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„Zone Classification of explosive areas for International purposes“

Introduction:

As a rule, the formation of explosive atmospheres can be prevented only partly if at all. Classification of hazardous places (areas) in term of zones is an aid to the provision of protection against explosions. The classification determines where effective ignition sources have to be eliminated. During extraction, production, processing, storage, handling and conveying of flammable gases, liquids or dusts (particle size < 0,5 mm) explosive mixtures (atmosphere) may occur.

The zone classifications are consistent in Europe by ATEX Directive (137) 1999/92/EC.

Depending on the probability of the frequency and duration of the presence of an explosive atmosphere, the following zones are differentiated:

- Flammable dusts, vapors, mists are defined as zones 0, 1 and 2
- Flammable dusts are defined as zones 20, 21 and 22.
- Zones 0/20: Hazard by explosive atmosphere permanent, for a long period or often
- Zones 1/21: Hazard by explosive atmosphere occasionally
- Zones 2/22: Hazard by explosive atmosphere seldom or for a short period

Topics:

- Zone classification in Europe according to ATEX 137
- Examples of application in Germany and Europe
- Zone classifications International
- Zone classifications North America
- Examples of application International and North America

Results/conclusions:

Although the zone definitions of ATEX Guideline 137 are consistent the interpretation within applications are not consistent in each country of the European Union, they can be much different. Within Europe there are serious differences for exposure, distances and definitions of duration and frequency of occurrence, but the zoning concept 0, 1, 2 and 20, 21, 22 is consistent.

The International working group of the Section „Machinery- and System Safety“ of ISSA (International Social Security Association) developed practical solutions for zoning of system applications. Therefore a brochure was issued in different languages, like German, English, French, Italian and Slovenian. The basic principles for explosion protection are similar worldwide. However the subject of explosion protection for electrical devices, systems and installations in North America has developed differently and differ much from the IEC-Standard. Explosive areas are defined in North America under following definition „hazardous (classified) locations“ and are described in the US Standards in Chapters 500 - 506 of the National Electrical Code (NEC) and in Canada in Chapter 18 and Annex J of the Canadian Electrical Code (CEC). They cover areas where flammable gases, vapors or mists (Class I), dusts (Class II) or fibres and fluffs (Class III) may occur in hazardous (ominous) quantities.

Depending on the frequency or duration of occurrence of these substances the explosive areas are traditionally defined in Division 1 and Division 2.

Zone comparison Europe - IEC - North America

CENELEC IEC CEC (issue 1988)	US NEC 505	US NEC 500		CENELEC IEC	US NEC 500 CEC, Chapter 18, Annex. J
Zone 0	Class I Zone 0	Class I Division 1		Zone 20	Class II, Division 1
Zone 1	Class I Zone 1	Class I Division 1		Zone 21	Class II, Division 1
Zone 2	Class I Zone 2	Class I Division 2		Zone 22	Class II, Division 2

This chart shows an overview of zones which are comparable. Devices which are developed and produced for the US-Market and used in explosive areas have to be certified from US-accepted Authorities. The acceptance of each others definition is not automatically given.

Gerhard Nied

