

Worth the Weight: New International Guidelines Published for Manufacturing Load Cells

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The revised OIML recommendation for the evaluation of load cells will affect the scales and balances used to weigh everything from people to grocery store bananas, and from blood pressure medications to cross-country shipments of goods.

At the heart of every electronic weighing instrument is a device called a load cell, which takes a mechanical force and turns it into an electronic signal. Anytime something needs to be weighed involving commerce – whether it's lunch meat at a deli counter, or a truck crossing a bridge with a weight limit, or medicine being formed into pills with exactly the right proportions there is a good chance that there's a load cell inside that scale or balance, making the measurement possible.

But before selling their products, companies that manufacture load cells need to ensure that their devices really do perform as intended. Most countries have a set of legal requirements that manufacturers must follow. The regulations that are adopted by many countries outside the United States¹ have, as their basis a standard established by an intergovernmental organization called the **International Organization of Legal Metrology (OIML)**.

Recently, a revised Recommendation (OIML documentary standard) for the metrological regulation of load cells – referred to as R60 – was published by OIML. It's the first update to the recommendation in 17 years.

John Barton of the National Institute of Standards and Technology (NIST) was the convener of the project group that revised the recommendation. This group comprised representatives from 26 of OIML's member states.

Barton says that much of the revision work was focused on clarifying what is defined as a load cell since there are a number of technologies and designs that have been developed to quantify the force of gravity on an object in terms of its weight.

“Probably the biggest challenge we had in the revision was to define scope – how to be all-inclusive without discriminating against any particular technology,” Barton said. The vast majority of load cells in commercial devices use strain gauges, which convert physical stress into a measurable change in an electronic signal. But load cells can use other technologies as well, including pneumatic, hydraulic, or piezoelectric. “The project group spent a great deal of time defining the various categories of load cells based on their capabilities and, to some extent, the technologies used in their design,” Barton said.

Other changes to the recommendation were centered on updating the load cell-testing process, which is typically performed by laboratories on behalf of their member state governments. The OIML project group experts amended existing test procedures to expedite the process and added new procedures that would improve testers' ability to evaluate how the devices respond to environmental influences, such as when exposed to electromagnetic fields during use.

The new revision also draws what Barton and his colleagues hope is a cleaner line between load cells and “complete weighing instruments,” which typically incorporate a load cell but are sold as units that include a readout of the weight. Complete weighing instruments are addressed under the OIML system in other recommendations, such as R76. Ideally, Barton said, manufacturers and testers don't want a system where it's unclear which OIML Recommendation applies to a device.

¹ In the U.S., the regulation of commercial devices is based on a different set of requirements, adopted by the National Conference on Weights and Measures (NCWM). However, one of the goals of the NIST Office of Weights and Measures is to harmonize the OIML and U.S. standards whenever possible.

As convener of the project group, Barton's job included developing meeting agendas, scheduling and chairing those meetings, collecting group members' input, incorporating their changes into subsequent drafts, and sending the revised document out for review. After receiving a set of comments, he would work them into a new draft and the cycle would start again. From beginning to end, the revision process took seven years.

"It seemed like every time we had it nailed down, someone would ask a question – 'What about this or that?' – and we would

Though consumers probably won't notice changes to their electronic bathroom scales or the process of weighing their grocery store bananas, both domestic and international manufacturers of load cells are likely to be affected by the update, as well as the laboratories that test load cells before they are put on the market.