Overview of the regulations surrounding the storage and handling of flammable liquids in South Africa

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THE IMPORTANCE OF HEALTH AND SAFETY MANAGEMENT

There are many dangers involved when handling flammable liquids in the workplace and when these dangers are underestimated fatal incidences can occur. Companies are ultimately responsible for the safety of their employees and rescue teams and therefore must take reasonable precautions when flammable liquids are handled and stored.

This information brochure will provide a summary of the current and applicable South African Safety regulations, standards and legislation and how companies can increase safety in their organisations with respect to the safe storage of flammable liquids.

“We strongly believe that only once the risks involved in handling hazardous materials are known, can they be actively avoided”

Meghan Magnussen, Brand Coordinator
1. GENERAL INFORMATION AND INTRODUCTION

Storing flammable liquids incorrectly can have huge and lasting consequences on a company. In an article addressing business interruption from a global perspective, published on the FA News website (www.fanews.co.za) the impact of fires and explosion on business interruptions was discussed.

In 2015 the Global Claims Review report from Allianz Global Corporate & Specialty (AGCS), analysed more than 1 800 large business interruptions (BI) claims from 68 countries and risk managers concluded that the impact of BI can be the top risk that companies can face.

It is reported that approximately one in five businesses can suffer major business interruption each year. While it is not possible to avoid all risks, unfortunate events can hinder and affect an organisation’s operational capacity.

During the years 2010 through to 2014, AGCS found that the majority of BI claims originated from technical or human factors (88% of BI losses) and the top ten causes of these BI losses account for over 90% of such claims by value, with fire and explosion being the top cause of BI accounting for 59% of all BI insurance claims globally. Each fire and explosion incident analysed averaged €1.7 million (R25 million) in BI costs alone and non-natural hazard events account for 88% of BI losses.

Business interruptions that are due to fire and explosions when working with and storing flammable liquids can be reduced by taking the necessary precautionary actions to ensure your organisation and employees are protected from any unforeseen accidents.
2. HOW TO STORE FLAMMABLE MATERIALS ACCORDING TO THE LOCAL REGULATIONS

In South Africa there are regulations in place for bulk storage and storage within the work place.

2.1 Occupational Health and Safety Act

The Occupational Health and Safety Act (OHASA) has various stipulations that regulates hazardous chemical substances in workplaces in South Africa. These regulations compel employers to ensure that their employees, visitors, contractors and neighbours are kept safe from the risks and hazards attached to hazardous substances and serve as guidelines for employers and employees alike with regard to how to achieve a safer workplace.

For the storage and use of flammable liquids, the General Safety Regulations published in 1986, outline the accepted storage of flammable liquids in regulation point 4.

The regulation states that bulk volumes must be stored within a fire resistant room which has been built to meet the following criteria:

a. Built using fire-resisting material with a fire-resistance of two hours
b. Constructed in such a way that, in case of spillage, a volume of the flammable liquid in question equal to the quantity of flammable liquid ordinarily kept in store plus 10 per cent of that quantity, can be contained
   c. Ventilated to the open air in such a manner that vapour cannot accumulate inside the store
d. Clearly marked with a sign indicating that it is such a store and also indicating the amount of flammable liquid which may be stored therein

However flammable liquids that are required for a single day’s work can be stored inside a marked and fire-proof wall cabinet inside the work place:

"only that quantity of flammable liquid needed for work on one day to be taken into or kept in such room, cabinet or enclosure: Provided that partially consumed stock may be stored in a properly marked, fireproof wall cabinet inside the work place"
The specifications of these fire-proof wall cabinets that meet OHSA regulations are:

a. Manufactured from single or double walled stainless steel, which only offers a maximum of 3 minutes of protection in the event of a fire.
b. Cabinet must be clearly marked with labels indicating there are flammables stored inside
c. Shelves must have leak proof sills
d. Inner lining must be removable to clean drips and spills

The OHSA regulation for the storage of flammable liquids in the workplace only offers minimum protection for employees who work with flammable liquids daily. The assumption is that after a day’s work an employee will return the flammable liquid to the central storage room that offers a higher level of protection. Unfortunately bad habits develop resulting in improper storage of flammable liquid inside the work place thereby creating a potentially unsafe working environment.

High incidences of negligence and the lack of strict regulations surrounding fire safety cabinets used to store flammable liquids inside the work place was recognised. The South African Bureau of Standards (SABS) responded accordingly and has subsequently drawn up a standard covering the minimum requirements for safer fire safety cabinets to be used inside the work place:

2.2 SANS 54470-1 Fire Safety Cabinets

The standard advises on the performance requirements for fire safety cabinets that can be used for the storage of flammable liquids inside the workplace.

Fire Resistance and protection:

The Safety storage cabinet needs to have a minimum classification type of 10 but can range up to 90. The classification type specifies the time taken for temperature inside the cabinet to rise by 180°C from a starting temperature of (20 +/- 5) °C. A cabinet’s classification type is an indication of the cabinet’s fire resistance capability. In the case of a fire the cabinet needs to ensure that for at least 10 minutes the contents of the cabinet do not contribute to any additional risks or further spread the fire. Therefore cabinets with a higher classification type offer a higher level of protection in the event of a fire. These safety cabinets are able to offer this level of protection due to the required safety features.
### Safety features of a fire rated safety storage cabinet according to SANS 54470-1:

<table>
<thead>
<tr>
<th>Classification Type</th>
<th>Measured time in minutes for the increase in internal temperature by 180°C from a starting temperature of (20 +/- 5)°C</th>
<th>Fire Resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>≥ 10</td>
<td>10 minutes</td>
</tr>
<tr>
<td>15</td>
<td>≥ 15</td>
<td>15 minutes</td>
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<tr>
<td>30</td>
<td>≥ 30</td>
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<td>60</td>
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<td>60 minutes</td>
</tr>
<tr>
<td>90</td>
<td>≥ 90</td>
<td>90 minutes</td>
</tr>
</tbody>
</table>

**a. Doors:** The doors need to have closed automatically and sealed before the room temperature reaches 65 +/- 20 °C. The self-closing door mechanism needs to be designed to ensure locking devices or door arrest systems don’t hinder the door closing. The doors must be sealed within 20 seconds from when the self-closing device is activated and the doors need to seal according to the type classification. The doors are subjected to a minimum of 100 operational cycles.

**b. Ventilation:** The cabinets need to be equipped with ventilation for inlet and exhaust air at an air exchange rate of at least 10 times the volumetric capacity of the cabinet per hour with an air pressure drop not exceeding 150 Pa. In the event of a fire the ventilation pathways shall close automatically to prevent heat and flames from a fire from entering the cabinet.

**c. Shelves:** The shelves need to maintain the load specified in the product information in the event of fire and they should not hinder the closure of the doors.

**d. Spill containment sumps:** All cabinets must include a sump at the bottom of the cabinet so that any liquids that are accidentally spilled from shelving above are collected in the sump. The sump needs to have a minimum depth of 50mm or a minimum capacity of 10% of the specified storage capacity of the cabinet.
e. **Marking and labelling:** Inscriptions with warning that the doors must be closed at all times when not in use, international hazardous signs, fire resistance capabilities for a specific time period of the cabinet and maximum shelf load and load of cabinet, must be clearly seen on the outside of the cabinet.

To ensure cabinets meet the requirements of the SANS 54470-1 standard each model manufactured must undergo a series of tests at a certified testing facility, where the results are recorded and the fire resistance capability of the cabinet in minutes and resulting classification is confirmed.

**This standard ensures that three major safety requirements for storage of flammable liquids are met:**

1. Minimizing the fire risk associated with storing flammable liquids by protecting the contents of the cabinet in the event of the fire for a known length of time. Managing this risk aims to reduce the impact of the fire by saving peoples’ lives and preventing extensive damage to property.

2. Minimizing the amount of vapour released into the working environment therefore preventing the build-up of explosive atmospheres.

3. Retaining accidental spills within the cabinet which will ensure the flammable liquids inside the cabinets don’t contribute to the spread and size of a fire.

Do not compromise on the quality of fire safety storage cabinets you use in your organisation. Choosing a Fire Safety Cabinet to store flammable liquids is an important decision. While companies may adhere to current fire regulations and purchase safety cabinets for the storage of flammable liquids, attention to the quality of the cabinet and the safety it will provide for their employees and property can often be overlooked. To ensure your organisation doesn’t become a statistic, investigate purchasing fire safety cabinets that will offer you the highest level of protection in accordance with SANS 54470-1.
BE ON THE SAFE SIDE
ALWAYS CONSIDER:

What is the right fire resistance for your facility?

1 **Distance**
   How long does it take for the fire fighters to reach your premises?

2 **Surroundings**
   Where is your company located and who is at risk in your area?

3 **Evacuation times**
   How long does it take for the employees to leave the building?

3 **Economic impact**
   What economic damage will your company suffer if the building is completely destroyed? (Value of your installations, downtimes etc.)
COULD YOU EVACUATE YOUR FACILITY IN 3 MINUTES...
HOW ABOUT 90 MINUTES?

Do you know how your flammable storage cabinet will perform?
Our latest video compares the performance of the three most common types of safety storage cabinets.

WATCH THE VIDEO:
www.youtube.com/asecoschannel
3. VENTILATION

In the General Safety regulation section 4 of the Occupation Health and Safety Act, it stipulates that

“No employer shall require or permit any person to work in a place where the vapour of any flammable liquid is generated to such an extent that it constitutes an actual or potential fire or explosion hazard or endangers the safety of any person”

To reduce the accumulation of flammable vapours, the Act states that every room, cabinet or enclosure where flammable liquids are handled or stored must be fitted with efficient intake and exhaust ventilation systems to remove any vapours, thus preventing its recirculation which may lead to the contamination of other work area that may create a fire or explosion.

When flammable vapours build-up they create explosive atmospheres:

An explosive atmosphere is a mixture of air and one or more dangerous substances in the form of gases, vapours, mists or dusts, under atmospheric conditions, in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

For a Fire resistant room that is designed to safely store flammable liquids the Act only mentions that the room must be “ventilated to the open air in such a manner that vapour cannot accumulate inside the store”. There is no reference to the number of air changes required to ensure low concentrations of vapours.

**However in the SANS 54470-1 fire safety cabinet standard it gives a detailed description on how to ventilate a cabinet in order to control the build-up of explosive atmospheres inside a fire resistant cabinet:**

According to SANS 54470-1 point 6.3 all cabinets need to be equipped with ventilation for inlet and exhaust air. When the door is closed an air exchange rate of at least 10 times the volumetric capacity of the cabinet per hour shall take place with an air pressure drop not exceeding 150Pa. The ventilation must be equipped with flame arrestors or shall close automatically when subjected to a temperature of (70 +/- 10) °C.

**There are three ways to ventilate a cabinet to reduce the build-up of explosive atmospheres inside:**

1. Connecting the cabinet to an existing exhaust system.
2. Use an extraction fan and install extensive ducting.
3. Use a re-circulating air filter accessory.
4. CONSEQUENCES OF MANAGEMENT FAILURE

The incorrect handling and storage of flammable liquids, as outlined by the Occupational and Safety Act, General Safety regulations section can lead to severe consequences for an organization if an employee is injured or killed due to this negligence. These consequences can include expensive compensation payouts, or an organization being held liable for culpable homicide in the event of a death.

4.1 Compensation for Occupational Injuries and Diseases Amendment Act, No 61 of 1997

In South Africa the Compensation for Occupational Injuries and Diseases Act ensures compensation is provided to an employee for disablement caused by occupation injuries or diseases sustained or contracted during the course of their employment, or for death resulting from such injuries or disease.

Section 22 (Right of employee to compensation) of this Act states that if an employee has an accident that results in his disablement or death, the employee or the dependents of the employee will be entitled to compensation. The level of compensation can vary according to the degree of the injury or in the event of death and the liability for compensation payment is outlined in Section 29 of the Act and states the Director, or the employer, or both, will be liable for payment.

4.2 Criminal procedure Act of 51 of 1997 Section 332

The Criminal procedures Act deals with corporate crime in general and Section 332 provides an approach to corporate criminal liability.

According to section 332(1):

A corporation will be held liable for any act or omission that is regarded as a crime, irrespective of whether it is regarded as such by legislation or by common law. The criminal liability of a corporation covers all intentional and negligent acts within the workplace and since intention and negligence are human attributes, a corporation can be held criminally liable for the actions of its directors and employees to the corporation.

Although it has been said that section 332(1) appears as though it refers to intentional acts or omissions, one type of offence that a corporation can be held liable for is culpable homicide which is a crime with negligence as an element that needs to be proven. There have been many cases which have proven that it is possible for a corporation to be convicted for culpable homicide under this section. In these cases the negligence of the employee was attributed to the corporation and the corporation was found guilty of culpable homicide. The decision was made in line with section 332(1) that regards the act and the culpability of the corporation’s directors and employees as the act and culpability of the corporation.
Do you require more information on how to protect your property and your employees? Do you need further information on the South African legislations?

Please do not hesitate to contact us.

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Sources:
EN 14470-1 Standard, SANS 54470-1 Standard, Occupation Health and Safety Act, Compensation for Occupational Injuries and Diseases Amendment Act, Criminal procedure Act, www.fanews.co.za