

# DIN EN ISO 8840:2024-09 (E)

## Refractory materials - Determination of bulk density of granular materials (grain density) (ISO 8840:2021)

---

| Contents  | Page      |
|---|-----------|
| European foreword.....  | 3         |
| Foreword.....   | 4         |
| <b>1 Scope</b> .....  | <b>5</b>  |
| <b>2 Normative references</b> .....   | <b>5</b>  |
| <b>3 Terms and definitions</b> .....  | <b>5</b>  |
| <b>4 Principle</b> .....  | <b>6</b>  |
| <b>5 Sampling</b> .....   | <b>6</b>  |
| <b>6 Preparation, number and test size of samples</b> .....   | <b>6</b>  |
| 6.1 Preparation of samples.....   | 6         |
| 6.2 Number of samples.....  | 6         |
| 6.3 Mass of test samples.....   | 6         |
| <b>7 Determination of mass of test sample</b> .....   | <b>6</b>  |
| <b>8 Determination of volume of test sample — Method 1: Mercury method with vacuum</b> .....  | <b>7</b>  |
| 8.1 Principle.....  | 7         |
| 8.2 Apparatus.....  | 8         |
| 8.3 Determination of mass of empty vacuum pycnometer.....   | 9         |
| 8.4 Determination of mass of pycnometer filled with mercury.....  | 10        |
| 8.5 Determination of mass of pycnometer containing test sample and filled with mercury ...  | 10        |
| 8.6 Calculation of volume of test sample.....   | 10        |
| <b>9 Determination of volume of test sample — Method 2: Arrested water absorption method</b> .....                                    | <b>11</b> |
| 9.1 Apparatus.....  | 11        |
| 9.2 Determination of volume of test sample.....   | 11        |
| 9.3 Calculation of results.....   | 12        |
| <b>10 Determination of bulk density of test sample — Method 3: Vacuum method with spin dryer option</b> .....                         | <b>12</b> |
| 10.1 Principle.....   | 12        |
| 10.2 Apparatus and materials.....   | 12        |
| 10.3 Procedure.....   | 13        |
| 10.3.1 Determination of the mass of dry test piece ( $m_1$ ).....   | 13        |
| 10.3.2 Soaking of the test sample.....  | 14        |
| 10.3.3 Determination of the apparent mass of the immersed test sample ( $m_5$ ) and the mass of the soaked test sample ( $m_3$ )..... | 14        |
| 10.4 Calculation of results.....  | 16        |
| 10.4.1 Calculation of the volume of the test sample ( $V_R$ ).....  | 16        |
| 10.4.2 Calculation of the bulk density of the test sample ( $\rho_R$ ).....   | 16        |
| 10.5 Precision and bias.....  | 16        |
| 10.5.1 Interlaboratory data.....  | 16        |
| 10.5.2 Precision.....   | 16        |
| 10.5.3 Bias.....  | 17        |
| <b>11 Test report</b> .....   | <b>17</b> |
| <b>Bibliography</b> .....   | <b>18</b> |