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|---|---|---|---|
| **Laboratory** | **Inspectorate Griffith India Pvt. Ltd., Gandhidham Laboratory, Plot No. 73, Sector-11, GIDC, Gandhidham, Kutch, Gujarat** | | |
| **Accreditation Standard** | **ISO/IEC 17025: 2005** | | |
| **Certificate Number** | **TC-8146** ***(in lieu of T-1889)*** | **Page 1 of 10** | |
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|---|---|---|---|---|
| | | **CHEMICAL TESTING** | | |
| **I.** | **SOLID FUELS** | | | |
| **1.** | **Coal & Coke** | Total Moisture (TM) | IS 1350 (Part-1), ISO-579, ISO-589, ASTM D3302/D3302M, ASTM D2961/D2961M, ASTM D 4931 | 0.5% to 40% |
| | | Moisture in analysis Sample (IM) | IS 1350 (Part1), ISO 687, ISO 11722, ASTM D3173 / D3173M, ASTM D7582 | 0.1% to 20% |
| | | Volatile Matter (VM) | IS 1350 (Part-I), ASTM-D3175, ASTM D6374, ASTM D7582, ISO 562 | 0.1 %to 55% |
| | | Ash | IS 1350 (Part-I), ASTM D3174, ASTM D4422, ASTM D7582, ISO 1171 | 0.1% to 50% |
| | | Gross Calorific Value (GCV) | IS:1350 (Part-II), ASTM D5865, ISO 1928 | 2000 kcal/kg to 8300 kcal/kg |
| | | Fixed Carbon (FC) | IS 1350 (Part-I) (By calculation), ASTM D3172 | 20% to 90% |
| | | Phosphorous as P | IS 1350 (Part-V) | 0.005% to 0.1% |

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| | | Total Sulphur as S | IS 1350(Part-III),<br>ASTM D4239,<br>ISO 334,<br>ISO 19579 | 0.05 %to 15% |
| | | Chlorine as Cl | IS 1350 (Part-V),<br>ISO-587 | 0.0005% to 0.1% |
| | | Iron as Fe | IS 1355 | 0.20% to 2.50% |
| | | Ultimate Analysis | | |
| | | Carbon | ASTM D5373,<br>ISO 29541 | 10% to 100% |
| | | Hydrogen | ASTM D5373,<br>ISO 29541 | 0.2% to 15% |
| | | Nitrogen | ASTM D5373,<br>ISO 29541 | 0.2% to 5% |
| | | Sulphur | ASTM D4239 | 0.05% to 15% |
| | | Oxygen | ASTM D3176,<br>ISO 17247 | 0.04% to 90% |
| | | Hardgrove Grindability Index (HGI) | ASTM D409/409M<br>IS:4433 | 30 unit to 90 unit |
| | | Reactivity of Coke | | |
| | | Coke Reactivity Index(CRI) | ASTM D5341/5341M | 10% to 65% |
| | | Coke Strength after Reaction(CSR) | ASTM D5341/5341M | 20% to 80% |
| | | Crucible Swelling Number/Free Swelling Index | IS 1353,<br>ISO 501,<br>ASTM D720 /D720M | 1 Unit to 9 Unit |
| | | Ash Fusion Temperature (Oxidizing & Reducing) | | |
| | | Initial Deformation Temperature (IDT) | ISO 540,<br>ASTM D1857/D1857M | $900^0$C to $1500^0$C |
| | | Spherical Temperature (ST) | ISO 540,<br>ASTM D1857/D1857M | $900^0$C to $1500^0$C |

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| | | Hemispherical Temperature (HT) | ISO 540, ASTM D1857/D1857M | $900^0$C to $1500^0$C |
| | | Flow Temperature (FT) | ISO 540, ASTM D1857/D1857M | $900^0$C to $1500^0$C |
| **2.** | **Pet Coke** | Nickel | ASTM D5056 | 5 mg/kg to 200 mg/kg |
| | | Iron | ASTM D5056 | 150 mg/kg to 500 mg/kg |
| | | Vanadium | ASTM D5056 | 5 mg/kg to 2000 mg/kg |
| | | Calcium | ASTM D5056 | 20 mg/kg to 225 mg/kg |
| | | Aluminum | ASTM D5056 | 15 mg/kg to 500 mg/kg |
| | | Hardgrove Grindability Index (HGI) | ASTM D5003 | 30 unit to 90 unit |
| **3.** | **Brown Coal and Lignite** | Total Moisture | ISO 5068 (Part I) | 1% to 50% |
| | | Moisture in analysis sample (IM) | ISO 5068 (Part II) | 0.1 %to 20% |
| | | Volatile Matter | ISO 5071 (Part I) | 0.1 % to 50% |
| **4.** | **Chemical Composition of Ash of Coal & Coke** | SiO2 | IS 1355, ASTM D3682 | 0.1% to 60% |
| | | Fe2O3 | IS 1355, ASTM D3682 | 0.1% to 40% |
| | | Al2O3 | IS 1355, ASTM D3682 | 0.5% to 30% |
| | | CaO | IS 1355, ASTM D3682 | 0.5% to 20% |
| | | MgO | IS 1355, ASTM D3682 | 0.5 % to 10% |
| | | Na2O | IS 1355 | 0.001 % to 5% |
| | | K2O | IS 1355 | 0.001 % to 5% |
| | | TiO2 | IS 1355, ASTM D3682 | 0.05 % to 20% |
| | | MnO | IS 1355 | 0.05 % to 7.5% |
| | | P2O5 | IS 1355 | 0.005 % to 1% |
| | | SO3 | IS 1355 | 0.1 % to 20% |

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| **II.** | **ORES & MINERALS** | | | |
| **1.** | **Iron Ore** | Silica | IS 1493(Part-I) | 0.1 % to 25% |
| | | Total Iron | IS 1493 (Part-I) | 25 % to 70% |
| | | Alumina | IS 1493 (Part-I), IGI/GDM/LAB/TPM/07, dtd. 01.03.2013 | 0.1 % to 25% |
| | | Titanium Oxide | IS 1493 (Part-III), IGI/GDM/LAB/TPM/06, dtd. 01.03.2013 | 0.05 % to 20% |
| | | Calcium Oxide | IS 1493, IGI/GDM/LAB/TPM/08, dtd 01.03.2013 | 0.1 % to 5% |
| | | Phosphorous | IS 1493 (Part-I), IS 1493, | 0.01 % to 1% |
| | | Sulphur | IS 1493 (Part-I), ASTM E1915 | 0.005 % to 0.5% |
| | | Transportable Moisture Limit (TML) | IMSBC CODE (Flow Table and Penetration method) | 1 % to 27% |
| | | Flow Moisture Point (FMP) | IMSBC CODE (Flow Table and Penetration method) | 1 % to 30% |
| **2.** | **Bauxite** | Loss on Ignition | IS 2000 (Part-I) | 5 % to 30% |
| | | Silica | IS 2000 (Part-II) | 0.5 % to 30% |
| | | Alumina | IS 2000 (Part-III) | 10.0 % to 85% |
| | | Ferric Oxide | IS 2000 (Part-IV) | 0.5 % to 35% |
| | | Titanium Oxide | IS 2000 (Part-V) | 0.50 % to 20% |
| | | Calcium Oxide | IS 2000 (Part-IX), IGI/GDM/LAB/TPM/17 dtd 01.08.2016 | 0.50 % to 5% |

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|---|---|---|---|---|
| | | Transportable Moisture Limit (TML) | IMSBC CODE (Flow Table and Penetration method) | 1 % to 18% |
| | | Flow Moisture Point (FMP) | IMSBC CODE (Flow Table and Penetration method) | 1 % to 20% |
| **3.** | **Limestone & Dolomite** | Loss on Ignition | IS 1760 (Part-I) | 5 % to 50% |
| | | Silica | IS 1760 (Part-II) | 1 % to 20% |
| | | Ferric Oxide | IS 1760 (Part-III), IGI/GDM/LAB/TPM/09, dtd 01.03.2013 | 0.05 % to 10% |
| | | Alumina | IS 1760 (P-III) | 0.05 % to 10% |
| | | Calcium Oxide | IS 1760 (P-III) | 10 % to 70% |
| | | Magnesium Oxide | IS 1760 (P-III) | 0.2 % to 35% |
| | | Sulphur | ASTM C25, ASTM E1915 | 0.005 % to 0.1% |
| | | Phosphorous | ASTM C25 | 0.005 % to 0.1% |
| **4.** | **Gypsum** | Calcium Oxide | IS 1288 | 5 % to 40% |
| | | Magnesium Oxide | IS 1288 | 0.1% to 5% |
| | | Silica as $SiO_2$ | IS 1288 | 0.1% to 10% |
| | | Combined Water | IS 1288 | 5% to 20% |
| | | Purity as $CaSO_4.2H_2O$ | IS 1288 | 60 % to 98% |
| **5.** | **Rock Phosphate** | $P_2O_5$ | IS 11224 | 10% to 50% |
| | | $SiO_2$ | IS 11224, IGI/GDM/LAB/TPM/10, dtd 01.03.2013 | 0.5% to 40% |
| | | Al2O3 | IS 11224, IGI/GDM/LAB/TPM/11 dtd 01.03.2013 | 0.1% to 30% |
| | | $Fe_2O_3$ | IS 11224, IGI/GDM/LAB/TPM/12 dtd 01.03.2013 | 0.1% to 5% |

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| | | CaO | IS 9386 | 10 % to 50% |
| | | Moisture | IS 11224 | 0.1 % to 10% |
| **6.** | **Fluorspar** | $CaCO_3$ | IGI/GDM/LAB/TPM/18, Dated 17.12.2016 | 0.5% to 40% |
| | | $SiO_2$ | IGI/GDM/LAB/TPM/18, Dated 17.12.2016 | 0.1% to 30% |
| | | $CaF_2$ | IGI/GDM/LAB/TPM/18, Dated 17.12.2016 | 2 % to 99% |
| | | $Fe_2O_3$ | IGI/GDM/LAB/TPM/18, Dated 17.12.2016 | 1% to 20% |
| | | $Al_2O_3$ | IGI/GDM/LAB/TPM/18, Dated 17.12.2016 | 0.2% to 15% |
| **III.** | **SOIL & ROCK** | | | |
| **1.** | **Clay** | Moisture | IS 7589 | 0.2% to 2% |
| | | Loss on Ignition | IS 2840: Annexure 6 | 8 % to 15% |
| | | Silica | IGI/GDM/LAB/TPM/13, dtd 05.12.2014 | 40% to 70% |
| | | Ferric Oxide | IS 2840: Annexure 8 | 0.1% to 2% |
| | | Titanium Dioxide | IS 2840: Annexure 9 | 0.1% to 1 to 5% |
| | | Alumina | IS 2840: Annexure 7 | 20 % to 40% |
| | | Calcium Oxide | IIGI/GDM/LAB/TPM/13, dtd 05.12.2014 | 0.1 % to 2% |
| | | Magnesium | IGI/GDM/LAB/TPM/13, dtd 05.12.2014 | 0.02% to 2% |
| | | $Na_2O$ | IS 9497 | 0.02 % to 5% |
| | | $K_2O$ | IS 9497 | 0.02 % to 5% |
| **IV.** | **BUILDING MATERIAL** | | | |
| **1.** | **Fly Ash** | $SiO_2$ | IS 1727: Clause 5.4 ASTM: C311/C311M | 20% to 65% |

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| | | $Al_2O_3$ | IS 1727: Clause 5.5 & 5.7 ASTM: C311/C311M | 0.5% to 35% |
| | | $Fe_2O_3$ | IS 1727: Clause 5.6 ASTM: C311/C311M | 0.5% to 30% |
| | | CaO | IS 1727: Clause 5.8 ASTM: C311/C311M | 0.5% to 20% |
| | | MgO | IS 1727: Clause 5.9 ASTM: C311/C311M | 0.5% to 10% |
| | | $SO_3$ | IS 1727: Clause 5.10 ASTM: C311/C311M | 0.1% to 10% |
| | | $TiO_2$ | ASTM C114 | 0.05% to 10% |
| | | $P_2O_5$ | ASTM C114 | 0.005% to 1% |
| | | $Na_2O$ | IGI/GDM/LAB/TPM/14, dtd 28.10.2015 | 0.01 % to 5% |
| | | $K_2O$ | IGI/GDM/LAB/TPM/14, dtd 28.10.2015 | 0.01% to 5% |
| | | LOI | IS 1727: Clause 5.3 ASTM: C311/C311M | 0.1 % to 15% |
| **V.** | **METALS & ALLOYS** | | | |
| **1.** | **Ferro Manganese** | Carbon | ASTM E1019 | 0.01% to 8% |
| | | Silicon | IS 1559 | 0.2% to 6% |
| | | Sulphur | ASTM E1019 | 0.005% to 0.5% |
| | | Phosphorus | IS 1559 | 0.01% to 1% |
| | | Manganese | IS 1559 | 25% to 90% |
| **2.** | **Silico Manganese** | Carbon | ASTM E1019 | 0.3% to 3% |
| | | Silicon | IS 1559 | 5% to 25% |
| | | Sulphur | ASTM E1019 | 0.005% to 0.1% |
| | | Phosphorus | IS 1559 | 0.01% to 1% |
| | | Manganese | IS 1559 | 25% to 70% |
| **3.** | **Mill Scale** | Iron as Fe | IS 1493 (Part-I) | 45% to 75% |
| | | Silica as $SiO_2$ | IS 1493 (Part-I) | 0.50% to 15% |
| | | Alumina as $Al_2O_3$ | IS 1493 (Part-I), | 0.50% to 10% |

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| | | | IGI/GDM/LAB/TPM/07, dtd 01.03.2013 | |
| | | Phosphorus as P | IS 1493 (Part-I), IS 1493 | 0.01 % to 0.10% |
| | | Sulphur as S | IS 1493 (Part-I), ASTM E1019 | 0.005% to 0.50% |
| | | Chromium as Cr | IS 1493 (Part-III) | 0.01% to 2% |
| **VI.** | **INDUSTRIAL & FINE CHEMICALS (INORGANIC CHEMICALS)** | | | |
| **1.** | **Salt** | Moisture | IS 797 | 0.1% to 10% |
| | | Matter Insoluble In Water | IS 797 | 0.01% to 2% |
| | | Total Chloride (as NaCl) | IS 797 | 75 % to 100% |
| | | Calcium as Ca | IS 797 | 0.005% to 1% |
| | | Magnesium as Mg | IS 797 | 0.005% to 1% |
| | | Sulphate as $SO_4$ | IS 797 | 0.05 % to 2% |
| **VII.** | **FERTILIZERS** | | | |
| **1.** | **Urea** | Moisture | Method of analysis as per the Fertilizer control Order-1985-Schedule- II, Part B, 2(i) c, | 0.1% to 5% |
| | | Total Nitrogen | Method of analysis as per the Fertilizer control Order-1985- Schedule- II, Part B, 3 (iv) | 1% to 46.5% |
| **2.** | **DAP** | Moisture | Method of analysis as per the Fertilizer control Order-1985-Schedule- II, Part B, 2(ii) a | 0.1% to 5% |
| | | Total Nitrogen | Method of analysis as per the Fertilizer control Order-1985- Schedule- II, Part B, 3 (iv) | 1% to 20% |

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| | | Ammoniacal Nitrogen | Method of analysis as per the Fertilizer control Order-1985- Schedule- II, Part B, 3 (vii) | 1% to 18% |
| | | Total $P_2O_5$ | Method of analysis as per the Fertilizer control Order-1985- Schedule- II, Part B, 4 (ii) | 1 % to 50% |
| | | Water soluble $P_2O_5$ | Method of analysis as per the Fertilizer control Order-1985- Schedule- II, Part B, 4 (iii) | 1% to 46% |
| | | Neutral Ammonia-Citrate soluble $P_2O_5$ | Method of analysis as per the Fertilizer control Order-1985- Schedule- II, Part B, 4 (ii), (iv) & (v) | 1 % to 48% |
| **VIII.** | **FOOD & AGRICULTURAL PRODUCTS** | | | |
| **1.** | **Feeding Stuffs (Extractions/ De-oiled Cakes)** | Moisture | ISO 6496 | 2% to 20% |
| | | Crude Protein | ISO 5983-1 | 8% to 65% |
| | | Crude Ash | ISO 5984 | 1% to 20% |
| | | Ash insoluble in Hydrochloric Acid (Sand and/or Silica) | ISO 5985 | 0.1% to 15% |
| | | Crude Fiber | ISO 6865 | 3 % to 40% |
| | | Crude Oil & Fats | ISO 6492 | 0.3% to 20% |
| | | Urease Activity | ISO 5506 | 0.05 to 1 mg of N/g/minutes @30°C |
| **2.** | **Food Grains** | Moisture (Except Maize) | IS 4333 (P-2) | 2 % to 25% |
| | | Moisture (For Maize) | ISO 6540 | 2% to 25% |
| | | Protein | ISO 20483 | 5 % to 20% |
| | | Wet Gluten (Wheat Flour) | IS 8162 | 15% to 35% |

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| | | Average Grain Length (In Rice) | ISO 7301 | 2.50 mm to 10 mm |
| | | Total Refractions | IS 4333 (Part-I) | 0.01% to 25% |
| **3.** | **Oils, Fats & related products** | Moisture & Volatile Matter | AOCS Ca 2c – 25 | 0.01% to 1% |
| | | Free Fatty Acid (FFA) | AOCS Ca 5a – 40 | 0.05% to 10% |
| | | Acid Value | AOCS Cd 3d – 63 | 0.1 to 22 (mg KOH/gm) |
| | | Iodine Value | AOCS Cd 1d – 92 | 18 units to 165 units |
| **4.** | **White Sugar** | Moisture by loss on drying | ICUMSA GS 2/1/3/9-15 | 0.01% to 0.10% |
| | | Conductivity Ash | ICUMSA GS2/3-17 | 0.01% to 0.10% |
| | | Colour | ICUMSA GS9/1/2/3-8 | 20 IU to 50 IU |

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