

North American And International Hazardous Area Standards and Approvals

The North American system for the certification, installation, and inspection of hazardous locations equipment includes the following elements:

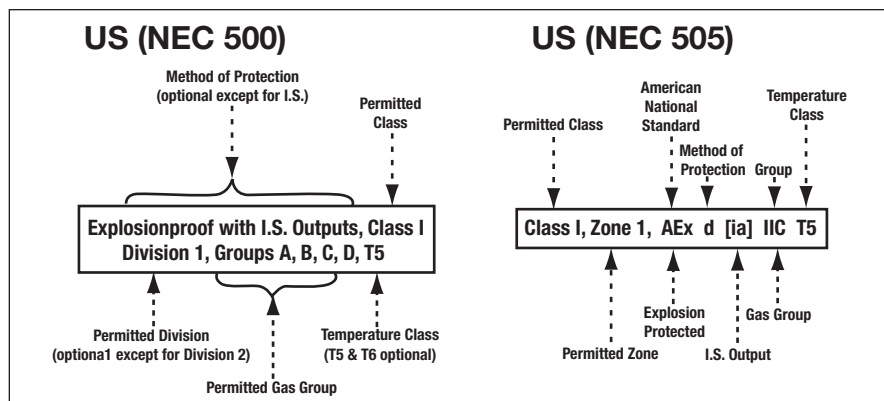
- Installation Codes; e.g. NEC, CEC
- Standard Developing Organizations (SDOs); e.g. UL, CSA, FM
- Nationally Recognized Testing Laboratories (NRTLs)
- Third Party Certifiers; e.g. ARL, CSA, ETI, FM, ITSNA, MET, UL
- Inspection Authorities; e.g. OSHA, IAEI, USCG

The installation codes in North America are the NEC (National Electric Code) for the USA, and the CEC (Canadian Electric Code) for Canada. In both countries these guides are accepted and used by most authorities as the final standard on installation and use of electrical products. Details include equipment construction, performance and installation requirements, and area classification requirements. With the issuance of the new NEC these are now almost identical.

The Standards Developing Organizations (SDOs) work with industry to develop the appropriate overall equipment requirements. Certain SDOs also serve as members of the technical committees charged with the development and maintenance of the North American installation codes for hazardous locations.

The Nationally Recognized Testing Laboratories (NRTLs) are independent third-party certifiers who assess the conformity of equipment with these requirements. The equipment tested and approved by these agencies is then suitable for use under the NEC or CEC installation standards.

In the United States the inspection authority responsible is OSHA (Occupational Health and Safety Administration). In Canada the inspection authority is the Standards Council of Canada. To confirm compliance to all national standards both countries require an additional indication on products tested and approved. As an example CSA approved product to USA standards must add NRTL/C to the CSA symbol. In Canada UL must add a small c to its label to indicate compliance to all Canadian standards.



North American Ex Marking and Area Classification

Once approved, the equipment must be marked to indicate the details of the approval.

Class I — Explosive Gases	
Division 1	Gases normally present in explosive amounts
Division 2	Gases not normally present in explosive amounts
Gas Types by Group	
Group A	Acetylene
Group B	Hydrogen
Group C	Ethylene and related products
Group D	Propane and alcohol products
Class II - Explosive Dusts	
Division 1	Dust normally present in explosive amounts
Division 2	Dust not normally present in explosive amounts
Dust Types by Group	
Group E	Metal dust
Group F	Coal dust
Group G	Grain and non-metallic dust

European and Rest of World Hazardous Area Standards and Approvals

The standards used in most countries outside of North America are IEC / CENELEC. The IEC (International Electrotechnical Commission) has set broad standards for equipment and classification of areas. CENELEC (European Committee for Electrotechnical Standardization) is a rationalizing group that uses IEC standards as a base and harmonizes them with all member countries standards. The CENELEC mark is accepted in all European Community (EC) countries.

CENELEC member countries:

Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, United Kingdom

All countries within the EC also have governing bodies that set additional standards for products and wiring methods. Each member country of the EC has either government or third party laboratories that test and approve products to IEC and or CENELEC standards.

ATmospheric EXplosibles (ATEX)

The ATEX directives set the minimum standards for both employer and manufacturer explosive atmospheres. It is the responsibility of the Employer to conduct an assessment of explosive risk and to take necessary measures to eliminate or reduce the risk. There are two European Directives that have been law since July 2003 that detail the manufacturers and users obligations regarding the design and use of apparatus in hazardous atmospheres.

Responsibility	Directive	Article
Manufacturer	94/9/EC	100a
Employer (End User)	1992/92/EC	137

ATEX Directive 94/9/EC Article 100a

Article 100a describes the manufacturers responsibilities:

- The requirements of equipment and protective systems intended for use in

EN 50014 Series	Definition	ATEX
Zone 0	Areas in which explosive atmospheres caused by mixtures of air and gases, vapors, mists or dusts are present continuously or for long periods of time	Category 1
Zone 1	Areas in which explosive atmospheres caused by mixtures of air and gases, vapors, mists or dusts are likely to occur	Category 2
Zone 2	Areas in which explosive atmospheres caused by mixtures of air or gases, vapors, mists or dusts are likely to occur or only occur infrequently or for short periods of time	Category 3

ATEX Category	Permitted Certification Type
Category 1	EEx ia
Category 2	EEx ib, EEx d, EEx e, EEx p, EEx m, EEx o, EEx q
Category 3	EEx ib, EEx d, EEx e, EEx p, EEx m, EEx o, EEx q, EEx n

potentially explosive atmospheres (e.g. Gas Detectors).

- The requirements of safety and controlling devices intended for use outside of potentially explosive atmospheres but required for the safe functioning of equipment and protective systems (e.g. Controllers).
- The Classification of Equipment Groups into Categories
- The Essential Health and Safety Requirements (EHSRs). Relating to the design and construction of the equipment / systems
In order to comply with the ATEX directive the equipment must:
 - display a CE mark.
 - have the necessary hazardous area certification.
 - meet a recognized performance standard e.g. EN 61779-1:2000 for flammable gas detectors.

The classification of hazardous areas has been re-defined in the ATEX directive.

ATEX Directive 94/9/EC article 100a

Article 100a describes the manufacturers responsibilities:

- The requirements of equipment and protective systems intended for use in potentially explosive atmospheres (e.g. Gas Detectors).

- The requirements of safety and controlling devices intended for use outside of potentially explosive atmospheres but required for the safe functioning of equipment and protective systems (e.g. Controllers).
- The Classification of Equipment Groups into Categories
- The Essential Health and Safety Requirements (EHSRs). Relating to the design and construction of the equipment/systems
In order to comply with the ATEX directive the equipment must:
 - display a CE mark.
 - have the necessary hazardous area certification.
 - meet a recognized performance standard e.g. EN 61779-1:2000 for flammable gas detectors.

Assessment of Explosion Risks

The employer must conduct a risk assessment including:

1. Probability of explosive atmosphere Zone Area classification
2. Probability of ignition source Equipment Categories
3. Nature of flammable materials Gas groups, ignition temperature (T rating), gas, vapor, mists and dusts
4. Scale of effect of explosion Personnel, plant, environment

Explosive Atmospheres Warning Sign

The employer must mark points of entry to places where explosive atmospheres may occur with distinctive signs:



In carrying out the assessment of explosion risk the employer shall draw up an Explosion Protection Document that demonstrates:

- explosion risks have been determined and assessed
- measures will be taken to attain the aims of the directive
- those places that have been classified into zones
- those places where the minimum requirements will apply
- that work place and equipment are designed, operated and maintained with due regard for safety

The employer may combine existing explosion risk assessments, documents or equivalent reports produced under other community acts. This document must be revised with significant changes, extensions or conversions.

The information for this article is taken from the Honeywell Analytics Gas Book. Used with permission. For more information call 800-538-0363; or write to: detectgas@honeywell.com

