

TC 3/SC 5/P 2

Secretariat's Responses to Comments on the 1st Committee Draft

The role of measurement uncertainty in conformity assessment decisions in legal metrology

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General Comments					
	General	CA	Canada has "no comment"		Noted
	General	CA	One comment that I would like to offer is that although the information provided is valuable, it can be found in textbooks and handbooks on statistics. It is my opinion that a document of the sort might be more useful if it only presents sections that the Sub-Committee members consider essential to the creation of a unified approach to including uncertainties in conformity assessment, such as sections 6 and 7 of CD1.		Not really. Which textbooks/handbooks treat the topic this same way? Possibly.
	General	JP	In Japan, as local governments (Measurement and Verification Offices) are verifying huge volumes of measuring instruments, their operation efficiency and cost-benefit performance shall be adequately taken into consideration. Therefore, either one of the followings should be proposed: 1) uncertainty shall be applied to only "type approval" and not to "verification" for the time being, or 2) If uncertainty will be applied to "verification", it shall be "shared risk or guard band".		Will use the second proposal for most cases, except when more stringent risk analysis is necessary.
	General	JP	The "field verification" to be performed by local Measurement and Verification Offices in Japan is different from type approval and verification performed at laboratories, and there are too many elements that need to be investigated at calculation of uncertainty and it makes difficult to discuss about the uncertainty in the same manner. In this document, therefore, it should be clearly stated that field verification is to be excluded from the scope.		Rather than excluding field verification from the Scope, it will be made clearer in the document that measurement uncertainty can be cost effectively incorporated in an implicit manner for field

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					verification. This is important for traceability considerations.
	General	JP	Some states of OIML members seem not to have required for institutions and local verification offices who undertake type evaluation in their countries to be granted with a certification by ISO/IEC 17025 or to comply with it. Therefore, as discussion on uncertainty will be difficult on assumption that those institutions and offices shall be certified by or comply with ISO/IEC 17025 " <i>General requirements for the competence of testing and calibration laboratories</i> ", it should be clearly stated in this document that those institutions and local offices that undertake type evaluation of measuring instruments not subjected to MAA in their countries may not necessarily be required to be certified by or to comply with ISO/IEC 17025.		<p>The scope of this document is not intended to cover when a country must require accreditation to ISO/IEC 17025, or even when and how a country must specify the required use of measurement uncertainty in its national legislation.</p> <p>If a country is an Issuing Participant in the OIML MAA, then the requirements in OIML D30 (which are based on ISO/IEC 17025) must be followed.</p>
		PT	In the whole document, in the Figures and in the main text, I would suggest to use the rules and style conventions for expressing values of quantities. In particular, I recall that symbols for quantities are single letters in an italic font. Quoting SI, "for numbers with many digits, the digits may be divided into groups of three by a thin space... neither dots nor commas are inserted in the spaces between groups of three". The result of C.8 would then be updated.		The convention used for OIML publications will be used.
	Through-out	UK	Avoid spurious spaces in mathematical equations		BIML editor will address this.
	Through-out	UK	Mis-use of 'effect'	Change to 'affect' in appropriate places	BIML editor will address this.
	Through-out	UK	Mis-use of 'range'	Change to 'interval' in appropriate places	BIML editor will address this.
	Through-out	UK	'best-estimate', used as a compound noun should not be hyphenated		BIML editor will address this.
	Through-out	UK	Incorrect reference	Change refs to VIM3 to ISO ref	Disagree. Proper reference is to

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					JCGM, which is given as reference [10]
	Through-out	UK	Confusion in use of 'formal MU' and 'formal concept of MU'	Stick to one term and define it	Noted; "formal" removed
	Through-out	UK	The GUM speaks of the evaluation of MU and not the calculation of MU	Change 'calculating' to 'evaluating' where appropriate	Accepted (although only one instance was found, in Annex B)
1 Scope and Objectives					
		SE	Seventh paragraph should specify that "attribute testing" (e.g., broken seals, labeling, etc.) is not covered in the scope. Also, an explicit statement should be added stating that the scope does not include populations of instruments in a 'statistical analysis' sense. A similar statement should also be added that the scope of this document does not include prepackages.		Accepted (see revised text)
		PL	<p>The document brings comprehensive information and guidance on various aspects of use of measurement uncertainty for purposes of legal metrology. In particular it provides - as declared in Chapter 1 "Scope and objectives" – guidance on "... how to take measurement uncertainty into account when using measured values,, as the basis for making pass-fail decisions." The text of the document is structured so that it will be very helpful to readers who carry out evaluation of measurement result, while performing legal metrology tasks. Full support should be given to the statement reminded in Chapter 1, which says "Harmonized methods for evaluating measurement uncertainties and implementing them into decision criteria used for the metrological evaluation of measuring instruments and systems are required in order that test evaluations and metrological judgments may yield comparable results from one national responsible body in legal metrology to another."</p> <p>An important advantage of the document are its figures, which provide good illustration of concepts dealt with in the text.</p>		Noted, with thanks.

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2 Terminology					
		DE	Chapter "2 Terminology" repeats and sometimes comments some definitions taken from the VIM which is nice for the reader although a reference to the VIM would be sufficient in most cases. Added to this chapter shall be other terms and abbreviations used in the document, such as: error of indication, uncertainty of the error of indication, PDF, measurement capability error index, maximum permissible uncertainty, Maybe the title should be changed to "Terminology and definitions".		Without explicit suggestions for what to omit, current entries will be kept. Most of the suggested additional entries have been added., although for some no (acceptable) definitions could be found. Title change partially accepted.
		PL	As regards additional terms that could be included in listing of terms in Chapter 2, we suggest the following: measurand, measurement function and instrumental bias. It is also advisable to explain shortly the following notions: Classical Approach (CA), Uncertainty Approach (UA) and GUM Approach, which are mentioned on pages 15, 27 and 29 and in a few other places. These exact meaning of those terms is not well known to many readers. Although one can learn their meaning from the text of the document, it seems appropriate to introduce them beforehand, especially considering the breakthrough made by switching from CA to UA. The same concerns the key terms: - risk of false acceptance, - risk of false rejection, - shared risk, which in fact are known, but as being fundamental when making conformity decisions, they should be introduced at the beginning of the document.		Suggested additional entries have been added where definitions could be found. Rather than explaining CA and UA here, decided to omit that from Note and leave reader to see VIM3 for elaboration.
	Item 2.1 (page 4)	DE	Replace "quantity value (VIM3 2.11)" with "quantity (VIM3 2.11)"		Agree (should be "quantity", VIM3 1.1) Corrected
	2.1	SE	Look at the ISO 10000 series for Conformity Assessment vocabulary. The concept 'quantity' is used prior to whether the		It seems most appropriate here

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			property is to be measured/tested.		to use VIM3 definition of "quantity"
	Page 4	DE	Add (if necessary) "quantity value (VIM3 1.19) number and reference together expressing magnitude of a quantity"		Agree
	Item 2.3 (page 4)	DE	Replace "error (of measurement) VIM3 2.16" with "measurement error (VIM3 2.16)"		Agree
	Item 2.7 (page 5)	DE	Replace "maximum permissible error MPE (VIM3 4.26)" with "maximum permissible measurement error, maximum permissible error MPE (VIM3 4.26)"		Thank you for noting this. VIM 3 reference has been corrected.
		PT	The entry 2.7 "maximum permissible error MPE (VIM3 4.26)" is repeated with the 2.15 entry. Consequently, I suggest to delete the 2.7 entry and to update to the right VIM3 reference entry, which is 4.26.		Thank you for noting this. VIM 3 reference has been corrected.
		PT	In the MPE entry, I suggest the following additional entry: NOTE 4 (not in VIM3) the set of quantity values belonging to the indication interval bounded by acceptable indications is the tolerance interval; it is determined before the construction of the measuring system, therefore it cannot be confused with the statistical tolerance interval; the tolerance range is the absolute value of the difference between the extreme values of the tolerance interval.		Since the term "tolerance" is used very sparingly in this document, and two of the four instances are in definitions referencing JCGM 106, it seems best to leave elaboration on that term to that reference.
	Item 2.15 (page 7)	DE	Replace "(VIM3 5.21)" with "(VIM3 4.26)"		Agree. See 2.7 above.
	2	JP	When compared with VIM, some terms in this document are not described with "Note". Which definitions shall be applied in priority, definitions of terms in this document or those in VIM? In addition, isn't there a need to make consistent with those in VIM?		See new text at top of clause 2. Notes in VIM 3 are kept when they are considered to be particularly helpful. The definitions in this document should be given priority, although there are no conflicts.
	2	JP	The term "Shared risk" should be defined as a new term.		Agree (has been added)

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	2	JP	The term “Guard banding (or guard band)” should be defined as a new term.		Agree (has been added)
	2.4	JP	Note → Note (There is not in VIM3) (Reason) Among the terms (2.2, 2.3, 2.4, 2.12, 2.15) with description of “Note” in OIML, the term 2.4 is not clearly stated “there is no Note in VIM3”. Note shall be added also to this term.		Agree
	2.4	UK	The note is not in VIM3	Add the fact that the note is not in VIM	Agree
	2.7	UK	Almost a copy of 2.15	Delete	Deleted 2.15
	2.15	JP	To be deleted. (Reason) As this term is not used in the text, there is no need to define it.		Deleted
	2.15	UK	Incorrect reference	Change ref to VIM3 5.21	Deleted
3 Introduction					
		PL	It seems that the expression “conformity assessment in legal metrology” may not be clear to the reader. The terms “conformity assessment” and “legal metrology” are sometimes perceived as two different areas of activity, although it is well known that type evaluation and primary verification can be realized using procedures of conformity assessment. Perhaps it would be clearer for the readers if an explanation on mutual relation between “conformity assessment” and “legal metrology” could be added. Such an explanation could also be used by TC 1 Secretariat which is working on revision of the VIML Also see: References [13] .		Accepted. See revised text.
	3, 4 and 5	JP	The word “formal” shall be deleted from “formal probabilistic concept of measurement uncertainty”. (Reason) There is not sufficient explanation on what meaning the word “formal” is used. For example, does it mean the formal agreements on measurement uncertainty at OIML or formal implementation by governments (central and local) of member		Accepted. See revised text.

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			states? When the word “formal” is used without clear definition, it may cause misunderstanding.		
	3, Para. 2	DE	In the sentence "One example is the practice of establishing 'expanded' or 'conservative' maximum permissible errors..." we'd prefer the more familiar wording 'in service' instead of 'conservative'.		Accepted. See revised text.
	Line 10	UK	Improve English	Change ‘that’ to ‘in which’	Accepted
	Through-out	UK	Improve English	Change ‘outside of’ to ‘outside’ and similarly for ‘inside of’	Accepted
	Through-out	UK	Maths type-setting rules not followed regarding italics, etc., etc.	Adhere to recommended rules. See GUM, ISO, e.g.	BIML editor will address this.
	Through-out	UK	Make notation consistent with main texts on MU, such as GUM	Use capital letters for quantities and corresponding lower case letters for values and estimates	BIML editor will address this.
4 Basic considerations pertaining to conformity testing decisions and measurement uncertainty					
5 Conformity testing decisions that explicitly incorporate measurement uncertainty					
		US	The last 3 paragraphs in this section indicate that “guidance should be provided” on practical methods of calculating uncertainty. In my opinion, it should be stressed that the GUM is the standardized method to be used and that the guidance is in the form of examples of how to apply the GUM.		Accepted (see revised text), but also examples on how to apply the GUM Supplements.

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	Page 13, 2nd paragraph:	AT	The expressions “random component of measurement uncertainty” and “systematic components of measurement uncertainty” should be avoided (see GUM, note to paragraph 3.3.3).		Accepted. See revised text.
	Through-out, e.g., 5 line 3	UK	Improve English	Change ‘than is’ to ‘from that’ and similarly elsewhere	BIML editor will address this.
	Through-out	UK	Avoid split infinitives	E.g., ‘to definitely state’ (clause 5, line 4), ‘to possibly lie’ (clause 5.3.1, line 5)	BIML editor will address this.
	Para 2, lines 5, 6	UK	Improve accuracy of statement	Replace last two lines by ‘another approach to measurement uncertainty evaluation based on a Monte Carlo method.’	Accepted. See revised text.
	Through-out	UK	Avoid ‘must’?	Replace by ‘should’?	Partially accepted.
	Through-out	UK	Use of u_S , u_{ROC} , etc. is unusual and differs from GUM use	Consider replacing	Considered, but some symbols are needed to distinguish between various different sources of uncertainty, and the GUM doesn’t provide such.
	Through-out	UK	‘Uncertainty of’ not technically correct	Consider use of ‘uncertainty associated with’	Accepted
		US	See editorial comments about systematic and random components of measurement uncertainty...		Agree (see comment above from AT)
5.1 Probability density function (PDF)					
		PL	The first sentence in clause 5.1 contains rather condensed information. Perhaps the message would be clearer if the sentence could be split into two. The same concerns the first sentence in 5.3.3.		It is not clear what is intended for 5.1. Accepted for 5.3.3.

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		SE	Clarify that the PDF in Figure 2 does not represent the testing of multiple instruments.		Accepted. See modified text.
	Line 1	UK	'the 'true' value of what it is that is intended to be measured' is clumsy	Improve	Accepted. See modified text.
	Line – 3	UK	Improve English	Change to '... a function, known as a probability density function, can be constructed that gives ...'	Accepted. See modified text.
	Para 2, line 4	UK	Improve English	Change to '...probability that the 'true' value of the error of indication lies somewhere on the horizontal axis.'	Accepted. See modified text.
	Para 2, line – 2	UK	Incorrect statement. The PDF is infinite in extent if normal, e.g.	Replace statement by something more meaningful	Disagree. The statement is correct as written.
	Para 2, line 1	UK	Inaccurate statement	Change to '... PDF encodes al the known information ...'	Accepted. See modified text.
		US	Might want to mention that for a Gaussian PDF, $\pm u_{EI}$ contains 66% of the expected E_I values and $\pm 2 u_{EI}$ contains 95% of the expected E_I values.		Accepted. See modified text.
5.2 Probability of conformity					
		PL	Perhaps it would be appropriate to draw the PDF curves in such a way that suggest to the reader (what is stated in the text) that the curves extend to infinity and do not cross the abscissa (eg. see Fig. 3). The shading in Fig. 3 (which is mentioned in the first sentence on p. 16) is missing.		See revised figure. (Shading was not missing.)
	Figure 3	UK	Figure unclear	Improve	Not accepted. No explicit suggestions provided.
	Through-out	UK	Non-standard presentation of number and a reference	Use '100 %' rather than '100%', e.g.	Will be left to BIML Editor.

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	Through-out	UK	Use English spelling	Change 'favor', 'rigor', etc.	Standard OIML practice will be used.
		US	The shaded and un-shaded areas and denotation of area An described in the text are not shown in Figure 3.		Noted. BIML to improve?
	Figure 3	US	Add 'non-conformance zone' and 'conformance zone'		Not accepted (would clutter figure, possibly be confusing)
		US	Hard to see shaded and un-shaded areas in figure 3.		Noted. BIML to improve?
		US	You might want to add a specific example: "Thus for example, the measuring instrument would be considered to pass the particular test if there was less than a 10% probability that it was non-conforming."		Accepted. See modified text.
		US	... the risk. If E_1 is exactly equal to MPE_+ , then there is a 50% probability that the error of indication lies within the conformance zone and a 50% probability that it is outside the conformance zone. The issue		Accepted. See modified text.
5.3 "Risks" and "decision rules" associated with conformity decisions					
		US	See Note 2 under MPE definition: Tolerance should not be used!		Not accepted. Use of "tolerance" here is general.
5.3.1 Risk and decision rule for false acceptance					
		US	The shaded and un-shaded areas and denotation of area An described in the text are not shown in Figure 3. In the last paragraph, an example of a decision rule is given that would limit the probability of false accept (PFA) to 5%. Guidance is needed as to whether this is applied as a joint probability (also called unconditional probability) which depends both on the PDF of the unit under test and the measurement system or if it is a conditional probability which depends only on the PDF of the measurement. The chairman of the NCSL International Z540.3 Handbook committee has told me that it is acceptable to interpret the 2% false accept risk as a joint, or unconditional probability. There is a huge difference in the guard bands that are required depending on the definition used.		Accepted. See revised figure. Accepted. Additional text is added to the introduction to Clause 5 to emphasize the importance of distinguishing between uncertainties arising from the test apparatus and from the instrument under test.

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5.3.2 Risk and decision rule for false rejection					
		UK	Improve English	Change to '... that are sufficiently near the MPE ...'	Not sure what is intended here? Need explicit proposal.
	Through-out	UK	Use of MPE, etc. non-standard	Replace appropriately; see JCGM 106	Not sure what is intended here? Need explicit proposal.
5.3.3 Shared risk					
		PL	See 5.1		Accepted. See revised text.
		US	The term, shared risk, appears to be applied as meaning no guard band is being applied; the test decision is made at the MPE limit and it is recognized there is both FAR and false reject risk (FRR). However, it should be recognized there is shared risk even if guard bands are used. The guard bands are just a tool to adjust the relative risks based on actual or perceived consequence costs. I think this document properly states the PFA cannot be reduced inordinately without considering the impact on the FRR.		Accepted. See additional text at end of 5.3.3.
		US	From the discussion in the next three sections, it appears that there are two shared risk agreements: (1) defining f_{EI} or (2) defining f_S . If this is the case, it not clearly presented. It is also not clear what the tradeoffs are between defining f_{EI} or defining f_S . What situations dictate one or the other?		This is an interesting viewpoint, but whether f_{EI} or f_S is used is not intended to impact whether the shared risk approach is used. A discussion of tradeoffs has been added to 5.3.6
5.3.4 Maximum permissible uncertainty (of error of indication)					
		US	Should be 5.3.3.1		Not accepted (see response to 5.3.3)
		PL	The symbol $MPUEI$, although analogical to MPE, does not seem appropriate because the letter U coincides with the symbol used for expanded uncertainty.		Not accepted. The letter U is part of MPU and so this should not be confusing.
		SE	Clarify that U_{EI} is not the 'uncertainty of the instrument.' Is U_{EI} a standard uncertainty ($k=1$), or does it refer to a different value of k (e.g., $k=2$)?		Accepted. Note that the symbol U_{EI} is not used in this clause. The symbol u_{EI} is defined in

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					clause 5 as a combined standard measurement uncertainty (i.e., not just the 'uncertainty of the instrument', which is also reinforced in other clauses).
	Through-out	UK	Change 'on the order' to 'of the order'	Accepted.
	Line 6	UK	Improve English	Change to '... typically regarded as ...'	Need more specifics.
		US	In the U.S. TUR is used as the figure of merit for the measurement uncertainty relative to the MPE. It is the inverse of fEI. Is there hope of standardizing this figure of merit between the U.S. and the Europeans?		Accepted. See revised text.
5.3.5 Maximum permissible uncertainty (of measurement standard)					
		US	Should be 5.3.3.2		Not accepted. (See response to 5.3.3)
		SE	Combine 5.3.5 with 5.3.4? Consider adding an explicit statement that if the uncertainty of the standard dominates, then MPU_{EI} is about equal to MPU_S .		Interesting idea, but keeping clauses separate helps emphasize difference. Explicit statement accepted (see revised text).
5.3.6 Summary of considerations for decision rules					
		PL	An index of symbols that were used throughout the document would be very helpful to the reader.		Will be considered at the end.
		SE	Add a statement that C_m is inversely proportional to MPU_{EI} and f_{EI} .		Partially accepted. See revised text (C_m is proportional to MPU_{EI} and inversely proportional to f_{EI} .)
		US	Is there value in condoning the use of fs? TAR = 1/fs has been used by MIL45662A and Z540.1 as an alternative to an		The use of f_s (or TAR) is of course not the preferred method

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			uncertainty analysis. The underlying assumption was that the uncertainty of the standard dominated the uncertainty. This simplification served us well for a number of decades but was often a false assumption which is why the newer standards such as 17025 and Z540.3 do not recognize TAR (just the ratio of the MPE to the spec of the standard alone). If OIML condones this practice, it is probably reasonable to keep f_s . However, if OIML requires an estimate of the entire uncertainty of measurement, it is probably a dis-service to include a discussion of f_s . Even if a full uncertainty analysis is required, the metrologist would still have the liberty to declare that the uncertainty of the standard (perhaps estimated by the standard's specifications) is presumed to dominate the measurement uncertainty so the estimate of the uncertainty is the specification of the standard (adjusted for assumed confidence level or distribution).		unless there is good evidence that the other components of uncertainty are negligible. However, the use of f_s is prevalent in the legal metrology community, and so its use should be discussed here, as the new text in 5.3.6 does.
		US	Is this an overall summary or just a summary of shared risk?		Overall summary.
	Para 3	US	I would have guessed that this decision rule would have its own section in this document. That the OIML Secretariats would not have to go to another reference if they want to use this approach.		Presumably the decision rule being referred to here is shared risk (or guardbanding)? Either way, it would be good for OIML Secretariats/Conveners to study the reference (JCGM 106) that discusses this.
6 Taking measurement uncertainty into account when establishing MPEs and accuracy classes					
7 Options pertaining to "measurement uncertainty" that should be					

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considered for inclusion in OIML Recommendations and other OIML documents					
		DE	Dr. Oliver Mack, in cooperation with Mr. Horst Roetteken (from Sartorius), is currently working out an example to be added to Chapter 7 that could demonstrate how the new OIML uncertainty document can be applied to a measuring instrument specific OIML recommendation. We estimate the example to comprise of about 2 pages.		Thank you for this example, which has been incorporated into the document as Annex G (which is significantly more than two pages!).
	7	JP	In the relation with this OIML recommendation and other OIML documents, can we understand that matters as described in this section 7 are proposed to be legally bineded? Or are other matters described in other sections also proposed? Isn't it appropriate to describe the proposed matters to OIML recommendation in Annexes A to E? Further, in this document, the proposal matters to OIML recommendation are included in a spot for each case, and it makes unclear that what proposals have been made as a whole. Therefore, from the viewpoint to make it easy to read and understand, we propose that all proposals to OIML recommendation shall be described collectively at one place.		The matters described in this document are not proposed to be legally binding. Whether the material in this clause is in the main text or an Annex seems immaterial. The Clause has been retitled as "Checklist and suggested text pertaining to "measurement uncertainty" that should be considered for inclusion in OIML Recommendations and other OIML publications", and restructured (and renumbered) accordingly, to try and address the suggestion for it being easier to understand.
		US	1) Again, the confidence level for the reporting of measurement uncertainty is not stated in the suggested clauses. Does OIML recommend stating the combined uncertainty contrary to the GUM in this case? There is opportunity for considerable confusion here as to the confidence levels stated. 2) (Step 1) typo? Should the word "effect" be "affect"? (two places)		The intention is to use standard uncertainties (confidence level for 1 sigma) unless otherwise stated. This will be clarified. In Chapter 7 of the GUM reporting combined measurement uncertainty is

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			<p>It is not clearly specified in this document that the GUM is the prescribed means of calculating measurement uncertainty. If that is the case, I think this document should contain less explanation of the GUM. There is GUM nomenclature used throughout this document that is not defined in Terminology, Section 2.</p> <p>The examples of uncertainty analysis for legal metrology in the Annexes will add tremendous value. It is the opportunity to show clearly the elements that that should be documented and give examples of how to document them.</p>		<p>encouraged!</p> <p>Typo has been corrected. Thank you.</p> <p>The GUM methodology is intended as the prescribed means for calculating uncertainty. Terminology has been augmented, as have the Examples.</p>
	7 (1)	JP	<p>The sentence of “The use of measurement uncertainty has become an important and essential element in all aspects of metrology including legal metrology” shall be deleted. (Reason) Legal metrology approach is still effective, but it can't be said to such a extent as “The use of measurement uncertainty has become an important and essential element in all aspects of metrology including legal metrology”. In the days ahead, taking in mind that “individual OIML recommendation could be revised in accordance with this document”, this sentence would be unnecessary.</p>		<p>Disagree. This sentence is intended to reinforce the idea of always considering measurement uncertainty, even if it is not always explicitly provided (also see response immediately below).</p>
	7 (1)	JP	<p>Instead of the sentence that “measurement uncertainty shall be considered in all aspects of measurement and conformity assessment decisions associated with this OIML recommendation”, how about to limit measurement uncertainty only to “type evaluation” for the time being?</p>		<p>Mostly disagree (see response immediately above). However, a new clause (6) has been added that explains that an explicit statement of measurement uncertainty is not always required (e.g. for marketplace verification).</p>
	7 (1)	JP	<p>As the exceptions of measuring results with “uncertainty”, it is defined as follows: “where individual measured values are obtained for the purpose of assessing a component of measurement uncertainty associated with the repeatability or</p>		<p>The situation in the former case is where the measurement uncertainty is associated with</p>

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			reproducibility, where it is determined that a component of measurement uncertainty is not significant in a particular measurement application.” We like to know what situation is imaged in the former case. In the latter case, may we understand that this is intended to mean shared risk?		the mean value of the individual values. This has been explained in the text. The latter case can be taken to mean shared risk if the entire combined standard uncertainty is found to be negligible.
	7 (2) Step 2	JP	From “type evaluation and/or verification”, “verification” shall be deleted. (Reason) As mentioned above, it should be limited to “type evaluation” for the time being.		Partially accepted. “verification” has been changed to “verification in the laboratory” (see also comments above for 7(1))
		US	(Step 7, page 23) The 2nd paragraph defines Type A as random and Type B as systematic. Prior to the GUM, uncertainty analyses were performed using random and systematic designations for the sources of error. Section 2.3 of the GUM (NIST TN 1297 in this case) states, “There is not always a simple correspondence between the classification of uncertainty components into categories of “random” and “systematic”. I think a number of the other GUMs have a similar statement. 7) (page 25) I strongly concur that the method of guard banding needs to be stated on the report if guard bands are used.		Agreed. “Type A” and “Type B” have been removed.
	Through-out	UK	Possible misuse of ‘measurement’, which is a process (VIM), e.g., clause 7, option 2), para 3, line – 2	Change to ‘indication values’, e.g., in appropriate places	This usage seems to be a common practice...
	7 (2) Step 7	JP	OIML recommendation (and other OIML documents), it should emphasize that random (A type) component of measurement uncertainty is not the “whole” uncertainty of measurement uncertainty and systematic (B type) component shall be also included. ↓ It should emphasize that random effect of measurement		Agreed, however this is clarified in the paragraph below Step 7. Also, see response above about removing “Type A” and “Type B.”

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			uncertainty is not the whole of measurement uncertainty in OIML recommendation (and other OIML documents) and systematic effect shall be also included. (Reason) Type A and type B uncertainty are just classification based on the valuation method of uncertainty, and random components of measurement uncertainty is not necessarily A type and systematic components is not necessarily B type.		
	Through-out	UK	Possible misuse of 'of', in, e.g., clause 7, option 2), step 7, line 1	Change to 'all these', e.g.	BIML Editor to address this.
	7 (3)	JP	The sentence of "For a verification test, the specified MPE could be based on a variety of considerations, as discussed in Clause 6" shall be deleted. (Reason) For the time being, uncertainty shall be limited to "type evaluation".		Disagree. Even verification tests, where uncertainty may not be explicitly stated, still have MPEs that must be met.
	Option 3), line 2	UK	Improve English	Change to '... what is the appropriate MPE ...'	BIML Editor to address this.
	Option 3), line 4	UK	Improve English	Change to '... classes for which the instrument is being tested.'	BIML Editor to address this.
	Option 4), para 2, line 1	UK	Clarify the use of 'prior'		See modified text.
	Option 5), line 4	UK	Clarify the use of 'measurement of error of indication', bearing in mind that in this document an indication is regarded as a value (see 2.3 and 2.12). Also similar construction in annex A, para 5, line 3		Agreed. Text modified accordingly.
	7 (6)	JP	"Verification" shall be deleted. (Reason) For the time being, uncertainty shall be limited to "type evaluation". The fact that measurement uncertainty (U_{EI}) at type evaluation can be easily obtained at the type evaluation will be different matter from obtaining measurement uncertainty at verification including field verification. At field verification, in particular, there may be significant increase of number of elements affecting to the calculation of uncertainty.		Mostly disagree (see response in 7 (1) above). However, the text has been modified to say "verification test in a laboratory", so that field verification is not included. Also, a new clause (6) has been added that explains that an

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			In addition, when measurement competence index (MCI) is used, it may be difficult for local governments (Weights and Measures Inspection Offices) to calculate uncertainty as far as appropriate advices are not provided in OIML recommendation.		explicit statement of measurement uncertainty is not always required (e.g. for marketplace verification).
	Option 6), line 1	UK	The sentence here (and that below) consists of 92 words	Subdivide into at least four sentences	Texts have been revised.
	7 (7)	JP	(C _M) → (C _M) (Reason) Clerical error to be revised.		Agreed. Thank you.
	7 (8)	JP	To be deleted. (Reason) The meaning of “Guidance on emphasizing any precautions and/or special considerations” is ambiguous.		Partially agree. Additional text has been added to address the possible ambiguity.
8 References					
		DE	As long as reference [7] is not available there should be no reference to it.		Reference is now available and has been added.
		UK	Check all references. Some are inaccurate or incomplete	Add JCGM 104	Reference has been added.
		PT	The following references should be updated: [6] <i>Evaluation of measurement data – Supplement 1 to the “guide to the expression of uncertainty in measurement” – Propagation of distributions using a Monte Carlo method</i> , JCGM 101:2008 [9] Ehrlich, C.D. and Rasberry, S.D., <i>Metrological timelines in traceability</i> , Metrologia, 1997, 34 , p. 503-514		References have been updated.
ANNEX A					
		SE	Look for overlap with main text, shorten where possible. Elaborate in next-to-last paragraph that there is usually a correspondence between “accuracy class” and “MPE”, which is typically used to specify requirements.		There is indeed overlap, but this Annex is basically intended to stand alone.
	Para 1, Line 1	US	Delete since the new way of thinking is about the quality of the measurement, not the measurement. Clearer without two 'abouts' Otherwise state the two ideas as: ... opened a new way of thinking about <i>both</i> the measurement and about expressing the perceived		Second idea is accepted, text has been revised.

1st Committee Draft	Clause	Country	Comment	Proposal for modification	Secretariat's Response
	Para 1, Line 2	US	At first reading there is very little difference between the first part of this sentence and the second part. Under careful reading the differences are the use of 'essentially-unique' and 'intended to be' Those seem like very minor and extremely subtle differences. If they are the primary differences, it would help the reader if these two phrases were highlighted in italics or some other way.		The important yet possibly subtle differences are “essentially unique”, “intended to be”, and ‘uncertainty’ instead of “error”. Italics have been added, as suggested.
	Para 2, line 6	UK	Improve English	Change to ‘must be considered and ...’	Accepted.
	Through-out	UK	Improve English	Use ‘sufficiently close’ rather than ‘close enough’	BIML Editor to address this.
	Para 9, line – 4	UK	Improve English	Delete ‘back’	Accepted.
	Para 10, line – 2	UK	Make correct	Replace ‘experimental data’ by ‘measured data and other knowledge, typically relating to systematic effects.	Not sure that existing text is incorrect, but proposed modification is accepted.
		US	As the document states, the GUM gives very poor guidance regarding the treatment of know bias (measurement error) except to say that is to be ‘corrected for.’ I suggest then, that this document should provide guidance as how to treat known bias. There are a number of methods including root sum square addition as any other uncertainty, arithmetically adding to the combined uncertainty. Here are a couple references where this issue is discussed: D. Deaver, “An Application of the Guide to Measurement Uncertainty”, 2000 Measurement Science Conference. Philips, Steven, Eberhardt, K.R., Estler, W.T., Measurement Uncertainty and Uncorrected Bias, NCSL Workshop & Symposium, 1999, pp. 831-849		Accepted. New text and these references have been added.
ANNEX A.1					
	Para 2, line 5	UK	Make correct	Delete ‘of the (assumed) Gaussian curve’	Accepted.

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	Para – 2, line 5	UK	Improve English	Change to ‘It is desired to ...’	Not sure what is being proposed here.
ANNEX A.2					
		DE	Clarify the meaning of the rightmost PDF in Figure A2. Is a Gaussian PDF the best choice for measuring instruments? Is it correct to use ‘error of indication’ when sensors are being used?		Additional text has been added. What other shape of PDF is more likely? Error of indication is applicable any time that an indicated value is compared with a reference value.
		SE	Add a sentence/paragraph that discusses how testing involves changing influence parameters, but the measurand is still the error of indication. Also discuss that the influence parameters themselves need to be measured (including uncertainty considerations).		Accepted. A paragraph has been added.
	Para 1, Line 2	US	This sentence basically states that indicated values are compared with measured values. I thought that indicated values would be compared to the calibrated value of the measurement standard.		Accepted. Text has been modified accordingly.
	Para – 1, line – 4	UK	Improve English	Use ‘convolving’ rather than ‘convoluting’	Accepted.
		US	<u>Verification</u> of the scale vs. testing.		Accepted.
		PL	The last sentence of Clause A.2 should rather read: “ ... uEI is the standard uncertainty of the error (of indication)”. Omitting the word “standard” may be confusing to the reader.		Accepted.
ANNEX B					
		JP	“Standard Normal Distribution Table” → “Standard Normal Distribution Table (Z table)” (Reason) As “Z table” described in Annex D indicates a “Standard Normal Distribution Table”, it should be made consistent with Annex D by adding “Z table”.		Accepted.
		UK	Consider omitting, giving the NIST link		Prefer to keep both.
ANNEX C					
	Annexes C & D	JP	The reason of italic parts is not known. If those mean proposals on OIML recommendation. It is suggested from the viewpoint to make it easy to read and understand, we propose the		The italic parts are the steps given in option 2 of clause 7 of the ICD. The Example here is

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			proposals to OIML recommendation shall be described collectively at one place in this document.		showing how to implement the provisions of this option. Describing everything in one place would be equally confusing, but better cross-referencing will be used.
		US	Equation C.4 introduces sensitivity coefficients but does not define them or explain their use very clearly.		Agreed, but the idea here is to provide an example and not duplicate the GUM, which is referenced.
	Annex C Proc. 2	JP	Application at fields may depend on their various environment, it may be difficult "to determine how the indication changes"		This step is intended to cover type evaluation testing in a laboratory, where changes in environment (influence quantities) can be controlled and the effects on the indication can be monitored.
	Annex C Proc. 2 Eq. C.5	JP	Formula C.5 shall be changed to the following: $u_{PS}^2 = u_{PG}^2 + (g \cdot h)^2 u_{\rho_f}^2 + (-g \cdot h)^2 u_{\rho_a}^2 + [(\rho_f - \rho_a) \cdot h]^2 u_g^2 + [(\rho_f - \rho_a) \cdot g]^2 u_h^2$ (Reason) The calculation of sensitivity factor is wrong.		Thank you for noticing that the minus sign in the third term is not present in C.5. Since the term is squared, the minus sign is inconsequential, however, it will be inserted.
	Annex C Proc. 2 Eq. C.7	JP	Formula C.7 shall be changed to the following: $u_{PS}^2 = (100)^2 + (9.79560 \cdot 0.0213)^2 (90)^2 + (-9.79560 \cdot 0.0213)^2 (0.005)^2 + \dots$ (Reason) Calculation of sensitivity factor is wrong.		Thank you for noticing that the minus sign in the third term is not present in C.7. Since the term is squared, the minus sign is inconsequential, however, it will be inserted.
	Annex C Proc. 6	JP	To simulate possible conditions that IUT could experience in a field environment. ↓ To simulate possible conditions (temperature test, humidity test, hysteresis test, etc.) that IUT could experience in a field environment. (Reason)		Accepted.

1st Committee Draft	Clause	Country	Comment	Proposal for modification	Secretariat's Response
			The explanation of contents of standard uncertainty (u_{roc}) in procedure 6 described in section 7 is not clear, and it can be made clearer with addition of concrete test items.		
	Through-out	UK	Express numbers correctly	Use '9.975 60' rather than '9.79560', etc.	Will be left to BIML Editor.
ANNEX D					
ANNEX E					
		PL	It is not clear, why two different symbols (C_M and C_m) are used on p .51 as they seem to denote the same notion ("measurement capability index").		Accepted (and corrected).
		SE	Add a statement that C_m is inversely proportional to MPU_{EI} and f_{EI} .		Not accepted (and not completely correct, since can't be inversely proportional to both). If an MPU_{EI} is specified, that can be compared directly with u_{EI} and use of C_m is not necessary.
ANNEX F					
		JP	To be deleted. (Reason) Annex F is the specification for measurement "uncertainty" of measuring instruments that have passed type evaluation or conformity assessment such as verification and have been placed on market. Measuring instruments placed on market should not be the subject being handled by OIML.		Not accepted. This is not intended as a normative Annex, and is provided for informational purposes only.
		US	The term "calibrated" in the 2 nd sentence, "... not only tested but <u>calibrated</u> , ...", appears to refer to an adjustment. This is not consistent with the VIM definition of "calibrated" which does not imply adjustment.		Not accepted. An adjustment is not intended, at least not a physical adjustment. Rather, what is intended by "calibration" is that a calibration curve is developed, from which measured values can be obtained from indicated values.