

**TEST METHOD LIST**

Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring  Palm Oil Mill and Rubber Factory Effluent	1a	Biochemical Oxygen	DOE Method, 4 <sup>th</sup> Edition 2019, REF
	1b	Demand (BOD <sub>3</sub> )	DOE Method, 4 <sup>th</sup> Edition 2019, ALT
	2	Chemical Oxygen Demand (COD)	DOE Method, 4 <sup>th</sup> Edition 2019, ALT
	3	Ammoniacal Nitrogen (AN)	In-house Method TP-EFF-03 Based on DOE Method, 4 <sup>th</sup> Edition 2019, REF
	4	Total Kjeldahl Nitrogen (TKN)	DOE Method, 4 <sup>th</sup> Edition 2019, ALT
	5	Suspended Solids (SS)	DOE Method, 4 <sup>th</sup> Edition 2019, REF
	6	Total Solids	APHA 2540 B, 19 <sup>th</sup> Edition 1995
	7	pH	APHA Method 4500-H <sup>+</sup> B 22 <sup>nd</sup> Edition 2012
	8	Oil & Grease (O & G)	DOE Method, 4 <sup>th</sup> Edition 2019, REF
	9	*Volatile Acids	APHA Method 5560 C 22 <sup>nd</sup> Edition 2012 – Organic And Volatile Acids
	10	Alkalinity	APHA 2320 B 22 <sup>nd</sup> Edition 2012 – Titration Method
	11	*Volatile Suspended Solids	APHA 2540 E 22 <sup>nd</sup> Edition 2012 - Fixed and Volatile Solids Ignited at 550°C
12	*Dissolved Oxygen	APHA 4500-O G 22 <sup>nd</sup> Edition 2012 – Membrane Electrode Method	

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Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Environmental Monitoring  Sewage Water  Water  Processed Water Surface Water	13	*Total Coliform	APHA Method 9221 B 23 <sup>rd</sup> Edition 2017
	14	*E-Coli	APHA Method 9221 F 23 <sup>rd</sup> Edition 2017
	15	pH at 25°C	APHA Method 4500-H+B 23 <sup>rd</sup> Edition 2017
	16	Biochemical Oxygen Demand (BOD <sub>5</sub> )	In-house Method, TP-WAT-03, Based on APHA Method 5210 B 23 <sup>rd</sup> Edition 2017
	17	Dissolved Oxygen	APHA Method 4500-O H 23 <sup>rd</sup> Edition 2017
	18	Chemical Oxygen Demand	In-house Method, TP-WAT-05, Based on APHA Method 5220 B 23 <sup>rd</sup> Edition 2017
	19	Ammoniacal Nitrogen	APHA Method 4500-NH <sub>3</sub> C 23 <sup>rd</sup> Edition 2017
	20	Nitrate Nitrogen	APHA Method 4500-NO <sub>3</sub> <sup>-</sup> B 23 <sup>rd</sup> Edition 2017
	21	Chloride	APHA Method 4500-Cl-B 23 <sup>rd</sup> Edition 2017
	22	Phosphorous	APHA Method 4500-P C 23 <sup>rd</sup> Edition 2017
	23	Total Solids	APHA Method 2540 B 23 <sup>rd</sup> Edition 2017
	24	Total Suspended Solids	APHA Method 2540 D 23 <sup>rd</sup> Edition 2017
	25	Total Dissolved Solids	In-house Method, TP-WAT-12, Based on APHA Method 2540 C 23 <sup>rd</sup> Edition 2017
	26	Conductivity	APHA Method 2510 B 23 <sup>rd</sup> Edition 2017
27	Hardness	APHA 2340 B 23 <sup>rd</sup> Edition 2017	

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Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
<u>Environmental Monitoring</u>	28	Potassium	APHA 3030E, 3120 B 23 <sup>rd</sup> Edition 2017/ICP
Sewage Water	29	Magnesium	
<u>Water</u>	30	Calcium	
Processed Water	31	Zinc	
Surface Water	32	Manganese	
	33	Iron	
	34	Copper	
	35	Aluminium	
	36	Sodium	
	37	Cadmium	
	38	Plumbum	
	39	Chromium	
	40	Selenium	
	41	Silver	
	42	*Sulphate	
	43	Turbidity	In-house Method, TP-WAT-16, Water & Environmental Analysis According to US EPA Regulations, 1995

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Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
<u>Foods</u>	45	Moisture & Volatile Matter	MPOB Test Method p2.1:2004
Palm Oil & Palm Oil Products	46	Insoluble Impurities	MPOB Test Method p2.2:2004
	47	Acidity	MPOB Test Method p2.5:2004
	48	Iodine Value	MPOB Test Method p3.2:2004
	49	Peroxide Value	PORIM Test Method p2.3:2004
	50	DOBI	MPOB Test Method p2.9:2004
	51	*Copper	MPOB Test Method p2.10:2004
	52	*Ferum	MPOB Test Method p2.10:2004
	53	*Phosphorous	MPOB Test Method p2.10:2004
	54	*Discriminant Function	MPOB Test Method p2.14:2004
	55	*Specific Extinction	MPOB Test Method p2.14:2004
	56	Carotene Content	MPOB Test Method p2.6:2004
	57	*Physical Analysis	Palm Oil Factory Process Handbook, Laboratory And Milling Control
	133	*Total Chloride	Operational Manual (Horizontal Furnace) For Coulometer Model MCD- 210

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Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
<u>Agriculture Products and Materials</u>  Foliar, Leaf and Rachis	58	Nitrogen	In-house Method, TP-FOL-06, Based on LECO TruMac CN Nitrogen in Soil and Plant Tissue Application Notes 203-821-394:2010
	59a 59b	Phosphorus	In-house Method, TP-FOL-02, Based on MS 677:Pt.I, II & IV:1980 Method A: UV Method B: ICPOES
	60a 60b	Potassium	In-house Method, TP-FOL-03, Based on MS 677:Pt.I, II & IV:1980 Method A: AAS Method B: ICPOES
	61a 61b	Magnesium	In-house Method, TP-FOL-03, Based on MS 677: Pt.I, II & VII:1980 Method A: AAS Method B: ICPOES
	62a 62b	Calcium	In-house Method, TP-FOL-03, Based on MS 677:Pt.I, II & IV:1980 Method A: AAS Method B: ICPOES
	63a 63b	Boron	In-house Method, TP-FOL-05, Based on MS 677:Pt.I & II:1980 and Method 9.3 Official Journal of the E.U, 2003 Method A: UV Method B: ICPOES
	64a 64b	Zinc	In-house Method, TP-FOL-04, Based on MS 677:Pt.I & II:1980 Method A: AAS Method B: ICPOES
	65a 65b	Ferum	
	66a 66b	Copper	
	67a 67b	Manganese	
	68	*Ash	
	134	*Chloride	In-House Method

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Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques	
Agriculture Products and Materials  Compost	69	Total Nitrogen	In-house Method, TP-FOL-06, Based on LECO TruMac CN Nitrogen in Soil and Plant Tissue Application Notes 203-821-394:2010	
	70a 70b	Total Phosphorus (as P <sub>2</sub> O <sub>5</sub> )	In-house Method, TP-FOL-02, Based on MS 677:Pt.I, II & IV:1980 Method A: UV Method B: ICPOES	
	71a 71b	Total Potassium (as K <sub>2</sub> O)	In-house Method, TP-FOL-03, Based on MS 677:Pt.I, II & IV:1980 Method A: AAS Method B: ICPOES	
	72a 72b	Total Magnesium (as MgO)	In-house Method, TP-FOL-03, Based on MS 677: Pt.I, II & VII:1980 Method A: AAS Method B: ICPOES	
	73a 73b	Total Calcium (as CaO)	In-house Method, TP-FOL-03, Based on MS 677:Pt.I, II & IV:1980 Method A: AAS Method B: ICPOES	
	74a 74b	*Total Boron (as B <sub>2</sub> O <sub>3</sub> )	In-house Method, TP-FOL-05, Based on MS 677:Pt.I & II:1980 and Method 9.3 Official Journal of the E.U, 2003 Method A: UV Method B: ICPOES	
	75a 75b	Total Carbon	a. In-house Method, TP-FER-08, Based on LECO TruMac CN	b. *Furnace
	76a 76b	Organic Carbon	Nitrogen in Soil and Plant Tissue Application Notes 203-821-394:2010	
	77a 77b	Organic Matter		
	78a 78b	CN ratio		
	79	Moisture	In-House Method, TP-FER-02, Based on MS 417:Part2:1994	
	135	*pH	APHA Method 4500-H*B 23 <sup>rd</sup> Edition 2107	

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Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Agriculture Products and Materials  Fertilizers	80a 80b	Moisture	MS 417:Part2:1994 Method A: Desiccators Method B: Oven
	81	Total Nitrogen	In-house Method, TP-FER-03, Based on MS 417:Part3:2020 (Second Revision)
	82a 82b	Total Phosphorus as P <sub>2</sub> O <sub>5</sub>	In-house Method, TP-FER-04, Based on MS 417:Part4:2020 (Second Revision) Method A: UV Method B: ICPOES
	83a 83b	Total Potassium as K <sub>2</sub> O	In-house Method, TP-FER-05, Based on MS 417:Part5:2020 (Second Revision) Method A: AAS Method B: ICPOES
	84a 84b	Total Magnesium as MgO	In-house Method, TP-FER-06, Based on MS 417:Part6:2020 (Second Revision) Method A: AAS Method B: ICPOES
	85a 85b	Total Calcium as CaO	In-house Method, TP-FER-07, Based on MS 417:Part6:2020 (Second Revision) Method A: AAS Method B: ICPOES
	86a 86b	Total Boron as B <sub>2</sub> O <sub>3</sub>	In-house Method, TP-FER-09, Based on MS 417:Part7:2020 (Third Revision) Method A: UV Method B: ICPOES
	86c	Water Soluble Boron as B <sub>2</sub> O <sub>3</sub>	In-house Method, TP-FER-09, Based on MS 417:Part7:2020 (Third Revision) / Titration
	87	Citric Acid Soluble Phosphorus as P <sub>2</sub> O <sub>5</sub>	In-house Method, TP-FER-16, Based on MS 417:Part4:2020 (Second Revision) / UV
	88a 88b	Water Soluble Magnesium as MgO	In-house Method, TP-FER-17, Based on MS 417:Part6:2020 (Second Revision) Method A: AAS Method B: ICPOES

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Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques	
<u>Agriculture Products and Materials</u>  Fertilizers	89a 89b	*Water Soluble Phosphorus as P <sub>2</sub> O <sub>5</sub>	In-house Method, TP-FER-04, Based on MS 417:Part4:2020 (Second Revision) Method A: UV Method B: ICPOES	
	90	*Sulphur	In-house Method, TP-FER-03, Based on MS 417:Part3:2020 (Second Revision)	
	91	*pH	APHA Method 4500-H+B 23 <sup>rd</sup> Edition 2017	
	92a 92b	*Ferum	In-house Method, Based on MS 417:Part5:2020 (Second Revision) Method A: AAS Method B: ICPOES	
	93a 93b	*Manganese		
	94a 94b	*Copper		
	95b 95b	*Zinc		
	96a 96b	*Total Carbon		
	97a 97b	*Organic Matter		
	98a 98a	*Organic Carbon		
	99a 99b	*C/N Ratio		
	125	*Particle Size	MS 417:Part2:1994	
	126	*Hardness	In-House Method	
	127	*Ammoniacal Nitrogen	In-house Method, TP-FER-12, Based on MS 417:Part3:1994 (First Revision)	
	128	*Urea Nitrogen	In-house Method, TP-FER-13, Based on MS 417:Part3:1994 (First Revision)	
	129	*Nitrate Nitrogen	In-house Method, TP-FER-14, Based on MS 417:Part3:1994 (First Revision)	

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**JOHOR PLANTATIONS GROUP BERHAD** (19780100126)

(Formerly known as Johor Plantations Berhad / Mahamurni Plantations Sdn Bhd)

**CENTRAL ANALYTICAL LABORATORY**Lot 2135 Batu 23½ Jalan Johor Bahru-Kota Tinggi  
81900 Kota Tinggi, Johor.Tel: 07-8821145 / Email: [jpcal@johorplantations.com](mailto:jpcal@johorplantations.com)

Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
<u>Agriculture Products and Materials</u>	130	*Sodium, Na	APHA 3030E, 3120B 23 <sup>rd</sup> Edition 2017
	131	*Conductivity	MS 2457:2012
Fertilizers	132	*Chloride	APHA 4500-Cl-B, 23 <sup>rd</sup> Edition 2017

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Materials/ Products Tested	Ref No.	Type of Test/ Properties Measured/ Range of Measurement	Standard Test Methods/ Equipment/Techniques
Agriculture Products and Materials  Soils	100	pH	MS 2457:2012
	101	Conductivity	MS 2458:2012
	102	Total Nitrogen	MS ISO 13878:2014
	103	Organic Carbon	In-House Method, TP-SOIL-05, Based on MS 10694:2016 and Soil Sampling, Preparation, and Analysis 1996 pg. 225
	104	Total Carbon	MS 10694:2016
	105	Organic Matter	
	106a 106b	Available Phosphorus	In-House Method, TP-SOIL-06, Based on Buku Panduan Analisis Tanah & Tumb, Jab Sains Tanah UPM 1988 pg. 23, Method A: UV Method B: ICPOES
	107	Total Phosphorus	MS 678:Part VII:1980 Method: UV
	108	Exchangeable Cation Potassium	MS 678:Part IV:1980 Method: ICPOES
	109	Exchangeable Cation Magnesium	
	110	Exchangeable Cation Calcium	
	111	*Exchangeable Cation Sodium	
	112	Cation Exchangeable Capacity	MS 678:Part V:1980
	113	*Exchangeable Al	Soil Analysis Handbook of Reference Methods.
	114	*Exchangeable H	
115	*Acid Extractable		

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<u>Agriculture Products and Materials</u>  Soils	136	*Ferum	SOP Penentuan Free Iron Oxide (Fe <sub>2</sub> O <sub>3</sub> ). Kaedah Calorimetric-Bacaan Atomic Absorption Spectrometer, <i>Version</i> <i>1.0, 2013.</i> Makmal Tanah, Jabatan Pertanian.
	137	*Loss of Ignition (LOI)	In House Method
	138	*Mechanical Analysis	SOP for Mechanical Analysis. Method DOA

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Rubber  Field Latex	116	Dry Rubber Content	MS 466:1987
	117	*TSC	MS 466:1987
	118	*Ammonia	In-house Method
	119	*VFA	
	120	*KOH	
	121	*Coagulant	
	122	*Magnesium	
	123	*Zinc	
	124	*Specific Gravity	

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