

# Class II: Combustible dusts

North American Protection Techniques Comparison			
Area	Protection Techniques	Applicable Certification Documents	
		USA	Canada
Div 1	• Intrinsic safety	UL 913	CSA 157
	• Dust-ignitionproof	UL 1203	CSA 25 or CSA E61241-1-1
	• Pressurized	NFPA 496	NFPA 496
Div 2	• Dusttight	ISA 12.12.01 or UL 1604	CSA 157 or CSA E61241-1-1
	• Hermetically-sealed	ISA 12.12.01 or UL 1604	---
	• Nonincendive	ISA 12.12.01 or UL 1604	---
	• Pressurized	NFPA 496	NFPA 496
	• Any Class II, Division 1 technique	See above	See above

## Class II, Division 1

**Intrinsically Safe Apparatus:** Apparatus in which all the circuits are intrinsically safe.

**Intrinsically Safe Circuit:** A circuit in which any spark or thermal effect is incapable of causing ignition of a mixture of combustible material in air under prescribed test conditions.

**Intrinsically Safe System:** An assembly of interconnected intrinsically safe apparatus, associated apparatus, and interconnecting cables, in that those parts of the system that may be used in hazardous (classified) locations are intrinsically safe circuits.

**Dust-Ignitionproof:** Equipment enclosed in a manner that excludes dusts and does not permit arcs, sparks, or heat otherwise generated or liberated inside of the enclosure to cause ignition of exterior accumulations or atmospheric suspensions of a specified dust on or in the vicinity of the enclosure.

**Pressurized:** The process of supplying an enclosure with a protective gas with or without continuous flow at sufficient pressure to prevent the entrance of a combustible dust or an ignitable fiber.

## Class II, Division 2

**Dusttight:** Enclosures constructed so that dust will not enter under specified test conditions.

**Hermetically Sealed:** Equipment sealed against the entrance of an external atmosphere where the seal is made by fusion, for example, soldering, brazing, welding, or the fusion of glass to metal.

**Nonincendive Circuit:** A circuit, other than field wiring, in which any arc or thermal effect produced under intended operating conditions of the equipment is not capable, under specified test conditions, of igniting the dust-air mixture.

**Nonincendive Equipment:** Equipment having electrical/electronic circuitry that is incapable, under normal operating conditions, of causing ignition of a specified dust-air mixture due to arcing or thermal means.

**Pressurized:** See definition of "Pressurized" under Class II, Division 1.

## International Protection Techniques Comparison

Area	Protection Techniques	Applicable Certification Documents			
		USA	Canada	IECEx Scheme	Europe
<b>Zone 20</b>	• Enclosures, “tD”	---	---	IEC 61241-1	EN 61241-1
	• Intrinsic safety, “iaD”	ISA 61241-11	---	IEC 61241-11	EN 61241-11
	• Encapsulation, “maD”	ISA 61241-18	---	IEC 61241-18	EN 61241-18
	• Class II, Div 1 intrinsic safety method	UL 913	---	---	---
	• Class II, Div 1 dust-ignitionproof method	UL 1203	---	---	---
<b>Zone 21</b>	• Enclosures, “tD”	ISA 61241-1	---	IEC 61241-1	EN 61241-1
	• Pressurization, “pD”	ISA 61241-2	---	IEC 61241-4	EN 61241-4
	• Intrinsic safety, “ibD”	ISA 61241-11	---	IEC 61241-11	EN 61241-11
	• Encapsulation, “mbD”	ISA 61241-18	---	IEC 61241-18	EN 61241-18
	• Any Zone 20 technique	See above	---	See above	See above
	• Any Class II, Div 1 technique	See USA Class II, Div 1 techniques	---	---	---
<b>Zone 22</b>	• Enclosures, “tD”	ISA 61241-1	---	IEC 61241-1	EN 61241-1
	• Any Zone 20 or 21 technique	See above	---	See above	See above
	• Any Class II, Div 1 or 2 technique	See USA Class II, Div 1 or 2 techniques	---	---	---

**Note:** Zone 20, 21 and 22 general requirements are contained in ISA 61241-0 (USA) and IEC/EN 61241-0 (IECEx Scheme & Europe).

### **Zone 20**

**Protection by Enclosure “tD”:** Type of protection for explosive dust atmospheres where electrical apparatus is provided with an enclosure providing dust ingress protection and a means to limit surface temperatures.

**Protection by Intrinsic Safety “iD”:** Type of protection where any spark or thermal effect is incapable of causing ignition of a mixture of combustible dust, fibers, or flyings in air under prescribed test conditions.

**Protection by Encapsulation “mD”:** Type of protection where electrical parts that could cause ignition of a mixture of combustible dust or fibers/flyings in air are protected by enclosing them in a compound in such a way that the explosive atmosphere cannot be ignited.

### **Zone 21**

**Protection by Enclosure “tD”:** See definition of “Protection by Enclosure” under Zone 20 above.

**Protection by Pressurization “pD”:** Type of protection that guards against the ingress of a mixture of combustible dust or fibers/flyings in air into an enclosure containing electrical equipment by providing and maintaining a protective gas atmosphere inside the enclosure at a pressure above that of the external atmosphere.

**Protection by Intrinsic Safety “iD”:** See definition of “Protection by Intrinsic Safety” under Zone 20 above.

**Protection by Encapsulation “mD”:** See definition of “Protection by Encapsulation” under Zone 20 above.

### **Zone 22**

**Protection by Enclosure “tD”:** See definition of “Protection by Enclosure” under Zone 20 above.