

What is the R-Ratio?

In essence the R-Ratio defines a water meters' low-flow capability. The R-Ratio is defined within OIML R49 international metrological standards for water metering and independently verified through a standardised and comprehensive testing regime. Every water meter is defined by its permanent flow-rate or Q3. In Australia, for a residential meter (typically 20mm sized meter), the Q3 value is 4,000 l/h or 4 kL/h. Each meter is then categorised using the R Ratio as at what flow-rate that meters measures to within + or - 5% or Q1, and + or - 2% or Q2 after a defined endurance test. This is why the R-Ratio is sometimes referred to as Q3/Q1.

R-Ratio in action for a residential meter in Australia (R200 or Q3/Q1 = 200 is the minimum requirement for Australia according to NMI R49):

- ▶ **Permanent Flowrate (Q3) = 4,000 l/h**
- ▶ **Maximum Flowrate (Q4) = 1.25 x Q3 = 5,000 l/h**
- ▶ **Minimum Flowrate (Q1 @ R200) = 20 l/h**
- ▶ **Transitional Flowrate (Q2) = 1.6 x Q1 = 32 l/h**

Why is the R-Ratio important for finance?

According to the data released by WSAA, usage revenue accounts for 36% of total revenue for Australian Utilities. Whilst for Utilities maximising revenue and profitability is not the highest priority, usage charges play a critical role in maintaining affordability and securing water for future generations. The better the R-Ratio the more effective usage charging is to deliver a sustainable future and to minimise tariff increases.

The R-Ratio is also a major contributor to the Fixed Charges. It is very common in Water Utilities that large meters are over-sized for their application leading to under-measurement of water at their low-flow. The dilemma for the Utility is the under-measurement of water in economic terms is less in value than the difference in the fixed charge. In some cases, the connection size is requested by the customer. Larger meters with better R-Ratio's help Utilities to maintain the fixed charge and recover the water.

Why is the R-Ratio important for Non-Revenue Water?

Non-Revenue Water has two main components; actual losses (Real Losses) and water that has been consumed but not measured (Apparent Losses). With between 10% and 40% of water passing through a residential water meter occurring at low-flow and if meters installed in the field are not capable of measuring these low-flows accurately; the water meter itself becomes a contributing factor to Non-Revenue Water. The R-Ratio becomes another important capability to helping minimise water losses. TasWater conducted a study that showed the iPERL with an R800 Ratio measured 8% more water than the existing meter with a ratio of R200. If NRW was 12% this would represent nearly a 60% reduction in NRW.

Why is the R-Ratio important for Customers?

Usage Charging was introduced to help encourage customers to conserve water to avoid governments having to fund oversized and expensive water and wastewater infrastructure projects. One common area water is often used but not measured is when a customer has a leakage. Between 20% and 40% of customers have a leakage at any one time and this can account for as high as 15% of consumption of total consumption. Customer Leakages that are not measured and not fixed have two impacts, firstly they are subsidised by all the other customers and secondly the leakage adds to the base load of the infrastructure, requiring the infrastructure to be larger. A better R-Ratio helps Customers to be accountable for the leakage and either pay for the water they use or fix the leak.

For residential customers, a large percentage of their usage would be classed as intermittent usage, and they use 10% of their consumption at low-flow. The better the R-Ratio the better the ability of the water meter to measure this water at the low-flow.

The R-Ratio becomes an important capability to help keep fixed and usage charges lower, empowering customers to better influence their bill in the future.

What R-Ratio should our meters have?

The higher the R-Ratio the better. The minimum Australian requirement for NMI R49 is R200, the best in-class ratio for residential meters used in Australia is R800. As the water meter becomes larger so does the impact of the R-Ratio. For example, for a 40mm application an R315 ratio, which is commonly used in Australia today achieves a minimum flowrate (Q1) of 50 l/h. The best available ratio in Australia of R800 achieves a Q1 of 20 l/h. Below Q1 there is no verification of measurement capability. This means over a year potentially 0.3 ML of water is not being billed.