



No. 028

Soils & Materials Engineering Co. Ltd.
綜合試驗有限公司

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CLIENTELE : Public
服務對象 : 公眾

ACCREDITED TEST CATEGORIES : Calibration Services 校正服務
認可測試類別 : Construction Materials 建築材料
Environmental Testing 環境測試

SCOPE OF ACCREDITATION : As shown on the following pages 詳見後頁
認可範圍

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TEST CATEGORY 測試類別	ITEMS, MATERIALS OR PRODUCTS TESTED 測試項目、材料或產品	SPECIFIC TESTS OR PROPERTIES MEASURED 特定測試或量度的特性	BEST MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (\pm)* 以不確定度表示最佳測量能力(\pm)*
CALIBRATION SERVICES (cont'd) 校正服務(續上)	Electrical measurement instruments (cont'd) - DC ammeters - AC voltage calibrators/ sources	Calibration of DC current over the following ranges :- 3.3 mA to 33 mA 33 mA to 330 mA 0.33 A to 1.1 A 1.1 A to 3 A 3 A to 20 A Calibration of AC voltage over the following ranges :- 40 Hz to 10 kHz 20 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 10 kHz to 30 kHz 20 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 30 kHz to 100 kHz 20 mV to 200 mV 200 mV to 2 V 2 V to 20 V 20 V to 200 V 45 Hz to 10 kHz 200 V to 1000 V	0.021% to 0.013% 0.021% to 0.017% 0.038% to 0.033% 0.052% to 0.047% 0.13% to 0.078% 0.088% to 0.026% 0.050% to 0.020% 0.050% to 0.017% 0.056% to 0.018% 0.21% to 0.048% 0.19% to 0.050% 0.19% to 0.029% 0.19% to 0.034% 0.21% to 0.11% 1.6% to 0.080% 1.6% to 0.080% 1.6% to 0.079% 0.24% to 0.018%

* A REPORTED UNCERTAINTY WILL BE THAT FOR THE INSTRUMENT ITSELF DURING CALIBRATION PLUS THE APPROPRIATE MEASUREMENT CAPABILITY OF THE LABORATORY. THE UNCERTAINTIES ARE BASED ON AN ESTIMATED LEVEL OF CONFIDENCE OF 95%.

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mass measurements - Balances - Electronic balances - Masses - Weights	Calibration over the following range :- up to 110 kg Calibration of mass in accordance with in-house procedure SMTP004-CA-007 over the following ranges :- 10 mg to 1 g above 1 g to 80 g above 80 g to 200 g above 200 g to 1 kg above 1 kg to 10 kg above 10 kg to 30 kg	Standard weights are available in OIML Class F1 from 1 mg to 20 kg and in Class E1 from 1 mg to 500 g Uncertainties quoted depend upon the performance of the weighing machine under calibration. 0.09 mg 0.2 mg 0.4 mg 5 mg 20 mg 303 mg

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology measurements - Angle measurement instruments - Angle measuring devices - Spirit level - Squares - Dimensional measurement instruments - Calibration foils - Coating thickness gauges	Calibration of angle in accordance with in-house method SMTP004-CA-141 over the following range :- 0° to 360° Calibration of sensitivity in accordance with BS 3509: 1962: Appendix A.2C and A.3 Calibration of squareness in accordance with JIG 61: 1980 Cl. 5, 7, 9 and 10 over the following range :- up to 300 mm Calibration of thickness in accordance with in-house method SMTP-CA-049C over the following range:- up to 1500 μm Calibration by using calibration foils in accordance with in-house method SMTP-CA-049B over the following range:- up to 1500 μm	2.5 minute of arc 6% of measured value $(2 + 14 \times \text{length in m}) \mu\text{m}$ 0.8 μm 3.5 μm

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology Measurements (cont'd) - Dimensional measurement instruments (cont'd) - Dial gauges and transducers - Engineer's steel measuring rules - Extensometers - External micrometers - Feeler gauges - Gauge blocks - Levelling staff	Dial gauges and displacement transducers in accordance with Appendix B3 of BS 907: 1965, Appendix A5 of AS 2103: 1978 and Section A4 of GEOSPEC 3: 2001 over the following range :- 0 to 25 mm 0 to 50 mm Calibration of steel rules in accordance with in-house method SMTP004-CA-004 Extensometers in accordance with BS 3846: 1970 (using calibrating rig) Calibration in accordance with Appendix A of BS 870: 1950 over the following range :- 25 mm, 50 mm, 75 mm and 100 mm Calibration of thickness for the ranges specified in BS 957: Part 2: 1969 Calibration of length in accordance with clauses 23 & 24 of JJG 146-1994 over the following range:- up to 110 mm Calibration of the scale of the levelling staff in accordance with in-house method SMTP004-CA 205 up to 5 m	3 μ m 9 μ m 0.16 mm Grade C for gauge length not less than 100 mm Grade D for gauge length not less than 50 mm Grade E, F for gauge length not less than 25 mm 2 μ m 2 μ m (0.2 + 3 x length in m) μ m 0.8 mm

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology Measurements (cont'd) - Dimensional measurement instruments (cont'd) - Linear variable displacement transducers (LVDT) - Measuring microscopes - Measuring tapes - Steel measuring tapes - Thickness gauges - Vernier callipers - Vernier height gauges	Calibration of LVDT in accordance with in-house procedure SMTP004-CA-006B over the following range :- up to 100 mm Calibration of travel in accordance with in-house procedure SMTP004-CA-151 over the following range :- up to 100 mm Calibration of length of measuring tapes in accordance with in-house method SMTP004-CA-116 Calibration of length of steel measuring tapes in accordance with in-house method SMTP004-CA-116 Calibration of indicated thickness in accordance with in-house method SMTP-CA-049A over the following range:- up to 10 mm Vernier callipers in accordance with Appendix B1, BS 887: 1982 over the following range :- up to 300 mm Calibration in accordance with Appendix A2 of BS 1643: 1983 over the following range :- up to 450 mm	10 μ m 3 μ m 0.2 mm per 5 m 0.2 mm per 5 m 2.5 μ m 10 μ m (18 + 12 x length in m) μ m

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology measurements (cont'd) - Force testing machines - compression - tension - stability testing of compression - Force measurement instruments - Hydraulic jack with load cell or other force transducers	Universal testing machines in compression in accordance with BS 1610: Part 1: 1992 (True force method) Concrete testing machines in compression in accordance with BS 1610: Part 1: 1992 (True force method) Force testing machine in tension in accordance with BS 1610: Part 1: 1985 Stability testing of compression testing machines in accordance with BS 1881: Part 115: 1986 (AMD 6536) CS 1: 1990 Appendix D Calibration in accordance with in-house procedure SMTP004-CA-028B over the following ranges :- 50 kN to 500 kN above 500 kN to 5000 kN above 5000 kN to 10000 kN	Grade 1.0 in the range 0.1 kN to 3000 kN Grade 1.0 in the range 0.1 kN to 3000 kN Grade 0.5 in the range 5 kN to 50 kN Grade 1.0 in the range 0.2 kN to 50 kN 0.7% 0.6% 0.6%

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology measurements (cont'd) - Torque measurement instruments - Torque wrenches - Form measuring instruments - Straight edges - Surface plates - Surface texture samples	Calibration of torque wrench in accordance in-house procedure SMTP004-CA-120 over the following range :- 0.1 Nm to 1.0 Nm 0.5 Nm to 5.6 Nm 0.05 Nm to 1000 Nm Calibration of straight edges over the following range :- up to 1000 mm length Calibration of from for the range specified in BS 817 Measurement of surface texture sample parameters, R_a , R_y and R_z in accordance with in-house procedure SMTP004-CA-108 over the following ranges :- R_a up to 5.0 μm R_y up to 30.5 μm R_z up to 19.5 μm	0.28% of reading 0.55% of reading 2.4% F.S. (0.5 + 3 x length in m) μm (2 + 2 x diagonal length in m) μm 6.7% of measured value 5.2% of measured value 5.3% of measured value

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CONSTRUCTION MATERIALS 建築材料	Adhesive	In-situ pull-off test for tile adhesive	In-house method FT017
	Admixtures (Chemical analysis)	Ash content	BS 5075: Part 1: 1982 (AMD 11057) Appendix D.2
		Chloride content	BS 5075: Part 1: 1982 (AMD 11057) Appendix E
		Dry material content	BS 5075: Part 1: 1982 (AMD 11057) Appendix D.1
		Relative density (liquid)	BS 5075: Part 1: 1982 (AMD 11057) Appendix D.3
		pH value	In-house Method SMTP003-CH(AD)-001
		Acid-soluble alkali content (equivalent Na ₂ O)	In-house Method SMTP003-CH(AD)-006
	Aggregates	Particle size distribution	BS 812: Section 103.1: 1995 (AMD 6003) - sieve analysis
		Relative density and water absorption	BS 812: Part 2: 1975 (AMD 4615) - Gas jar method & wire basket method
		Flakiness index	BS 812: Section 105.1: 1989
		Elongation index	BS 812: Section 105.2: 1990
		Moisture content	BS 812: Section 109: 1990 (oven drying method)
		Bulk density	BS 812: Part 2: 1975 (AMD 4615)
		Aggregate impact value	BS 812: Part 3: 1975 (AMD 4616) BS 812: Part 112: 1990 (AMD 8772)
		Aggregate crushing value	BS 812: Part 110: 1990
		Ten per cent fine value	BS 812: Part 111: 1990
Aggregates (Site test)	Clay, silt and dust content	BS 812: Part 1: 1975 (AMD 4875) (Decantation method)	
		Shell content	BS 812: Part 106: 1985
	Sampling	BS 812: Part 102: 1989	

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CONSTRUCTION MATERIALS 建築材料	Aggregate (Chemical analysis)	Acid-soluble material	BS 812: Part 119: 1985 <i>Excluding</i> Cl. 4
		Water-soluble chloride salts	BS 812: Part 117: 1988 <i>Excluding</i> Cl. 4
		Chloride content (acid extraction)	BS 812: Part 117: 1988 Appendix C <i>Excluding</i> Cl. 4
		Water-soluble sulphate content	BS 812: Part 118: 1988 Cl. 5 <i>Excluding</i> Cl. 4 (gravimetric)
		Total sulphate content (acid extraction)	BS 812: Part 118: 1988 Cl. 6 <i>Excluding</i> Cl. 4
		Soundness	BS 812: Part 121: 1989 <i>Excluding</i> Cl.4 & Appendix A
		Soluble calcium oxide content	HKHA MTS Technical Specification Part D Cl. 1.4.9
		Soluble silica content	HKHA MTS Technical Specification Part D Cl. 1.4.9
	Anchor bolts	In-situ tensile proof load test in the force range 1 kN to 500 kN	In-house Method FT021
	Bituminous Materials	Aggregate grading	ASTM C117-95 ASTM C136-96a with modification
		Quantitative extraction of bitumen from bituminous paving mixtures	ASTM D2172-95 Method A, Ashing method
		Theoretical maximum specific gravity and density of bituminous paving mixtures	ASTM D2041-95 (weighing in water using type A container)
		Bulk specific gravity and density of non-absorptive compacted bituminous mixtures	ASTM D2726-96a
		Percent air voids in compacted dense and open bituminous paving mixtures	ASTM D3203-94

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Blocks & Bricks	Compressive strength of clay bricks Dimensions check of clay bricks Dimensions check of precast concrete masonry units Compressive strength of precast concrete masonry units Transverse strength of precast concrete blocks Dimensions check of clay & calcium silicate pavers Transverse breaking load of clay & calcium silicate pavers Skid resistance value of clay & calcium silicate pavers Compressive strength of precast concrete paving blocks Compressive strength of interlocking blocks Water absorption of clay bricks Water absorption of masonry units and segmental pavers Transverse strength of precast concrete flags, kerbs, channels and edgings Water absorption of precast concrete flags, kerbs, channels and edgings Dimensions check of precast concrete flags, kerbs, channels and edgings	BS 3921: 1985, Cl. 7, Appendix D (AMD 8946) BS 3921: 1985, Cl. 4, Appendix A (AMD 8946) BS 6073: Part1: 1981, Cl. 9, Appendix A (AMD 3944 & 4462) BS 6073: Part1: 1981, Cl. 10, Appendix B (AMD 3944 & 4462) BS 6073: Part1: 1981, Cl. 10.2, Appendix C (AMD 3944 & 4462) BS 6677: Part 1: 1986, Cl. 5, Appendix A & C BS 6677: Part 1: 1986, Cl. 6, Appendix D BS 6677: Part 1: 1986, Cl. 7, Appendix E BS 6717: Part 1: 1993, Cl. 11, Annex A & B HKHA Specification (1998 ed.) RAP3.T010.2 to T060.2 HKHA Specification (2000 ed.) RAP3.T010.3 to T060.3 General specification for civil engineering works:1992, Cl. 11.75 to 11.78, Appendix 11.1 BS 3921: 1985, Cl. 8, Appendix E (AMD 8946) AS/NZS 4456.14: 1997 BS 7263: Part1: 1994, Annex B BS 7263: Part 1: 1994, Annex C BS 7263: Part 1: 1994, Annex A

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Cement	Compressive strength of concrete cubes in the force range 50 kN - 3000 kN Compressive strength of mortar cubes in the force range 50 kN - 3000 kN Flexural strength of mortar prism in the force range 0.5 kN - 5 kN Compressive strength of broken mortar prism in the force range 5 kN - 1000 kN Density Fineness Standard consistence Setting times Soundness	BS 4550: Part 3: Section 3.4: 1978 (AMD 4247, 4498 & 5704) BS 4550: Part 3: Section 3.4: 1978 (AMD 4247, 4498 & 5704) BS EN 196-1: 1995 BS EN 196-1: 1995 BS 4550: Part 3: Section 3.2: 1978 BS EN 196-6: 1992 Annex NC BS 4550: Part 3: Section 3.3: 1978 (AMD 4387 & 5703) (Using the method stated in Appendix D of BS 4359: Part 2: 1982) BS EN 196-6: 1992 Cl. 4 (Blaine Method) BS 4550: Part 3: Section 3.5: 1978 (AMD 5705) BS EN 196-3: 1995 Cl. 5 BS 4550: Part 3: Section 3.6: 1978 (AMD 5706) BS EN 196-3: 1995 Cl. 6 BS 4550: Part 3: Section 3.7: 1978 (AMD 5707) BS EN 196-3: 1995 Cl. 7
	Cement (Site test)	Sampling	BS 4550: Part 1: 1978

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Cement (Chemical analysis)	Sample preparation Alumina content (Al_2O_3) Chloride ion content Free lime content Insoluble residue content Residue insoluble in hydrochloric acid and sodium carbonate Residue insoluble in hydrochloric acid and potassium hydroxide Iron oxide content (Fe_2O_3) Lime saturation factor Loss-on-ignition (L.O.I.) Magnesia content (MgO) Manganese content (Mn) Manganese content (as MnO) Manganese trioxide content (Mn_2O_3) Phosphoric anhydride content (P_2O_5) Total and acid-soluble potassium oxide contents (K_2O) Total and acid-soluble sodium oxide contents (Na_2O) Titanium dioxide content (Ti_2O) Impure silica content	BS 4550: Part 2: 1970 Cl. 11 BS 4550: Part 2: 1970 Cl. 7.1 BS EN 196-2 : 1995 Cl. 13.11 BS 4550: Part 2: 1970 (AMD 5713) Cl. 17 BS EN 196-21: 1992 Cl. 4 BS 4550: Part 2: 1970 Cl. 14.1.5 BS 4550: Part 2: 1970 Cl. 3.1 BSEN 196-2: 1995 Cl. 9 BS EN 196-2 : 1995 Cl. 10 BS 4550: Part 2: 1970 Cl. 8 BS EN 196-2 : 1995 Cl. 13.10 BS 12: 1978 Cl. 6.1 BS 4550: Part 2: 1970 Cl. 13.2 BS EN 196-2: 1995 Cl. 7 BS 4550: Part 2: 1970 Cl. 9.1 BS EN 196-2 : 1995 Cl. 13.15 BS EN 196-2 : 1995 Cl. 12 BS EN 196-2 : 1995 Cl. 12 BS 4550: Part 2: 1970 Cl. 14.14 BS EN 196-2 : 1995 Cl. 12 BS 4550: Part 2: 1970 Cl. 14.2.2 In-house Method SMTP-CH(CE) 013 In-house Method SMTP-CH(CE) 013 BS 4550: Part 2: 1970 Cl. 141 BS EN 196-2 : 1995 Cl. 13.2 and Cl. 13.3

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Cement (Chemical analysis) (cont'd)	Pure silica content Soluble silica content Total silica content (SiO ₂) Sulphuric anhydride content (SO ₃) Sulphate content (as SO ₃) Tricalcium aluminate content (C ₃ A) Calcium oxide content (CaO) Heat of hydration Reactive silica content (as SiO ₂)	BS EN 196-2 : 1995 Cl. 13.6 BS EN 196-2 : 1995 Cl. 13.7 and Cl. 13.8 BS 4550: Part 2: 1970 Cl. 4.1 BS EN 196-2 : 1995 Cl. 13.9 BS 4550: Part 2: 1970 Cl. 10 BS EN 196-2: 1995 Cl. 8 BS 12: 1978 Cl. 6.4 BS 4550: Part 2: 1970 Cl. 6.1 BS EN 196-2 : 1995 Cl. 13.14 BS 4550: Part 3: Section 3.8: 1978 with modification BS EN 197-1 : 2000 Cl. 3.2

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Cement and Portland pulverized fuel ash cement	Compressive strength of concrete cubes in the force range 50 kN – 3000 kN Compressive strength of mortar cubes in the force range 50 kN – 3000 kN Flexural strength of mortar prism in the force range 0.5 kN – 5 kN Compressive strength of broken mortar prism in the force range 5 kN – 1000 kN Density Fineness Standard consistence Setting times Soundness	BS 4550: Part 3: Section 3.4: 1978 (AMD 4247, 4498 & 5704) BS 4550: Part 3: Section 3.4: 1978 (AMD 4247, 4498 & 5704) BS EN 196-1: 1995 BS EN 196-1: 1995 BS 4550: Part 1: Section 3.2: 1978 BS EN 196-6: 1992 Annex NC BS 4550: Part 1: Section 3.2: 1978 (AMD 4387 & 5703)(Using the method stated in Appendix D of BS 4359: Part 2: 1982) BS EN 196-6: 1992 Cl. 4 (Blaine Method) BS 4550: Part 3: Section 3.5: 1978 (AMD 5705) BS EN 196-3: 1995 Cl.5 BS 4550: Part 3: Section 3.6: 1978 (AMD 5706) BS EN 196-3: 1995 Cl.6 BS 4550: Part 3: Section 3.7: 1978 (AMD 5707) BS EN 196-3: 1995 Cl.7

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Concrete	<p>Accelerated curing of test specimens (35 °C, 55 °C and 82 °C)</p> <p>Air content of fresh concrete</p> <p>Assessment of the cement, aggregate and water contents of fresh concrete</p> <p>Bond strength of mortars on concrete (In-situ pull-off test)</p> <p>Compressive strength of cores in the force range 50 kN - 3000 kN</p> <p>Compressive strength of cubes in the force range 50 kN - 3000 kN</p> <p>Curing of test specimens (Tropical zone temperature)</p> <p>Density of fresh concrete</p> <p>Density of hardened concrete</p> <p>Flexural strength of beams in the force range 5 kN – 100 kN</p> <p>Making of test specimen (beams)</p> <p>Making of test specimen (cubes)</p> <p>Making of test specimen (cylinders)</p> <p>Mixing of fresh concrete</p> <p>Sampling of fresh concrete</p> <p>Tensile splitting strength of cylinders in the force range 50 kN – 3000 kN</p> <p>Water absorption</p> <p>Workability (Compacting factor)</p>	<p>BS 1881: Part 112: 1983 (AMD 6100)</p> <p>CS1: 1990: Section 6 (AMD 1101 & 1102)</p> <p>BS 1881 : Part 128 : 1997 Annex A (Buoyancy method)</p> <p>HKHA MTS (00/02) Specification: Part D Cl. 43</p> <p>BS 1881: Part 120: 1983 CS 1: 1990 Section 15 (AMD 1201, 1202, 1203 & 1205)</p> <p>BS 1881: Part 116: 1983 CS 1: 1990 Section 12 (AMD 1201, 1202 & 1203)</p> <p>BS 1881: Part 111: 1983 CS 1: 1990 Section 10 (AMD 1101)</p> <p>CS1: 1990: Section 5 (AMD 1101)</p> <p>BS 1881: Part 114: 1983 (Section 6) CS 1: 1990 Section 16 (AMD 1201, 1202 & 1203)</p> <p>BS1881: Part 118: 1983 CS1: 1990: Section 14 (AMD 1201)</p> <p>CS1: 1990: Section 8 (AMD 1101)</p> <p>CS1: 1990: Section 7 (AMD 1101, 1102)</p> <p>CS1: 1990: Section 9 (AMD 1101, 1102)</p> <p>CS1: 1990: Section 11 (AMD 1201)</p> <p>CS1: 1990: Section 1 (AMD 1101)</p> <p>BS 1881: Part 117: 1983 (AMD 6096) CS1: 1990: Section 13 (AMD 1201, 1203 & 1204)</p> <p>BS 1881: Part 122: 1983 (AMD6108)</p> <p>CS1: 1990: Section 3 (AMD 1101 & 1102) BS 1881: Part 103: 1983</p>

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Concrete (cont'd)	Workability (Flow)	BS 1881: Part 105: 1983 CS1 : 1990 : Section 22 (AMD 1206)
		Workability (Slump)	CS1: 1990: Section 2 (AMD 1101)
		Workability (Vebe time)	CS1: 1990: Section 4 (AMD 1101 & 1102) BS 1881: Part 104: 1983
	Concrete (non-destructive test)	Covermeter survey	BS 1881: Part 204: 1988 HKHA MTS(00/02) Specification: Part D Cl.4.3.2
		Determination of rebound number by rebound hammer	BS EN 12504-2: 2001 BS 1881: Part 202: 1986 HKHA MTS (00/02) Specification: Part D Cl. 4.1.1
		Measurement of velocity of ultrasonic pulses in concrete	BS 1881:Part 203: 1986 Cl. 6 (direct transmission) HKHA MTS (00/20) Specification: Part D Cl. 4.1.2
	Concrete (site tests)	Density of fresh concrete	CS 1: 1990 Section 5 (AMD 1101)
		Making of test specimens (beams)	CS 1: 1990 Section 8 (AMD 1101)
		Making of test specimens (cubes)	CS 1: 1990 Section 7 (AMD 1101 & 1102)
		Making of test specimens (cylinders)	CS 1: 1990 Section 9 (AMD 1101 & 1102)
		Obtaining core samples	CS1: 1990: Section 15 (AMD 1201 & 1203)
		Sampling of fresh concrete	CS 1: 1990 Section 1 (AMD 1101)
		Workability (slump)	CS 1: 1990 Section 2 (AMD 1101)
		Temperature of fresh concrete	BS 5328: Part 4: 1990 Cl.3.4(b)
	Monitoring of setting time of fresh concrete	HKHA-MTS (2006/2008) Package A Specification Part D Cl. 1.3.9	

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Concrete (Chemical analysis)	Treatment of samples Cement and aggregate content (by CaO determination) Cement and aggregate content (by SiO ₂ determination) Aggregate / cement ratio Chloride content Sulphate content Combined water content Capillary porosity Original water content Original water/cement ratio Carbonate content Detection of PFA pH value	BS 1881: Part 124: 1988 Cl. 4 CS1: 1990 Section 21.4 BS 1881: Part 124: 1988 Cl. 5.4 & 5.9 CS 1: 1990: Section 21.6.4, 21.6.6 & 21.6.7 BS 1881: Part 124: 1988 Cl. 5.5 & 5.9 CS 1: 1990: Section 21.6.5, 21.6.6 & 21.6.7 BS 1881 Part 124: 1988 Cl. 5.9 BS 1881: Part 124: 1988 Cl. 10.2 CS1: 1990 Section 21.10. 2 BS 1881: Part 124: 1988 Cl. 10.3 CS1: 1990 Section 21.10.3 BS 1881: Part 124: 1988 Cl. 7.5 CS1: 1990 Section 21.7.5 BS 1881: Part 124: 1988 Cl. 7.4 CS1: 1990 Section 21.7.4 BS 1881: Part 124: 1988 Cl. 7 CS1: 1990 Section 21.7 BS 1881: Part 124: 1988 Cl. 5 and 7 CS1: 1990 Sections 21.6 and 21.7 CS1: 1990 Section 21.10.4.2 (manometric) CS1: 1990 Section 21.5 In-house method SMTP003-CH(CO)-009

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Foundation	Plate loading test	BS 1377: Part 9: 1990 Cl. 4.1 (Incremental loading method)
		Pile integrity test (PIT)	ASTM D5882-2000
		Cross-hole sonic logging test	ASTM D6760-2002
		Dynamic pile test (PDA)	ASTM D4945-2000
	Grout	Flow of grout for preplaced aggregate Concrete (in laboratory and on site)	ASTM C939: 97
		Compressive strength of grout cubes in the force range of 50 kN - 3000 kN	In-house Method SMTP 001-CO-031 HKHA/MTS Package A (06/08) Part D Cl.2.1
		Bleeding and free expansion (in laboratory and on site)	GS for Civil Engineering Works (1992) Cl. 17.60 HKHA Specification Library 2000 Cl. Pil. 1.T320.3
		Change in height	ASTM C1090-01 (Re-approved 2005)
		Early change in height	ASTM C827-01a (Re-approved 2005)
		Modified Figg test – Air permeability test	HKHA Specification Library (2004) CON 2 T120.4(2) HKHA/MTS Package A (06/08) Part D Cl.2.8
		Setting time	ASTM C953-06
	Ground water (Chemical analysis)	Sulphate content	BS 1377: Part 3: 1990 Cl. 5 <i>Excluding</i> Cl. 5.6 GEO Report No. 36: Test 3.5.5: 1996 GEOSPEC 3: 2001 Cl. 9.3
		pH value	BS 1377: Part 3: 1990 Cl. 9 GEOSPEC 3: 2001 Cl. 9.5
Metallic Materials	Metallic materials tensile test for the force range 50 kN to 2000kN	BS EN 10002-1 : 2001 Cl.10	

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Pulverised fuel ash	Fineness	BS 3892: Part 1: 1982 Appendix D BS 3892: Part 1: 1997 Appendix D
		Moisture content	BS 3892: Part 1: 1982 Appendix B BS 3892: Part 1: 1997 Appendix C
		Water requirement	BS 3892: Part 1: 1982 Appendix E BS 3892: Part 1: 1997 Appendix E
		Strength factor	BS 3892: Part 1: 1997 Appendix F
	Pulverised fuel ash (Chemical analysis)	Loss-on-ignition	BS 4550: Part 2: 1970 Cl. 13.2
		Chloride content	BS EN 196-2: 1992 Cl. 4
		Magnesia content	BS 3892: Part 1: 1982 Appendix C
		Sulphuric anhydride content	BS 4550: Part 2: 1970 Cl. 10
		Total alkali content (equivalent Na ₂ O)	In-house Method SMTP 003-CH(PF) 005
	Portland pulverized fuel ash cement (PPFAC) (Chemical analysis)	Loss-on-ignition (L.O.I.)	BS EN 196: Part 2: 1995 Cl. 7
		Magnesium oxide content (MgO)	BS 3892: Part 1: 1982 Appendix C
		Proportion of PFA	In-house method SMTP003-CH(PFC)-001
		Sulphuric anhydride content	BS EN 196: Part 2: 1995 Cl. 8
Repair mortar	Bond strength of mortars on concrete (In-situ pull-off test)	HKHA MTS (00/02) Specification Part D Cl. 215 (method 1)	

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Rock	Determination of the laboratory direct shear strength of jointed rock Determination of point load strength index of rock Determination of moisture content of rock by mass Determination of porosity / density of intact rock using saturation and buoyancy techniques Determination of porosity / density of intact rock using saturation and caliper techniques Determination of pulse velocities and ultrasonic elastic constants of intact rocks Determination of Schmidt rebound hardness of rocks Determination of unconfined compression strength of intact rock Preparation of rock core specimens and determining dimensional and shape tolerance Rock bolt anchor pull test Rock bolt long-term load retention test Point load strength test	ISRM 1981, with modification ASTM D5607-95, with modification ASTM D5731-95 ASTM D2216-98, with modification ISRM 1981, with modification ISRM 1981, with modification ISRM 1981, with modification ISRM 1981, with modification ISRM 1981, with modification ASTM D2938-95, with modification ASTM D4543-85 (Reapproved 1991), with modification ASTM D4435-84 (Reapproved 1998) .vs. ASTM D4436-84 (Reapproved 1998) .vs. ISRM : 1985 "Suggested method for determining point load strength"

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil	<p>Determination of moisture content by oven-drying at 45°C±5°C</p> <p>Determination of moisture content by oven-drying at 105°C±5°C</p> <p>Comparative test for the determination of moisture content by oven-drying</p> <p>Determination of liquid limit by cone penetrometer method</p> <p>Determination of plastic limit, plasticity index and liquidity index</p> <p>Determination of liquid limit, plastic limit, and plasticity index</p> <p>Determination of liquidity index</p> <p>Determination of particle density by gas jar method</p> <p>Determination of particle density by small pyknometer method</p> <p>Determination of particle size distribution by wet sieving (with dispersant)</p> <p>Determination of particle size distribution by wet sieving (without dispersant)</p> <p>Determination of particle size distribution by the hydrometer (with dispersant)</p>	<p>GEO Report No. 36: 1994 Test 22B GEOSPEC 3: 2001 Test 5.1</p> <p>GEO Report No. 36: 1994 Test 22A GEOSPEC 3: 2001 Test 5.2</p> <p>GEO Report No. 36: 1994 Test 22 C GEOSPEC 3: 2001 Test 5.3</p> <p>GEO Report No. 36: 1994 Test 2.4.3</p> <p>GEO Report No. 36: 1994 Test 2.5.3</p> <p>GEOSPEC 3: 2001 Test 6.1</p> <p>GEOSPEC 3: 2001 Test 6.2</p> <p>GEOSPEC 3: 2001 Test 7.1</p> <p>GEOSPEC 3: 2001, Test 7.2</p> <p>GEO Report No. 36: 1994 Test 2.9.2A GEOSPEC 3: 2001 Test 8.1</p> <p>GEO Report No. 36: 1994 Test 2.9.2B GEOSPEC 3: 2001 Test 8.2</p> <p>GEO Report No. 36: 1994 Test 2.9.5A GEOSPEC 3: 2001 Test 8.5</p>

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil (cont'd)	<p>Determination of particle size distribution by the hydrometer method (without dispersant)</p> <p>Construction of a continuous particle size distribution curve from the results of wet-sieving and sedimentation tests</p> <p>Determination of the dry density/moisture content relationship of soils containing particles which are not susceptible to crushing (using a 1000cc mould and 2.5 kg rammer)</p> <p>Determination of the dry density/moisture content relationship of soils containing particles which are susceptible to crushing (using a 1000cc mould and 2.5 kg rammer)</p> <p>Determination of the dry density/moisture content relationship of soils containing particles which are not susceptible to crushing (using a CBR mould and 2.5 kg rammer)</p> <p>Determination of the dry density/moisture content relationship of soils containing particles which are susceptible to crushing (using a CBR mould and 2.5 kg rammer)</p> <p>Determination of the dry density/moisture content relationship of soils containing particles which are not susceptible to crushing (using a 1000cc mould and 4.5 kg rammer)</p> <p>Determination of the dry density/moisture content relationship of soils containing particles which are susceptible to crushing (using a 1000cc mould and 4.5 kg rammer)</p> <p>Determination of the dry density/moisture content relationship of soils containing particles which are not susceptible to crushing (using a CBR mould and 4.5 kg rammer)</p> <p>Determination of the dry density/moisture content relationship of soils containing particles which are susceptible to crushing (using a CBR mould and 4.5 kg rammer)</p>	<p>GEO Report No. 36: 1994 Test 2.9.5B GEOSPEC 3: 2001 Test 8.6</p> <p>GEO Report No. 36: 1994 Test 2.9.6 GEOSPEC 3: 2001 Test 8.7</p> <p>GEO Report No. 36: 1994 Test 43A GEOSPEC 3: 2001 Test 10.1</p> <p>GEO Report No. 36: 1994 Test 43B GEOSPEC 3: 2001 Test 10.2</p> <p>GEO Report No. 36: 1994 Test 44A GEOSPEC 3: 2001 Test 10.3</p> <p>GEO Report No. 36: 1994 Test 44B GEOSPEC 3: 2001 Test 10.4</p> <p>GEOSPEC 3: 2001 Test 10.5</p> <p>GEOSPEC 3: 2001 Test 10.6</p> <p>GEOSPEC 3: 2001 Test 10.7</p> <p>GEOSPEC 3: 2001 Test 10.8</p>

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil (cont'd)	<p>Determination of the in situ bulk density and in situ dry density of soil by the sand replacement method suitable for fine- and Medium-grained soils (with small pouring cylinder)</p> <p>Determination of the in situ bulk density and in situ dry density of soil by the sand replacement method suitable for fine-, Medium-, and coarse-grained soils (with large pouring cylinder)</p> <p>Determination of relative compaction of fill material</p> <p>Determination of the California Bearing Ratio (CBR)</p> <p>Determination of compressibility characteristics of soils by the one-dimensional consolidation test</p> <p>Determination of compressibility characteristics of soils by the isotropic compression test in a triaxial cell</p> <p>Determination of shear strength of soils by the unconsolidated undrained triaxial compression test without pore pressure measurement</p> <p>Determination of shear strength of soils by the isotropically consolidated undrained triaxial test with pore pressure measurement</p> <p>Determination of shear strength of soils by the isotropically consolidated drained triaxial compression test with measurement of volume change</p> <p>Determination of shear strength of soils by the direct shear test using small shear box</p>	<p>GEO Report No. 36: 1994 Test 91 GEOSPEC 3: 2001 Test 11.1</p> <p>GEO Report No. 36: 1994 Test 92 GEOSPEC 3: 2001 Test 11.2</p> <p>GEOSPEC 3: 2001, Test 11.4 Buildings Department, PNAP 55: 1994, Clause 2, Appendix A</p> <p>GEOSPEC 3: 2001, Test 12.1</p> <p>GEOSPEC 3: 2001, Test 14.1</p> <p>GEOSPEC 3: 2001, Test 14.2</p> <p>GEOSPEC 3: 2001, Test 15.1</p> <p>GEOSPEC 3: 2001, Test 15.2</p> <p>GEOSPEC 3: 2001, Test 15.3</p> <p>GEOSPEC 3: 2001, Test 16.1</p>

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil (cont'd)	Determination of resistivity of soil by Disc electrodes method Determination of unconfined compressive strength of Cohesive soil by load frame method Determination of shear strength of cohesive Soil by the laboratory vane method Determination of permeability by constant Head method (with manometer) Determination of soil density using linear measurement method Determination of linear shrinkage of soil Determination of the coefficient of permeability of soil by falling-head or Constant-head method using a permeameter Of model Nanjing-55 Determination of maximum dry density for granular sands soils using an electric vibrating hammer Determination of maximum dry density for granular gravelly soils using an electric vibrating hammer Determination of minimum dry density for granular sand soils Determination of minimum dry density for granular gravelly soils GCO Probe Soil nail pull-out test	BS 1377: 1990: Part 3, Method 10.2 BS 1377: 1990: Part 7, Method 7 BS 1377: 1990: Part 7, Method 3 BS 1377: 1990: Part 5, Method 5 BS 1377: 1990: Part 2, Method 7.2 BS 1377: 1990: Part 2, Method 6 CN SD128-84 with modification BS 1377: 1990: Part 4, Method 4.2 BS 1377: 1990: Part 4, Method 4.3 BS 1377: 1990: Part 4, Method 4.4 BS 1377: 1990: Part 4, Method 4.5 General specification for civil engineering works: 1992 : volume 1: Appendix 7.1 GEOGUIDE 2: Section 23 (dynamic probing) HKHA Specification Library 2000: Cl. GIN.T120.3 HKHA Specification Library 1998: Cl. GIN.T120.2 HKHA Specification Library 1997: Cl. GIN.T120.1 HKHA Specification 2000 edition: SLO.T310.3 to SLO.T350.3 GEO particular specification for soil nail pull-out test: Cl. 7.229

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil (Chemical analysis)	Organic matter content Mass loss on ignition Water-soluble chloride content Acid-soluble chloride content pH value Water-soluble sulphate content Acid-soluble sulphate content	BS 1377: Part 3: 1990 Cl. 3 GEOSPEC 3: 2001 Cl. 9.1 BS 1377: Part 3: 1990 Cl. 4 GEOSPEC 3: 2001 Cl. 9.2 BS 1377: Part 3: 1990 Cl. 7.2 GEOSPEC3: 2001 Cl. 9.4 BS 1377: Part 3: 1990 Cl. 3 BS 1377: Part 3: 1990 Cl. 9 GEOSPEC3: 2001 Cl. 9.5 BS 1377: Part 3: 1990 Cl. 5 <i>Excluding</i> Cl. 5.6 GEO Report No. 36: Test 3.5.5: 1996 GEOSPEC 3: 2001 Cl. 9.3 BS 1377: Part 3: 1990 Cl. 5 <i>Excluding</i> Cl. 5.6 GEO Report No. 36: Test 3.5.5: 1996 GEOSPEC 3: 2001 Cl. 9.3
	Steel (pull-off test)	In-situ tensile proof load test of steel bar in the force range 1 kN – 700 kN	In-house Method FT020

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Steel	Tensile test on unmachined specimens of bolt and screw in the force range 50 kN – 2000 kN	BS 3692 : 2001 Cl. 13 BS EN 20898-1 : 1992 Cl. 8.2
		Tensile test on machined specimens of bolt and screw in the force range 50 kN – 2000 kN	BS 3692 : 2001 Cl. 13 BS EN 20898-1 : 1992 Cl. 8.1
		Proof load test for steel nuts	BS EN 20898-2 : 1994 Clause 8.1 BS 3692 : 2001 Annex C.1
	Steel (pull-off test)	In-situ tensile proof load test of steel bar in the force range 1 kN – 700 kN	In-house Method FT020
	Steel (reinforcing steel)	Tensile strength tests on hot rolled bars in the force range 5 kN - 2000 kN	BS 4449: 1988 Building Ordinance Office PNAP: 122 (Jan 90)
		Tensile strength tests on carbon steel bars in the force range 5 kN - 2000 kN	CS 2: 1995
		Bend tests on hot rolled bars	BS 4449: 1988 Building Ordinance Office PNAP: 122 (Jan 90)
		Bend tests on carbon steel bars	CS 2: 1995
		Rebend tests on hot rolled	BS 4449: 1988 Building Ordinance Office PNAP: 122 (Jan 90)
		Rebend tests on carbon steel bars	CS 2: 1995
Tensile strength tests of steel fabric in the force range 5 kN – 500 kN		BS 4483: 1985 BS 4483 : 1998 Annex A1.4	
	Rebend test of steel fabric	BS 4483: 1985 BS 4483 : 1998 Annex A 1.5	

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Steel (reinforcing steel) (cont'd)	Weld test of steel fabric Tensile strength tests of steel cold reduced wire in the force range 5 kN to 500 kN Rebend test of cold reduced wire Tensile test of reinforcing bar with mechanical coupler in the force range 5 kN – 2000 kN Performance test of tension bonded epoxy coated carbon steel bars	BS 4483: 1985 BS 4483 : 1998 Annex A 1.6 BS 4482: 1985 BS 4482: 1985 BS 8110: Part 1: 1997 Cl. 3.12.8.16.2 General Specification for Civil Engineering Works Volume 2: 1992 edition: Clause 15.33 General Specification for Civil Engineering Works Volume 2: 2006 edition: Clause 15.35 BS 7295 : Part 1 : 1990 (AMD6955) BS 3900 : Part C5 : 1992 (method 6)
	Steel (structural steel)	Tensile strength test of weldable structural steel section in the force range 5 kN – 2000 kN 2 kN – 2000 kN Charpy V-notch impact test Tensile test of hot rolled products of structural steels in the force range 50 kN – 2000 kN Tensile strength of hot finished structural hollow sections of non-alloy and fine grain steels in the force range 50 kN – 2000 kN Tensile test of cold formed welded structural hollow sections of non-alloy and fine grain steels in the force range 50 kN – 2000 kN	BS 4360: 1990 (with AMD 6825) BS 4360: 1986 BS EN 10045: Part1: 1990 BS EN 10025-1 : 2004 Clause 10.2.1 BS EN 10210-1 : 2006 Clause 9.2.2 BS EN 10219-1 : 2006 Clause 9.2.2
	Tile	In-situ pull-off test for tile	In-house Method FT005
	Water (Chemical analysis)	Total alkalinity	APHA 20e 2320B
		Chloride content	APHA 20e 4550 Cl B
		Sulphate content	BS 1377: Part 3: 1990 Cl. 5 <i>Excluding</i> Cl. 5.6
		Total dissolved solids dried at 180°C	APHA 20e 2540C
		Acid-soluble alkali content (equivalent Na ₂ O)	In-house Method SMTP003-CH(WC)007

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TEST CATEGORY 測試類別	ITEMS, MATERIALS OR PRODUCTS TESTED 測試項目、材料或產品	SPECIFIC TESTS OR PROPERTIES MEASURED 特定測試或量度的特性	SPECIFICATION, STANDARD METHOD OR TECHNIQUE USED 規範、標準方法或應用技術
ENVIRONMENTAL TESTING 環境測試	Noise	Noise measurement (Leq(A)) for construction sites	<p>Technical memorandum on noise from construction work in designated areas, Annex D – General calibration and measurement procedures</p> <p>Technical memorandum on noise from percussive piling, Annex – General calibration and measurement procedures</p> <p>Technical memorandum on noise from construction work other than percussive piling, Annex – General calibration and measurement procedures</p> <p>Test method for the above requirements :- ISO 1996-1: 1982 < Excluding the following > Clause 5.3</p>
	Sediment	Trace Metals :- (Acid-leachable) - Cadmium, Chromium, Copper, Lead, Nickel, Zinc - Mercury	<p>ASTM D3974 - 81 (Extraction) .vs. USEPA 7000A (Determination) .vs.</p> <p>ASTM D3974 - 81 (Extraction) .vs. APHA 20e 3112B (Cold vapour AAS) .vs.</p>
	Water and Wastewater	Physical examination :- - pH value - Total suspended solids dried at 103°C to 105°C Organic pollutants :- - Chemical oxygen demand	<p>In-house Method SMTP003-CH(EN)003</p> <p>APHA 20e 2540 D (Gravimetric)</p> <p>APHA 20e 5220 B (Open reflux)</p>

.vs. denotes test voluntarily suspended