# ATEX

Explosion protection
for industrial processes.

DEKRA

WE ENABLE A **REAL SAFETY**

# DEKRA Process Safety

## Expertise, People, Global presence

The width and depth of expertise in process safety makes us globally recognised specialists and trusted advisors.

We help our customers to **understand and evaluate their risks**, and work together to develop pragmatic solutions. Our value-adding and practical approach integrates specialist process safety management, engineering and testing. We seek to educate and grow customer's competences to provide sustainable performance improvement. Partnering with our customers we combine technical expertise with a passion for life preservation, risk reduction and asset protection.

We are a service unit of DEKRA, a global leader in safety since 1925 with over 44.000 employees in 60 countries. As a part of the world's leading expert organisation DEKRA, we are the **global partner for a safe world**.

# Beyond Hazardous Area Classification
# Mechanical Equipment Ignition Sources

## A risk-based approach to explosion risk

In explosion incidents, **electrical arcs** and **electrostatic sparks** are often considered to be primary ignition sources, because they are "everywhere" and can have sufficient energy to ignite most flammable gases and vapours and dense clouds of many combustible dusts. However, there is a wide variety of other types of ignition sources that should be assessed, that have little to share with electricity.

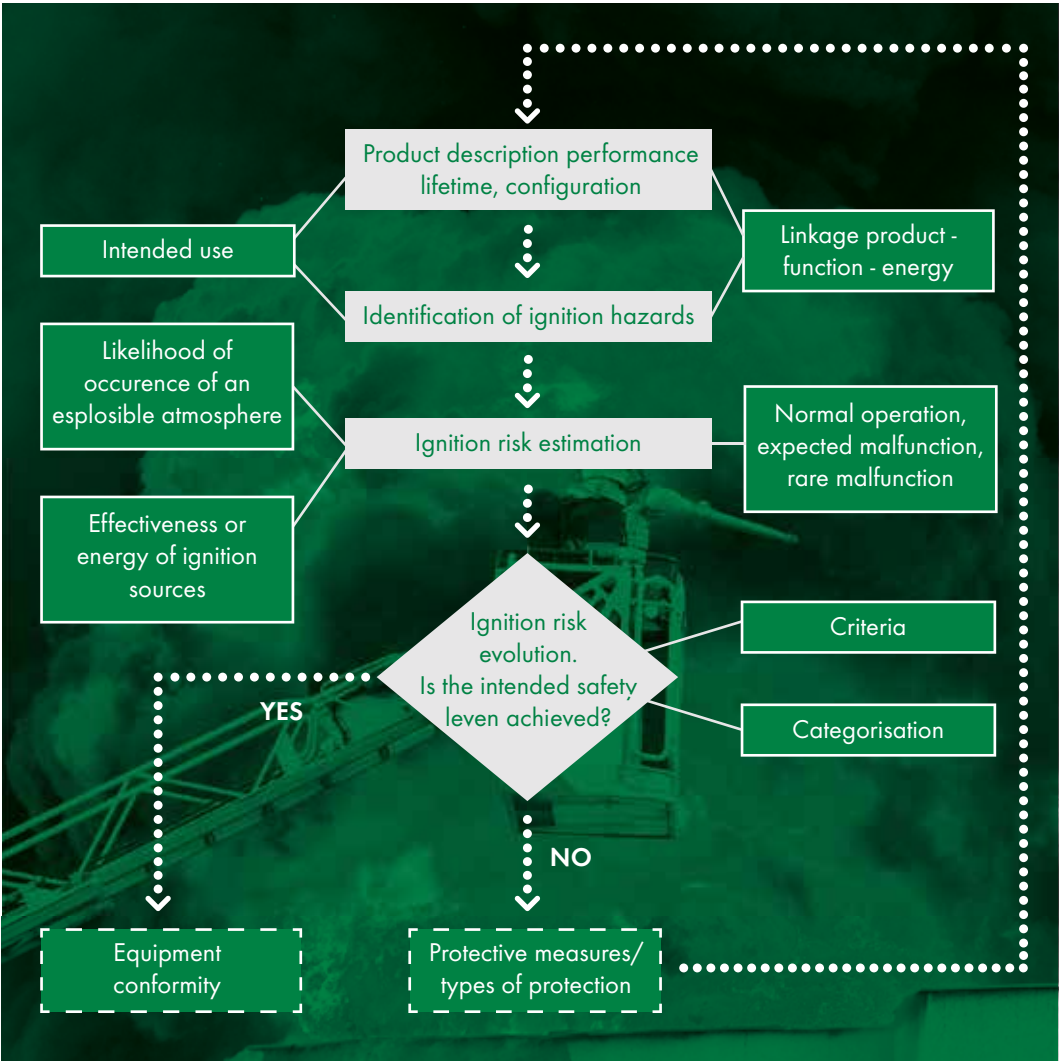
Mechanical equipment is commonly found in manufacturing sites and can present a significant non-electrical ignition hazard. Hazardous Area Classification, to manage selection and installation methods of electrical devices, traditionally only addresses the ignition hazard of electrical equipment. Mechanical equipment such as bucket elevators, mixers and blenders, and rotary airlocks can cause frictional heat or frictional sparks during routine operation or during equipment-upset conditions.

To identify – and eliminate or control – these kind of ignition sources, our DEKRA experts rely on an analysis method that is known as **"Mechanical Equipment Ignition Risk Assessment" [MEIRA]**.

When carrying out a MEIRA, DEKRA complies with the procedures that are presented in the Standard EN 15198 "Methodology for the ignition hazard assessment of non-electrical equipment and components for intended use in potentially explosive atmospheres". Beyond that, DEKRA's subject matter experts (SMEs) can provide additional insights and unique perspectives on ignition hazards, thanks to their extensive background in the process industry.

## The MEIRA Procedure

**Mechanical Equipment Ignition Risk Assessment**



The equipment-evaluation diagram from the Standard provides guidance concerning the MEIRA procedure.
A companion document is ATEX 137, where ATEX stands for "ATmospheres EXplosives". ATEX 137, that is the common name of **European Union Directive 99/92/EC**, aims at establishing and harmonising minimum requirements for improving the safety and health of workers potentially at risk from explosive atmospheres, and is an established way to manage non-electrical equipment.
Additionally, DEKRA's holistic approach to explosion safety integrates the MEIRA with concepts and indications from **Standards EN 1127-1** on basic concepts of explosion prevention and **ISO 80079-36** on non-electrical equipment for explosive atmospheres.

When evaluating the probability of occurrence of a fire or explosion, there are two likelihoods that should be determined:

(1) the likelihood of an explosible fuel/air mixture occurring
(2) the likelihood of an ignition source with enough energy occurring within the explosible mixture

With regards to point (2) above, the probability of occurrence of an effective ignition source – where effective means having enough energy to ignite the explosible atmosphere – is the main criteria that DEKRA adopts to define the safety level of mechanical (and electrical) apparatuses against the risk of explosion, as suggested in international Standards and summarized in the concept of the equipment Category.

## Categories of ATEX equipment

**> Category 1**
Equipment or devices that are designed for very good protection against intrusion by the surrounding environment, assuming that an explosible fuel/air mixture could occur very frequently or could persist continuously; that is, in areas that are classified as Zones 0 [gases/vapours] or 20 [dusts]. Category 1 equipment is designed to be capable of keeping within operational parameters, with "redundant" protection against being an ignition source. Equipment in this category would be installed in areas in which an explosible atmosphere caused by mixtures of air and gases, vapours, mists, or suspended dusts are highly likely to occur or are present continuously, for long periods of time.
Equipment in this Category is characterised by **integrated explosion-protection measures** that function such that in the event of a failure of one means of protection, at least a second independent means of protection provides a sufficient level of safety, such as stopping the flow of electrical, hydraulic, or pneumatic power to the

equipment. Examples would be hermetically-enclosed or encapsulated intrinsically-safe devices where the voltage and/or current are limited such that the worst-case discharge of energy would be less than the minimum ignition energy of the surrounding explosible atmosphere.

**> Category 2**

Equipment is designed for good protection against intrusion by the surrounding environment, assuming that an explosible fuel/air mixture could occur frequently or could persist for a considerable period; that is, in areas that are classified as Zones 1 [gases/vapours] or 21 [dusts].Category 2 equipment is designed to be capable of maintaining isolation of all types of ignition sources from the surrounding environment. Equipment in this category would be installed in areas in which an explosible atmosphere caused by **mixtures of air and gases, vapours, mists, or suspended dust** are likely to occur.

**> Category 3**

Equipment is designed for minimal protection against intrusion by the surrounding environment, assuming that an explosible fuel/air mixture would occur only infrequently; that is, in areas that are classified as Zones 2 [gases/vapours] or 22 [dusts]. Category 3 equipment is designed to be capable of keeping within its operational parameters, particularly temperature and leak-resistance, with a normal level of protection against being an ignition source. Equipment in this category could be installed in areas in which an explosible atmosphere caused by mixtures of air and gases, vapours, mists, or suspended dust are unlikely to occur and if they do occur, they do so infrequently and only for a short period of time.

As stated in **ATEX 99/92/EC**, "Zone 0 and 20 require Category 1 marked equipment, Zone 1 and 21 require Category 2 marked equipment, and Zone 2 and 22 require Category 3 marked equipment. Zone 0 and 20 are the Zones with the highest risk of an explosive atmosphere being present." Category 1 equipment could also be used where Category 2 or Category 3 equipment would be required.

Category 2 equipment could also be used where Category 3 equipment would be required. As indicated by the above categories for the design and operation of non-electrical equipment, there is a strong similarity to the requirements for the design and operation of electrical equipment in hazardous areas.

## Book Your Assesment with DEKRA

Whenever a manufacturing site handles and/or processes combustible dusts or flammable vapours or gases, a minimum standard of safety must include appropriate control of ignition sources.

DEKRA's experts can assist sites not only in completing a Hazardous Area Classification, but also in assessing the ignition hazards associated with "mechanical equipment" that could ignite these materials. Through the MEIRA assessment, DEKRA provides sites with an analysis of non-electrical ignition sources that could pose a **danger to personnel and business**.

DEKRA

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**EMPOWER** YOUR BUSINESS.

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