

Specification of Competency Standards
for the Testing, Inspection and Certification Industry
Unit of Competency

Functional Area - Testing Operations

Title	Develop procedures for estimation of measurement uncertainty in accordance with the ISO Guide to the Expression of Uncertainty in Measurement
Code	105757L5
Range	This unit of competency (UoC) covers the abilities to develop procedures for estimating the measurement uncertainty in testing or calibration activities by interpreting the requirements in the ISO Guide to the Expression of Uncertainty in Measurement (ISO GUM) in testing laboratories.
Level	5
Credit	4 (For Reference Only)
Competency	<p>Performance Requirements</p> <p>1. Possess knowledge and principles of estimating the measurement uncertainty in accordance with ISO GUM</p> <ul style="list-style-type: none"> • Command the knowledge of statistics, e.g. mean, standard deviation, variance, standard deviation of the mean, degrees of freedom. • Explain the applications of various significance tests, e.g. t-test, F-test, analysis of variance (ANOVA), standard deviation of prediction, linear regression. • Identify steps in the measurement, test or calibration involved. • Employ the principles and procedures of relevant measurements. • Determine the degree of rigour in estimation of measurement uncertainty to meet the requirements of intended use, test standards and/or regulatory specifications. • Examine and verify information on calibration certificates, specifications, repeated measurements and variations due to operation such as operators, environment conditions and setup. <p>2. Develop and document procedures for estimation of measurement uncertainty according to ISO GUM</p> <ul style="list-style-type: none"> • Construct a mathematical model for the measurement. • Identify factors affecting the components of the model. • Determine the required confidence level. • Describe the method for estimating the standard uncertainty and sensitivity coefficient of each input factor. • Explain the approaches to determine the following parameters for the estimation: <ul style="list-style-type: none"> ○ combined uncertainties according to the law of propagation, ○ degree of freedom for each input factor and effective degree of freedom of final output, ○ expanded measurement uncertainty by multiplying the combined uncertainties with the coverage factor as devised from the effective degree of freedom. • Verify and document the procedures for estimation of measurement uncertainty in accordance with ISO Guide to the Expression of Uncertainty in Measurement. <p>3. Exhibit professionalism</p> <ul style="list-style-type: none"> • Recommend improvement and control of test operation and use of equipment meeting the uncertainty requirement.
Assessment Criteria	<p>The integrated outcome requirements of this UoC are the abilities to:</p> <ul style="list-style-type: none"> • analyse steps of measurement with the use of appropriate equipment, test or calibration involved in the testing or calibration activities, • construct a mathematical model and categorise input factors affecting the measurement uncertainty,

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	<ul style="list-style-type: none">• develop and document the procedures for estimation of measurement uncertainty by applying the knowledge of statistical tests and approaches in accordance with ISO Guide to the Expression of Uncertainty in Measurement (ISO GUM).
Remark	