

HALO[®], powered by CiDRA's *SMARTring*[®] technology, leverages active sonar and signal processing techniques to provide permanent, fixed multipoint measurements around the circumference of the slurry pipe thereby eliminating manual point-to-point measurements.

Increase Pipeline Predictability, Reliability and Reduce Costs with HALO *SMARTring*

HALO *SMARTring* technology and service overcomes the deficiencies of traditional, manual UT methods used to measure pipe wear. CiDRA leverages its differentiated sonar and signal processing expertise to provide timely, accurate, repeatable pipe wear measurements and other relevant pipeline information and characteristics.

The *SMARTring* pipe wear measurement tool clamps around the outside of the pipe and remains installed throughout the life of the pipe. On most larger diameter pipes, the *SMARTring* solution features twelve measurement locations, equally spaced around the pipe. "On-demand" a technician connects a "smart" ruggedized, handheld reader-processor to each *SMARTring* sensor and acquires multiple measurement data sets simultaneously. Because acquisition of all measurement points can be made

virtually in seconds, tens of thousands of points can be frequently measured, thereby enhancing predictive modeling of wear rates by your pipeline and asset reliability teams.



HALO *SMARTring* Solution Benefits

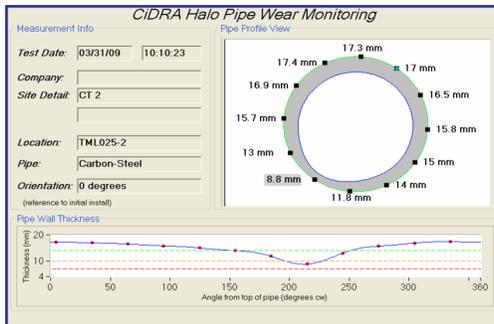
More frequent and accurate pipe wear information dramatically improves predictive modeling techniques and enables preventative action to be taken. CiDRA's innovative approach to pipe wear measurement and characterization provides the following benefits for pipeline reliability engineers and plant maintenance operations:

- Reduces process safety risk
- Significantly reduces unplanned shutdowns
- Mitigates loss of production and loss of containment
- Extends pipe life
- Reduces operating costs such as construction and rental of scaffolding, hydro-excavation, pipe cleaning and other services
- Eliminates labor expenses associated with NDT engineering firm manual UT measurements
- Proactive scheduling and maintenance

HALO *SMARTring* Features

- Twelve measurement locations equally spaced around the pipe (actual number depends on pipe diameter)
- Rotation sensor and pipe rotation tracking: Angle of rotation
- Dual connection ports at 180° that allow complete accessibility when pipe is rotated or becomes inaccessible due to partially submerged or covered pipes: accumulation of sand, ice, snow, etc.
- Long cable tethers which are utilized to eliminate need for scaffolding required to access pipes on racks
- Interpolation and characterization of pipe loss between sensors





HALO® SMARTring® Specifications

Area Classification: Standard: Ordinary Location
Optional: Class I Division 2, Groups A, B, C, D (presently for Canada only)

Certifications: (Ordinary Location SAFETY):

- UL 61010-1:2004 R10.08
- CAN/CSA-C22.2 NO.61010-1-04

(Hazardous Location):

- CAN/CSA-C22.2 NO.213-M1987

Pipe Material: Carbon Steel, Alloy Clad Pipe, HDPE* and Stainless Steel

Temperature Rating: -40°C to 85° C

Calibration: Calibration of the *SMARTring* measurements is maintained throughout the life of the sensor band by way of an integrated known reference element. Each time a measurement is taken the reference element is queried to assure the validity of the measurements.

Sizes:
10-inch to 48-inch
Other sizes available upon request

Measurement Resolution: 0.1 mm

*Measurements must be taken when process is not running



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