

Objective of the spreadsheet:

This spreadsheet aims at simplifying and automatizing classical(Frequentist) assessments of the conformity of an item considering the comparison of the estimated value of a measurand with a limit or limit values for that measurand where the measurement uncertainty can be considered.

The spreadsheet also allows conformity assessments where the measurement uncertainty is not considered in a shared risk approach between the consumer and the producer.

The terms "consumer" and "producer" must be understood in a broad sense referring to the party "not interested in the acceptance of a non-conform item" or "not interested in the rejection of a conform item", respectively. For example, in a quantitative anti-doping analysis, the "producer" will be the athlete and the "consumer" will be the society represented by the regulatory authority.

If the conformity is assessed by directly using the reported expanded uncertainty for P confidence level, the selected Producer's or Consumers' risk should be $(1-P)/2$. For instance, if $P = 95\%$, the risk will be 2.5 %.

This spreadsheet assumes measurement result expressed with uncertainty has a normal distribution.

The spreadsheet is not applicable to more complex distributions of the estimate of the measurand, to multivariate conformity assessments and to Bayesian conformity assessments. Nevertheless, this spreadsheet can be useful for a large number of test laboratories that perform accredited chemical analysis.

The user of the spreadsheet should have basic knowledge on conformity assessments, for instance acquired by reading the Eurachem/CITAC guide on the use of measurement uncertainty in conformity assessment [1].

Although the spreadsheet was checked for algorithms validity, the authors are not responsible for the impact of any mistake of the used version of the spreadsheet. The final users of the spreadsheet are encouraged to check and validate the used formulas and to report to ForMEQ any mistakes or suggestions for a future version.

Instructions:

The spreadsheet can be used by entering the following data and extracting the conformity conclusion from sheet "Conformity Assessment".

1st: Select the type of reference risk on cell I8 ("Consumer's Risk", "Producer's Risk" or "Shared Risk"). Consumer's and producer's risk is the risk of a false acceptance or a false rejection, respectively.

2nd: Enter the reference risk on cell I10 (Relevant when "Consumer's Risk" or "Producer's risk" is selected in cell I8);

3rd: Enter the units of the measured quantity, typically a concentration, in cell I12;

4th: If available, enter the target (maximum) uncertainty in cell I17 and select the type of target uncertainty (Select "Absolute" or "Relative" type in cell I15 and "Standard" or "Expanded" form in cell I16). If an "Expanded" uncertainty is considered, enter the respective coverage factor in cell O16. Relative uncertainties are entered as fractions (for instance, a 5 % is entered as 0.05);

5th: Select the type of legal or specification limit in cell I19 ("Lower limit", "Upper limit" or "Interval") and enter the limit(s) value(s) on cells L23 and L25. The document that presents the limits can be inserted in cell I21.

6th: Enter the uncertainty of measurements performed at the limit(s) in cells I32 and I33. Select the type of reported uncertainties using cells I30 and I31, and, if an expanded uncertainty is entered, insert the coverage factor in cell O30;

7th: Enter the value of the measured quantity in the sample in cell I41;

8th: Extract the decision rule from cell I39 and the conformity decision from cell I42. In cells I46 to I48, possible ways of reporting the conformity decision are presented. The considered acceptance limits is/are reported in cells I36 and I37.

Note: In assessing the conformity with an interval of values, if the measurement uncertainty is too high, it can be not possible to achieve the entered maximum producer's or consumer's risk. The effective risk is reported in cell P37, and I46 to I48. The effective risk is determined by an iterative process carried out in the sheet "Aux_Overlap_Intervals".

References:

1. S. L. R. Ellison, A. Williams (Eds), Eurachem/CITAC guide: Use of uncertainty information in compliance assessment, First Edition, 2007 (Available from www.eurachem.org).
2. JCGM 106:2012, Evaluation of measurement data – The role of measurement uncertainty in conformity assessment, BIPM, 2012 (Available from www.bipm.org).
3. ILAC G8:09/2019, Guidelines on Decision Rules and Statements of Conformity, ILAC, 2019 (Available from www.ilac.org).