



**Future Perfect**

A subsidiary of General Physics (UK) Ltd  
[www.gpsustainability.com](http://www.gpsustainability.com)

# ISO Standard Listing and Summary Handout

© Future Perfect Limited 2011

Future Perfect Limited  
Arden House, Hampton Court, Marsh Lane,  
Hampton in Arden, Solihull, West Midlands B92 0AJ  
Main Office: +44 (0)1675 446321  
Email: [futureperfecttraininguk@gpworldwide.com](mailto:futureperfecttraininguk@gpworldwide.com)

# ISO Standard Listing and Summary Handout

## Relevant ISO standards – The basics

EU Decision 18/07/07 (on Monitoring and Reporting) lists a number of international and European standards that it requires to be used as reference for certain areas of calculation and reporting activity.

Verifiers should be aware of and familiar with standards relevant to the verification activities that they are undertaking.

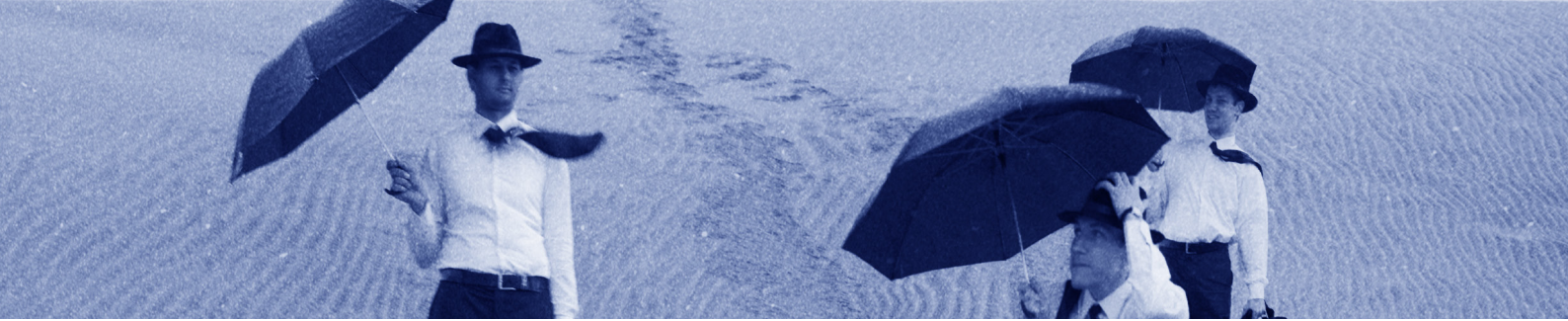
The Standards listed are:

## Quality assurance and quality control

The Decision requires that the operator establishes, documents, implements and maintains an effective data management system for the monitoring and reporting of greenhouse gas emissions in accordance with the guidelines. Such a system should be put into place before the start of the reporting period, in order that all data is recorded and controlled appropriately in preparation for verification. The decision outlines what is expected within such a system. The decision specifically recognises the use of systems that meet the following standards:

- EU Eco-Management and Audit Scheme (EMAS)
- ISO 14001:1996 - Environmental management systems – Specification with guidance for use
- ISO9001:2000 - Quality management systems – Specification with guidance for use

It should be noted that since the EU published the decision document, ISO has revised and reissued the ISO14001 standard as ISO14001:2004. It is this standard therefore operators would be expected to be working to if they have a registered EMS. 2005 was the transition year from old to new versions.



## Measuring techniques and devices

The Decision requires that the operator ensures that relevant measuring equipment is calibrated, adjusted and checked at regular intervals including prior to use, and checked against measurement standards traceable to international measurement standards. In addition, the operator needs to assess and record the validity of any previous measuring results when the equipment is found not to conform to requirements. When equipment is found not to conform to requirements, the operator must promptly take necessary remedial action. Records of the results of calibration and authentication shall be retained.

Standards of relevance to measurement systems include:

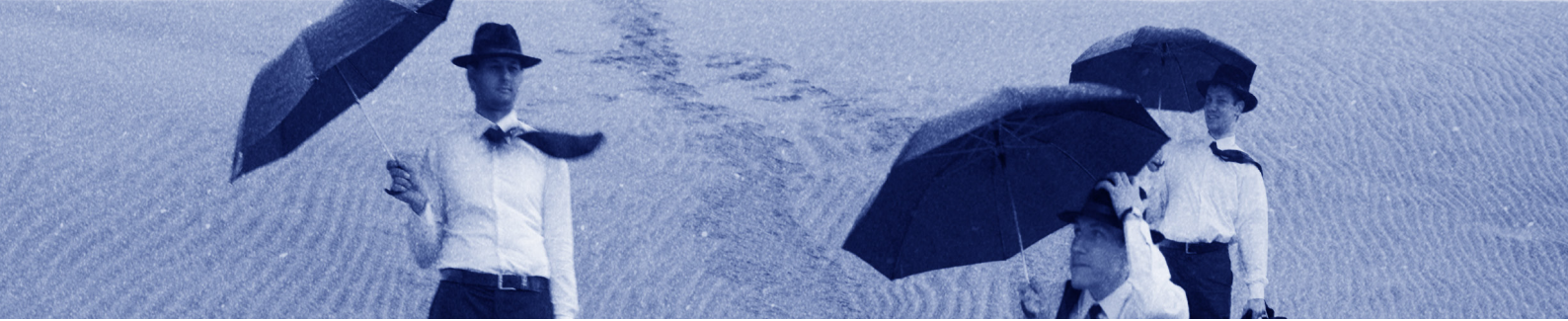
- ISO5167 - measurement of fluid flow by pressure differential devices inserted in circular cross-section conduits running full:
  - Part 1: General principles and requirements
  - Part 2: Orifice plates
  - Part 3: Nozzles and Venturi nozzles
  - Part 4: Venturi tubes
- ISO 9300:1990: Measurement of gas flow by means of critical flow Venturi nozzles
- ISO 9951-1993/94: Measurement of gas flow in closed conduits - Turbine meters
- ISO 5168 (2005): Measurement of fluid flow - Procedures for the evaluation of uncertainties
- ISO10723:1995 - Natural gas – Performance evaluation for on-line analytical systems

If the operator is working with a continuous emission measurement system the following standards should be used by the operator:

- EN 14181 Stationary source emissions – Quality assurance of automated measuring systems
- EN ISO 14956:2002 Air quality – Evaluation of the suitability of a measurement procedure by comparison with a required uncertainty.

Alternatively, independent and accredited test laboratories may be entrusted with the measurements, evaluation of data, monitoring and reporting. In this case the test laboratories shall in addition be accredited against the following standard – and in particular for the relevant fuel and analytical test to be done:

- EN ISO 17025:2005 General requirements for the competence of testing and calibration laboratories



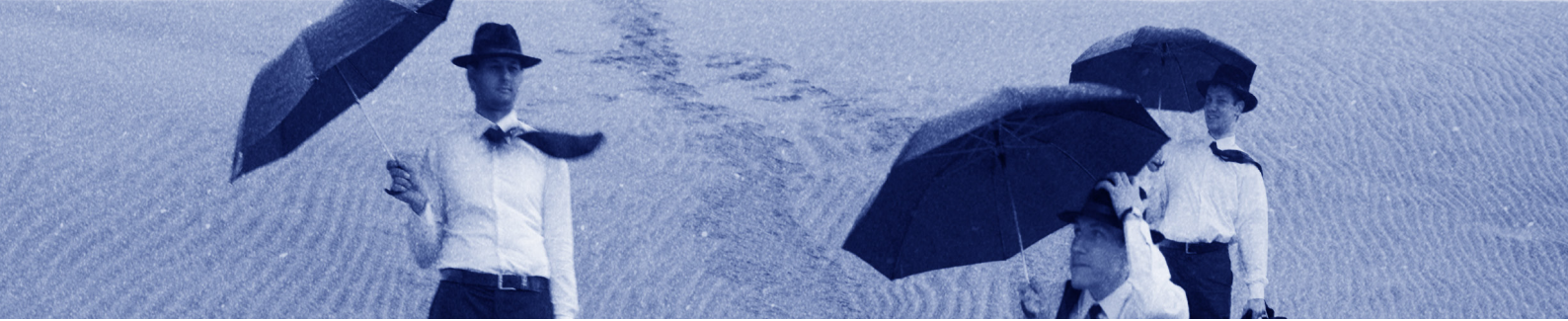
The IETA/EA Training syllabus, in particular requires that the verifier needs to be able to understand this standard from the perspective of GHG verification and the EU ETS, including the basics of the standard, its use, and any specific issues that relate to the verification such as – is the laboratory accreditation applicable to the monitoring and testing being undertaken and is it applicable to this specific test.

## **Continuous Emissions Measurement Systems (CEMS):**

The decision requires that measurement procedures for CO<sub>2</sub> concentrations and mass/ volume flow of off-gases through the stack should reference relevant CEN standards. Where these are not available ISO or National Standards should be used. Where there are no standards procedures should follow draft standards or industry best practice guidance.

### **Examples of relevant ISO standards are:**

- ISO 10396:2006 - Stationary source emissions – Sampling for the automated determination of gas concentrations
- ISO 10012:2003 - Measurement management systems – Requirements for measurement processes and measuring equipment
- ISO 14956:2002 - Air quality — Evaluation of the suitability of a measurement procedure by comparison with a required measurement uncertainty
- ISO 14164:1999 - Stationary source emissions. Determination of the volume flow rate of gas streams in ducts - automated method
- ISO 12039:2001 - Stationary source emissions – Determination of carbon monoxide, carbon dioxide and oxygen - Performance characteristics and calibration of an automated measuring method



## Uncertainty analysis

The revisions to the MRG for Phase 2 have added a more specific requirement for uncertainty analysis and the verification of it. The revised Decision references a number of standards including:

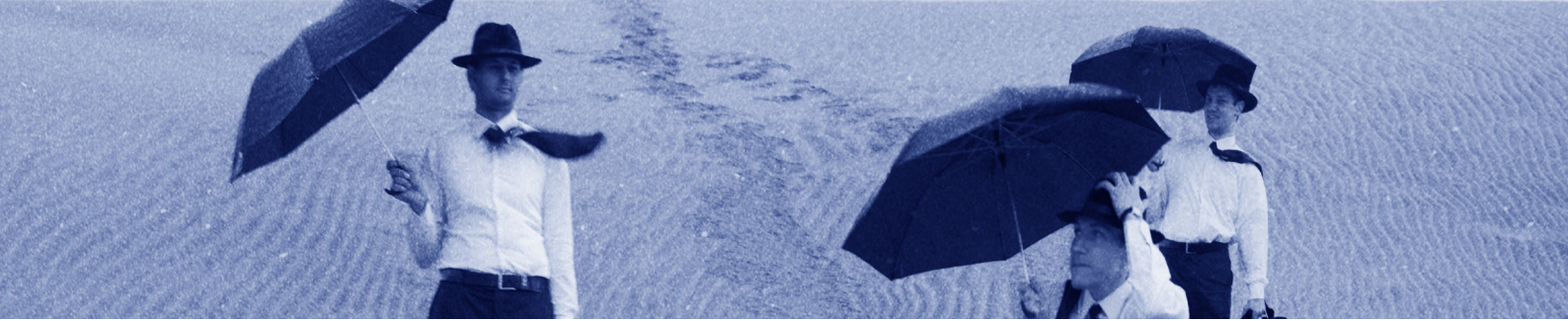
- ISO's Published Document – Guide to the Expression of Uncertainty in Measurement (1995) (known as GUM); published in 1993, reprinted with corrections in 1995)
- ISO 5168:2005 - Measurement of fluid flow — Procedures for the evaluation of uncertainties

## Determination of net calorific values and emission factors for fuels

The decision requires that the specific procedure to determine the activity specific emission factor including the sampling procedure for a specific fuel type shall be agreed with the competent authority before the start of respective reporting period in which it will be applied. The procedures to be applied to sample fuel and to determine its net calorific value, carbon content and emission factor shall be based on relevant CEN standards (covering for example sample frequency, sampling procedures, determination of gross and net calorific value, and carbon contents for different fuel types). If CEN standards are not available, ISO standards or national standards shall apply. Where no applicable standards exist, procedures can be carried out where possible in accordance with draft standards or industry best practice guidelines.

### Examples for relevant CEN standards include:

- EN ISO 4259:1996 Petroleum products - Determination and application of precision data in relation to methods of test
- Examples for relevant ISO standards include:
  - ISO 13909-1,2,3,4: 2001 Hard coal and coke - Mechanical sampling
  - ISO 5069-1,2: 1983: Brown coals and lignite's; Principles of sampling
  - ISO 625:1996 Solid mineral fuels - Determination of carbon and hydrogen - Liebig method
  - ISO 925:1997 Solid mineral fuels - Determination of carbonate carbon content - Gravimetric method
  - ISO6974 - Natural gas — Determination of composition with defined uncertainty by gas chromatography



- Part 1 - Guidelines for tailored analysis
  - Part 2 - Part 2: Measuring-system characteristics and statistics for processing of data
  - Part 3 - Part 3: Determination of hydrogen, helium, oxygen, nitrogen, carbon dioxide and hydrocarbons up to C8 using two packed columns
  - Part 4 - Part 4: Determination of nitrogen, carbon dioxide and C1 to C5 and C6+ hydrocarbons for a laboratory and on-line measuring system using two columns
  - Part 5 - Part 5: Determination of nitrogen, carbon dioxide and C1 to C5 and C6+ hydrocarbons for a laboratory and on-line process application using three columns
- SO6976:2005 - Natural gas - Calculation of calorific values, density, relative density and Wobbe index from composition

Supplemental national standards for the characterization of fuels include:

- BS2869 (1998) - Specification for fuel oils for agricultural, domestic and industrial engines and boilers
- DIN 51900-1:2000 Testing of solid and liquid fuels – Determination of gross calorific value by the bomb calorimeter and calculation of net calorific value – Part 1: Principles, apparatus, methods
- DIN 51857:1997 Gaseous fuels and other gases - Calculation of calorific value, density, relative density and Wobbe index of pure gases and gas mixtures
- DIN 51612:1980 Testing of liquefied petroleum gases; calculation of net calorific value
- DIN 51721:2001 Testing of solid fuels - Determination of carbon and hydrogen content (also applicable for liquid fuels)