Electromagnetic Flowmeters Fact sheet for businesses

This fact sheet provides guidance to customers required to install and maintain an electromagnetic flowmeter (also known as a magflow) to measure the trade waste volume being discharged to a Greater Western Water sewer.

Why do I need to install an electromagnetic flowmeter?

All trade waste customers discharging more than 25 kiloliters per day to sewer must install an electromagnetic flowmeter. Some customers with daily trade waste volumes to sewer less than 25 kiloliters may be required to install an electromagnetic flowmeter due to the type of business activity they perform, the quality of their trade waste or if the volume of trade waste generated cannot be related to the volume of potable water supplied to the site. Greater Western Water will always advise a customer when electromagnetic flowmeter installation is required.

Electromagnetic flowmeters are the most suitable flowmeters for determining trade waste volumes and flow rates. The readings from such flowmeters are used by Greater Western Water to:

- accurately bill for the trade waste discharged to Greater Western Water's sewer and sewerage system
- establish current and forecast future trade waste contaminant loads discharged to sewage treatment plants
- assess sewerage system capacity.

What is an electromagnetic flowmeter and how does it work?

An electromagnetic flow meter is an instrument used to determine the instantaneous flow rate and total volume of liquid that has flowed through a pipe. These flowmeters are very versatile and are commonly used for the measurement of water and wastewaters (including trade waste).

Electromagnetic flowmeters work by applying a magnetic field to the pipe to be metered; when liquid passes through the pipe a potential difference results which varies proportionally with the rate of flow, allowing it to be metered. Electromagnetic flowmeters are the most accurate meter type that is commonly available.

Electromagnetic flowmeters have a digital display and are frequently linked to a recorder for data collection. Some electromagnetic flowmeters also have alarm settings and will send out an alert if flows move outside pre-set limits or stop due to a blockage. Most electromagnetic flowmeters can be password protected, preventing unauthorized users from operating the meter or changing settings.

Installing an electromagnetic flowmeter

Greater Western Water requires customers to employ a suitably qualified flowmeter practitioner to:

- assist in the sizing, design and installation of an electromagnetic flowmeter, and
- provide a statement that the installation of the flow sensor and recording device meets manufacturer's specifications.

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Aspects that should be considered during the design and installation of a electromagnetic flowmeter are described in the table below. Further guidance is available from the Water Services Association of Australia Code of Practice WSA-15 (Trade Waste Metering Code of Practice) and WSA-12 (Metering Selection and Installation Code of Practice). Flowmeter manufacturer's recommendations should also be considered.

Consideration	Description
Location	A flowmeter to be used for the purposes of measuring trade waste flows must be located downstream of any on-site wastewater treatment system and before the connection to the sewer. No other trade waste connection or flow to sewer should be made beyond the flowmeter other than domestic connections. Ideally domestic contributions should not contribute to the flow passing through the flowmeter; these should be plumbed with separation connections to the sewer. Where this is not practicable and domestic flows pass through the flowmeter, Greater Western Water will apply a correction to account for the domestic volume and load contributions (in cases where the flowmeter reads will be used for trade waste billing and measurement purposes).
Gradient	Electromagnetic flowmeters should be installed level with no gradient. In some cases they can also be installed vertically provided the flow passes through in an upwards direction only.
Full pipe	An electromagnetic flowmeter will not be able to give accurate readings if the pipe is not full. It is therefore important that the section of pipe in which the electromagnetic flowmeter sits is always full of liquid. It may be necessary to put a downward bend in the pipe upstream of the flowmeter and an upward bend beyond the flowmeter so this can be achieved. The angle of these bends is not critical however the nature of the wastewater (solids content) should be considered to avoid blockage or excessive pipe wear. In some cases it may also be necessary to introduce an air vent into the pipework near the electromagnetic flowmeter to achieve a full pipe as pressure differences over the flowmeter can sometimes prevent a full pipe from being achieved. Vents also reduce the likelihood of siphon effects occurring. The qualified installer may identify the need for a vent when installing or verifying the flowmeter's accuracy. Where an electromagnetic flowmeter is installed vertically and upstream of a pump positioned at a lower level, a non-return valve may be required to be installed downstream of the flowmeter to ensure the flowmeter remains full of liquid.
Minimum straight lengths	Upstream of an electromagnetic flowmeter a straight length of pipe of at least 10 times the diameter of the flowmeter pipe should usually exist. Downstream a straight length of pipe 5 times the diameter is usually recommended to ensure accuracy. The magnitude of these lengths can also depend on the proximity of pumps and other special features.
Meter size and flow rate	Different electromagnetic flowmeters exist for different pipe dimensions. The velocity through a meter should be in the range 1 to 3 meters per second. A meter supplier will be able to assist with sizing.
Vibration	Pipelines should be supported on both sides of the flowmeter to avoid potential damage that may occur through vibration.

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Clearance	Electromagnetic flowmeter installations should allow sufficient room next to the pipe flanges to install nuts and stud bolts. Flowmeters should be installed such that quick and easy maintenance is possible.
Turbulence	If the flowmeter has a smaller diameter than the pipework, tapered reducers should be used either side of the meter to reduce turbulence.
Foaming	An electromagnetic flowmeter will not be able to give accurate readings if the pipe contains foam. Where required, consideration should be given to additional treatment to prevent foaming.
Static	Installation of earthing flanges must be in place to prevent the build-up of static electricity around the flowmeter installation.
Submersion	A submersible flowmeter can be utilised if it needs to be located in liquid. This can allow a flowmeter to be retrofitted into an existing trade waste pit rather than having to do additional excavation works downstream.
Isolating valves	Suitable isolating valves must be installed such that operations and maintenance activities can be performed.
Power supply	Hard wired 240v power supply must be provided to electromagnetic flowmeters. All electromagnetic flowmeters must have a back-up power supply in the event of a power failure (e.g. solar panel, battery back-up).
Electromagnetic fields	Avoid installing electromagnetic flowmeters near strong electromagnetic fields, e.g. major power sources, power substations, high voltage power lines, switchboards, eddy current sorter machines as these can interfere with the flowmeter's operation.
Pulse outs and signal strength	Spare pulse outputs must be available to allow a connection to a data logger and/or composite sampler. The strength of the signal/pulses must be strong enough to be recognized by composite samplers.
No reset to zero	Totaliser recording volume discharged not able to be reset.
Measurement	Flowmeters should be able to return instantaneous readings in liters per second and totalised volume in kiloliters.

To ensure electromagnetic flowmeters are running within Greater Western Water's required tolerance of +/-2.5% the following guarantees and maintenance arrangements are required:

Requirement	Description
Calibration certificates	Calibration certificates must be obtained by the customer upon installation of the electromagnetic flowmeter. They provide a guarantee for one year that the flow accuracy is within 2.5% tolerance. Calibration is not typically performed in-situ. A copy of this certificate must be provided to Greater Western Water.
Verification certificate (post-installation)	At the time of installation of the electromagnetic flowmeter, a verification certificate will need to be obtained by the customer from the qualified installer. During verification, checks are performed on the electronics (motherboard etc.), connections (cables linking equipment), and magnetism (check for interference from electric motors etc.) to ensure the 2.5% accuracy tolerance can be maintained. If the accuracy is not within 2.5%, the technician will have to troubleshoot the installation as they should not be able to print out the certificate until it meets the tolerance. Greater Western Water will require a copy of the verification report.

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How do I maintain an electromagnetic flowmeter?

To ensure electromagnetic flowmeters continue to run within Greater Western Water's required tolerance of +/-2.5%:

Requirement	Description
Verification certificate	Customers are required to verify annually that the flowmeter is still reading within the 2.5% tolerance. This is done by a suitably qualified professional providing a verification certificate. Greater Western Water requires copies of these verification certificates.

What if I need to repair or replace my electromagnetic flowmeter?

It is important that customers notify Greater Western Water prior to removing a trade waste flowmeter for repair. The time and date of removal, along with the totaliser reading should also be provided to Greater Western Water.

Greater Western Water will adopt, in consultation with the customer, an alternative method for determining trade waste volumes for the purpose of billing whilst the flowmeter is being repaired. Where possible, trade waste should not be discharged where appropriate metering is not available.

For more information, call the trade waste team on 9313 8366, email tradewaste@gww.com.au, speak to your site's assigned Trade Waste Consultant or refer to the WSAA Metering Codes of Practice.