



FLAMMABLE LIQUID STORES

Flammable liquids are used extensively in industry and commerce and their storage is strictly controlled by local authority and national legislation.

Storage requirements are primarily based on the flammability of the substance, which for the purpose of this bulletin is defined as a substance that has a closed-cup flash point below 55°C. The flash point being the lowest temperature at which the application of a small flame causes the vapour above the liquid to ignite momentarily when it is heated or cooled under prescribed conditions in a closed container.

Classification of Liquids

Flammable liquids are classified according to their flash points and these classifications determine the quantities of liquids that may be kept on any premises without providing a flammable liquid store as described in this document. There is some variance in the requirements of local authorities, particularly with regard to the classifications and it is recommended that these be checked with the local fire brigade to ensure compliance.

SABS 0400 – The Application of the National Building Regulations

The South African Bureau of Standards Code of Practice for the Petroleum Industry Part 1: The Handling, Storage and Distribution of Petroleum Products in bulk depots (SABS 089 Part 1- 1999), classifies flammable liquids as follows:

- Class 1A: Liquids with a closed-cup flash point below 23°C and a boiling point below 35°C
- Class 1B: Liquids with a closed-cup flash point below 23°C and a boiling point above 35°C.
- Class 1C: Liquids with a closed-cup flash point at or above 23°C but below 38°C
- Class 11: Liquids with a closed-cup flash point at or above 38°C but below 60,5°C
- Class 111A: Liquids with a closed-cup flash point at or above 60,5°C but below 93°C
- Class 111B: Liquids with a closed-cup flash point at or above 93°C

Construction of stores

The requirements listed below are general. It is imperative that the local authority fire brigade be consulted to ensure compliance with the regulations.

Positioning

The store should not be positioned where it will impede the escape of persons from any building, or endanger any building. The store may under certain circumstances be constructed of non-combustible material, which is not fire resisting if it has no building nearer to it than 30 m and it is surrounded by a bund (retaining) wall. The purpose of the bund is to ensure that burning flammable liquids are contained to the storage area.

Walls

These should be of brick, or other impervious material having similar stability characteristics. The material used should be capable of withstanding the effects of fire for 240 minutes in the case of a store attached to a building. In the case of free-standing stores and when permitted by the chief fire officer, the fire resistance rating of the walls may be reduced to 120 minutes.

Doors

The door to the store should be at least a Class B rated door and frame assembly as defined by the SABS. Such a door achieves a minimum tested rating of 120 minutes stability, 60 minutes integrity and 60 minutes insulation.

In the case of attached stores, any door communicating with any other part of the building should be a Class D door. These doors achieve a minimum tested rating of 120 minutes for stability, integrity and insulation and been subjected to an impact test.

Doors should open outwards and be kept locked when the store is not in use. When the total floor area exceeds 20 m² two doors, in opposite walls, should be provided. The additional door is intended as an escape door and should be accessible and securely closed with a device that permits easy and quick operation from the inside without the use of a key.

Windows

In the case of stores attached to other buildings, windows are only permitted on external walls. The windows should have metal frames and be non-opening. Glazing should be of wire-woven glass with panes not exceeding 450 mm by 450 mm.

Floor

The floor should be of concrete or a suitable impervious material and should be constructed in such a manner that the liquid kept in the store will be confined in the event of leakage. It could be recessed below the door threshold or incorporate a sill. The well so formed should have sufficient capacity to contain the maximum registered liquid capacity plus 10 % thereof, as a safety factor.

Ventilation

Ventilation should be provided to ensure that vapour accumulation is prevented. Where circumstances permit, natural cross-flow ventilation through terra-cotta air bricks, protected by non-corrodible wire gauze having a mesh not exceeding 600 micrometers, can be provided. The bricks are usually spaced 450 mm apart on all free walls to provide ventilation openings at 0,15 m² per 5 m² of floor area.

Where natural ventilation is not practicable, or when the well is of greater depth than 300 mm, mechanical ventilation through an exhaust fan providing 30 air changes per hour should be provided. The fan extraction point should be at threshold height and should discharge through vertical metal ducting terminating at least 1 m above the roof or at least 3,65 m above ground level. The ducting should be earth bonded to prevent the generation of static electricity.

The wall opposite the exhaust fan(s) should have a row of air bricks installed at threshold height and spaced 225 mm apart.

Ducting external to the store but in communication with other working areas, should be enclosed in 100 mm brick or any other fire resistant coating/plaster with an equivalent rating. Ducts should be as short as possible and not have sharp bends.

The exhaust fan(s) should be operated by means of a courtesy switch fitted to the door to ensure that ventilation is continuous whilst the door is open.

Where decanting takes place within the store it should be ensured that the extraction system remains operable for a time period after the doors have been closed ensuring that the fumes are less than 20% of the lower flammability or explosion limit of that vapour

Lighting

If electric lighting is required, it should be of the flameproof type with wiring enclosed in seamless screwed metal conduit or of armoured cable design.

Switches, junction boxes, fuses and other electrical equipment should be outside the store.

Fire Protection

At least one 9 kg dry powder extinguisher should be provided. The extinguisher should be mounted on a bracket outside the store.

Notices

Suitable signage in accordance with SABS 1186 indicating “No Smoking” and “No Open Flames” need to be provided. A sign should also be affixed outside the store indicating the use thereof ‘Flammable Liquid Store’.

General

- In local authority controlled areas, stores may be required to be registered with that authority. The registration certificate will normally state the class of liquid and maximum quantity of flammable liquid permitted to be kept therein.
- Plans of the store are usually required to be submitted and these should include a site plan, ground plan, wall elevation showing ventilation provisions and a section through the store showing the roof and floor well details.
- Combustible shelving, packaging or any other combustible material other than flammable liquids, are not permitted with the store.
- The store should not be used for any other purpose than for the storage of flammable liquids.
- People should not be permitted to work in the store unless the doors are fully open and kept unobstructed. It is also strongly recommended that the ventilation system remain operable at all times that the persons are working or decanting in the store.
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References:

Various municipal regulations relating to the storage, use and handling of flammable liquids and substances.

Occupational Health & Safety Act (Act85 -1993): General Safety Regulations: Section 4 – The Use and Storage of Flammable Liquids.

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