

# DIN EN ISO 18125:2017-08 (E)

## Solid biofuels - Determination of calorific value (ISO 18125:2017)

---

| Contents                |   | Page      |
|-------------------------|---|-----------|
| European foreword ..... |   | 4         |
| Foreword .....          |   | 5         |
| <b>1</b>                | <b>Scope</b> .....  | <b>6</b>  |
| <b>2</b>                | <b>Normative references</b> .....   | <b>6</b>  |
| <b>3</b>                | <b>Terms and definitions</b> .....  | <b>6</b>  |
| <b>4</b>                | <b>Principle</b> .....  | <b>7</b>  |
| 4.1                     | Gross calorific value .....   | 7         |
| 4.2                     | Net calorific value .....   | 8         |
| <b>5</b>                | <b>Reagents</b> .....   | <b>8</b>  |
| <b>6</b>                | <b>Apparatus</b> .....  | <b>9</b>  |
| <b>7</b>                | <b>Preparation of test sample</b> .....                                     | <b>12</b> |
| <b>8</b>                | <b>Calorimetric procedure</b> .....   | <b>13</b> |
| 8.1                     | General .....   | 13        |
| 8.2                     | Preparing the bomb for measurement .....                                    | 15        |
| 8.2.1                   | General procedure .....   | 15        |
| 8.2.2                   | Using combustion aid .....  | 15        |
| 8.3                     | Assembling the calorimeter .....  | 16        |
| 8.4                     | Combustion reaction and temperature measurements .....                      | 16        |
| 8.5                     | Analysis of products of combustion .....                                    | 17        |
| 8.6                     | Corrected temperature rise $\theta$ .....                                   | 17        |
| 8.6.1                   | Observed temperature rise .....   | 17        |
| 8.6.2                   | Isoperibol and static-jacket calorimeters .....                             | 17        |
| 8.6.3                   | Adiabatic calorimeters .....  | 19        |
| 8.6.4                   | Thermometer corrections .....   | 19        |
| 8.7                     | Reference temperature .....   | 19        |
| <b>9</b>                | <b>Calibration</b> .....  | <b>19</b> |
| 9.1                     | Principle .....   | 19        |
| 9.2                     | Calibrant .....   | 20        |
| 9.2.1                   | Certification conditions .....  | 20        |
| 9.2.2                   | Calibration conditions .....  | 20        |
| 9.3                     | Valid working range of the effective heat capacity $\epsilon$ .....         | 20        |
| 9.4                     | Ancillary contributions .....   | 21        |
| 9.5                     | Calibration procedure .....   | 21        |
| 9.6                     | Calculation of effective heat capacity for the individual experiment .....  | 22        |
| 9.6.1                   | Constant mass-of-calorimeter-water basis .....                              | 22        |
| 9.6.2                   | Constant total-calorimeter-mass basis .....                                 | 22        |
| 9.7                     | Precision of the mean value of the effective heat capacity $\epsilon$ ..... | 23        |
| 9.7.1                   | Constant value of $\epsilon$ .....  | 23        |
| 9.7.2                   | $\epsilon$ as a function of the observed temperature rise .....             | 24        |
| 9.8                     | Redetermination of the effective heat capacity .....                        | 24        |

|   |  |           |
|---|--|-----------|
| <b>10</b>   | <b>Gross calorific value</b> .....                                   | <b>24</b> |
| 10.1  | General.....   | 24        |
| 10.2  | Combustion.....  | 25        |
| 10.3  | Calculation of gross calorific value.....                            | 25        |
| 10.3.1  | General.....   | 25        |
| 10.3.2  | Constant mass-of-calorimeter-water basis.....                        | 25        |
| 10.3.3  | Constant total-calorimeter-mass basis.....                           | 27        |
| 10.3.4  | $\epsilon$ as a function of the observed temperature rise.....       | 28        |
| 10.4  | Expression of results.....   | 28        |
| 10.5  | Calculation to other bases.....                                      | 28        |
| <b>11</b>   | <b>Performance characteristics</b> .....                             | <b>29</b> |
| 11.1  | Repeatability limit.....   | 29        |
| 11.2  | Reproducibility limit.....   | 29        |
| <b>12</b>   | <b>Calculation of net calorific value at constant pressure</b> ..... | <b>29</b> |
| 12.1  | General.....   | 29        |
| 12.2  | Calculations.....  | 29        |
| <b>13</b>   | <b>Test report</b> .....   | <b>30</b> |
| <b>Annex A (normative) Adiabatic bomb calorimeters</b> .....  |  | <b>31</b> |
| <b>Annex B (normative) Isoperibol and static-jacket bomb calorimeters</b> .....   |  | <b>35</b> |
| <b>Annex C (normative) Automated bomb calorimeters</b> .....  |  | <b>41</b> |
| <b>Annex D (informative) Checklists for the design and procedures of combustion experiments</b> .....   |  | <b>44</b> |
| <b>Annex E (informative) Examples to illustrate the main calculations used in this document when an automated bomb calorimeter is used for determinations</b> ..... |  | <b>49</b> |
| <b>Annex F (informative) List of symbols used in this document</b> .....  |  | <b>53</b> |
| <b>Annex G (informative) Default values of most used solid biofuels for the calculations of calorific values</b> .....  |  | <b>56</b> |
| <b>Annex H (informative) Flow chart for a routine calorific value determination</b> .....   |  | <b>57</b> |
| <b>Bibliography</b> .....   |  | <b>58</b> |
| <b>Index</b> .....  |  | <b>59</b> |