

# DIN EN ISO 12183:2019-12 (E)

## Nuclear fuel technology - Controlled-potential coulometric assay of plutonium (ISO 12183:2016)

---

| <b>Contents</b>  | <b>Page</b> |
|--|-------------|
| <b>European foreword</b> .....   | <b>3</b>    |
| <b>Foreword</b> .....  | <b>4</b>    |
| <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>5</b>    |
| <b>5 Reagents</b> .....  | <b>6</b>    |
| <b>6 Apparatus</b> .....   | <b>6</b>    |
| <b>7 Procedure</b> .....   | <b>12</b>   |
| 7.1 Plutonium determination .....  | 12          |
| 7.1.1 Weighing the test sample, with an uncertainty of $\pm 0,01$ %, $K = 1$ .....   | 12          |
| 7.1.2 Preparation of the test sample .....   | 13          |
| 7.1.3 Electrode pre-treatment .....  | 13          |
| 7.1.4 Electrical calibration of the current integration system .....                 | 14          |
| 7.1.5 Formal potential determination .....   | 15          |
| 7.1.6 Coulometric blank determination .....  | 16          |
| 7.1.7 Plutonium measurement .....  | 17          |
| 7.2 Analysis of subsequent test samples .....  | 17          |
| <b>8 Expression of results</b> .....   | <b>18</b>   |
| 8.1 Calculation of the electrical calibration factor .....                           | 18          |
| 8.2 Calculation of the blank .....   | 18          |
| 8.3 Fraction of electrolysed plutonium .....   | 19          |
| 8.4 Plutonium content .....  | 20          |
| 8.5 Quality control .....  | 20          |
| <b>9 Characteristics of the method</b> .....   | <b>20</b>   |
| 9.1 Repeatability .....  | 20          |
| 9.2 Confidence interval .....  | 21          |
| 9.3 Analysis time .....  | 21          |
| <b>10 Interferences</b> .....  | <b>21</b>   |
| <b>11 Procedure variations and optimization</b> .....                                | <b>25</b>   |
| 11.1 Accountability measurements and reference material preparation .....            | 25          |
| 11.2 Process control measurements .....  | 25          |
| 11.3 Measurement cell design .....   | 25          |
| 11.4 Electrolyte and electrode options .....   | 26          |
| 11.5 Test sample size .....  | 26          |
| 11.6 Background current corrections .....  | 26          |
| 11.7 Correction for iron .....   | 27          |
| 11.8 Control-potential adjustment .....  | 28          |
| 11.9 Calibration methodologies .....   | 28          |
| <b>Annex A (normative) Purification by anion-exchange separation</b> .....           | <b>29</b>   |
| <b>Annex B (normative) Determination of formal potential, <math>E_0</math></b> ..... | <b>31</b>   |
| <b>Bibliography</b> .....  | <b>32</b>   |