

Laboratory **Quality Control Laboratory, Haldia Refinery, P.O. Haldia Oil Refinery,
Dist. Purba Medinipur, West Bengal**

Accreditation Standard **ISO/IEC 17025: 2005**

Certificate Number **TC-7787 (in lieu of T-0340)**

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Validity **18.09.2018 to 17.09.2020**

Last Amended on --

| Sl. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|--------------------------------|-------------------------------|----------------------------|---|---|
| <u>CHEMICAL TESTING</u> | | | | |
| 1. | PETROLEUM AND PRODUCTS | | | |
| 1. | Bitumen | Absolute Viscosity at 60°C | IS:1206(2):2004 | 50 poise to 6500 poise |
| | | Penetration, 1/10 mm | IS:1203:2008 ASTM D-5:2013 | 10 to 400 |
| | | Flash point | IS 1448(69):2003 ASTM D-92:2016 | 100 °C to 380 °C |
| | | Kinematic Viscosity | IS:1206(3):2004 ASTM D-2170:2010 | 250 cSt to 400 cSt |
| 2. | ATF | Acidity | IS 1448(113):2006 ASTM D-3242:2011 RA:2017 | (0 to 0.1) mg KOH/gm |
| | | Aromatics | ASTM D-1319:2015 | 5.0 % to 99 % vol |
| | | Color(Saybolt) | IS 1448(14): 2003 RA:2013 ASTM D-156:2015 | 0 to 30 (Saybolt) |
| | | Color(Saybolt) | ASTM D-6045:2012 | 0 to 30 (Saybolt) |
| | | Color (visual) | Visual | |
| | | Copper strip corrosion | IS 1448(15): 2004 RA:2006 ASTM D-130:2012, ISO-2160:1998 | 1a to 4 c |
| | | Distillation | IS 1448(18): 2006 ASTM D-86:2017 ISO-3405:2011 | 0 to 400 % vol |
| | | Density at 15°C | IS 1448(16): 2007 ASTM D-1298:2012 RA-2017 ISO-3675:2014 | 600 kg/m ³ to 1100 kg/m ³ |
| | | Doctor Test, rating | IS 1448(19): 2007 ASTM D-4952:2012 RA:2017 | -ve |

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|-----|----------------------------|--|---|---|
| | | Electrical Conductivity | ASTM D-2624:2015 | 1 to 2000 pS/m |
| | | Existent Gum | IS 1448(29): 2004 RA:2016 ASTM D-381:2012 RA:2013 | 0 to 30 mg/100ml |
| | | Flash Point; ABEL | IS 1448(20): 2004 ISO-13736:2013 | (-)18 °C to 70 °C |
| | | Freezing point | IS 1448(11): 2004 ASTM D-2386:2015 | (-)80 °C to +20 °C |
| | | JFTOT, ΔP, mm Hg. | IS 1448(97): 2007 | 0 to 25 mm Hg. |
| | | Tube rating | ISO-6249:1999 | 0 to 4 mm Hg. |
| | | Lubricity | ASTM D-5001:2014 | 0.45 mm to 1.00 mm |
| | | Naphthalene content | IS 1448(118): 2007 ASTM D-1840:2017 | 0.3%V to 5.0 %V |
| | | Particulate Contamination at mfg point | ASTM D-5452:2012 | 0 to 2.0 mg/l |
| | | Silver Strip corrosion, rating | IP-227:1999 | 0 to 4 |
| | | Smoke Point | IS 1448(31): 2003 ASTM D-1322:2018 ISO-3014:1993 | 15 mm to 30 mm |
| | | Specific energy | ASTM D-3338:2014 | 40 MJ/kg to 45 MJ/kg |
| | | Sulphur Mercaptan | IS 1448(109): 2004 RA:2016 | 0.0003 m% to 0.01 m% |
| | | Sulphur | ASTM D-2622:2016 | 0.0017 m% to 4.6 m% |
| | | Water separometer Index Modified | ASTM D-4294:2016 | 50 to 100 |
| | | Water reaction interface rating | IS 1448(142): 2008 ASTM D-3948:2014 | 1 to 4 |
| | | KV at @-20°C | IS 1448(42): 2006 ASTM D-1094:2007 RA-2013 | 0.2 mm ² /sec to 300000 mm ² /sec |
| 3. | Naphtha | Aromatics | ASTM D-1319:2015 | 5.0 mm ² /sec to 99 mm ² /sec |

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| | | Distillation | IS 1448(18):2006 ASTM D86:2017 ISO:3405:2011 | 0 to 400 °C, % vol |
| | | Density at 15°C, | IS 1448(16): 2007 ASTM D-1298:2012 RA-2017 ISO-3675:2014 | 600 to 1100 |
| | | Sulphur | ASTM D-2622:2016 | 3.0 mg/kg to 50000 mg/kg |
| | | Sulphur | ASTM D-1319:2015 | 0.0017 wt% to 4.6 wt% |
| | | Olefins | ASTM D-4294:2016 | 0.3% to 55 % vol |
| | | Paraffins, isoparaffins, olefins, naphthenes, aromatics, | P-23:2004, RA:2016 D-1319:2015 | 0.01v to 99 % vol |
| | | Reid Vapour Pressure (RVP) | ASTM D-6730:2016 | 0.07 % to 16 %, kpa |
| 4. | Motor Gasoline | Color (visual) | Visual | |
| | | Copper strip corrosion | IS 1448(15): 2004RA:2006 ASTM D-130:2012, ISO-2160:1998 | 1a to 4 c |
| | | Distillation °C | IS 1448(18):2006 ASTM D86:2017 ISO:3405:2011 | 0 to 400 °C, % vol |
| | | Density at 15°C | IS 1448(16): 2007 ASTM D-1298:2012RA- 2017 ISO-3675:2014 | 600 kg/m ³ to 1100 kg/m ³ |
| | | Sulphur | ASTM D-2622:2016 | 3.0 mg/kg to 50000 mg/kg |
| | | Olefins | P-23:2004, RA:2016 D-1319:2015 | 0.3% to 55%vol |
| | | Reid Vapour Pressure (RVP) | IS 1448(39):2003 IP-69:2008 | 0.07 % to 16 % |

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|-----|----------------------------|------------------------------|---|---|
| | | Motor Octane Number (MON) | IS 1448(26):2003 RA:2013 ASTM D-2700:2017 ISO-5163:2014 | 40 to 90 |
| | | Research Octane Number (RON) | IS 1448(27):2003 ASTM D-2699:2017 ISO-5164:2014 | 0.04 % to 1.0 % |
| 5. | Kerosene | Color (Saybolt) | IS 1448(14): 2003 RA:2013 ASTM D-156:2015 | 0 to 30 |
| | | Color (Saybolt) | ASTM D-6045:2012 | 0 to 30 |
| | | Color (visual) | Visual | |
| | | Copper strip corrosion | IS 1448(15): 2004 RA:2006 ASTM D-130:2012, ISO-2160:1998 | 1a to 4c |
| | | Distillation | IS 1448(18):2006 ASTM D86:2017 ISO:3405:2011 | 0 to 400 °C,% vol |
| | | Density at 15°C | IS 1448(16): 2007 ASTM D-1298:2012 RA-2017 ISO-3675:2014 | 600 kg/m ³ to 1100 kg/m ³ |
| | | Flash Point;ABEL, | IS 1448(20): 2004 ISO-13736:2013 | 4 °C to 70°C |
| | | Smoke Point | IS 1448(31): 2003 ASTM D-1322:2018 ISO-3014:1993 | 15 mm to 30 mm |
| | | Sulphur Mercaptan | IS 1448(109): 2004RA:2016 | 0.0003 wt% to 0.01 wt% |
| | | Sulphur | ASTM D-4294:2016 | 0.0017 wt% to 4.6 wt% |
| 6. | Diesel Fuel | Color(visual) | Visual | 0.007 % to 0.06 % |
| | | Copper strip corrosion | IS 1448(15): 2004 RA:2006 ASTM D-130:2012, ISO-2160:1998 | 1a to 4c |
| | | Distillation | IS 1448(18):2006 ASTM D86:2017 | 0 to 400 °C,% vol |

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| | | | ISO:3405:2011 | |
| | | Density at 15 ^o C | IS 1448(16): 2007 ASTM D-1298:2012 RA-2017 ISO-3675:2014 | 600 to 1100 |
| | | Flash Point;ABEL, | IS 1448(20): 2004 ISO-13736:2013 | 4 to 70 |
| | | Sulphur | ASTM D-2622:2016 | 3.0 mg/kg to 50000 mg/kg |
| | | Sulphur | ASTM D-4294:2016 | 0.0017 wt% to 4.6,wt% |
| | | Cetane Index | ASTM D-4737:2010 RA:2016 | |
| | | Kinematic Viscosity | IS 1448(25):2007 ASTM D-445:2017 | 1 cSt to 1200 cSt |
| | | Flash Point;PMCC | IS 1448(21):2007 ASTM D-93:2016 | 40 to 280 |
| | | Pour Poin | IS 1448(10):2013 ASTM D-97:2016 RA:2017 | 33 to +20 |
| 7. | Furnace Oil | Density at 15 ^o C,kg/m ³ | IS 1448(16): 2007 ASTM D-1298:2012 RA-2017 ISO-3675:2014 | 600 to 1100 |
| | | Sulphur | ASTM D-2622:2016 | 3.0 mg/kg to 50000 mg/kg |
| | | Sulphur | ASTM D-4294:2016 | 0.0017 to 4.6 |
| | | Kinematic Viscosity | IS 1448(25):2007 ASTM D-445:2017 | 1 to 1200 |
| | | Flash Point;PMCC | IS 1448(21):2003 ASTM D-93:2016 | 40 °C to 280 °C |
| | | Pour Point | IS 1448(10):2013 ASTM D-97:2016 RA:2017 | (-)-33 °C to +20 °C |
| | | Acidity/TAN in mg KOH | IS 1448(2):2007RA:2013 ASTM D-974:2014 | |
| | | CCR | ASTM D-189:2014 | |

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| 8. | JBO | Distillation | IS 1448(18):2006 ASTM D86:2017 ISO:3405:2011 | 0 to 400 °C,% vol |
| | | Density at 15°C | IS 1448(16): 2007 ASTM D-1298:2012 RA-2017 ISO-3675:2014 | 600 kg/m ³ to 1100 kg/m ³ |
| | | Kinematic Viscosity | IS 1448(25):2007 ASTM D-445::2017 | 1 to 1200 |
| | | Flash Point;PMCC | IS 1448(21):2003 ASTM D-93:2016 | 40 °C to 280 °C |
| 9. | Lube Oil | Flash point, °C | IS 1448(69):2003 ASTM D-92:2016 | 100 °C to 380 °C |
| | | Color (Saybolt) | IS 1448(14): 2003 RA:2013 ASTM D-156:2015 | 0 to 30 |
| | | Color (Saybolt) | ASTM D-6045:2012 | 0 to 30 |
| | | Color (visual) | Visual | |
| | | Density at 15°C | IS 1448(16): 2007 ASTM D-1298:2012 RA-2017 ISO-3675:2014 | 600 kg/m ³ to 1100 kg/m ³ |
| | | Sulphur | ASTM D-2622:2016 | 3.0 mg/kg to 50000 mg/kg |
| | | Sulphur | ASTM D-4294:2016 | 0.0017 wt% to 4.6 wt% |
| | | Kinematic Viscosity | IS 1448(25):2007 ASTM D-445:2017 | 1 to 1200 |
| | | Pour Point | IS 1448(10):2013 ASTM D-97:2016 RA:2017 | (-)33 °C to +20 °C |
| | | Acidity/TAN in mg KOH | IS 1448(2):2007 RA:2013 ASTM D-974:2014 | 0 to 0.5 mg KOH/gm |
| | | CCR | ASTM D-189:2014 | 0.01 to 15% wt |
| | | Ash Content | IS 1448(4):2008 RA:2013 ASTM D-482:2013 | 0.0001% to 1.0% mass |

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| | | Color (ASTM) | ASTM D-1500:2012 RA:2017 | 0.5 to 8.0 |
| | | Viscosity Index | IS 1448(56):2003 D-2270:2016 | 90 to 125 |
| | | Crackle Test | IS 4543:2004 | - |
| 10. | LPG | LPG Analysis for Composition | IS 1448(111):2006 ASTM D-2163:2014 ISO-7941 | 0.1 to 100 |
| | | Copper Strip Corrosion rating | ASTM D-1838:2014 | 1a to 4c |
| | | MON | IS 14861:2000,Annex A ISO:7941:1998 | 0 to 100 |
| | | Volatility Evaporation temp. for 95% V at 760 mm Hg. Pressure, °C | IS 1448(72):2003 ASTM D-1837:2011 | (-).5.0 °C to 10.0 °C |
| II. | POLLUTION AND ENVIRONMENT | | | |
| 1. | Effluents | pH | IS 3025(11):2006 | 1 to 13 |
| | | Phenol | IS 3025(43):2003 | 0.01 mg/l to 1.0 mg/l |
| | | BOD | IS 3025(44):2003 | 1 mg/l to 350 mg/l |
| | | Oil and Grease | IS 3025(39):2003 | 1 mg/l to 100 mg/l |
| | | Sulphide | IS 3025(29):2003 | 0.1 mg/l to 20 mg/l |
| | | Total suspended Solids | IS 3025(17):2006 | 1 mg/l to 200 mg/l |
| | | COD | IS 3025(58):2006 | 10 mg/l to 1000 mg/l |