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|---|---|---|---|
| **Laboratory** | **Kailtech Test and Research Centre Private Limited, 141-C, Electronic Complex Industrial Area, Pardesipura, Indore, Madhya Pradesh** | | |
| **Accreditation Standard** | **ISO/IEC 17025: 2005** | | |
| **Discipline** | **Mechanical Testing** | **Issue Date** | **18.09.2016** |
| **Certificate Number** | **T-1801** | **Valid Until** | **17.09.2018** |
| **Last Amended on** | **07.11.2016** | **Page** | **1 of 18** |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **I.** | **BUILDING MATERIALS** | | | |
| **1.** | **Cement** | Fineness -Blaine's permeability | IS 4031 (Part 2): 1999 (RA 2008) | 100 $m^2$/kg to 600 $m^2$/kg |
| | | Fineness by - Le –Chatelier | IS 4031 (Part 3): 1988 (RA 2009) | 0.5 mm to 20 mm |
| | | Soundness - Autoclave | | 0.02 % to 1.5 % |
| | | Consistency | IS 4031 (Part 4): 1988 (RA 2009) | 15 % to 40 % |
| | | Initial setting time<br>Final setting time | IS 4031 (Part 5): 1988 (RA 2009) | 10 minute to 400 minute<br>100 minute to 600 minute |
| | | Compressive strength | IS 4031 (Part 6): 1988 (RA 2009) | 2 $N/mm^2$ to 80 $N/mm^2$ |
| | | Drying Shrinkage | IS 4031 (Part 10):1988 (RA 2009) | 0.018 % to 2 % |
| | | Whiteness | IS 8042: 2015 | 60 % to 99 % |
| | | Density/Specific Gravity | IS 4031(P 11): 1988 (RA 2009) | 1.5 g/cc to 3.5 g/cc |
| | | Fineness by Dry sieving | IS 4031 (Part 1): 1996 (RA 2010) | 2 % to 30 % |
| **2.** | **Pozzolana** | Fineness- Blaine's permeability | IS 1727: 1967 (RA 2008) | 100 $m^2$/kg to 600 $m^2$/kg |
| | | Particles retained on 45µ | | 5 % to 50 % |
| | | Lime Reactivity | | 1 $N/mm^2$ to 20 $N/mm^2$ |
| | | Compressive strength | | 50 % to 95 % |
| | | Soundness by Autoclave | | 0.01 % to 1.5 % |
| | | Specific Gravity/Density | | 1.0 g/cc to 3.0 g/cc |
| | | Drying Shrinkage | IS 4031 (Part 10):1988 (RA 2009) | 0.018 % to 2 % |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **3.** | **Aggregates** | Crushing Value | IS 2386 (Part 4): 1963 (RA 2011) | 5 % to 40 % |
| | | Impact Value | | 5 % to 60 % |
| | | Abrasion Value | | 5 % to 70 % |
| | | 10% Fines value | | 1 kN to 400 kN |
| | | Sieve Analysis | IS 2386 (Part 1): 1963 (RA 2011) | 80 mm to 0.150 mm |
| | | Material Finer than 75µ/Silt Content | | 0.5 % to 6 % |
| | | Flakiness Index | | 5 % to 40 % |
| | | Elongation Index | | 5 % to 40 % |
| | | Specific Gravity | IS 2386 (Part 3): 1963 (RA 2011) | 2 to 4 |
| | | Water Absorption | | 0.1 % to 5 % |
| | | Bulk Density | | 1.2 kg/l to 2 kg/l |
| | | Bulking of Fine Aggregate | | 0.5 % to 25 % |
| | | Stone Polish Value | IS 2386 (Part 4): 1963 (RA 2011) | 20 to 120 |
| | | Alkali Reactivity | IS 2386 (Part 7): 1963 (RA 2002) (Chemical Method) | 2.5 millimoles/l to 2500 millimoles/l |
| | | Organic Matter | IS 2720 (Part 22): 1972 (RA 2010) | 0.05 % to 2.5 % |
| | | Coal and Lignite | IS 2386 (Part 2): 1963 (RA 2011) | 0.05 % to 5 % |
| | | Clay lumps | | 0.05 % to 5 % |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Aggregates** | Material finer than 75 micron | IS 2386 (Part 1): 1963 (RA 2002) | 0.05 % to 25 % |
| | | Soft fragment | IS 2386 (Part 2): 1963 (RA 2011) | 0.05 % to 3 % |
| | | Shale | | 0.05 % to 2 % |
| | | Mica | | 0.05 % to 2 % |
| | | Soundness by Magnesium Sulphate $MgSO_4$ | IS 2386 (Part 5): 1963 (RA 2002) | 0.02 % to 20 % |
| | | Soundness by Sodium Sulphate $Na_2SO_4$ | | 0.02 % to 15 % |
| | | Iron unsoundness | IS 383: 2016 | 0.1 % to 5 % |
| | | Sand Equivalent Value | IS 2720 (Part 37): 1976 (RA 2011) | 25 % to 80 % |
| | | Stripping Value of Aggregate | IS 6241: 1971 (RA 2013) | 90 % to 100 % |
| **4.** | **Bentonite** | Sand Content | IS 6186: 1986 (RA 2010) | 0.1 % to 20 % |
| | | Free Swell | | 0 to 100 % |
| | | pH | | 1 to 13 |
| | | Density | IS 6186: 1986 (RA 2010) | 1 g/ml to 2 g/ml |
| | | Liquid Limit<br>Plastic Limit | IS 2720 (Part 5): 1985 (RA 2010) | 40 % to 80 %<br>30 % to 50 % |
| **5.** | **Bitumen & Bitumen Mix** | Softening Point | IS 1205: 1978 (RA 2009) | 30 °C to 80 °C |
| | | Penetration | | 30 DIV. to 120 DIV. |
| | | Ductility | | 10 cm to 100 cm |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Bitumen & Bitumen Mix** | Marshal Stability/Flow | ASTM D 1559: 1989 | 500 kg to 1800 kg<br>0.1 mm to 6.0 mm |
| | | Bitumen Binder Content | ASTM D 2172: 2011 | 1 % to 25 % |
| **6.** | **Bitumen & Bituminous material** | Flash Point | IS 1448 (Part 69): 2013 | 30 °C to 355 °C |
| | | Solubility in Trichloroethylene | IS 1216: 1978 (RA 2014) | 0.5 % to 100 % |
| | | Kinematic Viscosity | IS 1206 (Part 3): 1978 (RA 2009) | 2 cSt to 600 cSt |
| | | Mineral Matter (Ash Content) | IS 1217: 1978 (RA 2014) | 0.01 % to 10 % |
| | | Loss on Heating | IS 1212: 1978 (RA 2014) | 0.01 % to 10 % |
| | | Water Content | IS 1211: 1978 (RA 2014) | 0.01 % to 10 % |
| | | Specific Gravity | IS 1202: 1978 (RA 2014) | 0.7 % to 2.0 |
| | | Volatile matter Content | IS 1220: 1978 (RA 2014) | 0.1 % to 75 % |
| | | Matter Soluble in toluene | IS 1215: 1978 (RA 2014) | 0.1 % to 30 % |
| **7.** | **Bitumen Emulsion** | Residue on 600 Micron Sieve | IS 8887: 2004 (RA 2014) | 0.01 % to 1.0 % |
| | | Viscosity | IS 3117: 2004 (RA 2014) | 1 Saybolt to 500 Saybolt |
| | | Coagulation | IS 8887: 2004 (RA 2014) | Qualitative |
| | | Storage Stability | | 0.1 % to 10 % |
| | | Miscibility with water | | Qualitative |
| | | Residue by Evaporation | | 0.05 % to 90 % |
| | | Water Content | | 0.05 % to 25 % |
| | | Particle Charge | | Qualitative<br>(cationic / anionic) |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **8.** | **Concrete** | Compressive Strength | IS 516: 1959 (RA 2008) | 10 $N/mm^2$ to 80 $N/mm^2$ |
| | | Flexural / transverse Strength | | 0.5 $N/mm^2$ to 30 $N/mm^2$ |
| | | Permeability of Concrete | IS 3085: 1965 (RA 2011) | 1 m/s to 50 x $10^{-12}$ m/s |
| | | Water Absorption | IS 2185 (Part 1): 2005 (RA 2010) | 0.1 % to 10 % |
| **9.** | **Hollow & Solid Concrete Block** | Dimension | IS 2185 (Part 1): 2005 (RA 2010)<br>IS 2185 (Part 2): 1983 (RA 2010) | 80 mm to 800 mm |
| | | Water Absorption | | 0.1 % to 10 % |
| | | Block Density | | 1000 $kg/m^3$ to 2000 $kg/m^3$ |
| | | Drying Shrinkage | | 0.01 to 0.2% |
| | | Moisture Movement | | 0.01 % to 0.2 % |
| | | Compressive Strength | | 2 $N/mm^2$ to 30 $N/mm^2$ |
| **10.** | **AAC Block** | Dimension | IS 2185 (Part 3): 1984 (RA 2010) | 80 mm to 800 mm |
| | | Block Density | IS 2185 (Part 3): 1984 (RA 2010)<br>IS 6441 (Part 1): 1972 (RA 2011) | 300 $kg/m^3$ to 1100 $kg/m^3$ |
| | | Drying Shrinkage | IS 2185 (Part 3): 1984 (RA 2010)<br>IS 6441 (Part 2): 1972 (RA 2011) | 0.01 % to 0.2 % |
| | | Compressive Strength | IS 2185 (Part 3): 1984 (RA 2010)<br>IS 6441 (Part 5): 1972 (RA 2011) | 1 $N/mm^2$ to 20 $N/mm^2$ |
| | | Thermal Conductivity | IS 2185 (Part 3): 1984 (RA 2010)<br>IS 3346: 1980 (RA 2010) | 0.1 W/mK to 0.8 W/mK |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **11.** | **Bricks** | Dimension | IS 1077: 1992 (RA 2011) | 500 mm to 5000 mm |
| | | Compressive Strength | IS 3495 (Part 1): 1992 (RA 2011) | 2 $N/mm^2$ to 30 $N/mm^2$ |
| | | Water Absorption | IS 3495 (Part 2): 1992 (RA 2011) | 1 % to 30 % |
| | | Efflorescence | IS 3495 (Part 3): 1992 (RA 2011) | Qualitative |
| **12.** | **Paver Block** | Visual Inspection | IS 15658: 2006 (RA 2011) | Qualitative |
| | | Dimension: Area- Plan, Wearing Face, Thickness of wearing layer, Squareness | | 40 mm to 500 mm |
| | | Water Absorption | | 0.1 % to 10 % |
| | | Compressive Strength | | 20 $N/mm^2$ to 100 $N/mm^2$ |
| | | Flexural Strength | | 2 $N/mm^2$ to 15 $N/mm^2$ |
| | | Abrasion Test(Loss in volume) | | (1000 $mm^3$ to 35000 $mm^3$)/ 5000 $mm^2$ |
| | | Freeze-Thaw Durability | | Qualitative |
| | | Tensile Splitting Strength | | 2 $N/mm^2$ to 30 $N/mm^2$ |
| **13.** | **Concrete Tiles** | Dimensions | IS 1237: 2012<br>IS 13801: 2013<br>IS 10646: 1991 (RA 2009)<br>IS 8968: 1978 (RA 2012) | 10 mm to 300 mm |
| | | Flatness | | 0.038 mm to 5 mm |
| | | Perpendicularity | | 0.019 % to 2 % |
| | | Straightness | | 0.019 % to 1.5 % |
| | | Water Absorption | | 1 % to 15 % |
| | | Wet Transverse Strength | | 1 $N/mm^2$ to 10 $N/mm^2$ |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Concrete Tiles** | Resistance to wear | IS 1237: 2012 | 0.1 mm to 5 mm |
| **14.** | **Ceramic Tiles** | Dimensions | IS 13630 (Part 1): 2006 (RA 2011) | 5 mm to 450 mm |
| | | Water Absorption | IS 13630 (Part 2): 2006 (RA 2011) | 1 % to 15 % |
| | | Linear Thermal Expansion | IS 13630 (Part 4): 2006 (RA 2011) | 0.1 mm to 10 mm |
| | | Resistance to Thermal Shock | IS 13630 (Part 5): 2006 (RA 2011) | Qualitative |
| | | Modulus of Rupture & Breaking Strength | IS 13630 (Part 6): 2006 (RA 2011) | 0.1 $N/mm^2$ to 60 $N/mm^2$ |
| | | Chemical Resistance | IS 13630 (Part 7 & 8): 2006 (RA 2011) | Qualitative |
| | | Crazing Resistance | IS 13630 (Part 9 & 11): 2006 (RA 2011) | Qualitative |
| | | Scratch Hardness of Surface According to MOHs | IS 13630 (Part 13): 2006 (RA 2011) | 1 to 10 |
| **15.** | **Thermoplastic Road Marking Material** | Binder Content | BS 3262 (Part 1): 1989 | 0.5 % to 80 % |
| | | Glass bead Content | | 0.5 % to 80 % |
| | | Softening Point | | 50 °C to 80 °C |
| | | Grading Constituent | BS 812 (Part 103) | 75 micron to 300 micron |
| | | Free Flow test | MORTH Section 803 | Qualitative |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| **16.** | **Natural Building Stones** | Dimensions | IS 1130: 1969 (RA 2008) | 2 mm to 3000 mm |
| | | Hardness | IS 13630 (Part 13): 2006 (RA 2011) | 1 to 10 |
| | | Specific Gravity/Density | IS 1122: 1974 (RA 2008)<br>IS 1124: 1974 (RA 2008) | 1 to 4.0 |
| | | Water Absorption | IS 1124: 1974 (RA 2008) | 0.1 % to 10 % |
| | | Compressive strength | IS 1121 (Part 1): 2013 | 0 to 1500 $kg/cm^2$ |
| | | Point Load Strength | IS 9143: 1979 (RA 2010) | 5 $kg/cm^2$ to 800 $kg/cm^2$ |
| | | Transverse Strength | IS 1121 (Part 2): 2013 | 1 MPa to 35 MPa |
| **II.** | **WOOD & WOOD PRODUCTS** | | | |
| **1.** | **Plywood** | Dimensions | IS 303: 1989<br>IS 4990: 2011<br>IS 710: 2010 | 5 mm to 3000 mm |
| | | Moisture | IS 1734 (Part 1): 1983 (RA 2013) | 0.1 % to 25 % |
| | | Glue Shear Strength | IS 1734 (Part 4): 1983 (RA 2013) | 500 N to 3000 N |
| | | Adhesive of Plies | IS 1734 (Part 5): 1983 (RA 2013) | Qualitative |
| | | Water Resistance | IS 1734 (Part 4): 1983 (RA 2013) | Qualitative |
| | | Tensile Strength | IS 1734 (Part 9): 1983 (RA 2013) | 10 $N/mm^2$ to 100 $N/mm^2$ |
| **III.** | **SOIL & ROCK** | | | |
| **1.** | **Soil** | Grain Size Analysis | IS 2720 (Part 4): 1985 (RA 2010) | 0.075 mm to 2.36mm |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Soil** | Moisture content | IS 2720 (Part 2): 1973 (RA 2010) | 0.5 % to 35 % |
| | | Specific Gravity | IS 2720 (Part 3): 1980 (RA 2011) | 1 to 3 |
| | | Free Swell Index | IS 2720 (Part 40): 1977 (RA 2011) | 0.1 % to 60 % |
| | | Liquid Limit<br>Plastic Limit | IS 2720 (Part 5): 1985 (RA 2010) | 20 % to 80 %<br>10 % to 30 % |
| | | Shrinkage Limit | IS 2720 (Part 6): 1972 (RA 2011) | 5 % to 40 % |
| | | CBR Value | IS 2720 (Part 16): 1987 (RA 2011) | 1 % to 60 % |
| | | Heavy compaction | IS 2720 (Part 8): 1983 (RA 2010) | MDD 1 g/cc to 3 g/cc<br>OMC 1 % to 20 % |
| | | Light compaction | IS 2720 (Part 7): 1980 (RA 2011) | MDD 1 g/cc to 3 g/cc<br>OMC 1 % to 20 % |
| | | Permeability Test | IS 2720 (Part 17): 1986 (RA 2011) | $10^{-3}$ cm/s to $10^{-8}$ cm/s |
| | | Swelling Pressure Test | IS 2720 (Part 41): 1977 (RA 2011) | 0.01 $N/mm^2$ to 1 $N/mm^2$ |
| | | Direct Shear Test | IS 2720 (Part 13): 1986 (RA 2011) | C: 0 to 1 $kg/cm^2$<br>$\phi$ 5° to 50° |
| | | Triaxial Shear Test | IS 2720 (Part 12): 1981 (RA 2011) | C: 0 to 4 $kg/cm^2$<br>$\phi$ Upto 25° |
| | | Consolidation | IS 2720 (Part 15 ): 1965 (RA 2011) | 1 $cm^2/s$ to 30 x $10^{-4}$ $cm^2/s$ |
| | | UCS of soil | IS 2720 (Part 10): 1991 (RA 2010) | 0 to 500 $kN/m^2$ |
| | | Density | IS 2720 (Part 14): 1983 (RA 2010) | 0.5 g/cc to 3 g/cc |

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|---|---|---|---|---|
| **IV .** | **MECHANICAL PROPERTIES OF METALS** | | | |
| **1.** | **Ferrous & Non Ferrous Materials** | Tensile Strength | IS 1608: 2005 (RA 2010)<br>ASTM A 370: 2016<br>ASME Section IX: 2010<br>EN 895: 1995<br>API 1104: 2005 | 50 N/mm² to 2500 N/mm² |
| | | Yield Strength/ Yield Point/ 0.2% Proof Stress | IS 1608: 2005 (RA 2010)<br>ASTM A 370: 2016<br>EN 895: 1995<br>API 1104: 2005 | 50 N/mm² to 2500 N/mm² |
| | | Elongation | IS 1608: 2005 (RA 2010)<br>ASTM A 370: 2016<br>EN 895: 1995<br>API 1104: 2005 | 0.5 % to 80 % |
| | | Reduction in area | IS 1608: 2005 (RA 2010) | 0.5 % to 80 % |
| | | Bend Test | IS 1599: 2012<br>ASTM A 370: 2016<br>ASME Section IX: 2010<br>EN 910: 1996 | Qualitative<br>(Mandrel Diameter:<br>7 mm to 280 mm) |
| | | Rockwell Hardness | IS 1586 (Part 1): 2012 | 20 HRC to 70 HRC<br>30 HRBW to 100 HRBW |
| | | Brinell Hardness | IS 1500: 2005 (RA 2010)<br>ASTM A 370: 2016 | 95 HBW to 550 HBW<br>(2.5 / 187.5) |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Ferrous & Non Ferrous Materials** | Vickers Hardness | IS 1501: 2002 (RA 2007)<br>EN 1043-1: 1996 | 20 $HV_5$ to 1500 $HV_5$<br>50 $HV_{10}$ to 1000 $HV_{10}$<br>100 $HV_{20}$ to 1000 $HV_{20}$<br>130 $HV_{30}$ to 1000,$HV_{30}$<br>190 $HV_{50}$ to 1000 $HV_{50}$ |
| | | Impact Charpy "V" Notch | IS 1757: 1988 (RA 2009) | 2 J to 300 J<br>(Temp:(-)20 ºC to Ambient) |
| | | Charpy "U" NOTCH | IS 1499: 1977 (RA 2009) | 2 J to 300 J |
| | | Izod | IS 1598: 1977 (RA 2009) | 2 J to 168.5 J |
| | | Proof load | IS 1367 (Part 3): 2002 (RA 2007) | 50 N to 900000 N |
| | | Flattening test | IS 2328: 2005 (RA 2010)<br>ISO 8492: 2013 | Qualitative<br>(OD Upto 600 mm) |
| | | Cupping test | IS 10175 (Part 1): 1993 (RA 2009)<br>ISO 8490: 1986 | Qualitative<br>(Thickness Upto 2 mm) |
| | | Nick Break Test | API 1104: 1999<br>ASME Section IX: 2010<br>IS 5504: 1997 (RA 2009) Annx A | Qualitative |
| | | Tube Drift Expanding Test | IS 2335: 2005 (RA 2010)<br>ISO 8493: 1998 | Qualitative<br>(Upto 150 mm) |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Ferrous & Non Ferrous Materials** | Dimension | IS 1929: 1982, (RA 2011)<br>IS 10102: 1982 (RA 2010)<br>IS 808: 1989 (RA 2009)<br>IS 1363 (Part 3): 2002 (RA 2007)<br>IS 1730: 1989 (RA 2009) | 0.01 mm to 1000 mm |
| | | Macro examination | IS 11371: 1985 (RA 2007)<br>EN 1321: 1997 | Qualitative |
| | | Sulphur Print | IS 12037: 1987 (RA 2007) | Qualitative |
| | | Salt spray Test | IS 9844: 1981 (RA 2010) | Qualitative |
| **2.** | **High Strength Deformed Steel Bar** | Weight | IS 1786: 2008 (RA 2013) | 0.05 kg/m to 50 kg/m |
| | | Re-bend Test | | Qualitative |
| | | Pull out Test | IS 2770 (Part 1): 1967 (RA 2012) | 50 N/mm² to 2500 N/mm² |
| **3.** | **Ply Strand Wire/Indented Wire/Pre-stressed Wire/Steel Wire/ HDS Wire/HTS Wire/Wire Ropes, 3 ply strand 6003/6006** | Breaking Load | IS 1608: 2005 (RA 2010) | 20 kN to 800 KN |
| | | Mass of Strand | IS 14268: 1995 (RA 2013) | 300 kg/km to 1200 kg/km |
| | | Elongation | | 0.5 % to 80 % |
| | | Dimension | | 0.1 mm to 200 mm |
| | | Bend /Reverse Bend | IS 1716: 1985 (RA 2010)<br>IS 1403 (Part 1): 1993 (RA 2009) | Qualitative<br>(Diameter:0.3 mm to 10 mm<br>Thickness: 0.3 mm to 3 mm) |
| | | Lay Length | IS 14268: 1995 (RA 2013) | 100 mm to 300 mm |

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|---|---|---|---|---|
| **V .** | **PLASTICS AND POLYMERS** | | | |
| **1.** | **Plastics** | Melt Flow Index<br>Melt Flow Rate | IS 2530: 1963 (RA 2008)<br>IS 7328: 1992 (RA 2008)<br>IS 13360 (Part 4/Sec I): 2000 (RA 2008) | (0.1 g to 50 g)/10 minute |
| | | Carbon Black Content | IS 2530: 1963 (RA 2008) | 0.1 % to 10 % |
| | | Density | IS 7328: 1992 (RA 2008)<br>IS 3400 (Part 9): 2014<br>IS 12235 (Part 14): 2004 (RA 2009)<br>IS 13360 (Part 3/Sec I): 1995 (RA 2008) | 100 kg/$m^3$ to 3000 kg/$m^3$<br>0.01 to 3.0 |
| | | Hydraulic Characteristics<br>Hydrostatic Characteristics<br>Hydraulic Characteristics<br>Hydrostatic Pressure<br>Hydrostatic Pressure<br>Internal Hydrostatic Pressure | IS 4984: 1995 (RA 2008) Annx B<br>IS 4985: 2000 (RA 2010)<br>IS 12786: 1989 (RA 2009)<br>IS 13487: 1992 (RA 2009)<br>IS 13488: 2008 (RA 2009)<br>IS 12235 (Part 8/Sec I): 2004 (RA 2009) | 0.01 bar to 99.99 bar |
| | | Brimful Capacity | IS 2798: 1998 (RA 2009) | 100 ml to 25 l |
| | | Transparency | IS 15410: 2003 (RA 2009)<br>IS 14625: 2015 | 1 % to 100 % |
| | | Opacity | IS 12235 (Part 3): 2004 (RA 2009)<br>IS 7834 (Part 1): 1987 (RA 2008) | 0 to 100 % |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Plastics** | Vicat Softening Temperature | IS 12235 (Part 2): 2004 (RA 2009) | 60 °C to 100 °C |
| | | Resistance to external Blow | IS 12235 (Part 9): 2004 (RA 2009)<br>IS 4985: 2000 (RA 2010) | 0 to 10 % |
| | | Thickness of Film | IS 2508: 1984 (RA 2008) | 0.001 mm to 1 mm |
| | | Longitudinal Reversion | IS 4984: 2000 (RA 2010) Annx C<br>IS 4985: 2000 (RA 2010)<br>IS 12235 (Part 5/Sec I): 2004 (RA 2009) | (-)10 % to (+)10 % |
| | | Tensile Strength at Break<br>Tensile Strength | IS 2508: 1984 (RA 2008)<br>IS 2530: 1963 (RA 2008)<br>IS 1969: 1985 (RA 2010) | 5 MPa to 100 MPa |
| | | Elongation At break | IS 3400 (Part 1): 2012<br>IS 12235 (Part 13): 2004 (RA 2009) | 20 % to 1000 % |
| | | Seam Strength | IS 9030: 1979 (RA 2008) | 10 kgf/cm to 1000 kgf/cm |
| | | Impact Resistance of Film | IS 2508: 1984 (RA 2008) | Qualitative |
| | | Drop Impact Test<br>Drop test | IS 2798: 1998 (RA 2009)<br>IS 14625: 2015 (RA 2009)<br>IS 14735: 1999 (RA 2010)<br>IS 15609: 2005 (RA 2010) Annx G | Qualitative |
| | | Resistance To Sulphuric Acid | IS 12235 (Part 7): 2004 (RA 2009) | 0.05 g to 5 g |
| | | Hardness | ASTM D 2240: 2015 | 10 Shore D to 100 Shore D<br>1 Shore A to 100 Shore A |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Plastics** | Threading of Pipes | IS 12818: 2010 | Qualitative |
| | | Dimensions | IS 12235 (Part 1): 2004 (RA 2009)<br>IS 4984: 2000 (RA 2010)<br>IS 2798: 1998 (RA 2009)<br>IS 12786: 1989 (RA 2009) | 0.01 mm to 15000 mm |
| | | Change In Volume (Water Immersion) | IS 3400 (Part 6): 2012 | 0 to 50 % |
| | | Water Absorption | IS 5382: 1985 (RA 2008) | 0 to 50 % |
| | | Tear Resistance | IS 13360 (Part 5/Sec XXIII): 1996 (RA 2008) | 1 N to 50 N |
| | | Overall Migration | IS 9845: 1998 (RA 2010) | 1 mg/l to 100 mg/l<br>1 mg/dm$^2$ to 100 mg/dm$^2$ |
| | | Stress Relief Test | IS 12235 (Part 6): 2004 (RA 2009) | Qualitative |
| **VI.** | **RUBBER AND RUBBER PRODUCTS** | | | |
| **1.** | **Rubber** | Melt Flow Index<br>Melt Flow Rate | IS 2530: 1963 (RA 2008)<br>IS 7328: 1992 (RA 2008)<br>IS 13360 (Part 4/Sec I): 2000 (RA 2008) | (0.1 g to 50 g)/10 minute |
| | | Carbon Black Content | IS 2530: 1963 (RA 2008) | 0.1 % to 10 % |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Rubber** | Density | IS 7328: 1992 (RA 2008)<br>IS 3400 (Part 9): 2014<br>IS 12235 (Part 14): 2004 (RA 2009)<br>IS 13360 (Part 3/Sec I): 1995 (RA 2008) | 100 kg/$m^3$ to 3000 kg/$m^3$<br>0.01 to 3.0 |
| | | Hydraulic Characteristics<br>Hydrostatic Characteristics<br>Hydraulic Characteristics<br>Hydrostatic Pressure<br>Hydrostatic Pressure<br>Internal Hydrostatic Pressure | IS 4984: 1995 (RA 2008) Annx B<br>IS 4985: 2000 (RA 2010)<br>IS 12786: 1989 (RA 2009)<br>IS 13487: 1992 (RA 2009)<br>IS 13488: 2008 (RA 2009)<br>IS 12235 (Part 8/Sec I): 2004 (RA 2009) | 0.01 bar to 99.99 bar |
| | | Brimful Capacity | IS 2798: 1998 (RA 2009) | 100 ml to 25 l |
| | | Transparency | IS 15410: 2003 (RA 2009)<br>IS 14625: 2015 | 1 % to 100 % |
| | | Opacity | IS 12235 (Part 3): 2004 (RA 2009)<br>IS 7834 (Part 1): 1987 (RA 2008) | 0 to 100 % |
| | | Vicat Softening Temperature | IS 12235 (Part 2): 2004 (RA 2009) | 60 °C to 100 °C |
| | | Resistance to external Blow | IS 12235 (Part 9): 2004 (RA 2009)<br>IS 4985: 2000 (RA 2010) | 0 to 10 % |
| | | Thickness of Film | IS 2508: 1984 (RA 2008) | 0.001 mm to 1 mm |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Rubber** | Longitudinal Reversion | IS 4984: 2000 (RA 2010) Annx C<br>IS 4985: 2000 (RA 2010)<br>IS 12235 (Part 5/Sec I): 2004 (RA 2009) | (-)10 % to (+)10 % |
| | | Tensile Strength at Break<br>Tensile Strength | IS 2508: 1984 (RA 2008)<br>IS 2530: 1963 (RA 2008)<br>IS 1969: 1985 (RA 2010) | 5 MPa to 100 MPa |
| | | Elongation At break | IS 3400 (Part 1): 2012<br>IS 12235 (Part 13): 2004 (RA 2009) | 20 % to 1000 % |
| | | Seam Strength | IS 9030: 1979 (RA 2008) | 10 kgf/cm to 1000 kgf/cm |
| | | Impact Resistance of Film | IS 2508: 1984 (RA 2008) | Qualitative |
| | | Drop Impact Test<br>Drop test | IS 2798: 1998 (RA 2009)<br>IS 14625: 2015 (RA 2009)<br>IS 14735: 1999 (RA 2010)<br>IS 15609: 2005 (RA 2010) Annx G | Qualitative |
| | | Resistance To Sulphuric Acid | IS 12235 (Part 7): 2004 (RA 2009) | 0.05 g to 5 g |
| | | Hardness | ASTM D 2240: 2015 | 10 Shore D to 100 Shore D<br>1 Shore A to 100 Shore A |
| | | Threading of Pipes | IS 12818: 2010 | Qualitative |
| | | Dimensions | IS 12235 (Part 1): 2004 (RA 2009)<br>IS 4984: 2000 (RA 2010)<br>IS 2798: 1998 (RA 2009)<br>IS 12786: 1989 (RA 2009) | 0.01 mm to 15000 mm |

| S. No. | Product / Material of Test | Specific Test Performed | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection |
|---|---|---|---|---|
| | **Rubber** | Change In Volume (Water Immersion) | IS 3400 (Part 6): 2012 | 0 to 50 % |
| | | Water Absorption | IS 5382: 1985 (RA 2008) | 0 to 50 % |
| | | Tear Resistance | IS 13360 (Part 5/Sec XXIII): 1996 (RA 2008) | 1 N to 50 N |
| | | Overall Migration | IS 9845: 1998 (RA 2010) | 1 mg/l to 100 mg/l<br>1 $mg/dm^2$ to 100 $mg/dm^2$ |
| | | Stress Relief Test | IS 12235 (Part 6): 2004 (RA 2009) | Qualitative |

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