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US/OIML Legal Metrology Comparison

By: Steve Cook

The following is a summary of the introduction in the DRAFT comparison report of the U.S. requirements for commercial weighing devices and those of the International Organization of Legal Metrology (OIML). The DRAFT document and introduction has been prepared by Mr. John Elengo, P.E., Consultant and is intended to provide an understanding of "harmonization" and to identify and clarify some of the similarities and differences between US legal metrology and OIML. The report provides a comprehensive comparison of the requirements and test procedures for scales in the 2003 Edition of NIST Handbook 44 Sections 1.10 "General Code," 2.20 "Scales," and applicable terminology in Appendix D "Definitions" with those contained in OIML Recommendation 76 "Non-automatic Weighing Instruments (Parts 1 and 2)" and Recommendation 60 "Metrological Regulation for Load Cells".

Harmonization: Metrology is the science and activity related to measurements. Legal metrology is the practice and process of applying regulatory structure and enforcement to metrology. It is to the benefit of society in such areas as commodity exchange or measured service, public health and safety, and protection of the environment that metrology be harmonized through reaching a national and international consensus.

Harmonization in legal metrology is the development in different countries of laws, regulations, testing requirements and testing procedures for the metrological control of measuring instruments and prepackages that permit manufacturers to market and sell their products with a minimum of different or duplicative requirements that must be met in order that there are no technical barriers to trade.

Harmonization is achieved through; 1) Mutual cooperation – working together towards common objectives through active participation within national and international forums, 2) mutual confidence – developing a sound technical basis for metrology in order to establish confidence and consensus among those affected, nationally and internationally, and 3) mutual recognition – accepting results of test and evaluation procedures for achieving the harmonized implementation of metrology

Scope and Purpose of the US and OIML Documents: While both H44 and R76 facilitate the achievement of measurement credibility, there is a difference in approach. H44 sets forth metrological and technical requirements for weighing and measuring devices with the objective of eliminating from use those devices that give false readings. The requirements deal both with the characteristics of a device and of the use of the device. NCWM Publication 14 – National Type Evaluation Program sets forth the checklists and procedures for evaluating a device against the requirements of H44 in a uniform and traceable way. R76 sets forth the metrological and technical requirements for nonautomatic weighing instruments with the objective of evaluating an instrument's

characteristics in a uniform and traceable way. The requirements in R76 are generally independent of installation conditions and use.

Both H 44 and R76 strive to achieve performance-based requirements. Nevertheless, H44 and R 76 each are influenced by their respective objectives; H 44 - to eliminate from use devices giving erroneous values, and R 76 - to provide the uniform type evaluation of devices. H 44's performance requirements tend to be application oriented (e.g. vehicle scales, livestock scales, postal scales, etc.) whereas R76's performance requirements tend to be more device oriented (e.g. non-self indicating, semi-self or self indicating, with or without price computation, etc.).

Areas of Existing Harmonization: The General Code of Handbook 44 provides specifications, tolerances, and other technical requirements that are mutually applicable to weighing and measuring equipment regardless of category. There is no equivalent OIML Recommendation to the General Code; there are only separate Recommendations that apply to specific categories of weighing and measurement devices.

The Scale Code of Handbook 44 provides specifications, tolerances, and other technical requirements that are applicable to all types of weighing devices other than automatic bulk-weighing systems, belt-conveyor scales, and automatic weighing systems. The equivalent OIML Recommendation is R76 – Nonautomatic Weighing Instruments. A nonautomatic weighing instrument is an instrument [i.e. an nonautomatic or automatic indicating scale] used to determine the mass of a body that requires the intervention of an operator during the weighing process, for example to deposit on or remove from the load receiver the load to be measured and also to obtain the result.

The terminology in Handbook 44 and the OIML Recommendations are in harmony; nevertheless, significant differences in language (wording) may exist. Improvement should be considered where the language is confusing or has the potential for inconsistent interpretation.

NCWM Publication 14 provides the administrative procedures, technical policy, checklists, and test procedures applicable to the conduct of type evaluations under the National Type Evaluation Program (NTEP). Chapters 1 and 5 of NCWM Publication 14 sets forth the technical policy for scales and load cells including test and examination procedures and a checklist to follow thereby ensuring that the evaluation includes all applicable requirements (Chapter 5 also defines a test report format). Annexes A and B of R76-1 set forth the testing procedures for nonautomatic weighing instruments and the additional tests for electronic instruments, respectively. There is close harmony of requirements between R60 (1991) for load cells and Publication 14 except that, while metrologically equivalent, the format of the test report differs.

Publication 14 checklists have greater detail in order to facilitate the more uniform interpretation of requirements and conduct of type evaluations than R 76 Annexes and R76-2. The Publication 14 checklists are reviewed and maintained by representatives of the various Participating Laboratories of NTEP that perform evaluations thereby

promoting such uniformity. The checklists have also benefited from the joint review undertaken by representatives of their respective evaluation laboratories in association with the US/Canada Mutual Recognition of Type Evaluation Program.

Most Significant Areas of Departure: The number of accuracy classes and the tolerance values applied differ. H 44 introduces a fourth step of tolerance values in each accuracy class corresponding with those in OIML R76 and also adds a different accuracy class, Class IIIL. If there is a metrological or technical reason for having added a fourth step and an accuracy class, then it should be presented for international consideration so that R76 may be improved. If not, then harmonization with R76 should be considered.

Both NIST H 44 and OIML R76 seek to uncover measurement shortfalls resulting from an electronic environment. H 44 utilizes a pragmatic approach requiring that evaluation be conducted under the conditions existing at the site of use. R76 relies on the results of type evaluation under laboratory conditions using specialized test equipment. Both methods have value but may not be fully equivalent.

OIML R76 does provide requirements that instruments have proper design and construction and does provide for their uniform and proper verification, however, no user-based requirements are provided; that is, those dealing with the proper selection, installation, operation and maintenance of equipment. In order to facilitate harmonization and lacking a substitute OIML Recommendation, the scope of R76 should be expanded to include user requirements that are internationally applicable.

Although R76 strives to set performance and not design requirements, it goes on to provide examples of "acceptable solutions" that are based on existing precedence and are considered in compliance. While not intended to be restrictive, these solutions can take on the strength of a requirement unless a different solution is accompanied by support.

What Can You Do? The comparison document will be the basis for proposed changes to promote alignment of the U.S. and OIML requirements. Your suggestions and feedback are important to the current activities of the NCWM Specifications and Tolerance Committee and assisting NIST in developing U.S. position papers regarding the upcoming revision of OIML R 76. Contact Steven Cook for electronic or hard copies of the draft comparison document can be requested by e-mail at steven.cook@nist.gov or by phone at 301-975-4003.