

# 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>