



Dust Explosions Sources of Ignition

Part 1 - Overview

A good starting point for information on sources of ignition for all explosions is standard EN 1127 Part 1 “Explosive atmospheres - Explosion prevention and protection Part 1: Basic concepts and methodology” This standard details 13 sources of ignition which are:

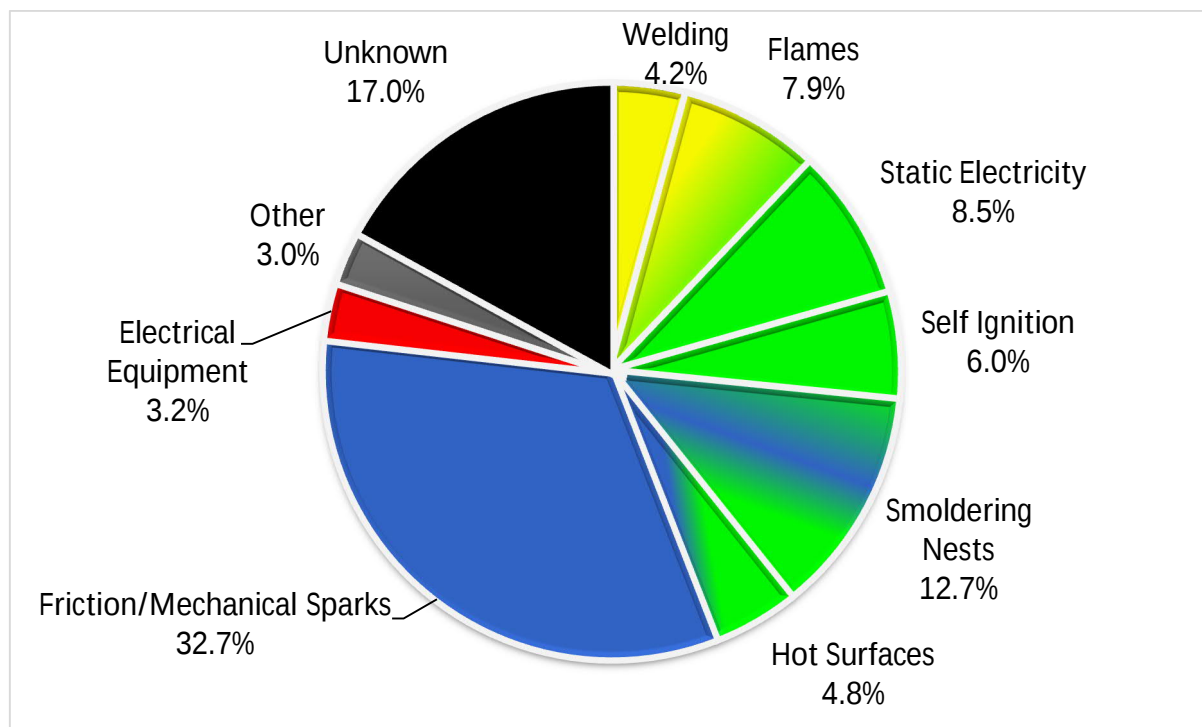
1. Hot surfaces
2. Flames and hot gases (including hot particles)
3. Mechanically generated sparks
4. Electrical apparatus
5. Stray electric currents, cathodic corrosion protection
6. Static electricity
7. Lightning
8. Radio frequency (RF) electromagnetic waves from 104 Hz to 3 x 10¹¹ Hz
9. Electromagnetic waves from 3 x 10¹¹ Hz to 3. x 10¹⁵ Hz
10. Ionizing radiation
11. Ultrasonics
12. Adiabatic compression and shock waves
13. Exothermic reactions, including self-ignition of dusts

As is to be expected the minimum ignition of a dust has a strong influence on whether or not a source of ignition will be an effective ignition source and lead to the ignition of a dust cloud. In general, the minimum ignition of a dust cloud varies between 1 mJ and more than 1000 mJ meaning that many of the ignition sources are only effective ignition sources with the very lowest minimum ignition energy or may not capable of igniting a dust cloud at all.

The effectiveness of each of the sources of ignition will be discussed in more detail in subsequent parts of this series.



BIA report 11/97 is another useful resource for information on ignitions sources. This report lists the known source of ignition for a large number of actual dust explosion incidents. The graph below shows the percentage of explosions caused by various sources of ignition.



Perhaps one of the most interesting points here is the relatively small number (3.2%) of incidents that were caused by electrical sparks. The report does not give any explanation for this but maybe the answer lies in the fact that electrical sparks have been known as a source of ignition for many years and certified electrical equipment is readily available.

Sources of ignition need to be considered in detail relative to the minimum ignition energy of the dust clouds which is the subject of my next blog in this series.

You can learn more about dust explosions and how to reduce the risk of a dust explosion occurring here:

IChemE Online Training

<https://www.icheme.org/career/training/online-courses/dust-explosion-risk-reduction/>

<https://www.icheme.org/career/training/online-courses/dust-explosions/>

Youtube Video

<https://www.youtube.com/embed/kWvgTKh3RtY>

<https://www.youtube.com/embed/k0cqo0hANK0>