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# Economy Report

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## *Canada*

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<b>Report developed/ approved by:</b>	Alan E. Johnston
<b>Position:</b>	President
<b>Organisation:</b>	Measurement Canada
<b>Contact details:</b>	151 Tunney's Pasture Boulevard Standards Building Room 253 Ottawa, Ontario K1A 0C9 Canada
<b>Telephone:</b>	613-952-0655

## SECTION 1 – Organisation and structure for metrology

The main Federal statutes governing legal metrology are the:

*Weights and Measures Act (R.S.C 1985);  
Electricity and Gas Inspection Act (R.S.C 1985); and the  
Consumer Packaging and Labelling Act (R.S.C.1985).*

The government bodies responsible for the application of these acts (all part of the Department of Innovation, Science and Economic Development Canada) update and publish regulations which have legal force. These regulations are entitled the:

*Weights and Measures Regulations (1974);  
Electricity and Gas Inspection Regulations (1986); and  
Consumer Packaging and Labelling Regulations (1985).*

Measurement Canada, an agency of the federal department of Innovation, Science and Economic Development Canada, has exclusive national responsibility and authority for legal metrology activities in Canada.

The agency is composed of several Directorates, including Engineering, Innovative Services, and Program Development. The Program Development Directorate is comprised of two Divisions, the Weighing and Measuring Division and the Utility Metering Division. The Program Development Directorate is responsible for the development of requirements and programs (this includes making legislative or regulatory amendments, developing specifications and establishing approaches for marketplace monitoring) to minimize inaccurate measurement and inequity in the trade of goods and services provided on the basis of measurement. It also establishes metrological policies and procedures for the approval, verification, re-verification, installation and use of measuring devices and establishes enforcement policies and marketplace monitoring programs.

The Engineering and Laboratory Services Directorate, besides assisting in the development of Specifications and Procedures, is responsible for the examination and approval of prototype weighing and measuring machines and prototype electricity and gas meters and metering devices used in trade. The directorate also has the responsibility to calibrate and certify measurement local standards used by government and authorized service providers.

The Innovative Services Directorate is responsible for the development, implementation and review of alternative service delivery mechanisms. This includes the development of mutual recognition agreements with the United States (National Conference on Weights and Measures - NCWM) for the approval of certain prototype devices. The directorate is also responsible for industry accreditation and registration programs that delegate specified mandated inspection activities to private sector organizations (commonly known as authorized service providers) which meet Measurement Canada's requirements.

Measurement Canada fulfils its mandate through a field inspection program carried out by inspection staff located in its three Regions and 9 Districts, certification of test equipment used by industry and government inspection personnel, verifying the accuracy and appropriate usage of weighing and measuring devices used in trade, verifying the net quantity of commodities sold on the basis of measure, resolving trade measurement complaints from consumers, examination and verification of meter performance prior to use, periodically re-verifying meter performance, and performing on site verification of complex measuring systems. The regions are also responsible for administering the accreditation and registration programs, including close monitoring of authorized service providers. Measurement Canada also investigates and arbitrates measurement disputes between the buyers and sellers of electricity and gas.

## USE OF ALTERNATIVE SERVICE DELIVERY MECHANISMS

Alternative Service Delivery Mechanisms are used for many inspection and certification activities traditionally performed by Measurement Canada.

### Accreditation and Registration Programs for Device Inspections

Measurement Canada has two programs that permit other organizations to inspect and certify measuring devices under the authority of the *Weights and Measures Act* or the *Electricity and Gas Inspection Act*.

The Accreditation Program was launched in 1986 for Electricity and Gas organizations and was expanded in 1995 to include Weights and Measures organizations. An accredited organization must document, establish and maintain a quality management system which meets the requirements of Measurement Canada's accreditation standard, S-A-01 - Criteria for the Accreditation of Organizations to Perform Inspections Pursuant to the *Electricity and Gas Inspection Act* and the *Weights and Measures Act*. These requirements are modelled after the ISO 9001 standard. In addition, technicians in Weights and Measures accredited organizations must pass mandatory theoretical and practical evaluations.

Organizations accredited by Measurement Canada are not limited in terms of which trade sectors they can offer their inspection services in. An accredited organization can certify any device under the scope of its accreditation regardless of the sector that the device is used in. To ensure compliance, the quality management system established by an accredited organization is subject to an annual surveillance and product audit by Measurement Canada.

The Registration Program was launched for Weights and Measures organizations in April 2004. This program also authorizes organizations to inspect and certify measuring instruments under the authority of the *Weights and Measures Act*. Initially, stakeholders in the downstream petroleum sector, including vulnerable parties, asked for the development and implementation of such a program. The Registration Program has since been expanded to include other sectors of the economy. The Registration Program is offered only following a consensus of the stakeholders of a given trade sector. The program scope is limited to the inspection of measurement equipment used in the trade sectors identified in the Registration Terms and Conditions. These Terms and Conditions also stipulate the requirements to be met by organizations seeking registration.

Organizations registered by Measurement Canada must have its technicians attend and successfully complete the mandatory Measurement Canada theoretical training. All potential recognized technicians must successfully pass theoretical and practical evaluations by Measurement Canada prior to becoming recognized. In addition, as there is no requirement for the implementation of a quality management system in the Registration Program, there is more frequent Measurement Canada monitoring of recognized technicians working for registered organizations than there is for recognized technicians working for accredited organizations.

Both the Accreditation and Registration Programs are open to organizations in Canada, the United States, and Mexico.

**Delegation of Authorities Program for Measuring Apparatus and Test Equipment Calibration**  
In May 2003, Measurement Canada launched a program permitting the calibration by other organization of certain measuring apparatus and test equipment utilized under the *Electricity and Gas Inspection Act*. The present scope of this program applies to the calibration and re-certification of electricity meter calibration consoles and the calibration and certification of pressure, temperature and dimensional standards used in the natural gas sector. Program requirements are established in C-D-01 - Conditions for the Delegation of Authority for the Calibration and Certification of Measuring Apparatus and Test Equipment Pursuant to the *Electricity and Gas Inspection Act*.

## Recognition of ISO 17025 Laboratories

Two other alternative service delivery mechanisms exist as follows:

- RC-01 - Conditions and Administrative Requirements for the Recognition Program of Calibration Results from CLAS Laboratories, which sets out the conditions and requirements to be met by ISO 17025 CLAS Laboratories to have their calibration results for mass and temperature standards recognized by Measurement Canada in order to be certified pursuant to the *Weights and Measures Act*. Section 7.1 below describes the CLAS program.
- RT-01 - Conditions and Administrative Requirements for the Recognition of Test Results from ISO 17025 Accredited Test Facilities, which permits the recognition of test results from ISO 17025 accredited test facilities, for the testing of previously approved electricity meters which have been modified and are being re-submitted for approval purposes.

## SECTION 2 – Key activities of 2015/16

### Implementation of Legislative and Regulatory Amendments - Mandatory Inspections and Compliance and Enforcement

Amendments to the *Weights and Measures Act* and regulations came into effect on August 1, 2014, establishing mandatory inspections in eight sectors of the marketplace: retail petroleum, retail food, dairy, downstream petroleum, fishing, forestry, grain and field crops, and mining. Since the coming into force of these provisions the number of inspections in the marketplace has increased almost threefold to more than 136,000 inspections per year. Measurement Canada anticipates that this number will reach approximately 250,000 inspections per year once fully implemented.

Measurement Canada's priority has been to implement the mandatory inspection frequencies and ensure that measuring device owners are educated regarding their new legal obligation to have their devices regularly inspected. This priority will do more to contribute to a fair, efficient and competitive marketplace by causing measurement issues to be detected and corrected. A pilot project to promote compliance in instances where non-approved devices are being used for trade measurement purposes was established and implemented in early 2016. This pilot project was used to ensure uniformity in the application of administrative monetary penalties moving forward. So far, two notices of violation, each for \$500, have been issued and paid. Moving forward Measurement Canada anticipates greater use of Administrative Monetary Penalties in order to promote compliance.

### Authorized Service Providers for device inspections

Measurement Canada relies heavily on the use of Alternative Service Delivery in order to fulfill its mandate. As of August 31, 2016, there were 223 organizations authorized to perform inspections of mass, volume, electricity and natural gas measuring devices on behalf of Measurement Canada (MC).

The majority of these organizations are located across Canada but 9 are located in the United States and Mexico. All authorized organizations were closely monitored and subject to audits and follow up inspections.

## **Introduction of an Online Reporting Application for Inspection Activities**

Measurement Canada has introduced an Online Reporting Application (ORA). ORA is a web-based application used by Measurement Canada inspectors and authorized service providers to report the results of scale, gas pump and other measuring device inspections. The application automatically issues a Device Examination Certificate to device owners via email outlining the results of their inspection and indicating if corrective action is required. Data reported through ORA is transferred to Measurement Canada's inspection results database (STARS).

As well, Measurement Canada recently introduced web services functionality in ORA. This functionality enables the uploading of inspection results data directly from an authorized service provider's database to ORA. Device Examination Certificates are still issued by ORA.

## **Timber Dimensional Measuring Devices (TDMD)**

Measurement Canada (MC) published the Terms and Condition (T&C) for the Evaluation of Timber Dimension Measuring Devices (TDMD) in the early summer of 2014. The first TDMD technology was approved for use in Canada in December 2015. The use of log scanning technology has the potential to revolutionize the measurement of timber in the forestry industry and improve the measurement accuracy of this increasingly scarce and precious resource.

## **2016 OIML Activities: Electricity Meters TC 12 – R46**

Measurement Canada is currently in the process of updating existing electricity meter approval specifications, in part to adapt R 46 requirements, but as well to address various other legal metrology issues pertaining to the Canadian electricity marketplace. This includes investigating the impact of harmonic content on measured values.

Harmonic content is becoming increasingly prevalent with the use of consumer electronics and power saving appliances, and this is having an increasingly significant impact on accuracy and equity in electricity trade measurement. Traditionally, meters in Canada (and much of the world) have been assessed at sinusoidal conditions and consequently, differing meter designs and methodologies will all produce the same measurement values. However, in varying and diverse real world conditions, different meters will produce different measurement values.

TC-12 will determine how to best address this issue in a possible revision to R 46.

## **Electric Vehicle Charging Stations (EVC Stations)**

Recent initiatives have been introduced by some federal departments, provincial governments and regional municipalities to install advanced transportation technologies such as electric vehicle charging stations as part of a growing trend to invest in clean technology alternatives for consumers. Many of the electric vehicle charging stations being installed are designed with measurement systems involving new technology, which has raised questions about the applicable federal measurement statutes administered and enforced by Measurement Canada to which these devices would be subject.

The total number of registered chargers in Canada is approximately 3000 but this number is increasing rapidly every day and does not include most of the residential chargers. Revenue models for EV charging stations will likely vary from region to region depending on the local regulations pertaining to who can and cannot offer electricity for resale.

Some of the common revenue models are explained below for commercial/public charging operations:

- *Free parking. Free Charging.* — In this scenario, the parking lot operator would install a charging station for the benefit of its customers. An example of this would be a store or hotel installing a charging station as a means to attract customers.
- *Paid Parking. Free Charging.* — In this scenario, the parking lot operator would charge a flat rate for the parking stall which would include power for PEV charging.
- *Flat Rate Charging Fee or Time Based.* — Unlimited charging for a flat fee or charges based on a set rate per minute.
- *Metered Charging* — Users charged per kilowatt hour (kWh) of electricity supplied.

The application of either the *Electricity and Gas Inspection Act (EGIA)* or the *Weights and Measures Act (WMA)* will be largely dependent on the intended use of the measuring device. With respect to EVC stations, Measurement Canada's mandate is restricted to the *Metered Charging Time Based* models.

### **LED and Adaptive Controls in street lighting**

Cities and municipalities are being encouraged by government regulators to reduce energy consumption for all of their facilities, including street lighting. Traditionally, the billing charges applied by utilities for energy consumed by street lights in a city or municipal region were not done by direct measurement. One method used by utilities applies power consumption ratings that are converted to kilowatt-hours through a factor and creating billing to the appropriate electricity rate in \$/kWh. Another billing method applies a calculated charge depending on the size and number of light fixtures. It should be noted that the flat rate billing of unmetered street lighting loads can vary from one jurisdiction to another.

To reduce energy consumption, many cities and municipalities are replacing high intensity discharge street lighting fixtures with solid state luminaires utilizing light emitting diodes (LEDs). The combination LED street lighting and adaptive controls also provide new innovative billing options for the electricity utilities. There are examples of electricity utilities using adaptive control data (voltage, current and power factor information) to verify flat rate street lighting billing. Other LED and adaptive control street lights incorporate meters that measure the actual consumption of electricity. Using adaptive control data or a metered street light would enable street light asset owners to more accurately pay for the energy actually consumed, while obtaining additional cost savings associated with the application of street light dimming or shut-off applications that are not typically available in traditional street light use and billing models.

However, current street light meter designs have encountered significant compliance issues with the applicable federal measurement statutes administered and enforced by Measurement Canada to which these devices would be subject (e.g., problem with the location of a required meter display when the meter is mounted at the top of a street light pole). Cities, municipalities, LED adaptive control suppliers and street light meter manufacturers are working with Measurement Canada to identify regulatory solutions. As a practical interim alternative to ensure accuracy, the electricity utility can measure the energy consumption of various street lighting installations using a Measurement Canada approved meter and compare that data to the corresponding adaptive control data.

**Compressed Natural Gas (CNG)**

In Canada, retail compressed natural gas (CNG) dispensers are used for refueling natural gas fueled passenger vehicles and small trucks incorporate Coriolis type mass flow meters rated up to 25 kg/min but approved for trade use up to 15 kg/min. CNG dispensers currently used for refueling larger natural gas vehicles (NGV) (e.g. buses, garbage trucks) and CNG trailers (e.g. used in so called “mobile or virtual pipeline” applications) incorporate Coriolis type mass flow meters rated up to 100 kg/min, but only approved by Measurement Canada for use in trade up to 50 kg/min. The demand for faster fill times using the higher capacity CNG dispensers has led to requests for their type approval up to their manufacturer’s specified maximum flow rate. This introduces challenges when using the gravimetric method of performance assessment testing for type approval and verification purposes due to the need for larger test receptacle, suitable scale selection, and disposal of increased quantities of accumulated test gas. Measurement Canada is reviewing the suitability of the gravimetric method for performance assessment of higher flow rate capacity CNG dispensers and the feasibility of alternative test methods (e.g. use of an in series master meter). The environmental and safety implications of venting or flaring large quantities of accumulated test gas, where it cannot otherwise be returned to the owner, are also key drivers in this review.