made of high quality cast iron, with clamp attached base plate. Accessories for cube mould :-

a. Spanner for 100 mould;
b. tamping bar to CS1;
c. mould oil, for lubricating the mould and protection against rust;
d. wire brush for cleaning mould.

Note 2 : a. Slump cone, made to CS1 of sheet steel suitably protected against corrosion.
b. Tamping rod for above, steel 600mm long x 16mm diameter round at one end.
c. Base plate, made of metal or plastic sheet, size approximately 420mm square.

Note 3 : The tank shall be made of sheet steel and capable of accepting 80-100 cubes of 100mm size; and shall be fitted with heater, circulating pump and thermometer. The heater, shall be thermostatically controlled, capable of maintaining the temperature at 27 degrees Celsius ±3 degrees Celsius and be wired for 200 - 240V, 50 cycles, single phase supply. The thermometer shall be capable of recording the minimum and maximum temperatures of water in the tank.

Testing Instrument Required for
Acceptance Tests of Electrical Installation

Instrument	Quantity* (nr.)	Tests for which Instrument can Perform	Test Current	Test Voltage	Resolution	Accuracy	Min. Acceptable Insulation	Additional Requirements
Low Voltage Ohmmeter	1	1. Continuity of Protective Conductor 2. Continuity of Ring Conductor 3. Polarity	AC or DC not less than 20mA	Not less than 3V not greater than 24V	On low scale 0.01	2%		
Insulation Resistance Tester	1	Insulation Resistance Test	DC	250V for ELV circuits, 500V for circuits up to 500V, 1000V for circuits between 500V - 1000V		2%	250V test - 250K Ohms 500V test - 500K Ohms 1000V test - 1M Ohm	1. Automatic capacitance discharge facility required. 2. Capable of supplying an output current of 1mA at its nominal voltage.
Applied Voltage Tester	1	Site Applied Insulation	5mA	Max-3750V AC		5% (test voltage)		
Earth Loop Tester	1	1. Earth Fault Loop Test 2. Continuity of Protective Conductor 3. Earth Electrode Resistance	20 - 25A	220V	Circuits up to 50A Resolution 0.01	2%		Instruments with test of 1/2 wave-test period - 4 half cycles. Full wave 2 full cycles. Test current time max 40mS.
RCD Tester	1	RCD Tests			Time resolution not greater than 1mS	Test current 10% Time duration 5%		

Testing Instrument Required for
Acceptance Tests of
Air-conditioning Installation

(1) Equipment		Quantity (nr.)
(a)	Inclined manometer calibrated in not less than 0.1 Pa	1
(b)	Combined inclined and vertical manometer 0-2000 Pa	1
(c)	Electronic direct reading manometer	1
(d)	Tachometer, high quality, direct contact, self-timing type	1
(e)	Deflecting vane anemometer	1
(f)	Rotating vane anemometer	1
(g)	Thermal type anemometer	1
(h)	Dial and glass stem thermometer	1
(i)	Digital electronic thermometer	1
(j)	Digital humidity and temperature meter	1
(k)	Sling psychrometer	1
(l)	Pressure gauge (manifold and single)	1
(m)	Refrigerant leakage tester	1
(n)	Testing equipment for air quality	1
(o)	Temperature and humidity recorder	1
(p)	Smoke generator for testing of low pressure air duct	1
(q)	Sound level meter with octave filter unit and sound level calibrator	1

(2) Accuracy : ± 5%

(3) Max. Calibration Period : 1 year

(4) Calibrated equipment for the electrical portions of the A/C Installation shall be as specified for Electrical Installation

Testing Instrument Required for
Acceptance Tests of
Lift Installation

Performance Specification	Quantity (nr.)	Accuracy	Maximum period between calibrations
Tachometer 30 – 10000 rpm	1	± 1%	1 year
Multi-tester (AVO) 0-1000V 0-1A 0-∞Ω	1	± 1%	1 year
Clamp on ammeter 0-1000A	1	± 1%	1 year
Insulation tester 500V-1000V	1	± 1%	1 year
Light meter 10-1000lux	1	± 1%	1 year
Sound meter 0-120dbA	1	± 1%	1 year
Harmonic analyzer (fundamental to 20 harmonic order	1	± 1%	1 year
Other necessary testing equipment	1	± 1%	1 year

Testing Instrument Required for
Acceptance Tests of
Fire Service Installation

Hydrant Flow and Pressure Gauge Quantity 1 set

Performance Specifications

Range : Flow gauge

2.6 litre/s to 60 litre/s

Pressure gauge

0 Bar to 14 Bar

Construction : Rigidly constructed. Calibration not to be affected by heavy mechanical and hydraulic shock.

Accuracy : Flow gauge

Comply with 95% confidence band limits as specified by the British Hydromechanics Research Association.

Pressure gauge

Comply with BS 1780 for industrial gauge. The error of pressure indication with either an increasing or decreasing pressure at any point above 10% and below 90% of the maximum scale value of the gauge is not greater than 1% of the maximum scale and for the rest of the scale 1.5% of the maximum scale value.

Maximum Period Between Calibration : Calibration is permanent. Components to be replaced if damaged.

Sound Level Meter Quantity 1 set

Range: 10-100 dB with octave filter unit and sound level calibrator

Note : Calibrated equipment for the electrical portions of the fire service installation shall be as specified for Electrical Installations.

Testing Instrument Required for
Acceptance Tests of
Security System

Performance Specification	Quantity (nr.)	Accuracy	Maximum Period between Calibrations
Multi-tester (AVO) 0-1000V 0-1A 0-1MΩ	1	± 1%	1 year
Clamp on ammeter 0-1000A	1	± 1%	1 year
Insulation tester 500V-1000V	1	± 1%	1 year
Oscilloscope with TV synchronizing Capability	1	± 1%	1 year
Walkie-talkie for communication during testing or digital wireless telephone, 2 sets	1		
Light meter 10-1000 lux	1	± 1%	1 year
Radio frequency generator	1		