

CUI Warning System

For CUI Control and Reduction of CUI Inspection Costs



MUI...the cost-effective solution.



MUI International
www.mui-int.com

Corrosion Under Insulator (CUI)



The corrosion of pipes, tanks and various equipment under thermal insulation has been a significant problem in the petrochemical and other industries. When metal structures are covered with thermal insulation, leak detection due to corrosion failure is often too late because the corrosion under insulation (CUI) cannot be visually inspected without removing the insulation materials. The high costs of corrosion repairs and inspection result in huge financial losses and manufacturing downtime.



Since the locations of CUI caused by water leakages are basically unpredictable, monitoring CUI in selected areas and partial visual inspections miss some of CUI locations, resulting in serious accidents. Therefore, large amounts of accurate CUI data from the entire pipelines or tanks must be collected with a minimum man-power.

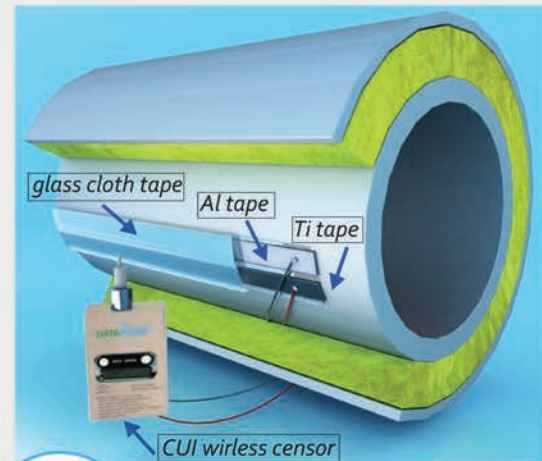
CUI Warning System include a long-lasting battery powered wireless sensors to transmit the data indicating the existences of corrosion electrolyte (water and moisture) on the CUI Sensor Tapes. CUI Warning System provides the frequency and duration of wet time to determine the risk of CUI for any portions or the entire structure of pipeline, tank or equipment in your office.

CUI Warning System

Features:

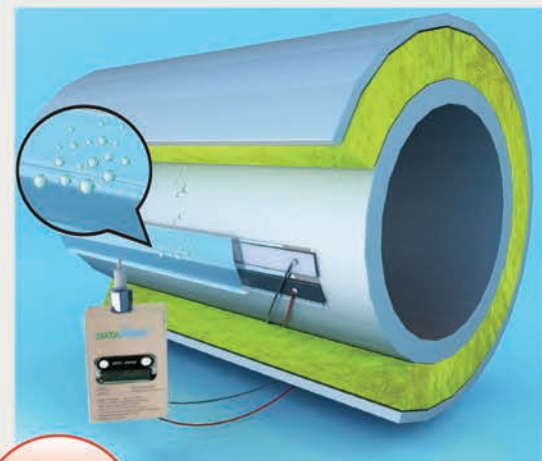
- Only sensor system that can monitor the "entire pipeline" from an office.
- Low cost and simple installation in any areas.
- Reduces major inspection cost by identifying the CUI areas of a long pipe.
- Safe in any hazardous areas.

This innovative "CUI Warning System" was developed to detect the presence of corrosion electrolyte on steel structures under any types of thermal insulators. The CUI Warning System consists of "CUI Sensor Tapes" with "Wireless Sensors" and "DataPorts". CUI Sensor Tape is constructed using two dissimilar, spaced-apart metal tapes, titanium and aluminum, coupled and attached on glass-cloth tape. For long life sensor tape, bare titanium and MMO coated titanium tapes are utilized. When there is no moisture on the CUI Sensor Tape, the voltage difference between two metals is zero. However, when any portion of tape is moist or wet, the voltage difference immediately develops and detected by Wireless Sensor. By monitoring the potentials of CUI Sensor Tapes, the existence of corrosion electrolyte on the metal surface can be detected.



~0 mV

CUI Sensor Tape (Dry Condition)



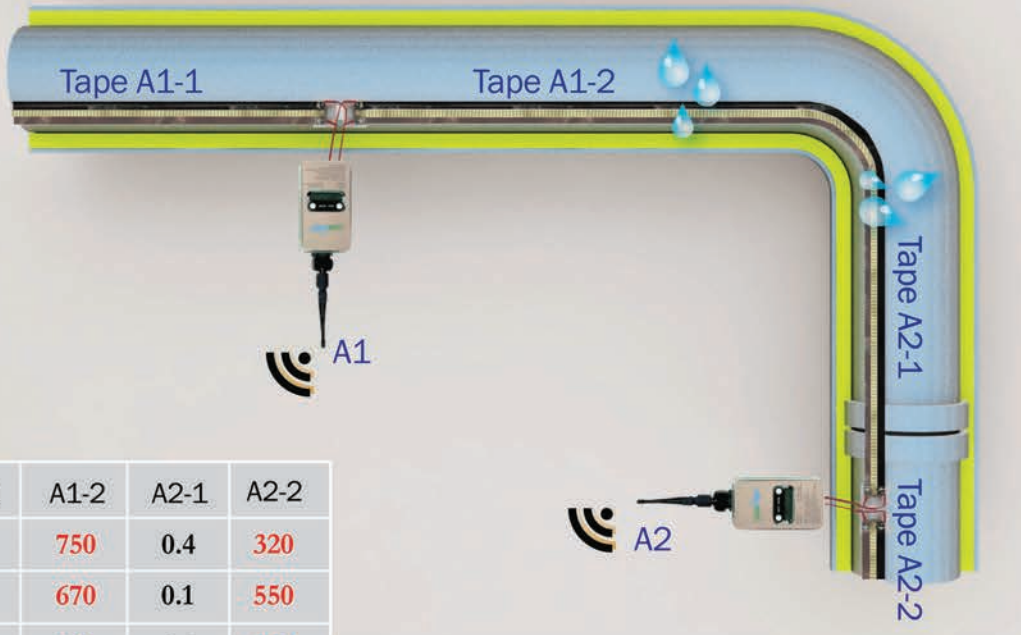
>500 mV

CUI Sensor Tape (Wet Condition)

Note : >300 mV for Ti & MMO Ti

To Initiate and Sustain Corrosion, "Electrolyte" is Required.

The electrolyte for CUI is the moisture or water resulting from the intrusion of rain water, deluge system water, wash water.

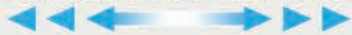


Time	A1-1	A1-2	A2-1	A2-2
11 : 00	0.2	750	0.4	320
12 : 00	0.1	670	0.1	550
13 : 00	0.1	810	0.2	770
14 : 00	0.3	780	0.2	690
15 : 00	0.1	760	0.1	630

Water Leakage Detection by CUI Sensor Tapes



Using External Antenna
Transmission Range: 2000 – 4000 m



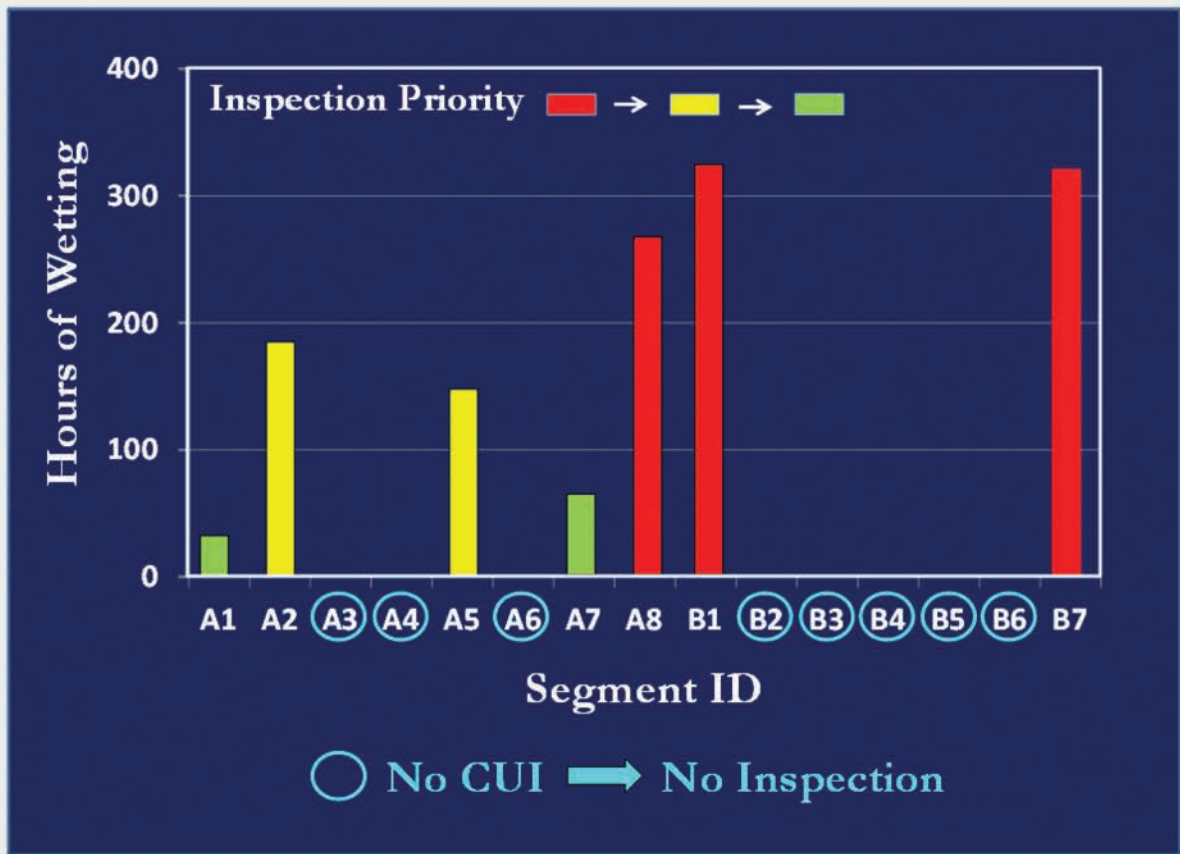
CUI Warning System for Entire pipeline



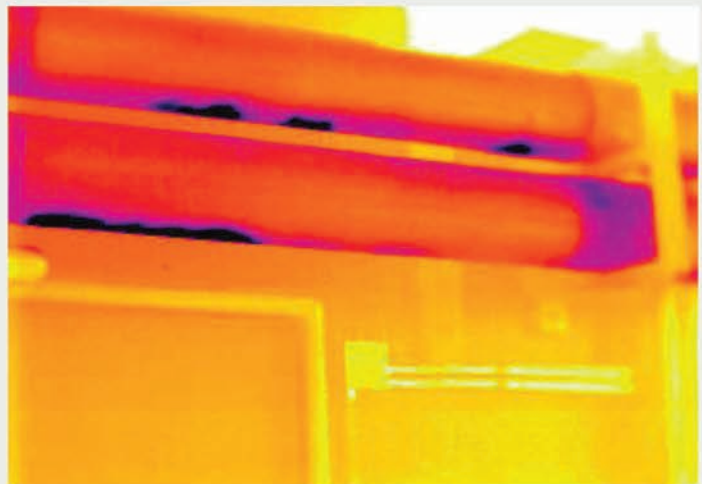
Transmission Range: 300 – 900 m



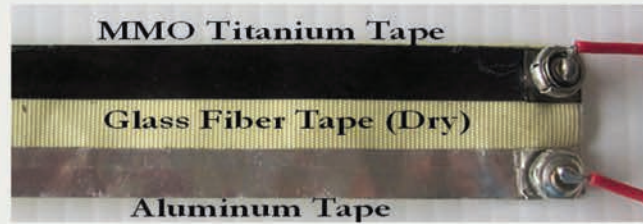
*One iPro Base Unit receives the data from 100 Wireless Sensors
(200 CUI Sensor Tapes)*



Results from CUI Warning System



Thermo-graphic Image
Pin-pointing the leakage locations
after detecting the electrolyte from CUI Sensors Tapes



iPro 1000 Wireless Base CUI Wireless Sensor

(Standard Type)
(Semi-Permanent Type)
CUI Sensor Tapes

Technical Specifications

iPro 1000: Wireless Base Radio Module and Data Logger

- iPro 1000: Wireless Base Radio Module and Data Logger
- Internal Wi-Fi server with integral browser
- Internal NiMH re-chargeable battery (5 years), with connection for solar panel/charging system
- Features 2GB compact flash card for unattended data recording
- 902 MHz – 928 MHz Frequency Hopping Spread Spectrum (FHSS), FCC certified ISM license-free band
- Includes USB and RS-485 modbus slave connection for easy access by remote SCADA
- Sample rates as high as 1/sec from all sensors
- IP68 enclosure, watertight, crushproof, and dust proof
- Optional Touch Screen Interface
- Optional Internal cellular data modem

CUI Wireless Sensor on Structure

- Contains two CUI Sensor Circuits
- Self-contained power, 'C' Size 3.6 V lithium battery, up to 5 year battery life, field replaceable
- Fibox enclosure with external or internal antenna
- Low battery alarm
- Contains extensive self-checking software and hardware that continuously monitors the operation
- Rated for industrial use -40° C to 85° C
- FM NEMA 4X weather-proof enclosure FM rated intrinsically safe for Class I, II, III; Div 1, Groups A, B, C, D, E, F & G; Class I, II, III, Div 2, Groups A, B, C, D, F & G. CSA
- FM Class T4 for max operating temp $\leq +85^{\circ}$ C CSA Temp Code T3, operating temp $\leq +85^{\circ}$ C
CSA Class I, Div 2 Temp Code T4, operating temp $\leq 85^{\circ}$ C

CUI Sensor Tape

- High temperature resistance (-54 to 300° C)
- Total tape thickness: 0.5 mm
- FAA flame-resistance



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