

Schedule

CAST Laboratories Pte Ltd
17 Tuas Ave 8
Singapore 639232

Certificate No. : LA-1988-0023-B

Issue No. : 28

Date : 18 November 2021

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FIELD OF TESTING : Civil Engineering Testing

ITEMS/MATERIALS/ PRODUCTS TESTED	TESTS/PROPERTIES	STANDARD METHODS/ TECHNIQUES EQUIPMENT	APPROVED SIGNATORY
A. Aggregates	1. LA Abrasion value (Resistance to Fragmentation)	ASTM C131-14 SS 73 : 1974 BS EN 1097-2: 2010	) KYS/LEH/) TEK))
	2. Angularity Number Particle size & shape	SS 73 : 1974 BS812 : Pt 1 :1975)))
	3. Bulk Density & Voids	BS 812-2 : 1995 SS 73 : 1974 BS EN 1097 -3:1998))))
	4. Crushing Value	BS 812:Pt 110:1990 SS 73 : 1974)))
	5. Elongation Index	BS 812 : Pt 105.2 : 1990 SS 73 : 1974)))
	6. Flakiness Index	BS 812 : Pt 105.1 : 1989 SS 73 : Pt 5.1 : 1992 BS EN 933 -3 : 2012))))
	7. Impact Value	BS 812 : Pt 112 : 1990 SS 73 : 1974)))
	8. Organic Impurities	ASTM C40-11, 16 SS 73 : Part 22 : 1992))

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	9. Silt Content	SS 73: 1974 (1992)) KYS/LEH/) TEK/
	10. Particle Size Distribution	BS 812 : Pt 103.1 : 1985 SS 73:1974 BS EN 933-1 : 2012.))))
	11. Relative Density /Water Absorption	BS 812-2 : 1995 SS 73 : 1974 BSEN 1097-6 : 2013))))
	12. Fine Content	BS EN 933 -1 : 2012))
	13. Water Content (Moisture Content Oven Dry Method)	BS 812-109 : 1990 BS EN 1097-5 : 2008)))
	14. 10% Fine Value	BS 812 : Pt 111 : 1990 SS 73 : 1974)))
	15. Shell content	BS 812-106:1985 BS EN 933-7 : 1998 SS 73: Pt 6: 1992))))
	16. Potential Alkali Reactivity for Aggregates (Mortar Bar Method)	ASTM C1260- 21	) CTJ/FSM/KYS))
	17. Particle Density of filler	BS EN 1097- 7 : 2008) CTJ/KYS/EK)
	18. Methylene Blue	BS EN 933-9 : 2009+A1:2013)))
	19. shape index	BS EN 933 – 4 : 2008)

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	20. Test for Thermal and Weathering Properties of Aggregates Part 4: Determination of Drying Shrinkage	BS EN 1367-4 : 2008) CTJ/FSM/KYS))))	
	21. Determination of the Resistance to Wear (Micro-Deval)	BS EN 1097-1 : 2011	) CTJ/TEK))
	22. Sampling	BS EN 932-1 : 97	) CTJ/KYS/LEH)
	23. Materials Finer than 75 um	ASTM C117-2013, 17)	
	24. Sand Equivalent Test	BS EN 933-8: 2012+A1: 2015	) CTJ/KYS))
	25. Percentage of Fractured Particles	ASTM D5821-13 (2017))))	
	26. Water Absorption (coarse)	ASTM C127-15))	
	27. Water Absorption (fine)	ASTM C128-15))	
	28. Sieve Analysis	ASTM C136-14)	
	B. Bricks	1. Compressive Strength	SS 103 : 1974 (Confirmed 1989) BS EN 772 - 1 : 2011 +A1: 2015 BS 3921 : 1985) CTJ/KYS)))))
		2. Dimensions	BS 3921 : 1985 SS 103 : 1974 (Confirmed 1989) BS EN 772 - 16 : 2011))))

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C. Concrete 1. Hardened Concrete	3. Water Absorption	BS EN772 – 7 :1998 SS 103 : 1974 (except Method V, Confirmed 1989)) CTJ/KYS))))
	4. Determination of total / Salts content	SS 103 : 1974 (Confirmed 1989))))
	5. Efflorescence Test	SS 103 : 1974 (Confirmed 1989)))
	1. Compression Test on Cubes	SS 78 : Pt A16 : 1987 BS EN 12390: Pt 3: 2019	) CTJ/KYS/) FSM/CYK
	2. Compression Test on Cylinders	ASTM C39 / C39M-17b,18 BS EN 12390: Pt 3: 2019	) CTJ/KYS/FSM))
	3. Compression Test on Concrete Cores	SS 78 : Pt A20 : 1987 (BS EN 12504: Pt 1: 2019) BS EN 12390 : Pt 3 : 2019 ASTM C39 / C39M-14, 18)))))))
	4. Density Test on Hardened concrete/ cores (a) as-received density (b) oven-dried density (c) saturated density	BS EN 12390 : Pt 7 : 2019 SS 78: Pt A 14:1987	) CTJ/KYS/FSM/CYK))))
	5. Flexural Strength	BS EN 12390: Pt 5: 2019) CTJ/KYS/) FSM))
	6. Water Absorption	BS 1881 : Pt 122 : 2011 SS 78 : Pt A22 : 1987)))

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	7. Indirect Tensile Strength (Splitting Tensile Strength)	SS 78 : Part A17 : 1987 BS EN 12390: Part 6:2009 ASTM C496-2011) CTJ/KYS/) FSM)	
	8. Static Modulus of Concrete	BS 1881 : Part 121 : 1983	) CTJ/KYS)
	9. Rapid Chloride Penetration Test	ASTM C1202-17a, 19	) CTJ/KYS/) FSM
	10. Absorption & Permeability Voids Test	ASTM C642-13	) CTJ/KYS)
	11. Water Penetration Test	DIN 1048 Part 5 : 1991 BS EN 12390-8: 2019	) CTJ/KYS/) FSM)
	12. Initial Surface Absorption Test	BS 1881 : Pt208 : 1996	) KYS/CTJ)
	13. Measuring the flexural tensile strength (limit of proportionality (LOP), residual)	BS EN 14651: 2005+A1: 2007	) CTJ/KYS/FSM/AA/) BL)))
	14. Measuring the fibre content in fresh and hardened concrete	BS EN 14721: 2005+A1: 2007))))	
	2. Hardened Concrete NDT	1. Covermeter Test	BS 1881 Pt 204 : 1988 SS78 : Pt B4:1992, 2013) CTJ/LEH/MURU/) JM/NN)
		2. Ultrasonic Pulse Velocity Test	BS EN 12504-4 : 2004 SS 78 : Pt B3 : 1992 ASTM C597-16))))
		3. Rebound Hammer Test	SS 78: Pt B2 :1992 BS EN 12504-2 : 2012))))
		4. Penetration Resistance Test Test	ASTM C803/803M-03 (Reapproved 2010),17,18)))
		5. Half-cell potential Measurement	ASTM C876-15) LEH/MURU)

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	6. Measurement of Carbonation (Cores / Broken Concrete)	BRE IP 6/81 BS EN 14630: 2006) LEH/MURU))
	7. In-situ Pull out test on tiles, Plaster, prepacked plaster Skimcoat and screed	CAST/SITE/HCN/001/12 BS EN 1015-12:16	) CTJ/KYS/MURU/) LEH/JM/NN)
3. Fresh Concrete	1. Dimensional Measurement On Cube Mould	SS78 : Pt A8: 1987 BS EN 12390-1:2012, Clause 5	) KYS/LEH/) FSM/CTJ
4. Precast Concrete Units			
i. Concrete Blocks	1. Compressive Strength	SS 271 : 1983	) KYS/LEH/) CTJ)))
	2. Density Test)))
	3. Dimension Measurement)))
ii. Concrete Masonry	1. Compressive Strength	SS 271 : 1983 BS EN 772 – 1 :2011 +A1: 2015))))))))
	2. Water Absorption	BS EN 772 – 11 :2011 SS 271 : 1983)))))
	3. Dimension Test	BS EN 771 – 3 :2011 +A1: 2015 BS EN 772 – 16 :2011))))))
iii. Concrete Paving Blocks	1. Compressive Strength	BS 6717-1 : 1993	) KYS/LEH/) CTJ/FSM
	2. Dimension Test	BS 6717-1 : 1993 BS EN 1338 :2003	) KYS/ CTJ)))
	3. Total Water Absorption	BS EN 1338 : 2003 (Annex E)))))
	4. Surface Layer Thickness	CAST/ BTD/ CPB/001/12) KYS/ CTJ/FSM

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iv. Concrete Kerbs	1. Compressive Strength	SS 214 : 2009, BS EN 12390: Pt 3: 2019) KYS/) CTJ/FSM)
v. Concrete Kerbs / Dividers/ Channels Kerb	1. Transverse Strength	SS 214 : 1999 BS 7263-1: 1994	) KYS/ CTJ))
	2. Bending Strength	SS 214 : 2009 BS EN 1340 : 2003 Annex F)))
	3. Water Absorption	SS 214 : 1999 BS 7263 – 1 : 1994)))
vi. Concrete Flags/ Slabs/Kerb	1. Bending Strength	BS 7263-1 : 2001)))
	2. Total Water Absorption	BS EN 1339 : 2003 Annex E)))
	3. Layer Thickness	CAST/BTD/CFS/002/12)))
vii. Precast Concrete Units/ Concrete Kerbs/ Dividers/ Channels	1. Total Water Absorption	SS 214 : 2009 BS EN 1340 : 2003 ANNEX E)))))))
	viii Ferro-cement Slab	1. Dimensional measurement	CAST/ MAT /TM/ 010-99
	2. Initial surface absorption test	BS 1881 : Pt 208 :1996)))
	3. Carbonation test	BRE IP 6/82 BS EN 14630:2006)))

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D. Hot Dip Galvanised Steel	1. Thickness of Coating	BS EN ISO 1461:2009	/MURU
E. Bituminous Mixtures	1. Bitumen Content	ASTM D2172 / D2172M, 17e1 (Method A & B)) CTJ/KYS/) LGH/AB)
	2. Density of Premix on Cored Samples with & without sample preparation	BS 598 : Pt 104 : 2005 (Clause 4))))
	3. Bulk Specific Gravity and Density	ASTM D2726 / D2726M - 19, 21	) CTJ/KYS/) LGH/AB
	4. Marshall Density & Stability	BS 598 : Pt 107 : 2004 ASTM D1559-89	) CTJ/KYS/) LGH/AB
	5. Marshall Stability and Flow of Asphalt Mixture	ASTM D6927-15	) CTJ/KYS/) LGH/AB)
	6. Particle Size Distribution	BS 812 : Pt 103.1 : 1985 BS EN 933 - 1 : 2012))
	7. Percentage Voids Density of Core Method	BS 598 : Pt 104 : 2005 Annex E	) CTJ/KYS/) LGH/AB
	8. Thickness of Core	ASTM D3549/D3549M-18	) CTJ/KYS/) LGH/AB)
	9. Bitumen Content by Ignition Method	ASTM D6307-19 (Method A)))
	10. Determination of Wheel-Tracking Rate (Dry)	BS 598 : Pt 110 : 1998	) CTJ/KYS/LGH)
	11. Los Angeles Abrasion	CAST/PAV/LAA 003/21	) CTJ/KYS/LGH/AB
	12. Measuring Pavement Macrot texture Depth (Volumetric Technique)	ASTM E965-15 (2019)) CTJ/KYS/) MURU)

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i. Pavement and Asphalt Materials	13. Measuring Surface Frictional & Properties (British Pendulum Tests)	ASTM E303-93 (reapproved 2013) ASTM E303-93 (2018)) CTJ/KYS/) MURU/) JM/NN	
	14. Measuring Longitudinal Profile and Computing - International Roughness Index (IRI)	CAST/SITE/IRI/001/2017	)MURU/NN/LGH/CTJ)KYS/JM/MM))
	ii. Asphalt Concrete Paving Mixture	15. Effect of Moisture on Asphalt Concrete Paving Mixture - Tensile Strength Ratio (TSR)	ASTM D4867/D4867M-09 (reapproved 2014))LGH/CTJ/KYS)))
		16. Sieve Analysis of Extracted Aggregate	ASTM D5444-15) CTJ/KYS/) LGH/AB
		17. Theoretical Maximum Specific Gravity & Density	ASTM D2041/D2041M - 19) CTJ/KYS) LGH/AB
		18. Percent Air Voids	ASTM D3203/D3203M -17) CTJ/KYS/)LGH/AB
		19. Preparation of Bituminous Specimens using Marshall Apparatus	ASTM D6926-16, 20) CTJ/KYS/) LGH/AB)
20. Draindown Characteristics in Uncompacted Asphalt Mixtures	ASTM D6390-11, 11 (reapproved 2017)	) CTJ/KYS/) LGH/AB)	
F. Soil	1. Bulk Density	BS 1377 : Pt 2 : 1990 (Clause 7.2)	) TEK/AKL/MT/) ATO/NHY
	2. California Bearing Ratio	BS 1377 : Pt 4 : 1990 (Clause 7) ASTM D1883 -16	) TEK/MT))
	3. Consolidation Test (1-Dimensional)	BS 1377 : Pt 5 : 1990 (Clause 3)) TEK/AKL/ATO/) NHY	

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	4. Direct Shear Test	BS 1377 : Pt 7 : 1990 (Clause 4)) TEK/AKL/NHY/) MT
	5. Dry Density / Moisture Content Relation	BS 1377 : Pt 4 : 1990 (Clause 3)) TEK/MT)
	6. In-situ Dry Density (Sand Replacement)	BS 1377 : Pt 9 : 1990 (Clause 2)	) CTJ/TEK/WT/) EE/MT
	7. Liquid Limit (Cone Penetrometer)	BS 1377 : Pt 2 : 1990 (Clause 4.3)	) TEK/AKL/MT/) ATO/NHY
	8. Plastic Limit	ASTM D4318 -17 BS 1377 : Pt 2 : 1990 (Clause 5.3)	TEK/AKL) TEK/AKL/MT/) ATO/NHY
	9. Plasticity index	ASTM D4318-17 BS 1377:Pt 2: 1990	TEK/AKL) TEK/MT/ATO/NHY
	10. Moisture Content (Lab)	ASTM D4318-17 BS 1377 : Pt 2 : 1990 (Clause 3.2)	TEK/AKL) TEK/AKL/MT/) ATO/NHY
	11. Particle Density	ASTM D2216-19 BS 1377 : Pt 2 : 1990 (Clause 8.3)	MT/NHY/TKL) TEK/AKL/MT/) ATO/NHY
	12. Particle Size Distribution (Hydrometer)	BS 1377 : Pt 2 : 1990 (Clause 9.5))))
	13. Particle Size Distribution (Wet Sieving)	BS 1377 : Pt 2 : 1990 (Clause 9.2)))
	14. Triaxial Test (CD)	BS 1377 : Pt 8 : 1990 (Clause 8)	) TEK/AKL/) ATO/NHY)
	15. Triaxial Test (CU)	BS 1377 : Pt 8 : 1990 (Clause 7)))
	16. Triaxial Test (UU)	BS 1377 : Pt 7 : 1990 (Clause 8)) TEK/AKL/ATO) /NHY

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	17. Unconfined Compression Test	BS 1377 : Pt 7 : 1990 (Clause 7.2 & 7.3) ASTM D2166:16) TEK/AKL/MT/) ATO/NHY/TKL) TEK/AKL/MT/) ATO
	18. Density & Moisture Content -Nuclear Density Gauge	ASTM D6938-10, 17 BS1377 : PT9 :1990	) CTJ/ TEK/) WT/MT
	19. Insitu Density by Core Cutter Method	BS 1377 : Pt 9 : 1990	) TEK/MT)
	20. Plate Bearing Test	BS 1377 : Part 9 : 1990	) CTJ/TEK/WT/EE
	21. Determination of Thermal Conductivity of Soil & Soft Rock by Thermal Needle Probe procedure	ASTM D5334-08, 14	) TEK/NHY/TKL)))
	22. Moisture Content by Speedy tester	ASTM D4944-2011, 2018 BS 812-109: 1990	) KYS/MT/WT/EE/)NHY MT/WT/EE/NHY
	23. Linear shrinkage	BS 1377:Pt 2: 1990	) TEK/MT/) NHY
	24. Max & Min dry density	BS 1377:Pt 4:1990	) KYS/TEK)
	25. Density index (cl 4)	BS 1377:Pt 4:1990)
	26. Insitu California Bearing Ratio (CBR) Site Test	BS 1377: Pt 9: 1990 (Clause 4.3)	) TEK/CTJ/) WT/EE/MT
	28. Lab Compaction of Soil - Standard Effort	ASTM D698-12e2	) TEK/) MT)
	29. Lab Compaction of Soil - Modified Effort	ASTM D1557-12e1))
	30. Density of Bituminous Concrete using NDG	ASTM D2950 / D2950M-14) CTJ/) TEK/WT/MT

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G. Rock cores	1. Point Load Strength Index	ASTM D5731-08, 16) CTJ/TEK/NHY/TKL)
	2. Unconfined Compression Test	ASTM D7012-10,13, 14, 14e1 (Method C only)))
	3. Water (Moisture) Content	ASTM D2216-19	NHY/TKL
H. Tiles	1. Water Absorption, apparent porosity, apparent relative density and bulk density	BS EN ISO 10545:3:2018	) CTJ/ FSM))))
	2. Friction Coefficient, Dry Floor Friction Test (Slip resistance test)	SS485 : 2011 (Annex B)	)CTJ/FSM/NN/JM/)MURU/MM)
	3. Wet Pendulum Test	SS 485 : 2011 (Annex A)	) CTJ/) MURU/FSM
	4. Resistance to Deep Abrasion of Unglazed Tiles	BS EN ISO 10545-6: 2010, 2012	) CTJ/FSM))
	5. Determination of dimensions & surface quality	BS EN ISO 10545-2: 2018 ISO 13006:2018 BS EN 14411: 2016))))))
	6. Determination of Modulus of rupture & breaking strength	BS EN ISO 10545-4 : 2019 BS EN 14411:2016)))))
	7. Scratch Hardness	SS 301:1985 SS 57 : 1989 BS 6431: PT13:1986 EN101: 1991))))))
	8. Colourfastness of title	SS301 : 1985 SS57 : 1989))

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M. Cement i. Cem I/ Cem II Cem III / Cem IV Cem V types as per SS EN 197-1 : 2008	1. Fineness (Blaine Air Method)	BS EN 196: Pt 6: 2010,2018 SS 397: Pt 6: 1997 SS26: 1984 (1997)) CTJ/) KYS/FSM/AA))		
	2. Standard Consistency Setting Time Soundness	BS EN 196-3: 2005 + A1: 2008, 2016 SS 397: Pt 3 : 1997 SS 26: 1984 (1987)))))))		
	3. Compressive Strength	BS EN 196 : Pt 1: 16 SS 397 : Pt 1 : 1997 SS 26 : 1987 (1997))))))		
	ii. GGBS	1. Moisture Content	BS EN 15167 : Pt 1 : Annex A : 2006 SS EN 15167 : Pt 1 : Annex A : 2008 (2016))))))	
		N. Building Materials i. Prepacked Plaster	1. Tension Adhesion Strength	BS EN 1015 - 12: 16) CTJ/FSM))
			2. Linear Shrinkage	ASTM C531-00 (2012), 18)))
	ii. Prepacked Skimcoat	1. Tension Adhesion Strength	BS EN 1015-12 : 16)))	
		2. Linear Shrinkage	ASTM C531-00 (2012), 18)))	
	iii Floor Screed and Water Proof Screed	1. Compressive Strength	ASTM C109M- 20)))	
		2. Flowability (hydraulic cement mortar)	ASTM C1437-15)))	
3. Slip/skid Resistance of Surface – Pendulum Test		BS EN 13036-4:11)))		

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iv Tile Adhesive	1. Determination of Tensile Adhesion Strength	BS EN 12004-2 : 2017) CTJ/FSM))
	2. Determination of Open Time	BS EN 12004-2 : 2017)))
	3. Transverse Deformation Test	BS EN 12004-2 : 2017)))
v. Tile Grout	1. Determination of Resistance to Abrasion	BS EN 12808 – 2 : 2008)))
	2. Determination of Flexural Strength & Compressive Strength	BS EN 12808 – 3 : 2008)))
	3. Determination of Shrinkage	BS EN 12808 – 4 : 2009)))
	4. Determination of Water Absorption	BS EN 12808 – 5 : 2008)))
O. Structural Fixings	1. In-situ pull out test on Structural fixings	CAST/ NDT CONC/ TM/ 002/ Nov 2004	) CTJ/ MURU))
P. Paint / Coating	1. Non-Destructive Measurement of Dry Film Thickness of Non-Magnetic Coatings Applied to a Ferrous Base	ASTM D7091-12)))))
Q. Repair Materials Compressive Strength	1. Compressive strength of hydraulic cement mortar (50 mm cubes)	ASTM C109/109M- 20	) KYS/) CTJ/FSM)
R. Curtain Walls & Window joints	2. Water Penetration test (field water tightness test)	CAST/SITE/WTT/001/12 (CONQUAS 21) AAMA 501.2: 09	) CTJ/KYS))
S. External Concrete Wall / Gable End Wall Joints	3. Water Penetration test (field water tightness test)	CAST/SITE/WTT/002/14 (Jan 2016)) CTJ/KYS) MURU/NN)

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T. Cement Treated Base	1. Moisture Density Relationship	ASTM D558-11(Method A)) TEK/MT))
	2. Optimum Moisture Content	ASTM D558-11(Method A))))
	3. Maximum Dry Density	ASTM D558-11(Method A))
	4. Liquid Limit, Plastic Limit and Plasticity Index	ASTM D4318-17	)TEK/AKL)
U. Paints	1. Non-volatile Matter	SS 5: Pt B2: 2013 (2018)	) FSM/CTJ))
	2. Dilution	CAST/MAT/TM/002-2019))
V. Ceramic Tiles Ceramic Floor and Wall Tiles	1. Chemical Resistance for Acid & Alkali - Glazed tiles	BS EN ISO 10545-13: 2016)))
	2. Chemical Resistance for Acid & Alkali - Unglazed tiles	BS 6431:Pt 18:1993, EN106: 1991 SS 301: 1985 Clause 5.2.1, 9.2.7 & Appendix J; BS EN ISO 10545-13: 2016))))))
W. Glazed Ceramic Tiles and Tile Fittings for Internal Walls	1. Chemical Resistance for Acids and Alkali	SS 57: 1989 Clause 6.2, 10.2.6 & Appendix H; BS EN ISO 10545-13: 2016))))
	2. Stain Resistance	SS 57: 1989 Clause 6.2, 10.2.7 & Appendix H BS EN ISO 10545:Pt 14:2015)))))
X. Ceramic Wall Tiles	1. Reverse Staining Test on Tiles	CAST/MAT/TM/001 – 98))

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Approved signatories

Mr Chai They Jhan	-	CTJ	Mr Lim Eng Heng	-	LEH
Mr Kwek Yeow Seah	-	KYS	Mr Foo Siang Meng	-	FSM
Mr Tay Ee Kwang	-	TEK	Mr Aung Ko Lat	-	AKL
Mr T Murugesan	-	MURU	Ms Aye Thida Oo	-	ATO
Ms Lim Geok Hua	-	LGH	Mr Naina Mohamed	-	NN
Ms Joanne Mendoza	-	JM	Mr M. Krishnamoorthy	-	MT
Ms Aashika Banu	-	AB	Ms Angelic P. Almonte	-	AA
Mr Ng How Yong	-	NHY	Mr Benedict Lim	-	BL
Mr Myo Win Tun	-	WT	Ms Mie Mie Sein Hla	-	MM
Ms Pyone Ei Ei Zaw	-	EE	Mr Ting Kuok Loong	-	TKL
Mr Chong Yong Keong	-	CYK			

Note :

This laboratory is accredited in accordance with the recognised International Standard ISO/IEC 17025. A laboratory's fulfilment of the requirements of ISO/IEC 17025 means the laboratory meets both the technical competence requirements and **management system requirements** that are necessary for it to consistently deliver technically valid test results. The **management system requirements** in ISO/IEC 17025 are written in language relevant to laboratory operations and operate generally in accordance with the principles of ISO 9001.