

Portable Tools: Flammable Atmosphere Requirements

Department: Chemical and General Safety

Program: Portable Tools

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All metal tools can produce sparks. Tools made from stainless steel and other *non-sparking* materials have a lower tendency to generate sparks than those made from tool steels, but the name *non-sparking* is misleading because these tools are still capable of producing a spark: the term *reduced-sparking tools* better describes these tools.

Non-sparking tools cannot be relied upon when working in potentially flammable atmospheres in the same way one relies on certified explosion-proof motors or electrical equipment. For example, the National Fire Protection Association (NFPA) has reported that there is little or no advantage in using non-sparking tools in preventing explosions of hydrocarbon-air mixtures. Instead, non-metals like wood, leather, and plastic are suitable for some tools like shovels, scrapers, or scoops and do not pose a friction spark hazard.

What Are the Hazards of Both Sparking and Non-sparking Tools?

Both *sparking* and *non-sparking* materials can cause ignition. Two types of hazards are associated with tools manufactured of either material:

1. Ignition by friction, with impact on each other or on other materials such as steel or concrete, in which an ordinary (mechanical or frictional) spark is generated. All tools can ignite flammable mixtures by sparks generated by friction or impact. However, this is true only when the generated spark is *incendive*: that means a spark that has to have enough *heat content* (that is, enough mass and sufficiently high temperature) and has to last long enough to heat a flammable air-vapor mixture above its ignition temperature. This is more likely in the case of sparks formed when using a metal grinder than a spark generated when a hammer strikes some metal.
2. Ignition by a chemically generated spark, caused by impact between certain metals and some oxygen-containing substances (such as rust, which is iron oxide).

Requirements

1. Follow safe work procedures. Always evaluate a job to be done in a hazardous environment (even the simplest one). Keep in mind that there are no truly non-sparking tools.
2. In any work where flames are used or sparks are produced, make sure that an explosive atmosphere does not develop. Such atmospheres include flammable vapor-air mixtures and organic dust clouds like flour or coal dust. Isolation, ventilation, and purging are methods of ensuring a safe working atmosphere. Use *explosimeters* in the workplace to protect those working in hazardous environments.