

Laboratory **Quality Control Laboratory, BPCL-Kochi Refinery, Ambalamugal P.O., Ernakulam Dist., Kerala**

Accreditation Standard **ISO/IEC 17025: 2017**

Certificate Number **TC-8054 (in lieu of T-0970)**

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Validity **04.10.2018 to 03.10.2020**

Last Amended on **26.10.2018**

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
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CHEMICAL TESTING

I.	PETROLEUM AND PRODUCTS			
1.	ATF Jet-A1	Particulate Contamination	IP 423: 2010	0.1 mg/l to 5.0 mg/l
		Appearance	ASTM D4176: 2014	Qualitative (Pass/Fail)
		Electrical Conductivity	ASTM D2624: 2015 ISO 6297: 1997	15 pS/m to 600 pS/m
		Freezing Point	ISO 3013: 1997 IS 1448 (Part 11) : 2016 ASTM D2386: 2015 ASTM D7153: 2015	(-) 80°C to (-) 10°C
		Jet Fuel Thermal Oxidation Test	ASTM D3241: 2018 ISO 6249: 1999 IS 1448 (Part 97):2015	Upto 50 mm Hg
		Lubricity of ATF	ASTM D5001: 2014	0.3 mm to 1.0 mm
		Naphthalene Content	IS 1448 (Part 118):2013 ASTM D1840: 2017	0.03 % vol to 4.25 % vol
		Particle Counts	IP 565: 2013	Upto 28
		Particulate Contamination	ASTM D5452: 2012	0.1 mg/l to 5.0 mg/l
		Silver Corrosion	IP 227: 1999	Qualitative
		Specific Energy	ASTM D3338M: 2014	35 MJ/kg to 50 MJ/kg
		Sulphur - Mercaptan	ASTM D3227: 2016 ISO 3012: 1999 IS 1448 (Part 109):2016	0.0003 % to 0.0080 %
		Total Acidity	ASTM D 3242: 2017 IS 1448 (Part 113): 2016 IP 354: 2017	0.001 mg KOH/g to 0.100 mg KOH/g
		Water Reaction	IS 1448 (Part 142) : 2015 ASTM D1094: 2013 ASTM D 3948: 2014	Qualitative: Range : 1 to 4 Qualitative: Range : 1 to 4 50 to 100

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		Water Separation Characteristics	IS 1448 (Part 142): 2016	
2.	Crude Oil	Density at 15 °C	ISO 12185: 1996 ASTM D 4052: 2018 ISO 3675: 1998 ASTM D1298: 2017 IS 1448 (Part 16):2014	0.72 g/ml to 0.84 g/ml
		Sediment by Extraction	ASTM D473: 2017 IS 1448 (Part 30):2013	0.01 % wt to 0.04 %
		Total Sulphur	ASTM D4294: 2016	0.02 % to 4.6 %
		Water Content	ISO 3733: 1999 IS 1448 (Part 40):2015	0.025 % vol to 10 % vol
3.	Liquefied Petroleum Gas	Density	IS 1448 (Part 76):2013	0.5 g/ml to 0.65 g/ml
		Volatility	IS 1448 (Part 72):2013	(-) 10 °C to 20 °C
4.	Liquefied Petroleum Gas, Liquefied Petroleum Gas Auto	Total Sulphur	ASTM D3246: 2015 ASTM D6667: 2014	10 mg/kg to 150 mg/kg
		Copper Corrosion	ASTM D1838: 2016 ISO 6251: 1996	Qualitative
		Hydrogen Sulphide	ASTM D2420: 2018	Qualitative (Pass/Fail)
		Propane, Propylene, butane, isobutane, npentane, 1pentene, 1,3-butadiene, Cis-2-butane, trans-2-butene	IP 405: 2015 ASTM D2163: 2014 ISO7941: 1988	0.01 % mole to 100 % mol
		Vapour Pressure	IS 1448 (Part 71):2016 ASTM D1267: 2018 ISO 4256: 1996	10 kPa to 1550 kPa
5.	Liquefied Petroleum Gas-Auto	Evaporation Residue	ISO 13757:1996	5 mg/kg to 150 mg/kg
		Motor Octane Number-Calculated	IS 14861: 2011 ISO 7941: 1988	70 to 100
6.	Propylene	Impurities: HydrocarbonMethane,	ASTM D2712: 2018	0.30 mg/kg to 8575 mg/kg

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		Ethane, Ethylene, Propane, Cyclopropane, Propadiene, Iso butane, N butane, 1-Butene, Cis-2-Butene, Trans-2-Butene, Iso butylene, Acetylene, Methyl Acetylene, 1,3 Butadiene, 2 Ethyl 1 Butene, 2 Methyl 2 Butene, N pentane, Neo pentane, Trans 2 pentane, Cis 2 Pentene, 2 Methyl 2 Pentene, 3 Methyl 1 Butene, 3 Methyl 1 Pentene, Cyclopentadiene, Hexane, green oil		
		Impurities-Permanent gases CO, CO ₂ , Hydrogen, Methane, Oxygen, Nitrogen	ASTM D2504/D2505: 2015 ASTM D8098: 2017	0.1 mol ppm to 50 mol ppm
		Oxygenates impurities Methanol, Ethanol, Propanol, Iso propanol, Acetone, Methyl Ethyl Ether, MTBE, t Butanol, Sec Butanol, n Butanol	ASTM D4864: 2014 ASTM D7423: 2017	0.5 mg/kg to 100 mg/kg
		Purity	ASTM D2163: 2014 ASTM D5623: 2018	1 % mol to 100 % mol

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		Sulfur speciation- Hydrogen sulfide, COS, Diethyl sulfide, Dimethyl sulfide, Methyl Ethyl Sulfide, Thiophene, Butyl mercaptans, Ethyl Mercaptans, Isobutyl mercaptans, Isopropyl mercaptan, Methyl mercaptan, N propyl mercaptan, Sec Butyl mercaptan, Tert Butyl mercaptan	ASTM D 5504: 2012	0.02 mol ppm to 50 mol ppm
		Total Sulfur	ASTM D6667: 2014	1.0 mg/kg to 100 mg/kg
9.	ATF Jet-A1, Kerosene	Smoke Point	ISO 3014: 1993 IP598: 2018 ASTM D1322: 2018 IS 1448 (Part 31):2017	10 mm to 30 mm
10.	Automotive Diesel Fuel	ASTM Colour	IS 1488 (Part 12):2013 ASTM D1500: 2017 ASTM D6045: 2017	0.5 to 8
		Calculated Cetane Index	ASTM D4737: 2016 ISO 4264: 2018	32.5 to 56.5
		Cetane Number	IS 1448 (Part 9): 2016 ISO 5165: 2017 ASTM D613: 2018	30 to 65
		Cold Filter Plugging Point	ASTM D6371: 2017 IS 1448 (Part 110):2013	(-) 6 °C to 18°C
		Lubricity of Diesel	ISO 12156: 2017 ASTM D6079: 2016	200 µm to 600 µm
		Oxidation stability	ASTM D2274: 2014 EN 12916: 2006	1 g/m ³ to 30 g/m ³ Upto 26 % m

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		Polycyclic Aromatic Hydrocarbon	ASTM D6591: 2017 IP 391: 2007	
		Total Contamination	EN 12662: 2008 IP 440: 2008	2 mg/kg to 100 mg/kg
		Water content	IP 438: 2013 ISO 12937: 2000	30 mg/kg to 1000 mg/kg
11.	Automotive Diesel Fuel & Light Diesel Oil	Ramsbottom Carbon Residue	ASTM D524: 2015 IS 1448 (Part 8): 2012 ISO 4262: 1993	0.05 % wt to 2.0 % wt
12.	Automotive Diesel Fuel, Light Diesel Oil, ATF, Jet-A1	Kinematic Viscosity	ASTM D445: 2017 IS 1448 (Part 25):2013 ASTM D7042: 2016	0.2 cSt to 8.0cSt
14.	Automotive Diesel Fuel, Light Diesel Oil, Fuel Oil	Ash Content	ISO 6245: 2001 IS 1448 (Part 4): 2013 ASTM D482: 2013	0.001 % wt to 0.18 % wt
		Pour Point	IS 1448 (Part 10):2013 ASTM D 97: 2017 ISO 3016: 2014 ISO 3016: 1994 ASTM D 5950: 2014	(-) 12 °C to 51 °C
		Sediment by Extraction	ASTM D473: 2017 IS 1448 (Part: 30):2013	0.01 % wt to 0.4 % wt
15.		Density at 15°C	ASTM D4052: 2018	680.0 kg/m ³ to 970 kg/m ³

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	Aviation Turbine Fuel Jet-A1, Automotive Diesel Fuel, Kerosene, Special Boiling Point Spirit, Naphtha, Motor Gasoline, Mineral Turpentine Oil, Light Diesel Oil and Fuel Oil		ISO 12185: 1996	
16.	Benzene	Acidity	ASTM D847: 2016	Qualitative
		Bromine Index	ASTM D5776: 2014	1 to 20
		Carbon disulphide	Annex L of IS 534:2013	1 mg/kg to 1000 mg/kg
		Colour Pt-Co	ASTM D6045: 2017	5 to 30
		Distillation	Annex E of IS 534:2013	30 °C to 150 °C
		Impurities- Non aromatics, Toluene, 1,4 Dioxane, n-heptane & higher	Annex A of IS 534:2013	6 mg/kg to 1000 mg/kg
		N-formylmorphine as Nitrogen	Annex K of IS 534:2013	0.3 mg/kg to 100 mg/kg
		Purity	Annex A of IS 534:2013 ASTM D7504: 2018	99.8 % wt to 100 % wt
		Solidification Point	ASTM D852: 2016 Annex G of IS 534:2013	4 °C to 6 °C
17.	Benzene, Toluene	Hydrogen Sulphide	Annex E of IS 537:2016	Qualitative (Absent / Present)
		Acid Wash Colour	ASTM D848: 2018 Annex J of IS 534:2013	1 to 14

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		Distillation	ASTM D850: 2018	30 °C to 50 °C
		Platinum-Cobalt Colour	Annex B of IS 534:2013	5 to 30
		Specific Gravity	Annex A of IS 537:2016 Annex C of IS:534:2013	0.85 g/ml to 0.90 g/ml
			ASTM D4052: 2018	
		Platinum-Cobalt Colour	ASTM D1209: 2011	5 to 30
18.	Benzene, Toluene, Naphtha, Motor Gasoline, Automotive Diesel Fuel	Total Sulphur	ISO 20846: 2011 ASTM D3120: 2014	1 mg/kg to 400 mg/kg
		Trace Sulphur	ASTM D5453: 2016	0.3 mg/kg to 200 mg/kg
20.	Bitumen	Absolute Viscosity	ISO 6619: 1988 IS 1448 (Part 2): 2013 ASTM D 2171: 2010	500 Poise to 5000 Poise
		Kinematic Viscosity	IS 1448 (Part 3): 2007 ISO 2997: 1977 ASTM D2170: 2010 IS 1206: 2014	120 cSt to 4000 cSt 120 cSt to 4000 cSt
		Rolling Thin Film Oven Test	ASTM D2872: 2012	10 cm to 140 cm
		Soluble Matter	IP 47:2000 IS 1216: 2002	95 % to 100 %
21.	Bitumen, Natural Rubber Modified Bitumen	Ductility	IS 1208: 2014 ASTM D113: 2017	10 cm to 140 cm
		Elastic Recovery	IS 15462: 2004 ASTM D6084: 2018	10 % to 80 %
		Flash Point by Cleveland Open Cup	IS 1448 (Part 69): 2013 IS 1209: 2014 ASTM D92: 2016 ISO 2592: 2017	90 °C to 300 °C
		Penetration	IS 1203: 2014 ASTM D5: 2013	20 1/10th mm to 200 1/10th mm

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		Softening Point	ASTM D36: 2014 IS 1205: 2014	30 °C to 80 °C
23.	Fuel Oil	Calculated Carbon Aromaticity Index	IS 15217: 2007 ISO 8217: 2012	750 to 1000
		Carbon Residue (Micro Method)	ASTM D4530: 2015 ISO 10370: 2014	8 % wt to 18 % wt
		Kinematic Viscosity	ASTM D445: 2017 IS 1448 (Part 25):2013	100 cSt to 400 cSt
		Ramsbottom Carbon Residue	ISO 4262: 2013 ASTM D524: 2015 IS 1448 (Part 8): 2012	8 % wt to 18 % wt
		Strong Acid No	ASTM D974: 2014	0.01 mg KOH/g to 5 mg KOH/g
		Total Sediments	ISO 10307: 2009 ASTM D4870: 2018	Upto 0.4 %
24.	Kerosene	Burning Quality	IS 1448 (Part 5): 2013	5 mg/kg to 30 mg/kg
25.	Kerosene, Automotive Diesel Fuel, Light Diesel Oil, Fuel Oil	Total Acidity	IS 1448 (Part 2): 2013 ISO 6619: 1988 ASTM D664: 2017	0.01 mg KOH/g to 5 mg KOH/g
26.	Kerosene, Mineral Turpentine , ATF Jet-A1, Automotive Diesel Fuel , High Flash Diesel	Flash Point- ABEL	IS 1448 (Part 20): 2013 ISO 13736: 2013 IP 170: 2014	19 °C to 70 °C
27.	Kerosene, Mineral Turpentine Oil, ATF, Jet-A1,	Distillation	ISO 3405: 2011 ASTM D86: 2017 IS 1448 (Part 18):2016	20°C to 400 °C

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	Automotive Diesel Fuel , Special Boiling Point Spirit, Naphtha, Motor Gasoline		IP 123: 2014	
28.	Light Diesel Oil & Fuel Oil	Flash Point -Pensky-Marten Closed Cup	IS 1448 (Part 21):2012	40 °C to 150 °C
		Density at 15°C	ISO 3675: 1998 IS 1448 (Part 16):2014 ASTM D1298: 2017	850 kg/m ³ to 1100 kg/m ³
		Flash Point -Pensky-Marten Closed Cup	ISO 2719: 2016 ASTM D93: 2016	40 °C to 150 °C
		Water Content	ISO 3733: 1999 IS 1448 (Part 40):2015	0.025 % vol to 100 % vol
29.	Mineral Turpentine Oil	Residue on Evaporation	IS 1448 (Part 29):2016	1 mg/100ml to 30 mg/100ml
30.	Mineral Turpentine Oil, ATF Jet-A1, Naphtha, Motor Gasoline	Aromatics & Olefins	IS 1448 (Part 23):2016 ASTM D1319: 2015 IP 156: 2008 ISO 3837: 1993	0.3 % vol to 50 % vol
31.	Motor Gasoline	Benzene Content	ASTM D3606: 2017	0.1 % vol to 5 % vol
		Lead	ASTM D5059: 2014	0.0001 g/l to 0.2 g/l
		Motor Octane Number	ISO 5163: 2014	40 to 100
			ASTM D2700: 2018 IS 1448 (Part 26):2013	
		Oxidation Stability	IS 1448 (Part 28):2013 ISO 7536: 1994 ASTM D525:2012	10 min to 720 min

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			IP 40:2014	
		Oxygenates & Oxygen Content	IS 2796: 2008 ASTM D4815: 2015	0.22 % wt to 12 % wt
		Research Octane Number	ISO 5164: 2014 IS 1448 (Part 27):2013 ASTM D2699: 2018	40 to 100
		Sulphur mercaptans	ASTM D 3227: 2016	0.0003 % to 0.0080 %
		Total Sulphur	ASTM D4294: 2016 ISO 8754: 2003	17 mg/kg to 500 mg/kg
32.	Motor Gasoline, ATF, JET-A1	Existent Gum	IS 1448 (Part 29):2016 IP 540: 2014 ASTM D381: 2017 ISO 6246:2017	1 mg/100 ml to 30 mg/100 ml
33.	Motor Gasoline, ATF, Jet-A1, Automotive Diesel Fuel , Light Diesel Oil, Kerosene	Copper Corrosion	ISO 2160: 1998 IS 1448 (Part 15):2016 ASTM D130: 2018	Qualitative
34.	Naphtha	Chloride	ASTM 4929: 2017	1 mg/kg to 5 mg/kg
		Non-Volatile Matter	IS 1448 (Part 64):2013	1 mg/100 ml to 30 mg/100 ml
		Sulphur - Mercaptan	IS 1448 (Part 36):2008 ASTM D 3227-16	3% to 80% 0.0003 % to 0.0080 %
37.	Naphtha, Fuel Oil	Calorific Value	ASTM D240: 2017 IS 1448 (Part 6): 2013 IS 1448 (Part 7): 2016	6000 cal/g to 12400 cal/g
38.	Naphtha, Kerosene, Mineral Turpentine Oil,	Total Sulphur	ISO 13032: 2012	0.05 % to 4.6 %

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	ATF Jet-A1, Automotive Diesel Fuel, Light Diesel Oil, Fuel Oil, Low Sulphur Heavy Stock, Motor Gasoline			
39.	Naphtha, Kerosene, Mineral Turpentine Oil, ATF Jet-A1, Automotive Diesel Fuel, Light Diesel Oil, Fuel Oil, Motor Gasoline	Total Sulphur	IP 336: 2014 ISO 20847: 2004 ASTM D4294: 2016	0.002 % to 4.6 %
		Reid Vapour Pressure	ISO 3007: 1999	1 kPa to 100 kPa
40.	Naphtha, Motor Gasoline	Reid Vapour Pressure	IS 1448 (Part 39):2012	1 kPa to 100 kPa
			ISO 3007: 1999	
41.		Total Sulphur	ISO 14596: 2007	3 mg/kg to 45000 mg/kg

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	Naphtha, Motor Gasoline, Kerosene, Mineral Turpentine Oil, ATF Jet-A1, Automotive Diesel Fuel, Light Diesel Oil, Fuel Oil		ASTM D2622: 2016	
42.	Naphtha, Special Boiling Point Spirit	Paraffins, Iso-Paraffins, Olefins, Naphthenes, Aromatics	ASTM D6760: 2016 ASTM D5134: 2017	0.05 % wt to 80 % wt
43.	Petcoke	Ash content	IS 1448 (Part 126):2016 ASTM D4422: 2013 2016	0.02 % to 40 %
		Calorific Value	ASTM D5865: 2013 IS 1448 (Part 6): 2013	6000 cal/g to 12400 cal/g
		Fixed carbon	Annex A of IS 8502:2011 ASTM D3172: 2013 ASTM D3172: 2013	1 % wt to 95 % wt
		Hardgrove Grindability Index (HGI)	ASTM D409M: 2016 IS 4433: 2015	20 to 70
		Moisture content	ASTM D3173M: 2017 ASTM D3302: 2017 IS 1448 (Part 132):2018	0.1 % wt to 50 % wt
		Total Sulphur	ASTM D4239: 2017 ASTM D2622: 2016	0.1 % wt to 20 % wt
		Volatile Matter	IS 1448 (Part 134):2013 ASTM D3175M: 2017	0.1 % to 40 %

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		Moisture content, Volatile Matter, Ash content, Fixed carbon	ASTM D7582: 2015	0.1 % to 95 %
44.	Special Boiling Point Spirit, Mineral Turpentine Oil, ATF Jet-A1, Toluene	Doctor Test	IS 1448 (Part 19):2015	Qualitative (Pass/Fail)
44.	Special Boiling Point Spirit, Naphtha, Kerosene, Mineral Turpentine Oil, ATF, Jet-A1	Saybolt Colour	ASTM D6045: 2017 IS 1448 (Part 14):2013 ASTM D156: 2015	(-)16 to 30
45.	Special Boiling Point Spirit, Naphtha, Motor Gasoline, Kerosene, Mineral Turpentine Oil, ATF, Automotive Diesel Fuel	Density at 15°C	ISO 3675: 1998 ASTM D1298: 2017 IS 1448 (Part 16):2014	650.0 kg/m ³ to 850.0 kg/m ³
46.	Toluene	Colour	IS 82: 1973	Qualitative (Pass/Fail)
		Distillation	Annex C of IS 537:2016	30 °C to 150 °C
		Purity	ASTM D7504: 2018 Annex D of IS 537:2016	99.8 % wt to 100 % wt
		Residue on Evaporation	Clause8 of IS: 82: 1991	1 mg/100ml to 300 mg/100ml

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		Water content	IP 438: 2013 ISO 12937: 2000	30 mg/kg to 1000 mg/kg

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