

**Laboratory**

**Alex Stewart International (India) Private Limited (Quality Assurance Laboratory), Office No. 6, 7, 8 & 9, 2nd Floor, Plot No. 588, Ward No. 12 / C, Gandhidham, Gujarat.**  
 Location 1 : Office No. 6, 7, 8 & 9, 2nd Floor, Plot No. 588, Ward No. 12 / C, Gandhidham, Gujarat.  
 Location 2 : Plot No. 195, Ward No. DC-2, Gandhidham, Gujarat

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

**Certificate Number TC-6578 (in lieu of T-2133)**

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**Validity 03.02.2018 to 02.02.2020**

**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
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**CHEMICAL TESTING**

<b><u>Location-1</u></b>				
<b>I.</b>	<b>SOILD FUEL</b>			
<b>1.</b>	<b>Coal</b>	Total Moisture	IS 1350 (Part 1) / ASTM D3302 D3302M-17 / ISO 589	1 % to 50 %
			ASTM D2961/ D2961M-17	1 % to 15 %
		Moisture / Moisture in Analysis sample	IS 1350 (Part 1) / ASTM D3173 & ASTM D3173M-17	0.5 % to 25 %
		Volatile Matter	IS 1350 (Part 1) / ISO 562 / ASTM D3175-17	10 % to 50 %
		Ash	IS 1350 (Part 1) / ISO 1171 / ASTM D3174-12	1 % to 60 %
		Fixed Carbon	IS 1350 (Part 1) / ASTM D3172-13 ISO 17246	20 % to 80 %
		Gross Calorific Value	IS 1350 (Part 2) / ISO 1928 / ASTM D5865-13	1500 to 9000 kcal/kg
		Total Sulphur	IS 1350 (Part 3) / ASIIPL/GIM/IHM/CC-01/ ISO 334 / ISO 19579 / ASTM D4239-14e2 (Method A)	0.05 % to 5 %

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Phosphorus	IS:1350 (Part 5)	0.005 % to 0.5 %
		Hardgrove Grindability Index	IS 4433 / ISO 5074 / ASTM D409/D409M-16	35 to 75 unit
		Chlorine	IS 1350 (Part 5) / ISO 587	0.005 % to 0.5 %
		Crucible Swelling Number (CSN)	IS 1353 / ISO 501	Up to 9
2.	Coke	Total Moisture	IS 1350 (Part 1) / ISO 579	0.5 % to 25 %
		Moisture / Moisture in Analysis sample	IS 1350 (Part 1) / ISO 687 / ASTM D3173/D3173M-17	0.1 % to 10 %
		Volatile Matter	IS 1350 (Part 1) / ISO 562 / ASTM D3175-17	0.1 % to 10 %
		Ash	IS 1350 (Part 1) / ISO 1171 / ASTM D3174-12	0.1 % to 50 %
		Fixed Carbon	IS 1350 (Part 1) / ISO 17246 / ASTM D3172-13	40 % to 99 %
		Gross Calorific Value	ISO 1928 / ASTM D5865-13	1500 to 9000 kcal/kg
		Total Sulphur	IS 1350 (Part 3) / ISO 334 / ASTM D4239-14e2 (Method A)	0.05 % to 5 %
		Phosphorus	IS 1350 (Part 5)	0.005 % to 0.5 %
		Coke Reactivity Index (CRI)	IS 4023 / ISO 18894 / ASTM D5341 / D5341M –14	10% to 40%
		Coke Strength after Reaction (CSR)	IS 4023 / ASTM D5341 / D5341M – 14 / ISO 18894	40% to 80%
3.	Coal & Coke (Ash Composition)	Silica	IS 1355	15.0 % to 65.0 %
		Ferric Oxide	ASIPL/GIM/IHM/CC-04 / Chemical & Instrumental Analysis- Indian Bureau of Mines, Pg – 5	3.0 % to 30.0 %

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Alumina	IS 1355 / Chemical & Instrumental Analysis - Indian Bureau of Mines, Pg - 8 & 9	5.0 % to 40.0 %
		Calcium Oxide	IS 1355 Chemical & Instrumental Analysis, Indian Bureau of Mines, Pg - 5 & 6	0.5 % to 15 %
		Magnesium Oxide	IS 1355 /Chemical & Instrumental Analysis Indian Bureau of Mines, Pg - 6 & 7	0.5 % to 10 %
		Sodium Oxide	IS 1355 / IS 9497	0.1 % to 10 %
		Potassium Oxide	IS 1355 / IS 9497	0.1 % to 10 %
		Titania	IS 1355 / ASI IPL/GIM/IHM/CC-02	0.5 % to 5 %
		Manganese Oxide	IS 1355 / ASI IPL/GIM/IHM/CC-03	0.01 % to 2.5%
		Phosphorus Pentoxide	IS 1355	0.1 % to 5 %
		Sulphur Trioxide	IS 1355 / ASTM D 5016	0.5 % to 20 %
4.	<b>Petroleum Coke</b>	Moisture (as Received)/ Total Moisture	IS 1448 -P:132; Method A-1 / ASTM D 4931-06 (2011)	1 % to 20 %
		Moisture / Moisture in Analysis sample	IS 1448 -P:132; Method A-2 / ASTM D 3173/ D 3173 M-17	0.1 % to 2 %
		Volatile Matter	IS 1448 -P:134 / ASTM D 6374 - 12	5 % to 15 %
		Ash	IS 1448-P: 126 / ASTM D 4422-13	0.1 % to 2 %
		Fixed Carbon	IS 1350 (Part 1) /	40 % to 99 %

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			ASTM D3172-13	
		Sulphur	IS 1448 -P:33 / ASTM D4239-14e2 (Method A)	1 % to 8 %
		Gross Calorific Value	IS 1350 -Part 2 / ASTM D5865-13	5000 kcal/kg to 9000 kcal/kg
<b>II.</b>	<b>ORES AND MINERALS</b>			
<b>1.</b>	<b>Iron Ore</b>	Moisture	IS 1493 (Part 1) IMSBC Code-2016, Apdx – 2	1 % to 15 %
		Silica	IS 1493 (Part 1)	0.3 % to 30 %
		Total Iron	IS 1493 (Part 1)	25 % to 70 %
		Alumina	IS 1493 (Part 1)	0.3 % to 10 %
		Phosphorus	IS 1493	0.01 % to 0.25 %
		Sulphur	IS 1493	0.004 % to 0.3 %
		Loss of Ignition	Chemical & Instrumental Analysis -Indian Bureau of Mines, Pg. 292	0.5 % to 10 %

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**MECHANICAL TESTING**

<u>Location-2</u>				
<b>I.</b>	<b>SOILD FUEL</b>			
<b>1.</b>	<b>Coke</b>	MICUM (M40) (Mechanical Strength)	IS1354 / ISO 556	60 % to 95 %
		MICUM (M10) (Mechanical Strength)	IS 1354 / ISO 556	1 % to 15 %