

UL 60079 STANDARD: TECHNICAL OVERVIEW FOR HAZARDOUS LOCATIONS



In industries where flammable gases, vapors, or dusts are present, ensuring that electrical equipment won't become an ignition source is critical. The UL 60079 series of standards addresses this need by establishing rigorous safety requirements for equipment used in explosive atmospheres.

What Is UL 60079?

UL 60079 is the U.S. implementation of the internationally harmonized IEC 60079 series, which defines the requirements for electrical and electronic equipment used in hazardous (classified) locations. These environments, also called explosive atmospheres, are commonly found in:

- Oil and gas facilities
- Chemical plants
- Mining operations
- Pharmaceutical manufacturing
- Food processing and storage
- Battery and energy storage systems

The UL version is published by UL Standards & Engagement, aligning with U.S. National Electrical Code (NEC) classifications, particularly Class I, II, III Divisions and Zones.



Global Equivalents: ATEX and IECEx

While UL 60079 applies primarily in North America, there are two major equivalent systems globally:

ATEX (EU): Based on the EN 60079 series, ATEX certification includes both technical and legal directives (Directive 2014/34/EU) that govern equipment intended for use in explosive atmospheres across the European Union.

IECEx (Global): Administered by the IECEx System, this scheme certifies products to the IEC 60079 standards and is accepted in many non-EU countries, including Australia, Brazil, and the Middle East.

Important: Compliance with UL 60079 does not imply ATEX or IECEx compliance. Separate certification processes are required.

Why UL 60079 Matters

The primary objective of UL 60079 is to minimize the risk of explosion by eliminating ignition sources within hazardous areas. This is achieved through detailed requirements related to:

- Equipment construction and enclosure integrity
- Limitation of surface temperatures
- Electrical and thermal energy control
- Protective techniques and installation practices

Certified equipment helps protect personnel, facilities, and the environment by ensuring the device will operate safely under specified hazardous conditions.

Core Protection Concepts in UL 60079

UL 60079 outlines several explosion protection techniques, each applicable to specific hazard types and equipment categories:

- **Intrinsic Safety (IS) – UL 60079-11**

Limits voltage and current to levels incapable of causing ignition, even in fault conditions.

- **Flameproof / Explosion-Proof Enclosure (Ex d) – UL 60079-1**

Encloses components in a rugged housing that can contain an internal explosion without transmitting it to the external atmosphere.

- **Increased Safety (Ex e) – UL 60079-7**

Applies to equipment that doesn't produce arcs or sparks and implements construction enhancements to prevent high temperatures.

- **Pressurization (Ex p) – UL 60079-2**

Maintains a protective gas overpressure inside enclosures to prevent ingress of flammable gases or dust.

- **Encapsulation (Ex m) – UL 60079-18**

Encases live parts in a protective compound to prevent ignition by isolating electrical energy.

Equipment Labeling Requirements

UL 60079-certified equipment must be permanently marked with key safety and compliance information, including:

- Manufacturer name and model number
- Specific protection technique(s) used (e.g., Ex d, Ex e)
- Gas group, temperature class, and ambient rating, if applicable
- Certification body mark and file number
- Zone and/or Division classification
- Any installation or maintenance precautions

Proper labeling ensures that installation personnel can verify suitability at a glance, helping maintain safety compliance.

Typical Applications of UL 60079-Certified Equipment

UL 60079 standards apply to a wide range of equipment types including motors, fans, lights, sensors, enclosures, and control panels used in:

- **Ventilation systems for underground mines –**
controlling air quality in environments with combustible coal dust or methane gas
- **Oil & gas processing units –**
preventing ignition from instrumentation or motor-driven equipment
- **Battery energy storage systems (ESS) –**
managing off-gassing risks in lithium-ion systems
- **Pharmaceutical or food facilities –**
addressing combustible powders in processing areas

In each case, certified equipment ensures that electrical sparks, arcs, and high surface temperatures are kept below the ignition thresholds of surrounding materials.

Certification and Compliance Process

To obtain UL 60079 certification, manufacturers must undergo a stringent process involving:

1. Design Evaluation

Technical review of schematics, materials, and construction.

2. Type Testing

Verification through destructive and non-destructive testing per applicable UL 60079 parts.

3. Factory Audit

Regular inspections to ensure ongoing compliance with the certified design.

4. Labeling and Documentation Review

Ensuring all safety markings and instructions are correct and complete.

Testing is typically performed by an NRTL (Nationally Recognized Testing Laboratory), such as UL, Intertek, or CSA Group.

Conclusion

UL 60079 plays a vital role in ensuring electrical equipment used in hazardous locations can operate safely without becoming a source of ignition. By adhering to these standards, manufacturers demonstrate a commitment to global safety, and operators gain peace of mind knowing their systems are compliant and reliable.

For engineers, designers, and safety professionals, understanding UL 60079 is essential for selecting, specifying, and maintaining equipment in classified environments.