Legal Metrology
ACCURATE MEASUREMENT, GOOD BUSINESS, FAIR TRADE AND SAFETY

APLMF Survey on the test procedure for initial verification of domestic water meters (Class 2)

Economy Name: _____

Name of person completing the survey: _____

Organisation responsible for verifying water meters within your economy: _____

- Please complete this survey to indicate how your economy's test procedures align or will align with the test procedures described below.
- Only tick (✓) one box per test.
- Send your completed survey to Secretariat@aplmf.org by:_____

• Currently water meters are verified • Intend to verify water meters within 5 y

• Water meters will not be verify in this economy (No need to complete this survey please return survey)

Test Name	Summary of Test Procedure	Fully aligns	Partially aligns	Does not align
TEST SET-UP	Manufacturers verify all meters they manufacturer. Imported meters are either individually tested or batch tested.			
	Meters are pattern/type approved and are marked accordingly.			
	Water meters of the same size and series can be tested in groups as long there is no significant interaction between the meters.			
	Test meters in the same position indicted on its markings (V/H). If there are no markings test in the horizontal position.			
	No supplementary device is attached to meters during testing unless they cannot be removed.			
	All filtration systems on the test rig are clean, operational and maintained.			
	Water temperature is maintained at 20°C ±10°C			
	Influence factors – ranges are maintained Ambient temperature is between 15°C and 25°C. Ambient humidity is between 45% and 75%. Atmospheric pressure is between 86 kPa and 106 kPa. Outlet gauge pressure is between 0.03 MPa and 1 MPa Control excessive vibrations			
	Batch Testing Batches comprise water meters of the same pattern, manufactured in the same location. Samples are selected at random using an acceptable batch sampling system such as that described the Australian Standard AS 1199.1.			

	Determine flowrates used for testing Each meter is marked with flowrate Q_3 and a ratio. Use these values to calculate flow rates for Q_1 and Q_2. Q_1 = Q_3 divided by the ratio Q_2 = Q_1 multiplied by 1.6 Meters are tested **once** at the following flowrates: ● between Q_1 and 1.1 Q_1; ● between Q_2 and 1.1 Q_2; ● between 0.9 Q_3 and Q_3; ● for combination meters, between 1.05 Q × 2 and 1.15 Q × 2 For value of Q see R49-2 Section 7.4.3.2			
	Determine the minimum quantity of water required for testing Use a test volume appropriate to maintain the measurement uncertainty as quoted for the laboratory. **Note:** A spreadsheet can be generated that can be used before each test. Enter the resolution of the meter and the uncertainty of the laboratory to calculate the amount of water required for testing. Use a larger tank or run the system for longer to lowers the uncertainty value.			
CONDITIONING THE SYSTEM	Conduct a dummy run to remove air and to pressurise the system. Install the meters in the test rig either singly or in groups. Open the valve allowing water to flow through the meters. Ensure the pressure is constant and free of pulsations. Ensure the test rig is free of leaks. Ensure flow rate can be maintained at a constant value during each test. Ensure influence factors are within the permitted ranges.			
STATIC PRESSURE	The purpose of this test is to ensure each meter can meet the pressure requirement of 1.6 X MAP. Connect the meter to the test system. Open the valve and allow water to run through the meter. Bring the system up to the pressure required. Allow the system to run for 1 min monitoring the pressure gauge. **Note:** Test can be carried with for individual meters or groups of meters. This will depend on the quality of the test rig. If pressure cannot be maintained the problem could be in the rig.			
ACCURACY	Close the valve that controls water flow through the meters. Record the flowrates required for testing. Select the first flowrate Q_1. Record the reading initial reading on all meters (m^3). Open the valve to allow water to flow through the meters Run the required volume through the meters. Close the valve allowing water to flow through the meters. Record the final reading (m^3).			

<table>
<tr>
<td></td>
<td>For each meter subtract the initial reading from the final reading to determine the indicated volume V_I.
Read the actual volume V_A from the calibrated reference device.
Calculate the relative error using:
$\{(V_I - V_A) \div V_A\} \times 100$
The errors shall not exceed the MPEs given in Table 1.
Table 1. MPEs for water meters
<table>
<tr><td rowspan="2">Accuracy class</td><td colspan="2">Flow rate range</td></tr>
<tr><td>$Q_1 \le Q < Q_2$</td><td>$Q_2 \le Q \le Q_4$</td></tr>
<tr><td>Class 2</td><td>±5%</td><td>±2%</td></tr>
</table>
If all the errors have the same sign, at least one of the errors shall not exceed one half of the MPE.
Repeat this procedure for each flowrate required.
Note: A batch is verified when all samples tested meet the acceptance criteria within the sample plan.
Apply the verification mark to meters that meet these requirements.</td>
<td></td><td></td><td></td>
</tr>
<tr>
<td>PLEASE DETAIL ANY ADDITIONAL TESTS REQUIRED</td>
<td></td><td></td><td></td><td></td>
</tr>
<tr>
<td>ADDITIONAL COMMENTS</td>
<td colspan="4"></td>
</tr>
</table>

Thank you for completing this Survey

Best Regards

APLMF SECRETARIAT
C/o Trading Standards
Ministry of Business, Innovation & Employment
Secretariat@aplmf.org | Telephone: +64 (4) 939 8429 |
15 Stout Street, Wellington, 6011