FLUXION TECHNOLOGIES

ILRT ANALYTICS

ADVANCED ANALYTICS FOR INTEGRATED LEAKAGE RATE TESTING

This Service Provides Real-Time Independent Verification of all Calculated ILRT Values
Advanced Analytics to Optimize all Test Intervals

Peer Checks All ILRT Calculated Values, Acceptance Criteria and Other Quality Related Values Performed Real-Time as The Test is in Progress Using Totally Independent Software Tools

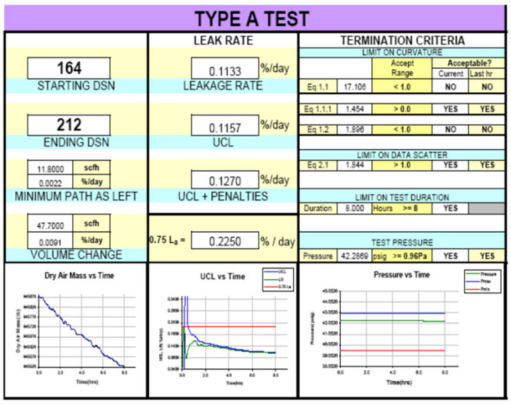
Continuously Scans for The Health, Accuracy and Stability of Each Sensor

Perform Advanced Statistical Techniques to Trouble-Shoot Issues and Minimize Testing Times

On-Site or Remote Service to Worldwide Locations

Prior to the ILRT

- Instrumentation system deep analysis and verification
- Evaluation and optimization of volume fractions
- Specifications for pressurization system capabilities
- Pressurization optimization plan
- Depressurization optimization plan



During the ILRT

- Pressurization Control: Temperature & humidity matching to minimize stabilization time
- Stabilization Phase: Identify earliest end to Stabilization for Passing Type A test
- Type A Test Termination: Optimize end time to ensure passage of the Verification Test
- Verification Test: Review choice of start time, induced leak rate and acceptance band
- Depressurization: Minimize depressurization time by staged openings of letdown paths
- Continuous Sensor Health Monitoring: As each data is received each sensor is evaluated
- Advanced Graphics for 2 and 3-D visualization of all raw and calculated values

Fluxion Technologies LLC, 21720 W. Long Grove Rd. STE C #161 60010
+1 (847) 971-8231 I Sales@FluxionTek I www.FluxionTek.com

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THE DETAILS

1. Pre-Test Instrument System Check-Out

A large amount of data is generated from long term pretest full system burn-in testing. The analytics software analyzes this data for any anomalies. This includes checking for bad and missing values, skipped data sets, excessive scatter, poor response times or tracking errors. The analytics quantifies the scatter contribution from each sensor to the system's overall calculation of the Upper Confidence Limit and other acceptance criterion.

2. Pre-Test Volume Fraction Calculations

The software uses the containment temperature survey data to determine the optimum volume fraction of each sensor. The volume fractions chosen are then utilized with previous test data to quantify the degree of improvement over past test results. The goal being to improve temperature containment modeling in a way that best accounts for spatial variances, thus reducing stabilization times and improving Stabilization Phase, Type A Test and Verification Test results.

3. Pressurization Optimization

The optimum average containment air temperature and humidity to be reached at the end of pressurization is determined. The software provides real-time temperature and humidity setpoints for the incoming air to containment in order to achieve those optimum values. This is essential to minimize the Stabilization Phase duration. Also, the software calculates the instantaneous and average rates of pressurization to verify the full expected performance of the pressurization system.

4. Stabilization Phase Calculations

The software calculates and displays all Stabilization Phase test data and parameters. It sweeps each incoming data set to identify any sensors that are faulty or disproportionately contribute to the overall system data scatter. In cases where the acceptance criteria are not being met, the software can determine if the cause is containment instability or a real leak from the containment. Based upon extrapolation of collected data, the software determines the first time when the Stabilization Phase can be ended, and a successful Type A Test begun.

5. Type A Test Calculations

The software calculates and displays all Type A Test data and parameters. It sweeps each incoming data set to identify any sensors that are faulty or disproportionately contribute to the overall system data scatter. The software identifies any calculated high leakage rates that may be due to causes other than a leak from containment. These would include volume changes, thermal instability or inter-volume leakage. Based upon extrapolation of collected data, the software determines the first time when the Type A Test can be ended, and a successful Verification Test begun.

6. Verification Test

The software calculates and displays all Verification Test data and parameters. It sweeps each incoming data set to identify any sensors that are faulty or disproportionately contribute to the overall system data scatter. The software verifies the proper calculation of the induced leakage rate as well as the upper and lower bounds. As needed, the software can back-calculate the effect of different start times.

7. Depressurization

Given the maximum allowable depressurization rate, pretest use this tool can be used to plan the choice of each opening as well as the timing of each opening. Unlike pressurization, this rate will change as a function of containment pressure. During the depressurization, the software monitors the rate and calculates when to open each opening while updating the time to reach zero pressure. The goal is to minimize the depressurization time without exceeding the maximum allowable rate.

8. Sensor What-If Calculations

These calculations compare current results to results with any combination of up to five identified most suspect sensors locked out. Using brute force iterative calculations, the software identified the optimum combination for evaluation under the plant's procedural guidelines. The software may be used to perform this function at any time during the Stabilization Phase, Type A Test or Verification Test.

9. Utility Calculations

These calculational modules are used to verify the accuracy of ancillary calculations performed by plant procedures.

- **%/day to engineering units**

Converts between %/day and engineering units.

- **Free air volume change from liquid level change corrections**

This module calculates the effects of liquid level changes on calculated leakage rates expressed in units of %/day. The capability exists for multiple calculations such as torus and reactor vessel at same time to determine if loss is internal or external. When the module is preloaded with the plant's sump and tank dimensions real time leak rate corrections may be made.

- **Pressurized volume corrections**

This module calculates the possible effects on all acceptance criterion of leakage from a pressurized gas volume(s) during the Type A test.

- **Intervolume leakage rates**

For each large volume, this module predicts the possible effects of inner volume leakage on the total calculated leakage rate.