



# HAZARDOUS LOCATION

## FUNDAMENTALS

<p>Hazardous Location Standards are laid out in the following guidelines:</p> <ul style="list-style-type: none"> <li>• The NEC (National Electric Code) for the USA</li> <li>• The CEC (Canadian Electric Code) for Canada</li> </ul> <p>In both countries these guides are accepted and used by most authorities as the final standard on installation and use of electrical products. These 2 guides with the issuance of the new NEC standard are almost identical.</p>	<p>In the United States of America the government agency responsible is Occupational Safety and Health Administration. OSHA has authorized a group of NRTL (Nationally Recognized Testing Laboratories). At this time the following laboratories are recognized.</p> <ul style="list-style-type: none"> <li>• CSA (Canadian Standards Association)</li> <li>• ETL Testing Laboratories Incorporated</li> <li>• Factory Mutual Research Corporation</li> <li>• MET Laboratories</li> <li>• UL (Underwriters Laboratories Inc.)</li> <li>• United States Testing Co. Inc.</li> </ul>	<p>In Canada the government agency responsible is the Standards Council of Canada. Standards Council of Canada has authorized a group of testing laboratories to certify equipment. At this time the following laboratories are authorized.</p> <ul style="list-style-type: none"> <li>• CSA (Canadian Standards Association)</li> <li>• ETL Testing Laboratories Incorporated</li> <li>• UL (Underwriters Laboratories Inc.)</li> <li>• C-UL (Underwriters' Laboratories of Canada)</li> </ul>
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In addition to these two government agencies both countries have state, city and county inspectors that may or may not accept the national standards

### Hazardous Locations and The National Electrical Code

#### ELECTRICAL CODE

The National Electrical Code treats installations in hazardous locations in articles 500 through 516. Hazardous locations are classified by NEC definitions. The following are interpretations of these classifications and applications.

#### CLASS I LOCATIONS

Class I locations are those in which inflammable gases or vapors are or may be present in sufficient quantities to produce explosive or flammable mixtures.

##### CLASS I, DIVISION 1

Class I, Division 1 locations are where hazardous atmosphere may be present during normal operations. It may be present continuously, intermittently, periodically or during normal repair or maintenance operations, or those areas where a breakdown in processing equipment releases hazardous vapors with the simultaneous failure of electrical equipment.

##### CLASS I, DIVISION 2

Class I, Division 2 locations are those in which volatile flammable liquids or gases are handled, processed or used. Normally they will be confined within closed containers or in closed systems from which they can escape only in the case of rupture or deterioration of the containers or systems.

#### CLASS II LOCATIONS

Class II locations are those that are hazardous because of the presence of combustible dust.

##### CLASS II, DIVISION 1

Class II, Division 1 locations include areas where combustible dust may be in suspension in the air under normal conditions in sufficient quantities to produce explosive or ignitable mixtures (Dust may be emitted into the air continuously, intermittently or periodically), or where failure or malfunction of equipment might cause a hazardous location to exist and provide an ignition source with the simultaneous failure of electrical equipment, included also are locations in which combustible dust of an electrically conductive nature may be present.

##### CLASS II, DIVISION 2

Class II, Division 2 locations are those in which combustible dust will not normally be in suspension nor will normal operations put dust in suspension, but where accumulation of dust may interfere with heat dissipation from electrical equipment or where accumulations near electrical equipment may be ignited.

#### CLASS III LOCATIONS

Class III locations are those considered hazardous due to the presence of easily ignitable fibers or flyings, which are in quantities sufficient to produce ignitable mixtures.

##### CLASS III, DIVISION 1

Locations in which easily ignitable fibers or materials producing combustible flyings are handled, manufactured or used.

##### CLASS III, DIVISION 2

Locations where easily ignitable fibers are stored or handled.

*This information is provided as a simplified guide only. For actual installation, use the NEC/CEC code book and IEC/CENELEC approvals and wiring codes as final authority on any installation. For paint booth applications consult NFPA Article 33.*

TASK ①

PAINTBOOTH ②

VAPOR DUST ③

VAPOR ④

WET DAMP ⑤

MARINE ⑥

EXPLOSION PROOF ⑦

HID ⑧

INSPECTION ⑨

PORTABLE LIGHTING ⑩

MOUNTING ⑪

PHOTOMETRY ⑫

LAMPS BALLASTS ⑬

INFO ⑭

CUSTOM ⑮

ASK THE EXPERT ⑯



# HAZARDOUS LOCATION

## CLASS I AREA CLASSIFICATIONS

### CLASS I - FLAMMABLE GASES, VAPORS OR LIQUIDS

- ① TASK
- ② PAINTBOOTH
- ③ VAPOR DUST
- ④ VAPOR
- ⑤ WET DAMP
- ⑥ MARINE
- ⑦ EXPLOSION PROOF
- ⑧ HID
- ⑨ INSPECTION
- ⑩ PORTABLE LIGHTING
- ⑪ MOUNTING
- ⑫ PHOTOMETRY
- ⑬ LAMPS BALLASTS
- ⑭ INFO
- ⑮ CUSTOM
- ⑯ ASK THE EXPERT

Class I Area Classifications	
<p><b>Division 1:</b> Where ignitable concentrations of flammable gases, vapors or liquids can exist all of the time or some of the time under normal operating conditions.</p> <p><b>Division 2:</b> Where ignitable concentrations of flammable gases, vapors or liquids are not likely to exist under normal operating conditions.</p>	<p><b>Zone 0:</b> Where ignitable concentrations of flammable gases, vapors or liquids can exist all of the time or for long periods of time under normal operating conditions.</p> <p><b>Zone 1:</b> Where ignitable concentrations of flammable gases, vapors or liquids can exist some of the time under normal operating conditions.</p> <p><b>Zone 2:</b> Where ignitable concentrations of flammable gases, vapors or liquids can exist some of the time under normal operating conditions.</p>

Class I Groups
<p><b>Division 1 &amp; 2</b> A (acetylene) B (hydrogen) C (ethylene) D (propane)</p> <p><b>Zone 0, 1 &amp; 2</b> IIC (acetylene &amp; hydrogen) IIB (ethylene) IIA (propane)</p>

Class I Temperature Codes	
<p><b>Division 1 &amp; 2</b> T1 (&lt;450°C) T2 (&lt;300°C) T2A, T2B, T2C, T2D (&lt;280°C, &lt;260°C, &lt;230°C, &lt;215°C) T3 (&lt;200°C) T3A, T3B, T3C (&lt;180°C, &lt;165°C, &lt;160°C) T4 (&lt;135°C) T4A (&lt;120°C) T5 (&lt;100°C) T6 (&lt;85°C)</p>	<p><b>Zone 0, 1 &amp; 2</b> T1 (&lt;450°C) T2 (&lt;300°C) T3 (&lt;200°C) T4 (&lt;135°C) T5 (&lt;100°C) T6 (&lt;85°C)</p>

Class I, Division 1 and 2 Protection Methods			
Area	Protection Methods	Applicable Certification Standards	
		U.S.	Canada
Div. 1	<ul style="list-style-type: none"> <li>• Explosionproof</li> <li>• Intrinsically safe (2 fault);</li> <li>• Purged/pressurized (Type X or Y)</li> </ul>	ANSI/UL 1203 ANSI/UL 913 ANSI/NFPA 496	CSA-30 CSA-157 ANSI/NFPA 496
Div. 2	<ul style="list-style-type: none"> <li>• Nonincendive</li> <li>• Non-sparking device</li> <li>• Purged/pressurized (Type Z)</li> <li>• Hermetically sealed</li> <li>• Any Class I, Div. 1 method</li> </ul>	UL 1604 UL 1604 ANSI/NFPA 496 UL 1604 ----	CSA-213 CSA-213 ANSI/NFPA 496 CSA-213 ----

Class I, Zone 0, 1 and 2 Protection Methods					
Area	Protection Methods	Applicable Certification Standards			
		U.S.	Canada	IEC	EUROPE
ZONE 0	<ul style="list-style-type: none"> <li>• Intrinsically safe, 'ia' (2 fault);</li> <li>• Class I, Div. 1 intrinsically safe (2 fault method)</li> </ul>	UL 2279, Pt. 11 ANSI/UL 913	CSA-E79-11 CSA-157	IEC 79-11 ----	EN 50020 ----
ZONE 1	<ul style="list-style-type: none"> <li>• Encapsulation, 'm'</li> <li>• Flameproof 'd'</li> <li>• Increased safety, 'e'</li> <li>• Intrinsically safe 'ib' (1 fault)</li> <li>• Oil immersion 'o'</li> <li>• Powder filling 'q'</li> <li>• Purged/pressurized 'p'</li> <li>• Any Class I, Zone 0 method</li> <li>• Any Class I, Div. 1 method</li> </ul>	UL 2279, Pt. 18 UL 2279, Pt. 1 UL 2279, Pt. 7 UL 2279, Pt. 11 UL 2279 UL 2279 UL 2279, Pt. 2 ---- ----	CSA-E79-18 CSA-E79-1 CSA-E79-7 CSA-E79-11 CSA-E79-6 CSA-E79-5 CSA-E79-2 ---- ----	IEC 79-18 IEC 79-1 IEC 79-7 IEC 79-11 IEC 79-6 IEC 79-5 IEC 79-2 ---- ----	EN 50028 EN 50018 EN 50019 EN 50020 EN 50015 EN 50017 EN 50016 ---- ----
ZONE 2	<ul style="list-style-type: none"> <li>• Nonincendive 'nC'</li> <li>• Non-sparking device 'nA'</li> <li>• Restricted breathing, 'nR'</li> <li>• Hermetically sealed 'nC'</li> <li>• Any Class I, Zone 0 or 1 method</li> <li>• Any Class I, Div. 1 or 2 method</li> </ul>	UL 2279, Pt. 15 UL 2279, Pt. 15 UL 2279, Pt. 15 UL 2279, Pt. 15 ---- ----	CSA-E79-15 CSA-E79-15 CSA-E79-15 CSA-E79-15 ---- ----	IEC 79-15 IEC 79-15 IEC 79-15 IEC 79-15 ---- ----	prEN 50021 prEN 50021 prEN 50021 prEN 50021 ---- ----



# HAZARDOUS LOCATION

## CLASS II AREA CLASSIFICATIONS

### CLASS II - CUMBUSTABLE DUSTS

#### Class II Area Classifications

##### Division 1:

Where ignitable concentrations of combustible dusts can exist all of the time or some of the time under normal operating conditions.

##### Division 2:

Where ignitable concentrations of combustible dusts are not likely to exist under normal operating conditions.

#### CLASS II Groups

Division 1 & 2  
E (metals)  
F (coal)  
G (grain)

#### Class II Temperature Codes

Division 1 & 2  
T1 (<450°C)  
T2 (<300°C)  
T2A, T2B, T2C, T2D  
(<280°C, <260°C, <230°C, <215°C)  
T3 (<200°C)  
T3A, T3B, T3C  
(<180°C, <165°C, <160°C)  
T4 (<135°C)  
T4A (<120°C)  
T5 (<100°C)  
T6 (<85°C)

#### Class II, Division 1 and 2 Protection Methods

Area	Protection Methods	Applicable Certification Standards	
		U.S.	Canada
Div. 1	• Dust-ignition	ANSI/UL 1203	CSA-25 or CSA-E1241-1-1
	• Intrinsically safe	ANSI/UL 913	CSA-157
	• Pressurized	ANSI/NFPA 496	ANSI/NFPA 496
Div. 2	• Dusttight	UL 1604	CSA-157 or CSA-E1241-1-1
	• Nonindendive	UL 1604	----
	• Non-sparking	UL 1604	----
	• Pressurized	ANSI/NFPA 496	ANSI/NFPA 496
	• Any Class II, Div. 1 method	----	----

#### Hazardous Location Markings

Class I, II & III, Division 1 & 2 (U.S. & Canada) - This marking would include: Class(es), Division(s), Gas/Dust Group(s), Temperature Code  
Example: Class I, Division 1, Group C & D, T4A

Class I, Zone 0, 1 and 2 (U.S. & Canada) - This marking would include: Method A: For Zone Listings based on UL 2279 or the CSA-E79 Series Class, Zone(s), Ex, Protection Method(s), Gas Group, Temperature Code Example: Class I, Zone 1, Ex de IIB T4 Method B: For Zone Listings based on UL or CSA Division Standards Class, Zone(s), Gas Group, Temperature Code Example: Class I, Zone 1, Group IIB, T4  
*Note: For Canadian Zone Listings based on the CSA-E79 Series, the "Class" and "Zone" elements of the markings string are optional*

Zone 0, 1 and 2 (IEC only) - This marking would include: Ex, Protection Method(s), Gas Group, Temperature Code Example: Ex de IIB T4

Zone 0, 1 and 2 (Europe only) - This marking would include: EEx, Protection Method(s), Gas Group, Temperature Code Example: EEx de IIB T4

- TASK ①
- PAINTBOOTH ②
- VAPOR DUST ③
- VAPOR ④
- WET DAMP ⑤
- MARINE ⑥
- EXPLOSION PROOF ⑦
- HID ⑧
- INSPECTION ⑨
- PORTABLE LIGHTING ⑩
- MOUNTING ⑪
- PHOTOMETRY ⑫
- LAMPS BALLASTS ⑬
- INFO ⑭
- CUSTOM ⑮
- ASK THE EXPERT ⑯



# HAZARDOUS LOCATION

## CLASS III AREA CLASSIFICATIONS

### CLASS III - IGNITABLE FIBERS AND FLYINGS

- ① TASK
- ② PAINTBOOTH
- ③ VAPOR DUST
- ④ VAPOR
- ⑤ WET DAMP
- ⑥ MARINE
- ⑦ EXPLOSION PROOF
- ⑧ HID
- ⑨ INSPECTION
- ⑩ PORTABLE LIGHTING
- ⑪ MOUNTING
- ⑫ PHOTOMETRY
- ⑬ LAMPS BALLASTS
- ⑭ INFO
- ⑮ CUSTOM
- ⑯ ASK THE EXPERT

**Class III Area Classifications**

<p><b>Division 1:</b> Where ignitable concentrations of ignitable fibers and flyings can exist all of the time or some of the time under normal operating conditions.</p>	<p><b>Division 2:</b> Where ignitable concentrations of ignitable fibers and flyings are not likely to exist under normal operating conditions.</p>
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**CLASS III Groups**

Division 1 & 2

NONE

**Class III Temperature Codes**

Division 1 & 2

T1 (<450°C)  
T2 (<300°C)  
T2A, T2B, T2C, T2D  
(<280°C, <260°C, <230°C, <215°C)  
T3 (<200°C)  
T3A, T3B, T3C  
(<180°C, <165°C, <160°C)  
T4 (<135°C)  
T4A (<120°C)  
T5 (<100°C)  
T6 (<85°C)

<b>Class III, Division 1 and 2 Protection Methods</b>			
Area	Protection Methods	Applicable Certification Standards	
		U.S.	Canada
Div. 1	<ul style="list-style-type: none"> <li>• Dusttight</li> <li>• Intrinsically safe</li> </ul>	ANSI/UL 1604 ANSI/UL 913	CSA-157 CSA-157
Div. 2	<ul style="list-style-type: none"> <li>• Dusttight</li> <li>• Any Class II or III Div. 1 method</li> </ul>	UL 1604 ----	CSA-157 ----

#### Hazardous Location Markings

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|--|---|
| <ul style="list-style-type: none"> <li>ANSI/UL 674</li> <li>ANSI/UL 698</li> <li>ANSI/UL 781</li> <li>ANSI/UL 783</li> <li>ANSI/UL 823</li> <li>ANSI/UL 844</li> <li>ANSI/UL 877</li> <li>ANSI/UL 886</li> <li>ANSI/UL 894</li> <li>ANSI/UL 913</li> <li>ANSI/UL 1002</li> <li>ANSI/UL 1010</li> <li>ANSI/UL 1067</li> <li>ANSI/UL 1203</li> <li>ANSI/UL 1207</li> <li>UL 1604</li> <li>UL 2208</li> <li>UL 2225</li> <li>UL 2279</li> </ul> | <ul style="list-style-type: none"> <li>Electric Motors and Generators for Use in Division 1 Hazardous (Classified) Locations</li> <li>Industrial Control Equipment for Use in Hazardous (Classified) Locations</li> <li>Portable Electric Lighting Units for Use in Hazardous (Classified) Locations</li> <li>Electric Flashlights and Lanterns for Use in Hazardous (Classified) Locations</li> <li>Electric Heaters for Use in Hazardous (Classified) Locations</li> <li>Electric Lighting Fixtures for Use in Hazardous (Classified) Locations</li> <li>Circuit Breakers and Circuit-Breaker Enclosures for Use in Hazardous (Classified) Locations</li> <li>Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations</li> <li>Switches for Use in Hazardous (Classified) Locations</li> <li>Intrinsically Safe Apparatus and Associated Apparatus for Use in Class I, II and III, Division 1, Hazardous (Classified) Locations</li> <li>Electrically Operated Valves for use in Hazardous (Classified) Locations</li> <li>Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations</li> <li>Electrically Conductive Equipment and Materials for Use in Flammable Anesthetizing Locations</li> <li>Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations</li> <li>Sewage Pumps for Use in Hazardous (Classified) Locations</li> <li>Electrical Equipment for Use in Class I and II, Division 2, and Class III Hazardous (Classified) Locations</li> <li>Solvent Distillation Units</li> <li>Metal-Clad Cables and Cable-Sealing Fittings for Use in Hazardous (Classified) Locations</li> <li>Electrical Equipment for use in Class I, Zone 0, 1 and 2 Hazardous (Classified) Locations</li> </ul> |
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