

**Laboratory**                      **Bhumi Research Centre (Civil Engineering Testing Laboratory),**  
**2/1362, 'Bhumi House', Sagrampura, Ring Road, Surat, Gujarat**  
**Accreditation Standard**    **ISO/IEC 17025: 2005**  
**Certificate Number**            **TC-7217 (in lieu of T-2959, T-3965)**                      **Page 1 of 8**  
**Validity**                              **19.05.2018 to 18.05.2020**                      **Last Amended on --**

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

**MECHANICAL TESTING**

| I. | SOIL AND ROCK |                                |   |                                     |
|----|---------------|--------------------------------|---|-------------------------------------|
| 1. | Soil          | Grain size Analysis            | IS 2720 (Part 4)<br>Rev-2                     | 75 µm to 10 mm                      |
|    |               | Hydrometer Analysis            | IS 2720 (Part 4)<br>Rev - 2, (Clause No. 5.2) | 1 µm to 75 µm                       |
|    |               | Liquid Limit                   | IS 2720 (Part 5)<br>Rev-2                     | Upto 50%                            |
|    |               | Plastic Limit                  | IS 2720 (Part 5)<br>Rev-2                     | Upto 50%                            |
|    |               | Plasticity Index               | IS 2720 (Part 5)<br>Rev-2,                    | Upto 50%                            |
|    |               | Free Swell Index               | IS 2720 (Part 40)                             | 1% to 200%                          |
|    |               | Specific Gravity               | IS 2720 (Part-3/Sec-1 & 2)<br>Rev - 1         | 2.00 to 2.90                        |
|    |               | Shrinkage Limit                | IS 2720 (Part 6).<br>Rev – 1                  | 1 % to 80%                          |
|    |               | Light Compaction<br>MDD<br>OMC | IS 2720 (Part 7)<br>Rev-2                     | 1.0 g/cc to 3.00 g/cc<br>1% to 30 % |
|    |               | Heavy Compaction<br>MDD<br>OMC | IS 2720 (Part 8)<br>Rev - 2                   | 1.0 g/cc to 3.00 g/cc<br>1% to 30 % |
|    |               | CBR                            | IS 2720 (Part 16)<br>Rev - 2                  | 1% to 50%                           |

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|------------|--|--|---|---|
|            |  | Direct Shear<br>C<br>Ø   | IS 2720 (Part 13),<br>Rev - 2                               | Upto 2.00 kg/cm <sup>2</sup><br>Upto 40°  |
|            |  | Unconfined<br>Compression<br>(without pore pressure)               | IS 2720 (Part 10)<br>Rev - 2                                | 0.2 kg/cm <sup>2</sup> to 4 kg/cm <sup>2</sup>                                  |
|            |  | Triaxial Shear (UU)<br>C<br>Ø<br>(without pore pressure)           | IS 2720 (Part 11)<br>Rev - 1                                | Upto 2.00 kg/cm <sup>2</sup><br>Upto 40°  |
|            |  | Consolidation Test<br>Cc<br>Pc<br>Co-efficient of Volume<br>Change | IS 2720 (Part 15)<br>Rev - 1                                | 0.05 to 0.50<br>0.50 to 3.0 kg/cm <sup>2</sup><br>Upto 0.10 cm <sup>2</sup> /kg |
|            |  | Moisture Content   | IS 2720 (Part 2),<br>Rev - 2                                | 0.2 % to 50%  |
|            |  | Swell Pressure   | IS 2720 (Part-41)   | Upto 3.50 kg/cm <sup>2</sup>  |
| <b>II.</b> | <b>BUILDING MATERIALS</b>                    |  |   |   |
| <b>1.</b>  | <b>Bricks<br/>(Burnt Clay / Fly<br/>Ash)</b> | Dimension<br>Width<br>Length<br>Height                             | IS 1077<br>IS 12894   | 1500 mm to 3000 mm<br>3000 mm to 6000 mm<br>1000 mm to 2000 mm                  |
|            |  | Water Absorption   | IS 3495 (Part 2),<br>Rev - 3                                | 1 % to 40 %   |
|            |  | Compressive Strength   | IS 3495 (Part 1),<br>Rev - 3                                | 1 N/mm <sup>2</sup> to 35 N/mm <sup>2</sup>                                     |
|            |  | Efflorescence  | IS 3495 (Part 3),<br>Rev - 3                                | Qualitative   |

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|-----|----------------------------|--|---|--|
| 2.  | Fine Aggregate             | Sieve Analysis                               | IS 2386 (Part 1)  | 75 µm to 10 mm                                   |
|     |                            | Specific Gravity                             | IS 2386 (Part 3)  | 1.00 to 3.00                                     |
|     |                            | Water Absorption                             | IS 2386 (Part 3)  | 0.1 % to 10.0 %                                  |
|     |                            | Bulk Density                                 | IS 2386 (Part 3)  | 1000 kg/m <sup>3</sup> to 3000 kg/m <sup>3</sup> |
|     |                            | Finer than 75micron                          | IS 2386 (Part 1)  | Upto 50%   |
|     |                            | Soundness by Na <sub>2</sub> SO <sub>4</sub> | IS 2386 (Part 5)  | Up to 20%  |
|     |                            | Soundness by MgSO <sub>4</sub>               | IS 2386 (Part 5)  | Upto 20%   |
| 3.  | Concrete Cubes / Core      | Compressive Strength                         | IS 516  | 1 N/mm <sup>2</sup> to 80 N/mm <sup>2</sup>      |
|     |                            | Slump Cone Test)                             | IS 1199   | Upto 250 mm                                      |
| 4.  | Concrete / Paver Block     | Compressive Strength                         | IS 15658 (Annex-D)  | 1 to 75 N/mm <sup>2</sup>                        |
|     |                            | Water Absorption                             | IS 15658 (Annex-C)  | Upto 15.00 %                                     |
|     |                            | Cross Sectional Area                         | IS 15658 (Annex-C)  | 1 mm <sup>2</sup> to 90000 mm <sup>2</sup>       |
| 5.  | Coarse Aggregate           | Sieve Analysis                               | IS 2386 (Part 1)  | 4.75 mm to 100 mm                                |
|     |                            | Specific Gravity                             | IS 2386 (Part 3)  | 1.00 to 3.00                                     |
|     |                            | Water Absorption                             | IS 2386 (Part 3)  | 0.1 % to 10.0 %                                  |
|     |                            | Flakiness Index                              | IS 2386 (Part 1)  | 1 % to 50 %                                      |
|     |                            | Elongation Index                             | IS 2386 (Part 1)  | 1 % to 50 %                                      |

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|-----|----------------------------|-------------------------|---|--|
|     |                            | Impact Value            | IS 2386 (Part 4)  | 1 % to 50 %                            |

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|-----|--|---|---|--|
|     |  | Crushing Value                                  | IS 2386 (Part 4)  | 1 % to 50 %                                      |
|     |  | 10% fines Value                                 | IS 2386 (Part 4)  | 1 kN to 400 kN                                   |
|     |  | Abrasion Value                                  | IS 2386 (Part 4)  | 1 % to 50 %                                      |
|     |  | Bulk Density                                    | IS 2386 (Part 3)  | 1000 kg/m <sup>3</sup> to 3000 kg/m <sup>3</sup> |
|     |  | Soundness by Na <sub>2</sub> SO <sub>4</sub>    | IS 2386 (Part 5)  | Upto 20%   |
|     |  | Soundness by MgSO <sub>4</sub>                  | IS 2386 (Part 5)  | Upto 20%   |
| 6.  | <b>Cement (OPC, PPC, SRC, PSC)</b>                   | Consistency                                     | IS 4031 (Part 4)  | 1 % to 40 %                                      |
|     |  | Initial Setting Time                            | IS 4031 (Part 5)  | 30 min to 450 min                                |
|     |  | Final Setting Time                              | IS 4031 (Part 5)  | 60 min to 600 min                                |
|     |  | Fineness by Blaine Air Permeability             | IS 4031 (Part 2)  | 200 m <sup>2</sup> /kg to 400 m <sup>2</sup> /kg |
|     |  | Soundness by Le-Chatelier                       | IS 4031 (Part 3)  | 0.5 mm to 10 mm                                  |
|     |  | Compressive Strength (At 72 Hrs,168 Hrs,672Hrs) | IS 4031 (Part 6)  | 1 N/mm <sup>2</sup> to 80 N/mm <sup>2</sup>      |
|     |  | Density   | IS 4031 (Part-11)   | 1 g/cc to 3.50 g/cc                              |
| 7.  | <b>Autoclaved Cellular Aerated Concrete Products</b> | Dimensions<br>Length<br>Height<br>Thickness     | IS: 2185 (Part-III)   | 40 mm to 1000 mm                                 |
|     |  | Bulk Density                                    | IS: 6441 (Part-I)   | 400 to 1000 kg/m <sup>3</sup>                    |

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|   |   | Compressive Strength      | IS: 6441 (Part-5)   | Upto 8 N/mm <sup>2</sup>   |
|   |   | Drying Shrinkage          | IS 6441 (Part 2)  | 0.0 to 2%  |
| <b>III. MECHANICAL PROPERTIES OF METALS</b> |   |                           |   |  |
| <b>1.</b>                                   | <b>Reinforcement &amp; Structural Steel</b> | Ultimate Tensile Strength | IS 1608   | 50 N/mm <sup>2</sup> to 900 N/mm <sup>2</sup><br>(06 to 600 kN)                              |
|   |   | Yield Stress              |   | 50 N/mm <sup>2</sup> to 650 N/mm <sup>2</sup><br>(06 to 600 kN)                              |
|   |   | Elongation                |   | 8 % to 50%<br>(1 to 300 mm)  |
|   |   | Bend Test                 | IS 1599   | Qualitative<br>(Mandrel Dia:<br>16, 20, 24, 32, 40, 50, 64,<br>80, 100, 140, 160, 200<br>mm) |
|   |   | Re Bend Test              | IS 1786   | Qualitative<br>(Mandrel Dia:<br>32, 40, 50, 64, 80, 100,<br>140, 160, 240, 280 mm)           |
|   |   | Weight/meter              |   | 0.1 kg/m to 8 kg/m<br>(1g to 6kg )   |

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**Sachin Tomar**  
Convenor

**N. Venkateswaran**  
Program Director

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| I.  | <b>SOIL &amp; ROCK</b>     |                                |   |  |
| 1.  | <b>Soil</b>                | Field Density (By Core Cutter) | IS 2720: (Part-29)  | 1.00 g/cc to 2.50 g/cc                 |
|     |                            | FDD (By Water Replacement)     | IS 2720: (Part-33)  | 1.00 g/cc to 2.50 g/cc                 |
|     |                            | FDD (By Sand Replacement)      | IS 2720: (Part-28)  | 1.00 g/cc to 2.50 g/cc                 |

**NON-DESTRUCTIVE TESTING**

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| <b>I. BUILDING MATERIALS – REINFORCED CONCRETE STRUCTURES</b> |                            |                           |   |  |
| <b>1.</b>   | <b>Building Materials</b>  |                           |   |  |
|   | <b>Reinforced Concrete</b> | Rebound Hammer            | IS 13311 (Part 2)   | 10 to 80 Rebound Number                |
|   |                            | Ultrasonic Pulse Velocity | IS 13311 (Part 1)   | 1.0 km/s to 5.5 km/s                   |