



G060002 – CECOD Safety guide for BioFuels – Rev 2

# **CECOD Safety guide for BioFuels**

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## 1) FOREWORD:

This document has been compiled by the CECOD SG 6 to provide informative guidance on explosion protection safety for fuel dispensers handling biofuels and blend fuels which are not within the scope of EN 228. This has been achieved by incorporating requirements in EN 13617-1 and national recommendations and guidance documents for biofuels characteristics.

Any reference to EN 13617-1 in this document is made to the EN 13617-1:2010 draft revision which is currently under CEN enquiry.

ATEX 94/9/EC applies to new or existing equipment for use in flammable and explosive atmospheres.

## 2) BIBLIOGRAPHY

ATEX Guidelines (Second Edition), *Guidelines on the application of Council Directive 94/9/EC of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres*, European Commission, Available at [www.europa.eu.int/comm/enterprise/atex/guide/index.htm](http://www.europa.eu.int/comm/enterprise/atex/guide/index.htm).

ATEX Product Directive, *Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres*.

EN 13463-1 *Non-electrical equipment for potentially explosive atmospheres: Part 1: Basic method and requirements*

EN 60079-10 *Electrical apparatus for explosive gas atmospheres Part 10: Classification of hazardous areas*

IEC/EN 60079-20-1:2010 *Explosive atmospheres - Part 20-1: Material characteristics for gas and vapour classification - Test methods and data*

EN 228 *Automotive fuels - Unleaded petrol - Requirements and test methods*

EN 14214 *Automotive fuels - Fatty acid methyl esters (FAME) for diesel engines - Requirements and test methods*

EN 15376 *Automotive fuels - Ethanol as a blending component for petrol – Requirements and test methods*

EN 590 *Automotive fuels - Diesel - Requirements and test methods*

prEN 13617-1:2010 *Petrol filling stations: – Safety requirements for construction and performance of metering pumps, dispensers and remote pumping units* .

### 3) SAFETY ASPECTS

#### 3.1 Gas grouping

EN 228 (Unleaded petrol) are explosion group IIA product according IEC/EN 60079-20-1:2010. EN 228 permits up to 5% ethanol content. Historically, 100% ethanol has been considered as a IIA product according IEC 60079-20 but according IEC 60079-20-1:2010 it is now considered as an explosion group IIB product. Also research published by PTB (Germany) has determined that ethanol blends above 90% ethanol content fall into explosion group IIB. (Flame arrestor terminology -> group IIB1). EN 13617-1 does not include fuels other than of Explosion group IIA. Dispensers under EN 13617-1 are consequently restricted for use only with blends of less than 90% ethanol. Dispensers which need to be used with ethanol blended fuels above 90% are required to meet the requirements of group IIB T2.

#### 3.2 Zoning

To determine the extent of hazardous zones consideration must be taken about flashpoint, vapor pressure, molecular mass and Lower explosion limit (LEL). Ethanol has a flashpoint of about +12 °C, and petrol has a flashpoint of -40 °C. As a result it can be assumed, particularly at low temperatures, that the higher the percentage of ethanol is, the less vapor will be produced. Ethanol has a vapor pressure of about one third of that of petrol countered by the fact that its molecular mass is considerably less. Ethanol has a lower explosion limit of about 3 % and EN 228 petrol has a lower explosion limit of about 1%. As a result, there would need to be a considerably larger emission of ethanol than petrol to generate a given radius of explosive atmosphere. Based on the above it is considered that the zoning defined in EN 13617-1 is valid also for ethanol blends.

#### 3.3 Corrosion and material compatibility

EN 13617-1 Materials in piping, fittings, safe breaks, nozzles, valves et c through which liquid fuel or vapor flow shall be constructed from material compatible with the relevant liquid fuel. It is recommended that the manufacturer obtains confirmation from the supplier that the material used is compatible with the anticipated fuel. There is a NOTE in prEN 13617-1:2010 clause 5.3.3.3 that copper may not be compatible with higher blends of ethanol fuels in terms of risk from electrolytic corrosion. For biodiesel blends with above 20% FAME it is recommended to use special hoses suitable for biodiesel.

### 3.4 Gaskets and seals

According prEN 13617-1:2010 clause 6.1.8.2 gaskets and seals for use with ethanol above 7% shall be tested with a High Blend ethanol fuel with a nominal ratio of 85% ethanol according EN 15376 and 15% unleaded petrol according EN 228. According prEN 13617-1:2010 clause 6.1.8.2 gaskets and seals for use with biodiesel blends with biodiesel content between the upper limit in EN 590 and up to 100% biodiesel shall be tested with 100% FAME in accordance with EN 14214.

### 3.5 Cables

EN 13617-1 clause 6.1.4.2 defines that cables for use in hazardous area of fuel dispensers shall be tested in gasoline (EN 228), methanol and ethanol. Biodiesel blends above what defined in EN 590 diesel contains increased levels of methyl esters and iodine which are known to be particularly aggressive towards organic based materials such as rubber. According prEN 13617-1:2010 clause 6.1.4.2 cables for use in dispensers intended for use with biodiesel blends above 20% shall be tested in 100% FAME (EN 14214).

## 4) NATIONAL REQUIREMENTS

### 4.1 Sweden

Nozzles on dispensers for ethanol fuels above must not be equipped with a nozzle latch mechanism to prevent risk of ignition due to static discharge during filling with ethanol. It is considered the risk is lower if the person filling the car constantly holds the nozzle handle during filling.