



Hydrogen Sensor Testing and Certification



Underwriters Laboratories Inc.

Working for a safer world since 1894

Overview

- Introduction to UL
- UL's experience and service offerings related to gas detection
- Background on H₂ Sensor testing/certification
- UL 2075 Scope and Applicability to H₂ sensors
- Other Applicable International Standards
- Benefits of Certification under UL 2075
- Wrap-Up / Questions



Introduction to UL

Underwriters Laboratories Inc. (UL) is an independent, not-for-profit Product Safety, Certification and Standards Development Organization (SDO)

UL has been testing and certifying products and writing safety standards/requirements for 117 years

UL participates in SDO processes and certification schemes serving over 102 countries.

UL certifications address product safety and performance



UL Sensor & Detector Experience

- Carbon Monoxide (CO) detectors and sensors
- Smoke detectors
- Refrigerant gas monitors
- Combustible gas detectors and sensors
- Combination/Multi-gas detectors
- Other (ozone, toxic, chemical warfare vapor, etc.)



UL Background – H₂ Sensors

- Tested and certified handful of products
- Both sensors and detectors
 - Listing of sensors separately from detectors allows for greater flexibility for manufacturers
- No current H₂ sensor or detector Listings
- Code authorities were not demanding 3rd Party Certifications, and manufacturers allowed Listings to expire or withdrew Listings



UL 2075

**Gas and Vapor Detectors
and Sensors**

1st Edition

November 5, 2004

revisions through September 28, 2007

Scope of UL 2075

This specification applies to toxic and combustible gas detectors and sensors intended for:

- Indoor or outdoor use; or both (portable)
- Environmental monitoring and open area protection
- Connection to a control unit for operation as part of a gas detection or emergency signaling system
- Control of ventilation or shut off devices such as fans or control valves
- Use in hazardous locations. Equipment must also comply with the applicable system and/or hazardous location requirements



UL 2075 Tests – Partial List

- Electrical fire and shock safety tests:
 - Current Measurement
 - Electric Shock Current
 - Dielectric Voltage-Withstand
 - Thermoplastic Materials testing

- Performance tests:
 - Sensitivity (validation of manufacturer claims; 25% LEL safety level)
 - Sensor/detector stability
 - Overvoltage / Undervoltage
 - Overload & Endurance
 - Variable Ambient tests (high/low humidity & temperature)
 - Static Discharge
 - Electrical Supervision



Other Applicable H₂ Standards

- **IEC/EN 60079-29-1:** “Gas detectors – Performance requirements of detectors for flammable gases” (*replaces EN 61779-1 through -5*)
- **ANSI/ISA 12.13.01:** “Performance Requirements for Combustible Gas Detectors” (*National Differences to the IEC/EN 60079-29-1*)
- **ISO 26142:** “Hydrogen detection apparatus — Stationary applications”
- **CSA C22.2 No 152:** “Combustible Gas Detection Instruments”
- **BS EN50054:** “Electrical Apparatus for the Detection and Measurement of Combustible Gases general requirements and test methods”



Benefits of Certification to UL 2075

UL 2075 Tests	ANSI/ISA 12.13.01 Tests
Sensitivity	Initial Calibration & Set-up, Accuracy, Repeatability, and Step Change Response
Electrical Supervision	Not Addressed
Overvoltage / Undervoltage	Supply voltage variation
Drop	Drop
Dust	Not Addressed
Static Discharge	Not Addressed
Replacement, Head and Cover	Not Addressed
Jarring	Not Addressed
Flooding with Undiluted Gas	Informative Only, Annex B
Variable Ambient - Temperature	Temperature Variation
Variable Ambient - Shipping and Storage	Unpowered Storage
Humidity	Humidity Variation
Leakage Current	Not Addressed
Transients -Hazardous and Low voltage	Per IEC 61000-4-4
Transients - RFI immunity	Radio frequency interference
Stability - Air Velocity Variation, Pressure and Momentary Power Interruptions	Air Velocity Variation, Pressure Test, and Short Interruption of power supply
Temperature (components)	Not Addressed
Abnormal Operation	Not Addressed
Overload	Not Addressed
Endurance	Not Addressed
Corrosion	Not Addressed
Vibration	Vibration
Battery Tests	Battery Capacity - Single Detector Test Only
Battery - secondary power interruptions	Not Addressed
Battery charging circuit	Not Addressed
Battery replacement	Not Addressed
Battery life	Not Addressed
Battery trouble	Identified, but not defined
End-of-Life Signal	Not Addressed
Selectivity	Not Addressed

Note: Test Program comparisons are not all inclusive, but are intended to reveal major similarities and differences between Standards.



Benefits of Certification to UL 2075 (cont.)

- Follow-Up Services (FUS)
- Re-evaluation when either product or requirements change
- Ongoing product monitoring and protection of the UL Mark
- Investigation of allegations that certified products do not meet requirements OR that products are bearing the UL Mark but are not authorized to do so
- Certification Requirement Decisions (CRDs)
- UL is engaged in product research and evaluation



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