

**JCGM/WG1 template for reporting the comments on JCGM 102:2009.**

Member organization (M.O.) or NMI : ISO, IEC, NMIJ, ILAC

Please, fill in the Table sequentially according to the text

M.O. or NMI	Serial item No.	(Sub) clause (e.g. 4.1)	Paragraph No. / Line No. / Figure/ Table/Note	Justification for change	Proposed change	Response of JCGM/WG1
BoA				None		No action required
FINAS				FINAS has no comments on JCGM 102, Evaluation of measurement data – Supplement 2 to the “Guide to the expressions of uncertainty in measurement” – models with any number of output quantities.		No action required
DKD				We don't have any comments on the document JCGM 102 (Evaluation of measurement data - Supplement 2 to the "Guide to the expression of uncertainty in measurement" - models with any number of output quantities).		No action required
RvA	n.a.	n.a.	Whole document	No comments.	No comments.	No action required
HAA				Please note that the Croatian Accreditation Agency (HAA) has no any comment to the proposed and we are consent with the Guide document on uncertainty in measurement.		No action required
OAA				OAA has no comments on JCGM 102		No action required
NATA				Thank you for forwarding JCGM 102 for our comment.  The document was reviewed by our staff working in the area of accreditation of calibration laboratories. They have no specific comments to offer beyond the fact that it has obviously been written for a specific application - uncertainty for models that have multiple output quantities - and that those involved in such pursuits will probably have appropriate		No action required

				<p>knowledge of the statistics and complex mathematics that are involved.</p> <p>We did forward the document to our NMI but received no feedback. We do note however that this document has originated in the BIPM so there is obviously adequate NMI input!</p> <p>Thank you for this opportunity. I am sorry we have no "pearls of wisdom" to offer.</p>		
IAJapan	1	-	Overall (Comment to ILAC secretariat)	Some practical examples should be added for the purpose of reducing the job of ABs, CABs, and/or their related organizations (e.g. regulatory agencies) and keeping alignment among ABs.		Not accepted. In the opinion of JCGM/WG1, several practical examples are already included
ISO DE	1			Germany disagrees for the following reasons: No, in particular due to 5.2.1 (see comment below)		No action required
IEC	DE-01			No, in particular due to 5.2.1 (see comment below)		No action required
ISO DE	2			The term "true value" shall be avoided throughout the whole document, see VIM Introduction and GUM D.3.5.		Not accepted. 'True value' is used as in JCGM 200:2008 (VIM)
IEC	DE-02			The term "true value" shall be avoided throughout the whole document, see VIM Introduction and GUM D.3.5.		As above
ISO DE	3			According to the ISO/IEC directives the decimal marker shall be the comma on the line.	Change accordingly.	Not accepted. This is a JCGM document and not an ISO document. See 4.16
IEC	DE-03			According to the ISO/IEC directives the decimal marker shall be the comma on the line.	Change accordingly.	As above
ISO MY	4	General		Would this document be published as JCGM102 or ISO/IEC Guide 98-3? If it is to be published as part-3 of Guide 98, then what are the parts 1, 2 and 4?	Briefly discussed what are in the other parts of Guide 98	Accepted. This publication will be a JCGM document. A reference will be given to JCGM 104:2009, which describes the related JCGM documents

ISO	5	Contents		The normative vs informative status of the annexes is missing. According to the ISO/IEC Directives Part 2, 2004, 5.2.6, "The annex heading shall be followed by the indication "(normative)" or "(informative)", and by the title, each on a separate line.	Please indicate if the annexes are informative or normative in the contents and in the annexes themselves.	Accepted.
ISO DE	6	1		Add a paragraph as follows: →	This document addresses quality managers, members of standards development organizations, accreditation authorities and regulatory agencies.	Accepted in principle. The audience of this document is that of the GUM and its Supplements, and JCGM 104.
IEC	DE-04	1		Add a paragraph as follows: →	This document addresses quality managers, members of standards development organizations, accreditation authorities and regulatory agencies.	As above
ISO MY	7	3.13 & the rest of doc.		"the random variable $\mathbf{X}$ ..."? As $\mathbf{X}$ is a vector of random Variables, would it be more appropriate to called $\mathbf{X}$ as random vector		Not accepted. See 4.13
ISO MY	8	3.15		"... $g_{\mathbf{X}}(z)dz_N \cdots dz_{i+1}dz_{i-1} \cdots dz_1$ " should be " $\dots g_{\mathbf{X}}(\xi)d\xi_N \cdots d\xi_{i+1}d\xi_{i-1} \cdots d\xi_1$ "	Change " $\dots g_{\mathbf{X}}(z)dz_N \cdots dz_{i+1}dz_{i-1} \cdots dz_1$ " to " $\dots g_{\mathbf{X}}(\xi)d\xi_N \cdots d\xi_{i+1}d\xi_{i-1} \cdots d\xi_1$ "	Accepted
ISO MY	9	3.18		The term $g_{X_i, X_j}(\xi_i, \xi_j)$ is not defined.	where $g_{X_i, X_j}(\xi_i, \xi_j)$ is the joint PDF of the two random variables $X_i$ and $X_j$ .	Accepted
NMIJ	1	3.19 (and 3.20)		Both "Cov" and "cov" are used to express covariance. For example, "Cov" is used in 3.19, while "cov" in 3.20 NOTE 1.	If there is a need to discriminate these expressions, their difference should be clarified. Otherwise, use the same symbol.	Accepted in principle. Appropriate action taken.
ISO DE	10	3.20	term	For consistency the word "measurement" shall be deleted.	Use "uncertainty matrix" throughout the document according to ISO/IEC Guide 98-3 Suppl. 1, 6.4.8.1.	Not accepted. The use follows a decision made by JCGM/WG1

IEC	DE-05	3.20	term	For consistency the word "measurement" shall be deleted.	Use "uncertainty matrix" throughout the document according to ISO/IEC Guide 98-3 Suppl. 1, 6.4.8.1.	As above
ISO DE	11	3.20	Note 1	The diagonal elements of the matrix shall be written as $u^2(x_i)$ as explained in the definition. It shall read Cov instead of cov according to 3.18. See ISO/IEC Guide 98-3 Suppl. 1, 6.4.8.1. The non-diagonal element shall be written as $u(x_i, x_j)$ (see 6.5.2.2 and ISO/IEC Guide 98-3 Suppl. 1, 6.4.8.1).	Change accordingly.	Accepted in principle. Appropriate action taken.
IEC	DE-06	3.20	Note 1	The diagonal elements of the matrix shall be written as $u^2(x_i)$ as explained in the definition. It shall read Cov instead of cov according to 3.18. See ISO/IEC Guide 98-3 Suppl. 1, 6.4.8.1. The non-diagonal element shall be written as $u(x_i, x_j)$ (see 6.5.2.2 and ISO/IEC Guide 98-3 Suppl. 1, 6.4.8.1).	Change accordingly.	As above
ISO DE	12	3.23	term and definition	The concept deviates from the one in the GUM. Why adapted and not adopted?	Replace completely by the concept of the GUM.	Not accepted. The GUM does not define 'coverage interval'. The definition used is as in JCGM 101:2008, accounting for JCGM 200:2008 (VIM)
IEC	DE-07	3.23	term and definition	The concept deviates from the one in the GUM. Why adapted and not adopted?	Replace completely by the concept of the GUM.	As above
ISO DE	13	3.25	term and definition	The concept deviates from the one in the GUM. Why adapted and not adopted?	Replace completely by the concept of the GUM.	Not accepted. The definition used is as in JCGM 101:2008, accounting for JCGM 200:2008 (VIM)
IEC	DE-08	3.25	term and definition	The concept deviates from the one in the GUM. Why adapted and not adopted?	Replace completely by the concept of the GUM.	As above
ISO DE	14	3.27	formula and note	According to 3.20 the letter symbol $V$ shall be replaced by $U_X$ . Throughout the document $U$ shall be used. The expectation is usually $x$ or $E(X)$ and not $\mu$ . See ISO/IEC Guide 98-3 Suppl. 1, 6.4.8.1).	Change accordingly.	Not accepted. $V$ and $\mu$ are used in the context of random variables, $U$ and $x$ in the context of values of those variables

IEC	DE-09	3.27	formula and note	According to 3.20 the letter symbol $V$ shall be replaced by $U_X$ . Throughout the document $U$ shall be used. The expectation is usually $\bar{x}$ or $E(X)$ and not $\mu$ . See ISO/IEC Guide 98-3 Suppl. 1, 6.4.8.1).	Change accordingly.	As above
ISO DE	15	3.28	definition	The parameters need to be explained. The gamma function needs not to be explained.		Accepted
IEC	DE-10	3.28	definition	The parameters need to be explained. The gamma function needs not to be explained.		As above
ISO DE	16	5.2.1	a)	It is essential that $x_i$ and $u(x_i)$ are mentioned.		Not accepted. The formulation is consistent with JCGM 101:2008 to which reference is made
IEC	DE-11	5.2.1	a)	It is essential that $x_i$ and $u(x_i)$ are mentioned.		As above
ISO DE	17	7.1		No information is given about the "Monte Carlo error". Such information is necessary to assess the accuracy of the method.	Add accordingly.	Not accepted. The formulation is consistent with JCGM 101:2008. Moreover, 7.1.8, 7.2 and 8.3 give relevant advice
IEC	DE-12	7.1		No information is given about the "Monte Carlo error". Such information is necessary to assess the accuracy of the method.	Add accordingly.	As above
ISO MY	18	7.3		For completeness, there should be a sub-clause on the generation of widely used multivariate Gaussian distribution (even though its detail discussion is referred to GUM supplement 1), beside the sub-clause 7.3.2 that discussed the generation of multivariate t-distribution.	Add a new sub-clause on Multivariate Gaussian distribution with an example.	Not accepted. Adequate reference to JCGM 101:2008 where this aspect is discussed is given
ISO MY	19	7.17	Note 1	A specific subclause is referred to in Supplement 1.	Add the year after Supplement 1.	Accepted
ISO MY	20	7.7.4	EXAMPLE	Provide simple discussion on how the lower triangular Matrix $L$ can be obtained, and provide the matrix $L$ of this example.		Accepted. Appropriate additions made to 7.7.4 and example.
ISO DE	21	7.8.2		To fundamental understanding the term "numerical tolerance" is extremely misleading and shall be replaced by $\rightarrow$	"rounding uncertainty".	Not accepted. Terminology aligns with GUM Supplement 1.
IEC	DE-13	7.8.2		To fundamental understanding the term "numerical tolerance"	"rounding uncertainty".	As above

				is extremely misleading and shall be replaced by →		
NMIJ	2	8 (and 9.2)		The “confidence interval” in the classical statistics is used in the GUM. On the other hand, this supplement uses the “coverage region” based on the Bayesian statistics. These two regions (or intervals) are not expected to be identical in principle. It is not appropriate to attempt to validate one of them by the other.	Add a note that validation like this is meaningful only to examine the insignificance of nonlinearity of measurement model or non-normality of distribution.	Not accepted. Treatment is consistent with GUM Supplement 1.
NMIJ	3	9.1		Subsection 9.1 does not give “Illustrations of aspects of this Supplement” but just “Illustrations of aspects of this section”.	Replace the title “Illustrations of aspects of this Supplement” with “Illustrations of aspects of this section”.	Not accepted. Title is correct
JAB	5	9.2.2.5	last line	close parentheses		Accepted
NMIJ	4	9.3		It remains unsettled whether the standard uncertainty should be defined as "the square root of the mean value of population variance" or "the standard deviation of population mean" in the Bayesian context. However, in subsection 9.3, the latter definition is adopted without any explanations. It is desirable to avoid discussion on the definition of standard uncertainty, and focus discussion on the coverage region.	Replace the discussions on standard deviations with those on coverage regions.	No specific change is proposed. JCGM/WG1 has decided not to make modification. Interested readers can refer to Kacker's paper, below, now included as a reference.
NMIJ	5	9.3		The alternative GUF method here is treated in the article by R N Kacker, “Bayesian alternative to the ISO-GUM's use of the Welch-Satterthwaite formula”, Metrologia 43(2006) 1-11.	Add Kacker's paper to the reference list.	Accepted
IAJapan	2	9.4.2.3	Table 11 (Comment to JCGM)	<p>It should be clearly identified that GUF refers to standard uncertainty and that MCM and Alt. GUF do not refer to standard uncertainty in order to avoid misunderstanding.</p> <p>Generally, according to other relevant standards including JCGM 200, small “<i>u</i>” is used for “standard uncertainty” (e.g. “<i>u</i>(<i>x</i>)”) or “combined standard uncertainty” (e.g. “<i>u<sub>c</sub></i>(<i>y</i>)”) and large “<i>U</i>” is used for expanded uncertainty</p> <p>However, in table 11, though small “<i>u</i>” is used for “<i>u</i>(<i>R</i>)/<math>\Omega</math>”, “<i>u</i>(<i>X</i>)/<math>\Omega</math>” and “<i>u</i>(<i>Z</i>)/<math>\Omega</math>”, the value of GUF “<i>u</i>(<i>R</i>)/<math>\Omega</math>”, 0.058 differs from the one of MCM “<i>u</i>(<i>R</i>)/<math>\Omega</math>”, 0.130.</p>		No specific change is proposed. JCGM/WG1 has decided not to make modification. Interested readers can refer to Kacker's paper, above, now included as a reference.

				If MCM uncertainties are evaluated with t-distribution and Alt. GUF uncertainties are evaluated with multivariate t-distribution with $p=0.95$ as each coverage probability, those values are not regarded as standard uncertainties.		
IAJapan	3	9.5.1	1 <sup>st</sup> sentence (Comment to JCGM)	This example is considered to be IPRT (Pt100).	Since sensitivity coefficient given in 9.5.2.6 refers to industrial platinum resistance thermometer (IPRT), change “a resistance thermometer” to “an industrial platinum resistance thermometer”	Accepted
IAJapan	4	9.5.3.7	Figure 22 (Comment to JCGM)	Practically, temperature is not assumed to be measured based on such a correlation as given in Fig. 22. If possible, more useful example should be inserted in this document.		Not accepted. The example is based on an existing thermometer and parameters derived from an actual calibration of the thermometer. The correlation given in figure 22 is typical for instruments for which the measurement uncertainty is dominated by the uncertainty due to calibration
JAB	6	-		make Alphabetical index		Accepted
ISO	22	C	1	The first paragraph is a hanging paragraph.	Add a "C.1 General", and renumber C.1 as C.2.	Accepted
ISO DE	23	Annex D		The list shall be thoroughly revised. E. g. $\mathcal{S}$ is missing.		Accepted
IEC	DE-14	Annex D		The list shall be thoroughly revised. E. g. $\mathcal{S}$ is missing.		As above
ISO DE	24	Bibliography		Some more information about the Monte Carlo method shall be given.	Add: George S. Fishman, Monte Carlo - concepts algorithms and applications, Springer New York	Not accepted. Relevant information concerning Monte Carlo method is given in JCGM 101:2008

					1996 and the references in there.	and JCGM 102
IEC	DE-15	Bibliography		Some more information about the Monte Carlo method shall be given.	Add: George S. Fishman, Monte Carlo - concepts algorithms and applications, Springer New York 1996 and the references in there.	As above