

## Q1 Economy Name

Answered: 8 Skipped: 0

| # | RESPONSES                   | DATE              |
|---|-----------------------------|-------------------|
| 1 | Malaysia                    | 7/31/2018 8:05 AM |
| 2 | Mongolia                    | 5/10/2018 5:15 PM |
| 3 | Republic of the Philippines | 5/9/2018 12:48 PM |
| 4 | Japan                       | 5/1/2018 4:31 PM  |
| 5 | Australia                   | 4/27/2018 7:49 PM |
| 6 | Canada                      | 4/26/2018 5:29 AM |
| 7 | VietNam                     | 3/25/2018 7:38 PM |
| 8 | Chinese Taipei              | 3/20/2018 8:22 PM |



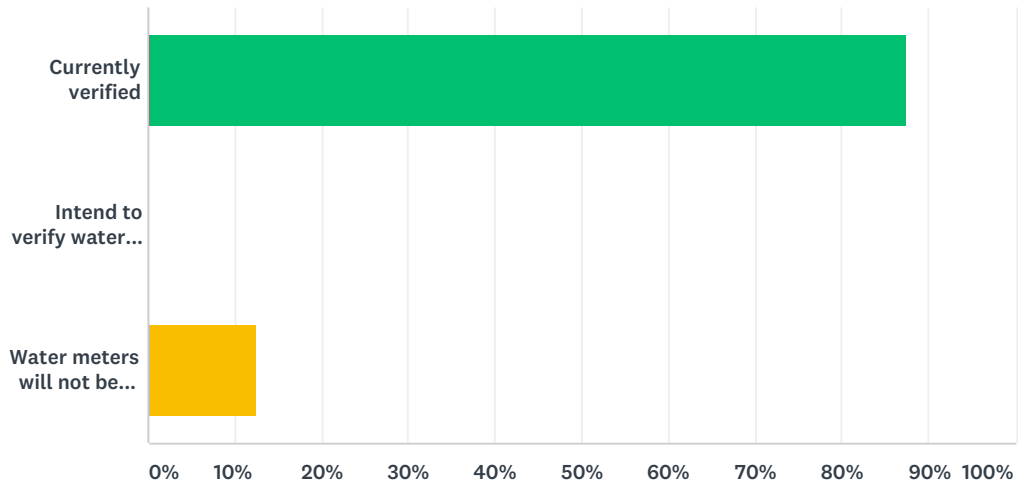
### Q3 Organisation responsible for verifying water meters within your economy

Answered: 8 Skipped: 0

| # | RESPONSES  | DATE              |
|---|--|-------------------|
| 1 | SPAN (NATIONAL WATER SERVICES COMMISSION)  | 7/31/2018 8:05 AM |
| 2 | Department of Measuring instrument verification under the Mongolian Agency for Standardization and Metrology (MASM)          | 5/10/2018 5:15 PM |
| 3 | water concessionaires on behalf of Metropolitan Waterworks and Sewerage System   | 5/9/2018 12:48 PM |
| 4 | Local governments (for less than 350mm dia.)   | 5/1/2018 4:31 PM  |
| 5 | Authorities appointed by the National Measurement Institute  | 4/27/2018 7:49 PM |
| 6 | N/A  | 4/26/2018 5:29 AM |
| 7 | Quantity Assurance and Testing Center 1/2/3/4; Technical Center of Standards Metrology and Quality of every City or Province | 3/25/2018 7:38 PM |
| 8 | Bureau of Standards, Metrology and Inspection  | 3/20/2018 8:22 PM |

## Q4 Water meters in your economy are

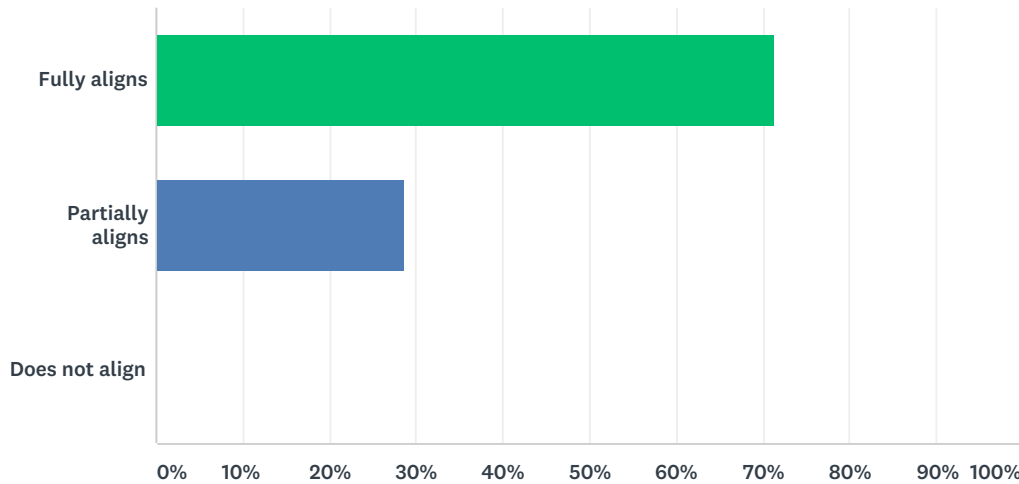
Answered: 8 Skipped: 0



| ANSWER CHOICES                                    | RESPONSES |          |
|---|-----------|----------|
| Currently verified                                | 87.50%    | 7        |
| Intend to verify water meters within 5 years      | 0.00%     | 0        |
| Water meters will not be verified in this economy | 12.50%    | 1        |
| <b>TOTAL</b>                                      |           | <b>8</b> |

### Q5 All meters are verified by an appropriately authorised laboratory prior to installation. Imported meters are either individually tested or batch tested.

Answered: 7 Skipped: 1

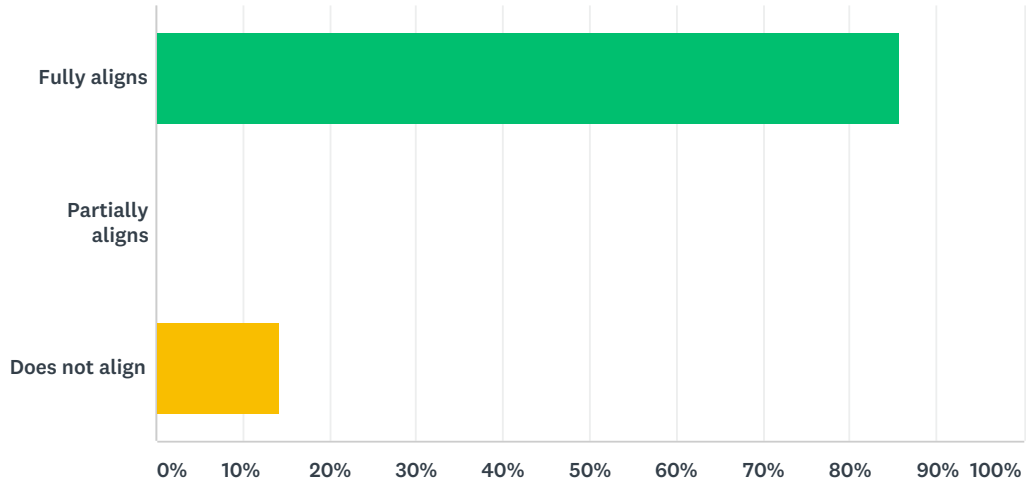


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 71.43% 5  |
| Partially aligns | 28.57% 2  |
| Does not align   | 0.00% 0   |
| TOTAL            | 7         |

| # | NONE OF ABOVE (PLEASE SPECIFY)  | DATE              |
|---|---|-------------------|
| 1 | MASM is responsible for testing imported water meters. For testing, Only 3 piece of all water meters for each type should be tested by MASM. If meters imported more than 1200 piece, than 100 meters will be verified by sampling from 1200 piece. | 5/10/2018 6:34 PM |
| 2 | The above statement aligns in the case of water meters with a Q3 value equal to or less than 16 m <sup>3</sup> /h. Water meters with a larger Q3 value are currently exempt from mandatory verification requirements.                               | 4/27/2018 8:11 PM |

## Q6 Meters are pattern/type approved and are marked accordingly.

Answered: 7 Skipped: 1

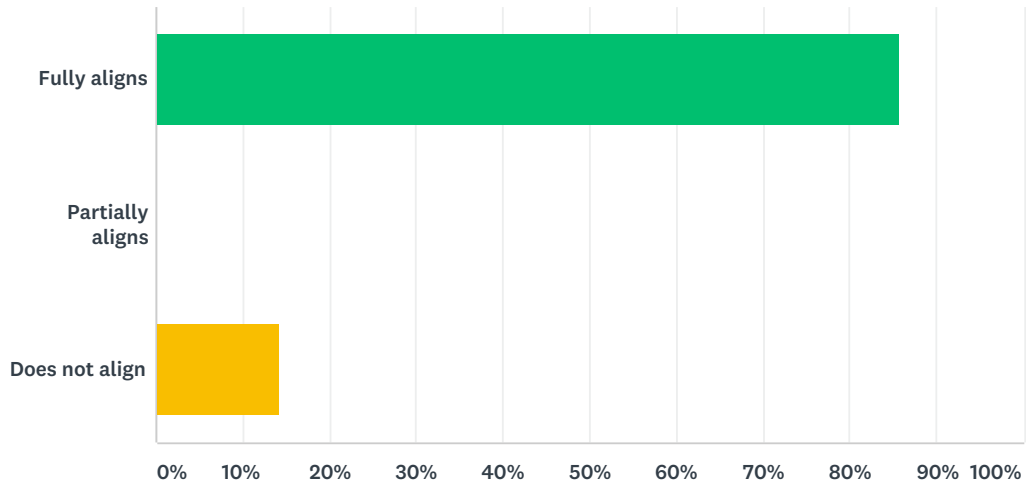


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 85.71% 6  |
| Partially aligns | 0.00% 0   |
| Does not align   | 14.29% 1  |
| <b>TOTAL</b>     | <b>7</b>  |

| # | NONE OF ABOVE (PLEASE SPECIFY)   | DATE              |
|---|--|-------------------|
| 1 | Water concessionaires check whether the meters are pattern/type approved or not.   | 5/9/2018 1:01 PM  |
| 2 | The above statement aligns in the case of water meters with a Q3 value equal to or less than 16 m3/h. Water meters with a larger Q3 value are currently exempt from mandatory pattern approval requirements. | 4/27/2018 8:11 PM |

## Q7 Water meters of the same size and series can be tested in groups as long there is no significant interaction between the meters.

Answered: 7 Skipped: 1

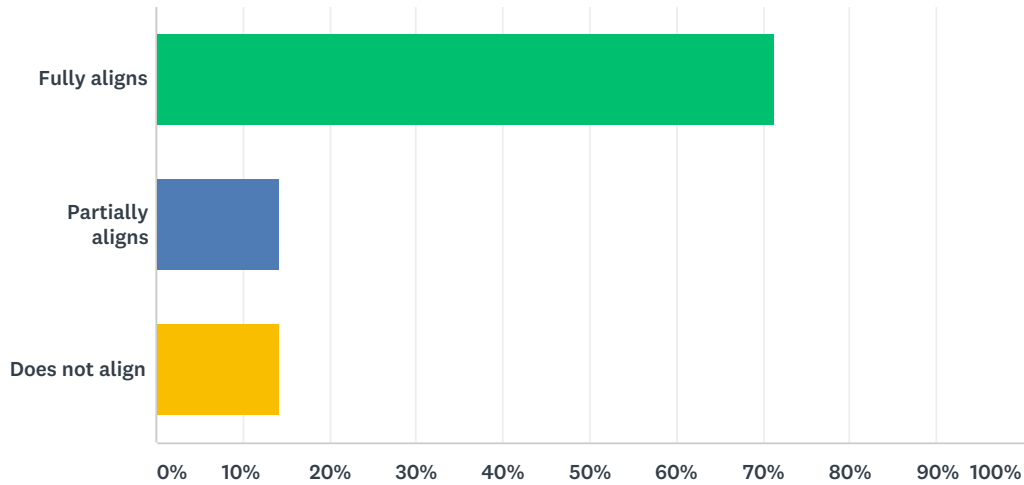


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 85.71% 6  |
| Partially aligns | 0.00% 0   |
| Does not align   | 14.29% 1  |
| TOTAL            | 7         |

| # | NONE OF ABOVE (PLEASE SPECIFY)            | DATE             |
|---|---|------------------|
| 1 | No information on this.                   | 5/9/2018 1:01 PM |
| 2 | All meters are inspected in verification. | 5/1/2018 4:42 PM |

### Q8 Test meters in the same position indicted on its markings (V/H). If there are no markings test in the horizontal position.

Answered: 7 Skipped: 1



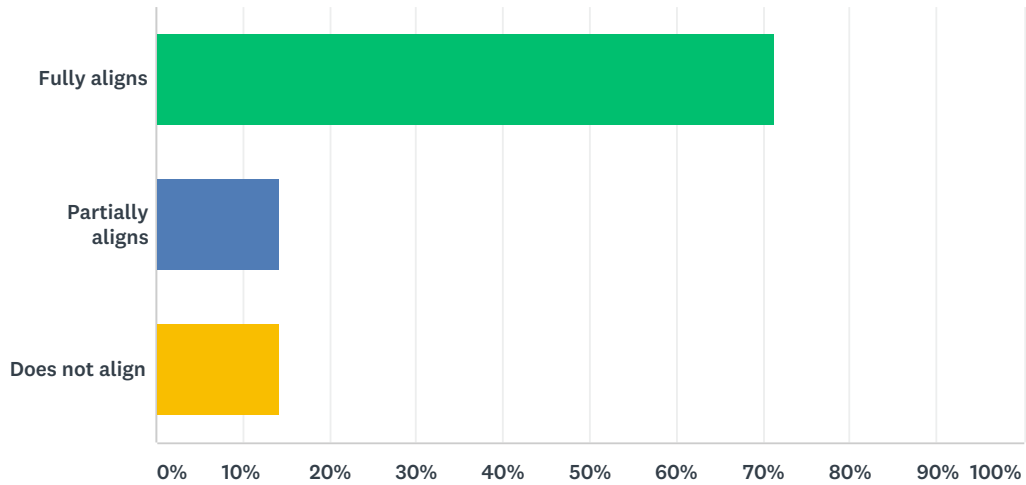
| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 71.43% 5  |
| Partially aligns | 14.29% 1  |
| Does not align   | 14.29% 1  |
| TOTAL            | 7         |

| # | NONE OF ABOVE (PLEASE SPECIFY)  | DATE              |
|---|---|-------------------|
| 1 | In the case of verification testing, the above statement aligns with Australian requirements. In the case of pattern approval testing, if the meter is not marked it is tested in V, H and intermediate orientations. | 4/27/2018 8:11 PM |



### Q9 No supplementary device is attached to meters during testing unless they cannot be removed.

Answered: 7 Skipped: 1

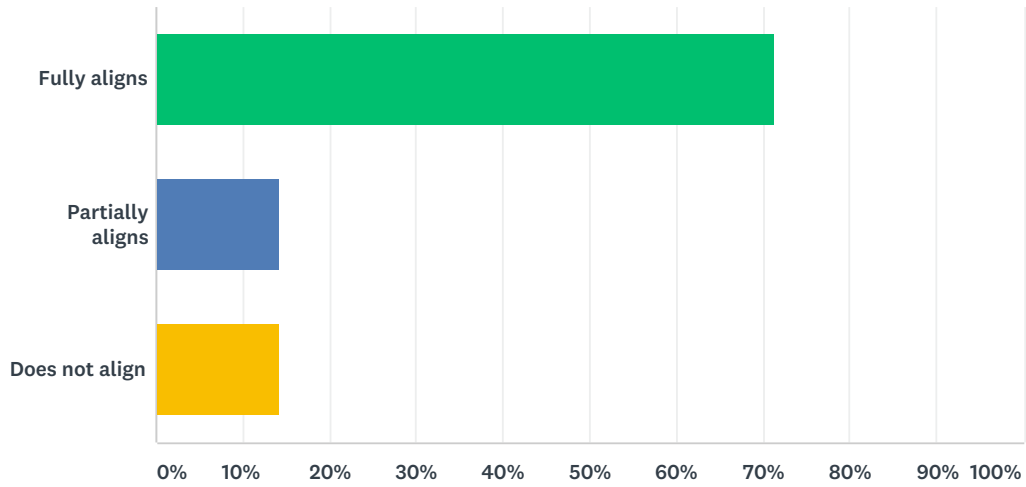


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 71.43% 5  |
| Partially aligns | 14.29% 1  |
| Does not align   | 14.29% 1  |
| TOTAL            | 7         |

| # | NONE OF ABOVE (PLEASE SPECIFY)   | DATE              |
|---|--|-------------------|
| 1 | In the case of verification testing, water meters may be fitted with devices that allow for the reading and recording of measurement data. E.g. optical reading devices, data recorders and transmitters. In the case of pattern approval testing, at least one meter in the sample shall be tested without any ancillary or supplementary devices attached. | 4/27/2018 8:11 PM |

## Q10 All filtration systems on the test rig are clean, operational and maintained.

Answered: 7 Skipped: 1

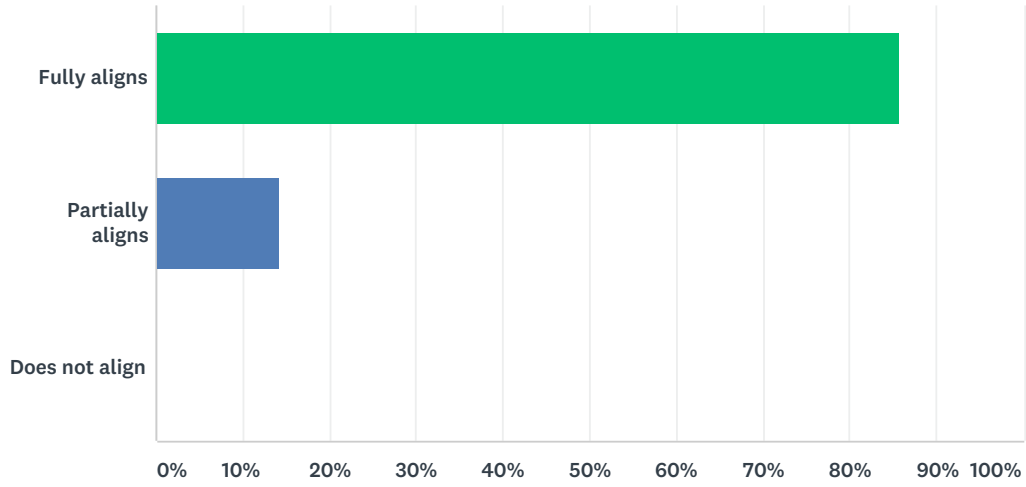


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 71.43% 5  |
| Partially aligns | 14.29% 1  |
| Does not align   | 14.29% 1  |
| TOTAL            | 7         |

| # | NONE OF ABOVE (PLEASE SPECIFY) | DATE             |
|---|--------------------------------|------------------|
| 1 | No information on this         | 5/9/2018 1:01 PM |

## Q11 Water temperature is maintained at 20°C ±10°C

Answered: 7 Skipped: 1

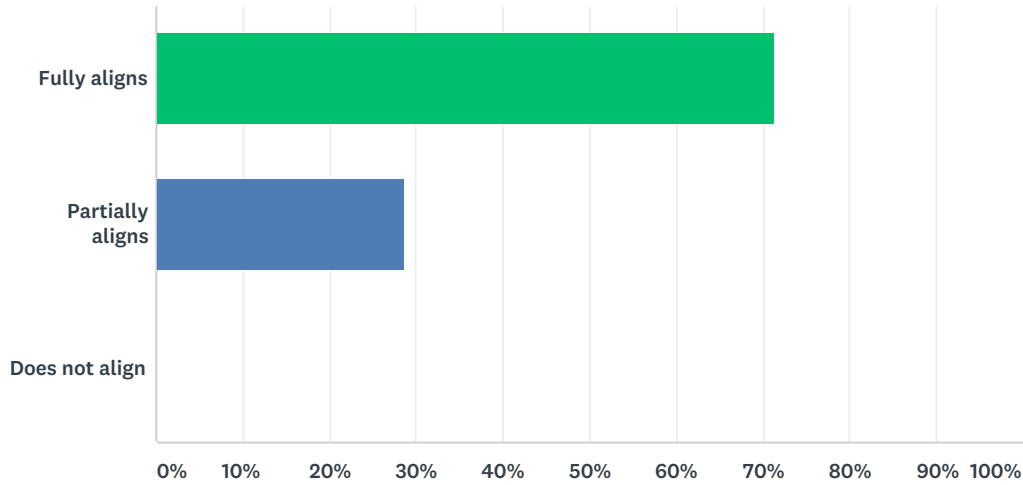


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 85.71% 6  |
| Partially aligns | 14.29% 1  |
| Does not align   | 0.00% 0   |
| <b>TOTAL</b>     | <b>7</b>  |

| # | NONE OF ABOVE (PLEASE SPECIFY) | DATE |
|---|--------------------------------|------|
|   | There are no responses.        |      |

Q12 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

Answered: 7 Skipped: 1

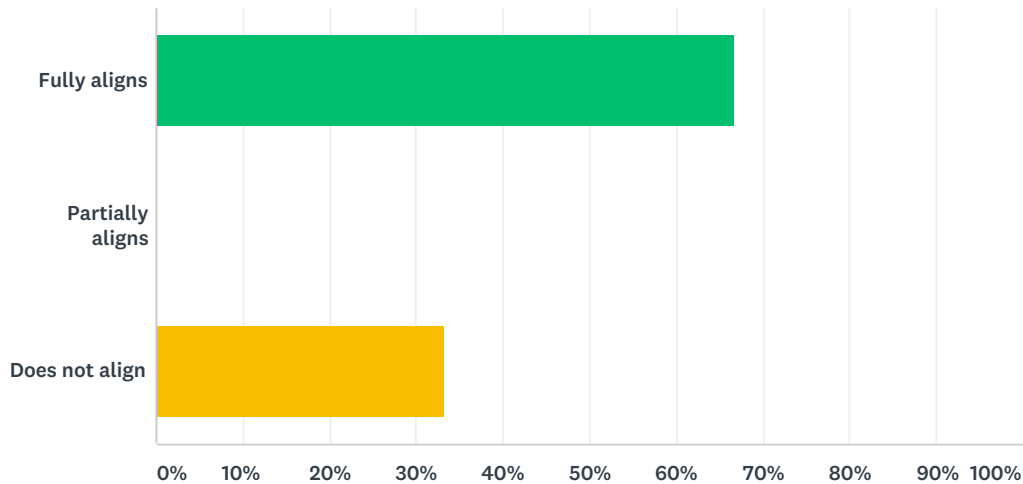


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 71.43% 5  |
| Partially aligns | 28.57% 2  |
| Does not align   | 0.00% 0   |
| TOTAL            | 7         |

| # | NONE OF ABOVE (PLEASE SPECIFY)                              | DATE              |
|---|---|-------------------|
| 1 | The local ambient temperature and humidity could be higher. | 3/20/2018 8:31 PM |

**Q13 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.**

Answered: 6 Skipped: 2

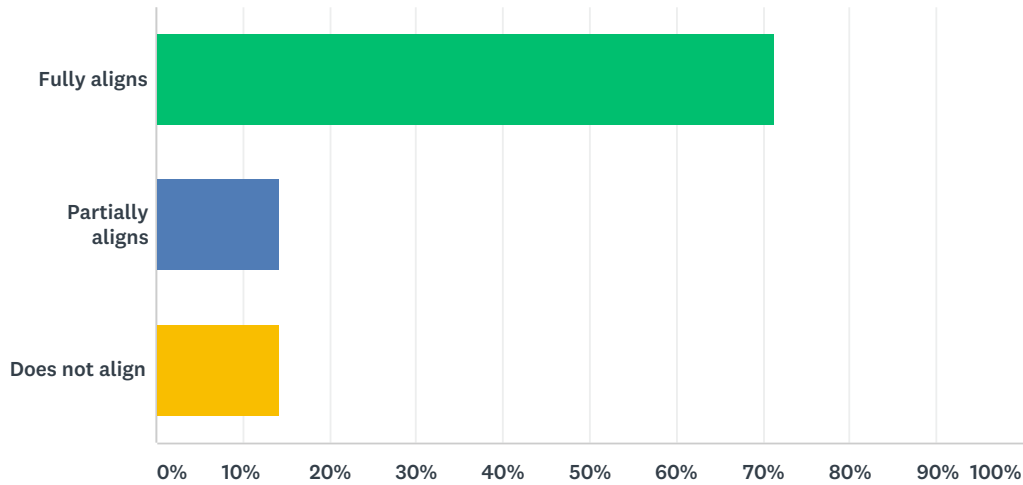


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 66.67% 4  |
| Partially aligns | 0.00% 0   |
| Does not align   | 33.33% 2  |
| TOTAL            | 6         |

| # | NONE OF ABOVE (PLEASE SPECIFY)                   | DATE              |
|---|--|-------------------|
| 1 | No information on this.                          | 5/9/2018 1:01 PM  |
| 2 | Sampling inspection is not used in Japan.        | 5/1/2018 4:42 PM  |
| 3 | We conduct test on every individual water meter. | 3/20/2018 8:31 PM |

**Q14 Determine flowrates used for testing Each meter is marked with flowrate Q3 and a ratio. Use these values to calculate flow rates for Q1 and Q2.  $Q1 = Q3$  divided by the ratio  $Q2 = Q1$  multiplied by 1.6 Meters are tested once at the following flowrates: between Q1 and 1.1 Q1; between Q2 and 1.1 Q2; between 0.9 Q3 and Q3; 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**

Answered: 7 Skipped: 1

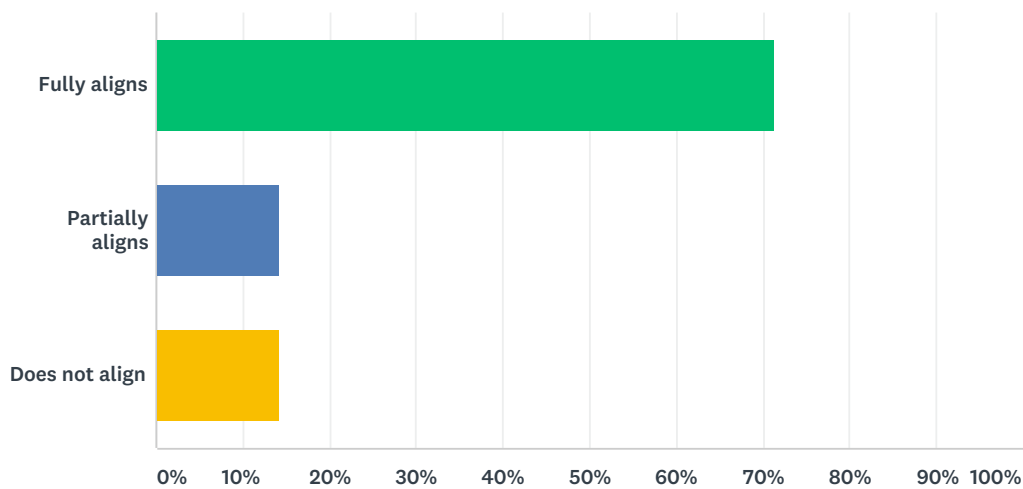


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 71.43% 5  |
| Partially aligns | 14.29% 1  |
| Does not align   | 14.29% 1  |
| TOTAL            | 7         |

| # | NONE OF ABOVE (PLEASE SPECIFY)   | DATE              |
|---|--|-------------------|
| 1 | In some cases batch-sampling processes may be used to reduce the number of test points required for all meters.                        | 4/27/2018 8:11 PM |
| 2 | The ratio of Q3 to Q1 depends on the turn down ratio and meters are tested once at two flow-rate, $Q2 \sim 1.1Q2$ and $0.9Q3 \sim Q$ . | 3/20/2018 8:31 PM |

**Q15 Determine the minimum quantity of water required for testing Use a test volume appropriate to maintain the measurement uncertainty as quoted for the laboratory. When verifying a water meter, the expanded uncertainty in the determination of the reference quantity (i.e. volume) shall not exceed one-third of the applicable maximum permissible error (MPE). 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.**

Answered: 7 Skipped: 1

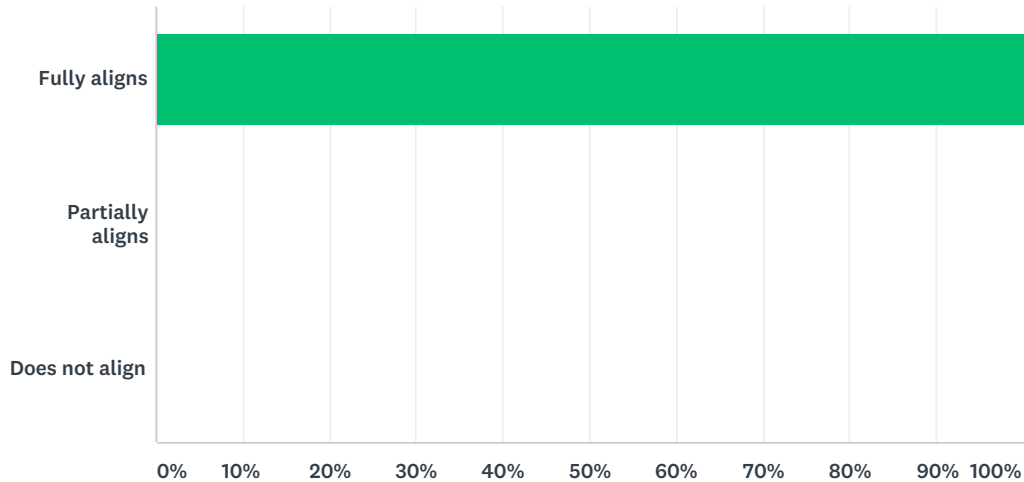


| ANSWER CHOICES   | RESPONSES |          |
|------------------|-----------|----------|
| Fully aligns     | 71.43%    | 5        |
| Partially aligns | 14.29%    | 1        |
| Does not align   | 14.29%    | 1        |
| <b>TOTAL</b>     |           | <b>7</b> |

| # | NONE OF ABOVE (PLEASE SPECIFY)            | DATE             |
|---|---|------------------|
| 1 | No information on this.                   | 5/9/2018 1:01 PM |
| 2 | The minimum quantity is specified in JIS. | 5/1/2018 4:42 PM |

**Q16 Conditioning The System** Install the meters in the test rig either singly or in groups. Conduct a dummy run to remove air and to pressurise the system. 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.

Answered: 6 Skipped: 2



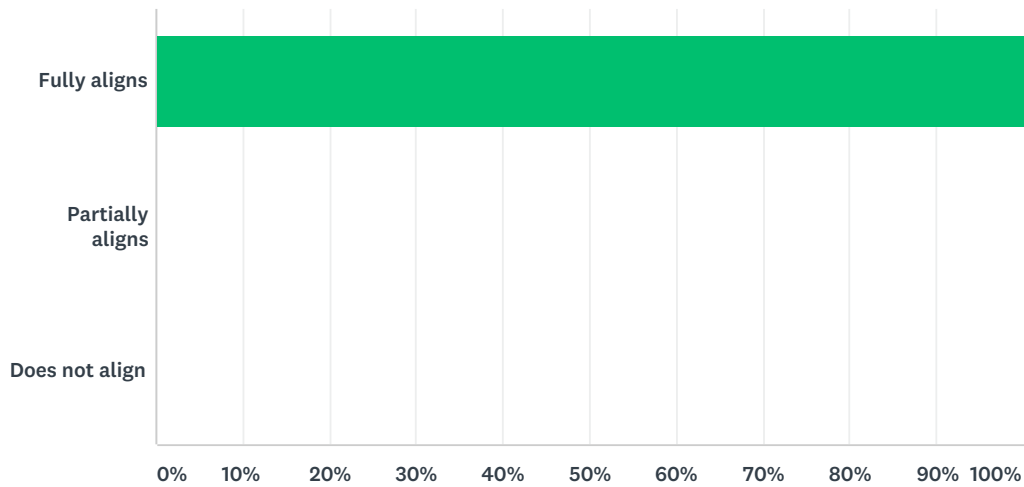
| ANSWER CHOICES   | RESPONSES |          |
|------------------|-----------|----------|
| Fully aligns     | 100.00%   | 6        |
| Partially aligns | 0.00%     | 0        |
| Does not align   | 0.00%     | 0        |
| <b>TOTAL</b>     |           | <b>6</b> |

| # | NONE OF ABOVE (PLEASE SPECIFY) | DATE |
|---|--------------------------------|------|
|   | There are no responses.        |      |



**Q17 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.

Answered: 6 Skipped: 2

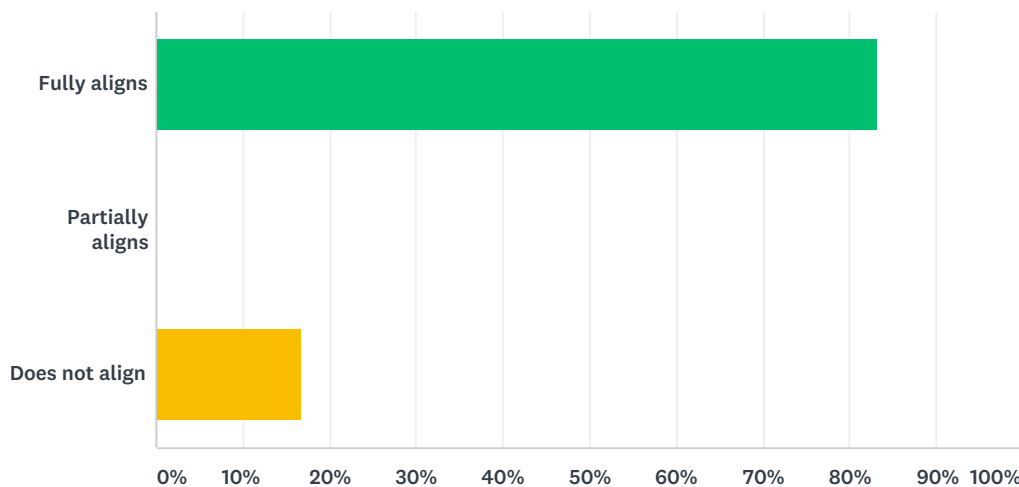


| ANSWER CHOICES   | RESPONSES |
|------------------|-----------|
| Fully aligns     | 100.00% 6 |
| Partially aligns | 0.00% 0   |
| Does not align   | 0.00% 0   |
| <b>TOTAL</b>     | <b>6</b>  |

| # | NONE OF ABOVE (PLEASE SPECIFY)   | DATE              |
|---|--|-------------------|
| 1 | In practice, this test is performed however it is not explicitly stated in the current NMIA verification requirements. | 4/27/2018 8:22 PM |

**Q18 Accuracy** Close the valve that controls water flow through the meters. Record the flowrates required for testing. Select the first flowrate Q1. Record the initial reading on all meters (m<sup>3</sup>). Note: water meters may also provide a volume indication in other units of volume, such as litres (L), kilolitres (kL) or megalitres (ML). 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 on all meters (m<sup>3</sup>). For each meter subtract the initial reading from the final reading to determine the indicated volume VI. Read the actual volume VA from the calibrated reference device. Calculate the relative error using:  $\{(VI - VA) \div VA\} \times 100$  The errors shall not exceed the MPEs given in Table 1. Table 1. MPEs for water meters Accuracy Class Flow rate range Flow rate range Accuracy Class Q1 ≤ Q < Q2 Q2 ≤ Q ≤ Q4 Class 1 ±3% ±1% Class 2 ±5% ±2% 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.

Answered: 6 Skipped: 2



| ANSWER CHOICES   | RESPONSES |   |
|------------------|-----------|---|
| Fully aligns     | 83.33%    | 5 |
| Partially aligns | 0.00%     | 0 |
| Does not align   | 16.67%    | 1 |

Survey on the test procedure for initial verification of domestic water meters

|       |   |
|-------|---|
| TOTAL | 6 |
|-------|---|

| # | NONE OF ABOVE (PLEASE SPECIFY)  | DATE              |
|---|---|-------------------|
| 1 | The MPE's are $\pm 2\%$ for both flow-rate, i.e. Q2~1.1Q2 and 0.9Q3~Q3. | 3/20/2018 8:33 PM |

## Q19 Please detail any additional test required

Answered: 2 Skipped: 6

| # | RESPONSES  | DATE             |
|---|--|------------------|
| 1 | None.  | 5/1/2018 4:45 PM |
| 2 | - Pressure lose test - Water temperature test - Overload water temperature test - Reverse flow test<br>- Flow disturbance test - Durability test | 4/9/2018 7:57 PM |

## Q20 Additional comments

Answered: 2 Skipped: 6

| # | RESPONSES   | DATE             |
|---|---|------------------|
| 1 | The concessionaires of water utilities verify the water meters in behalf of MWSS in the national capital region whereas the water districts are the ones performing the verification procedure in the municipal/provincial areas. | 5/9/2018 1:05 PM |
| 2 | None.   | 5/1/2018 4:45 PM |