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|---|---|---|---|
| **Laboratory** | **Central Material Technology Laboratory, Central Railway Locomotive Workshop, Dr. Babasaheb Ambedkar Road, F South, Ward F South, Mumbai City, Maharashtra** | | |
| **Accreditation Standard** | **ISO/IEC 17025: 2005** | | |
| **Certificate Number** | **TC-7384** | **Page 1 of 4** | |
| **Validity** | **09.06.2018 to 08.06.2020** | **Last Amended on --** | |

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|---|---|---|---|---|
| | | **CHEMICAL TESTING** | | |
| **I.** | **METALS & ALLOYS** | | | |
| **1.** | **Low Alloy Steel** | C | IS 8811 | 0.09 % to 0.73 % |
| | | Mn | | 0.31 % to 1.21 % |
| | | Si | | 0.16 % to 1.83 % |
| | | S | | 0.04 % to 0.11 % |
| | | P | | 0.04 % to 0.12 % |
| | | Cu | | 0.06 % to 0.71 % |
| | | Cr | | 0.32 % to 1.46 % |
| | | Ni | | 0.25 % to 3.97 % |
| | | V | | 0.35 % to 0.64 % |
| | | Mo | | 0.07 % to 0.42 % |
| | | Ti | | 0.005 % to 0.08 % |
| | | Co | | 0.06 % to 0.295 % |
| **2.** | **Stainless Steel** | C | IS 9879 | 0.017 % to 0.057 % |
| | | Mn | | 0.43 % to 1.75 % |
| | | Si | | 0.54 % to 0.62 % |
| | | S | | 0.001 % to 0.025 % |
| | | P | | 0.02 % to 0.04 % |
| | | Cu | | 0.05 % to 3.95 % |
| | | Cr | | 15.67 % to 25.90 % |
| | | Mo | | 0.13 % to 2.08 % |
| | | Ni | | 0.43 % to 10.34 % |
| **3.** | **Aluminium and its Alloys** | Si | IS 11035<br>IS 7658 | 0.33 % to 13.00 % |
| | | Fe | | 0.19 % to 0.89 % |
| | | Zn | | 0.12 % to 1.60 % |
| | | Mn | | 0.12 % to 0.32 % |
| | | Mg | | 0.25 % to 10.40 % |
| | | Cu | | 0.05 % to 9.75 % |
| | | Ti | | 0.09 % to 0.21 % |

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| **4.** | **Tool Steel** | C | CMTL/CR/SOP-01 Issue 01, Date 01.06.2017 | 0.40 % to 1.51 % |
| | | Mn | | 0.29 % to 0.38 % |
| | | S | | 0.002 % to 0.02 % |
| | | Si | | 0.25 % to 1.06 % |
| | | Ni | | 0.05 % to 0.34 % |
| | | Mo | | 0.29 % to 4.92 % |
| | | Cr | | 4.14 % to 11.54 % |
| | | W | | 0.02 % to 17.58 % |
| | | V | | 0.78 % to 1.82 % |
| | | Co | | 0.01 % to 0.39 % |
| **5.** | **Copper and its Alloys** | Sn | BS EN 15079 | 0.0356 % to 4.59 % |
| | | Pb | | 0.01 % to 5.32 % |
| | | Zn | | 0.02 % to 38.8 % |
| | | Fe | | 0.02 % to 0.075 % |
| | | Ni | | 0.01 % to 0.46 % |
| | | Si | | 0.01 % to 3.14 % |
| | | Bi | | 0.006 max |
| **II.** | **POLUTION AND ENVIRONMENT** | | | |
| **1.** | **Waste Water** | p H | IS 3025 (Part 11) | 2 to 14 |
| | | Total dissolved solids | IS 3025 (Part 16) | (1.0 to 500) mg/100 mL |
| | | Total Volatile solids | IS 3025 (Part 18) | (1.0 to 750) mg/100 mL |
| | | Total solids | IS 3025 (Part 15) | (1.0 to 1000) mg/100 mL |
| | | Chemical Oxygen Demand | IS 3025 (Part 58) | 400 mg/L to 3000 mg/L |

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**MECHANICAL TESTING**

| | | | | |
|---|---|---|---|---|
| **I.** | MECHANICAL PROPERTIES OF METALS | | | |
| **1.** | **Ferrous Materials, Alloys & Products** | Ultimate Tensile strength, Yield strength and Proof stress | IS 1608 | 100 MPa Min.<br>1.0 kN to 180 kN |
| | | % Elongation | IS 1608 | 2 % to 40 % |
| | | Brinell Hardness<br>500 kgf, 10 mm ball<br>750 kgf, 5 mm ball<br>3000 kgf, 10 mm ball | IS 1500 | <br>60 HBW to 200 HBW<br>190 HBW to 285 HBW<br>100 HBW to 500 HBW |
| | | Rockwell Hardness<br>HRC Scale<br>HRB Scale | IS 1586 | <br>20 HRC to 65 HRC<br>40 HRB to 95 HRB |
| | | Bend Test | IS 1599 | Qualitative<br>(Mandrel Diameter:<br>12 mm, 16 mm, 20 mm,<br>24 mm, 30 mm, 32 mm<br>and 36 mm) |
| | | Average Grain Size by microscopic method (comparison method) | IS 4748 | Qualitative<br>(No. 00 to No. 10) |
| | | Decarburization depth by microscopic method | IS 6396 | 0.01 mm to 2 mm |

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| | | **NON – DESTRUCTIVE TESTING** | | |
| **I.** | **METALS & ALLOYS** | | | |
| **1.** | **Welded Joints, Gear, Pinion, Buffer Casing** | Magnetic Particle Testing (using magnetic yoke, visible wet) | IS 3703:2004 | Qualitative<br>Surface & sub surface indication<br>(Upto to 3 mm depth) |
| **2.** | **Welded Joints** | Dye Penetrant Testing (Fluorescent / Non-Fluorescent, Solvent & water washable) | IS 3658:1999 (RA 2000)<br>IS 12889:1989 | Qualitative<br>(Open to Surface) |
| **3.** | **Rolling stock Axels** | Ultra Sonic Testing (contact & Backwall Method) | ASTME-114-Straight Beam<br>ASTME-587-Angle Beam | Qualitative<br>Upto 3000 mm Length |

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