

Engineered Solutions Across the Hydrogen Value Chain



Appleton™ and Nelson™

Keep your hydrogen applications operating safely and efficiently with a full suite of electrical products.



Optimizing Global Hydrogen Operations



Emerson understands that hydrogen applications demand electrical products engineered to provide proper protection from dangers like heat and arc or spark-induced ignition. Your facilities are designed based on these associated dangers using electrical products certified to your geography and application requirements.

For over 100 years our products have been helping to protect facilities and their workers. Whatever certification your geography and application requires, our product range, regulatory involvement and technical expertise solve the challenges of outfitting your facilities.

Emerson's Appleton™, and Nelson™ brands offer a portfolio of industrial grade electrical products specifically engineered to drive energy transformation and decarbonization. From electrical infrastructures to temperature maintenance, Emerson's end-to-end solutions improve operations across the hydrogen value chain while lowering costs and safeguarding processes.

End-to-End Solutions to Overcome the Toughest Challenges

Appleton electrical solutions by Emerson offer one of the widest selections of LED luminaires, power distribution panels, enclosures, fittings, junction boxes, cable glands, and connectors for facilities processing, handling, storing, or consuming hydrogen.

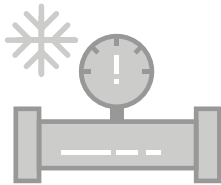


Electrical Solutions

Appleton electrical products are built to withstand the unique challenges posed by combustible gases, vapors, or dusts, wet locations and constrained spaces

- Designed and certified to continuously withstand relentless vibrations, flammable atmospheres, and corrosive environments
- Improve facility infrastructure, reduce maintenance, and create a safer work environment for facility personnel

Emerson's broad line of Nelson Heat Trace self-regulating and constant wattage electric heating cables, monitoring equipment, controllers and accessories solve temperature management issues at every stage of hydrogen's value chain. Our heat trace systems keep critical processes operating by precisely maintaining the temperature inside pipes transporting gases and liquids in-facility and from supply sites to demand locations.



Freeze Protection Solutions

Nelson Heat Trace offers are engineered with reliability in mind to keep your facility flowing year round

- Prevent pipes from freezing with modern freeze protection technologies
- Safeguard your facility from potential flooding, the expense of replacement parts and repairs, environmental damage, and facility downtime



Hydrogen Market in Action

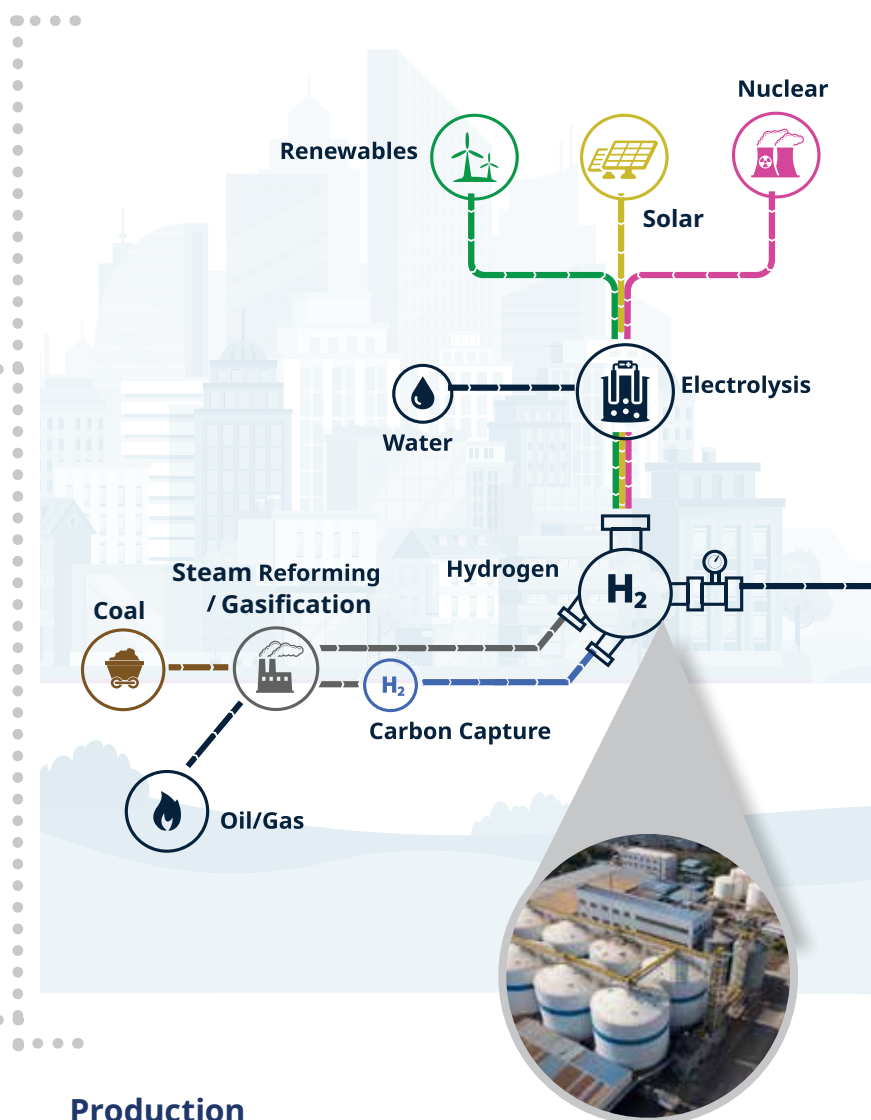
Selecting the proper electrical solutions throughout the hydrogen value supply chain can be difficult. Different areas across the value chain have their own sets of challenges and requirements that must be met to maintain worker safety and efficient, cost-effective production. Partnering with a manufacturer that understands these demands can help simplify the process. Throughout your entire hydrogen operation, Emerson's portfolio of Appleton Electrical Solutions and Nelson Heat Trace products optimize the safety and efficiency of any kind of hydrogen-based industry or technology.

Appleton Solutions

- Task and Area Lighting
- Flood Lighting
- Linear Lighting
- High Bay Lighting
- Connected Lighting
- Explosionproof Lighting
- Emergency Lighting
- Egress Lighting
- Cable Glands, Connectors and Fittings
- Plugs and Receptacles
- Disconnect Switches
- Conduit Bodies and Conduit Boxes
- Contactors and Motor Starters
- Controls
- Panelboards
- Enclosures and Junction Boxes

Nelson Heat Trace Solutions

- Heater Cables
- Connection Systems
- Thermostats
- Circuit Management and Cable Monitoring



Production

To produce hydrogen, it must be separated from other elements in the molecules H₂ where it occurs. Currently steam methane reforming is the dominant production method, but there is a worldwide push towards electrolysis - hydrogen made from water and electricity. Both production methods are energy intensive and have various classified hazardous locations.

Green Hydrogen

Created via water electrolysis using renewable energy, emitting no carbon, green hydrogen offers clean fuel for various applications.

Yellow Hydrogen

Yellow hydrogen specifies solar power as the renewable source. It follows the same production as green hydrogen.

Pink Hydrogen

Produced from nuclear power, pink hydrogen also goes through electrolysis.

Blue Hydrogen

Blue hydrogen is produced from natural gas with carbon capture, effectively reducing emissions.

Grey Hydrogen

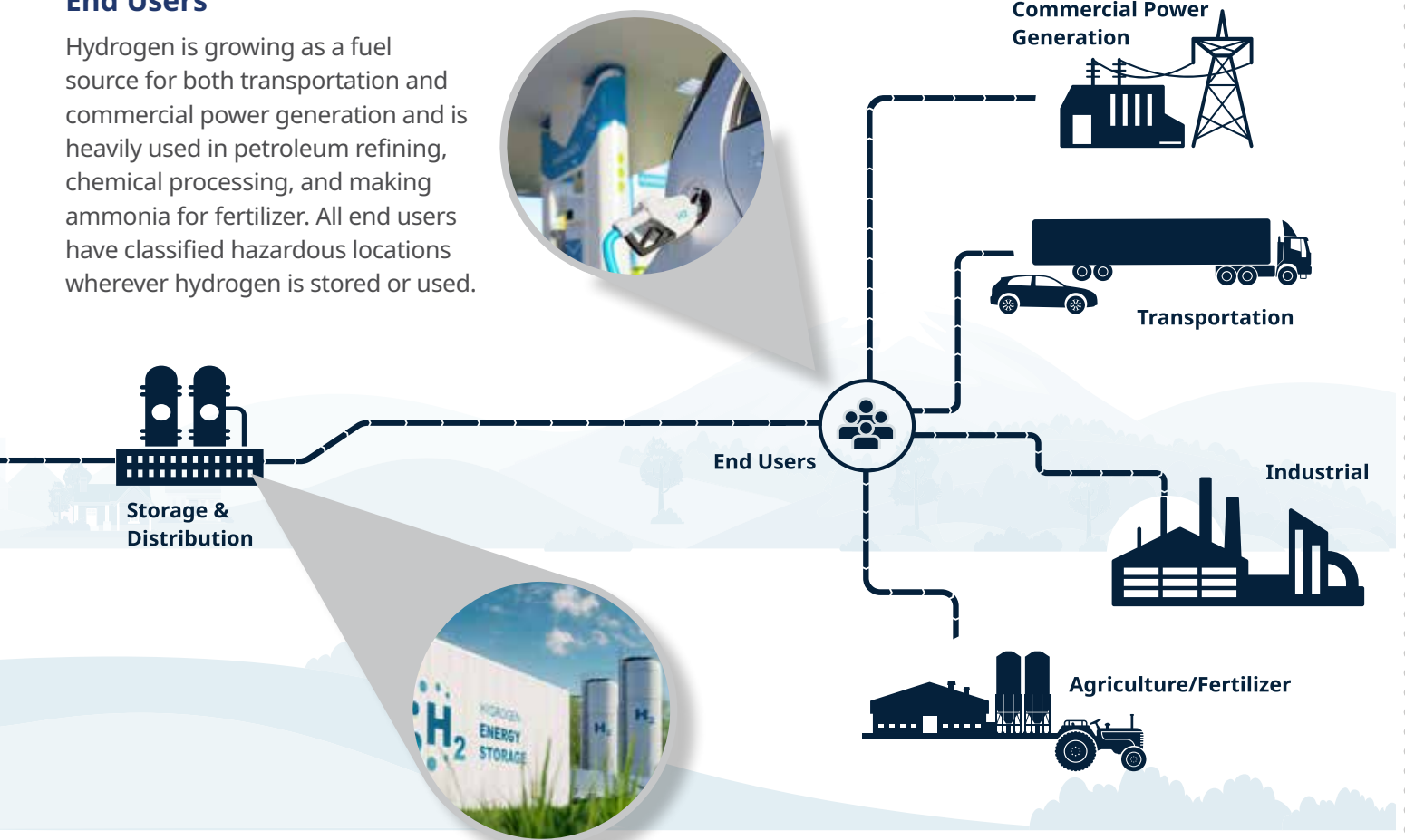
Grey hydrogen is derived from natural gas, similar to blue hydrogen, but lacks emissions reduction via carbon capture processes.

Brown Hydrogen

Hydrogen generated from coal production, contributes significantly to carbon dioxide emissions.

End Users

Hydrogen is growing as a fuel source for both transportation and commercial power generation and is heavily used in petroleum refining, chemical processing, and making ammonia for fertilizer. All end users have classified hazardous locations wherever hydrogen is stored or used.



Storage and Distribution

If hydrogen is not consumed at its point-of-origin (“captive” production), bulk hydrogen must be transported to its point-of-use in gaseous tube trailers, cryogenic liquid tankers, or pipeline. Wherever hydrogen is transported or stored becomes a classified hazardous location.



Visit www.masteringindustry.com/hydrogen to learn more about our proven solutions across the hydrogen value chain.

Appleton LED Lighting Solutions

Connected



Connected LED lighting assists facilities, reduces energy consumption and maintenance needs, enhances safety, and strengthens a wireless network.

- Mercmaster™ Connect LED
- Areamaster™ Connect LED
- Appleton Wireless Motion Sensor
- Emerson 1410S WirelessHART™ Gateway
- Emerson Plantweb™ Insight Connected Lighting Application

Task and Area



Task lighting provides vertical and horizontal illumination in areas with mounting heights up to 3 meters (10 feet). Area lighting is designed to provide overall illumination for large open areas with mounting heights from 3.65 to 10.67 meters (12 to 35 feet).

- Mercmaster LED Generation 3
- Mercmaster LED Low Profile
- Glomaster™ LED
- Contender™ LED
- CLED LED

High Bay



In areas with high ceilings or in areas above tanks, our high bay luminaires are ideal for applications with mounting heights up to 30 meters (100 feet).

- Baymaster™ LED
- IHC LED

Flood



For applications including tank farms, loading docks and perimeter fence line lighting, our floodlights are ideal for mounting heights over 6 meters (20 feet).

- Areamaster™ Generation 2 LED
- Areamaster Generation 2 Zone 1 LED

Linear



Linear lighting is typically used to illuminate narrow spaces, such as walkways, and areas where low clearance demands a compact design.

- Limaster™ LED Zone 1 and 2
- FDLED Series
- FELED Series
- FNLED Series
- Rigmaster™ LED

Explosionproof



Class I, Division 1 explosionproof luminaires have engineered flamepaths that vent the pressure of an explosion and release cooled gases at temperatures that will not ignite the surrounding flammable atmospheres.

- Code•Master™ LED Factory Sealed
- Code•Master Jr. LED Factory Sealed
- A-51™ LED Factory Sealed
- Explosionproof Rigmaster™ LED
- EHLED Handlamp

Egress and Emergency



Egress lighting is used as visual signal lighting to provide a pathway for exiting a building.

- HEX Series LED
- FDBAES LED

Emergency lighting is essential in the event of a power failure and should be installed in critical areas of the facility to ensure the safety of personal.

- Mercmaster LED Generation 3
- Mercmaster LED Low Profile
- Rigmaster LED
- HB LED Multilens Bulkhead
- FDLED Series
- Limaster LED Zone 1 and 2
- CLED LED

Shaded products have a Hydrogen specific certification. Non-highlighted products are for use in other classified environments, harsh industrial, and outdoor locations. Refer to catalog pages for detailed certification information.

Cable Glands | Connectors | Fittings



Cable glands, connectors, and sealing fittings are used to connect and change the direction of wire, conduit, or cable runs as well as to provide a secure connection from the run to an enclosure. Cable glands provide a barrier and environmental seal around cable conductors. Conduit fittings connect wire, conduit, or cable. Sealing fittings minimize the passage of gases and vapors.

- PX2K-REX Series Liquid Resin Barrier Type Cable Glands
- EY 25% Fill Vertical and Horizontal Conduit Sealing Fittings
- EXGJH and EXLK Flexible Couplings
- EYDM 25% Fill Vertical Conduit Drain Sealing Fittings
- ST, 4Q, and 4QS Liquidtight™ Connectors
- Liquidtight STN Connectors for Liquidtight Flexible Metal Conduit

Conduit Bodies | Conduit Boxes



Conduit bodies and boxes provide access for maintenance, allow the connection of different lengths of conduit, and for changing the direction of conduit. These corrosion-resistant bodies and boxes are ideal for indoor and outdoor, classified, and unclassified locations.

- GR, GRF, and GRTS Conduit Outlet Boxes
- FM9™ Aluminum Conduit Outlet Bodies Covers Gaskets
- ER Conduit Outlet Boxes

Plugs | Receptacles



Portable equipment can be used to build, repair, operate, and maintain facilities. Achieving this safely requires connectivity solutions you can install quickly and rely on to provide quick access to power across a site.

- U-Line™ Contender Factory Sealed 20 Amp Plugs and Receptacles
- U-Line ECS Factory Sealed 15 and 20 Amp Plugs and Receptacles
- UPR Series Plugs and Sockets
- Powertite™ Series Pin and Sleeve Plugs, Connectors, Receptacles

Enclosures | Junction Boxes



To protect your equipment and employees, controls and junction boxes are designed to fully contain an explosive force within the enclosure and be strong enough to withstand the effects of corrosion, weather extremes, and time.

- AJBEW Cast Junction Boxes
- GUBB and GUBBD Series
- EXB Cast Iron Junction Boxes
- PJB Series Polyester Nonmetallic Enclosures

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Controls



Electrical control products are engineered to increase production efficiencies. A wide range of control options meet the needs of almost any application, while their superior design options ensure safe operation in your environment.

- Contender Factory Sealed Control Stations and Tumbler Switches
- Contender 4/4X Control Stations and Tumbler Switches
- EDS Factory Sealed Tumbler Switches
- EFD/EFDB and EDS Control Stations and Pilot Lights

Disconnect Switches



Disconnect switches are essential for personnel safety to ensure power is disconnected from equipment. They should be installed within 15.24 meters (50 feet) from the controlled equipment, or at the service entrance to disconnect power from the entire building at once.

- AE Series Disconnect Switches
- AE Bolted Molded Case Switches
- EDS Heavy Duty Disconnect Switches
- PlexPower™ Factory Sealed Enclosed Disconnect Switches
- WD2S Factory Sealed Disconnect Switches

Contactors | Motor Starters



Contactors and motor starters provide safe and efficient control and protection of systems such as pumps, motors, and lighting. NEC and CEC certified solutions ensure systems keep working, especially in wet and corrosive environments.

- PlexPower Contactor and Motor Starters
- PlexPower Lighting Contactor
- AEB Series Bolted Motor Starters and Contactors
- AELB Series 65 kAIC Bolted Motor Starters and Contactors
- ES Bolt-On Series Line Starter Enclosures

Panelboards



Panelboards provide protection and control in harsh industrial, hazardous, damp, wet, or corrosive environments, either indoors or outdoors. Available in a complete range of designs and materials ensures the flexibility to make the perfect panelboard choice.

- PlexPower Series Factory Sealed Panelboards
- PlexPower Fiber Panelboards
- ALPN, APPN and AGPN Series Distribution Panelboards
- ALPF Factory Sealed Lighting Panelboards
- APPF Power Distribution Panelboards
- D2P Factory Sealed Circuit Breaker Panelboards

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Heater Cables



Heater cables keep pipes and the fluids inside of them at a constant temperature or prevent freezing. Self-regulating heater cables automatically alter their output in response to temperature changes and feature multiple power output and voltage ratings. Mineral insulated heater cables feature excellent chemical resistance and are used in applications that require higher temperatures.

- Type LT Self-Regulating Heater Cable
- Type HLT Self-Regulating Heater Cable
- NC Constant Wattage Heater Cable
- Mineral Insulated Heater Cable

Circuit Management | Cable Monitoring



Micro-processor based, digital, general purpose controllers are designed to provide temperature control of individual heater segments with sensor monitoring, remote alarm contacts, digital communications, and ground fault leakage detection. Multi-point control systems provide an economical approach to process control where large concentrations of heater circuits are present.

- CM3 Circuit Management System
- CM-1 Microprocessor Based Heater Cable Monitoring System
- CM 2201 Single Point Circuit Management System
- CM 2202 Dual Point Circuit Management System

Thermostats



When paired with field-fabricated heating cables, thermostats are approved for use in a variety of hazardous areas. Weatherproof options ensure accurate temperature measurement regardless of the location.

- TE760-TC Hazardous Location Thermostats
- TA7140 Hazardous Location, Ambient Temperature Thermostat
- TF4X40 Weatherproof Thermostats
- TA4X140 Weatherproof, Ambient Temperature Thermostat

Connection Systems



Connection kits and accessories are available for powering, splicing, and terminating cables under pipe insulation or in a rugged NEMA 4X enclosure. Offering exceptional weather and corrosion resistance, they are designed to handle wide temperature ranges and harsh environments.

- HASK Series Connection Kits
- AX Connection Kits
- PLT-Series Connection Kits

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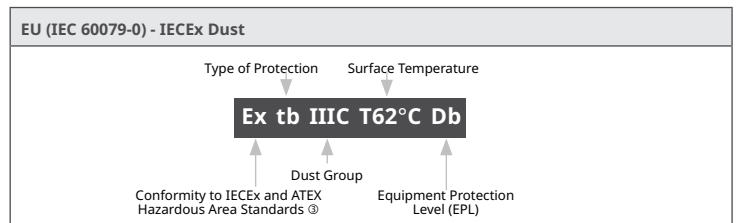
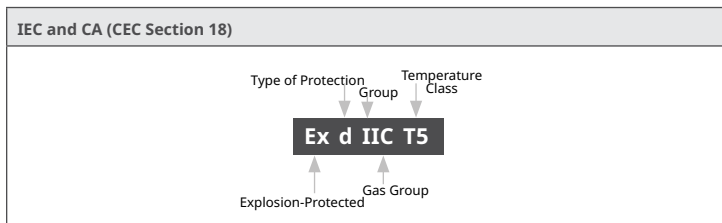
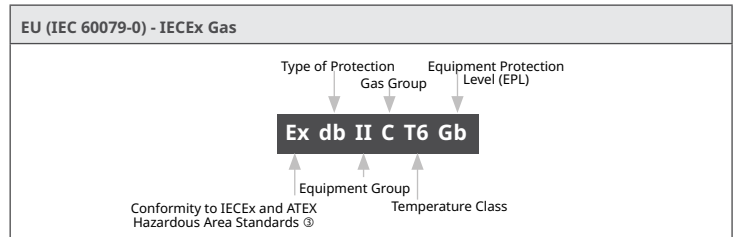
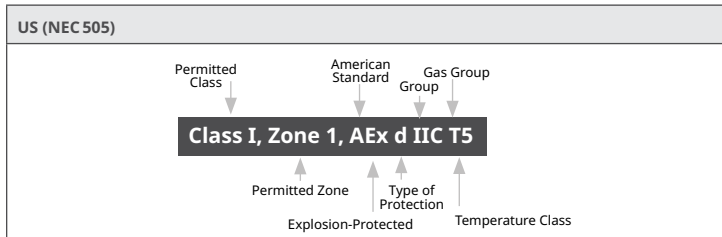
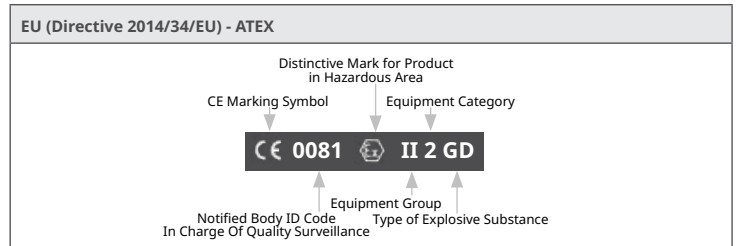
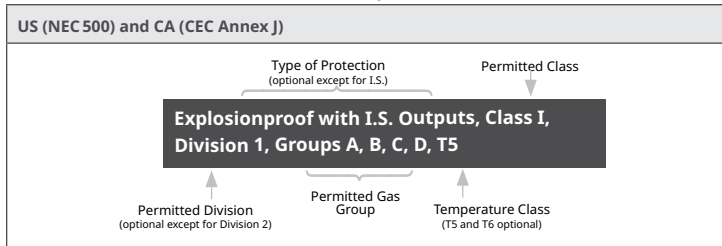


Ensure Safety for a Range of Hydrogen Applications

Emerson takes the challenge of protecting hazardous environments seriously. Because hydrogen is in gas group IIC and the T1 temperature class it means it is extremely combustible and can explode in confined spaces. Each regulatory body identifies the amount of exposure, destructive force and ignition temperature of the gas, vapor or dust differently in their nomenclature and sub-category tracking. Correctly certified electrical equipment is required at every point across the hydrogen value chain.

Product Marking Charts

Certifications and performance markings are displayed on all electrical equipment to ensure proper conformity to each hazardous location's requirements. ②



② Ambient temperature ranges other than standard $-20\text{ °C} \leq T_a \leq +40\text{ °C}$ ($-4\text{ °F} \leq T_a \leq +104\text{ °F}$) must be marked.

③ This symbol indicates that the electrical equipment corresponds to one or more of the types of protection which are the subject of specific standards.

Global Comparison of Hazardous Locations

Emerson's expansive Appleton and Nelson brands offer solutions approved for NEC/CEC and ATEX/IECEx locations.

Comparing ATEX/IECEx Zone and NEC/CEC Divisions			
CEC/IEC	Zone 0 / Zone 20	Zone 1 / Zone 21	Zone 2 / Zone 22
NEC/CEC	Division 1		Division 2

Solutions Protecting Your People and Processes Across the Hydrogen Chain



Emerson's global presence demands a deep understanding of the worldwide regional regulations and a full product offering for every application. Across the entire hydrogen value chain, our global technologies are backed by industry experts who understand customer expectations relating to reliability, safety and cost.







Visit www.masteringindustry.com/hydrogen to learn more about our proven solutions across the hydrogen value chain.

Engineered Solutions Proven To Work In the Toughest Environments.



Achieve operational excellence; minimize energy usage, installation, and maintenance costs while enhancing equipment reliability.

Learn more at: www.masteringindustry.com/hydrogen

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