

# DIN EN ISO 19036:2020-05 (E)

## Microbiology of the food chain - Estimation of measurement uncertainty for quantitative determinations (ISO 19036:2019)

---

<b>Contents</b>		<b>Page</b>
European foreword .....		4
Foreword .....		5
Introduction .....		6
<b>1</b>	<b>Scope .....</b>	<b>7</b>
<b>2</b>	<b>Normative references .....</b>	<b>7</b>
<b>3</b>	<b>Terms, definitions and symbols .....</b>	<b>7</b>
<b>3.1</b>	<b>Terms and definitions .....</b>	<b>7</b>
<b>3.2</b>	<b>Symbols .....</b>	<b>10</b>
<b>4</b>	<b>General considerations .....</b>	<b>11</b>
<b>5</b>	<b>Technical uncertainty .....</b>	<b>12</b>
<b>5.1</b>	<b>Identification of main sources of uncertainty .....</b>	<b>12</b>
<b>5.1.1</b>	<b>General aspects .....</b>	<b>12</b>
<b>5.1.2</b>	<b>Sampling uncertainty .....</b>	<b>13</b>
<b>5.1.3</b>	<b>Bias .....</b>	<b>13</b>
<b>5.1.4</b>	<b>Critical factors .....</b>	<b>13</b>
<b>5.2</b>	<b>Estimation of technical uncertainty .....</b>	<b>14</b>
<b>5.2.1</b>	<b>General aspects .....</b>	<b>14</b>
<b>5.2.2</b>	<b>Reproducibility standard deviation derived from intralaboratory experiments, sIR .....</b>	<b>14</b>
<b>5.2.3</b>	<b>Reproducibility standard deviation derived from interlaboratory studies .....</b>	<b>19</b>
<b>6</b>	<b>Matrix uncertainty .....</b>	<b>20</b>
<b>6.1</b>	<b>General aspects .....</b>	<b>20</b>
<b>6.2</b>	<b>Case of homogeneous laboratory (or test) sample .....</b>	<b>21</b>
<b>6.3</b>	<b>Multiple test portions from laboratory samples .....</b>	<b>21</b>
<b>6.4</b>	<b>Known characteristic of the matrix .....</b>	<b>22</b>
<b>7</b>	<b>Distributional uncertainties .....</b>	<b>23</b>
<b>7.1</b>	<b>General aspects .....</b>	<b>23</b>
<b>7.2</b>	<b>Colony-count technique -- Poisson uncertainty .....</b>	<b>23</b>
<b>7.3</b>	<b>Colony-count technique -- Confirmation uncertainty .....</b>	<b>23</b>
<b>7.4</b>	<b>Most probable number uncertainty .....</b>	<b>24</b>
<b>8</b>	<b>Combined and expanded uncertainty .....</b>	<b>25</b>
<b>8.1</b>	<b>Combined standard uncertainty .....</b>	<b>25</b>
<b>8.1.1</b>	<b>General considerations .....</b>	<b>25</b>
<b>8.1.2</b>	<b>Combined standard uncertainty based on separate technical, matrix, and distributional standard uncertainties .....</b>	<b>25</b>
<b>8.1.3</b>	<b>Combined standard uncertainty based on reproducibility standard deviation alone .....</b>	<b>26</b>
<b>8.2</b>	<b>Expanded uncertainty .....</b>	<b>26</b>
<b>8.3</b>	<b>Worked examples .....</b>	<b>26</b>
<b>8.3.1</b>	<b>Example 1 -- Technical, matrix and Poisson components of uncertainty .....</b>	<b>26</b>
<b>8.3.2</b>	<b>Example 2 -- Poisson component negligible .....</b>	<b>26</b>
<b>8.3.3</b>	<b>Example 3 -- Poisson, matrix and confirmation components .....</b>	<b>27</b>
<b>8.3.4</b>	<b>Example 4 -- Technical, matrix and most probable number components .....</b>	<b>27</b>

<b>9</b>	<b>Expression of measurement uncertainty in the test reports .....</b>	<b>28</b>
<b>9.1</b>	<b>General aspects .....</b>	<b>28</b>
<b>9.2</b>	<b>Results below the limit of quantification .....</b>	<b>29</b>
<b>9.2.1</b>	<b>General aspects .....</b>	<b>29</b>
<b>9.2.2</b>	<b>Example .....</b>	<b>29</b>
<b>Annex A (informative)</b>	<b>Calculation of standard deviations with two or more than two test portions (intralaboratory reproducibility standard deviation and matrix uncertainty standard deviation) .....</b>	<b>31</b>
<b>Annex B (informative)</b>	<b>Matrix effect and matrix uncertainty .....</b>	<b>36</b>
<b>Annex C (informative)</b>	<b>Intrinsic variability (standard uncertainty) of most probable number estimates .....</b>	<b>38</b>
<b>Annex D (informative)</b>	<b>Correction of experimental standard deviations for unwanted uncertainty components .....</b>	<b>40</b>
<b>Bibliography .....</b>		<b>43</b>