

Annex I

Scope of Accreditation



No. 022

ETS-Testconsult Limited
東業德勤測試顧問有限公司

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CLIENTELE 服務對象 : Public
公眾

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

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

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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	CALIBRATION AND MEASUREMENT CAPABILITY* 校準和測量能力*
CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology measurements - Dimensional measurements - Calipers - Coating thickness gauge - Depth Gauge - Dial Gauge - Digital Indicator - Displacement transducer - Extensometers	Calibration of calipers in accordance with clause B1, B2.2 and B2.3 of BS 887 : 1982 over the following range :- Up to 300 mm Up to 600 mm Calibration of coating thickness gauge in accordance with in-house method CQS/013/L over the following range : Up to 1036 μm Calibration of depth gauge in accordance with in-house method CQS/023/L over the following range :- Up to 200 mm Calibration of dial gauges in accordance with clause A5 of AS 2103 : 1978 and clause B3 of BS 907 : 1965 over the following ranges :- Up to 100 mm Calibration of digital indicator over the following range :- Up to 25mm 25mm to 50 mm Calibration of displacement transducer over the following range :- Up to 100 mm Extensometers in accordance with BS 3846 : 1970 Calibration of extensometers in accordance with BS EN ISO 9513 : 2002	19 μm 30 μm 2.7 μm 23 μm 1.9 μm 1.8 μm 14 μm 9 μm Grade D for gauge lengths 50 mm – 200 mm Class 1 for gauge lengths 50 mm – 100 mm

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	- External Micrometer	Calibration of external micrometer in accordance with appendix A of BS 870 : 1950 over the following range :- Up to 50 mm	2.3 μ m
	- Feeler gauges	Calibration of feeler gauge in accordance with in-house method CQS/007/L over the following range :- 0.03 mm to 2 mm	3 μ m
	- Bevel protractor	Calibration of angles with angle gauge for the range :- 15° to 140°	3.0 minutes
	- Measuring Tape	Calibration of measuring tape in accordance with in-house method CQS/014/L over the following range :- Up to 10 m Above 10 m to 50 m	0.29 mm 0.86 mm
	- Measuring Head	Calibration of measuring head in accordance with in-house method CQS/022/L over the following range :- Up to 25 mm	1.3 μ m
	- Plastic Foils	Calibration of plastic foils in accordance with in-house method CQS/013/L over the following range :- Up to 1036 μ m	2.6 μ m
	- Spirit Level	Calibration of level in accordance with in-house method CQS/021/L	0.091 mm/m or 0.3'
	- Square	Calibration of square in accordance with in-house method CQS/018/L over the following range :- Up to 200 mm	7.3 μ m
	- Steel Rule	Calibration of steel rule in accordance with in-house method CQS/015/L over the following range :- Up to 1 m	0.11 mm
	- Step wedge	Calibration of thickness for the range :- 1 mm to 20 mm	5.6 μ m

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology measurements (cont'd) - Dimensional measurements (cont'd) - Weld gauges - Force testing machines - compression	Calibration of main rule for length measurement : 0 to 40 mm Calibration of sliding rule for height and depth measurement : 0 to 16 mm Calibration of vernier rule for depth measurement : 0 to 25 mm Calibration of angle gauge for angle measurement: 90° to 150° Calibration of main and angle rule for width measurement : 0 to 40 mm Universal testing machines in compression in accordance with BS EN ISO 7500 : Part 1 : 2004 Concrete testing machine in compression in accordance with BS 1610 : Part 1 : 1992 CS 1 : 1990 : Vol. 2 Appendix D Concrete testing machine in compression in accordance with BS EN 12390-4: 2000: Annex B CS 1 : 2010 : Vol. 2 Appendix D	0.2 mm 0.2 mm 0.05 mm 1.1° 0.5 mm Class 1.0 in the force range 0.7 kN – 3000 kN Grade 1.0 in the force range 1 kN – 3000 kN Class 1.0 in the force range 1 kN – 3000kN

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology measurements (cont'd) - Force testing machines (cont'd) - Impact testing machine - Tension - Force, torque and pressure measurements - Proving ring - Load cell (Compression) - Pull-off Tester - Torque wrench	Calibration for indirect verification in accordance with BS EN 10045-2 : 1993 : Cl. 6 Calibration in accordance with in-house method CQS/012/F over the following range: 1 kN to 50 kN Calibration in accordance with GEOPSPEC 3: Appendix A : Section A3.1 over the following range: 0.1 kN to 10 kN Above 10 kN to 50 kN Calibration in accordance with in-house Method CQS/009/F over the following range: 0.1 kN to 10 kN Above 10 kN to 50 kN Calibration in accordance with in-house Method CQS/009/F over the following range: 1 kN to 50 kN Above 50 kN to 300 kN Above 300 kN to 3000 kN Load verification in accordance with in-house method CQS/010/F over the following range :- 1 kN to 50 kN Calibration of torque wrench in accordance with ISO 6789 : 2003 and BS EN 26789 : 1994 : clause 4:- 20 Nm to 1000 Nm	± 4 joules at CRM of 28.8 joules ± 15% of CRM of 127 joules 0.043% to 0.3% 0.05% to 0.6% 0.05% to 0.12% 0.05% to 0.74% 0.052% to 0.12% 0.052% to 0.26% 0.059% to 0.13% 0.08% to 0.88% 0.17% to 3.1% 0.6% to 3.2%

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology measurements (cont'd) - Force, torque and pressure measurements (cont'd) - Compression load cell for pile tests - Compression load cell for pile tests - Pressure transducer and Gauge and recorder - Water pressure gauge, recorder and transducer	Calibration of load cell in accordance with in-house method over the following range :- 300 kN < load < 900 kN 900 kN < load < 2400 kN 2400 kN < load < 6000 kN 6000 kN < Load < 12000 kN Calibration of load cell with hydraulic jack in accordance with in-house method over the following range :- 300 kN < load < 900 kN 900 kN < load < 2400 kN 2400 kN < load < 6000 kN 6000 kN < Load < 12000 kN Calibration of pressure transducer and gauge over the following range :- 6 to 1000 bar (oil as pressure medium) 6 - 25 bar 25 - 40 bar 40 - 250 bar 250 - 400 bar 400 - 1000 bar Calibration of gauge pressure over the following range:- 0 bar to 10 bar Calibration in accordance with GEOSPEC 3 Appendix A3.2 over the following range:- 0 bar to 10 bar	7.7% of the measured load 3.1% of the measured load 1.5% of the measured load 0.88% of the measured load 7.7% of the measured load 3.1% of the measured load 1.5% of the measured load 0.88% of the measured load 0.16 bar 0.39 bar 1.6 bar 3.3 bar 8.1 bar 0.013 bar

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Mechanical metrology measurements (cont'd) - Force, torque and pressure measurements (cont'd) - Air pressure gauge and Transducer - Vacuum gauge and Transducer - Hardness measurements - Hardness testing machine - Hardness testing machine	Calibration of gauge pressure over the following ranges:- 0 bar to 12 bar 12 bar to 20 bar Calibration of gauge pressure over the following range:- - 1 bar to 0 bar Indirect verification of testing machines for measuring Vickers hardness in accordance with BS 427 : 1990 at the following specific values :- Vickers HV 5 Vickers HV 10 Vickers HV 30 Indirect verification of testing machines for measuring Vickers hardness in accordance with BS EN ISO 6507-2 : 1998 at the following specific values :- Vickers HV 5 Vickers HV 10 Vickers HV 30	0.022 bar 0.06 bar 0.005 bar 2.3% HV 1.9% HV 1.3% HV 2.0% HV 1.9% HV 1.3% HV

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CALIBRATION SERVICES (cont'd) 校正服務(續上)	Temperature measurements - Drying oven - Incubator - Liquid bath - Temperature bath - Thermometers - Liquid in-glass Thermometer - Liquid in-glass Thermometer	Calibration of temperature over the following range: 30 °C to 184 °C Calibration of temperature over the following range: 19 °C to 80 °C Calibration of temperature distribution in accordance with in-house method CQS/008/T over the following range: 10 °C to 180 °C Calibration of temperature, stability in accordance with in-house method CQS/004/T over the following range: Temperature: 20 °C to 40 °C 40 °C to 75 °C Stability: 20 °C to 40 °C 40 °C to 75 °C Calibration of temperature at the following specific point:- 0 °C Calibration in accordance with in-house method CQS/003/T over the following range:- 10 °C to 100 °C Above 100 °C to 150 °C Above 150 °C to 180 °C	0.7 K 0.5 K 0.082 K 0.4 K 0.5 K 0.12 K 0.08 K 0.07 K 0.15 K 0.21 K 0.40 K

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CONSTRUCTION MATERIALS 建築材料	Adhesive	Pull-off test of adhesive	In-house Method TPF / 016
	Aggregates	Clay, silt and dust content	BS 812 : Part 1 : 1975 (AMD 4875) (Decantation method)
		Relative density and water absorption	BS 812 : Part 2 : 1975 (AMD 4615) (Gas jar method and Pycnometer method)
		Particle size distribution	BS 812 : Section 103.1 : 1985 (AMD 6003) (Sieve analysis)
		Flakiness index	BS 812 : Section 105.1 : 1989
		Shell content	BS 812 : Part 106 : 1985
		Moisture content	BS 812 : Part 109 : 1990 (Oven drying method)
		Ten per cent fines value	BS 812 : Part 111 : 1990
		Aggregate impact value	BS 812 : Part 112 : 1990
	Aggregates (Site tests)	Sampling	BS 812 : Part 102 : 1984
	Aggregates (Chemical analysis)	Water-soluble chloride salts	BS 812 : Part 117 : 1988
		Water-soluble sulphate content	BS 812 : Part 118 : 1988 Cl.5 <i>Excluding</i> Cl.4
		Total sulphate content	BS 812 : Part 118 : 1988 Cl.6 <i>Excluding</i> Cl.4
		Acid-soluble materials	BS 812 : Part 119 : 1985 <i>Excluding</i> Cl.4
		Soundness	BS 812 : Part 121 : 1989 <i>Excluding</i> Cl.4 & Appendix A
	Anchor	Tensile proof load test on anchors 1kN to 1000kN	BS 5080 Part 1 : 1993, Cl. 6, 7.1.1 & 7.1.3 (incremental loads) In-house method TPF 003 (without deformation and graphical presentation)
		Shear proof load test on anchors 1kN to 500kN	BS 5080 Part 2 : 1986 Cl. 6 & 7

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Anchor bolts	Tensile proof load test on anchor bolts (1 kN - 15 kN)	In-house method TPF / 003
		Tightening torque test for in-situ anchor bolt in the range : 50 Nm – 1000 Nm	In-house method TPF / 021
	Building components	Load test of spider	In-house method TPF/020
	Building stones	Flexural strength of dimension stone	ASTM C880-06
		Strength of individual anchorages in dimension stone	ASTM C1354-96 (2004) Clause 9.0
	Cement	Compressive strength of concrete cubes in the force range 50 kN-2500 kN	BS 4550 : Part 3 : Section 3.4 : 1978 (AMD 4247, 4498 & 5704)
		Compressive strength of mortar cubes in the force range 50 kN-2500 kN	BS 4550 : Part 3 : Section 3.4 : 1978 (AMD 4247, 4498 & 5704)
		Compressive strength of broken mortar prism in the force range 2 kN – 250 kN	BS EN 196-1 : 1995
		Density	BS 4550 : Part 3 : Section 3.2 : 1978 BS EN 196-6 :1992
		Fineness	BS 4550 : Part 3 : Section 3.3 : 1978 (Using the method stated in Appendix D of BS 4359 : Part 2 : 1982)(AMD 5703) BS EN 196-6 : 1992
		Flexural strength of mortar prism in the force Range 2 kN – 250 kN	BS EN 196-1 : 1995
		Setting times	BS 4550 : Part 3 : Section 3.6 : 1978 (AMD 5706) BS EN 196-3 : 1995
		Soundness	BS 4550 : Part 3 : Section 3.7 : 1978 (AMD 5707) BS EN196-3 : 1995
Cement (Site tests)	Standard consistence	BS 4550 : Part 3 : Section 3.5 : 1978 (AMD 5705) BS EN 193-3 : 1995	
	Sampling	BS 4550 : Part 1 : 1978 BS EN 196-7 : 1992	

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Cement (Chemical analysis)	Aluminum content (Al ₂ O ₃)	BS 4550 : Part 2 : 1970 Cl. 7.1
		Insoluble residue content	BS 4550 : Part 2 : 1970 Cl. 3.1
		Iron oxide content (Fe ₂ O ₃)	BS 4550 : Part 2 : 1970 Cl. 8
		Loss-on-ignition (L.O.I.)	BS 4550 : Part 2 : 1970 Cl. 13.1 BS EN 196-2 : 1995 Cl. 7
		Magnesia content (MgO)	BS 4550 : Part 2 : 1970 Cl. 9.1
		Manganese oxide content (Mn ₂ O ₃)	BS 4550 : Part 2 : 1970 Cl. 14.1.4
		Phosphorus oxide content (P ₂ O ₅)	BS 4550 : Part 2 : 1970 Cl. 14.2.2
		Potassium oxide content (K ₂ O)	BS 4550 : Part 2 : 1970 (AMD 4260) Cl. 16.1
		Sodium oxide content (Na ₂ O)	BS 4550 : Part 2 : 1970 (AMD 4260) Cl. 16.1
		Titanium oxide content (TiO ₂)	BS 4550 : Part 2 : 1970 Cl. 14.2.1
		Total calcium oxide content (CaO)	BS 4550 : Part 2 : 1970 Cl. 6.1
		Total silica content (SiO ₂)	BS 4550 : Part 2 : 1970 Cl. 4.1
		Total sulphur content (SO ₃)	BS 4550 : Part 2 : 1970 Cl. 12
		Sulphate content (SO ₃)	BS EN 196-2 : 1995 Cl. 8
		Chloride content	BS 4550 : Part 2 : 1970 Cl. 17 (AMD 5713) BS EN 196-21 : 1992 Cl. 4
		Ammonium hydroxide group	BS 4550 : Part 2 : 1970 Cl. 5
		Residue insoluble in hydrochloric acid and sodium carbonate	BS EN 196-2 : 1995 Cl. 9
		Coating	Pull-off test of Coating
	Pull-off test of spray fire-resistive coating material		ASTM E736-92 : Field test method with modification

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Concrete	Mixing and sampling of fresh concrete Slump Compacting factor Flow table Density of compacted fresh concrete Making of test specimens (cubes) Making of test specimens (cylinders) Curing of test specimens (Tropical zone temperature) Density of hardened concrete Compressive strength of cubes in the force range 50 kN - 3000 kN Compressive strength of cores in the force range 50 kN - 3000 kN Water absorption Setting time monitoring of fresh concrete	CS 1 : 1990 Section 11 (AMD 1101) CS 1 : 2010 Section 11 BS 1881 : Part 102 : 1983 (AMD 6090) CS 1 : 1990 Section 2 (AMD 1101) CS 1 : 2010 Section 2 Part I CS 1 : 1990 Section 3 (AMD 1101) CS 1 : 2010 Section 2 Part II BS 1881 : Part 105 : 1984 (AMD 6087) CS1 : 1990 Section 22 (AMD 1206) CS 1 : 2010 Section 2 Part IV BS 1881 : Part 107 : 1983 (AMD 6085) CS 1 : 1990 Section 5 (AMD 1101) CS 1 : 2010 Section 5 BS 1881 : Part 108 : 1983 (AMD 6105) CS 1 : 1990 Section 7 (AMD 1101) CS 1 : 2010 Section 7 BS 1881 : Part 108 : 1983 (AMD 6103) CS 1 : 1990 Section 9 (AMD1101) CS 1 : 2010 Section 9 BS 1881 : Part 111 : 1983 CS 1 : 1990 Section 10 (AMD 1101) CS 1 : 2010 Section 10 BS 1881 : Part 114 : 1983 Section 6 (AMD 6098) CS 1 : 1990 Section 16 (AMD 1201) CS 1 : 2010 Section 16 BS 1881 : Part 116 : 1983 (AMD 6097) CS 1 : 1990 Section 12 (AMD 1201 & 1202) CS 1 : 2010 Section 12 BS 1881 : Part 120 : 1983 CS 1 : 1990 Section 15 (AMD 1201 & 1202) CS 1 : 2010 Section 15 BS 1881 : Part 122 : 1983 HKHA MTS (00/02) Specification Part D Clause 1.3.9

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Concrete (Chemical analysis)	Cement and aggregate content (by CaO determination) Aggregate / cement ratio Original water content Chloride ion content Oven dried bulk density Sulphate content pH value Detection of PFA	BS 1881: Part 124: 1988 Cl. 5.4 & 5.9 CS 1 : 1990: Section 21.6.4, 21.6.6 & 21.6.7 CS 1 : 2010: Section 21.6.4, 21.6.6 & 21.6.7 BS 1881 : Part 124 : 1988 Cl. 5.9 BS 1881 : Part 124 : 1988 Cl. 7 CS1: 1990 Cl. 21.7 CS1: 2010 Cl. 21.7 BS 1881 : Part 124 : 1988 Cl. 10.2 CS1: 1990 Cl. 21.10.2 CS1: 2010 Cl. 21.10.2 BS 1881 : Part 124 : 1988 BS 1881 : Part 124 : 1988 Cl. 10.3 CS1: 1990 Cl. 21.10.3 CS1: 2010 Cl. 21.10.3 In-house Method TPC / 060 CS1: 1990 Cl. 21.5 CS1: 2010 Cl. 21.5

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Concrete (Non-destructive testing)	Carbonation test Concrete core sampling Concrete open-up inspection to reinforcement Covermeter survey Half-cell potential measurement Obtaining drilling powder Repair mortar inspection core Resistivity of concrete structure Schmidt Hammer test Ultrasonic pulse velocity test (direct method)	HKHA MTS (00/02) Specification Part D Cl. 4.3.1 Method 1 BRE IP6/81 CS1 : 1990 :Section 15 CS1 : 2010 :Section 15 HKHA MTS Package A1 (2000/2002) Part 1 : Cl. 4.2.1 HKHA MTS (00/02) Specification Part D Cl. 4.3.2 BS1881 : Part 204 : 1988 HKHA MTS (00/02) Specification Part D Cl. 4.3.4 ASTM C876-91 HKHA MTS (00/02) Specification Part D Cl. 6.4 HKHA MTS (00/02) Specification Part D Cl. 2.1.22 BS1881 : Part 120 : 1983 BS 1881 Part 2d : 1986 Cl. 2.3 HKHA MTS (00/02) Specification Part D Cl. 4.1.1 BS1881 : Part 202 : 1986 BS EN 12504-2 : 2001 HKHA MTS (00/02) Specification Part D Cl. 4.1.2 BS 1881 : Part 203 : 1986

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Grout	Preparation of Trial Mix Early-age Change of Height Making and curing of grout cubes Determination of compressive strength of grout cubes (20 kN to 2000 kN) Determination of grout flow for preplaced-aggregate concrete (Flow cone method) Bleeding and free expansion Determination of expansion and bleeding of freshly mixed grouts for preplaced-aggregates concrete	In-house Method TPM/001/G ASTM C827-01a In-house Method TPM/002/G In-house Method TPM/003/G ASTM C939-87 ASTM C939-94a ASTM C939-97 ASTM C939-02 ASTM C939-87 (with modification) ASTM C939-94a (with modification) ASTM C939-97 (with modification) ASTM C939-02 (with modification) General Specification for civil Engineering Works (1992), Clause 7.129 and Clause 17.60 Hong Kong Housing Authority Specification Library (2004 edition) Section PIL. 1. T320.4 Section PSC. T720.4 and Section GRO. T110.4 ASTM C940-98a (Reapproved 2003)
	Grout (Site test)	Making and curing of grout cubes Determination of grout flow for preplaced-aggregate concrete (Flow cone method) Bleeding and free expansion Determination of expansion and bleeding of freshly mixed grouts for preplaced-aggregates concrete	In-house method TPM/002/G ASTM C939-87 ASTM C939-94a ASTM C939-97 ASTM C939-02 ASTM C939-87 (with modification) ASTM C939-94a (with modification) ASTM C939-97 (with modification) ASTM C939-02 (with modification) General Specification for civil Engineering Works (1992), Clause 7.129 and Clause 17.60 Hong Kong Housing Authority Specification Library (2004 edition) Section PIL. 1. T320.4 Section PSC. T720.4 and Section GRO. T110.4 ASTM C940-98a (Reapproved 2003)

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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
CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Paving Blocks	Compressive Strength	GS for Civil Engineering Work 1992
		Dimension	BS 6677 : Part 1 : 1986
		Skid resistance value of paving blocks	BS 6677 : Part 1: 1986 : Appendix E BS 812 : Part 3 : 1975 : Cl. 10.9
		Transverse Breaking Load	BS 6677 : Part 1 : 1986
		Water Absorption	AS/NZS 4456 : 14 : 1997
	Polymer modified mortar (Chemical analysis)	Sample preparation	HKHA 002 : 1990 (modified) Cl.6
		Polymer solids content	HKHA 002 : 1990 (modified) Cl.8
		Aggregate/cement ratio	HKHA 002 : 1990 (modified) Cl.7
	Polymer latex (Chemical analysis)	Polymer solids content	HKHA 002 : 1990 (modified) Cl.2
	Portland pulverised fuel ash cement (Chemical analysis)	Magnesia content	BS 3892 : Part 1 : 1982 Appendix C
		Sulphur trioxide content	BS 4550 : Part 2: 1970 Cl. 12
		Loss-on-ignition	BS 4550 : Part 2: 1970 Cl. 13.2
		Proportion of pulverised fuel ash	In-house Method TPC / 073
	Pulverized fuel ash	Moisture content	BS 3892 : Part 1 : 1982 Appendix B
		Fineness	BS 3892 : Part 1 : 1982 Appendix D
		Water Requirement	BS 3892 : Part 1 : 1982 Appendix E
	Pulverised fuel ash (Chemical analysis)	Magnesia content	BS 3892: Part 1: 1982 Appendix C
		Sulphuric anhydride content	BS 4550: Part 2: 1970 Cl. 10
		Loss-on-ignition	BS 4550: Part 2: 1970 Cl. 13.2

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Repair mortar	Trial mix Making of test cube Compressive strength of test cubes in the force range of 50 kN - 2000 kN Flow Pull-off test on mortar	In-house Method based on HKHA MTS (00/02) Specification, Part D Cl. 2.1.20 In-house Method TPM / 002 / M HKHA MTS (00/02) Specification, Part D Cl. 2.1.1 BS 4551 : 1980 Cl. 12 HKHA Material Testing Specification (1995) Clause B1.15 method 1 BS EN 1542: 1999 Cl. 7.0
	Repair mortar (Site tests)	Making of test cube	In-house Method TPM / 003 M
	Rock	Determination of laboratory direct shear of joint rock Preparing rock core sample specimens and determining dimensional and shape tolerances Unconfined compressive strength of intact rock core specimens Determination of the point load strength index of rock	ASTM D5607-02 ASTM 4543-04 ASTM D2938-95 (Reapproved 2002) ASTM D7012-07 ASTM D5731-95
	Soil	Determination of moisture content by oven-drying at 45°C±5°C Determination of moisture content by oven-drying at 105°C±5°C Comparative test for the determination of moisture content by oven-drying Determination of liquid limit by the cone penetrometer method Determination of plastic limit, plasticity index and liquidity index Determination of liquid limit, plastic limit, and plasticity index	GEO Report No. 36 : 1994 Test 2.3.2B GEOSPEC 3 : 2001 Test 5.1 GEO Report No. 36 : 1994 Test 2.3.2A GEOSPEC 3 : 2001 Test 5.2 GEO Report No. 36 : 1994 Test 2.3.2C GEOSPEC 3 : 2001 Test 5.3 GEO Report No. 36 : 1994 Test 2.4.3 GEO Report No. 36 : 1994 Test 2.5.3 GEOSPEC 3 : 2001 Test 6.1

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil (cont'd)	Determination of liquidity index	GEOSPEC 3 : 2001 Test 6.2	
		Determination of particle density by gas jar method	GEOSPEC 3 : 2001 Test 7.1	
		Determination of particle density by small pyknometer method	GEOSPEC 3 : 2001 Test 7.2	
		Determination of particle size distribution by wet sieving (with dispersant)	GEO Report No. 36 : 1994 Test 2.9.2A GEOSPEC 3 : 2001 Test 8.1	.vs.
		Determination of particle size distribution by wet sieving (without dispersant)	GEO Report No. 36 : 1994 Test 2.9.2B GEOSPEC 3 : 2001 Test 8.2	.vs.
		Determination of particle size distribution by the hydrometer method (with dispersant)	GEO Report No. 36 : 1994 Test 2.9.5A GEOSPEC 3 : 2001 Test 8.5	.vs.
		Determination of particle size distribution by the hydrometer method (without dispersant)	GEO Report No. 36 : 1994 Test 2.9.5B GEOSPEC 3 : 2001 Test 8.6	.vs.
		Construction of a continuous particle size distribution curve from the results of wet sieving and sedimentation tests	GEO Report No. 36 : 1994 Test 2.9.6 GEOSPEC 3 : 2001 Test 8.7	.vs.
		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)	GEO Report No. 36 : 1994 Test 4.3.3A GEOSPEC 3 : 2001 Test 10.1	.vs.
		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)	GEO Report No. 36 : 1994 Test 4.3.3B GEOSPEC 3 : 2001 Test 10.2	.vs.
		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)	GEO Report No. 36 : 1994 Test 4.3.4A GEOSPEC 3 : 2001 Test 10.3	.vs.
		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)	GEO Report No. 36 : 1994 Test 4.3.4B GEOSPEC 3 : 2001 Test 10.4	.vs.
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)	GEOSPEC 3 : 2001 Test 10.5			

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil (cont'd)	<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>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 in-situ bulk density and in-situ dry density of soul by nuclear densometer method suitable for fine- and medium grained soils</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 – the one-dimensional consolidation test Ratio (CBR)</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> <p>GEO Report No. 36 : 1994 Test 9.2.1 GEOSPEC 3 : 2001 Test 11.1</p> <p>GEO Report No. 36 : 1994 Test 9.2.2 GEOSPEC 3 : 2001 Test 11.2</p> <p>GEOSPEC 3 : 2001 Test 11.3</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>

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil (cont'd)	<p>Determination of compressibility characteristics of soils – the isotropic compression test in a triaxial cell</p> <p>The unconsolidated undrained triaxial compression test without pore pressure measurement</p> <p>The isotropically consolidated undrained triaxial compression test with pore pressure measurement</p> <p>The isotropically consolidated drained triaxial compression test with measurement of volume change</p> <p>The direct shear test (small shear box apparatus)</p> <p>Soil nail pull-off test</p> <p>Determination of properties of fill material - resistivity</p> <p>Determination of in-situ redox potential of reinforced fill structure</p> <p>Determination of density of soil (Linear measurement method)</p> <p>Determination of resistivity of soil (open container method)</p> <p>Determination of redox potential of soil</p> <p>The isotropically consolidated undrained triaxial compression test with pore pressure measurement – Triaxial test on loosely compacted fill material</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> <p>ENV 1997-1 : Eurocode 7 KCRC Major Capital Works Standard Specification : Cl. 52.31 Hong Kong Housing specification 2000 Edition : SLO.T310.3 to SLO.T350.3 GEO Particular Specification for soil Nail Pullout Test : Cl. 7.229A1</p> <p>GEOSPEC 2: 1989: Cl. 5.4</p> <p>GEOSPEC 2: 1989: Cl. 5.5</p> <p>BS 1377 : Part 2 : 1990, Cl. 7.2</p> <p>BS 1377 : Part 3 : 1990, Cl. 10.4</p> <p>BS 1377: Part 3: 1990: Cl. 11</p> <p>In-house method TPG/084</p>

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Soil (Chemical analysis)	Acid-soluble sulphate content and water-soluble sulphate content	BS 1377 : Part 3 :1990 Section 5.2 - 5.3	
		Organic matter content	GEOSPEC 3 : 2001 : Test 9.1	
		Loss-on-ignition (L.O.I.)	GEOSPEC 3 : 2001 : Test 9.2	
		Total sulphate content (as SO ₃)	GEOSPEC 3 : 2001 : Test 9.3	
		Water-soluble sulphate content (as SO ₃)	GEOSPEC 3 : 2001 : Test 9.3	
		Water-soluble chloride content	GEOSPEC 3 : 2001 : Test 9.4	
		pH value	GEOSPEC 3 : 2001 : Test 9.5	
		Ground water (Chemical analysis)	Sulphate content	BS 1377 : Part 3 : 1990 Section 5.2 - 5.5 GEOSPEC 3 : 2001 : Test 9.3
			pH value	GEOSPEC 3 : 2001 : Test 9.5
		Steel (reinforcing)	Tensile strength test on hot rolled bars in the force range 5 kN - 2000 kN	BS 4449 : 1988
			Bend test on hot rolled bars	BS 4449 : 1988
			Rebend test on hot rolled bars	BS 4449 : 1988
			Tensile strength test on carbon steel bars in the force range 5 kN - 2000 kN	CS2 : 1995
			Bend test on carbon steel bars	CS2 : 1995
			Rebend test on carbon steel bars	CS2 : 1995
		Tensile test for ultimate tensile strength and permanent elongation of high yield deformed bar mechanically spliced joint (8 mm – 50 mm diameter) in the force range 5 kN – 2000 kN	BS 8110 : Part 1 : 1989 BS 8110 : Part 1 : 1997 General Specification for Civil Engineering Works Volume 2 : 1992 edition : Clause 15.33	
		Tensile strength test on cold reduced steel Wire in the force range 5 kN - 2000 kN	BS 4482 : 1985 (with modification)	

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Carbon steel (Chemical analysis)	Carbon content	In-house Method TPC / 001 / M (Combustion gasometric)	
		Sulphur content	In-house Method TPC / 001 / M (Combustion titrimetric)	
		Manganese content	In-house Method TPC / 002 / M (Flame AAS)	
		Silicon content	In-house Method TPC / 003 / M (Gravimetric)	
		Phosphorus content	In-house Method TPC / 004 / M (Alkalimetric)	
		Niobium content	In-house Method TPC / 005 / M (Colorimetric)	
		Vanadium content	In-house Method TPC / 006 / M (Flame AAS)	
		Nickel content	In-house Method TPC / 007 / M (Gravimetric)	
		Chromium content	In-house Method TPC / 008 / M (Oxidation-titration)	
		Molybdenum content	In-house Method TPC / 009 / M (Flame AAS)	
		Copper content	In-house Method TPC / 010 / M (Flame AAS)	
		Stainless steel (Chemical analysis)	Carbon content	In-house Method TPC / 011 / M (Combustion gasometric)
			Sulphur content	In-house Method TPC / 011 / M (Combustion titrimetric)
			Manganese content	In-house Method TPC / 012 / M (Flame AAS)
			Silicon content	In-house Method TPC / 013 / M (Gravimetric)
			Phosphorus content	In-house Method TPC / 014 / M (Alkalimetric)
			Nickel content	In-house Method TPC / 015 / M (Gravimetric)
			Chromium content	In-house Method TPC / 016 / M (Oxidation-titration)
			Molybdenum content	In-house Method TPC / 017 / M (Flame AAS)

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Water (Chemical Analysis) Welds (Non-destructive tests)	Alkaline carbonates and bicarbonates content Magnetic particle flaw detection Magnetic particle examination of welds (magnetic flow method and colour contrast techniques) Penetrant flaw detection Penetrant testing (colour contrast and solvent removal method) Radiographic examination Radiographic examination Radiographic examination of welded joint Ultrasonic examination of welds (Manual examination) Ultrasonic thickness measurement (Manual method) Ultrasonic examination of welded joint (manual method) Visual examination of fusion welded joint (post-welding) Non-destructive examination of fusion welds - visual examination Magnetic particle weld test	In-house Method TPC / 039 BS 6072 : 1981 (1986) (Magnetic flow method colour contrast technique using permanent magnets, D.C. and A.C. yokes) BS EN 1290 : 1998 BS 6443 : 1984 (Colour contrast method) BS EN 571-1 : 1997 BS2910 : 1986 (Butt joints in steel pipes, X-ray and gamma ray) BS2600 : Part 1 : 1983 (Fusion welded butt joint in steel, X-ray & gamma Ray) BS EN 1435 : 1997 BS 3923 : Part 1 : 1986 (Butt welds in plates & pipes, 'T' joint welds, Nozzle welds and Node welds) BS 3923 : Part 1 : 1986 BS EN 1714 : 1998 BS 5289 : 1976 BS EN 970 : 1997 BS EN ISO 9934-1: 2001 (Magnetic flow method colour contrast technique using permanent magnets, D.C. and A.C. yokes)

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CONSTRUCTION MATERIALS (cont'd) 建築材料(續上)	Welds (Destructive tests)	Vickers hardness test of fusion welded joint in scale range of HV5 and HV10 Charpy V-notch impact test of fusion welded butt joint Bend test of fusion welded butt joint in plate and pipe Macro examination of fusion welded joint Fillet weld fracture test Nick-break test Transverse tensile test of fusion welded joint All-weld tensile test of fusion welded joints (5 kN – 2000 kN)	BS EN 1043 : Part 1 : 1996 BS EN 875 : 1995 BS EN 910 : 1996 BS EN 1321 : 1997 BS EN 1320 : 1997 BS 709 : 1983, Clause 7 (amend. 1 & 2) BS EN 895 : 1995 BS EN 876 : 1995

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ENVIRONMENTAL TESTING 環境測試	Asbestos in bulk	Sampling a) Cementitious b) Wet applied c) Dry applied d) Bonded	In-house Method TPE / 001 / A
	Asbestos bulk samples	Identification Asbestos-containing material	In-house Method TPE / 002 / A Air Pollution Control Ordinance, Section 2 (Gazette No. 23 / 1997)
	Asbestos air-borne fibres and dust	Air sampling - 10 minute control - 4 hour control - Clearance - Leak - Reassurance - Background - Penultimate - Environmental	In-house Method TPE / 003 / A
	Asbestos air-borne samples	Fibre counting	MDHS 39/3
	Water and Wastewater	Physical Examination :-	
		- pH value	In-house Method TPE / 003 / W (Electrode)
- Dissolved Oxygen		In-house Method TPE / 004 / W (Electrode)	
- Turbidity		In-house Method TPE / 005 / W (Nephelometric)	
- Total Suspended Solids Dried at 103-105°C	In-house Method TPE / 006 / W (Gravimetric)		
- Total Dissolved Solids Dried at 180°C	In-house Method TPE / 007 / W (Gravimetric)		
Trace Metals :- (Dissolved and Total)			
- Preliminary Treatment for Metals	In-house Method TPE / 012 / W (Filtration/nitric acid digestion)		
- Cadmium, Calcium, Chromium, Copper, Lead, Magnesium, Nickel, Potassium, Sodium and Zinc	In-house Method TPE / 014 / W (Flame AAS)		



Summary of Voluntary Suspension

1. .vs. denotes tests being voluntarily suspended with effect from 3 March 2011 (Notification Letter no. 022-126).