De Dietrich
PROCESS SYSTEMS

GLASWATCH
MONITORING SYSTEMS

De Dietrich

Product Description

The auto-compensating GlasWatch Model AZ glass monitor has been designed for the in-service continuous monitoring of the lining of a glassed vessel. Immediate detection of a defect will minimize metal contamination of the batch and penetration of the steel wall of the vessel. The timely repair of a small defect is simpler and more effective to perform.

GlasWatch AZ is comprised of a microprocessor, a Zener barrier and two conductive electrodes in contact with the product. These electrodes can be placed on the head of a bottom outlet valve (shown below), on a spacer ring, on a baffle or on a thermowell.

Self-monitoring GlasWatch AZ switches itself on if the monitoring conditions are met (electrodes in contact with a product of sufficient conductivity).

Because GlasWatch AZ is auto-compensating, when a leak rate is indicated, it is proportional to the size of the defect and independent of the conductivity of the batch in the range 0.1–20 mS/cm. In this range, the batch conductivity can be estimated.

Standard process interfaces include relay outputs, 0/4-20 mA analog signal and interface RS 232. Available options are 0-5V analog output and interface RS 422.

Operating Principle

Detection of a failure in the lining is based on a comparison of the alternating current passing between two conductive electrodes (reference current) with the direct current passing between these two electrodes and the vessel substrate (leakage current).

In Operation

Reference: Two conductive electrodes, insulated from ground, are placed on the glass of a bottom outlet valve, space ring, baffle or thermowell. By applying an alternating voltage between these electrodes, we obtain a reference current (Iref) proportional to the conductivity of the product. After calibration of the electrodes and storing their K factors into the microprocessor's memory, the assembly can indicate the approximate conductivity of the product (Cond). An adjustable threshold placed on this circuit indicates the presence or absence of minimum detection conditions.

Detection of a defect: If a direct voltage is maintained between the grounded vessel substrate and the conductive electrodes, a discontinuity in the lining causes flow of a leakage current (If), the intensity of which varies with the conductivity of the product and the size of the defect. Using these two values, Iref and If, and a linearization table, the microprocessor calculates an absolute leak rate (Tabs) which is independent of the conductivity of the product in the range 0.1–20 mS/cm. This absolute leak rate quantifies the extent of the defect and is transmitted as a 4-20 mA or 0-20 mA signal. Tantalum repairs or microleaks at gaskets may cause leakage current in the absence of defects. This initial absolute leak rate (Tabs0) can be calculated, retained and then subtracted from the absolute leak rate to give the relative rate (Trel). An alarm threshold (LED + relay) is adjustable on the relative leak rate scale.

Repair plugs: Vessels that are supplied for use with GlasWatch systems will have their factory installed plugs isolated with polyamide insulating bushings. These plugs are electrically insulated from the metal substrate of the vessel, eliminating the need for calibrations and comparative readings to determine defects. The GlasWatch Model AZ will be equal effectiveness when used on older vessels. Plugs or patches must be removed and reinstalled using polyamide insulating bushings and non-conductive cement.

Hazardous areas operation: The field circuit is Classified by Underwriters Laboratories Inc. as intrinsically safe for operation in Class 1, Groups A, B, C and D hazardous areas (7M48) when connected to an UL approved DDPS sensor in accordance with appropriate control drawings. Zener safety barrier is an MTL 766 ac, FM entity approved (J.I.1H8A1.AX) for intrinsically safe operation of field circuit in Class I, Div. 1, Groups A, B, C and D; Class II, Div. 1, Groups E, G; Class III, Div. 1 areas, Dwg. SCI-88.

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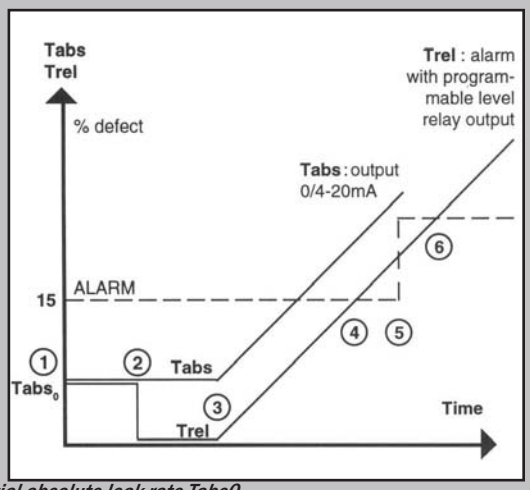
Advantages

- Full time surveillance checks for lining defects during normal operation of vessel
- Monitors evolution of defects repairs may be delayed to finish batch or campaign
- Saves you money by:
  1. Slashing unplanned downtime eliminating contaminated batches
  2. Reducing maintenance costs extending the life of your equipment
- Microprocessor compensates for changing batch conductivity
- Can be applied to any glass or plastic lined vessel

Monitoring the development of a defect



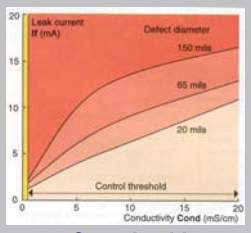
1. Initial absolute leak rate Tabs0
2. Zero correction: Trel = Tabs – Tabs0
3. Appearance of a defect
4. Alarm signal is given
5. The ALARM threshold is factory set at 15% which corresponds to a defect of 20 to 25 mils in diameter
6. Alarm suppression

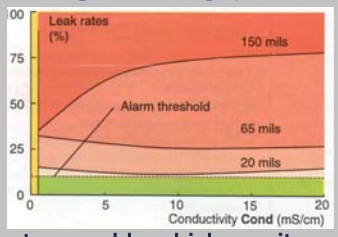
Two complementary ways to monitor the defect:

Record Tabs (output 0/4-20 mA) and observe the curve's shape, or suppress alarm by increasing the value of ALARM threshold (5). An estimate of the corrosion rate can be based on the time elapsed until another alarm signal occurs (6).

Detailed Characteristics

Linearization of absolute leak rate Tabs: Leak current If varies widely with conductivity, so the microprocessor calculates an absolute leak rate Tabs which is nearly independent of batch conductivity. This is the basis of the auto-compensating feature of GlasWatch Model AZ lining monitoring system.





Enclosure: Standard instrument assembly, which monitors one vessel, is housed in a lockable NEMA 3, 4X, 12 FRP enclosure. Multiple assemblies can be ordered.

Electrical Data:

Supply voltage	100V[ac]; 220V[ac]; 24V[ac]
Reference current	3mA max. at 5V[ac]
Measuring current	10mA max. at 5V[ac]
Zener barrier	MLT 766 [ac]
Analog output: absolute leak	0-20mA and 4-20mA(standard) 0-5V(optional)
"ALARM" & "CONTROL" relay output ratings	240V, 50mA max. for purely resistive load
Remote dialogues	Interface RS 232 (standard) RS 422 (optional)

Communication system-GlasWatch AZ is designed with an on-line microprocessor to help the user avoid potential errors. During filling or emptying, the insulated electrodes may be grounded/earthed, which would signal an alarm condition. Having the system alarm during this condition can be avoided by using a switch on the inlet and/or outlet valve. Then, when filling or emptying the vessel, the control circuit would be opened. This would signal the "CONTROL" relay that surveillance has been interrupted, and the green LED light turns off. Then the "ALARM" relay and red LED light, which provides failure indication, is essentially disabled. Electrode condition can be determined by measuring reference current. Following the progression of the relative leak rate enables distinction between a slow gasket leak and a glass failure. Connection of GlasGuard AZ to your central computer system makes all of this information available for intelligent supervision.

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