

**The warehousing of dangerous goods
Part3: The storage and handling of
Corrosive substances**

Public Review Draft

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Kenya International freight Association
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Kenya Railways
Directorate occupational health and safety services.
Pest control product board
Kenya Maritime Authority
Kenya Airways
Kenya Transport Association
Kenya ports authority
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Dangerous goods management ltd.
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**The warehousing of dangerous goods
Part3: The storage and handling of
Corrosive substances**

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Foreword

This Kenya Standard was developed by the Technical Committee on Transport of dangerous goods under the guidance of the Standards Project Committee, and is in accordance with the procedures of the Kenya Bureau of Standard.

During the preparation of this standard, reference was made to the following publications:
SANS 10263-8:2016.

Acknowledgement is hereby made for the assistance obtained from these sources.

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1 Scope

This part of standard specifies requirements for the safe storage and handling of corrosive substances of class 8, as defined in KS 2324 in excess of the exempt quantity and their associated subsidiary risks, in locations that are generally industrial, commercial and retail.

The standard does not apply to

a) the storage and handling of corrosive substances for domestic use in residential premises or for own use on farms;

NOTE This exemption does not apply to home-based industries using corrosives.

b) laboratories;

NOTE This exemption does not provide for any exemption from the use of fume cabinets or any other safe working practice as may be required by the relevant national legislation (see foreword).

c) the storage of corrosive substances in container sizes that exceed a capacity of 50 kg or 50 L, is dealt with in terms of this standard;

d) dangerous goods that have a class 8 subsidiary risk, as defined in KS 2324 ;

e) manufacturing, production or decanting facilities;

NOTE This standard;is applicable to storage facilities used for the storage of packaged corrosives associated with such manufacturing, production or decanting facilities.

f) facilities designated as major hazard installations (MHI) in terms of the relevant national legislation (see foreword).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies

SANS 1186-1, Symbolic safety signs – Part 1: Standard signs and general requirements.

SANS 1431, Weldable structural steels.

KS 2324, The identification and classification of dangerous goods for transport.

KS 2383-1 The warehousing of dangerous goods – Part 1: General requirements.

SANS 10400 (SABS 0400), The application of the National Building Regulations.

SANS 50025-1/EN 10025-1, Hot rolled products of structural steels – Part 1: General technical delivery conditions.

SANS 50025-2/EN 10025-2, Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels.

SANS 50025-3/EN 10025-3, Hot rolled products of structural steels – Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels.

SANS 50025-4/EN 10025-4, Hot rolled products of structural steels – Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels.

SANS 50025-5/EN 10025-5, Hot rolled products of structural steels – Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance.

SANS 50025-6/EN 10025-6, Hot rolled products of structural steels – Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition.

3 Definitions

For the purposes of this document, the following definitions apply.

3.1

acceptable

acceptable to the authority administering the standard, or to the parties concluding the purchase contract, as relevant

3.2

bund

low wall or embankment around a storage tank intended to enclose and retain the product stored within it in the case of a spillage or leakage

3.3

combustible

substance that can burn

3.4

competent person

trained and experienced person who is competent to execute the relevant duties

3.5

containers

3.5.1

combustible containers

containers that include paper bags, fibre drums, plastics containers, and wooden or fibre boxes, as well as non-combustible containers having removable combustible liners or packing, and non-combustible containers in combustible outer packaging or overpacks (or both)

3.5.2

non-combustible containers

containers constructed of glass or metal that can be coated with a polymeric material no more than 50 µm in thickness

3.6

corrosive

any material that has the ability to damage living tissue, metals or textiles through chemical action

3.7

exempt quantity

storage of corrosive substances in quantities that do not exceed the following quantities:

Category 150 litres or kilograms

Category 2200 litres or kilograms

Category 31000 litres or kilograms

NOTE 1 The above exempt quantities comprise the sum of the weight in kilograms and volume in litres where both

dry and liquid corrosives may be stored, handled or sold.

NOTE 2 The total exempt quantity may not exceed the maximum quantity specified for the highest hazard packaging group.

3.8

incompatible material

any material that, when in contact with a corrosive substance, can cause a hazardous reaction or can promote or initiate decomposition of the materials involved

NOTE This could include acid and alkaline substances that, whilst both are class 8 corrosive substances, are incompatible with each other.

3.9

label

written, printed or graphic material printed directly onto the product container or firmly affixed to the product container

3.10

occupancy

particular use or the type of use to which a building or portion thereof is normally put or intended to be put

3.11

oxidizing substance

oxidizer

substance that, whilst in itself is not necessarily combustible, may generally by yielding oxygen cause or contribute to the combustion of material with which it comes into contact

3.12

packaging group

hazard grouping in decreasing level of hazard indicated by Roman numerals and designated as group I (high hazard), group II (moderate hazard) and group III (low hazard) in terms of KS2324

3.13

retail occupancy

premises or occupancies classified as shops or wholesalers where corrosive substances may be sold directly to the general public

3.14

warehouse

facility classified as a storage occupancy in where corrosive substances are received, stored, and subsequently dispatched in their original containers

4 General

4.1 Application of this standard.

There is no objection to the use of other national or international standards or systems, methods, or devices that comply with or exceed the requirements of this part of standard, provided technical documentation is submitted to the authority that demonstrates compliance with this part of Kenyan standard through rational design and provided that the system, method, or device is acceptable (see 3.1) for the intended purpose.

4.2 Classification of corrosive substances

For the purposes of this part of standards corrosive are classified into three categories, depending on the severity of the hazards, as indicated in table 1. Testing shall be performed in accordance with KS 2324.

Table 1 — Classification criteria of corrosive substances

1	2	3	4
Packing group	Full thickness destruction of intact skin		Corrosion rate on steel or aluminium ^a mm/year at 55 °C
	Exposure time min	Observation period	
I	≤ 3	≤ 1 hour	–
II	> 3 ≤ 60	≤ 14 days	–
III	> 60 ≤ 240	≤ 14 days	> 6,25

Suitable metals are steel, grade 240 WA of the relevant part(s) of or a similar type and aluminium, non-clad type 7075-T6 or AZ5GU-T6.

5 Requirements

5.1 Warning notices, symbolic safety signs and product labels

5.1.1 General

5.1.1.1 All symbolic safety signs and warnings shall be relevant and appropriate, and shall be so positioned that they are

- clearly visible at all times,
- not subject to misinterpretation,
- not subject to damage during normal storage operations, and
- sufficiently illuminated by either natural or artificial lighting in order to ensure that they are clearly visible at all times.

5.1.1.2 All personnel employed in premises used for the storage or sale of corrosives shall undergo training in the meaning of the signs, warning notices, symbols on the labels and the interpretation of the written instructions.

5.1.2 Warning notices

5.1.2.1 Outside the warehouse

At the entrance of the warehouse the warning “Storage of dangerous substances – Unauthorized entry prohibited” shall be displayed in red letters against a white background. The warning notice shall be in one of the official languages and in at least one other language indigenous to the region. The height of the letters shall be at least 75 mm.

5.1.2.2 Inside the warehouse

Every type of storage area and utility inside the warehouse shall be clearly demarcated, for example, separate storage areas for poisons, flammables and oxidizing substances shall display the relevant class diamonds. The dimensions of the hazard class diamonds shall be at least 250 mm × 250 mm.

5.1.3 Symbolic safety signs

5.1.3.1 Symbolic safety signs in accordance with the requirements of shall be displayed

at the entrance to the warehouse, and inside the warehouse, to denote the safety-related features of the warehouse, for example

- eye protection such as goggles or face shields,

- b) gloves,
- c) long sleeve garments,
- d) shoes, and
- e) respiratory protection.

5.1.3.2 The dimensions of the symbolic safety signs shall be at least 290 mm × 290 mm.

5.1.3.3 Each storage area inside the warehouse used for the storage of different classes of dangerous goods shall be clearly demarcated with floor markings and symbolic safety signs.

5.1.4 Product labels

The acquisition, storage, sale or use of corrosive substances in packages and containers that are not clearly labelled are strictly forbidden. Such containers shall be bagged and tagged as described in 5.5.2 and returned to the supplier or manufacturer, or be disposed of in accordance with 5.6.5.

5.2 Storage configuration

5.2.1 General

Corrosive substances shall be stored in such a manner as to avoid contact with any incompatible substances such as oxidizers (see 3.8, 3.11 and note 3).

NOTE 1 See KS 2324 and KS 2530 for the approved packaging for corrosive substances.

NOTE 2 Caution is required in the storage of any unknown materials in the vicinity of corrosive substances.

NOTE 3 Organic and mineral acids, class 8 acid and alkaline substances, and certain other products are incompatible with each other and an appropriate separation as described in 5.2.4 should be maintained between these substances. Solids should also be separated from liquids.

5.2.2 Storage surfaces

5.2.2.1 Corrosive substance packages or pallets shall only be stored on or above hardened floor surfaces such as concrete, screeded floors, tar or paving that are resistant to the effects of corrosive substances and shall not be placed on bare earth, gravel or chip stone surfaces that will make the recovery of any spillages difficult or complex.

5.2.2.2 Where corrosive substances are stored on shelves or racks, the shelves shall be constructed of an appropriate material such as plastic or metal.

NOTE Wooden shelving should not be used unless the shelf is coated or painted with a suitable epoxy or enamel paint.

5.2.3 Ventilation

Due to the risks of corrosive dusts or fumes, any warehouse or room used for the storage of corrosive substances shall be adequately ventilated to ensure the dilution and dispersion of such dusts or fumes in order to safeguard the health and safety of the occupants of those areas.

5.2.4 Separation of incompatible substances

5.2.4.1 Corrosive substances shall be segregated from incompatible substances by means of barriers or partitions, or by an appropriate horizontal separation distance.

5.2.4.2 In warehouses a horizontal separation distance of at least 5 m shall be maintained between corrosive substances and oxidizers, and between incompatible corrosive substances (see 5.1.1).

5.2.4.3 In retail occupancies a horizontal separation distance of at least 1 m shall be maintained between corrosives and oxidizers, and between incompatible corrosive substances such as alkalis and acids. These will include their associated back storage areas which shall still deem to be an F1, F2 or F3 occupancy and not be classified J1, J2 or J3

5.2.4.4 The separation distances need not be used as a cordon sanitaire, but may be used for the storage or display of other inert or compatible substances.

5.2.4.5 Solid corrosive substances shall not be stored directly beneath liquids in both warehouse and retail occupancies.

5.2.4.6 Where corrosives and incompatible substances are stored directly above or below each other on grid type mezzanine floors or in high bay storage racks, the vertical distance shall not be deemed to be part of the separation distance. The required horizontal separation distance or the use of physical barriers or partitions shall still be required to maintain adequate substance separation.

5.2.5 Exposure to heat and sunlight

Corrosive substances shall be stored away from heat sources and out of direct sunlight as this may lead to a pressure build-up within the containers that could rupture the container or result in the formation and release of fumes, vapour or mist under pressure once the container is opened.

5.2.6 Product catchment and containment

5.2.6.1 Any warehouse used exclusively for storage of corrosives shall make adequate provision for spill containment and catchment as described in KS 2383-1

5.2.6.2 Any mixed-use warehouse used for the storage of corrosives and general merchandise, which may include other incompatible substances, shall make adequate provision through bund walls, floor slopes, ramps or drains to ensure that spillages or releases of incompatible liquid substances do not encroach or come into contact with each other. These bund walls or ramps shall surround the area used

for the storage of such liquid corrosives and shall be at least 250 mm high. The containment area shall be able to hold at least 10 % of the volume of the product stored within it. (should have own marking and separation area)

5.2.6.3 Receiving bays and storage areas associated with retail premises that handle fast moving consumer goods (FMCG) shall not be required to make specific provision for spill catchment. However, contingency measures shall be made for the management of any spills or releases that might occur from damaged containers as stipulated in 5.6.4.

5.2.6.4 Retail occupancies that display 1 000 L or more of liquid corrosive substances for sale to the public on any single display shall display the liquid corrosive containers on leak-proof spill trays made of suitable plastic or corrosion resistant stainless steel as a form of secondary containment. The spill tray shall provide for the containment of at least 10 % of the volume of the containers standing in it.

5.2.6.5 Retail occupancies that display less than 1 000 L of liquid corrosive substances for sale to the public on any single display area need not make specific provision for spill catchment and containment within that specific display rack.

5.2.6.6 Retail occupancies that display liquid corrosive substances for sale to the public shall not display such containers more than 1 m above floor level to avoid containers rupturing should they be knocked off the display shelving. As far as is reasonably practicable, containers of liquid corrosive substances shall be displayed on the bottom shelf of any display.

5.3 The responsibilities of the warehouse controller or retail manager

5.3.1 General

The responsibilities of the warehouse controller or retail manager of premises that stock or store corrosive substances shall be stipulated in writing. These responsibilities include that

- a) all safety, operating and emergency procedures regarding corrosive substances shall be adhered to,
- b) safety data sheets (SDSs) are available in respect of each corrosive substance stored, sold or handled on those premises,
- c) stock records shall be kept up to date and be readily available, and
- d) workers shall be trained in all operations relating to the movement and management of corrosive substances.

5.3.2 Job knowledge

The person responsible for the management of a warehouse or retail occupancy where corrosive substances are kept or handled shall ensure that all personnel concerned with the handling of such substances on the premises are made fully conversant with

- a) the means of identifying dangerous goods and the properties of the specific substances handled, by reference to the relevant safety data sheets (SDSs), and
- b) applicable safety regulations and procedures.

NOTE For transit warehouses, such information can be obtained from transport documentation.

5.3.3 Training

The person responsible for the management of a warehouse or retail occupancy where corrosive substances are kept or handled shall provide training to persons employed at the premises on

- a) the nature of the work and safe methods of operation,
- b) the properties and hazards associated with the substances handled,
- c) the location of first-aid equipment and first-aid measures to be taken,
- d) the correct use of personal protective equipment and its care and maintenance,
- e) the location of a list of up-to-date emergency contacts and telephone numbers, and
- f) actions to be taken in various emergencies, including spills, gas escape, fire and explosions.

5.3.4 Hygiene and personal safety

5.3.4.1 Employers shall make adequate provision for the health and safety of their employees in terms of the relevant national legislation (see foreword).

5.3.4.2 Any warehouse that stores more than 2 000 L or 2 000 kg of corrosive substances shall be equipped with a suitably approved decontamination shower capable of delivering at least 30 L of water per minute and eye bath to deal with any occupational corrosive exposures. The shower shall be capable of delivering water over an entire person's body. The shower or eye bath valve shall be operable within 1 s and automatically remain in the open position until intentionally turned off. The travel distance from any point in a warehouse to the nearest safety shower should not exceed 50 m.

5.3.4.3 Any warehouse that stores less than 2 000 L or 2 000 kg of corrosive substances shall be equipped with a shower or decontamination facility such as a domestic shower in an ablution facility or a first-aid fire-fighting hose reel that may readily be used within a period of 20 s for the decontamination of any personnel that may have been exposed to a corrosive substance.

5.3.4.4 Retail occupancies, or premises that deal in lead acid batteries for motor vehicles need not have any specific personnel decontamination showers or measures, and the first-aid fire-fighting hose reels installed in such premises in accordance with the relevant national regulation (see foreword) shall be

deemed to be adequate for this purpose.

5.3.4.5 The following directions shall be followed by all persons whose work involves handling of corrosive substances:

- a) Do not introduce, keep, prepare or consume any food or drink, or smoke tobacco in any area where corrosive substances are stored or handled.
- b) After handling corrosive substances always wash your hands before eating, drinking, smoking or using the toilet and before going home.
- c) Immediately attend to injuries caused by contact with corrosive substances.

Suitable signs to this effect shall be prominently displayed in the work area .

5.3.4.6 Appropriate personal protective clothing and equipment (PPE) shall be available in any area where corrosive substances are stored. Such PPE shall be made of an appropriate material to withstand the effects of the specific corrosive substances stored or handled on those premises. Suitable PPE may include long sleeved overalls, aprons, gloves, eye protection, respirators, helmets and boots as described in the product's SDS and as may be appropriate to the nature of the corrosive substance, as well as the nature of the operation being conducted, for instance, storage, retail, movement or product, nature of containers and quantities.

5.3.4.7 Any PPE not issued as a personal issue to an employee shall be kept in a readily accessible and signposted location or cabinet to allow for easy access when required. All personal protective equipment shall be maintained in good order, and shall be thoroughly cleaned and decontaminated after each use.

5.4 Fire protection

As most corrosives do not pose an extraordinary fire risk, no specific fire protection measures are required in premises storing or handling corrosive substances. The fire-fighting provisions stipulated in shall be deemed to be appropriate.

5.5 Housekeeping

5.5.1 Any accumulation of waste in storage areas shall be prohibited.

5.5.2 Spilled corrosive substances and leaking or broken containers shall be removed immediately to a safe area to await disposal in accordance with applicable regulations and the manufacturer's and processor's instructions. Spilled substances shall be placed in a clean, separate container that is sift proof for solids and leak-proof for liquids, and shall not be returned to the original container. The container or bag shall be tagged as "waste" or "returned corrosive substances". The waste of such substances shall not be combined with that of ordinary trash and their disposal shall be carried out by trained personnel (see 5.3.3).

5.6 Waste collection, storage and disposal

5.6.1 General

5.6.1.1 Waste collection systems shall comply with the requirements of the relevant national legislation

5.6.1.2 Separate waste storage systems shall be provided for incompatible materials.

5.6.2 Storage of waste

5.6.2.1 An occupancy in which corrosive substances are stored, handled or sold shall be equipped with facilities or designated leak-proof receptacles for the storage of waste, contaminated substances, damaged or defective containers returned by customers. Receptacles used for this purpose may be drums or boxes with leak-proof polyethylene liners.

5.6.2.2 Waste materials that still meet the criteria of a corrosive substance shall, pending their disposal, be kept in accordance with all of the relevant requirements of this standard.

5.6.2.3 Access to waste containers, unless authorized by the retail manager or warehouse controller, shall be prohibited until such time as they can be disposed of. All such containers shall be kept securely closed and locked, and a record of the containers shall be kept.

5.6.2.4 Receptacles used for the storage of corrosive waste, contaminated substances or damaged returns shall be clearly marked or labelled with text and graphics indicating the specific type of corrosive substance for which the receptacle is intended. No incompatible corrosives or oxidizers may be stored together in the same container.

5.6.3 Items for disposal

5.6.3.1 Corrosive substances

Corrosive substances shall be disposed of when

- a) container labels and markings are illegible,
- b) the substance is contaminated, and
- c) the substance was collected as leaks or spills, including all residues.

NOTE Items for disposal should preferably be returned to the supplier or manufacturer for reprocessing or disposal. However, where this is impractical for whatever reason disposal should be carried out in accordance with

the manufacturer's recommendations, the relevant national legislation (see foreword) or local by-laws.

5.6.3.2 Other items

Other items that shall be disposed of are

- a) empty containers of corrosive substances, other than those to be returned to the supplier for refilling with the same product, and damaged containers,
- b) effluent from washing or chemicals used for cleaning spills,
- c) any contaminated clothing which cannot be returned to service,
- d) the contents of warehouse sump or bunded areas; and
- e) absorbent materials used for the collection of spills and run off.

NOTE 1 Absorbent materials used to bind or absorb corrosive material will generally not neutralize the corrosive substance with which they have been used. The absorbent material will, however, exhibit the same chemical properties as the corrosive substance, and should be treated with caution and managed in the same manner as the corrosive substance itself.

NOTE 2 Empty containers should be thoroughly decontaminated before their disposal.

5.6.4 Spill management

5.6.4.1 Spill management equipment and materials (spill kits) shall be available at premises used for storing, handling or selling corrosive substances. Such spill kits shall be appropriate to the specific corrosive substances handled within the premises and may include:

- a) absorbent materials such as sand or chemical binders;
- b) buckets and mops;
- c) brooms and dustpans; and
- d) containers for recovered substances.

5.6.4.2 The spill kit shall contain instructions for the management of spillages and shall only be used by appropriately trained personnel. Access to the contaminated area shall be restricted to trained personnel engaged in clean-up operations. Other personnel may be permitted to enter the area under supervision at the discretion of the warehouse controller or retail manager.

5.6.5 Methods of disposal

5.6.5.1 Corrosive substance spillages, other than residues resulting from very small spillages that cannot be absorbed by any binder or sand, and that cannot be returned to the supplier or manufacturer for reprocessing or disposal, may not be disposed of by means of sewers or drains due to their pH. Any spilled or released material shall be contained and disposed of in accordance with the manufacturer's instructions.

5.6.5.2 The supplier or manufacturer, local waste management authority, the environmental protection authority and the health department, as appropriate, shall be consulted on the acceptability of the proposed method of disposal.

5.6.5.3 Corrosive residues on hardened surfaces, such as tar or concrete, from minor spillages that cannot be recovered with binders or sand may, at the discretion of the warehouse controller or retail manager be mopped up with water by trained staff using the appropriate PPE. The water used in mopping up any such spill may be disposed of to a sewer together with copious amounts of water.

5.6.5.4 Any pools or puddles of liquid corrosive spillages shall be recovered with a chemical binder or sand. Any spillages of corrosive substances large enough to run off to watercourses shall be contained as a precautionary measure and their management and disposal shall be handed over to the emergency services or waste disposal specialists.

5.6.5.5 On-site neutralization of any corrosive substance shall be avoided as far as is reasonably practical. However, where deemed necessary, it shall only be carried out by trained waste disposal experts or hazardous material technicians. Inappropriate neutralization techniques can result in vigorous chemical reactions that can endanger people, property and the environment.

5.6.5.6 Any container used for corrosive substances should not be reused or if they should be reused they should be cleaned by other chemicals recommended in the ADR. This standard prescribes the requirements and the methods of sampling and tests for black web offset ink used for printing newspapers and books.

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