

## Certified Test Data Requirements, Electric Meters



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### 1. Scope

This standard covers the requirements for certified test data from 0.2 and 0.5 accuracy class electric meters.

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### 2. Application

Certified test data is used for the approval and verification of 0.2 and 0.5 accuracy class electric meters.

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### 3. Industry Standards

Certified test data shall meet the requirements of the latest revision of the following industry standards:

**ANSI C12.1-2008**; Electric Meters Code for Electricity Metering

**ANSI C12.10-2011**; Physical Aspects of Watthour Meters - Safety Standard

**ANSI C12.20-2010**; Electricity Meters - 0.2 and 0.5 Accuracy Classes

**IEC 61000-4-4:2012**; Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test

**IEEE C37.90.1-2012**; IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus

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## 4. Requirements

### 4.1 Certified Test Report

Certified test reports shall be supplied by email.

The email shall be sent to the meter lab at [SCL\\_Meter\\_Test@seattle.gov](mailto:SCL_Meter_Test@seattle.gov).

### 4.2 Certified Test Data Format

The certified test data file shall contain the following information in American Standard Code for Information Interchange (ASCII) format.

A heading with each line in text, in the following order:

Line #01 - Manufacturer

Line #02 - Type

Line #03 - Form

Line #04 - Class

Line #05 - Volts

Line #06 - Test amps

Line #07 - Watthour constant

Line #08 - Wires

Line #09 - Stators

Line #10 - Register ratio

Line #11 - Shaft reduction

Line #12 - Multiplier

Line #13 - Cost

Line #14 - Purchase date

Line #15 - Purchase order (PO) number and PO line number

Line #16 - Stock number

Line #17 - Comm ID Type (any additional information up through line 19)

Line #18 – Manufacturer Catalog Number, Comm Program ID,  
Comm Firmware ID, Meter Program ID, Meter Firmware ID,  
HAN Software ID, HAN Firmware ID

Line #19 - (for future use)

Line #20 - Comma separated data header<sup>1</sup>

Line #21 - Comma separated data<sup>2</sup>

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<sup>1</sup> Line 20 contains the certified data header for listed data:

BarCode,Ser#,CL#,FL,PF,LL,LF,LP,MF,MP,RF,RP,Crt,Pal,CommID,CommIDType

Either FL,PF,LL or LF,LP,MF,MP,RF,RP are required.

A comma shall be included in place of unlisted data. For example, if CommID is not installed, its comma is still necessary.

Nothing prevents all the identified series and element tests above from being listed.

See Table 4.2 for data definitions.

<sup>2</sup> Line 21 begins the variable data record given as comma separated data. The record contains the meter bar code, serial number (in text), company number, certified test results, carton number, pallet number, and communications identification when applicable. Any data not given is identified in place by a comma. Subsequent lines are additional records.

**Table 4.2. Comma-separated Data Header in Line 20**

Abbreviation	Definition
BarCode	All text and numbers in the AEP bar code
Ser#	Manufacturer serial number
CL#	City Light-assigned badge number
FL	Full load series unity test in a 3.2% format
PF	Power factor series 50% power factor test in 3.2% format
LL	Light load series unity test in 3.2% format
LF	Left element full load in 3.2% format
LP	Left element 50% power factor in 3.2% format
MF	Middle element full load in 3.2% format
MP	Middle element 50% power factor in 3.2% format
RF	Right element full load in 3.2% format
RP	Right element 50% power factor in 3.2% format
Crt	Carton number
Pal	Pallet number
CommID	Each meter's communications contacting identity
CommIDType	Communications module description

### 4.3 Examples of Certified Test Data Files

In the following two examples, a line number (Line #01) is included for clarification. This number does not appear in the actual test data file.

#### Example #1

Line #01 - L+G  
 Line #02 - RXR-SD  
 Line #03 - 25S  
 Line #04 - 200  
 Line #05 - 120  
 Line #06 - 30  
 Line #07 - 14.4  
 Line #08 - 3  
 Line #09 - 1  
 Line #10 -  
 Line #11 -  
 Line #12 - 1  
 Line #13 - 179.00  
 Line #14 - 06/01/2016  
 Line #15 - SCL-0000033495-B Line 1  
 Line #16 - 013907  
 Line #17 - Gridstream\_4  
 Line #18 - DMBH0M7A-0A78-4000,1F0D.09.26,09.30,51200,0537, ,  
 Line #19 -  
 Line #20 - Barcode, Ser#,CL#,FL,PF,LL,LF,LP,MF,MP,RF,RP,Crt,Pal,CommID,  
 Line #21 - W6A136269950F7F13,136269950,1000003,100.00,100.01,099.96,  
 099.97,100.08,000.00,000.00,100.03,099.95,001,001,40C3213E,Gridstream\_4  
 Line #22 - W6A136269951F7F13,136269951,1000004,100.00,100.01,099.96,  
 099.99,099.95,000.00,000.00,100.02,100.08,002,001,40C3212A,Gridstream\_4

**Example #2**

**Note:** This example unit does not have a comm module, so Line # 17 is blank.

- Line #01 - L+G
- Line #02 - AXR-SD
- Line #03 - 25S
- Line #04 - 200
- Line #05 - 120
- Line #06 - 30
- Line #07 - 14.4
- Line #08 - 3
- Line #09 - 1
- Line #10 -
- Line #11 -
- Line #12 - 1
- Line #13 - 120.00
- Line #14 - 06/14/2016
- Line #15 - SCL-0000033615-B Line 1
- Line #16 - 013901
- Line #17 -
- Line #18 - DGBH0M00-0A78-6000,,,41200,0534, ,
- Line #19 -
- Line #20 - Barcode,Ser#,CL#,FL,PF,LL,LF,LP,MF,MP,RF,RP,Crt,Pal,CommID,
- Line #21 - W6A136673060QDG13,136673060,19000009,100.00,099.99,099.95,  
100.05,099.93,000.00,000.00,099.94,100.06,001,001,,
- Line #22 - W6A136673061QDG13,136673061,19000010,100.01,100.01,099.95,  
100.04,100.00,000.00,000.00,099.97,100.02,001,001,,

**4.4 Accuracy Class**

**4.4.1 Class 0.2 Accuracy**

Class 0.2 accuracy of each meter shall be documented through a certified test report.

Test results shall not exceed the following error limits:

**Table 4.4.1a. Series Tests for Class 0.2 Accuracy**

Test	Error limit
Full Load	± 0.10%
Light Load	± 0.15%
Power Factor	± 0.15%

**Table 4.4.1b. Element Balance for Class 0.2 Accuracy (for Polyphase Meters)**

Test	Error limit
Unity	± 0.20%
Power Factor	± 0.30%

Test results obtained during acceptance or verification testing shall not differ from the certified test reports bar (  $\bar{x}$  ) by more than the following sigma (  $\sigma$  ).

**Table 4.4.1c. Series Tests During Acceptance or Verification Testing**

Test	Error limit
Full Load	± 0.15%
Light Load	± 0.20%
Power Factor	± 0.20%

**Table 4.4.1d. Element Balance During Acceptance or Verification Testing**

Test	Error limit
Unity	$\pm 0.25\%$
Power Factor	$\pm 0.35\%$

**Example: (Full Load)**

Mfg. ( $\bar{x}$ ) = 100.05%

Acceptable limits are 99.90% to 100.20%, (100.05%  $\pm$  0.15%)

SCL tests show ( $\bar{x}$ ) = 100.10%, ( $\sigma$ ) = 0.10%

The meters are acceptable because their statistical percentage of 1  $\sigma$  is between 100.00% and 100.20%, and that is within the limits of 99.90% and 100.20%.

**4.4.2 Class 0.5 Accuracy**

Class 0.5 accuracy of each meter shall be documented through a certified test report.

Test results shall not exceed the following error limits:

**Table 4.4.2a. Series Tests for Class 0.5 Accuracy**

Test	Error limit
Full Load	$\pm 0.25\%$
Light Load	$\pm 0.35\%$
Power Factor	$\pm 0.50\%$

**Table 4.4.2b. Element Balance for Class 0.5 Accuracy (for Polyphase Meters)**

Test	Error limit
Unity	$\pm 0.40\%$
Power Factor	$\pm 0.50\%$

Test results obtained during acceptance or verification testing shall not differ by more than the following sigma ( $\sigma$ ) from the certified test reports bar  $x$  ( $\bar{x}$ ):

**Table 4.4.2c. Series Tests During Acceptance or Verification Testing**

Test	Error limit
Full Load	$\pm 0.25\%$
Light Load	$\pm 0.35\%$
Power Factor	$\pm 0.50\%$

**Table 4.4.2d. Element Balance During Acceptance or Verification Testing (Polyphase)**

Test	Error limit
Unity	$\pm 0.60\%$
Power Factor	$\pm 0.70\%$

**Example: (Full Load)**

Mfg ( $\bar{x}$ ) = 100.10%

Acceptable limits are 99.85% to 100.35%, (100.10%  $\pm$  0.25%)

SCL tests show ( $\bar{x}$ ) = 100.15, ( $\sigma$ ) = 0.20, (limits of 99.95% to 100.35%)

The meters are acceptable because their statistical percentage of 1  $\sigma$  is between 99.95% and 100.35% which is within the limits of 99.85% to 100.35%.

#### 4.5 Meter Manufacturing File (MMF)

For each advanced meter, an MMF shall be created and provided.

##### 4.5.1 MMF Report

The MMF shall be supplied by email.

The email shall be sent to SCL\_Meter\_Test@seattle.gov.

##### 4.5.2 MMF Report Format

The MMF data file shall be in XML format, as follows:

XML Tag	Source of Data
<MeterMfgData>	Start of Report
<manufacturer>	Landis+Gyr Inc.
<customer>	Seattle City Light
<shippedTo>	Seattle City Light 'Ship to' Address
<shippedToState>	WA
<shippedDate>	Obtain from Sales Order
<meters>	Start of Meter Data Section
<meter>	Start of Individual Meter Section (repeat for each meter)
<custMeterNo>	SCL-Assigned 7 Digit Badge Number
<mfgSerialNumber>	Obtain from Calibration Data
<amrSerialNumber>	AMR Module Register Number from Calibration Data (Hexadecimal format)
<amrRevisionNumber>	L+G Module Characteristics
<amrModuleNumber>	L+G Module Characteristics
<amrModuleType>	L+G Module Characteristics
<integratedSerialNumber>	Serial Number per L+G Direction
<cononicalAmrSerialNumber>	Serial Number per L+G Direction
<kH>	Meter Characteristics
<numDials>	
<form>	
<base>	
<class>	
</meter>	End of Individual Meter Section
</meters>	End of Meter Data Section
</MeterMfgData>	End of Report

#### 4.5.3 Example of an MMF

The MMF shall follow the example format below.

```
<?xml version="1.0" encoding="UTF-8"?>
<MeterMfgData>
  <manufacturer>Landis+Gyr Inc.</manufacturer>
  <customer>SEATTLE CITY LIGHT</customer>
  <shippedTo>SEATTLE CITY LIGHT</shippedTo>
  <shippedToState>WA</shippedToState>
  <shippedDate>2016-06-01</shippedDate>
  <meters>
    <meter>
      <custMeterNo>1900003</custMeterNo>
      <mfgSerialNumber>136269946</mfgSerialNumber>
      <amrSerialNumber>40C3213D</amrSerialNumber>
      <amrRevisionNumber></amrRevisionNumber>
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#### 5. References

**SCL Material Standard 4911.05**; “Kilowatthour Meters, Single-Phase, Solid-State, Electronic”

**SCL Material Standard 4913.05**; “Kilowatthour Meters, Polyphase, Solid-State, Electronic”

**SCL Material Standard 4980.10**; “Bar Code, Nameplate, Shipping Label Requirements, Electric Meters”

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#### 6. Sources

**Hanson, Brett**; SCL Standards Engineer, subject matter expert, and originator of 4980.05

**Matsen, Chuck**; SCL Meter Electrician and subject matter expert for 4980.05

**Shaw, Ben**; SCL Meter Electrician and subject matter expert for 4980.05