

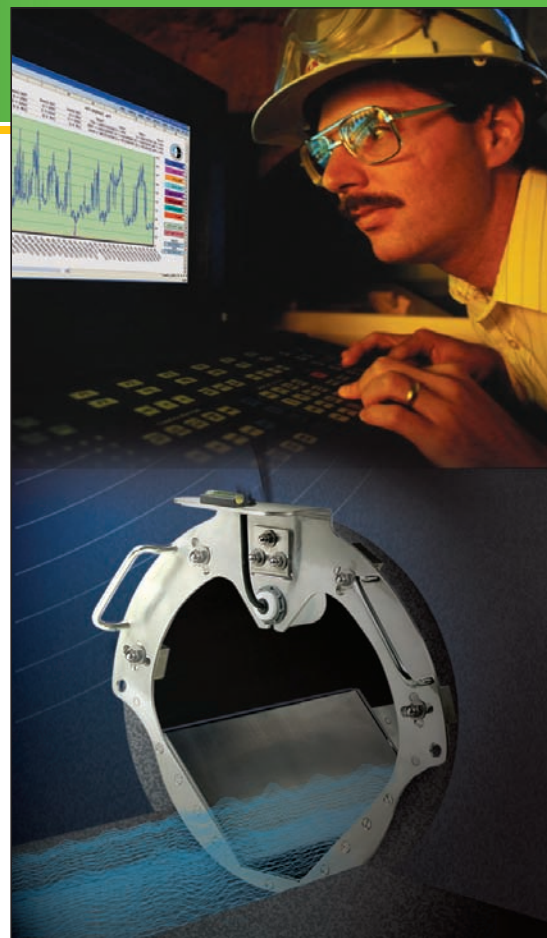
Cartridge Meter Self-Validation: A Technological First

Eastech introduces state-of-the-art technology (pat. pend.) for self-validation of flow meter calibration stability without the need for confined space entry. Status IQ Technology, a standard feature on all Cartridge Meters, has now eliminated manhole entry safety concerns when operating personnel are required to meet municipal agency standards for field verification of flow meter accuracies.



One of the most common operations for any collection system group responsible for flow meter integrity is focused around validating the instrument's calibration stability over time. In the past, for sewer flow and billing meters, this could be an expensive and time consuming process, not to mention the safety issues involved when entering a potentially lethal confined space. Status IQ Technology enables Collection System operating

personnel to undertake a full in-situ assessment of any Cartridge Meter, from electronics through sensor, without removing the meter, stopping the flow of wastewater or entering the manhole. Confirmation of calibration integrity can be remotely accomplished in less than five minutes without the requirement for manhole entry or purchase and manipulation of secondary references. Eastech's next-generation technology dramatically reduces collection system meter verification safety concerns and expense.



THE METHODOLOGY FOR ESTABLISHING POSITIVE CONFIRMATION OF FLOW METER CALIBRATION INTEGRITY IS OUTLINED IN DETAIL BELOW. METERS MAY NOW BE EASILY AND SAFELY VERIFIED, EVERY HOUR, EVERY DAY, EVERY MONTH OR EVERY SIX MONTHS.

● NIST TRACEABLE CALIBRATION

Prior to field shipment, every Cartridge Meter, besides being tested and certified, is NIST traceable calibrated at Eastech's Flow Metrology Laboratory under the identical size and flow conditions specified for it's ultimate application. The resulting data then becomes a permanent part of the flow meter's historical record. For future verification purposes, this historical database can be utilized as a diagnostic tool when compared to present flow measurements.



● REMOTE DATA RETRIEVAL

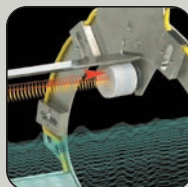
After initial installation of the Cartridge, there is never again the need for field personnel to enter a confined space within a manhole for validation of calibration stability. Validation information may safely and simply be acquired through any of the following methods:

- A. Wireless download to laptop
- B. Visual confirmation at local display
- C. Transfer to remote facility via telemetry



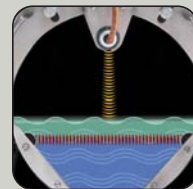
● LEVEL SENSOR VALIDATION

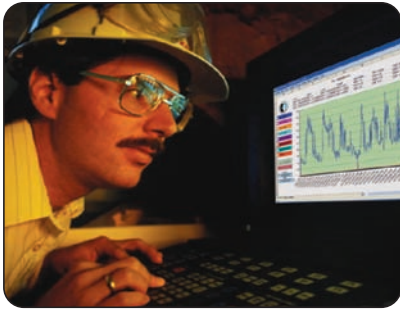
During normal operation, ultrasonic level sensor readings are self-validated by continuously recording and comparing the ultrasonic signal to a known reference distance securely fixed within the stainless frame of the Cartridge. This method also allows for self-recalibration of the level sensor during daily temperature variations. (see back page)



● VELOCITY SENSOR VALIDATION

Also during normal operation, velocity sensor readings are self-validated by repeatedly comparing volume at a certain height calculated by the area-velocity transit-time method to the known volume at this identical height previously calculated by the flume/ level sensor combination. (see back page)



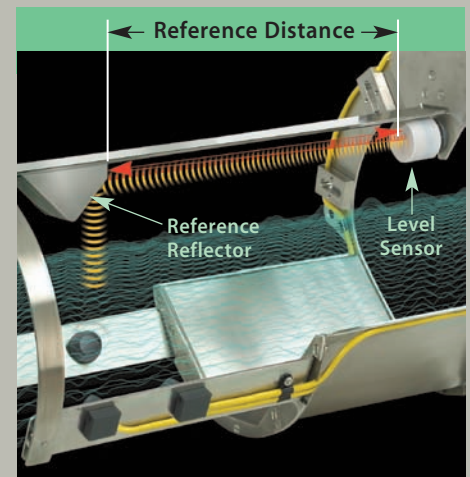


Due to the known hazards of confined space entry, it is extremely advantageous for Collection System field personnel to have the capability of validating flow meter calibration stability without the need for placing themselves within the potentially lethal confines of a manhole. Presently available methods of flow measurement usually require the periodic cleaning of sensors, at which time, a physical confirmation of level and velocity readings are performed. Since the Cartridge Meter concept has been shown not to require maintenance for at least 18 months and maybe indefinitely (verified in various Government studies), the need for continuous manhole entry for maintenance purposes has been eliminated. This important feature has provided Eastech with the impetus to incorporate within the Cartridge Meter design additional technological features that are capable of automatically performing two very important tasks: Validation and Calibration.

LEVEL SENSOR SELF-VALIDATION AND SELF-CALIBRATION

The 45 degree Reference Reflector, contained within each Cartridge Meter, is specifically designed (pat. pend.) so that an incremental portion of the ultrasonic signal from the Level Sensor is not reflected downwards towards the water, but instead, reflected back towards the Sensor. This known Reference Distance not only allows for the continuous computation and monitoring of the sonic velocity of the air within the conduit for Self-Calibration purposes, but also functions as a known Reference Distance that can now be utilized for Level Sensor Self-Validation.

The Reference Distance is permanently fixed between two points within the stainless Cartridge. The Level Sensor measures the distance from the face of the Sensor to the small vertical incremental portion of the Reflector. This exact Reference Distance, ascertained at time of manufacture, is continuously compared to the distance measured by the ultrasonic Level Sensor. This internal comparison consistently provides for Self-Validation of Level Sensor measurement accuracy.



VELOCITY SENSOR SELF-VALIDATION AND SELF-CALIBRATION

A pair of Transit-Time Velocity Sensors, in combination with an ultrasonic Level Sensor, utilize proven Area-Velocity technology in order to compute flow once the water level within the conduit has reached 33% of the inside pipe diameter. Prior to the level reaching 33% of pipe I.D., a Trapezoidal Flume in combination with the identical ultrasonic Level Sensor ascertains the volume of flow.

The Trapezoidal Flume/ Level Sensor combination, since it was NIST Traceable calibrated from zero to 40% pipe I.D. at Eastech's in-house Flow Laboratory, provides an accurate comparison reference that may be utilized for continuous dynamic Self-Calibration and Self-Validation of Velocity Sensor performance. Both the Reference Trapezoidal Flume/Level Sensor flow rate and the Velocity Sensor/Level Sensor flow rate may be compared to one another within the comparative operating range of both technologies (33% - 40%). The Transit-Time Velocity Sensors may now be adjusted, if necessary, to correlate with the known volume of flow previously calculated by the NIST traceable Trapezoidal Flume. This Self-Validation procedure not only provides for a safe and cost-efficient method of verifying sensor accuracies, but also provides for constant confirmation of Cartridge Meter flow measurement integrity.

