CUSTOM HEATERS & RESEARCH
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Hazardous Area Heating Equipment Understanding NEC 500 and 505 Comparison

The National Electric Code defines Hazardous Locations according to 2 different standards; NEC 505 and NEC 500. NEC 505 defines the Zone System and NEC 500 defines the Division System.

Comparison Between Zones and Classes/Divisions		
Standards	NEC 505	NEC 500
Atmosphere		
Gases, Vapors	Zone 0	Class I Division 1
	Zone 1	
	Zone 2	Class I Division 2
Dusts	Zone 20	Class II Division 1
	Zone 21	
	Zone 22	Class II Division 2

AREA CLASSIFICATION			
CLASS I - FLAMMABLE MATERIAL			
	PRESENT CONTINUOUSLY	PRESENT INTERMITTENTLY	PRESENT ABNORMALLY
IEC/EU	ZONE 0	ZONE 1	ZONE 2
USA NEC 505 & 500	ZONE 0	ZONE 1	ZONE 2
	DIVISION 1		DIVISION 2
CANADA CEC SECTION 18 & ANNEX J	ZONE 0	ZONE 1	ZONE 2
	DIVISION 1		DIVISION 2

Our products are certified to Class 1, Division 1, Zone 1 extending our level of protection into Division 1. The Zone classification system divides Division 1 into two zones. Zone 0 is generally only considered for mining applications, underground, or for very high concentrations of explosive gas that occur continuously. Therefore, where most industrial applications state Division 1, it will be equivalent to the Zone 1 certification. The final decision should rest with the user's risk assessment of the area in question.

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NEC 505 defines the following:

Zone Definitions

A place in which an explosive atmosphere in the form of a gas/vapor (or cloud of combustible dust) in air…

Zone 0 (Zone 20)
…is present continuously, or for long periods or frequently.

Zone 1 (Zone 21)
…is likely to occur in normal operation occasionally.

Zone 2 (Zone 22)
…is not likely to occur in normal operation but if it does occur, will persist for only a short period.

NEC 500 defines the Division System:

Class/Division Definitions

Class I – Contains flammable gasses or vapors in quantities large enough to produce an explosion.
Class II – Is hazardous due to the presence of combustible dust in the air.
Class III – Contains easily ignitable fibers or flyings in the air. However, the quantity of fibers and flyings suspended in the air are not likely to be large enough to cause an explosion.

Division 1 – There is a high probability of an explosive atmosphere in normal operation. This can be for part of the time, up to all the time.
Division 2 – There is a low probability of an explosive atmosphere present during normal operation.

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Marking Explanations

The gas group IIC and the temperature classification T3 indicate that both may be used with all of the listed gases in each of the temperature classification categories T1, T2, and T3 and correlate to NEC 500 Gas Groups A through D.

The 338F/170°C marking indicates that this equipment will not exceed this temperature under normal operating conditions (includes 10% over-voltage and 104°F(40°C) ambient). The equivalent maximum temperature marking is 392F/200°C Bottom Heating product. It is important to note that when determining which temperature classifications are appropriate for the area of use, reference should be made to the auto-ignition temperature of the gasses present, rather than the flash point. These NEC 505 temperature classifications directly correlate to the temperature classifications outlined in NEC 500. Please see the charts below:

HAZARDOUS ATMOSPHERE CATEGORY (GAS OR DUST GROUPING)				
Explosive Atmosphere	Typical Hazard Material	North America NEC 500 - 503 / CEC 18		NEC 505 / CEC 18
		Hazard Category	Grouping	Gas Grouping
Gases and Vapors	Acetylene	Class I	Group A	IIC
	Hydrogen	Class I	Group B	IIC or IIB + H2
	Ethylene	Class I	Group C	IIB
	Propane	Class I	Group D	IIA
Dusts	Metal Dust	Class II	Group E	-
	Coal Dust	Class II	Group F	-
	Grain Dust	Class II	Group G	-
Fibers and Flyings	Wood, Paper, or Cotton Processing	Class III	-	-

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Explanation of T-rating temperatures

Temperature Classification

Maximum Surface Temperature	IEC NEC® 505	NEC 500 - Table 500.8(C)
450°C (842°F)	T1	T1
300°C (572°F)	T2	T2
280°C (536°F)		T2A
260°C (500°F)		T2B
230°C (446°F)		T2C
215°C (419°F)		T2D
200°C (392°F)	T3	T3
180°C (356°F)		T3A
165°C (329°F)		T3B
160°C (320°F)		T3C
135°C (275°F)	T4	T4
120°C (248°F)		T4A
100°C (212°F)	T5	T5
85°C (185°F)	T6	T6

Source: http://www.poweroilandgas.com/2011/07/atex-iec-reference-for-explosive.html