CITY OF NEW YORK

DEPARTMENT OF ENVIRONMENTAL PROTECTION

GUIDE TO WATER SUBMETERS

Produced in association with Intro 0268-2010

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Michael R. Bloomberg, Mayor

Carter H. Strickland, Jr., Commissioner

Introduction

This booklet is provided as technical information for the design professional, licensed plumber, or conservation professional as an introduction to water meter and meter communications technology. Additional information can be obtained from the manufacturer websites listed at the end of this document. The legislation passed by the New York City Council (Intro 0268-2010) does not include a requirement that submeters need to be "approved" in any form. This booklet should not be viewed as an "approved list" but as a technical resource.

Some of the meters listed in this booklet are qualified for use as DEP billing meters and others are not. Inclusion in this booklet does not mean that the meter is approved for DEP billing purposes, nor that the product is approved or endorsed by the city of New York. Please refer to the separate "List of Approved Water Meters" available on the DEP website (Customer Service > Property Managers and Trade Professionals). This booklet will be updated approximately once a year.

If you have questions, comments or suggestions about this list, write:

Warren Liebold
Bureau of Customer Services - Metering
New York City Department of Environmental Protection
59-17 Junction Blvd. - 1st Floor LR
Flushing, NY 11373
wliebold@dep.nyc.gov

A Few Abbreviations and Acronyms

AMR	Automated (or Automatic) Meter Reading. Use of a radio- or telephone-based transmitter to send meter readings a short or long distance to a receiver that may be mobile or fixed. DEP billing meters are read using an Aclara Star AMI system.
Meter Body	The base meter with internal measuring element
Meter Register	The portion of the meter mounted on the meter body, that totalizes and displays water use information

About Water Meters and Industry Standards

Water meters used by U.S. or Canadian water utilities must meet prescriptive and performance requirements set by the American Water Works Association ("AWWA"). Some European meters also comply with ISO 4064 where Class C and D in that system represent meters with utility grade accuracy. The ISO standard is more performance- rather than prescriptive-based. The city legislation does not prohibit the use of meters that do not meet either standard set but if you do use non-standard products there may be less assurance about accuracy, quality of construction and longevity of service. Some BTU meters are only covered by European standards that may be excellent but have no U.S. equivalent.

Note on "No Lead" Alloys

DEP water use rules[a] require that all water meter bodies be composed of an alloy with no more than 0.25% lead. The Council's bill has no such requirement for submeters but the design professional and licensed plumber may wish to avoid specifying a product that the owner may consider substandard from a health and safety perspective. Plastic meter bodies comply and metal meter bodies that comply should be stamped or labeled "NSF-61." Meter manufacturers may use more than one alloy to accomplish this purpose and the mention of a specific alloy in this document does not preclude a manufacturer from using another equal or superior alternative. Some manufacturers simply provide an epoxy coating over an old-type meter to attain compliance. Since some of the meters on this list are not DEP-approved the design professional needs to confirm that the product they use is "NSF-61 Certified."

Meter Types

Most submeters used for building monitoring or cost allocation purposes will be "positive displacement" or "single-jet" types but some of the other technologies will be used for larger connections.

Positive displacement, or "disc" meters

The primary design used in most small residential and commercial applications due to reliability and low cost. Available in ⅝" through 2" sizes. The 1½" and 2" versions do not register very precisely at flow rates below 1.5 gpm. Positive displacement meters can be installed on inclined and even vertical pipe. Some manufacturers have versions designed for hot water. The smaller versions can often operate for more than a decade with only modest deterioration of accuracy. These meters have internal strainers (screens). There are at least five (5) manufacturers. Positive displacement meters should not be used on branches with fire protection sprinklers.

Single-Jet Meters

This design is often directed at either applications with a need for accuracy at low flow rates (under 2 gpm) or limited space since they are physically smaller than positive displacement meters. They are considerably more expensive than positive displacement or multi-jet meters. They must be installed on a level horizontal plane (+/- 10%) to operate accurately. There is currently only one manufacturer of small single-jet meters, Metron-Farnier. Their meters are rated for hot water service up to 140 degrees. They are available in ⅝" through 6" sizes.

Multi-Jet Meters

This meter design has traditionally been popular with utilities that have suspended matter or grit in their water since it is more tolerant of that material than positive displacement meters. They do not remain as accurate as positive displacement meters over the long term. They must be installed in a level horizontal plane. This class of meter has never been approved for billing purposes by DEP. They are available in ⅝" through 2" sizes.

Oscillating flow meters

One manufacturer (Elster) produces an oscillating flow meter with an electronic register in ¾" and 1" sizes that claims to operate with high accuracy for 20 years or longer.

Turbine meters

Available in 2" and larger sizes, these are inferential meters designed for high flow rates.

Electromagnetic meters

Manufactured by several companies in sizes 1½" and larger, these meters have no moving parts and operate on Faraday's Principle.

BTU Meters

More a functional group rather than a technological type, these are meters that measure both flow and heat content (not just temperature) and at least for now are far more common in Europe which defines their standards. The can be single-jet, turbine or other types.

Units of Measurement

Most U.S. water utilities have water meters that measure in cubic feet with billing in hundreds of cubic feet. Almost all meter manufacturers also supply units that register in gallons. Be sure to specify gallons if that is what you want. 7.48 gallons = 1 cubic foot.

Meter Registers: Different Ways to Obtain a Remote Reading

All meters can be read directly by viewing the odometer-type display on the meter. Some have slightly different layouts, and standardizing to one manufacturer may have some advantages. Transmission of data to a remote location or to a remote computer of some kind requires some thought.

Absolute Encoders

Most American and Canadian water utilities use meters with registers that are "absolute encoders." What this means is that a specialized meter reading handheld computer, or an AMR box is wired to the meter register and that device sends a very low voltage signal into the register. The register returns an actual read by detecting the the current positions of the odometer-type wheels. Most meters do this through a combination of chips and mechanical sensors or markers on the odometer wheels (physical encoders) while some newer versions use optical pickups (optical encoders). A few very recent models are appearing that dispense with physical parts altogether and are all-electronic. The electronic registers are not true encoders, their output is a meter reading and not a pulse.

Pulse

There are several "flavors" but all of them issue a pulse that represents a specific volume of water for each pulse, usually one pulse per gallon or one pulse for every ten gallons for larger (2"+) meters. This technology does not provide the reading on the meter. Operation begins with a coordination between the reading at the meter and the start reading at a remote location and then the remote location receives the pulses and acts as a totalizer. If a wire or communications are cut the totalizer must be reset or adjusted and someone may need to physically read the meter to re-establish the current reading.

4-20 ma

This protocol may be commonly used in the HVAC industry but it is less common in the meter industry. It is sometimes an option for electromagnetic meters.

Manufacturer	Meter Model and Size Range	Encoder Register Model Name	Pulse or Other Register Type Model Name
Positive Displacement Meters			
Badger	Recordall ⅝" – 2"	ADE	RTR: piezo electric switch
Hersey	400 Series, 500 Series ⅝" – 2"	Translator	None
Neptune	T10 ⅝" – 2"	AutoDetect (Mechanical encoder) E-Coder (Solid State Encoder)	None, but has attachments "Tricon-E" and "Tricon-S" that generate 4-20 ma or pulse output
Sensus	SRII	ICE Opto Absolute Encoder (0.01 CF and 0.1 gallon resolution)	None
Single-Jet Meters			
Metron-Farnier	Spectrum ⅝" – 6"	Hawkeye Optical Encoder	Innov8 Register, dual encoder and pulse outputs (2011). HRI Pulse Output: Open Drain Transistor, 10-year battery included
Electronic and Other New Technologies			
Badger	e-Meter E-55 ⅝" - 1" Ultrasonic	ADE Register emulation	Badger RTR emulation
Elster	evoQ4 1½" – 10" Electromagnetic	Elster Scancoder or Sensus Protocol	Optional dual pulse output
Elster	SM700 Fluidic Oscillator ¾" and 1"	Unknown	Unknown
Sensus	iPERL ⅝" – 1" Electromagnetic	Fully electronic encoder	None
Istec	BTU Meters single-jet and turbine	None	Open collector or dry contact type

METER MANUFACTURER WEBSITES AND OTHER USEFUL ONLINE RESOURCES

Most of the water meter manufacturers have websites that offer downloadable specifications, parts lists and installation instructions.

Meter Manufacturers

Elster-Amco

http://www.elsteramcowater.com/en/

Badger

http://www.badgermeter.com/

Hersey Meters

http://www.herseymeters.com/

Metron-Farnier

http://www.metronfarnier.com/

Neptune Technology Group

http://www.neptunetg.com/

Sensus Metering Systems

http://www.sensus.com/index.xml

[a] Title 15 Chapter 20, Rules of the City of New York