
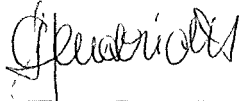

	STANDARD	Allocation Centre 38A	Reference Number KSA-025	Rev 5
NNR. NO No	STANDARD FOR THE PREVENTION OF FIRES FROM FLAMMABLE AND COMBUSTIBLE SUBSTANCES			PAGE 1
KORC NO	ACCESS Nuclear Restricted	IMPORTANCE CATEGORY SR	NEXT REVIEW DATE <i>2025-06-17</i>	DATE AUTHORISED <i>2022-06-17</i>

COMPILED / REVISED	REVIEWED	AUTHORISED
		
A VAN ROOYEN	L HENDRICKS	N MTWEBANA
CHIEF FIRE OFFICER	ASSITANT OFFICER FRM	GENERAL MANAGER - KNPS (ACTING)
DATE <i>2022/06/14</i>	DATE <i>2022-06-14</i>	DATE <i>2022-06-17</i>

THIS STANDARD HAS BEEN SEEN AND ACCEPTED BY:

A van Rooyen	Document Custodian
JL Booysen	Materials Management Manager
M Vuba	Operating Manager
S Fisa	Maintenance Execution Manager
S Xaso	Security Manager
A Lewis	ALARA
L Lukwe	Nuclear Services Manager (Acting)

FCA PROTECTION	ALARA REVIEW YES <i>2022-04-15</i>	SUPERSEDES KSA-025, Rev 4 dd 2018-10-19 FULL REVIEW
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1.0 PURPOSE

- 1.1 To describe the requirements for the storage, transport, labelling, issue, handling and use of flammable and combustible liquids at the Koeberg Operating Unit.
- 1.2 To ensure compliance with National, Provincial and Local government laws and by-laws.

2.0 SCOPE

- 2.1 Applicable to all flammable and combustible liquids stored and transported in portable or mobile containers and tanks.
- 2.2 Applicable to the warehousing, storage, using, transporting and dispensing of flammable and combustible substances.

3.0 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

- 3.1.1 **Approved Safety Can** – A container specifically designed and constructed for the transportation, storage and dispensing of flammable or combustible liquids.
- 3.1.2 **Boiling Point** – The temperature reached in a liquid when its vapour pressure equals the atmospheric pressure and the liquid begins to boil.
- 3.1.3 **Bund wall** – A containment wall surrounding an above ground storage tank, constructed of an impervious material and designed to contain 110% of the contents of the tank.
- 3.1.4 **Chief Fire Officer** – The person in charge of the Fire Service as contemplated in the Fire Brigade Services Act,
- 3.1.5 **Combustible Liquid** – For the purpose of this standard, any liquid having a flash point at or above 55°C (see Table 1 and Appendix 1 for examples).
- 3.1.6 **Condition Report** – An electronic reporting system for recording events, reports, conditions and out of normal situations.
- 3.1.7 **Controlling Authority** – The chief fire officer or his respective delegate/s as contemplated in section 19 of the Fire Brigade Services Act and in section 5 of this Standard.
- 3.1.8 **Drum** – Unless otherwise stated, a drum will mean a single container of not more than 220 litres capacity.

- 3.1.9 **Flammable Liquid** – For the purpose of this standard, any liquid having a flash point below 55°C, including Classes I and II, as indicated in Table 1 below (see Appendix 1 for examples).

Table 1

Hazard classification for flammable liquids			
Class	Flash Point	Boiling Point	Examples
I-A	below 23°C	below 38°C	diethyl ether, pentane, ligroin, petroleum ether
I-B	below 23°C	at or above 38°C	
I-C	24-38°C	----	
Hazard classification for combustible liquids			
Class	Flash Point	Boiling Point	Examples
II	39-60°C	----	diesel fuel, motor oil, kerosene, cleaning solvents
III-A	61-93°C	----	paints (oil base), linseed oil, mineral oil, lubricating oil
III-B	93°C or above	----	paints (oil base), neatfoot oil, hydraulic oil, transformer oil

NOTE: For the purposes of this Standard, the term “Flammable” or “Flammable Liquid” shall also mean, “Combustible” or “Combustible Liquid” and shall include a flammable or combustible substance, unless otherwise stated.

- 3.1.10 **Flammable Store** – A store that is used for the storage of flammable liquids and complies with the criteria set out in Attachment 3 of this Standard.
- 3.1.11 **Flash Point** – The lowest temperature at which a spark or flame causes an instantaneous flash in the vapour space above the liquid.
- 3.1.12 **Metal Safety Cabinet** – A cabinet with suitably arranged shelves. Each shelf will be fitted with a metal tray capable of holding the liquid contents of that shelf plus 10%. The cabinet will have upper and lower ventilation ports that will have flame arrester gauze over them. (See Appendix 2 for a more detailed description.)

- 3.1.13 **Non-combustible** – a substance or material classified as non-combustible when tested in accordance with SANS 10177; Part 5.
- 3.1.14 **Occupancy** – The particular use or type of use to which a building or portion thereof, is normally put or intended to be put as provided in the National Building Regulation.
- 3.1.15 **Safety Related Area** – An area containing safety related cables or equipment which is important for the safe shutdown of the plant.
- 3.1.16 **Owner** – means:
- (a) in relation to premises, workshop, plant area or building, a person who has been appointed at the area owner or who is the line or senior manager responsible for that premises, workshop plant area or building;
 - (b) in relation to a building, either a natural or juristic person in whose name the land on which such building was or such land, as the case may be, is registered in the deeds office in question;
 - (c) in relation to an installation, either a natural or juristic person in whose name a contract is entered into regarding approval, erection, operation and maintenance of the installation; provided that such a person is not the owner in (b), and
 - (d) any person, appointed in writing, to be the owner of the premises, plant area or building or who, by virtue of their position or appointment, is the supervisor or manager in charge.
- 3.1.17 **Person in charge** – means:
- (a) in relation to premises, either a natural or juristic person who is permanently or temporarily responsible for the management, maintenance or utilisation of the premises;
 - (b) in relation to a building, either a natural or juristic person who is permanently or temporarily responsible for the management, maintenance or utilisation of the building;
 - (c) in relation to an installation, either a natural or juristic person who is permanently or temporarily responsible for the management, maintenance or utilisation of the installation; provided that such a person is not the same person mentioned in (a), and
 - (d) in the event of Fire Risk Management being unable to determine the identity of a person mentioned in (a), (b) and (c), any person who is in the opinion of Fire Risk Management deemed to be in charge of such premises, building or installation.

- 3.1.18 **Premises** – Any building, area, beach, land, terrain, road, vehicle and can include a vessel, train or aircraft.
- 3.1.19 **SANS Code** – South African National Standards Codes of Practice and Specifications issued in terms of the Standards Act.
- 3.1.20 **Site** – Any erf, lot, plot, stand, public excluded or owner controlled area or other piece of land on which a building or number of building has been, is being erected.
- 3.1.21 **Tank** – A container mounted permanently or temporarily on or embodied in a vehicle or trailer and so constructed to be suitable for the containment of flammable liquid or gas cargo.
- 3.1.22 **Underground Tank** – A tank used or intended to be used for the storage of flammable liquids wholly sunk into and below the surface of the ground.
- 3.1.23 **Vehicle** – A vehicle as defined in the National Road Traffic Act and includes the following:
- (a) road tank vehicle - a tank truck, tank trailer, or truck-tractor and tank-semi-trailer combination;
 - (b) tank-semi-trailer - a vehicle with a tank mounted on it or built as an integral part of it, and so constructed that, the semi-trailer is drawn by a truck-tractor or another trailer, through a fifth wheel connection part of the load rest on the towing vehicle;
 - (c) tank trailer - means a vehicle with a tank mounted on it or built as an integral part of it, and so constructed that, when the tank trailer is drawn by a tank truck, practically all of its load rests on its own wheels;
 - (d) tank truck- means a single, self-propelled vehicle with a tank mounted on it;
 - (e) truck-tractor - means a self-propelled vehicle used to pull a tank-semi-trailer, and
 - (f) any other vehicle, which in the opinion of Fire Risk Management, is a vehicle contemplated in (a) – (e).
- 3.1.24 **Storage vessel** – A pressure vessel as defined in the regulations for pressure vessels promulgated in terms of the Occupational Health and Safety Act.
- 3.1.25 **Transient Combustible Permit** – A permit issued by Fire Risk Management for the storage, movement and use of a flammable or combustible material or substance which may be in the form of a solid, liquid or gas (see KSA-024, Appendix 1).

3.2 Abbreviations

- 3.2.1 **C** – Celsius
- 3.2.2 **CR** – Condition Report
- 3.2.3 **FPASA** – Fire Protection Association of South Africa
- 3.2.4 **FRM** – Fire Risk Management
- 3.2.5 **L** – Litres
- 3.2.6 **Max. No.** – Maximum Number
- 3.2.7 **NBR** – National Building Regulations
- 3.2.8 **SANS** – South African National Standards
- 3.2.9 **SRA** – Safety Related Area

4.0 REFERENCES

4.1 Referenced Documents

- 4.1.1 32-108, Rev 1: Firefighting Organisation
- 4.1.2 32-124, Rev 1: Eskom Fire Risk Management
- 4.1.3 335-2, Rev 5: Koeberg Nuclear Power Station Management Manual
- 4.1.4 Act 6 of 1983 Occupational Health and Safety Act (General Safety Regulations; 1986)
- 4.1.5 Act 99 of 1987: Fire Brigade Services Act
- 4.1.6 Act 103 of 1977: National Building Regulations and Building Standards Act
- 4.1.7 FPASA GF11: Fire Protection Association of South Africa Bulletin
- 4.1.8 KAA-500, Rev 13: The Process for Controlled Documents
- 4.1.9 KAA-582; Rev 9 Organisational Responsibility for Fire Prevention and Protection
- 4.1.10 KSA-011, Rev 14: The Requirements for Controlled Documents
- 4.1.11 KSA-097, Rev 4: Fire Prevention Standard for Stores and Storage Practices
- 4.1.12 SANS-0232: Emergency Information System for Road Transport

- 4.1.13 SANS-1089: Electrical Code of Practice for the Petroleum Industry
- 4.1.14 SANS-1186: Standard Signs and General Requirements
- 4.1.15 SANS-1253: Fire-doors and Fire-shutters
- 4.1.16 SANS-10108: The Classification of Hazardous Locations and the Selection of Equipment for use in such Locations
- 4.1.17 SANS-10131: Above-ground Storage Tanks for Petroleum Products
- 4.1.18 SANS-10400: Application of the National Building Regulations
- 4.1.19 SANS-10089: Storage and Distribution of Petroleum Products in above-ground Bulk Installations
- 4.1.20 SANS-54470: Safety Storage Cabinets for Flammable Liquids

4.2 Applicable Documents

- 4.2.1 Act 6 of 1983 Occupational Health and Safety Act (General Safety Regulations; 1986)
- 4.2.2 By-Law 11257: Relating to Community Fire Safety (Provincial Gazette 5832)
- 4.2.3 KAA-661: Fire Risk Management
- 4.2.4 KSA-024: Control of Transient Combustibles

5.0 REQUIREMENTS

5.1 Administration and Enforcement

- 5.1.1 The chief fire officer is responsible for the administration and enforcement of this Standard.
- 5.1.2 Where no chief fire officer has been appointed in terms of the Fire Brigade Services Act, the plant manager is responsible for the administration and enforcement of this Standard.
- 5.1.3 The owner or person in charge shall be responsible for compliance with this standard.

5.2 Delegation

- 5.2.1 The chief fire officer may delegate any power granted to him in terms of this Standard and in accordance with section 19 of the Fire Brigade Services Act.
- 5.2.2 The plant manager may delegate any power granted to him in terms of this Standard.

5.3 Enforcement Provisions

- 5.3.1 The controlling authority may, whenever he regards it necessary or expedient to do so, enter any premises at any reasonable time to ensure compliance with this Standard.
- 5.3.2 The controlling authority has the authority to summarily abate any condition which is in violation of any provision of this Standard and which presents an immediate fire hazard or other threatening danger.
- 5.3.3 The controlling authority must remedy any violation mentioned in subsection (5.3.2), by performing any act, and may also:
- (a) call for the immediate evacuation of the premises;
 - (b) order the closure of the premises until such time as the violation has been rectified;
 - (c) order the cessation of any activity, and
 - (d) order the removal of the immediate threat.

5.4 Authority to Investigate

- 5.4.1 Notwithstanding anything to the contrary contained in any other standard, the controlling authority has the authority to investigate the cause, origin and circumstances of any fire or other threatening danger.

5.5 Failure to Comply with Provisions

- 5.5.1 When the controlling authority finds that there is non-compliance with the provisions of this Standard, a written notice must be issued and a Condition Report (CR) generated which shall include the following:
- (a) confirmation of the findings;
 - (b) provisions of this Standard that are being contravened;
 - (c) the remedial action required, and
 - (d) set forth a time for compliance.

5.5.2 An order or notice issued under this Standard must be given to the owner or person in charge (see 3.1.16 and 3.1.17).

5.6 Denial, Suspension or Revocation of an Approval or a Transient Combustible Permit

5.6.1 The controlling authority may refuse, suspend or revoke an approval, certificate or a permit as required by this Standard for:

- (a) failure to meet the provisions of this Standard for the issuance of the approval, certificate or permit, or
- (b) non-compliance with the provisions of the approval, certificate or permit.

5.7 Storage and Use of a Flammable Substance

5.7.1 Prior to the construction of a new installation or the alteration of an existing installation, whether temporary or permanent, for the storage of a flammable substance, the owner or person in charge of the installation must submit a building plan to Fire Risk Management, in accordance with the National Building Regulations, and a copy of the approved plan must be available at the site where the installation is being constructed.

5.7.2 Prior to the commissioning of an aboveground or underground storage tank installation, liquid petroleum gas installation or associated pipework, the owner or person in charge of the installation must ensure that it is pressure-tested in accordance with the provisions of the National Building Regulations (T1), SANS-10131: Parts 1 and 2, SANS-10089: Part 3 and SANS-10087: Parts 1, 3 and 7 (whichever is applicable) in the presence of the controlling authority.

5.7.3 Notwithstanding subsection (5.7.2), the controlling authority may require an existing above ground or underground storage tank installation, liquid petroleum gas installation or associated pipework, to be pressure-tested in accordance with the provisions of the National Building Regulations (T1).

5.7.4 The controlling authority must be notified at least 48 hours prior to the pressure test.

5.7.5 Prior to the alteration of the premises that impacts on the fire safety of an existing above ground or underground storage tank installation, liquid petroleum gas installation or associated pipework, the owner or person in charge of the premises or modification shall notify Fire Risk Management, who may call for the premises or installation to be rendered safe.

5.7.6 The owner or person in charge of the premises may not store or use:

- (i) a flammable gas in excess of 19 kilograms, or
- (ii) a flammable liquid of a danger group (i), (ii), (iii) or (iv) in excess of 220 litres, unless it is an approved storage facility that has met all the SANS requirements for the storage of the flammable substance and he has obtained a Transient Combustible Permit from the controlling authority.
- (iii) a flammable gas of less than 19 kilograms or a flammable liquid of a danger group (i), (ii), (iii) or (iv) of less than 220 litres, unless he has been given approval by the controlling authority and a Transient Combustible Permit has been issued.

NOTE: *Where a flammable liquid of any danger group of a capacity less than that described in 5.7.6 (i) or (ii) is not being stored in a properly constructed and designated flammable store (see Appendix 3), the substance shall be stored in a Fire Safety Cabinet which complies with SANS-54470-1.*

5.8 Transient Combustible Permit

- 5.8.1 The owner or person in charge of the premises, who requires a transient combustible permit mentioned in section 5.7.6, must submit a request to Fire Risk Management.
- 5.8.2 Fire Risk Management will request additional information from the applicant as is necessary.
- 5.8.3 The controlling authority must refuse to issue the transient combustible permit if the premises do not comply with the requirements of the National Building Regulations (T1) as well as additional requirements set out in this Standard, and where the controlling authority is of the opinion that the non-compliance of the premises can be remedied or mitigated, he must instruct the owner or person in charge of the premises to take all reasonable steps to render the premises safe prior to usage of the premises in accordance with section 5.7.6 and the issuing of the permit.
- 5.8.4 A transient combustible permit must be renewed annually, on or before the date as indicated on the transient combustible permit, and whenever the quantity or class of the flammable substance requires to be changed or when section 5.7.5 applies.
- 5.8.5 If at any time Fire Risk Management becomes aware that the usage of the premises is not in accordance with the transient combustible permit, they must act in terms of sections 5.3.2 or 5.5 and section 5.6 of this Standard.

- 5.8.6 Notwithstanding subsection (5.8.5), when in the opinion of the controlling authority, a flammable substance is stored or utilised for any process in a manner which is hazardous to life or property, or an installation is unauthorised, an order may be issued for the removal of the flammable substance or installation from the premises.
- 5.8.7 A supplier may not supply flammable substances to the owner or person in charge of the premises unless the owner or person in charge of the premises is in possession of a transient combustible permit or certificate issued by the controlling authority.
- 5.8.8 A transient combustible permit is valid only:
- (a) for the installation or storage facility for which it was issued;
 - (b) for the state of the premises at the time of issue;
 - (c) for the quantities stated on the permit, and
 - (d) for the type of substance for which the permit was issued.
- 5.8.9 The transient combustible permit must be available on the premises for inspection at all times.
- 5.8.10 The controlling authority must keep records of all premises in respect of which a transient combustible permit has been issued, amended and renewed.
- 5.9 Permanent or Temporary above Ground Storage Tank for a Flammable Liquid**
- 5.9.1 Applicable to a permanent or temporary above ground tank used for the storage of flammable liquids.
- 5.9.2 A temporary above ground storage tank other than that at a bulk storage depot is permitted, at the discretion of the controlling authority, on the merit of the situation, provided that the following requirements are complied with:
- (a) if it has a capacity not exceeding 9000 litres and is not used for the storage of flammable substances with a flash point below 40°C;
 - (b) to be on the premises for a period not exceeding six months;
 - (c) the entire installation must comply with SANS-10131: Part 1 or SANS-10131: Part 2 whichever is applicable, and
 - (d) written application together with a plan must be forwarded to Fire Risk Management at least 14 days prior to the erection of the tank and written permission has been obtained from Fire Risk Management for the erection of the tank.

- 5.9.3 Notwithstanding section 5.7.1, if a larger capacity above ground storage tank is required or the tank is to be a permanent installation, an acceptable rational design based on a relevant national or international code or standard must be submitted to Fire Risk Management for approval in terms of the National Building Regulations (T1).
- 5.9.4 The design requirements and construction of a permanent tank must be in accordance with relevant national or international recognised codes.
- 5.9.5 The rated capacity of a permanent or temporary tank must provide sufficient ullage to permit expansion of the product contained therein by reason of the rise in temperature during storage.
- 5.9.6 A permanent or temporary tank must be erected at least 5 metres from boundaries, buildings and other flammable substances or combustible materials.
- 5.9.7 A permanent or temporary tank must be located on firm, level ground and the ground must be of adequate strength to support the mass of the tank and contents.
- 5.9.8 A permanent or temporary tank must have a bund wall.
- 5.9.9 Adequate precautions must be taken to prevent spillage during the filling of a tank.
- 5.9.10 Sufficient fire extinguishers, as determined by the controlling authority, must be provided in weatherproof boxes in close proximity to a tank.
- 5.9.11 Symbolic safety signs depicting “**No Smoking**”, “**No Naked Lights**” and “**Danger**” must be provided adjacent to a tank, and the signs must comply with SANS-1186: Part 1.
- 5.9.12 The flammable liquid in the tank must be clearly identified, using the Hazchem placards listed in SANS-0232: Part 1.
- 5.9.13 An electrical or an internal combustion-driven pump must be equipped and so positioned as to eliminate the danger of the flammable liquid being ignited.
- 5.9.14 The electrical installation associated with the above ground storage tank must comply with SANS-10108 and SANS-1089: Part 2.
- 5.10 Underground Storage Tank for a Flammable Liquid**
- 5.10.1 The installation of underground storage tanks, pumps, dispensers and pipework at transport depots and dispensing installations must be in accordance with National Building Regulations (T1) read in conjunction with SANS-10400, SANS-10089: Part 3 and SANS-10131: Part 3

5.11 Bulk Storage Depot for Flammable Substances

- 5.11.1 The handling, storage and distribution of flammable substances at bulk depots must be in accordance with the National Building Regulations (T1), read in conjunction with SANS-10089: Part 1.

5.12 Small Installations for Liquefied Petroleum Gas

- 5.12.1 Liquefied petroleum gas installations involving gas storage containers of individual water capacity not exceeding 500 litres and a combined water capacity not exceeding 3 000 litres per installation must be installed and handled in accordance with SANS-10087: Part 1.

5.13 Liquid Petroleum Gas Installation in Mobile Units and Small Non-permanent Buildings

- 5.13.1 A liquid petroleum gas installation in mobile units and small non-permanent buildings shall be in accordance with SANS-10087: Part 2.

5.14 The Fuelling of Forklift Trucks and other LP Gas Operated Vehicles

- 5.14.1 The fuelling of forklift trucks and other LP gas operated vehicles shall be in accordance with SANS-10087: Part 8

5.15 The Storage and Filling or Refillable Liquid Petroleum Gas Containers

- 5.15.1 Storage and filling sites used for refillable liquid petroleum gas containers of capacity not exceeding 9kg must be in accordance with SANS-10087: Part 7.

5.16 Bulk Storage Vessel for Liquid Petroleum Gas

- 5.16.1 The layout, design and operation of installations for the storage of a bulk liquid petroleum vessel and allied facilities must be in accordance with the National Building Regulations (T1), read in conjunction with SANS-10087: Part 3.

5.17 Termination of the Storage and Use of Flammable Substances

- 5.17.1 If an above ground or underground tank installation, liquid petroleum gas installation or associated pipework is no longer required for the storage or use of a flammable substance, the owner or person in charge of the premises on which the installation was erected must, in accordance with Provincial By-law: 11257:
- (a) within seven days of the cessation, inform Fire Risk Management;
 - (b) within 30 days of the cessation, remove the flammable substance from the installation and render it safe;
 - (c) within six months of the cessation, remove the installation including any associated pipework, from the premises entirely, unless the controlling authority otherwise instructs, and

- (d) restore a public footpath or roadway, which has been disturbed by the removal to the satisfaction of the controlling authority within a period of seven days of the completion of the removal of the installation.

5.17.2 If the removal of an underground tank installation detrimentally affects the stability of the premises, the owner or person in charge of the installation must apply in writing to the controlling authority to fill the tank with liquid cement slurry.

5.18 Reporting Accidents

5.18.1 If an accident occurs which involves a flammable substance and results in a fire, an explosion, spillage or loss of a flammable substance, as well as personal injury or death, the owner or person in charge of the premises must immediately notify Fire Risk Management.

5.19 Flammable Stores

5.19.1 The construction of a flammable store shall be in accordance with the National Building Regulations (T1) read in conjunction with SANS-10400.

5.19.2 The floor shall be of concrete construction or other impermeable material and must be recessed below the door level or incorporate a sill.

5.19.3 The recess or sill must be of such a depth or height that in the case of spillage it will be capable of containing the quantity of flammable liquid, as indicated on the transient combustible permit and an additional 10% of the quantity mentioned on the permit.

5.19.4 Notwithstanding the National Building Regulations (T1) read in conjunction with SANS-10400:

- (a) the roof assembly of a flammable store shall be constructed of a concrete slab capable of providing a two-hour fire resistance when it forms part of another building;
- (b) the ventilation of a flammable store must be achieved by the use of air bricks located in the external walls at the ratio of one air brick nominally above the sill level and one air brick located in the top third of the wall per 5 m² of wall area or part thereof, so that vapour cannot accumulate inside the store;
- (c) the air bricks must be covered both internally and externally with closely-woven, non-corrodible wire gauze of at least 1 100 meshes per metre, and
- (d) the wire gauze must be held in position by metal straps, a metal frame or cement.

- 5.19.5 When required by the controlling authority, the flammable store must be ventilated by a mechanical ventilation system approved by Fire Risk Management and must comply with the following requirements:
- (a) the ventilation system is to be intrinsically safe, provide 30 air changes per hour and must operate continuously;
 - (b) the fan extraction point must be nominally above sill level and must discharge through a vertical metal duct terminating at least 1 metre above roof height or at least 3,6 metres above ground level, whichever is the greater;
 - (c) ducting material that is external to the store, but communicates with the remainder of the building, must be fitted with a fire damper of two-hour fire resistance at the point of exit from a flammable store, and
 - (d) the ducting must be as short as possible and must not have sharp bends.
- 5.19.6 Notwithstanding the National Building Regulations (T1) read in conjunction with SANS-10400, a flammable store door must be constructed of material with a fire resistance of two hours, provided that all relevant safety distances are complied with, and the door must open outwards.
- 5.19.7 When required by the controlling authority, a flammable store door shall be a D-class fire door, which complies with SANS-1253.
- 5.19.8 Notwithstanding the National Building Regulations (T1) read in conjunction with SANS-10400, artificial lighting in the flammable store must be by electric light having vapour-proof fittings wired through seamless steel conduit and the switches operating the lights must be located outside the store.
- 5.19.9 No other electrical apparatus will be installed in the flammable store.
- 5.19.10 A flammable store must be provided with a foam inlet consisting of a 65 millimetre male instantaneous coupling and mild steel pipework leading to the inside thereof and the foam inlet must be identified by means of a sign displaying the words “**Foam Inlet**” in 100 millimetre block letters.
- 5.19.11 Racking or shelving erected in the flammable store shall be of non-combustible material.
- 5.19.12 The flammable store must be identified by the words, “**Flammable Store**”, and the permissible quantity allowed within the flammable store, indicated in 100 millimetre block letters on both the inside and outside of all doors communicating directly with the store.
- 5.19.13 The owner or person in charge of a flammable store must ensure that the flammable store doors are kept locked when the store is not in use.

- 5.19.14 A person shall not enter a flammable store or cause or permit it to be entered without the permission of the owner or person in charge of the premises.
- 5.19.15 Sufficient fire extinguishers, as determined by the controlling authority, must be mounted on the external wall of the flammable store in a conspicuous and easily accessible position.
- 5.19.16 Any hand tool used in the flammable store must be intrinsically safe.
- 5.19.17 A person will not use or permit a flammable store to be used for any purpose other than that indicated on the transient combustible permit, unless the store is not in use as a flammable store and the controlling authority has been notified in terms of the following procedure:
- (a) within seven days of the cessation, notify the controlling authority in writing thereof;
 - (b) within 30 days of the cessation, remove the flammable substance from the flammable store and render it safe, and
 - (c) within 30 days of the cessation, remove all signage.
- 5.19.18 Subject to the provisions in this section, the controlling authority may call for additional requirements to improve the fire safety of a flammable store.

5.20 Container Handling and Storage

- 5.20.1 All flammable substance containers must be kept closed when not in use.
- 5.20.2 A person may not extract flammable liquids from a container of a capacity exceeding 20 litres unless the container is fitted with an adequately sealed pump or tap.
- 5.20.3 Flammable liquid containers must be labelled and marked with words and decals, which indicate the flammable liquids contained therein as well as the hazard of the liquids.
- 5.20.4 Flammable substance containers must be declared gas or vapour-free by a competent person before any modification or repairs are undertaken.
- 5.20.5 All flammable substance containers must be manufactured and maintained in such a condition as to be reasonably safe from damage and to prevent leakage of flammable substances or vapours therefrom.
- 5.20.6 An empty flammable liquid container shall be placed in a flammable store.

- 5.20.7 Where a flammable store is not available for the storage of empty flammable liquid containers, the controlling authority may permit such storage in the open; provided that:
- (a) the storage area must be in a position and of sufficient size which in the opinion of the controlling authority will not cause a fire hazard or other threatening danger;
 - (b) the storage area is well ventilated and enclosed by a wire mesh fence and:
 - (i) the fence supports are of steel or reinforced concrete;
 - (ii) has an outward opening gate that is kept locked when not in use, and
 - (iii) when the floor area exceeds 10 m² an additional escape gate is installed, fitted with a sliding bolt or other similar locking device that can be opened from the inside without the use of a key;
 - (c) the storage area is free of vegetation and has a non-combustible firm level base;
 - (d) a two metre distance around the perimeter of the fenced area is clear of grass, weeds and similar combustible materials;
 - (e) when the storage area has a roof, the construction of the roof and supporting structure must be of non-combustible material;
 - (f) open flames, welding, cutting operations and smoking is prohibited in or near the storage area and signage is prominently displayed on the fence and complies with SANS-1186: Part 1, and
 - (g) fire-fighting equipment is installed as determined by the controlling authority.

- 5.20.8 An empty flammable liquid container must be securely closed with a bung or other suitable stopper.

5.21 Spray Rooms and Booths

- 5.21.1 A spray room, booth or area designated for the application of a flammable liquid shall be constructed and equipped in such a manner as to comply with the General Safety Regulations promulgated in terms of the Occupational Health and Safety Act.

5.22 Liquid Petroleum Gas Containers

- 5.22.1 A liquid petroleum gas container must be manufactured, maintained and tested in accordance with SANS-10087: Part 1 and SANS-10019.

5.22.2 A liquid petroleum gas container shall be used and stored in such a manner as to prevent damage or leakage of liquid or vapour therefrom.

5.22.3 A Liquid Petroleum Gas Container of a Capacity not Exceeding Nine (9) Kilogram must be Filled and Stored in Accordance with SANS-10087: Part 7

5.23 Containers Stored Outdoors

5.23.1 Stored drums (up to 220 litres) of flammable liquids must be at least 25 metres away from all plant buildings. The maximum number of drums per lot is as follows:

Table 2

CLASSIFICATION	I-A	I-B	II	III
Max. No. of drums (Group)	15	50	100	500

5.23.2 Groups of stored drums of flammable liquids shall be separated by at least 15 metres.

5.23.3 Storage of drums shall be limited to one drum in height.

5.23.4 Where two or more classes of flammable liquids are stored in a single group, the maximum number of drums in the group shall be the smallest of the requirements for the individual Class.

5.23.5 Stored Class 0 liquids must be sheltered from direct sunlight.

5.23.6 Drum storage areas for flammable liquids must be sloped sufficiently to divert possible spillage away from buildings and other exposures, (i.e. plant or machinery) or, the storage area must be bounded by a curb capable of containing the contents of the stored liquid area plus 10%.

5.23.7 Drum storage areas shall be provided with appropriate drains as necessary, to relieve rainwater accumulating within the curbed area. Drains must terminate at a safe location and be accessible to operation under fire conditions.

5.23.8 The storage area shall be kept clear of grass, weeds and other foreign combustible matter for at least 8 metres around.

5.23.9 Smoking and the use of naked flames is not allowed within 15 metres of any storage area. The area shall be sign posted to make this fact known.

- 5.23.10 The person responsible for the storage area must keep a register of all hazardous, flammable and combustible liquids in the storage area. The register shall be made available on request to Fire Risk Management. The category of hazardous flammable and combustible liquids must be indicated on the register (see Appendix 1).
- 5.23.11 The owner or person in charge shall ensure that the Material Safety Data Sheets (MSDS) pertaining to each type of flammable substance stored in the storage area is maintained and posted in the vicinity and shall point this out to the controlling authority on request.

5.24 Handling of Flammable Liquids Outdoors

- 5.24.1 Dispensing of flammable liquids or transfer between containers must be done at a designated point at least 8 metres from the drum storage area. The dispensing area must be at least 5 metres from the nearest building and the number of drums allowed in the dispensing area is limited to two (2).
- 5.24.2 When transferring liquids having a flash point below 55°C, the two containers must be earthed and electrically bonded to one another to reduce the possibility of static spark generation.

5.25 Container Stored Indoors

- 5.25.1 Under no circumstances shall flammable or combustible liquids be stored within Safety Related Areas.

NOTE: *Storage of flammable and combustible liquids may be permitted in safety related areas only during unit outages when the unit is in a Maintenance Cold Shutdown state.*

- 5.25.2 Drum storage of liquids having a flash point below 55°C may be allowed within buildings (other than safety related areas) only when located within specifically designated flammable liquids storage rooms built in accordance with regulations governing "flammable liquid stores".
- 5.25.3 Drum storage of liquids having a flash point over 55°C will be allowed in the oil storage rooms of warehouses or in flammable liquid stores as described in section 5.19, is an a process area that has been designed for that purpose, provided that the quantity of stored drums does not exceed that indicated on the transient combustible permit.
- 5.25.4 Only the original metal containers or approved safety cans specifically approved for use in handling flammable liquids may be used for storage purposes.
- 5.25.5 No plastic or other "non-safety" containers must be used for the storage of flammable liquids within any building.

- 5.25.6 Flammable liquids of more than 100 litres (of which no more than 25 litres may be Class 0 liquids) aggregate capacity that are not stored within a flammable liquid store shall be stored within an approved metal safety cabinet as contained in SANS-54470 (see Appendix 2).
- 5.25.7 Not more than two (2) such cabinets will be located in any single area as approved by Fire Risk Management. Each cabinet must be painted yellow and must be clearly labelled with white lettering of not less than 100 mm in height with the wording “**FLAMMABLE LIQUIDS – NO SMOKING – NO NAKED FLAMES – MAX. 100L**” with an assigned unique number 33 mm in height in the top right-hand corner of the door (see Appendix 2).
- 5.25.8 Flammable liquid storage cabinets shall not be used for storage of any material other than flammable liquids.
- 5.25.9 Location of metal safety cabinets shall only be approved in writing by Fire Risk Management.
- 5.25.10 The owner or person in charge (see 3.1.16 and 3.1.17) is responsible for the storage of hazardous, flammable or combustible liquids and shall keep a register of all such liquids, their location and quantities, and shall make this register available on request to Fire Risk Management.
- 5.25.11 The owner or person in charge shall ensure that the Material Safety Data Sheets (MSDS) pertaining to each type of flammable substance stored in the cabinet is maintained and posted in the vicinity and shall point this out to the controlling authority on request.

5.26 Dispensing, Handling and Use of Flammable Liquids

- 5.26.1 No flammable liquids will be transported, dispensed or used within any plant area which, in the opinion of Fire Risk Management, is deemed to be a high risk area without the issue of a transient combustible permit as referenced in KSA-024 and the appropriate mitigation is in place.
- 5.26.2 The transient combustible permit must be posted in the area where the flammable liquid will be used or temporarily or permanently stored.
- 5.26.3 Flammable liquids shall not be dispensed into other containers unless appropriate bondings and earthing is provided during filling operations (by means of an earth cable to prevent static electricity as an ignition source).
- 5.26.4 During dispensing operations, means must be provided to control any spillage.
- 5.26.5 Under no circumstances must flammable liquids be left unattended in safety related areas.

- 5.26.6 Where replenishment activities require handling of combustible liquids within safety related areas, the combustible liquid must be transported only in its original container or in an approved closed metal container. The container must be labelled to indicate its contents.
- 5.26.7 The amount of combustible liquid transported must be the minimum amount of liquid required for one shift's work (8 hours), or 220 litres (1 drum in the case of Class II liquids).
- 5.26.8 Notwithstanding the requirements contained in 5.26.7, Fire Risk Management shall determine the quantity of flammable liquid permitted to be transported, the current plant state and the mitigation that has been put in place and may increase or decrease the limit accordingly on the transient combustible permit.

5.27 Radiological Control

- 5.27.1 No drums or other containers containing flammable or combustible material will be removed from any radiologically controlled area without the container and its contents having been checked for residual radiation contamination. The Radiation Protection Department shall be consulted in this regard.
- 5.27.2 No flammable or combustible liquid shall be transported, handled, used or dispensed within any radiologically controlled area without a valid Radiation Protection Certificate and a Transient Combustible Permit.
- 5.27.3 No volatile aerosol spray such as a degreasing agent shall be used on contaminated or potentially contaminated equipment, plant or components without the use of Respiratory Protection and permission from the Radiation Protection Department.
- 5.27.4 If any flammable or combustible liquid is spilled in a radiologically controlled area, the Radiation Protection Department and Fire Risk Management must immediately be informed.
- 5.27.5 Every possible precaution must be taken to prevent contamination of liquids brought into a radiologically controlled area.
- 5.27.6 Flammable and Combustible liquids in a radiologically controlled area must not exceed the limits as stated in this standard or on the transient combustible permit.

5.28 Exemptions

5.28.1 The only exemptions applicable are:

Where the requirement is that absolute liquid purity must be maintained or where glass containers must be used, e.g. liquids required in a laboratory or liquids drawn for sampling.

NOTE: *Liquids must still be kept to a minimum and must be stored in a flammable liquid store or cabinet when not in use.*

5.29 General

5.29.1 No flammable or combustible liquid will be disposed of down any drain or be allowed to soak away in any ground or soil. Only approved methods of disposal for flammable and combustible substances must be used, as determined by the Environmental Assurance Manager.

6.0 ATTACHMENTS

Appendix 1 – Examples of Typical Flammable and Combustible Liquids Found at Power Stations

Appendix 2 – Flammable Liquid Cabinet as per SANS-54470-1, (Safety Storage for Flammable Liquids)

Appendix 3 – Requirements for the Construction of a Flammable Store

Appendix 4 – Justification

APPENDIX 1**EXAMPLES OF TYPICAL FLAMMABLE AND COMBUSTIBLE
LIQUIDS FOUND AT POWER STATIONS****Class I-A****"Special Group"**

Petroleum Ether

Isoprene

Carbon Disulfide

Pentone

Class I-B

Petrol

Octane

Lacquer

Acetone

Methyl Alcohol

Toluene

**EXAMPLES OF TYPICAL COMBUSTIBLE LIQUIDS
FOUND AT POWER STATIONS****Class II**

Kerosene

Turpentine (Mineral spirits)

Diesel Fuel

Paint (Oil based)

Class III

Hydraulic Fluids

Transformer Oil

Lubricating Oil

Glycerine

APPENDIX 2

FLAMMABLE LIQUIDS CABINET AS PER SANS-54470-1, (SAFETY STORAGE FOR FLAMMABLE LIQUIDS)



It is common for workplaces to have small amounts of flammable liquids on site – either as part of a manufacturing process or for maintenance purposes. Even small quantities of flammable and combustible liquids must be stored in a flammable liquid cabinet when not in use:

- Safe storage of flammable liquids requires attention to several matters other than whether the substances are in a flame-proof cabinet.
- General guidance would be to store such substances in tightly-closed containers in cool, dry, isolated areas well away from sources of ignition, oxidising agents, foodstuffs and clothing, and out of direct sunlight.
- Keep containers closed when not in use and securely sealed and protect against physical damage.
- Inspect regularly for deficiencies such as damage or leaks.
- Always keep in containers made of the same material as the supply container.
- Have appropriate fire extinguishers available near the storage area.
- In all cases, the recommendations of the relevant Material Safety Data Sheets (MSDS) should be checked and followed.
- MSDS should be obtained from the manufacturer or supplier.
- The requirements for handling storage, and considerations relating to stability and reactivity should be built into work procedures.

APPENDIX 3

REQUIREMENTS FOR THE CONSTRUCTION OF A FLAMMABLE STORE

1. The construction of a flammable store must be in accordance with the National Building Regulations (T1) read in conjunction with SANS-10400.
2. The floor must be of concrete construction or other impermeable material and must be recessed below the door level or incorporate a sill.
3. The recess or sill must be of such a depth or height that in the case of spillage it will be capable of containing the quantity of flammable liquid, as indicated on the flammable substance certificate and an additional 10% of the quantity mentioned on the certificate.
4. Notwithstanding the National Building Regulations (T1) read in conjunction with SANS-10400:
 - (a) the roof assembly of a flammable store must be constructed of a concrete slab capable of providing a two-hour fire resistance when it forms part of another building;
 - (b) the ventilation of a flammable store must be achieved by the use of air bricks located in the external walls at the ratio of one air brick nominally above the sill level and one air brick located in the top third of the wall per 5 m² of wall area or part thereof, so that vapour cannot accumulate inside the store;
 - (c) the air bricks must be covered both internally and externally with closely-woven, non-corrodible wire gauze of at least 1 100 meshes per metre, and
 - (d) the wire gauze must be held in position by metal straps, a metal frame or cement.
5. When required by the controlling authority, the flammable store must be ventilated by a mechanical ventilation system approved by Fire Risk Management and must comply with the following requirements:
 - (a) the ventilation system is to be intrinsically safe, provide 30 air changes per hour and must operate continuously;
 - (b) the fan extraction point must be nominally above sill level and must discharge through a vertical metal duct terminating at least 1 metre above roof height or at least 3,6 metres above ground level, whichever is the greater;
 - (c) ducting material that is external to the store, but communicates with the remainder of the building, must be fitted with a fire damper of two-hour fire resistance at the point of exit from a flammable store, and
 - (d) the ducting must be as short as possible and must not have sharp bends.
6. Notwithstanding the National Building Regulations (T1) read in conjunction with SANS-10400, a flammable store door must be constructed of material with a fire resistance of two hours, provided that all relevant safety distances are complied with, and the door must open outwards.

APPENDIX 3 (Continue)**REQUIREMENTS FOR THE CONSTRUCTION OF A FLAMMABLE STORE**

7. When required by the controlling authority, a flammable store door must be a D-class fire door, which complies with SABS-1253.
8. Notwithstanding the National Building Regulations (T1) read in conjunction with SANS-10400, artificial lighting in the flammable store must be by electric light having vapour-proof fittings wired through seamless steel conduit and the switches operating the lights must be located outside the store.
9. No other electrical apparatus may be installed in the flammable store.
10. A flammable store must be provided with a foam inlet consisting of a 65 millimetre male instantaneous coupling and mild steel pipework leading to the inside thereof and the foam inlet must be identified by means of a sign displaying the words "**Foam Inlet**" in 100 millimetre block letters.
11. Racking or shelving erected in the flammable store must be of non-combustible material.
12. The flammable store must be identified by the words, "**Flammable Store**", and the permissible quantity allowed within the flammable store, indicated in 100 millimetre block letters on both the inside and outside of all doors communicating directly with the store.
13. The owner or person in charge of a flammable store must ensure that the flammable store doors are kept locked when the store is not in use.
14. A person shall not enter a flammable store or cause or permit it to be entered without the permission of the owner or person in charge of the premises.
15. Sufficient fire extinguishers, as determined by the controlling authority, must be mounted on the external wall of the flammable store in a conspicuous and easily accessible position.
16. Any hand tool used in the flammable store must be intrinsically safe.
17. A person may not use or permit a flammable store to be used for any purpose other than that indicated on the flammable substance certificate, unless the store is not in use as a flammable store and the controlling authority has been notified in terms of the following procedure:
 - (a) within seven days of the cessation, notify the controlling authority in writing thereof;
 - (b) within 30 days of the cessation, remove the flammable substance from the flammable store and render it safe, and
 - (c) within 30 days of the cessation, remove all signage.
18. Subject to the provisions in this section, the controlling authority may call for additional requirements to improve the fire safety of a flammable store.

APPENDIX 4

JUSTIFICATION

Revision 2

1. Changed to bring document in line with organisational changes.

Revision 3

1. Scheduled review.
2. Changed to bring document in line with organisational changes.

Revision 4

1. Full review.
2. Changed to bring document in line with Provincial By-Laws, SANS Codes of Practice and current legislation.

Revision 5

1. Scheduled review.