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1. SCOPE

The scope of this document is to describe the mandatory sequence of methodological and usage instructions that ITC-CNR (Construction Technology Institute) adopts to define the rule establishing the way measurement uncertainty is accounted for when declaring conformity with a specified requirement.

2. FIELD OF APPLICATION

This Procedure is applied by the Certification Body for AVCP activities 1+,1 i.e., for the performance of tests, analyses or trials aimed at issuing a construction product certification or performing surveillance activities. It applies in all cases where the client requires a declaration of conformity with a specification or standard. This Procedure has been drawn up to support the operators qualified to express an opinion on the conformity of the result obtained in the use of decision rules for declarations of conformity.

3. REFERENCES

- UNI CEI EN ISO/IEC 17025: General requirements for the competence of testing and calibration laboratories.
- UNI CEI EN ISO/IEC 17065: Conformity assessment – Requirements for bodies certifying products, processes and services.
- JCGM 106: Evaluation of measurement data – The role of measurement uncertainty in conformity assessment.
- ILAC-G8:09: Guidelines on Decision Rules and Statements of Conformity.

For undated normative references the latest version in force applies.

4. DEFINITIONS

The terms and definitions that serve as reference are those given in JCGM 106 [*Evaluation of measurement data – The role of measurement uncertainty in conformity assessment*]. See definitions below:

- **guard band (w)**: interval between a tolerance limit and a corresponding acceptance limit, of magnitude $w = |TL - AL|$;
- **measure of expanded uncertainty (U)**: expanded uncertainty is obtained by multiplying the standard uncertainty $u_c(y)$ by a coverage factor k ;
- **tolerance interval**: interval of the permissible values of a property;
- **acceptance interval**: interval of permissible measured quantity values;
- **rejection interval**: interval of non-permissible measured quantity values;
- **acceptance limit (AL)**: specified upper or lower bound of permissible measured quantity values;
- **tolerance limit (TL) or specification limit**: specified upper or lower bound of permissible values of a property;
- **LSL**: lower specification limit;
- **decision rule**: documented rule that describes how measurement uncertainty will be accounted for when declaring conformity with a given requirement;
- **specific risk**: probability that a particular accepted item is non-conforming or that a particular rejected item is conforming. Risk is based on a single measured item;

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- **measured quantity value:** quantity value representing a measurement result
- **USL:** Upper specific limit.

5. RESPONSIBILITIES

The Technical Director of ITC is responsible for all activities relating to the qualification and management of subcontractors and for the application of this procedure. The Technical Management Representative is responsible for managing all aspects set out in PQ 01 "Management of Documents, Data and Records".

6. OPERATIONAL PROCEDURES

6.1. DECISION RULES AND DECLARATION OF CONFORMITY

Decision rules must be compatible with the customer, the Regulation and the requirements of the standards. The specification or standard and the decision rule must be clearly defined when a customer applies for a declaration of conformity with a specification or a testing standard. Unless the chosen decision rule is already contained in the specification or standard, it must be communicated to the customer and, if necessary, discussed with him. The laboratory must document the decision rule used, taking into account the associated risk level prior to applying the rule.

When drawing up declarations of conformity, measurement uncertainty shall be accounted for, unless it can be disregarded under the standard or the specification.

The laboratory shall provide the declaration of conformity in such a way that the following aspects are clearly identified:

- a) results to be addressed by the declaration;
- b) specifications, standards or parts of them to be complied with or not;
- c) applied decision rule (unless it is already contained in the standard or made explicit by the customer).

In the case of a declaration of conformity to a specific class according to a certain standard, the adopted decision rule must be explicitly reported in the classification report or in the test report.

When the rule is set by the customer, by legal regulations or documents, there is no need to further account for the risk level.

Any discrepancies between the request or offer and the contract must be resolved prior to the start of laboratory activities.

Deviations requested by the customer shall not affect the integrity of the laboratory or the validity of the results.

6.1.1. Selection of the decision rule

Figure 1 shows the flow chart "Pass/Fail Conformity Decision Rule selection" given on page 14 ILAC-G8:09 guidelines.

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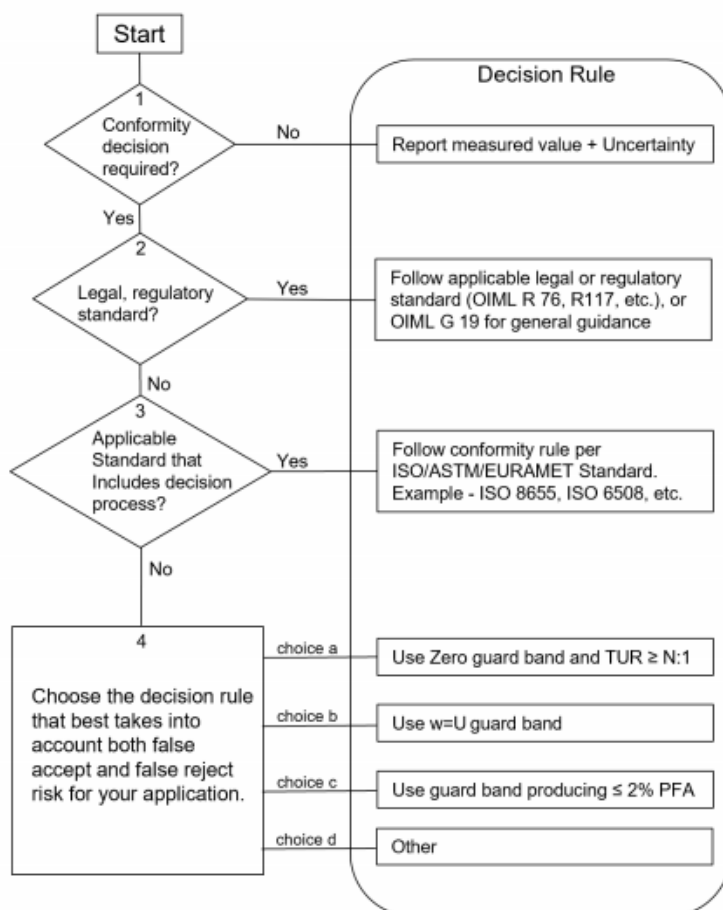


Figure 1. Flow chart “Pass/Fail Conformity Decision Rule selection” (ILAC-G8:09 guidelines).

The possible scenarios are listed below:

- 1) a test for which the laboratory is not required to express an opinion about the conformity of the result obtained: express the result as measured quantity value with the associated measurement uncertainty;
- 2) a measurement result is governed by legal standards or regulations: use the decision rule set out in the specific standard;
- 3) decision rules are governed by a standard guideline published by a national or international body: use the decision rule set out in the guidelines;
- 4) decision rules are governed by a specific test procedure adopted by ITC: use the decision rule provided for in the procedure;
- 5) the guard band and a threshold value set by a standardized test are already integrated with each other: there is no need for a further guard band to reduce the risk of false acceptance or false rejection;
- 6) the customer explicitly requests to use a given decision rule: assess the rule requested by the customer; if it does not affect the integrity of the laboratory and/or the validity of the results, it can be adopted. Otherwise, the adoption of another decision rule must be agreed with the customer.

If no standards or guidelines exist to govern the selection of the decision rule to be adopted, i.e. none of the six cases listed above applies, the decision rule described in paragraph 6.1.2. applies.

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6.1.2. DECISION RULE TO BE ADOPTED IF NONE OF THE CASES LISTED IN PARAGRAPH 6.1.1 APPLY

The decision rule to be adopted if none of the cases listed in Paragraph 6.1.1 apply is the so-called **non-binary acceptance rule based on a guard band $w=U$** , shown in Figure 2.

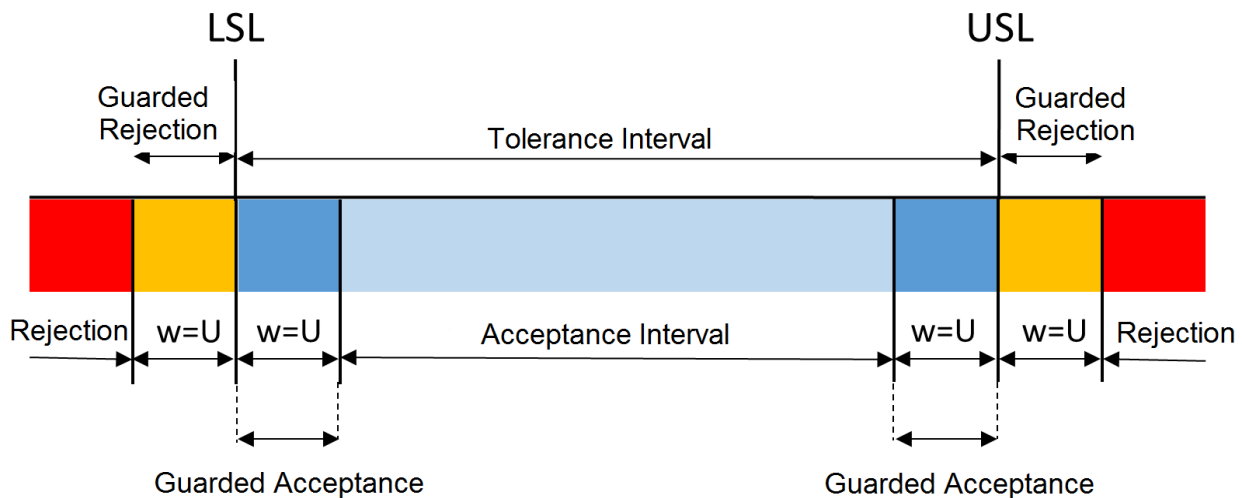


Figure 2. Non-binary acceptance rules based on a guard band $w=U$.

The customer agrees that the decisions shall be based on acceptance limits defined by guard bands. Declarations of conformity are non-binary.

Assuming that the estimate of the measurand has a normal probability, the results are expressed as:

- Conforming: the measured value lies within the acceptance interval. The maximum risk of false acceptance is 2.5%.
- Non-conforming: the measured value lies within the rejection interval. The maximum risk of false rejection is 2.5%.
- Conditionally conforming: the measured value lies within the tolerance interval, but lies outside the acceptance interval. In this case, a portion of the expanded uncertainty intervals lies outside the tolerance interval, as shown in Figure 3. When the measured value is close to the tolerance limit, the risk of false acceptance is 50%.
- Conditionally non-conforming: the measured value lies outside the tolerance interval, but a portion of the expanded uncertainty intervals lies within this interval, as shown in Figure 3. When the measured value is close to the tolerance limit, the risk of false rejection is 50%.

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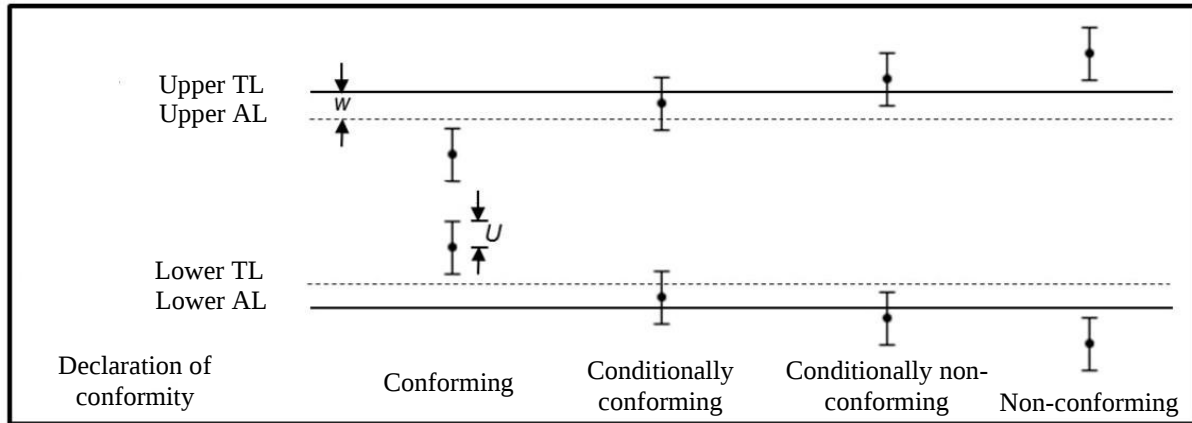


Figure 3. Graphic representation of the non-binary acceptance rule based on a guard band $w=U$.

A. CASES IN WHICH IT IS NOT POSSIBLE TO TAKE INTO ACCOUNT MEASUREMENT UNCERTAINTY

Classification of air permeability of windows and doors, according to EN 12207:1999, derives from the combination of the results of two classifications on basis of two distinct parameters: air permeability related to the overall area of the sample, expressed in $\text{m}^3/(\text{m}^2 \text{ h})$ and air permeability related to the length of the opening joint(s), expressed in $\text{m}^3/(\text{m h})$. The combination rules are defined by the standard. In this case, it is not possible to take into account the measurement uncertainty in the classification of the product. For the same reason, it is not possible to take into account the measurement uncertainty in the following further cases:

- classification of windows and doors on basis of their wind load resistance, according to the standard EN 12210:2016;
- classification of air permeability of curtain walls, according to the standard EN 12152:2002.

In the cases listed in the following, classification is made on basis of visual inspections and, hence, it is not possible to take into account measurement uncertainty:

- classification of water-tightness performance of windows and doors, according to the standard EN 12208:1999;
- classification of windows on basis of their impact resistance, according to the standard EN 13049:2003;
- classification of water-tightness performance of curtain walls, according to the standard EN 12154:1999;
- classification of curtain walls on basis of their impact resistance, according to the standard EN 14019:2016;
- classification of reaction to fire, according to the standard EN 13501-2, on basis of the results of the single-flame source test (EN ISO 11925-2:2000).