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|---|---|---|---|
| **Laboratory** | **Becquerel Industries Pvt. Ltd., A-36, MIDC, Butibori, Nagpur, Maharashtra** | | |
| **Accreditation Standard** | **ISO/IEC 17025: 2005** | | |
| **Certificate Number** | **TC-6382** ***(in lieu of T-1677, T-2663 & T-3609)*** | **Page 1 of 12** | |
| **Validity** | **24.09.2017 to 23.09.2019** | **Last Amended on 06.10.2017** | |

| Sl. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|

**CHEMICAL TESTING**

| | | | | |
|---|---|---|---|---|
| **I.** | **METALS & ALLOYS** | | | |
| **1.** | **Plain Carbon, Low Alloy Steel** | C | ASTM E-415-2017 | 0.04 % to 1.45 % |
| | | Si | ASTM E-415-2017 | 0.10 % to 1.90 % |
| | | Mn | ASTM E-415-2017 | 0.20 % to 1.85 % |
| | | P | ASTM E-415-2017 | 0.008 % to 0.08 % |
| | | S | ASTM E-415-2017 | 0.007 % to 0.07 % |
| | | Cr | ASTM E-415-2017 | 0.040 % to 1.45 % |
| | | Ni | ASTM E-415-2017 | 0.01 % to 1.78 % |
| | | Mo | ASTM E-415-2017 | 0.02 % to 0.55 % |
| | | V | ASTM E-415-2017 | 0.003 % to 0.55 % |
| | | Cu | ASTM E-415-2017 | 0.02 % to 0.45 % |
| | | Nb | ASTM E-415-2017 | 0.0015 % to 0.025 % |
| | | Ti | ASTM E-415-2017 | 0.002 % to 0.012 % |
| | | Al | ASTM E-415-2017 | 0.006 % to 0.35 % |
| | | N | ASTM E-415-2017 | 0.004 % to 0.010 % |
| | | Sn | ASTM E-415-2017 | 0.004 % to 0.035 % |
| | | B | ASTM E-415-2017 | 0.0002 % to 0.0044 % |
| | | Co | ASTM E-415-2017 | 0.003% to 0.01 % |
| **2.** | **Stainless Steel** | C | ASTM E-1086-2014 | 0.018 % to 0.118 % |
| | | Si | ASTM E-1086-2014 | 0.483 % to 1.650 % |
| | | Mn | ASTM E-1086-2014 | 0.314 % to 1.92 % |
| | | P | ASTM E-1086-2014 | 0.019 % to 0.028 % |
| | | S | ASTM E-1086-2014 | 0.021 % to 0.063 % |
| | | Cr | ASTM E-1086-2014 | 15.13 % to 27.192 % |
| | | Ni | ASTM E-1086-2014 | 9.644 % to 22.924 % |
| | | Mo | ASTM E-1086-2014 | 0.629 % to 2.322 % |
| | | Cu | ASTM E-1086-2014 | 0.097 % to 0.201 % |
| | | N | ASTM E-1086-2014 | 0.014 % to 0.070 % |
| | | Co | ASTM E-1086-2014 | 0.046 % to 0.058 % |
| **3.** | **Cast Iron** | C | ASTM E-1999-2011 | 2.574 % to 4.048 % |

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|---|---|---|---|---|
| | | Si | ASTM E-1999-2011 | 1.035 % to 1.293 % |
| | | Mn | ASTM E-1999-2011 | 0.468 % to 1.131 % |
| | | P | ASTM E-1999-2011 | 0.078 % to 0.267 % |
| | | S | ASTM E-1999-2011 | 0.015 % to 0.245 % |
| | | Cr | ASTM E-1999-2011 | 0.579 % to 1.562 % |
| **4.** | **Alloy Aluminium** | Si | ASTM E 1251-2011 | 0.582 % to 8.459 % |
| | | Fe | ASTM E 1251-2011 | 0.630 % to 1.958 % |
| | | Cu | ASTM E 1251-2011 | 1.17 % to 4.774 % |
| | | Mn | ASTM E 1251-2011 | 0.014 % to 0.271 % |
| | | Mg | ASTM E 1251-2011 | 0.261 % to 2.783 % |
| | | Cr | ASTM E 1251-2011 | 0.135 % to 0.22 % |
| | | Zn | ASTM E 1251-2011 | 1.026 % to 5.192 % |
| | | Ti | ASTM E 1251-2011 | 0.133 % to 0.231 % |
| | | Ni | ASTM E 1251-2011 | 0.011 % to 0.442 % |
| | | Pb | ASTM E 1251-2011 | 0.097 % to 0.264 % |
| | | Bi | ASTM E 1251-2011 | 0.027 % to 0.077 % |
| | | Co | ASTM E 1251-2011 | 0.020 % to 0.035 % |
| | | V | ASTM E 1251-2011 | 0.011 % to 0.020 % |
| **5.** | **Copper Base Alloys** | Zn | BSEN 15079:2015 | 4.90 % to 27.10 % |
| | | Pb | BSEN 15079:2015 | 0.02 % to 6.75 % |
| | | Sn | BSEN 15079:2015 | 1.50 % to 4.55 % |
| | | P | BSEN 15079:2015 | 0.003 % to 0.17 % |
| | | Mn | BSEN 15079:2015 | 0.001 % to 0.018 % |
| | | Fe | BSEN 15079:2015 | 0.004 % to 0.12 % |
| | | Ni | BSEN 15079:2015 | 0.026 % to 0.16 % |
| | | As | BSEN 15079:2015 | 0.014 % to 0.081 % |
| | | Sb | BSEN 15079:2015 | 0.013 % to 0.29 % |
| | | Bi | BSEN 15079:2015 | 0.02 % to 0.10 % |
| | | Al | BSEN 15079:2015 | 0.002 % to 0.10 % |
| | | Ag | BSEN 15079:2015 | 0.003 % to 0.10 % |
| **6.** | **Carbon Steel** | Carbon | IS 228(Part 1): 1987 (RA 2012) Amd-01 | 0.05 % to 2.5 % |

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|---|---|---|---|---|
| | | Sulphur | IS 228 (Part 9): 1989 (RA 2014) | 0.01 % to 0.25 % |
| | | Silicon | IS 228 (Part 8): 1989 (RA 2014) | 0.05 % to 2.0 % |
| | | Manganese | IS 228 (Part 2): 1987 (RA 2012) | 0.1 % to 3.0 % |
| | | Phosphorus | IS 228 (Part 3): 1987 (RA 2012) | 0.01 % to 0.5 % |
| **7.** | **Stainless Steel** | Carbon | IS 228 (Part 1): 1987 (RA 2012) Amd-01 | 0.03 % to 0.5 % |
| | | Sulphur | IS 228 (Part 9): 1989 (RA 2014) | 0.01 % to 0.25 % |
| | | Silicon | IS 228 (Part 8): 1989 (RA 2014) | 0.05 % to 2.0 % |
| | | Manganese | IS 228 (Part 2): 1987 (RA 2012) | 0.1 % to 3.0 % |
| | | Phosphorus | IS 228 (Part 3): 1987 (RA 2012) | 0.01 % to 0.5 % |
| | | Nickel | IS 228 (Part 5): 1987 (RA 2014) | 0.1 % to 20.0 % |
| | | Molybdenum | IS 228 (Part 7): 1987 (RA 2012) | 1.0 % to 5.0 % |
| | | Chromium | IS 228 (Part 6): 1987 (RA 2014) | 0.1 % to 20.0 % |
| **II.** | **SOLID FUELS** | | | |
| **1.** | **Coal** | Ash | IS 1350 (Part 1): 1984 (RA 2013) Amd.01 | 5.0 % to 60.0 % |
| | | Total Moisture | IS 1350 (Part 1): 1984 (RA 2013) Amd.01 | 1.0 % to 40.0 % |
| | | Volatile Matter | IS 1350 (Part 1): 1984 (RA 2013) Amd.01 | 10.0 % to 60.0 % |
| | | Total Sulphur | IS 1350 (Part 3): 1969 (RA 2010) Amd. 02 | 0.1 % to 10.0 % |

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|---|---|---|---|---|
| | | Gross Calorific Value | IS 1350: 1975 Pt 2 RA 2015 Amd- 01 | 2500 Kcal/Kg to 9000 Kcal/Kg |
| **III.** | **BUILDING MATERIAL** | | | |
| **1.** | **Cement (OPC, PPC, PSC)** | Silica as $SiO_2$ | IS 4032:1985 (RA 2009) Amd-02 | 5.0 % to 30 % |
| | | Alumina as $Al_2O_3$ | IS 4032:1985 (RA 2009) Amd-02 | 0.5 % to 15 % |
| | | Iron Oxide as $Fe_2O_3$ | IS 4032:1985 (RA 2009) Amd-02 | 0.5 % to 10 % |
| | | Calcium as CaO | IS 4032:1985 (RA 2009) Amd-02 | 1.0 % to 70 % |
| | | Magnesium as MgO | IS 4032:1985 (RA 2009) Amd-02 | 0.5 % to 10 % |
| | | Sulphuric anhydride as $SO_3$ | IS 4032:1985 (RA 2009) Amd-02 | 0.1 % to 10 % |
| | | Loss on Ignition | IS 4032:1985 (RA 2009) Amd-02 | 0.5 % to 10 % |
| **2.** | **Admixture** | pH | IS 9103:1999 (RA 2013) | 2 to 12 |
| | | Ash Content | IS 9103:1999 (RA 2013) | 5 % to 30 % |
| | | Relative Density | IS 9103:1999 (RA 2013) | 1 to 1.5 |
| | | Dry Material Content | IS 9103:1999 (RA 2013) | 5 % to 50 % |
| | | Chloride Iron Content | IS 9103:1999 (RA 2013) | 0.010 % to 0.10 % |
| **3.** | **Soil** | pH | IS 2720 (Part 26): 1987 (RA 2011) | 2 to 12 |
| | | Total Soluble Sulphate as Sodium Sulphate | IS 2720 (Part 27): 1977 (RA 2015) | 0.05 % to 1.5 % |
| | | Organic impurities | IS 2720 (Part 22): 1972 (RA 2015) | Qualitative |
| **4.** | **Bitumen** | Solubility in Trichloroethylene | IS 1216:1978 | 90 % to 100 % |
| | | Ash Content | IS 1217:1978 | 1 % to 20 % |

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| **5.** | **Aggregate (Fine)** | Soundness By :<br>1. Sodium Sulphate<br>2. Magnesium Sulphate | IS:2386(P-5):1963 RA.2016 | 0.1 % to 15 % |
| **6.** | **Aggregate (Coarse)** | Soundness By :<br>1. Sodium Sulphate<br>2. Magnesium Sulphate | IS:2386(P-5):1963 RA.2016 | 0.1 % to 20 % |
| **IV.** | **WATER** | | | |
| **1.** | **Construction Water** | Total Dissolved Solid | IS 3025 (Part 16): 1984 (RA 2012) Amd-01 | 2000 mg/l to 10000 mg/l |
| | | Volatile Residue | IS 3025 (Part 18): 1984 (RA 2012) Amd-01 | 50 mg/l to 2000 mg/l |
| | | Fixed Residue | IS 3025 (Part 18): 1984 (RA 2012) Amd-01 | 100 mg/l to 2000 mg/l |
| | | Total suspended solid | IS 3025 (Part 17): 1984 (RA 2012) Amd- 01 | 50 mg/l to 3000 mg/l |
| | | pH value | IS 3025 (Part 11): 1983 (RA 2012) Cl.2 | 2 to 12 |
| | | Chloride | IS 3025 (Part 32): 1988 (RA 2014) Cl.2 | 50 mg/l to 5000 mg/l |
| | | Sulphate | IS 3025 (Part 24): 1986 (RA 2014) | 50 mg/l to 1000 mg/l |
| | | Alkainity | IS 3025 (Part 23): 1986 Cl.8.1 | 1 ml to 100ml |
| | | Acidity | IS 3025 (Part 23): 1986 (RA 2003) Cl.8.1 (RA 2014) Amd-02 | 0.1 ml to 50 ml |

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| **Certificate Number** | **TC-6382** ***(in lieu of T-1677, T-2663 & T-3609)*** | **Page 6 of 12** | |
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|---|---|---|---|---|
| | | **MECHANICAL TESTING** | | |
| **I.** | **BUILDING MATERIALS** | | | |
| **1.** | **Aggregate (Fine)** | Sieve Analysis | IS 2386 (Part 1): 1963 (RA 2016) | 150 Micron to 4.75 mm (0.1 % to 100 %) |
| | | Specific gravity | IS 2386 (Part 3): 1963 (RA 2016) | 2.00 to 4.00 |
| | | Water absorption | IS 2386 (Part 3): 1963 (RA 2016) | 0.1 % to 5.0 % |
| | | Bulk Density<br>1. Loose Bulk Density<br>2. Compacted Bulk Density<br>3. Voids in Compacted Bulk Density | IS 2386 (Part 3): 1963 (RA 2016) | 1 kg/lit to 4 kg/lit |
| | | Particles Finer Than 75 micron | IS 2386 (Part 1): 1963 (RA 2016) | 0 to 20 % |
| | | Bulking of Sand | IS 2386 (Part 3): 1963 (RA 2016) | 5 % to 40 % |
| **2.** | **Aggregate (Coarse)** | Sieve Analysis | IS 2386 (Part 1): 1963 (RA 2016) | 0.1 % to 100 %<br>4.75 mm to 80 mm |
| | | Specific gravity | IS 2386 (Part 3): 1963 (RA 2016) | 2.00 to 4.00 |
| | | Water absorption | IS 2386 (Part 3): 1963 (RA 2016) | 0.1 % to 20.0 % |
| | | Flakiness Index | IS 2386 (Part 1): 1963 (RA 2016) Amd-04 | 1 % to 50 % |
| | | Elongation Index | IS 2386 (Part 1): 1963 (RA 2016) Amd-04 | 1 % to 50 % |
| | | Impact Value | IS 2386 (Part 4): 1963 (RA 2016) Amd-03 | 1 % to 50 % |

| Sl. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Crushing Value | IS 2386 (Part 4): 1963 (RA 2016) Amd-03 | 1 % to 50 % |
| | | Los Angles Abrasion Value | IS 2386 (Part 4): 1963 (RA 2016) Amd-03 | 1% to 60% |
| | | 10% Fine Value | IS 2386 (Part 4): 1963 (RA 2016) Amd-03 | 1 ton to 50 ton |
| | | Bulk Density<br>1. Loose Bulk Density<br>2. Compacted Bulk Density<br>3. Voids in Compacted Bulk Density | IS 2386 (Part 3): 1963 (RA 2016) | 1.00 Kg/l to 4.00 Kg/l |
| | | Striping Value | IS 6241 (Part l): 1971 (RA 2008) | Qualitative |
| **3.** | **Cement OPC, PPC, Slag Cement** | Consistency | IS 4031 (Part 4): 1988 (RA 2016) | 23 % to 40 % |
| | | Initial Setting Time | IS 4031 (Part 5): 1988 (RA 2014) Rev-1 | 30 min to 500 min |
| | | Final Setting Time | IS 4031 (Part 5): 1988 (RA 2014) Rev-1 | 30 min to 600 min |
| | | Fineness by Blain Air Permeability | IS 4031 (Part 2): 1999 (RA 2013) Rev-2 | 200 $m^2$/kg to 600 $m^2$/kg |
| | | Soundness by Lechatlier | IS 4031(Part 3): 1988 (RA 2014) | 0.1 mm to 10 mm |
| | | Soundness by Autoclave | IS 4031 (Part 3): 1988 (RA 2014) | 0.01 % to 2.0 % |
| | | Compressive Strength | IS 4031(Part 6): 1988 (RA 2009) | 5 $N/mm^2$ to 80 $N/mm^2$ |
| | | Drying Shrinkage | IS 4031 (Part 10): 1988 RA 2014) | 0.01 % to 5 % |
| | | Density | IS 4031 (Part 11): 1988 (RA 2014) | 2.0 gm/cc to 3.3 gm/cc |
| **4.** | **Hardened Concrete** | Compressive Strength | IS 516:1959 (RA 2013) | 1 $N/mm^2$ to 80 $N/mm^2$ |

| Sl. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | | Beam Flexural Strength | IS 516:1959 (RA 2013) | 2 MPa to 10 MPa |
| | | Concrete Permeability Test | MORTH & H Clause 1717.7.5 | 1 mm to 50 mm |
| **5.** | **Bricks** | Dimension | IS 1077:1992 (RA 2011) Amd-1 | 10 mm to 5000 mm |
| | | Water Absorption | IS 3495 (Part 2): 1992 (RA 2011) | 1 % to 50 % |
| | | Compressive Strength | IS 3495 (Part 1): 1992 (RA 2011) | 10 $kg/cm^2$ to 200 $kg/cm^2$ |
| | | Efflorescence | IS 3495 (Part 3): 1992 (RA 2011) | Qualitative |
| **6.** | **Concrete Paving Blocks** | Compressive Strength | IS 15658:2006 (RA 2016) | 10 $N/mm^2$ to 75 $N/mm^2$ |
| | | Water Absorption | IS 15658:2006 (RA 2016) | 1% to 25 % |
| | | Resistance to wear | IS 15658:2006 (RA 2016) | 50 $mm^3$ to 15000 $mm^3$ / 5000 $mm^2$ |
| **7.** | **Bitumen** | Softening Point | IS 1205:1978 | 10 °C to 100 °C |
| | | Penetration 1/10 mm | IS 1203:1978 | 1 Div. to 400 Div. |
| | | Specific Gravity | IS 1202:1978 | 0.5 to 1.2 |
| | | Flash Point | IS 1448 (Part 69) | 100 °C to 400 °C |
| | | Ductility | IS 1208:1978 | 1 cm to 100 cm |
| **8** | **Bituminous Mix** | Binder Content | ASTM D 2172 | 0.1 % to 15 % |
| **II.** | **SOIL & ROCK** | | | |
| **1.** | **Soil** | Moisture Content | IS 2720 (Part 2): 1973 (RA 2015) | 1 % to 100 % |
| | | Liquid Limit | IS 2720 (Part 5): 1985 (RA 2015) | 20 % to 200 % |
| | | Plastic limit, % | IS 2720 (Part 5): 1985 (RA 2015) | 10 % to 80 % |
| | | Specific gravity | IS 2720 (Part 3 & Sec 1): 1980 (RA 2011) | 1.0 to 4.0 |
| | | Compaction Test :- Light Compaction | IS 2720 (Part 7): 1980 (RA 2011) & | MDD 0.8 gm/cc to 4.0 gm/cc |

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|---|---|---|---|---|
| | | Heavy Compaction | IS 2720 (Part 8): 1983 (RA 2015) | OMC 1 % to 50 % |
| | | California Bearing Ratio | IS 2720 (Part 16): 1987 (RA 2011) | 1 % to 50 % |
| | | Sieve Analysis & Hydrometer<br>Sieve Analysis<br>1. Gravel %<br>2. Sand %<br>Hydrometer<br>3. Silt %<br>4. Clay % | IS 2720 (Part 4): 1985 (RA 2015) | 80 mm to 2 micron |
| | | Shrinkage Limit | IS 2720 (Part 6): 1972 | 1 % to 30 % |
| | | Unconfined Compression Test | IS 2720 (Part 10): 1993 (RA 2010) | 0.1 MPa to 2 MPa |
| | | Direct Shear Test<br>Cohesion<br>Angle of Internal Fraction | IS 2720 (Part 13) :1985 (RA 2011) | 0.01 kg/cm$^2$ to 0.8 kg/cm$^2$<br><br>5 ° to 50 ° |
| | | Consolidation Test-Compression index | IS 2720 (Part 15): 1985 (RA 2011) | 0.01 Cc to 0.5 Cc |
| | | Permeability Test- | IS 2720 (Part 17): 1986 Cl. 6 (Falling Head) (RA 2011) | 1x10$^{-3}$ to 1x10$^{-10}$cm/s |
| | | Free Swell Index | IS 2720 (Part 40): 1977 (RA 2011) | 5 % to 300 % |
| | | Swell Pressure Test | IS 2720 (Part 41): 1977 (RA 2011) | 0.1 kg/cm$^2$ to7.8 kg/cm$^2$ |
| **2.** | **Rock / Building Stone** | Unconfined Compression Test | IS 9143:1979 (RA 2011) | 1 kg/cm$^2$ to 1500 kg/cm$^2$ (NX size) |
| | | Point Load Test | IS 8764:1998 (RA 2014) | 0.5 MPa to 50 MPa |
| | | Water Absorption | IS 13030:1991 (RA 2011) | 1 % to 25 % |
| | | Specific Gravity | IS 13030:1991 (RA 2011) | 1 to 4 |
| | | Wet/ Dry Density | IS 13030:1999 (RA 1991) | 1 gm/cc to 5 gm/cc |

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|---|---|---|---|---|
| | | Porosity | IS 13030:1991 (RA 2011) | 0.01% to 0.1% |
| **3.** | **Soil / Rock Field Testing** | Modulus Of Subgrade Reaction (K-Value) | IS 9214:1979 (RA 2007) | 0.02 $Kg/cm^2/cm$ to 35.0 $Kg/cm^2/cm$ |
| | | In Situ Density By Core Cutter | IS 2720 (Part 29): 1975 (RA 2010) | 1.0 gm/cc to 4.0 gm/cc |
| | | By Sand Replacement | IS 2720 ( Part 28): 1974 (RA 2010) | 1.0 gm/cc to 4.0 gm/cc |
| **III.** | **MECHANICAL PROPERTIES OF METALS** | | | |
| **1.** | **Metals & Alloys** | **Tensile Testing**<br>Tensile Strength<br><br>Yield/ Proof Strength<br>% of Elongation<br>% of Reduction | <br>IS 1608:2005 (RA 2011)<br>IS 1786:2008 (RA 2013) Amd-2 | 10 KN to 580 KN |
| | | Bend Test | IS 1599:2012 (RA 2012) | No. of Mandrels Size 12, 20, 24, 32, 36, 40, 42, 48, 54, 60, 66, 84, 100, 112, 120, 125, 224 |
| | | Re-bend Test | IS 1786:2008 (RA 2013) Amd-2 | No. of Mandrels Size 12, 20, 24, 32, 36, 40, 42, 48, 54, 60, 66, 84, 100, 112, 120, 125, 224 |
| | | Impact Test Charpy Impact Test 'V' Notch | IS 1757 (Part 1): 2014 (Excluding fracture appearance) | Upto 280 J (2J) Room Temp to -49 °C |
| | | Hardness Test<br>HRC<br>HRB | IS 1586 (Part 1): 2012 | <br>20 HRC to 60HRC<br>70 HRB to 100 HRB |
| | | Weight/Meter | IS 1786:2012 | Length-0.5 m to 3 m<br>Weight-0.2 kg to 10 kg |

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| | | **NON - DESTRUCTIVE TESTING** | | |
| **I.** | **METALS & ALLOYS** | | | |
| **1.** | **Ferrous & Non Ferrous Metal & Alloy Weld, Casting & Forging** | Liquid Penetration Test (Solvent Removable)<br>Visible Method<br>Fluorescent Method | ASME Section-V<br>Article-6:2015<br>SE 165:2015 | Qualitative<br>(Flaws Open to Surface) |
| **2.** | **Ferrous & non ferrous Metal & Alloy, Weld & Casting** | Radiography Testing<br>X-Ray (250kv)<br>Gamma Ray :Ir-192<br>Gamma Ray:Co-60 | ASME Section-V<br>Article-2&22 :2015<br>SE 94 :2015<br>IS 2595 :2008 | Qualitative (3mm to 30mm for X-Ray<br>10mm to 75mm for Gamma-Ray<br>40mm to 200mm for Gamma-Ray Co-60) |
| **3.** | **Ferromagnetic, Weld, Casting & Forging** | Magnetic Particle Testing (Prod, Yoke & Coil Method)<br>Fluorescent<br>Non-Fluorescent | ASME Sec V<br>Article-7:2015<br>SE 709:2015<br>IS 3703 :2004 | Qualitative (Surface & Sub-surface Depth<br>(Upto 3mm Maximum) |
| **4.** | **Ferrous Metals & Alloys, Weld, Casting & Forging** | Ultrasonic Testing for Flaw detection | ASME Section-V<br>Article 4,5 & 23:2015<br>SA 388:2015<br>SA 435:2015<br>SA 577:2015<br>SA 578:2015<br>SA 609:2015<br>SA 213 :2015<br>SA 273 :2015<br>IS 9565:1995 (RA 2000)<br>IS 7666:1988 | Qualitative<br>(3 mm to 300 mm Plate<br>6 mm to 125 mm Weld<br>3 mm to 2000 mm Forging<br>3 mm to 1000 mm Casting) |
| **5.** | **Ferrous & Non Ferrous Metals & Alloys** | Ultrasonic Thickness Measurement | ASME Section-V<br>Article-23<br>SA 797 :2015 | 2 mm to 60 mm<br>Steel thickness |

**Ramprasath R**
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|---|---|---|---|---|
| **II.** | **BUILDING MATERIALS - REINFORCED CONCRETE STRUCTURES** | | | |
| **1.** | **Reinforced Concrete Structures** | Ultrasonic Pulse Velocity | IS 13311 (Part 1): 1992 (RA 2013) | 0.1 Km/s to 5 Km/s |
| | | Rebound Hammer | IS 13311 (Part 2): 1992 (RA 2013) | 10 $N/mm^2$ to 80 $N/mm^2$ |

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