# ISO/TR 6037:2024-05 (E)

## Automated liquid handling systems - Uncertainty of the measurement procedures

## Contents

Page


Foreword ..... iv

Introduction ..... v

1 Scope ..... 1

2 Normative references ..... 1

3 Termsanddefinitions ..... 1

4 General procedure for the uncertainty calculation ..... 1

5 Modelling of the measurement ..... 2

6 Standard uncertainty components associated with the measuring system ..... 2
6.1 General information on standard uncertainty components estimation ..... 2
6.2 Specific information on standard uncertainty components estimation ..... 3

7 Standard uncertainty components associated with the ALHS ..... 3
7.1 General ..... 3
7.2 ALHS-type specific influencing parameters ..... 3
7.3 Test liquid properties influencing ALHS operation ..... 3
7.4 Standard uncertainty of ALHS resolution ..... 4
7.5 Standard uncertainty of cubic expansion coefficient (optional) ..... 4
7.6 Standard uncertainty associated with air cushion effects (optional) ..... 4

8 Repeatability and reproducibility of the liquid delivery process ..... 5
8.1 Repeatability (experimental standard deviation) ..... 5
8.2 Reproducibility ..... 5

9 Combined standard uncertainty of measurement associated with the systematic error of mean volume ..... 5

10 Sensitivitycoefficients ..... 6

11 Coverage factor k ..... 7

12 Expanded uncertainty of measurement associated with the mean volume ..... 7

13 Examples for determining the uncertainty of the volume measurement of ALHS ..... 7
13.1 Measurement conditions ..... 7
13.2 Results ..... 8
13.2.1 Standard uncertainty of the ALHS mean volume ..... 8
13.2.2 Expanded uncertainty of the measurement ..... 8
13.2.3 Result of measurement ..... 8
13.2.4 Caution regarding use of numerical values in this report ..... 8
13.2.5 Remarks on conformity with ISO/IEC Guide 98-3 ..... 8

Annex A (informative) Dual-dye ratiometric photometric procedure ..... 10

Annex B (informative) Gravimetric procedure ..... 17

Annex C (informative) Optical image analysis of droplets ..... 33

Bibliography ..... 43