

**Laboratory** Testings Concern, 158/12, Belilious Road, 1st Floor, Howrah, West Bengal

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

**Discipline** Chemical Testing **Issue Date** 08.07.2014

**Certificate Number** T-0905 **Valid Until** 07.07.2016

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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 |
|-------|----------------------------|-------------------------|---|--|
|-------|----------------------------|-------------------------|---|--|

#### I. METALS AND ALLOYS

|    |   |                           |  |                 |
|----|---|---------------------------|--|-----------------|
| 1. | <b>Iron &amp; Steels (Plain Carbon, Low Alloy, Stainless Steel &amp; Nickel Chromium Iron Alloys)</b> | Carbon                    | IS: 228(PART1)/87 RA-2008  | 0.05 to 2.5%    |
|    |   | Manganese                 | IS: 228(PART2)/87 RA-2008<br>ASTM E 350 RA 2005  | 0.10 to 2.5 %   |
|    |   | Silicon                   | IS: 228(PART8)/89 RA-2009  | 0.05 to 5.0%    |
|    |   | Sulphur                   | IS: 228(PART9)/89 RA-2009  | 0.01 to 0.25%   |
|    |   | Phosphorus                | IS: 228(PART3)/87 RA-2008  | 0.01 to 0.3%    |
|    |   | Nickel                    | IS: 228(PART5)/87 RA-2009  | 0.1 to 30.0%    |
|    |   | Chromium                  | IS: 228(PART6)/87 RA-2009  | 0.10 to 30.0%   |
|    |   | Copper                    | IS: 228(PART15)/92 RA-2009   | 0.05 to 5.0%    |
|    | Molybdenum  | IS: 228(PART7)/90 RA-2012 | 1.0 to 6.0%  |                 |
| 2. | <b>Copper &amp; Copper Base Alloys</b>  | Copper                    | IS: 440/64 RA-2006<br>IS: 3685/66 RA-2006<br>IS: 7212/74 RA-2010<br>IS: 4027 (PART1)/87 RA-2006<br>IS: 3187/65 RA-2006 | 50.00 to 99.99% |
|    |   | Silicon                   | IS: 3685/ 1966 RA -2006  | 0.05 to 2.00%   |
|    |   | Zinc                      | IS: 3685/66 RA-2006<br>IS: 3187/65 RA-2006<br>IS: 4027 (PART6)/87 RA-2006  | 0.10 to 50.0%   |
|    |   | Tin                       | IS: 4027 (PART5)/87 RA-2000<br>IS: 3685/66 RA-2006   | 0.10 to 15.0%   |
|    |   |                           |  |                 |

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|-------|--|-------------------------|---|--|
|       |  | Lead                    | IS: 440/64 RA-2006<br>IS: 4027 (PART1)/87 RA-2006<br>IS: 3685/66 RA-2006  | 0.10 to 15.0%                          |
|       |  | Manganese               | IS: 3187/65 RA-2006<br>IS: 3685/66 RA-2006                                | 0.05 to 2.00%                          |
|       |  | Nickel                  | IS: 3685/66 RA-2006<br>IS: 3187/65 RA-2006                                | 0.05 to 12.0%                          |
|       |  | Iron                    | IS: 4027 (PART8)/91 RA-2007<br>IS: 3685/66 RA-2006<br>IS: 3187/65 RA-2006 | 0.10 to 7.0%                           |
|       |  | Phosphorus              | IS: 4027 (PART3)/87 RA-2006<br>IS: 3685/66 RA-2006                        | 0.02 to 1.0%                           |
|       |  | Aluminium               | E-478-08  | 0.05 to 15.0%                          |
| 3.    | <b>Aluminium &amp; Aluminium Base Alloys</b> | Silicon                 | IS: 504 (PART1)/2002  | 0.3 to 20.0%                           |
|       |  | Chromium                | IS:504 (PART-8) 2002  | 0.05 to 0.35 %                         |
|       |  | Copper                  | IS: 504 (PART3)/2002  | 0.10 to 7.0%                           |
|       |  | Zinc                    | IS: 504 (PART4)/2002  | 0.10 to 5.0%                           |
|       |  | Manganese               | IS: 504 (PART5)/2002  | 0.10v1.50%                             |
|       |  | Magnesium               | IS: 504 (PART6)/2002  | 0.05 to 12.0%                          |
|       |  | Nickel                  | IS: 504 (PART7)/2002  | 0.10 to 4%                             |
|       |  | Iron                    | IS: 504 (PART2)/2002  | 0.10 to 2%                             |
|       |  | Tin                     | IS: 504 (PART9)/2002  | 0.05 to 0.5%                           |

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|-------|---------------------------------|-------------------------|---|--|
| 4.    | Cast Iron                       | Carbon                  | IS: 12308 (PART11)/91 RA-2006                               | 1.50 to 4.50%                          |
|       |                                 | Manganese               | IS: 12308 (PART10)/91 RA-2006                               | 0.10 to 7.0%                           |
|       |                                 | Silicon                 | IS: 12308 (PART6)/91 RA-2006                                | 0.10 to 6.0%                           |
|       |                                 | Sulphur                 | IS: 12308 (PART2)/87 RA-2007                                | 0.05 to 0.25%                          |
|       |                                 | Phosphorus              | IS: 12308 (PART5)/91 RA-2006                                | 0.01 to 0.50%                          |
|       |                                 | Chromium                | IS: 12308 (PART 8)/97 RA 2007                               | 0.01 to 4.00 %                         |
|       |                                 | Nickel                  | IS: 12308 (PART 7)/91 RA 2006                               | 0.5 to 5.00%                           |
| 5.    | Wrought Copper & Its Alloys     | Mercurous nitrate test  | IS : 2305/1988 RA 2009                                      | N/A                                    |
| 6.    | Plain Carbon & Low Alloy Steels | C                       | IS-8811/1998 RA 2012  | 0.015 to 1.4%                          |
|       |                                 | Mn                      | ASTM E415-99a   | 0.05 to 2.3%                           |
|       |                                 | Si                      | (Reapproved 2008)   | 0.05 to 4.0%                           |
|       |                                 | S                       |   | 0.005 to 0.1%                          |
|       |                                 | P                       |   | 0.005 to 0.13%                         |
|       |                                 | Ni                      |   | 0.02 to 4.5%                           |
|       |                                 | Cr                      |   | 0.05 to 5.00%                          |
|       |                                 | Mo                      |   | 0.01 to 2.00%                          |
|       |                                 | Cu                      |   | 0.03 to 1.00%                          |
|       |                                 | Co                      |   | 0.01 to 0.20%                          |
|       |                                 | V                       |   | 0.05 to 1.00%                          |
|       |                                 | W                       |   | 0.005 to 3.1%                          |
|       |                                 | Al                      |   | 0.005 to 1.0%                          |
| N     |                                 | 0.001 to 0.03%          |   |  |

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| 7.    | Cr-Cr/Ni Steels<br>Stainless<br>Steels/High Alloy<br>Steels | C                       | IS-9879/1998<br>ASTM E1086-94<br>(Reapproved 2008)          | 0.015 to 2.5%                          |
|       |   | Mn                      |   | 0.001 to 15.2%                         |
|       |   | Si                      |   | 0.05 to 3.00%                          |
|       |   | S                       |   | 0.005 to 0.35%                         |
|       |   | P                       |   | 0.005 to 0.14%                         |
|       |   | Ni                      |   | 1 to 28 %                              |
|       |   | Cr                      |   | 2 to 28%                               |
|       |   | Mo                      |   | 0.1 to 3%                              |
|       |   | Cu                      |   | 0.005 to 2.00%                         |
|       |   | Co                      |   | 0.002 to 2.00%                         |
|       |   | Ti                      |   | 0.005 to 1.00%                         |
|       |   | N                       |   | 0.001 to 0.5%                          |
|       |   | B                       |   | 0.002 to 0.02%                         |
|       |   | As                      |   | 0.0015 to 0.12%                        |
| 8.    | Aluminium &<br>Aluminium Alloys                             | Si                      | ASTM E1251-2011<br>(Reapproved 1996)<br>IS-11035/84 RA 2010 | 0.05 to 16%                            |
|       |   | Fe                      |   | 0.05 to 3.00%                          |
|       |   | Cu                      |   | 0.005 to 6.00%                         |
|       |   | Mn                      |   | 0.05 to 4.00%                          |
|       |   | Cr                      |   | 0.05 to 0.5%                           |
|       |   | Ni                      |   | 0.05 to 2.8%                           |
|       |   | Zn                      |   | 0.05 to 3.00%                          |
|       |   | Ti                      |   | 0.004 to 1.00%                         |
|       |   | Pb                      |   | 0.01 to 1.5%                           |
|       |   | Sn                      |   | 0.007 to 2.00%                         |
|       |   | Mg                      |   | 0.005 to 6 %                           |

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| 9.    | Copper & Copper Alloys       | Zn<br>Pb<br>Sn<br>P<br>Mn<br>Fe<br>Ni<br>Si<br>As<br>Sb<br>Ag<br>Al<br>S | ASTM E1507-1998(RA 2003)                                    | 0.015 to 45%<br>0.001 to 17%<br>0.005 to 14.8%<br>0.005 to 1%<br>0.005 to 5.5%<br>0.005 to 6.1%<br>0.05 to 15%<br>0.006 to 6.1%<br>0.004 to 0.40%<br>0.0035 to 1.7%<br>0.003 to 1.6%<br>0.005 to 11.2%<br>0.002 to 0.1% |
| 10.   | Pig Iron,Cast Iron & Sg Iron | C<br>Mn<br>Si<br>S<br>P<br>Cr<br>Ni<br>Mo<br>Cu                          | ASTM E 1999/2004  | 1.20 to 4.35%<br>0.05 to 2.5%<br>0.5 to 4.00%<br>0.005 to 0.36%<br>0.005 to 0.40%<br>0.05 to 2%<br>0.015 to 2%<br>0.005 to 1.00%<br>0.005 to 1.00%  |
| 11.   | Manganese Steel              | C<br>Mn<br>Si<br>S<br>P<br>Cr<br>Ni<br>Mo                                | TC/SOP/02   | 0.10 to 2.00%<br>2.00 to 14.00%<br>0.10 to 2.00%<br>0.005 to 0.3%<br>0.005 to 0.2%<br>0.05 to 4.00%<br>0.05 to 5.00%<br>0.05 to 2.00%   |

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| 12.   | Tool Steel                 | C<br>Mn<br>Si<br>S<br>P<br>Cr<br>Mo<br>V<br>W<br>Co | TC/SOP/03   | 0.1 to 2.50%<br>0.05 to 2.00%<br>0.005 to 3.00%<br>0.005 to 0.10%<br>0.005 to 0.2%<br>0.05 to 10.00%<br>0.05 to 10.00%<br>0.005 to 6.00%<br>0.1 to 22.00%<br>0.1 to 10.00% |

**II. METALLIC COATINGS AND TREATMENT SOLUTIONS**

|    |                                     |                          |                                     |                             |
|----|-------------------------------------|--------------------------|-------------------------------------|-----------------------------|
| 1. | <b>Zinc Coated Iron &amp; Steel</b> | Mass Of Zinc Coating     | IS: 6745/72 RA-2010<br>BS: 729/1971 | 30 to 2000gm/M <sup>2</sup> |
|    |                                     | Uniformity Of Coating    | IS: 2633/86 RA-2010<br>BS: 729/1971 | 1to 6 DIPS                  |
|    |                                     | Thickness Of Coating     | IS: 3203/1982 RA 2010               | 1 to 200 micron             |
|    |                                     | Adhesion Test/Knife Test | IS: 2629/1985 RA 2010               | NA                          |

**-X-X-X-X-X-X-X-X-X-X-X-X-**