# Bulletin

| | | |
|---|---|---|
| Category: **ELECTRICITY** | Bulletin: **E-27 (rev.1)** | Page: **1 of 10** |
| Document(s): | Issue Date: **2014-01-01** | Effective Date: **2014-01-01** |
| | Supersedes: **E-27** | |

The copy of this document located on Measurement Canada's website is considered to be the controlled copy.

**Policy on the use of deductive and net measurement**

## 1.0 Purpose

The purpose of this bulletin is to communicate Measurement Canada's (MC) policy on net quantity values declared in electricity trade transactions comprising the transfer of both delivered and received energy.

## 2.0 Scope

This bulletin applies to all quantity declarations used to establish the basis of a charge for active and/or reactive energy that are declared as a net measurement value.

## 3.0 References

S-E-05 – Specification for approval of type of electronic meters - net metering[link 1]

S-E-08 –Specifications for the installation and use of electricity meters – Measurement Canada standard drawings for electricity metering installations[link 2]

Information bulletin – In-series metering connection configurations (2010-06-03)[link 3]

## 4.0 Background

In 2007, MC established E-27, which granted temporary permission for the use of electro-mechanical meters in net metering applications. This permission expired on December 31, 2013.

In 2008, MC issued specification S-E-05, which establishes criteria for the approval of meters providing a net registration. Net metering is the ability to measure delivered and received energy and to register the (net) difference between the two. If received energy exceeds delivered energy, the net value is negative. If delivered energy exceeds received energy, the net value is positive. These criteria were established on the premise that any measurement error of the meter would be of the same magnitude for energy registered in the received direction as that for energy registered in the delivered direction.

MC has recently discovered that electricity metering installations configured to use net measurement methodologies can result in quantity declarations for a net value of energy that exceed legislated tolerances under certain conditions. Net values will be inaccurate when the error of energy registration in the received direction is different than the error in the delivered direction. The extent of inaccuracy attributed to a net value is dependant on the following characteristics: connection configuration, load directions, load ratio and individual meter errors.

## 5.0 Connection configurations (see appendix 1 for illustrative examples)

### 5.1 In-series connection configuration (illustrations 1, 2 and 3)

**5.1.1** An in-series configuration is one whereby two or more distinct electricity loads and/or generators (two or more distinct purchasers/sellers from the perspective of the *Electricity and Gas Inspection Act* (EGIA)), are connected to the common electricity grid in the following manner:

a) one meter is connected between the grid and a junction point between two or more loads;
b) one meter is connected between the junction point and one of the loads; and
c) no meter is connected between the junction point and the other load.

**5.1.2** The energy attributed to the non-metered load is not measured but calculated using a deductive totalizing method.

### 5.2 Parallel connection configuration (illustration 4)

Parallel measurement is the typical manner in which multiple distinct purchasers/sellers are metered and connected to a common electricity grid. Each distinct load and/or generator is connected directly to the grid through individual meters with no common interconnection on the non-grid side of the meters.

## 6.0 Deductive totalizing

### 6.1 Description

Deductive totalizing (as defined in S-E-08) is a manner of deductive summation used with an in-series connection configuration. This manner of summation is used to determine an non-metered load indirectly by subtracting the value of all metered loads from the value of the total metered load. The calculated non-metered load value corresponds to the declared net value.

### 6.2 Inaccuracy

Deductive totalizing can result in quantity declarations for the non-metered load that exceed legislated tolerances under certain conditions. The extent of inaccuracy is dependant on load directions, load ratio and individual meter errors.

### 6.3 Impact of inaccuracy

It is known that as the magnitude of error between the declared net value and the true net value increases, the impact of the error decreases, because the true net value also decreases in relation to the total value of energy transacted. In addition, as the true net value increases, the magnitude of error between the declared net value and the true net value decreases (see appendix 2 for practical examples).

## 7.0 Net and deductive measurement policy

### 7.1 General

With regard to section 6.3, it can be concluded that the materiality of the error in declared values is sufficiently low such that Measurement Canada will permit a net value declaration subject to certain conditions. MC will place priority on the accuracy of the actual meter values declared pursuant to those conditions.

### 7.2 Single direction energy flow, multiple customers (illustration 1)

**7.2.1** This refers to an electricity connection configuration, as described in section 5.1, in which the loading from the grid is attributed to multiple distinct customers (each customer has a distinct customer account with the supplier). All customers only consume energy from the grid, they do not generate any energy to the grid.

**7.2.2** As per section 9.2 of S-E-08, deductive totalizing in this context is not permitted.

### 7.3 Bi-directional energy flow, multiple customers (illustration 2)

**7.3.1** This refers to an electricity connection configuration, as described in section 5.1, in which the loading from the grid and generation to the grid is attributed to two or more distinct customer accounts with the grid deemed the supplier as a point of reference. A net value is calculated for a non-metered point using the values of the actual meter readings.

**7.3.2** Declaration (for billing purposes) of a calculated net value for the non-metered junction point is permitted subject to the following conditions:

a) All coincident meter register readings (current and previous) for each meter, and each respective consumption/delivery value are provided on the quantity declaration statements (invoices) in addition to the net declared value for each legal unit of measure (LUM) traded.
b) The supplier (grid) makes the following quantity declarations for each LUM traded:

   i) value of LUM charged to the generating customer (meter 2 delivered registration);
   ii) value of LUM charged to the loading customer (meter 1 delivered registration);
   iii) value of LUM charged to the loading customer (meter 2 received registration);
   iv) value of LUM credited to the loading customer (meter 1 received registration);
   v) value of LUM credited to the loading customer (meter 2 delivered registration);
   vi) value of LUM credited to the generating customer (meter 2 received registration).

**Note:** Meter 1 is the meter connected between the grid and the junction point and meter 2 is the meter connected between the junction point and either the loading or generating customer.

**7.3.3** The purpose of making the six identified LUM quantity declarations distinctly in the manner indicated is that each declaration is considered a trade transaction and deviation (from true) for each transacted value will not be any larger than that of the individual meter error.

**7.3.4** As an alternative to 7.3.2, calculation of a net quantity declaration for the non-metered junction point is permitted subject to the following conditions:

a) All coincident meter register readings (current and previous) for each meter, and each respective consumption/delivery value are provided on the quantity declaration statements (invoices) in addition to the net declared value for each LUM traded.
b) Quantity declaration statements (invoices) include the following disclaimer: "Net values declared on this statement may not comply with accuracy requirements of the *Electricity and Gas Inspection Act* where the ratio between the delivered energy (from the grid) and the received energy (to the grid) is less than 2:1".

**Note:** It has been mathematically confirmed that when meter registration errors are no more than ± 1.0% (the MC verification tolerance) and the ratio between the delivered energy and the received energy is greater than 2:1, the error in net quantity declared will not exceed ± 3.0% (the legal limit pursuant to the *Electricity and Gas Inspection Regulations*).

### 7.4 Bi-directional energy flow, single customer (illustration 3)

**7.4.1** This refers to an electricity connection configuration, as described in section 5.1, in which the loading from the grid and generation to the grid is attributed to one customer with the grid deemed the supplier as a point of reference. While there is only one actual customer in this case, there may be two customer accounts due to the separation (in load settlement) of customer generation and customer load. In this connection configuration, the only declared values that are necessary to determine the usage/generation of the customer are the values provided by meter 1. However, for the purposes of load settlement, meter 2 may be used in this configuration to establish LUM values that are part of a trade transaction.

**7.4.2** Declaration (for billing purposes) of a calculated net value for the non-metered junction point is permitted subject to the following conditions:

a) All coincident meter register readings (current and previous) for each meter, and each respective consumption/delivery value are provided on the quantity declaration statements (invoices) in addition to the net declared value for each LUM traded.
b) The supplier (grid) makes the following quantity declarations for LUM traded:

   i) value of LUM charged to the customer (meter 2 delivered registration);
   ii) value of LUM charged to the customer (meter 1 delivered registration);
   iii) value of LUM charged to the customer (meter 2 received registration);
   iv) value of LUM credited to the customer (meter 1 received registration);
   v) value of LUM credited to the customer (meter 2 delivered registration);
   vi) value of LUM credited to the customer (meter 2 received registration).

**Note:** Meter 1 is the meter connected between the grid and the junction point and meter 2 is the meter connected between the junction point and the generator.

**7.4.3** The purpose of making the six identified LUM quantity declarations distinctly in the manner indicated is that each declaration is considered a trade transaction and any deviation (from true) for each transacted value will not be any larger than that of the individual meter error. In this case, since the customer and the generator are the same party, the six LUM quantity declarations identified in section 7.4.2 (b) may be combined (additively) as follows:

i) value of LUM charged to the customer (meter 2 delivered registration, plus meter 1 delivered registration, plus meter 2 received registration);
ii) value of LUM credited to the customer (meter 1 received registration, plus meter 2 delivered registration, plus meter 2 received registration).

**7.4.4** As an alternative to 7.4.2, calculation of a net quantity declaration for the non-metered junction point is permitted subject to the following conditions.

a) All coincident meter register readings (current and previous) for each meter, and each respective consumption/delivery value are provided on the quantity declaration statements (invoices) in addition to the net declared value for each LUM traded.
b) The quantity declaration statements (invoices) include the following disclaimer: "Individual net values declared on this statement may not comply with accuracy requirements of the *Electricity and Gas Inspection Act* where the ratio between the delivered energy (from the grid) and the received energy (to the grid) is less than 2:1. However, the aggregated value of the individual measured quantities will remain in compliance".

**Note:** 7.4.4 (b) differs from 7.3.4 (b) due to the fact that the two customer accounts are attributed to only one actual customer. This means that some of the six quantity declaration errors will offset each other, resulting in an aggregate error equal to or less than the meter errors.

### 7.5 Transition period

A transition period of one year is granted to electricity sellers that make net quantity declarations to comply with the provisions of sections 7.3 and 7.4, as applicable. These provisions will be in force as of January 1, 2015.

## 8.0 Parallel measurement (illustration 4)

Parallel measurement precludes the establishment of a value for a LUM at a non-metered point. No net or deductive totalized values are established and therefore the policy requirements of section 7 are not applicable.

## 9.0 Electro-mechanical meters

As per clause 7.2.1.5 of the initial version of E-27, the temporary permission to use electro-mechanical meters in net measurement applications has expired. As of January 1, 2014, any meter used for net measurement shall be of a type approved for providing a net registration or shall be of a type approved to provide registration in both directions.

## 10.0 Revision

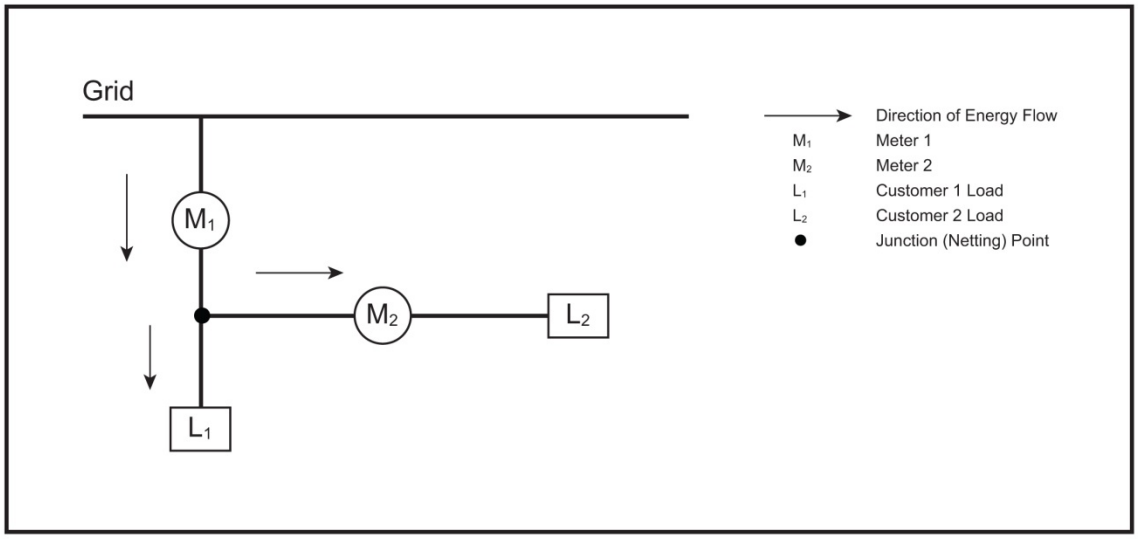
The purpose of this revision is to communicate that the temporary permission to use electro-mechanical meters in net metering applications expired December 31, 2013. This revision also establishes MC's policy regarding the use of deductive calculations in a net measurement context.

---

[Link 1] http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm00173.html
[Link 2] http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04068.html
[Link 3] http://www.ic.gc.ca/eic/site/mc-mc.nsf/eng/lm04345.html

## Appendix 1 - Illustrations of net calculation configurations

### Illustration 1 – Deductive, single direction energy flow, multiple customers




### Illustration 2 - In-series, bi-directional energy flow, multiple customers

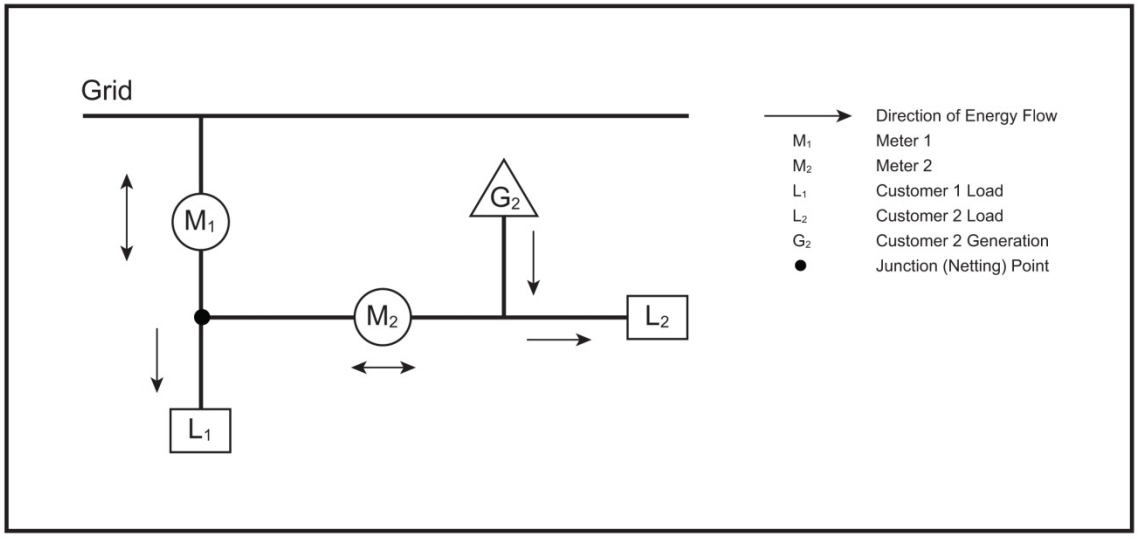


**Illustration 3 - In-series, bi-directional energy flow, single customer**

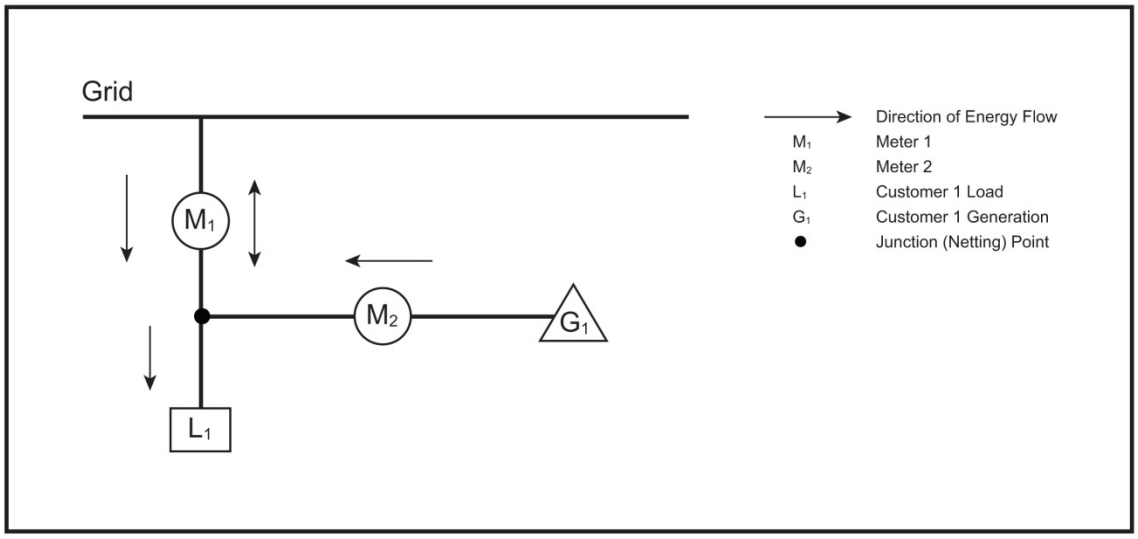
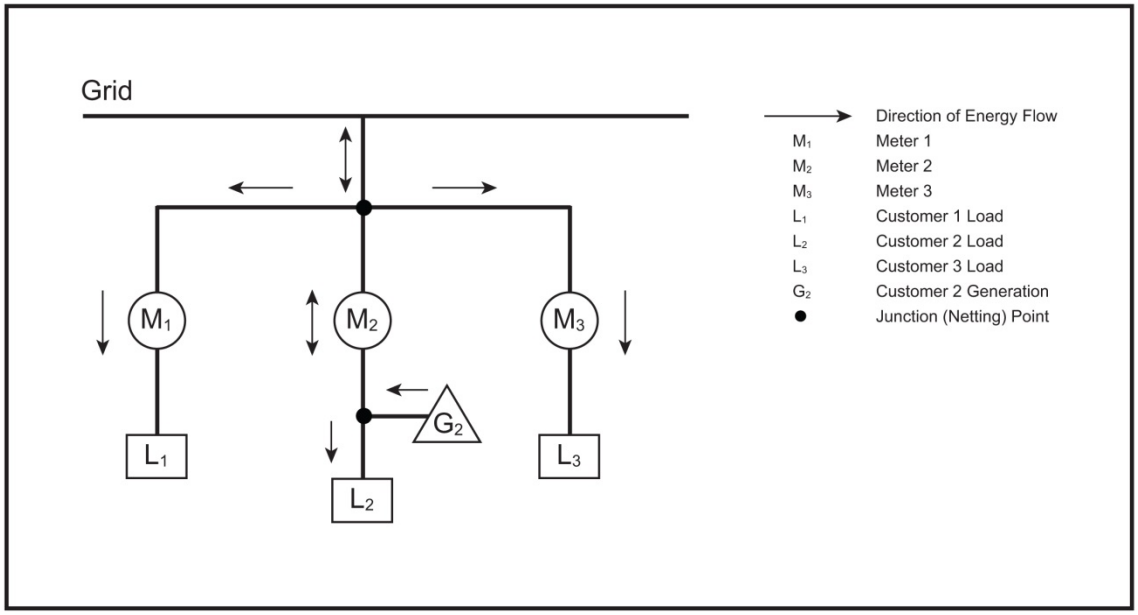



**Illustration 4 - Parallel metering, bi-directional energy flow, multiple customers**



## Appendix 2 – Examples of net error impact

### Example 1 – Large net error, small net value

Meter has error of +0.2% in delivered direction and -0.4% in received direction.

If the total energy delivered is 20000 W-h and the total energy received is 19500 W-h, the true net value is 500 W-h.

In this case the meter would register 20040 W-h delivered and 19422 W-h received. The net value registered by the meter would be 618 W-h. The error between the declared net value and the true net value is +23.6%.

In considering the relative amount of the net energy declared compared to the total amount of energy transacted between the two parties (500 W-h out of 20000 W-h), it could be considered that that the impact of the error in net value is relatively insignificant when compared to the amounts of total energy transacted. From that perspective it could be considered that the error is 118 W-h incorrect out of a total of 20000 W-h. As a percentage this is 0.59%. The net error is large (well in excess of the tolerances prescribed in the EGIA) but the impact on the total transaction is small.

### Example 2 – Large net value, small net error

Meter has error of +0.2% in delivered direction and -0.4% in received direction.

If the total energy delivered is 20000 W-h and the total energy received is 11000 W-h, the true net value is 9000 W-h.

In this case the meter would register 20040 W-h delivered and 10956 W-h received. The net value registered by the meter would be 9084 W-h. The error between the declared net value and the true net value is +0.93%.

As the net value increases, the net error decreases to well within tolerances prescribed in the EGIA.