M6-EN.5 EXPLOSIONS AND FIRE FIGHTING

M6-EN.5.1 Introduction

A variety of explosive materials exist in a motor vehicle repair workshop. These can be:

- Waste engine oil that is stored in drums/tanks
- Other flammable liquids storage/use of paints, solvents, cleaning materials
- Flammable gases welding/cutting equipment, LPG heaters, battery charging, LPG-fuelled vehicles, some aerosols
- Explosive dusts sanding organic fillers e.g. fibre-glass
- Other explosive materials air bags, seat belt parts
- Flammable materials in welding/cutting of diesel tanks, or near to special circumstances brake lines etc
- Gases in cylinders. They are often stored at very high pressures, and so their uncontrolled release can be physically dangerous. A small amount of released gas (such as Liquefied Petroleum Gases (LPGs)) can fill a large area with a potentially explosive mixture. Stored cylinders need to be suitably restrained and their valves protected from impact damage. In addition, gas cylinders may need special valves, fittings and hoses
- Fine flammable dusts, which if ignited, can cause violent explosion and damage
- Plastic foams, packaging materials, polyester wadding and textiles, which ignite easily and burn fiercely, giving off a lot of dense black smoke

M6-EN.5.2 Ignition

Ignition is the process whereby a material capable of reacting exothermically reached a state of rapid combustion. At atmospheric temperatures and pressures, flammable mixtures of hydrocarbons and air will not ignite unless they have a source of energy.

Certain characteristics of fuel and oxidant mixtures, such as minimum volume, minimum energy, auto ignition temperature and ignition lag time, give some indication of how 'easily' or how 'quickly' a specific mixture in a specific situation will ignite. For a particular mixture at a particular temperature and pressure there will be a minimum volume of flammable mixture required to sustain ignition. For a given flame volume, there is a balance between heat generated by the exothermic reaction and heat lost to the surroundings. The auto-ignition temperature is the lowest temperature to which an entire fuel and oxidant mixture must be raised before it spontaneously ignites.

Flammable liquids can give off large volumes of flammable vapours at room temperature. These vapours, when mixed with air, can ignite, often violently. Spilled flammable liquids

can, if not contained, flow a long way to an ignition source, and then flash back to the source of the leak. Ignition sources can be very varied and they include sparks from electrical equipment or welding and cutting tools, hot surfaces, open flames from heating equipment, smoking materials etc.

Safety Precautions

- Remove all obvious ignition sources from the storage and handling areas
- Smoking must be prohibited in the garage, especially near explosive, flammable, and combustible materials
- Never store combustible materials close to heaters or electrical equipment which could run hot and act as a local ignition source
- Keep passageways, exits and working areas clear of packaging materials, finished products containing flammable solids etc. **(M6.5.1.jpg)**

M6-EN.5.3 Explosions

Dealing with flammable substances is a hazardous activity. This is due to the risk of fire and explosion. Fuel, air and a source of ignition are the ingredients for starting a fire or explosion. By controlling or eliminating even one of these, fire can be prevented. A great variety of flammable substances exists in the workplace. They can be divided to the obvious (heating fuel, petrol, painting thinners, etc) and the less obvious (packaging materials, etc).

Safety Precautions

Those working with flammable dusts (during sanding, welding, etc) must remember to:

- keep plant dust-tight
- keep the working area dust-free by regular cleaning, and vacuuming spillages immediately

In addition to the precautions outlined above, when dealing with flammable gases:

- Never use oxygen instead of compressed air
- Never use oxygen for sweetening the air in a working area or confined space
- Never use grease or oil on equipment containing oxygen
- Always check manufacturers or suppliers' instructions and fit the correct equipment. Protect hoses from potential causes of damage that could cut, scuff or weaken them. Inspect them regularly and replace those that show signs of damage or wear that could give rise to a leak

M6-EN.5.4 Fire Fighting

Employers are responsible to ensure the health, safety and welfare of their employees and other that may have access to the workplace. These duties include among others, safety in relation to fire hazards, both from the work processes and activities, as well as general fire safety in the workplace. Employers must also carry out a fire risk assessment, although this can be done as part of the general risk assessment.

Safety Precautions

Employers are required to:

- Establish means of detecting and giving warning in case of fire
- Provide escape routes with clear indications
- Provide fire extinguishers in conspicuous positions on escape routes, preferably near exit doors **(M6.5.2.jpg)**

Provide fire-fighting equipment, ensure free access to it (bad practice: **M6.5.3.jpg, M6.5.6.jpg)** , and good working condition

- Keep exit doors free of obstacles **(M6.5.7.jpg, M6.5.8.jpg)**. No emergency exits should be placed in toilets, must be away from rooms containing hazardous materials, and should never exist in narrow passages
- Provide emergency lighting, which will indicate the escape routes clearly, will provide illumination along escape routes allowing safe movement towards final exits, and will ensure that the fire alarm call points and fire-fighting equipment can be readily located
- Provide training of employees in fire safety
- Provide suitable storage containers for flammable substances, ventilation systems to dilute or remove flammable gas, extraction systems to remove combustible materials, and equipment selected not to be a source of ignition are key elements for the elimination of fire
- Consider their fire characteristics when storing, handling, and piling materials
- Store non-compatible materials that may create a fire hazard at least 7.5m apart or separate them with a barrier having at least a 1-hour fire rating.
- Pile material in such a way to minimise internal fire spread and to provide convenient access for fire fighting. At least 1m clearance should exist between stored materials and unit heaters, radiant space heaters, duct furnaces, and flues or the clearances shown on the approval agency label.
- Provide appropriate fire fighting equipment for each floor separately, in case that the garage has more than one floor

For more information the trainee is addressed to the information provided in the introductory module, section M0-EN.6.

M6-EN.5.4.1 Removal of combustible material

Any combustible material (petrol, oil, solvents, etc) must be removed from the garage. If possible, move the work to a location well away from combustible materials. In case that another location cannot be found, then combustibles must be protected with a cover made of fire-resistant material.

Safety Precautions

- Remove all combustible materials 10m away from the garage
- Use fire-resistant material for covering or blocking all open doorways, windows, cracks, and other openings

- Enclose the storage room for these materials with portable fire-resistant screens
- Protect combustible walls, ceilings, floors, etc, from sparks and heat with fire-resistant covers
- When working on a car, move nearby combustibles to a safe location, to prevent their ignition
- In case that relocation of combustibles cannot be done, an employee can be designated to serve as a fire watch, equipped with a fire extinguisher, during the welding operation and for at least one half-hour after welding is completed
- No welding or cutting must take place, on material having a combustible coating or combustible internal structure, as car particles, or accessories, without an approved method for eliminating the hazard
- After welding or cutting, make a thorough examination for evidence of fire. It must be mentioned that easily visible smoke or flame may not be present for some time after the fire has started
- Avoid welding or cutting in atmospheres containing dangerously reactive or flammable gases, vapours, liquids, or dust (such as vapours from solvents, petrol, etc)
- Do not apply heat to a container that has held an unknown substance or a combustible material whose contents, when heated, can produce flammable or explosive vapours
- Never heat a car piece, when is covered by an unknown substance or whose coating can produce flammable, toxic, or reactive vapours when heated
- Develop adequate procedures and use proper equipment for doing the job safely
- Adequate ventilation must be provided by the employers, in the workplace in order to prevent accumulation of flammable gases, vapours, or dusts