

<b>Laboratory</b>	<b>Essen &amp; Co., # 92, 7<sup>th</sup> Main Road, III Phase, Peenya Industrial Area, Bangalore, Karnataka</b>		
<b>Accreditation Standard</b>	<b>ISO/IEC 17025: 2005</b>		
<b>Discipline</b>	<b>Chemical Testing</b>	<b>Issue Date</b>	<b>27.12.2013</b>
<b>Certificate Number</b>	<b>T-0768</b>	<b>Valid Until</b>	<b>26.12.2015</b>
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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
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#### **I. ORES & MINERALS**

<b>1. IRON ORE</b>	Fe		IS 1493 (Part 1) –1981 EC/BLR/IHP/O&M/01	45 to 68%
	SiO <sub>2</sub>		IS 1493 (Part 1) –1981 Reaffirmed 2001	0.5 to 30.0%
	Al <sub>2</sub> O <sub>3</sub>		IS 1493 (Part 1) –1981 Reaffirmed 2001	0.5 to 10.0%
	P		IS 1493 (Part 1) –1981 Reaffirmed 2001	0.01 to 0.30%
	S		IS 1493 (Part 1) –1981 Reaffirmed 2001	0.003 to 0.05%
	Mn		IS 1493: 1959 Reaffirmed 2001	0.5 to 2.00%
	FeO		EC/BLR/IHP/O&M/02	0.5 to 30.0%
	TiO <sub>2</sub>		IS 1493: 1959 Reaffirmed 2001	0.10 to 1.00%
<b>2. MANGANESE ORE</b>	Mn		IS 1473: 2004	20 to 56%
	MnO <sub>2</sub>		IS 1473: 2004	30 to 70%
	Fe		IS 1473: 2004	1.0 to 35%

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		SiO <sub>2</sub>	IS 1473: 2004	1.0 to 30%
		Al <sub>2</sub> O <sub>3</sub>	IS 1473: 2004	1.0 to 10%
		P	IS 1473: 2004	0.01 to 0.30%
<b>II. BUILDING MATERIALS</b>				
<b>1.</b>	<b>LIMESTONE, DOLOMITE AND ALLIED MATERIALS</b>	SiO <sub>2</sub>	IS 1760 (Part 2)-1991 Reaffirmed 2001	0.5 to 20.0%
		Al <sub>2</sub> O <sub>3</sub>	IS 1760 (Part 3)-1992 Reaffirmed 2001	0.2 to 5.00%
		Fe <sub>2</sub> O <sub>3</sub>	IS 1760 (Part 3)-1992 Reaffirmed 2001	0. 2 to 5.0%
		CaO	IS 1760 (Part 3)-1992 Reaffirmed 2001	20.0 to 55.0%
		MgO	IS 1760 (Part 3)-1992 Reaffirmed 2001	1.0 to 45.0%
		TiO <sub>2</sub>	IS 12107 (Part 5)-1987 Reaffirmed 2001	0.1 to 0.50%
		Loss on Ignition	IS 1760 (Part 1)-1991 Reaffirmed 2001	20.0 to 52.0%

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2.	<b>MINERALS FOR REFRACTORIES ALUMINO SILICATES, CLAYS AND FELDSPAR</b>	SiO <sub>2</sub>	IS 12107 (Part 2)-1987 Reaffirmed 2001	1.0 to 70.0%
		Al <sub>2</sub> O <sub>3</sub>	IS 12107 (Part 3)-1987 Reaffirmed 2001	10.0 to 60.0%
		Fe <sub>2</sub> O <sub>3</sub>	IS 12107 (Part 6)-1987 Reaffirmed 2001	0.1 to 20.0%
		CaO	IS 12107 (Part 8)-1987 Reaffirmed 2001	0.5 to 10.0%
		MgO	IS 12107 (Part 8)-1987 Reaffirmed 2001	0.5 to 90.0%
		TiO <sub>2</sub>	IS 12107 (Part 5)-1987 Reaffirmed 2001	0.1 to 5.0%
		Na <sub>2</sub> O	IS 12107 (Part 9)-1987 Reaffirmed 2001	0.05 to 13.0%
		K <sub>2</sub> O	IS 12107 (Part 9)-1987 Reaffirmed 2001	0.05 to 14.0%
		Loss on Ignition	IS 12107 (Part 1)-1987 Reaffirmed 2001	0.2 to 20.0%

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3.	<b>QUARTZ QUARTZITE AND SILICA SAND</b>	SiO <sub>2</sub>	IS 1917 (Part 3)-1992 Reaffirmed 1998	95.0 to 99.9%
		Al <sub>2</sub> O <sub>3</sub>	IS 1917 (Part 4)-1991 Reaffirmed 2006	0.1 to 4.0%
		Fe <sub>2</sub> O <sub>3</sub>	IS 1917 (Part 5)-1992 Reaffirmed 2005	0.05 to 1.0%
		Loss on Ignition	IS 1917 (Part 1)-1991 Reaffirmed 2001	0.1 to 1.0%
4.	<b>BAUXITE</b>	SiO <sub>2</sub>	IS 2000(Part 2) –1985 Reaffirmed 2001	0.05 - 40.0
		Al <sub>2</sub> O <sub>3</sub>	IS 2000 (Part 3) –1985 Reaffirmed 2001	20.0 - 60.0
		Fe <sub>2</sub> O <sub>3</sub>	IS 2000 (Part 4) –1985 Reaffirmed 2001	0.5 -50.0
		TiO <sub>2</sub>	IS 2000(Part 5) –1985 Reaffirmed 2001	0.5 -7.0
		Loss on Ignition	IS 2000(Part 1) –1985 Reaffirmed 2001	5.0 - 35.0

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### **III. WATER**

<b>1. POTABLE AND DOMESTIC WATER</b>	Colour	IS 3025 Part 4 / 1983 Reaffirmed 2002	5.0 to 100 Hazen Units
	Odour	IS 3025 Part 5/1983 Reaffirmed 2002	----
	Taste	IS 3025 Part 7/1984 Reaffirmed 2002	----
	Turbidity	IS 3025 Part 10/1984 Reaffirmed 2002	1.0 to 100 NTU
	pH	IS 3025 Part 11/1983 Reaffirmed 2002	0.1 to 14
	Total Hardness (asCaCO <sub>3</sub> )	IS 3025 Part 21/1983 Reaffirmed 2002	1.0 to 1000 mg/l
	Calcium Ca	IS 3025 Part 40/1991 Reaffirmed 2003	0.5 to 500 mg/l
	Magnesium as Mg	IS 3025 Part 46/1994 Reaffirmed 2003	0.5 to 500 mg/l
	Total Alkalinity	IS 3025 Part 23/1986 Reaffirmed 2003	1.0 to 500 mg/l

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S.No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Total dissolved solids	IS 3025 Part 16/1984 Reaffirmed 2002	5.0 to 3000 mg/l
		Sulphate as SO <sub>4</sub>	IS 3025 Part 24/1986 Reaffirmed 2003	0.5 to 500 mg/l
		Nitrate as NO <sub>3</sub>	IS 3025 Part 34/1988 Reaffirmed 2003 & APHA 20 <sup>th</sup> edition NO <sub>3</sub> -4500NO <sub>3</sub> .13 P. No.4-115	0.1 to 500 mg/l
		Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH	IS 3025 Part 43/1992 Reaffirmed 2003	2.0 to 100 mg/l
		Boron as B	IS 3025 Part 29/1964 IS 3025 Part 57/2005	0.2 to 100 mg/l
		Iron as Fe	IS 4542/1968 Reaffirmed 2003 & APHA 20 <sup>th</sup> edition 3500 Fe B	0.2 to 100 mg/l
		Zinc as Zn	IS 3025 Part 49/1994 Reaffirmed 2003	0.4 to 12000 mg/l
		Cyanide as CN	IS 3025 Part 27/1986	0.10 to 100 mg/l
		Chlorides as Cl	IS 3025 Part 32/1988	2.5 to 1000 mg/l

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		Residual chlorine (Total/Free)	IS 3025 Part 26/1986 IS 3025 Part 45/1964	0.1 to 1000 mg/l
		Fluoride as F	Spadns Method (APHA)	0.2 to 100 mg/l
		Ammonical Nitrogen	IS 3025 Part 34 /1988	0.5 to 1000 mg/l
<b>2.</b>	<b>WASTE WATER</b>	Colour	IS 3025 Part 4 / 1983 Reaffirmed 2002	5.0 to 100 Hazen Units
		Turbidity	IS 3025 Part 10/1984 Reaffirmed 2002	1.0 to 100 NTU
		pH	IS 3025 Part 11/1983 Reaffirmed 2002	0.1 to 14
		Total Hardness (asCaCO <sub>3</sub> )	IS 3025 Part 21/1983 Reaffirmed 2002	1.0 to 1000 mg/l
		Calcium	IS 3025 Part 40/1991 Reaffirmed 2003	0.5 to 500 mg/l

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		Magnesium as Mg	IS 3025 Part 46/1994 Reaffirmed 2003	0.5 to 500 mg/l
		Total Alkalinity	IS 3025 Part 23/1986 Reaffirmed 2003	1.0 to 500 mg/l
		Total dissolved solids	IS 3025 Part 16/1984 Reaffirmed 2002	5.0 to 3000 mg/l
		Sulphate as SO <sub>4</sub>	IS 3025 Part 24/1986 Reaffirmed 2003	0.5 to 500 mg/l
		Nitrate as NO <sub>3</sub>	IS 3025 Part 34/1988 Reaffirmed 2003 & APHA 20 <sup>th</sup> edition NO <sub>3</sub> .4500NO <sub>3</sub> .13 P. No.4-115	0.1 to 500 mg/l
		Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH	IS 3025 part 43/1992 Reaffirmed 2003	2.0 to 100 mg/l
		Boron as B	IS 3025 Part 29/1964 IS 3025 Part 57/2005	0.2 to 100 mg/l
		Mercury as Hg	IS 3025 Part 48/1994 Reaffirmed 2003	0.2 to 1.00 mg/l
		Iron (asFe)	IS 4542/1968 Reaffirmed 2003 & APHA 20 <sup>th</sup> edition 3500 Fe B	0.2 to 100 mg/l



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		Aluminium as Al	APHA Method (20th edition 1998. P.No.3-56)	0.2 to 50 mg/l
		Nickel as Ni	IS 12122-1987 Reaffirmed 1998	1.8 to 80 mg/l
		Copper as Cu	IS 3025 part 42/1992 Reaffirmed 2003	1.0 to 1000 mg/l
		Lead as Pb	IS 3025 Part 47/1994 Reaffirmed 2003	1.0 to 400 mg/l
		Zinc as Zn	IS 3025 Part 49/1994 Reaffirmed 2003	0.4 to 12000 mg/l
		Cadmium as Cd	IS 3025 Part 41/1992 Reaffirmed 2003	0.5 to 800 mg/l
		Manganese as Mn	IS 3025 Part35 /1964 Reaffirmed 2003	1.0 to 100 mg/l
		Total Chromium	IS 3025 Part 52 / 2003	2.0 to 60
		Cyanide as CN	IS 3025 Part 27/1986	0.1 to 100 mg/l
		Chlorides as Cl	IS 3025 Part 32/1988	2.5 to 1000 mg/l
		Residual chlorine (Total/Free)	IS 3025 Part 26/1986 IS 3025 Part45/1964	0.1 to 1000 mg/l

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		Fluoride as F	Spadns Method (APHA)	0.2 to 100 mg/l
		Suspended solids	I.S.3025 Part 17/1984	5.0 to 1000 mg/l
		Temperature	IS 3025 Part 9 /1984	1.0 to 50°C
		Oil & Grease	IS 3025 Part 39/1991	10 to 1000 mg/l
		Ammonical Nitrogen	IS 3025 Part 34 /1988	2.0 to 1000 mg/l
		Total Kjeldal Nitrogen	IS 3025 Part 34 /1988	2.0 to 1000 mg/l
		B.O.D.	IS 3025 Part 44/1993 & 1959	3.0 to 10000 mg/l
		Chemical Oxygen Demand	IS 3025 Part 58 -2006	10.0 to 1000 mg/l

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