

OIML Recommendation R 111

In Europe the weight classification system adopted is that produced by the International Organization of Legal Metrology (OIML), known as document *OIML Recommendation R 111*. It describes the metrological aspects of reference standard weights with recommendations for seven classes of weights - from high quality reference standards at Class E₁ to those used in industrial settings at Class M₃. The full classification includes classes E₁, E₂, F₁, F₂, M₁, M₂, and M₃ in tiers of uncertainty or tolerances - for example a Class E₁ weight would normally be used as a standard for the calibration of a Class E₂ weight (of the same nominal mass).

The OIML recommends model criteria but it does not have power to legislate; its recommendations have, however, been substantially if not fully accepted around the world and for instance European Directive 74/148/EEC has embodied the OIML recommendations for five of the Classes (E₁, E₂, F₁, F₂, and M₁) into European law.

OIML R 111 describes the principal physical characteristics and metrological requirements for weights, which are to be used:

- For the verification of weighing instruments
- For the verification of weights of a lower class of accuracy
- With weighing instruments

The nominal mass of the weights covered by this Recommendation range from 1 milligram (mg) to 50 kilograms (kg) and the document also specifies the methods and equipment to be used for checking the conformity of weights. The OIML weight classes are:

- **Class E₁** weights intended to ensure traceability between national mass standards (with values derived from the International Prototype of the kilogram) and weights of class E₂ and lower (i.e. F₁, F₂ ...). Class E₁ weights or weight sets shall be accompanied by a calibration certificate.
- **Class E₂** weights intended for use in the initial verification of class F₁ weights and for use with weighing instruments of accuracy class I. Class E₂ weights or weight sets shall always be accompanied by a calibration certificate. They may be used as class E₁ weights if they comply with the requirements for surface roughness and magnetic susceptibility and magnetization for class E₁ weights and their calibration certificate gives the appropriate data.
- **Class F₁** weights intended for use in the initial verification of class F₂ weights and for use with weighing instruments of accuracy class I and class II.
- **Class F₂** weights intended for use in the initial verification of class M₁ and possibly class M₂ weights. Also intended for use in important commercial transactions (e.g. precious metals and stones) on weighing instruments of accuracy class II.

- **Class M₁** weights intended for use in the initial verification of class M₂ weights, and for use with weighing instruments of accuracy class III.
- **Class M₂** weights intended for use in the initial verification of class M₃ weights and for use in general commercial transactions and with weighing instruments of accuracy class III.
- **Class M₃** weights intended for use with weighing instruments of accuracy class III.
- **Classes M₃ and M₂₋₃** weights 50 kg to 5 000 kg of lower accuracy intended for use with weighing instruments of accuracy class III.*

* The error in a weight used for the verification of a weighing instrument shall not exceed 1/3 of the Maximum Permissible Error for an instrument. These values are listed in section 3.7.1 of OIML International Recommendation 76 *Non-automatic Weighing Instruments* (1992).