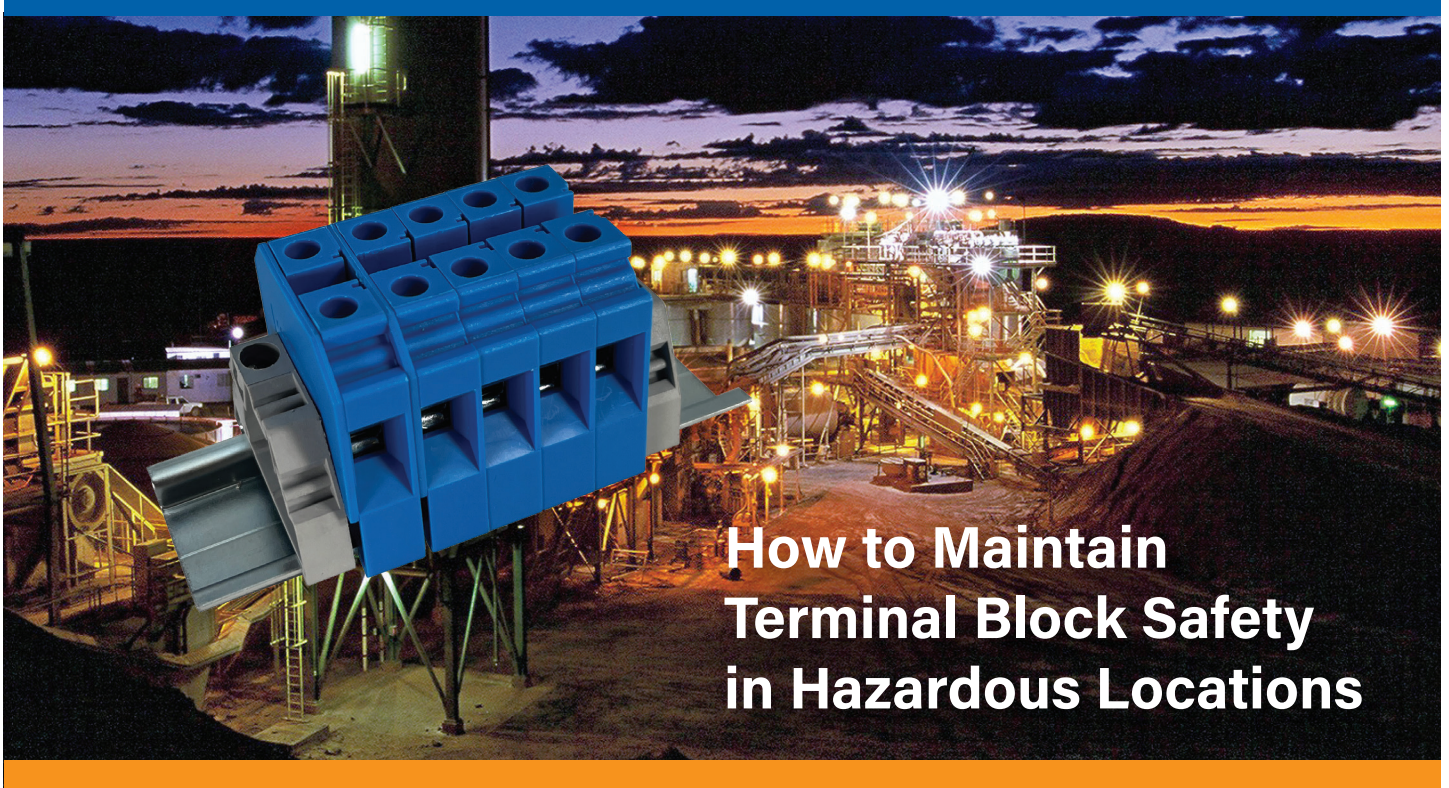




How to Maintain Terminal Block Safety in Hazardous Locations

Exploring why compliance with NEC, CEC, ATEX and IECEx codes is crucial for terminal block technologies in potentially explosive atmospheres.

In industrial settings, safety is non-negotiable — especially in environments prone to explosions from flammable gases, vapors, mists or combustible dust. Electrical installations in these volatile areas demand more than standard components; they need equipment specially designed and certified to prevent ignition.

Navigating these hazardous areas necessitates strict adherence to NEC, CEC, ATEX and IECEx standards. These global and North American benchmarks provide a comprehensive framework for equipment operating in explosive atmospheres, ensuring every component and system is engineered, manufactured and rigorously tested to eliminate explosion risks.

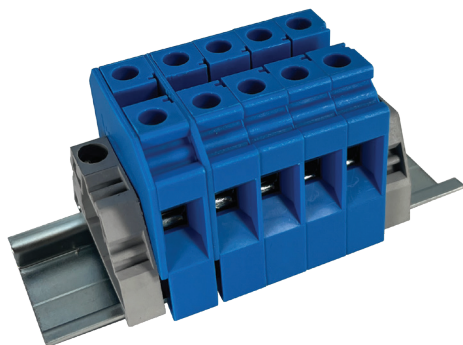
Even seemingly simple electrical components like terminal blocks play a critical role in this safety ecosystem. Though often viewed as simple connecting devices, their compliance with NEC, CEC, ATEX and IECEx is paramount to maintaining the overall safety and integrity of electrical systems in potentially explosive settings.

Here's how advanced terminal block connection technologies that comply with these codes significantly enhance safety and reliability in these critical installations.

Understanding North American and Global Directives

In North America, the National Electrical Code (NEC) in the U.S. and Canadian Electrical Code (CEC) provide standards for the installation and use of electrical equipment in potentially explosive environments. These codes include provisions for both ordinary and hazardous locations, with hazardous locations posing explosion risks due to the presence of flammable gases, vapors and dust.

Similarly, ATEX (2014/34/EU) in Europe and IECEx provide guidance for equipment and systems intended for use in potentially explosive atmospheres. Both consider not only electrical sources of ignition, but also the presence of potentially explosive concentrations of gas, vapor and dust in the air. Their primary goal is to ensure that the components used in these environments are designed, manufactured and tested to prevent explosions and promote personnel and equipment safety. Specifically:



- ATEX (Atmosphères Explosibles) is a mandatory European Union directive that provides a legal framework for controlling explosive atmospheres. It outlines health and safety requirements for equipment and protective systems intended for use in these environments.
- IECEx (International Electrotechnical Commission System for Certification to Standards Relating to Equipment for Use in Explosive Atmospheres) is a global certification system that facilitates trade in equipment and services for use in hazardous areas. It aims to lower testing and certification costs for manufacturers and enhance end-user safety.

NEC and CEC: Scope and Protection Types

Despite their similarities, the four codes vary in scope and use different classification systems. NEC and CEC categorize locations based on the presence of hazardous materials during normal (Division I) or abnormal (Division II) conditions. They further divide locations into three classes based on the hazard type: Class I (gases and vapors); Class II (dusts); and Class III (fibers).

In addition to the Class/Division system (Article 501), NEC divides locations into zones (Article 505), which more closely aligns with international standards. This system is based on the frequency and duration of the presence of explosive atmospheres. For example:

- Zone 0 = continuous presence.
- Zone 1 = likely presence during normal operation.
- Zone 2 = presence only under abnormal conditions.

NEC and CEC also outline protection methods for equipment used in these hazardous locations — each one designed to prevent ignition in explosive atmospheres.

Examples include:

- Intrinsic Safety (Ex i): Low-energy circuits limit the energy available for ignition.
- Explosion-proof (XP): Housing can contain explosions, preventing external ignition.
- Pressurized Enclosure (Ex p): Protective gas inside prevents explosive gas entry.
- Flameproof Enclosure (Ex d): Robust enclosure can withstand internal explosions.

ATEX and IECEx: Scope and Protection Types

ATEX and IECEx classify hazardous areas into zones based on the frequency and duration of the presence of an explosive atmosphere:

Gas / Dust Zone	Description
Zone 0 / Zone 20	Continuous presence of an explosive atmosphere.
Zone 1 / Zone 21	Likely occurrence under normal conditions.
Zone 2 / Zone 22	Unlikely occurrence under normal conditions.

To be used in specific zones, equipment must be certified with levels of protection depending on the risk. ATEX further divides equipment into groups based on their intended use — for example, Group I refers to underground mining equipment while Group II refers to surface industries — as well as categories based on the level of protection they offer:

- Category 1: Very high level of protection (for Zones 0 or 20).
- Category 2: High level of protection (for Zones 1 or 21).
- Category 3: Normal level of protection (for Zones 2 or 22).

The Importance of Terminal Block Compliance

Within any electrical installation in a hazardous area, each component — no matter how small — can become a potential source of ignition if not properly designed and certified according to NEC, CEC, ATEX and IECEx. One example is the terminal block, which serves as the connection point in electrical circuits. In an explosive atmosphere, an uncertified or improperly installed terminal block could generate sparks, excessive heat or electrical arcs, leading to ignition.

Explosion-proof terminal blocks have undergone the rigorous engineering and testing required for safe use in potentially explosive environments. Their design and features demonstrate why compliance at the component level is non-negotiable.

Here are some examples of features and design specifications to look for in terminal blocks with the proper compliance, ensuring safety in your installation:

Robust design and material selection.

Terminal blocks designed for use within ATEX/IECEx certified enclosures have a minimum IP54 rating. For dusty environments, they're integrated into enclosures providing the type of protection ("t") that complies with IEC/EN60079-31. A suitable insulation material is Polyamide 66, which features a Comparative Tracking Index (CTI) of 600 and belongs to Material Group I, indicating high resistance to tracking and electrical breakdown.

Excellent thermal management.

Excessive heat is one of the most common causes of ignition in hazardous areas. Terminal blocks, especially when carrying rated currents, can generate heat, making it imperative to select components that are designed to manage this thermal load effectively.

Look for terminal blocks with a maximum service temperature of 110°C, though for some series, the maximum temperature may be 85°C. The highest temperature of the insulating material must not exceed these specified maximum values. In addition, these components can operate within an ambient temperature range of -60° to +66°C at the mounting position.

Electrical and mechanical integrity.

Terminal blocks must maintain proper electrical separation and secure connections. At Altech, we ensure that minimum creepage and clearance distances are maintained for respective voltage ratings between neighboring terminal blocks, as well as between the current bar and the DIN-Rail, preventing electrical breakdown and short circuits. For example, for a 630-V system, creepage distance is 12 millimeters (mm) and clearance distance is 10 mm. For a 400-V system, these values are 8 and 6 mm, respectively.

Compliance with explosion-proof directives also emphasizes proper care for stranded wire connections to prevent conductor damage during installation, leading to loose connections and potential arcing. To avoid short circuits between adjacent conductors, the insulation of each conductor must be maintained up to the metal of the terminal.

Requirements for intrinsically safe circuits.

An intrinsically safe ("i") design will limit a circuit's electrical and thermal energy, preventing ignition in an explosive atmosphere. If identified as part of an intrinsically safe circuit, terminal blocks should be marked with a light blue color.

Altech terminal blocks used in such circuits have been tested for compliance with intrinsic safety requirements, including clearance, creepage and solid insulation distances for circuits up to 60 V. A minimum separation

distance of 50 mm between intrinsically safe and non-intrinsically safe circuits is required, achievable via partition plates or spacers. These terminal blocks must also meet the requirements for a T4 temperature class, ensuring that their surface temperature remains below the ignition temperature of most hazardous gases.

Clear marking and certification.

Safety and explosion-proof compliance is not just about design and performance; it's also about clear identification. Altech terminal blocks bear the required information, including the IECEx SIR certification number and Ex protection marking.

- For increased safety ("e"), markings such as Ex eb IIC Gb or Ex ec IIC Gc signify robust construction designed to prevent ignition sources in hazardous gas environments.
- For intrinsic safety ("i"), markings like Ex ib IIC Gb or Ex ic IIC Gc indicate the circuit's energy is restricted to levels incapable of causing ignition.

Learn More

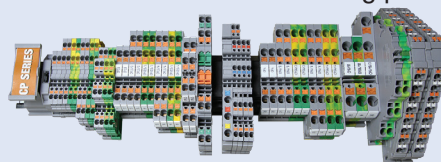
The importance of NEC, CEC ATEX and IECEx compliance in industrial safety can't be overstated. It's a critical framework that safeguards people, equipment and the environment in potentially explosive atmospheres. In these conditions, every component within an electrical system must meet these rigorous standards — and terminal blocks are a prime example of why this compliance is critical.

To learn more [please visit: altechcorp.com](https://altechcorp.com).

A Safe, Versatile Product Line for Every Need

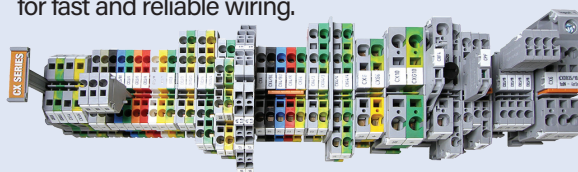
SIDEBAR

Altech ATEX-IECEx approved line includes a variety of terminal block technologies to meet diverse application requirements. Choose from the following product lines:



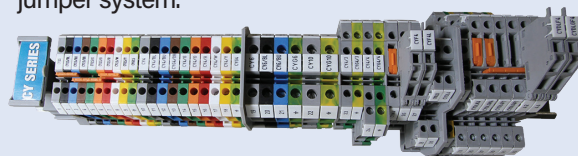
▪ CP Series Push-In Terminal Blocks:

These feature tool-less connection, a stainless steel push-in spring and a universal push-in jumper system for fast and reliable wiring.



▪ CX Series Spring/Cage Clamp Terminal Blocks:

Known for their compact design and stainless steel spring, these blocks also utilize the universal push-in jumper system.



▪ CY Series Screw Clamp Terminal Blocks:

Combining a strong screw clamping system with the modern universal push-in jumper system, this series includes snap-on ground blocks.



▪ CT Series Screw Clamp Terminal Blocks:

This series offers a large range of block types for various applications and uses a traditional screw-type jumper system.

In addition to these, we offer Ring Lug and Stud Terminals for severe vibration and large wire sizes, as well as Panel Mount and Mini Rail Terminal Blocks, which provide compact wiring solutions with both screw and spring/cage clamp technologies.

To discover more, please visit: altechcorp.com.