



National Measurement System Guidance Documents

Advanced Manufacturing & Underpinning Metrology

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| Document Title and Hyperlink | Document Description |
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| A beginner's guide to uncertainty in measurement. | The guide explains the concept and importance of measurement uncertainty, using examples from everyday life. It illustrates how to estimate uncertainty in real measurement situations, showing a detailed uncertainty calculation step by step. |
| Absorption and diffusion of moisture in polymeric materials. . | This Guide describes methods for measuring the absorption and diffusion of moisture in polymeric materials, including plastics, adhesives and composites |
| Accelerated environmental ageing of polymeric materials. | This Good Practice Guide is intended to give guidance on accelerated ageing and performance testing of polymeric materials for generating design data and for quality assurance purposes. |
| Adhesive tack. | This guide is intended to give guidance on the measurement of permanently tacky pressure sensitive adhesives (including tapes) and adhesives whose tack requires activation in some way. |
| Application of MEMS Ultrasonic Transducers to Flow Measurement | This guidance document describes Application of MEMS Ultrasonic Transducers to Flow Measurement |
| Assessment and criticality of defects and damage in materials systems. | Guidance and recommendations are provided as to the degree of knowledge and complexity required for non-destructive evaluation (NDE), defect classification, defect criticality assessment and materials characterisation. |
| Ball cratering or micro-abrasion wear testing of coatings. | This Guide aims to provide introductory guidance on wear testing for coatings using the ball cratering or micro-abrasion wear test. |
| Best Practice Guide for Generating Mass Spectra | The guide takes the user, step-by-step, through the process of generating mass spectra that are fit for purpose. |

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| Biaxial flexural strength testing of ceramic materials. | Covering the advantages and disadvantages of the wide range of possible testing geometries. |
| Calibration and use of Optical Time Domain Reflectometers (OTDR). | This document describes the calibration of Optical Time Domain Reflectometers (OTDR). |
| Callipers and micrometers. | This guide covers the use of callipers and micrometers for internal, external and depth measurements. |
| Characterisation of flexible adhesives for design. | This guidance document describes the characterisation of flexible adhesives for design |
| Characterising strength of adhesion. | Guidance is given to the selection and use of surface characterisation and adhesion strength test methods. |
| CMM measurement strategies. | This guide covers the selection of the number of measurement points when using Co-ordinate Measuring Machines (CMMs). |
| CMM probing. | This guide is a general guide on probes and probing. |
| CMM verification. | This guide covers performance assessment of CMM accuracy, use of everyday artefacts for regular CMM checking, methods of monitoring machine performance between formal verification intervals, and traceability. |
| Code of practice for the measurement of bending in uniaxial low cycle fatigue testing. | The code of practice includes a method for measuring bending caused by misalignment of loading in uni-axial fatigue testing. |

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| Cure monitoring techniques for polymer composites, adhesives and coatings. | This guidance document describes cure monitoring techniques for polymer composites, adhesives and coatings. |
| Determination of residual stresses by magnetic methods. | This guidance document describes determination of residual stresses by magnetic methods. |
| Determination of residual stresses by X-ray diffraction. | This guide is applicable to X-ray stress measurements on crystalline materials. |
| Durability performance of adhesive joints. | This document is intended to give guidance on the selection and use of test methods and environmental conditioning procedures for generating design data and for quality assurance purposes. |
| Elastic modulus measurement. | The Good Practice Guide draws together some of the background to the techniques, discusses the current standards, and highlights a number of key factors crucial to obtaining good quality measurement. |
| Estimating uncertainties in testing | This guide presents principles and guidance for the estimation of measurement uncertainty. |
| Eurachem Guide: The Fitness for Purpose of Analytical Methods. A Laboratory Guide to Method Validation and Related Topics | A guide for laboratory managers responsible for setting up and evaluating validation studies, as well as for analysts carrying out validation work. |
| EURACHEM Guide: The selection and use of reference materials | This guide gives detailed guidance for the establishment of measurement traceability in quantitative chemical analysis and will assist laboratories in meeting the traceability requirements of ISO 17025. |
| Eurachem/CITAC Guide: Measurement uncertainty arising from sampling: A guide to methods and approaches | This Guide aims to describe various methods that can be used to estimate the uncertainties arising from the processes of sampling and the physical preparation of samples. |

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| Eurachem/Citac Guide: Quality Assurance for Research and Development and Non-routine Analysis | This guide provides those working in the non-routine environment with advice on good practice to facilitate the implementation of quality systems. |
| Eurachem/Citac Guide: Quantifying Uncertainty in Analytical Measurement, 2nd Edition | This guide gives detailed guidance on the evaluation of uncertainty in quantitative chemical analysis, based on the approach taken in the ISO 'Guide to the Expression of Uncertainty in Measurement'. |
| EURACHEM/CITAC guide: Traceability in chemical measurement | This guide gives detailed guidance for the establishment of measurement traceability in quantitative chemical analysis and will assist laboratories in meeting the traceability requirements of ISO 17025. |
| Eurachem/CITAC Guide: Use of uncertainty information in compliance assessment | The guide is applicable to decisions on compliance with regulatory or manufacturing limits where a decision is made on the basis of a measurement result accompanied by information on the uncertainty associated with the result. |
| Extensional flow properties of polymer melts using stretching flow methods. | This guide details the measurement of the extensional flow properties of polymer melts using tensile stretching methods. |
| Extensional flow properties of polymers using stretching flow methods. | This guidance document describes the extensional flow properties of polymers using stretching flow methods. |
| Fatigue and creep testing of adhesives and thermoplastic joined systems. | This Good Practice Guide is intended to give guidance on fatigue testing of adhesively bonded joints and creep testing of bonded joints and welded thermoplastics for generating design data and for quality assurance purposes. |
| Fibre reinforced plastic composites - machining of composites and specimen preparation. | The guide provides background information on all stages and aspects of machining and specimen preparation. |
| Fibre-reinforced plastic composites - qualification of composite materials. | This Measurement Good Practice Guide presents a Standard Qualification Plan (SQP) aimed at reducing the substantial costs involved in qualifying fibre-reinforced plastic composite materials. |

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| Finite element analysis of piezoelectric ceramics. | This guide is intended to help people wanting to do finite element analysis of piezoelectric materials. |
| Flexural strength testing of ceramics and hardmetals. | Covering standardised tests, reasons for geometrical limitations, surface finish requirements, chamfering, test jig design requirements, sources of error (including friction and alignment problems), good test practice. |
| Force. | The guide aims to help anyone wishing to measure force in any industrial or laboratory environment. (not available to download, must be requested) |
| Fractography of brittle materials. | Covering the methodology for viewing fractured fragments of brittle components such as high-strength ceramics and hard metals, tracing the path of fracture and identifying the fracture origins. |
| Fundamental good practice guide in the design and interpretation of engineering drawings for measurement processes | This good practice guide is written for engineers, designers and metrology technicians who wish to understand the basics of the interpretation of engineering drawings in relation to the measurement process. |
| Fundamental good practice in dimensional metrology. | This good practice guide is written for those who need to make dimensional measurements but are not necessarily trained metrologists. |
| General approach and procedures for erosive wear testing. | This guide aims to provide guidance on erosive wear testing. |
| Good practice guide for quantifying microstructural heterogeneity in hot compression testpieces. | This document describes good practice for measurements of material microstructure in hot compression testpieces such as AC (axisymmetric) and PSC (plane strain). |
| Good practice guide for the measurement of gloss. | This guide describes how gloss is specified and measured. It contains recommendations on how to obtain the suitable results for a given application, including descriptions of technology and the assessment of uncertainties. |

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| Good practice guide to phase noise measurement. | This guidance document describes good practice in phase noise measurement. |
| Good Practice Guide: Introduction to Flow Meter Installation | This good practice guide describes Good Practice Guide: Introduction to Flow Meter Installation Effects |
| Guide to mechanical tests for hardmetals. | This guidance document describes mechanical tests for hardmetals. |
| Guide to the calibration and testing of torque transducers. | This guide describes a collection of methods for the calibration of a torque transducer. It encompasses transducers based on different technologies and transducers that operate in both static and dynamic applications. |
| Guide to the Measurement of Humidity | A detailed guide to many aspects of humidity measurement. It covers humidity concepts and definitions, methods of measurement, instrument performance and calibration, and good measurement practices for humidity. (not available to download, must be requested) |
| Guide to the measurement of smooth surface topography using coherence scanning interferometry. | This guide describes good practice for the measurement and characterisation of smooth surface topography using coherence scanning interferometry. |
| Guidelines for in-house production of Reference Materials - Version 2 | The guidelines highlight the key issues that analysts should take into account when preparing reference materials in-house. |
| Guidelines for measuring anionic contamination of Printer Circuit Boards (PCB) and Circuit Assemblies (PCA) using ion chromatography. | This guide provides the procedure to identify the level of anionic contamination residues on printed circuit boards (PCBs) and circuit assemblies (PCAs) using Ion Chromatography (IC). |
| High temperature solid torsion tests. . | This guide outlines good measurement practice to be adopted for High Temperature Torsion tests on solid metallic materials. |

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| Human factors in measurement and calibrations. | This guide takes as its central theme the impact of human strengths and weaknesses on the accuracy and efficiency of measurement calibration services. |
| Improving single-crystal orientation determination for advanced nickel-based alloys. | This Good Practice Guide describes the determination of single-crystal orientation measurements for single-crystal nickel-base castings by back and side-reflection X-ray diffraction (Laue). |
| Improving the consistency of particle size measurement. | The principal causes of variability in particle size measurement, particularly in the sub-sieve range of 50 µm to sub 1 µm are summarised. |
| Laboratory test procedures to high temperature steam atmosphere. | The influence of various experimental parameters, which can be controlled in the laboratory, on the steam oxidation response of materials is discussed and recommendations for best practice are proposed. |
| Mass & Weight - | This Guide offers valuable information about a wide range of issues affecting weighing from traceability to practical aspects of weighing. (not available to download, must be requested) |
| Measurement and analysis of creep in plastics. | The guide describes procedures for obtaining creep data for plastic test pieces. |
| Measurement and modelling of self-heating in piezoelectric materials and devices. | Failures due to thermal issues are common in high power piezoelectric devices. This Good Practice Guide aims to give engineers an understanding of the problems, where they occur and how to avoid them. |
| Measurement of high field dielectric properties of piezoelectric materials. | These guidelines are intended to enable a user to perform high field dielectric measurements on piezoelectric ceramic materials such as PZT (lead zirconium titanate). |
| Measurement of the extensional flow properties of polymer melts using converging flow methods. | This guide details the measurement of the extensional flow properties of polymer melts using converging flow methods. |

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| Measuring flow stress in hot axisymmetric compression tests. | The guide describes good practice for measuring hot flow stress in metallic materials. |
| Measuring flow stress in plane strain compression tests. | This guidance document describes measuring flow stress in plane strain compression tests |
| Measuring piezoelectric d33 coefficients using the direct method. | This guide will examine the advantages and disadvantages of the direct method. |
| Meeting the traceability requirements of ISO 17025: An analyst's guide (3rd ed) | This guide provides essential practical advice to analysts and laboratory managers on how to establish the traceability of their results to reliable and appropriate measurement standards. |
| Method of measuring piezoelectric displacement in piezoelectric ceramics. | This Good Practice Guide is intended to aid a user to perform displacement measurements on piezoelectric ceramic materials such as PZT (lead zirconium titanate) in either monolithic or multilayer form. |
| Methodology for Accurate Mass Measurement of Small Molecules | The aim of this guide is to provide users and suppliers of Accurate Mass instrumentation with a clear summary of the essential steps in obtaining reliable data. |
| Microstructural measurement on ceramics and hardmetals. | This guide provides information on the role of microstructure on properties and performance. |
| Multi-rate and extensional flow measurements using the melt flow rate instrument. | This guide presents the procedures and analyses necessary to carry out testing using new methods based on the use of the melt flow rate equipment for characterising the shear and extensional flow behaviours of polymer melts. |
| Non-destructive assessment of coating adhesion. | This document is a guide to the non-destructive assessment of coating adhesion both for the purposes of manufacturing quality assurance and onsite inspection. |

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| Piezoelectric resonance. | This Guide is intended to help a user to perform resonance spectra measurements on piezoelectric ceramics. |
| Polarisation effects and measurements in optical fibre systems. | This document has been written to give guidance and understanding to the array of polarisation properties and effects found within optical fibres, optical fibre components and optical fibre systems. |
| Predicting and measuring the 'feel' of soft-touch thermoplastic elastomers. | This guidance document describes predicting and measuring the 'feel' of soft-touch thermoplastic elastomers |
| Prediction of the impact performance of plastics using finite element methods. | This guidance document describes predicting the impact performance of plastics using finite element methods. |
| Preparation and testing of adhesive joints. | This guide will give guidance on the preparation and testing of adhesive joints, and the use of test methods. |
| Preparation of Calibration Curves: A Guide to Best Practice | The aim of this guide is to highlight good practice in setting up calibration experiments, and to explain how the results should be evaluated. |
| Pressure & Vacuum. | This guide provides advice for those wishing to select and use instruments for measuring pressure or vacuum.. (not available to download, must be requested) |
| Regular transmittance measurements. | This document is a guide to the assessment of spectrophotometers that are used to make regular transmittance measurements of optical radiation at ultra-violet (UV), visible and near infrared (NIR) wavelengths from 200 nm to 3000 nm. |
| Residual stress in polymeric mouldings. | This guide describes approaches to measurement of residual stress using layer removal, hole-drilling and chemical probe techniques. It will be of particular value to polymer processors, designers and materials testers. |

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| Rotating wheel abrasive wear testing. | This Measurement Good Practice Guide aims to provide introductory guidance on abrasive wear testing. |
| Selecting a Flow Meter | This guidance document describes Selecting a Flow Meter |
| Slip flow measurement by capillary extrusion rheometry. | This guidance document describes slip flow measurement by capillary extrusion rheometry. |
| Solderability testing of surface mount components and PCB pads. | This document guides you to choose the correct test parameter settings for solderability testing of different type and size surface mount components and PCB pads. |
| Surface colour measurements. | This document is a guide to the measurement of surface colour. It is primarily concerned with visible wavelengths of light in the range 360 nm to 780 nm. |
| Surface tension and extrusion-based rheological characterisation of hot melt adhesives. | This Guide presents guidance for good practice in measurement of the surface tension and the shear and extensional flow properties of hot melt adhesives. |
| Surface testing for bonding. | Methods for determining roughness, wettability, absorbency and bonding performance are presented. |
| Tests for advanced technical ceramic materials performance. | This guidance document describes tests for advanced technical ceramic materials performance. |
| The assessment of damage tolerance under long-term loading. | This Guide provides best practice guidance for fatigue loading of composite materials and on the use of traditional static defect tolerance test methods under long-term fatigue loading. |

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| The guide to the preparation and testing of bulk specimens. | This guide describes methods for preparing bulk specimens of adhesives and methods for testing these for the determination of mechanical property data needed for design. |
| The measurement of mass and weight. | This Good Practice Guide is intended as a useful reference for those involved in the practical measurement of mass and weight. |
| The measurement of palmqvist toughness for hard and brittle materials. | Covering a draft procedure appropriate for hard metals, background to successful testing, potential errors, correlations to plain-strain toughness tests discussion of problems of using the test on ceramic materials. |
| The measurement of residual stresses by the incremental hole drilling technique. | This guide provides both the inexperienced user and the expert with a practical guide to achieving better measurements. |
| The measurement of surface texture using stylus instruments. | This guide covers the measurement of surface texture using a stylus instrument. |
| The metallographic measurement of WC grain size. | This guide details recent developments in understanding the measurement issues. |
| The scratch test: calibration, verification and the use of a certified reference material. | This guide aims to help you get the best out of your scratch tester. |
| The use of finite element methods for design with adhesives. | This guidance document describes the use of finite element methods for design with adhesives. |
| The use of GTEM cells for EMC measurements. | This guide is aimed at users of GTEM cells. |

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| Thermal analysis techniques for composites and adhesives (second edition). | This Measurement Good Practice Guide covers five thermal analysis techniques; DSC, TMDSC, DMA, DEA and DTUL. |
| Thermal analysis techniques for composites and adhesives. | This Guide covers three of the most common thermal analysis techniques. |
| Uncertainties in surface colour measurements. | This guidance document describes the uncertainties in surface colour measurements. |
| Uncertainty and statistical modelling. | This guide provides best practice on the evaluation of uncertainties within metrology, and on the support to this topic given by statistical modelling. |

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