

# Implementation of ATEX Guidelines

**Vötsch**  
Industrietechnik



Temperature and Climatic Test Chambers  
for Usage under Conditions Carrying a Risk of Fire and Explosion

# What are ATEX guidelines ?

## Introduction

**ATEX** (French abbreviation for 'Atmosphere Explosive') is a European guideline assuring the safe operation of industrial systems in explosion sensitive environments or under conditions carrying a risk of explosion.

Two EU guidelines were released to execute these tasks - 99/92/EG and 94/9/EG. Since July 1st, 2003 these guidelines are binding. The installation of explosion-proved systems not complying with these guidelines will no longer be permitted.

The guideline 99/92/EG describes the duties of the system user whereas the 94/9/EG lays down the duties of the system manufacturer.

The prime duty of the system user is the assessment of potential danger as well as the classification of potential danger within the system - so-called zones.

The system manufacturer has to carry out the classification and labeling of the systems according to the risk of igniting potentially explosive mixtures - so-called system categories. This duty links the system manufacturer with the system user.



## Duties of the system user ...

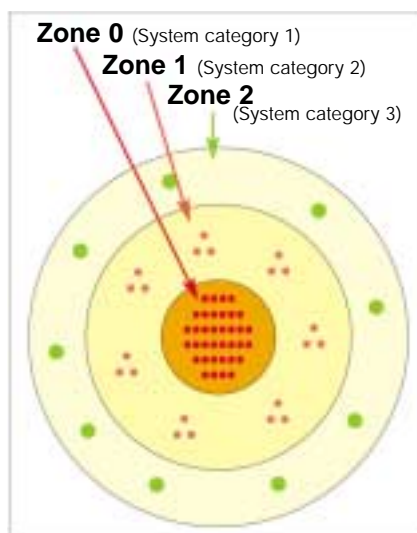
According to operational safety standards the system user has to carry out the following duties:

### 1. Doing a danger assessment

The user has to do a danger assessment of the systems requiring supervision as well as the working appliances. The zones of explosion sensitive areas in the systems have to be determined. The identification of all existing materials as well as possible electrical and also non-electrical ignition sources and their assessment with regard to the risk of explosion is of highest importance.

### Classification into zones

The assignment of the explosion sensitive areas into zones is for fixing and determination of the safety requirement and protection systems for the chambers. The respective zone determines the category according to which the chambers and components have to be designed and tested.



## Definition of zones

### Zone 0:

Area in which the presence of an explosive atmosphere as a mixture of flammable substances in the form of gas, steam or mist with air is permanent or long-term or frequent.

### Zone 1:

Area in which explosive atmosphere as a mixture of flammable substances in the form of gas, steam or mist with air during normal operation is expected occasionally.

### Zone 2:

Area in which during normal operation an explosive atmosphere as a mixture of flammable substances in the form of gas, steam or mist with air is not expected. However, if it still occurs, then for a short period of time only.

### 2. Compiling documentation for explosion protection

According to the individual dangers, the system user or the system manufacturer has to implement suitable explosion safety measures.

A plan has to be drawn up for the necessary safety measures for the used electronic and non-electronic accessories and has to be put down in the prescribed explosion safety document.

# ... and how are they put in to practice ?

## Duties of the system manufacturer ...

### Classification into system categories

According to guideline 94/9/EG Vötsch temperature and climatic test cabinets fall into the system group II. This group is divided into 3 categories:

#### Category 1

comprises systems which are designed to be operated in accordance with the characteristic values indicated by the manufacturer and guarantee **a very high degree of safety.**

Systems of this category have to guarantee the necessary degree of safety even during **rarely occurring system failures** and therefore contain explosion safety precautions. In the event of a technical safety precaution failure, at least a **second independent technical safety precaution** guarantees the required safety. The required safety is even guaranteed if **two independent faults** should occur.

#### Category 2

comprises systems which are designed to be operated in accordance with the characteristic values indicated by the manufacturer and guarantee **a high degree of safety.**

The technical explosion safety measures of this category guarantee the required degree of safety even **during frequent** system failures or errors which are **usually to be expected.**

#### Category 3

comprises systems which are designed to be operated in accordance with the characteristic values indicated by the manufacturer and guarantee a normal degree of safety.

Systems of this category are designed for use in areas in which an explosive atmosphere by gases, steam, mist or raised dust **is not to be expected.** However, in case it is, then **temporarily and for a short period of time only.**

### Additional notes:

Classification into system category 2 does require an individual auditing of each system by a nominated body, e.g. TÜV for electric devices.

For a classification into system category 3 the necessary safety precautions can be selected by the system manufacturer on the basis of the documents provided by the customer as well as in conjunction with the safety department of the system user. An auditing by a nominated body (e.g. TÜV) is not explicitly required.

## Temperature classes and explosion groups of gases and vapours

Temperature Class	T1	T2	T3	T4	T5	T6
Ignition Temperature	> 450 °C	> 300 - 450 °C	> 200 - 300 °C	>135 - 200°C	> 100 - 135 °C	> 85 - 100 °C
Explosion Group	Examples of Substances					
IIA (ignition energy > 180 µJ)	Acetone, Dimethyl Ammoniac, Benzene, Acetic acid, Methane, Propane, Toluene, Methanol	n-Butone n-Butyle alcohol Natural gas Vinylchloride	Benzine Diesel Fuell oil n-Hexane	Acetaldehyde		
IIB (ignition energy 60 ... 180 µJ)	Cyane hydrogen CNG	Ethylen Isoprene Ethyl alcohol	Hydrogen sulphide	Ethylether		
IIC (ignition energy <60 µJ)	Hydrogen	Acetylene				Carbon disulphide

# Explosion and fire hazard in regard to temperature and climatic test chambers

A danger can be present, when flammable substances are brought together with the device under test within or in the vicinity of the chamber. A flammable or explosive atmosphere (i.e. the test space or ambient atmosphere) can be created when these substances are released into the atmosphere to a certain concentration (lower explosion limit).

## Critical components and areas in the test space:

- hot surfaces of resistance heaters or heat exchangers
- hot surfaces of light bulbs
- sparks at fan blades in case of a mechanical fault
- electrical sparks at faulty sensors
- hot surfaces of door heaters

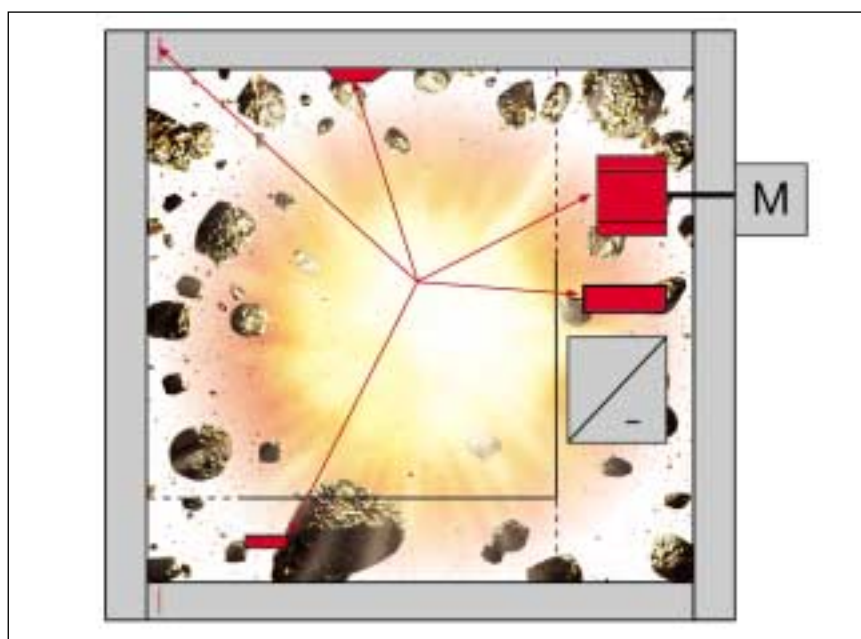
These ignition sources can cause a deflagration, fire or explosion.

For overpressure systems (e.g. hydraulics) it has to be noted that aerosols or mists escaping from leakage points can be flammable (independent of the flash point) while getting in contact with hot surfaces.

The contact with hot surfaces is achieved when the pressurized aerosol is directly getting in touch with the corresponding parts or the diffusion with the test space air is carried to the hot surface.



## Critical components and areas in the test space



# Formation of a fire and explosion hazard

In general flammable mixtures are:

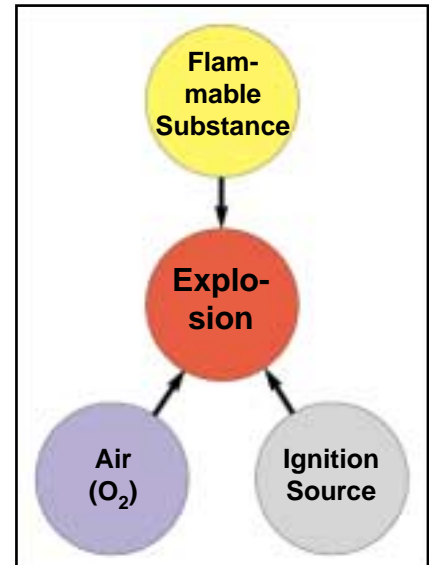
- **gas-air mixtures**
- **aerosol-mist-air mixtures**
- **dust-air mixtures**

The formation of these mixtures can be initiated by a fault in the customer's system which can be unwanted or rather deliberate by a constituent of a test.

A mixture is explosive if the concentration is within certain substance-specific limits.

These limits are designated as lower explosion limit and upper explosion limit and are indicated in corresponding charts.

A present fire or explosion hazard requires protective measures taken at the chamber and/or installation site depending on the danger level.



*Condition for an explosion*

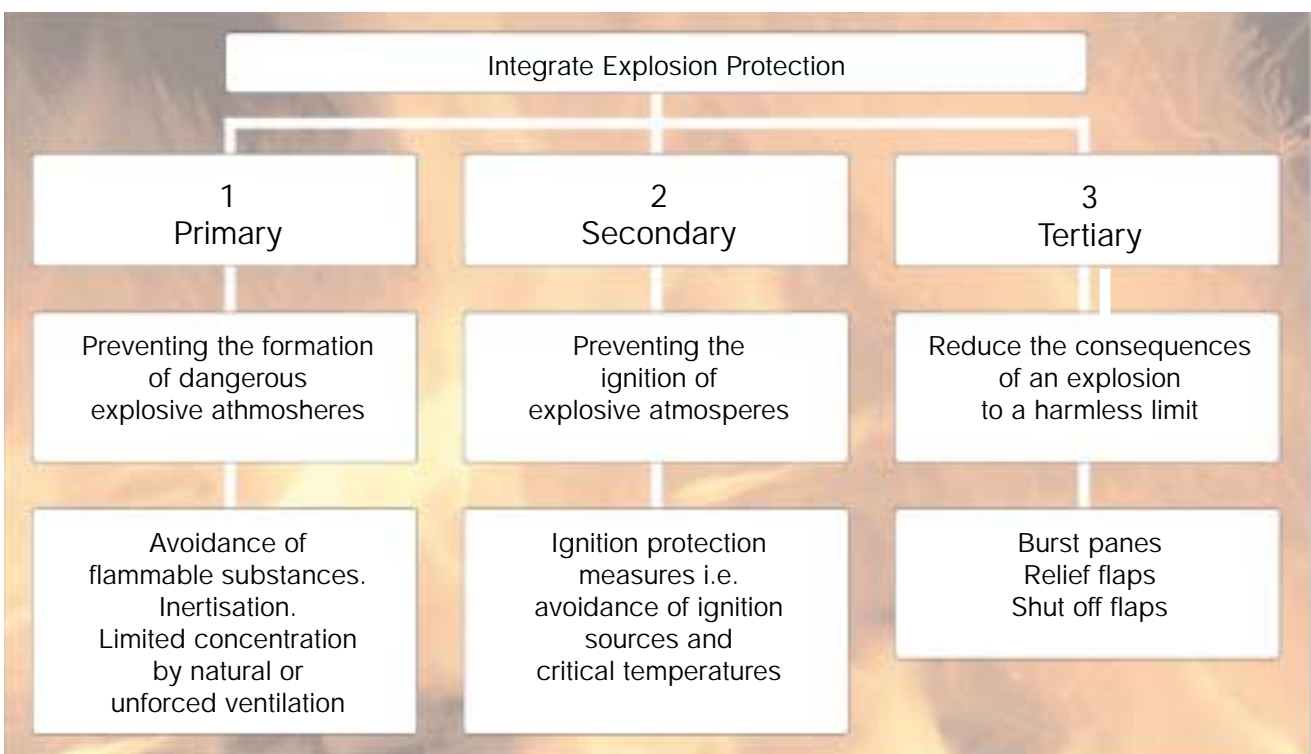
## General protective measures

Top priority of the explosion protection is the primary explosion protection. The secondary explosion protection is only applied if sufficient safety cannot be guar-

anteed by the primary explosion protection or if the primary explosion protection cannot be applied. The tertiary explosion protection is only applied if both the

primary and the secondary explosion protection cannot be applied demonstrably.

## Classification of protective measures



# Chamber specific implementation ...

## 1. Possible designs for system category 3 (zone 2)

### 1.1 Design with primary explosion protection

#### Nitrogen inertisation type SN

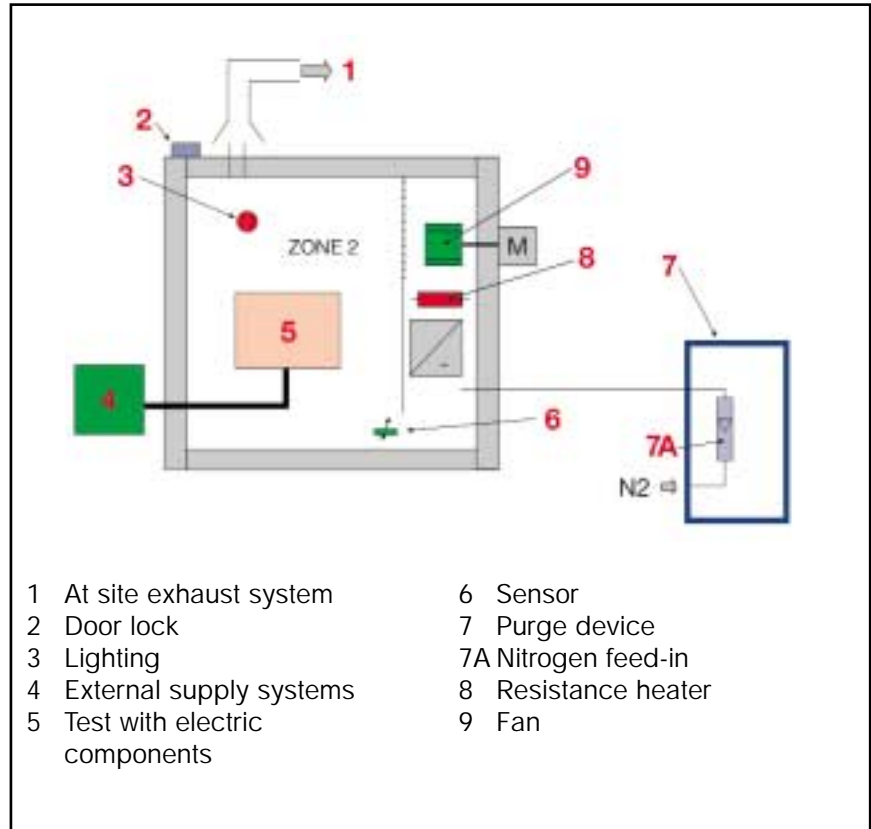
- inertisation with nitrogen with large and small cleansing amount
- supervision of the cleansing amount
- with door lock and
- key switch

Applicable to temperature test chambers of series VT, VLM, VTS, VTV.

Not applicable to tests with defined climatic conditions.

#### Possible application:

Tests with diesel fuel, brake fluids and hydraulic oils with systems under pressure.



### 1.2 Design with secondary explosion protection

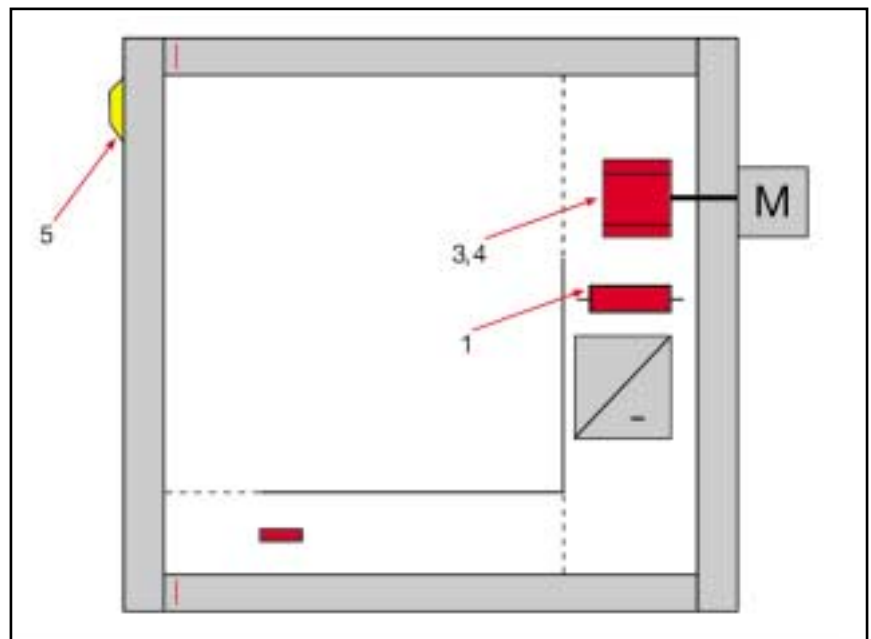
#### Surface temperature limitation and supervision of resistance heaters (1)

in combination with the following additional measures

- spark-safe fan (3)
- supervision of the fan motor (4)
- exterior lighting for design with observation window (5)

Applicable to temperature test chambers of series VT, VLM, VTS, VTV.

Application limits are tests with high heating rates (> 5 K/min).



#### Possible application:

Tests with brake fluids or hydraulic oils with systems under pressure.

#### Important:

Testing temperature has to be lower than flash point temperature of medium.



## 2.2 Design with secondary explosion protection

### Type approved systems with explosion protected test space

Available are temperature and climatic test cabinets of sizes 480, 800 and 1300 l.

The systems are approved for use up to temperature class T3 and explosion group IIB and fulfill the requirements of category 2 and 3.

Designation of the systems:  
VT/VC ....II 2G EEx IIB T3



### Labeling and certifications for systems in conformity with ATEX

- Type plate with model designation and CE mark
- CE Declaration of Conformity with extension for design according to explosion protection guideline 94/9/EG and filing of the following documentation:
  - factory-provided documentation for system category 3
  - or**
  - type test certificate (e.g. ex-test cabinets) with test number
  - or**
  - test certificate of an individual auditing by a nominated body (e.g. TUEV) for e.g. special chambers, system category 2

### Project related engineering work

#### **Vötsch Industrietechnik offers the following project related engineering work:**

- support in safety and risk examination
- designing and drafting of safety installations
- close contact to nominated bodies
- experience and know-how

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