

Aggiornamenti rispetto all'evoluzione normativa in corso: *la revisione della GUM*

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La GUM

La GUM - Guide to the expression of uncertainty in measurement è stata pubblicata nel 1995 dal BIPM, IEC, IFCC, ISO, IUPAC, IUPAP e l'OIML.

Le organizzazioni coinvolte nello sviluppo della guida sono:

- BIPM – Bureau International des Poids et Mesures; 
- IEC – International Electrotechnical Commission; 
- **ILAC – International Laboratory Accreditation Cooperation (dal 2005);** 
- IFCC – International Federation of Clinical Chemistry; 
- ISO – International Organization for Standardization; 
- IUPAC – International Union of Pure and Applied Chemistry; 
- IUPAP – International Union of Pure and Applied Physics 
- OIML – International Organization of Legal Metrology 

Le Guide in Metrologia

Il JCGM (Joint Committee for Guides in Metrology) è responsabile della GUM (WG 1) e del VIM (WG 2)

Entrambi i documenti sono scaricabili gratuitamente dal sito del BIPM

Bureau International des Poids et Mesures - the intergovernmental organization through which Member States act together on matters related to measurement science and measurement standards.

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Guides in Metrology

Overview | **Uncertainty in Measurement (GUM)** | Vocabulary of Metrology (VIM)

→ The Joint Committee for Guides in Metrology (JCGM) has responsibility for the following two publications:

- **Guide to the Expression of Uncertainty in Measurement (known as the GUM); and**
- *International Vocabulary of Metrology - Basic and General Concepts and Associated Terms (known as the VIM).*

The latest versions of these and related publications can be downloaded free of charge from the BIPM website.

In order to benefit fully from the hyperlinking between the documents, the reader is advised to download all JCGM documents presently available in one ZIP file.

Related articles

GUM:

- BIPM Consultation: Revised GUM documents
- BIPM Workshop on Measurement Uncertainty
- Software related to the GUM and the GUM supplements 1 and 2
- Tutorial for metrologists on the probabilistic and statistical apparatus underlying the GUM and related documents
- Bibliography on Uncertainty
- News from the JCGM-WG1
- JCGM Working Group 1

VIM:

- The rationale for VIM3
- FAQs on the VIM3
- News from the JCGM-WG2
- JCGM Working Group 2

JCGM 100:2008. Guide to the expression of uncertainty in measurement

La GUM e i suoi Supplementi

Guides in Metrology

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→ The fundamental reference document is the *Guide to the Expression of Uncertainty in Measurement (GUM)*:

- [Evaluation of measurement data – Guide to the expression of uncertainty in measurement](#)
 JCGM 100:2008
 (GUM 1995 with minor corrections)

Note: JCGM 100:2008 is also available in HTML form from the [JCGM portal](#) on ISO's website.

→ The JCGM Working Group 1 (JCGM-WG1) is producing a series of documents to accompany the GUM. The first four of these documents have been approved and are available for download as PDF files. Printed copies are available for purchase from ISO.

Evaluation of measurement data – An Introduction to the "Guide to the expression of uncertainty in measurement" and related documents JCGM 104:2009	
Evaluation of measurement data – Supplement 1 to the "Guide to the expression of uncertainty in measurement" – Propagation of distributions using a Monte Carlo method JCGM 101:2008	
Evaluation of measurement data – Supplement 2 to the "Guide to the expression of uncertainty in measurement" – Extension to any number of output quantiles JCGM 102:2011	
Evaluation of measurement data – The role of measurement uncertainty in conformity assessment JCGM 106:2012	
Evaluation of measurement data – Concepts and basic principles	

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- News from the JCGM-WG2
- JCGM Working Group 2

GUM 1995 con
correzioni minori

Supplemento 1
Metodo Monte Carlo

Supplemento 2
Modelli Multivariati

JCGM 106:2012
Ruolo dell'incertezza di
misura nella valutazione
della conformità

La revisione della GUM

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- **BIPM Workshop on Measurement Uncertainty**

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- FAQs on the VIM3
- News from the JCGM-WG2
- JCGM Working Group 2

Area Riservata:
Revisione della GUM

Workshop
sull'Incertezza di
Misura (BIPM, giugno
2015)

La revisione della GUM

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Revisione della GUM

Workshop sull'Incertezza
di Misura (BIPM, giugno
2015)

W. Bich, "Revision of the "Guide to the Expression of Uncertainty in Measurement". Why and how", *Metrologia* 51 (2014), S155-S158.

Limiti della GUM

Possibili situazioni di non soddisfacente stima dell'incertezza:

- Modello di misura fortemente non lineare;
- Distribuzioni di probabilità delle quantità di input non simmetriche;
- Contributi di incertezza di diverso ordine di grandezza;
- Distribuzione di probabilità della variabile di output che si discosta dalla Gaussiana
- Caso di più misurandi (Multivariato)

Nuova GUM

Principali novità della bozza della nuova GUM - JCGM 100:201X

$$y = f(x_1, x_2, \dots)$$

- Le funzioni di densità di probabilità (PDF) descrivono il livello di conoscenza di tutte le variabili di input x_i del modello di misura (approccio di tipo Bayesiano). Il parametro - deviazione standard della PDF - porta alla determinazione dell'incertezza:

- non vi è più la distinzione fra l'incertezza di Categoria A e B per l'incertezza di Categoria A:

attuale GUM $u(x_i) = s/\sqrt{n}$; nuova GUM $u(x_i) = \sqrt{n}$
 $-1/\sqrt{n} - 3 s/\sqrt{n}$;

- non è più necessario calcolare i gradi di libertà dell'incertezza (uso della formula di Welch-Satterthwaite)
- non è più necessario approssimare la distribuzione della variabile di output con una Gaussiana o t-Student

Nuova GUM

Principali novità della bozza della nuova GUM - JCGM 100:201X:

- Determinazione di intervalli di copertura di tipo conservativo

$$k \downarrow p = \overset{\Rightarrow}{t} / \sqrt{1-p} \quad \text{ad esempio per } p = 0.95 \quad k_p = 4,47$$

$$k \downarrow p = 2/3 \sqrt{1-p} \quad \overset{\Rightarrow}{\text{per PDF simmetriche}} \quad \text{ad esempio per } p = 0.95 \quad k_p = 2,98$$

- Attenzione particolare al Supplemento 1 (Simulazione Monte Carlo)
- Costituzione di un nuovo documento dedicato esclusivamente agli esempi (**JCGM 110:201X Evaluation of measurement data – Examples of uncertainty evaluation**).
-

EA e ILAC

- 18 febbraio 2015: diffusione nuova GUM da parte della Segreteria ILAC con richiesta di commenti a tutti i membri ILAC
- 18-19 marzo 2015: presentazione di M. Cox (NPL) sulla nuova GUM alla riunione EA LC di Atene;
- 18-19 marzo 2015 e il 9-10 aprile: Presentazione di E. Oehlenschlaeger (DANAK) sulla nuova GUM alla riunione EA LC di Atene e a quella dell'ILAC AIC a Francoforte;

Quesiti senza ancora una risposta:

- Tempi di applicazione della nuova GUM e definizione del periodo di transizione;
- Verifica della linearità dei modelli di misura dei bilanci di incertezza dei Laboratori accreditati tramite l'applicazione del Supplemento 1 (Simulazione Monte Carlo);
- Revisione dei bilanci di incertezza contenenti importanti contributi di categoria A (con $n < 10$) e conseguente variazione delle CMC;
- Attesa della revisione dei documenti che fanno riferimento alla GUM (EA 4/02, ILAC P14, ILAC G17, ILAC G8 per la sua implementazione.

ACCREDIA L'ente italiano di accreditamento

Grazie per l'attenzione

Paola Pedone