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NO: SAMM 443

LABORATORY LOCATION/ CENTRAL OFFICE:	Sime Darby Plantation Research Sdn Bhd, LS Laboratories - Sabah KM 18, Jalan Merotai - Bombalai, PO Box 135, 91007 Tawau, Sabah , 91007, SABAH MALAYSIA
ACCREDITED SINCE :	06 APRIL 2025
FIELD(S) OF TESTING:	CHEMICAL

This laboratory has demonstrated its technical competence to operate in accordance with MS ISO/IEC 17025:2017 (ISO/IEC 17025:2017).

This laboratory's fulfillment 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 and calibrations. 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 (see Joint ISO-ILAC-IAF Communiqué dated April 2017).

CENTRAL LOCATION:	Sime Darby Plantation Research Sdn Bhd, LS Laboratories - Sabah KM 18, Jalan Merotai - Bombalai, PO Box 135, 91007 Tawau, Sabah , 91007, Sabah
FIELD(S) OF TESTING :	CHEMICAL,

SCOPE OF TESTING : CHEMICAL

Material / Product Tested	**Type Of Test / Properties Measured / Range Of Measurement**	**Standard Test Methods / Equipment / Techniques**
Crude Palm Oil	Volatile Matter (VM)	MS 817:1989, Sect.4
	Peroxide Value (PV)	MS 817:1989, Sect.6
	Acidity (FFA)	MS 817:1989, Sect.8
	Impurities (Dirt)	MS 817:1989, Sect.5
	Anisidine Value (AV)	MS 817:1989, Sect.7
	Specific Extinction in UV Light (UV Totox)	MS 817:1989, Sect. 21
	Deterioration of Bleachability Index (DOBI)	MS 817:1989, Sect.18
	Carotene	MS 817:1989, Sect. 9

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques
	Iron (Fe)	In-house method (Ref. No. PP1) based on AOAC 10° Edition and Cocks & Van Rede, (1966) Laboratory Handbook for Oil and Fat Analysts
	Copper (Cu)	In-house method (Ref. No. PP2) based on AOAC 10" Edition and Cocks & Van Rede, (1966) Laboratory Handbook for Oil and Fat Analysts
	Phosphorus (P)	MS 817: 1989, Sect. 14
	lodine Value (IV)	MPOB p 3.2: 2004
	Determination of Paraquat	In-house method
	DOBI	MPOB p2.9:2004
	Volatile Matter (VM)	MS 817:1989, Section 4
	DOBI	MPOB p2.9:2004
	Deterioration of Bleachability	MPOB p2.9 : 2004
	Determination of lodine Value	In-house Method JKM K 0219
Effluent (rfe/pome)	Biochemical Oxygen Demand (BOD)- Alternative Method	DOE-™s Revised Std. Methods Ed 3, 2011
	Chemical Oxygen Demand (COD)- Alternative Method	DOE-™s Revised Std. Methods Ed 3, 2011
	Total Nitrogen (TN) (Macro Method)-" Reference Method	DOE-™s Revised Std. Methods Ed 3, 2011
	Suspended Solids (SS) (Except for Raw Palm Oil Mill Effluent)-" Alternative Method	DOE-™s Revised Std. Methods Ed 3, 2011
	Oil and Grease (O & G) for Raw Palm Oil Mill Effluent	In-house method (Ref. No. E1) based on DOE-™s Revised Std. Methods Ed. 3, 2011
	Oil and Grease (O & G) for Treated Effluent- Reference Method	DOE-™s Revised Std. Methods Ed 3, 2011
	Determination of Ammoniacal Nitrogen (AN) (Distillation Method)- Reference Method	DOE-™s Revised Std. Methods Ed 3, 2011
	Determination of Volatile Suspended Solid (VSS)	APHA 1995, Ed . 19,
	Determination of Phenolpthalein Alkalinity and Total Alkalinity (ALK) (As CaCOs) for Palm Oil Mill Effluent- Titration	APHA 1995, Ed . 19, 2320 B
	Determination of Total Alkalinity (ALK) (As CaCOs) for Rubber Factory Effluent (pH Meter)	APHA 1995, Ed . 19, 2320 B
	Volatile Fatty Acid (VFA)	APHA 1995, Ed . 19, 5560 C
	Total Solid (TS)	APHA 1995, Ed . 19, 2540 B
	pH	. 19, 4500-H*B APHA 1995, Ed

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques
	Suspended Solids (SS) (For Raw Palm Oil Mill Effluent)- Reference Method	DOE-™s Revised Std. Methods Ed. 3, 2011
Fertilizer	Moisture	MS 417 : Part 2 : 1994
	Ammoniacal Nitrogen in Ammonium Chloride and Ammonium Sulphate (as % N)	MS 417 : Part 3 : 1994 (Distillation Method)
	Urea-Nitrogen (as % N)	MS 417 : Part 3 : 1994 (Urease Titration Method)
	Urea-Nitrogen (as % N)	In-house method (Ref. No. F5) Based on MS 417 : Part 3 : 1994 (Urease Titration Method)
	Nitrate-Nitrogen (as % N)	MS 417: Part 3 : 1994
	Total phosphorus (as % P20s)	Part 4: MS 417: 1994 (Method 1)
	Citric Acid Soluble Phosphorus (as %	Part 4: MS 417: 1994
	Water Soluble Phosphorus (as % P2Os)	Part 4: MS 417: 1994
	Total Potassium (as % K2O)	Part 5: MS 417: 1994
	Total Magnesium (as % MgO)	MS 417: 1994
	Boron (as %	Part 7: MS 417: 2001 (Carmine Method)
	Boron (as %	In-house method (Ref. No. F6) Based on MS 417 : Part 7 : 2001 (Azomethine Method)
	Calcium (as CaO)	MS 417 : Part 8 : 1994
	Sample Preparation	MS 417: Part 1: 1994-Clause 5
	Moisture	MS 417: Part 2: 1994-Clause 3
	Moisture	MS 417: Part 2: 1994
	None	None
	Moisture	n-house Method PBL/LTM/F1,
	Total Nitrogen	In-house method F05 based on MS ISO 13878: 2014
	Determination of Moisture	MS 417: Part 2: Clause 3, Method |:
	Total Magnesium as MgO	In-House No. FT02 (Based on
	None	None
	Determination of Phosphorus,	In-House Method, TM-02
	Total Nitrogen (as N)	In-house Method, Ref. No. F2, based
Mixtures/ Compounds Fertilizer	Total Nitrogen (as % N)	In-house method (Ref. No. F1) based on MS 417 : Part 3 : 1994
	Phosphorus (as % P2Os)	In-house method (Ref. No. F2) based on MS 417 : Part 4 : 1994 (HCI Digestion)
	Potassium (as % K20)	In-house method (Ref. No. F3) based on MS 417 : Part 5 : 1994

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques
	Magnesium (as % MgO)	In-house method (Ref. No. F4) based on MS 417 : Part 6 : 1994
	Total Nitrogen (as N)	In house Method, F5, Based on MS 678:Pt. I-V:1980, Part II and MS 417:Part 3:2020 (Distillation Method)
	Total Nitrogen (as N)	In-house Method, F6, Based on MS 678:Pt. I-V:1980, Part II and QuikChem® Method 13-107-06-2-D
	None	MS 417:Part 4:2020
Palm Kernel	Shell and Dirt (Admixture)	MS 236: 1989, Appendix E
	Moisture and Volatile Matter	MS 236: 1989, Appendix D
	Free Fatty Acid (FFA)	MS 236: 1989, Appendix C
	Shell and Dirt (Admixture)	MS 236:1989, Appendix E
	Determination of Moisture and	MPOB k1.2:2004
Plant	Ash	MS 677: Pt. 1980, Part II
	Nitrogen (N)	MS 677 Pt. -VIII 1980, Part III
	Phosphorus (P)	MS 677 Pt. -VIII 1980, Part IV
	Potassium (K)	MS 677 Pt. I-VIII 1980, Part V
	Calcium (Ca)	MS 677 Pt. 1980, Part VI
	Magnesium (Mg)	MS 677: Pt. 1980, Part VII
	None	In-house method (Ref. No. P1)
	Sample Preparation	MS 677: Part (a): 1980
	Ashing and Preparation of Ash Solution	MS 677: Part II: 1980
	Ash Content	In-house Method ITC/TM/P02 based on AOAC 923.03 20" Edition, 2016
	Nitrogen	MS 677: Part III: 1980 Clause 2
	Phosphorus	MS 677: Part IV: 1980
	Potassium	MS 677: Part V: 1980
	Calcium	MS 677: Part VI: 1980
	Magnesium	MS 677: Part VII: 1980
	Total Boron	In-house Method ITC/TM/P12 based on MS 417: Part 7: 2001-Clause 6.2.3
	Copper	In-house Method ITC/TM/P08 based on AOAC 975.03 20" Edition, 2016
	Zinc	In-house Method ITC/TM/P09 based on AOAC 975.03 20" Edition, 2016
	Iron	In-house Method ITC/TM/P10 based on AOAC 975.03 20" Edition, 2016

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques
	Manganese	In-house Method ITC/TM/P11 based on AOAC 975.03 20" Edition, 2016
	Ash	MS 677:Pt. I-VIII:1980, Part II
	Manganese (Mn)	In-house Method, P3, Based on
	Sample Preparation for Plant	In-house Method, Ref. No. P5,
	N	n-house Method PBL/LTM/P1,
	Fe	In-house Method PBL/LTM/P9,
	Preparation of Leaves for	MS 677: Pt I - VIII: Part I: 1980
	Ash	MS 677: Part II: 1980
Soil	Mechanical Analysis (Clay, Silt, Fine & Coarse Sand)	In-house method (Ref. No. S1) based on The Bouyoucos Hydrometer method for Particle Size Analysis, Texas A&M University System
	pH	MS 2457 : 2012
	Conductivity (Cond.)	MS 2458 : 2012
	Organic Carbon (Org. C)	MS 2459 : 2012
	Total Nitrogen (N)	MS 678 : Pt. to 1980, Part II
	Phosphorus (Available)	In-house method (Ref. No. S2) based on J. Sci. Fd. Agric. Vol. 21, 275-278 and MS 678: Pt. VI to IX:
	Sample Preparation	In-house Method ITC/TM/S01 based on MS 678: Part 0: 1980
	pH	MS 2457: 2012
	Nitrogen	MS 678: Part II: 1980- (a)
	Organic Carbon	MS 2469: 2012
	Total Phosphorus	In-house Method based on MS 678: Part VIII: 1980
	Available Phosphorus	In-house Method ITC/TM/S08 based on A laboratory manual of methods of Soil Analysis research Branch Agriculture Department Sarawak 1993, clause 19
	Exchangeable Cations (K,Mg,Ca)	In-house Method ITC/TM/S06 based on MS 678: Part IV: 1980
	Cation Exchange Capacity	In-house Method ITC/TM/S07 based on MS 678: Part V: 1980
	Particle Size Analysis	In-house Method ITC/TM/S10 based on ASA-SSSA, Methods of Soil Analysis 1986, Part 1, Chapter 15
	Determination of In-situ Density	BS 1377: Part 9: 1990
	2.5 kg Rammer	BS 1377-2:2022
	Clay, Silt, Fine Sand &	In-house Method, S1, Based on
	Phosphorus (total)	In-house Method, S5, Based on MS 678:Pt. VI to IX:1980, Part VIII

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques
	Phosphorus (total)	In-house Method, S6, Based on MS 678:Pt. VI to IX:1980, Part VIII and QuikChem® Method 12-115-01-1-N
	Cation Exchange Capacity (C.E.C)	MS 678:Pt. to V:1980, Part V
	Cation Exchange Capacity (C.E.C)	In-house Method, S7, Based on MS 678:Pt. to V:1980, Part V and QuikChem® Method 13-107-06-2-D
	Total Exchangeable Bases: Potassium (K)	MS 678:Pt. to V:1980, Part IV (Flame photometry)
	Total Exchangeable Bases: Potassium (K)	In-house Method, S8, Based on MS 678:Pt. to V:1980, Part IV and QuikChem® Method 12-119-03-1-C
	Sodium (Na)	In-house Method, S9, Based on MS 678:Pt. to V:1980, Part IV
	Calcium (Ca)	MS 678:Pt. to V:1980, Part IV (Atomic Absorption Spectrophotometry)
	Magnesium (Mg)	MS 678:Pt. to V:1980, Part IV (Atomic Absorption Spectrophotometry)
	Determination of Particle Size	Part 2: MS 1056 2013 Section 10.2
	Mechanical Analysis (Clay, Silt, Fine & Coarse Sand)	In-house Method, Ref. No. S1, Based on The Bouyoucos Hydrometer Method for Particle Size Analysis,
	Arsenic (As)	None
	Determination of Electrical Conductivity in Soil Sample	In-House Method P702-07 base on MS 2458:2012
	Moisture Content Test - Oven Drying Method	MS 1056: Part 2: 2005
	Liquid Limit Test - Casagrande Method	MS 1056: Part 2: 2005
	Liquid Limit Test - Cone Penetrometer Method	MS 1056: Part 2: 2005
	Plastic Limit Test	MS 1056: Part 2: 2005
	Plasticity Index	MS 1056: Part 2: 2005
	Linear Shrinkage	MS 1056: Part 2: 2005
	Specific Gravity- Small Pyknometer Method	MS 1056: Part 2: 2005
	Particle Size Distribution -” Wet Sieving Method	MS 1056: Part 2: 2005
	Sedimentation -” Hydrometer Method	MS 1056: Part 2: 2005

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques
	Compaction Test	MS 1056: Part 4: 2005 (Clause 4.2, 4.5, 4.6)
	Determination of pH value	BS 1377 : Part 3: 1990, Clause 9
	Determination of chloride content	BS 1377 : Part 3: 1990, Clause 7
	Determination of sulphate content	BS 1377 : Part 3: 1990, Clause 5 (Gravimetric)
	Determination of organic matter content	BS 1377 : Part 3: 1990, Clause 3
	Determination of moisture content	BS 1377 : Part 2: 1990, Clause 3.2
	Determination of particle size distribution	BS 1377 : Part 2: 1990, Clause 9.3
	Determination of In-situ Density and Moisture Content	Soils for Civil Engineering Purposes, BS 1377:1990, Part 9: Clause 2.1-Sand Replacement
	Determination of In-situ Density and Moisture Content	Soils for Civil Engineering Purposes, BS 1377:1990,
	Moisture Content	BS 1377: Part 2: 1990, Clause 3.2.4
	Moisture Content	BS 1377: Part 2: 1990, Clause 3.2
	Particle Size Distribution	BS 1377: Part 4: 1990, Clause 9.5
	Field Density Test: Core Cutter	BS 1377: Part 9: 1990, Clause 2.4
	Determination of Moisture	BS 1377:Part 2:1990 Clause 3.2
	Particle Size Distribution	BS 1377: Part 2: 1990, Clause 9.2 & 9.3
	Moisture Content	BS 1377: Part 2: 1990, Clause 3.2
	California Bearing Ratio (Soaked)	BS 1377: Part 4: 1990, Clause 7
	Dry Density / Moisture Content Relationship (4.5 kg Rammer Method)	BS 1377: Part 4: 1990, Clause 3.6
	Liquid Limit (Casagrande Apparatus Method)	BS 1377: Part 2: 1990, Clause 4.5
	None	Part 2: BS 1377 1990, Clause 5.3 & 5.4
	Dry Density / Moisture Content	Part 4: MS 1056 2005, Clause 4.5 & 4.6
	Dry Sieving Method	MS 1056 Part 2 : 2005, Clause 10.3 Part 2 : 1990, Clause 9.3 BS 1377
	Determination of Moisture Content	BS 1377: Part 2: 1990 Clause 3.2
	Moisture Content	BS 1377 Part 2: 1990 : Clause 3.2
	Liquid Limit (Cone Penetrometer Method)	BS 1377 Part 2: 1990 : Clause 4.3
	In-situ Density Test by Sand	None
	pH	MS 2457: 2012
	Electrical Conductivity	MS 2458: 2012
	Available Phosphorus	In-house method S07 based on Bray & Kurtz, 1945 & ICP-OES
	Total Nitrogen	MS ISO 13878: 2014

Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques
	Total Phosphorus	In-house method S13 based on EPA Method 3050B & ICP-OES
	Determination of Particle Density (Small Pyknometer Method)	BS 1377:1990 Part 2, Clause 8.3
	Determination of Particle Size Distribution (Dry Sieving Method)	BS 1377:1990 Part 2, Clause 9.3
	Determination of Particle Size Distribution (Wet Sieving Method)	BS 1377:1990 Part 2, Clause 9.2
	Determination of Particle Size	None
	Determination of Water Content	BS 1377: Part 2
	Determination of pH value of fine	BS 1377-3: 2018
	Determination of Soil pH	MS 678: Part - V: Part |, Soil pH:
	None	None
	Total Recoverable Elements	USEPA 200.2 Rev. 2 : 8 EMMC
	Chloride	MS 678: Part VI to
	In-situ Density Test	BS 1377: Part 9:1990 Clause 2.1
	Moisture Content	BS EN ISO 17892-1:2014
	Particle Size Distribution -" Wet	BS EN ISO 17892-4:2016
	Arsenic, Mercury, Cadmium,	EPA 3050 B
	Loss on Ignition	BS 1377 part 3: 1990 (Clause 4)
	Carbonate	BS 1377 Part 3: 1990 (Clause 6.3)
	Moisture Content	BS 1377-1: 2016
	In-situ California Bearing Ratio (CBR)	BS 1377 : Part 9 : 1990 Clause 4.3
	Moisture Content	BS 1377-1: 2016
	In-situ California Bearing Ratio (CBR)	BS 1377 : Part 9 : 1990 Clause 4.3
	pH Value	BS 1377-3:1990:9.5
	None	None
	Aluminum (Al)	USEPA 200.2, Revision 2.8, 1994
	Particle Size Distribution (gravel,	In House Method 0588 based on
	Determination of Particle Size Distribution for Soils	BS 1377: Part 2: 1990 Clause 9
	Determination of Moisture Content	BS 1377: Part 2: 1990 Clause 3.2
	Determination of the Liquid Limit (Casagrande apparatus method)	BS 1377: Part 2: 1990 Clause 4.5
	Determination of the Plastic Limit and Plasticity Index	BS 1377: Part 2: 1990 Clause 5
	Determination of dry density/moisture content relationship (Rammer Method)	BS 1377: Part 4: 1990 Clause 3.3, 3.4, 3.5 & 3.6
	Determination of dry density/moisture content relationship (Vibrating Hammer Method)	BS 1377: Part 4: 1990 Clause 3.7
	Determination of soil density test	BS 1377: Part 2: 1990 Clause 7
	Determination of The Moisture	BS 1377: Part 2:1990: Method 3.2
	Determination of In-Situ Density	BS 1377: Part 9: 1990

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Material / Product Tested	Type Of Test / Properties Measured / Range Of Measurement	Standard Test Methods / Equipment / Techniques
	Determination of The Moisture	BS 1377: Part 2:1990: Method 3.2
	Toxicity characteristic leaching	USEPA 1311: 1992
	Phosphorus, P Sulphur, S	None
	SVOCs (Refer to Appendix 2 and 3 for	EPA Method 3510C: 1996
	Determination of Moisture Content	BS 1377:2:1990, Clause 3.2 MS 1056:2:2005, Clause 4.2
	Determination of Density	BS 1377:2:1990, Clause 7.2 MS 1056:2:2005, Clause 8.2
	Linear Shrinkage	BS 1377:2:1990, Clause 6.5 MS 1056:2:2005, Clause 7.5
	Determination of Particle Density	BS 1377:2:1990, Clause 8.3 MS 1056:2:2005, Clause 9.3
	Determination of Liquid Limit Using Casagrande Method	BS 1377:2:1990, Clause 4.5 & 4.6 MS 1056:2:2005, Clause 5.5 & 5.6
	Determination of Liquid Limit Using Cone Penetrometer Method	BS 1377:2:1990, Clause 4.3 & 4.4 MS 1056:2:2005, Clause 5.3 & 5.4
	Determination of the Plastic Limit	BS 1377:2:1990, Clause 5
	Maximum dry density / Moisture content relationship	BS 1377: Part 4: 1990
	Shear Strength Test without	None
	The laboratory Vane e	BS 1377: Part 7: 1990: Clause 3
	Field Density Test (Sand Replacement Method)	BS 1377: Part 9:1990 Clause 2.1
	Plastic limit test	Test instruction reference to BS
	Moisture content	BS1377-2, Clause 4.1