

**Laboratory** Inspectorate Griffith India Pvt. Ltd., Visakhapatnam Laboratory, Door No. 24-1-17, Ground Floor & 1<sup>st</sup> Floor, Fatima Building, Thompson Street, Visakhapatnam, Andhra Pradesh

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

**Certificate Number** TC-6436 (in lieu of T-2673)

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**Validity** 14.10.2017 to 13.10.2019

Last Amended on 17.10.2017

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
<b><u>CHEMICAL TESTING</u></b>				
<b>I</b>	<b>SOLID FUELS</b>			
<b>1.</b>	<b>Coal</b>	Total Moisture	ISO 589, ASTM D2961, ASTM D3302 IS 1350 (Part 1)	0.5% to 54.00%
		Moisture	IS 1350 (Part 1) ASTM D3173 ISO 11722	0.2 % to 19.00%
		Volatile Moisture	ISO 562 IS 1350 (Part 1) ASTM D3175	0.2 % to 48.00%
		Gross Calorific Value	ASTM D5865 ISO 1928	150 kcal/kg to 7800 kcal/kg
		Ash	ISO 1171 IS 1350 (Part 1) ASTM D3174	0.2 % to 70.00%
		Fixed Calorific Value	IS 1350 (Part 1)	By Calculation
		P	IS 1350 (Part 5) IGI/VSP/TPM - 7.1	0.003 % to 0.10%
		S	ASTM D4239 ISO 19579	0.1 % to 3.0%
<b>2.</b>	<b>Coke</b>	Total Moisture	ISO 579, ASTM D3173	0.5 % to 15.00%
		Moisture	IS 1350 (Part 1) ASTM D3173	0.2 % to 1.00%
		Volatile Moisture	ISO 562 IS 1350 (Part 1) ASTM D3175	0.2 % to 5.00%

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		Ash	ISO 1171 IS 1350 (Part 1) ASTM D3174	0.1 % to 18.00%
		Fixed Carbon	IS 1350 (Part 1)	By Calculation
		P	IS 1350 (Part 5) IGI/VSP/TPM - 7.1	0.003 % to 0.10%
		S	ASTM D4239	0.30 % to 0.85%
<b>II.</b>	<b>ORES &amp; MINERALS</b>			
<b>1.</b>	<b>Iron Ore</b>	Total Fe	IS 1493 (Part 1)	29.00 % to 69.00%
		FeO	IS 1493	0.050 % to 20.00%
		Al <sub>2</sub> O <sub>3</sub>	IS 1493 (Part 4)	0.20 % to 6.00%
		SiO <sub>2</sub>	IS 1493 (Part 1)	0.50 % to 25.00%
		S	IS 1493	0.005 % to 1.00%
		LOI	IS 1493	0.10 % to 20.0%
		Moisture	IS 1493	1 % to 25.00%
		P	IS 1493 (Part 1)	0.009 % to 1.0%
		TML	IMSBC Code MSC 393,App.2	8.00 % to 12.00%
<b>2.</b>	<b>Manganese Ore</b>	Mn	IS 1473	12.00 % to 52.00%
		MnO <sub>2</sub>	IS 1473	10.00 % to 66.00%
		SiO <sub>2</sub>	IS 1473	0.10 % to 55.0%
		Fe	IS 1473	0.20 % to 25.00%
		Al <sub>2</sub> O <sub>3</sub>	IS 1473	0.20 % to 8.50%
		CaO	IS 1473	0.028 % to 20.00%
		P	IS 1473	0.020 % to 0.450%
		Moisture	IS 1473	0.20 % to 12.00%
		S	IS 1473	0.005 % to 0.020%
<b>3.</b>	<b>Chromite Ore</b>	Cr <sub>2</sub> O <sub>3</sub>	IS 4737	22.00 % to 60.00%
		SiO <sub>2</sub>	IS 4737	0.10 % to 55.0%
		Moisture	IS 4737	0.03 % to 5.00%
		Fe <sub>2</sub> O <sub>3</sub>	IS 4737	10.90 % to 17.00%
		Al <sub>2</sub> O <sub>3</sub>	IS 4737	9.00 % to 20.00%

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4.	Bauxite	CaO	IS 4737	0.10 % to 2.00%
		MgO	IS 4737	10.00 % to 26.00%
		LOI	IS 2000 (Part 1)	10 % to 30%
		SiO <sub>2</sub>	IS 2000 (Part 2)	0.2 % to 30%
		Al <sub>2</sub> O <sub>3</sub>	IS 2000 (Part 3)	20 % to 60.00%
		R. Silica	IS 2000 (Part 2)	0.2 % to 30%
		THA	IGI/VSP/LAB/TPM-4.9	15 % to 50%
5.	Limestone	Non R. Silica	IS 2000 (Part 2)	0.10 % to 1.00%
		LOI	IS 1760 (Part 1)	10.0 % to 50.0%
		SiO <sub>2</sub>	IS 1760 (Part 2)	0.10 % to 5.0%
		Fe <sub>2</sub> O <sub>3</sub>	IS 1760 (Part 3)	0.05 % to 3.00%
		Al <sub>2</sub> O <sub>3</sub>	IS 1760 (Part 3)	0.05 % to 5.00%
		CaO	IS 1760 (Part 3)	30.00 % to 56.00%
		MgO	IS 1760 (Part 3)	0.02 % to 5.00%
		P	ASTM C25	0.01 % to 0.06%
S	ASTM C25	0.005 % to 0.015%		
6.	Dolomite	LOI	IS 1760 (Part 1)	20.0 % to 45.0%
		SiO <sub>2</sub>	IS 1760 (Part 2)	0.10 % to 5.0%
		Fe <sub>2</sub> O <sub>3</sub>	IS 1760 (Part 3)	0.05 % to 3.00%
		Al <sub>2</sub> O <sub>3</sub>	IS 1760 (Part 3)	0.05 % to 5.00%
		CaO	IS 1760 (Part 3)	20.00 % to 40.00%
		MgO	IS 1760 (Part 3)	18.00 % to 24.00%
7.	Quartz	CaO	IS 1917 (Part 6)	0.10 % to 10.00%
		MgO	IS 1917 (Part 6)	0.05 % to 5.00%
		LOI	IS 1917 (Part 1)	0.05 % to 2.00%
		SiO <sub>2</sub>	IS 1917 (Part 3)	10.00 % to 99.90%
		Al <sub>2</sub> O <sub>3</sub>	IS 1917 (Part 4)	0.008 % to 1.00%
		Fe <sub>2</sub> O <sub>3</sub>	IS 1917 (Part 5)	0.010 % to 1.00%

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8.	Gypsum	CaO	ASTM C471M & IS 1288	5.00 % to 40.00%
		SO <sub>3</sub>	ASTM C471M & IS 1288	10.00 % to 50.00%
		Purity / Gypsum	ASTM C471M & IS 1288	30.00 % to 98.00%
		Combined water	ASTM C471M & IS 1288	1.00 % to 30.00%
		Free water	ASTM C471M & IS 1288	0.10 % to 5.00%
		Chlorides	ASTM C471M & IS 1288	0.001 % to 0.1%
9.	Rock Phosphate	P <sub>2</sub> O <sub>5</sub>	IS 11224	24.00 % to 38.00%
10.	Feldspar	SiO <sub>2</sub>	IS 9749	60.00 % to 70.00%
		Al <sub>2</sub> O <sub>3</sub>	IS 9749	14 % to 22%
		Fe <sub>2</sub> O <sub>3</sub>	IS 9749	0.10 % to 1.00%
		CaO	IS 9749	0.10 % to 4.50%
		MgO	IS 9749	0.10 % to 4.50%
		Na <sub>2</sub> O	IS 9749	1.50 % to 12.00%
		K <sub>2</sub> O	IS 9749	1.50 % to 12.00%
III.	<b>METALS &amp; ALLOYS</b>			
1.	Ferro Manganese	C	IGI/VSP/TPM-6.1	2.00 % to 8.00%
		S	IGI/VSP/TPM-6.1	0.005 % to 0.05%
		Silicon	IS 13938 (Part 1)	0.10 % to 2.00%
		P	IS 13938 (Part 3)	0.005 % to 1.00%
		Mn	IS 1559	30.00 % to 90.00%
2.	Silico Manganese	C	IS 1559	0.20 % to 3.00%
		S	IS 1559	0.005 % to 0.05%
		Silicon	IS 1559	0.005 % to 50.00%
		P	IS 1559	0.010 % to 1.00%
		Mn	IS 1559	30.00 % to 70.00%
3.	Pig Iron	C	IGI/VSP/TPM-6.1	1.0 % to 4.5%
		S	IGI/VSP/TPM-6.1	0.005 % to 0.05%
		Mn	IS 12308 (Part 10)	0.01 % to 3.00%
		Silicon	IS 12308 (Part 6)	0.5 % to 5.00%
		P	IS 12308 (Part 5)	0.01 % to 0.50%

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4.	Mill Scale	FeO	IS 1493	30.0 % to 50.0%
		T. Fe	IS 1493 (Part 1)	40.0 % to 75.0%
		SiO <sub>2</sub>	IS 1493 (Part 1)	0.10 % to 5.00%
		Al <sub>2</sub> O <sub>3</sub>	IS 1493 (Part 4)	0.10 % to 5.00%
		P	IS 1493 (Part 1)	0.020 % to 0.100%
		CaO	IS 1493 (Part 1)	0.002 % to 0.25%
		S	IS 1493	0.005 % to 0.05%
5.	Ferro Silicon	C	IGI/VSP/TPM-6.1	0.005 % to 1.0%
		S	IGI/VSP/TPM-6.1	0.001 % to 1.0%
		Al	IS 1559	0.1 % to 2.0%
		Silicon	IS 1559	25.00 % to 80.00%
		P	IS 1559	0.005 % to 0.05%