

ESWATINI NATIONAL STANDARD

Minimum Requirements for Petroleum Retail Outlets

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Marble Construction Building, Plot 247 11th Street King Mswati III Avenue West

P. O. Box 1399, Matsapha, Kingdom of Eswatini

Telephone: +268 2518 4633, Facsimile: +268 2518 4526

Website: www.swasa.co.sz

E-mail: info@swasa.co.sz

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The Information Officer

Eswatini Standards Authority

P.O. Box 1399, Matsapha

Tel. + 268 2518 4633

Fax: + 268 2518 4526

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Website: www.swasa.co.sz

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Table of changes

Clause Changed	Date	Change

NATIONAL FOREWORD

This Eswatini National Public Review Draft Standard was prepared by Technical Committee *SWASA/TC 23 Petroleum Products & Lubricants* in accordance with procedures of the Eswatini Standards Authority, in compliance with Annex 3 of the WTO/TBT Agreement.

Table of Contents

0	Introduction	8
1	Scope	9
2	Normative References	9
3	Terms and Definitions	9
	3.1.1	9
	3.1.2	9
	3.1.3	9
	3.1.4	10
	3.1.5	10
	3.1.6	10
	3.1.7	10
	3.1.8	10
	3.1.9	10
	3.1.10	10
	3.1.11	10
	3.1.12	10
	3.1.13	10
	3.1.14	11
	3.1.15	11
	3.1.16	11
	3.1.17	11
	3.1.18	11
	3.1.19	11
	3.1.20	11
	3.1.21	11
	3.1.22	12
	3.1.23	13
	3.1.24	13
	3.1.25	13
	3.1.26	14
	3.1.27	14
	3.1.28	14
	3.1.29	15
	3.2	15
	3.3	16
4	Planning of Service Station	16
	4.1 Licensing	16
	4.2 Service Station Sitting Planning	17
	4.2.1 Stations should be located within a growth center in urban or rural areas, land zoned for commercial/industrial use or be designated specifically for the purpose in a subdivision.....	17

4.2.2	17
4.2.3	17
4.2.4	17
4.2.6	17
4.2.7	17
4.2.8	17
4.2.9	17
4.2.10	17
4.2.11 A Fire impact assessment shall be conducted.	17
4.2.12	17
4.2.13 Urban Stretches	18
4.2.14 Traffic Impact Assessment	18
4.3 Composition	19
4.3.1 Forecourt	19
4.3.2 Tank Farm	20
4.3.3 Buildings Specifications	20
4.3.4 Exits and Entrances	20
4.3.5 Boundaries	20
4.4 Design Specifications for Service Stations	21
4.4.1 General	21
4.4.2 Design Area Specifications	21
4.5 Minimum Requirements for Construction of a Petroleum Retail Outlet	21
4.5.1	21
4.5.2	21
4.5.3	21
4.5.4	21
4.5.5	21
4.5.6	21
4.5.7	22
4.5.8	22
4.5.9	22
4.5.10	22
4.5.11	22
4.5.12	22
4.5.13	22
4.6 Minimum Requirements of an Operating Petroleum Retail Outlet	22
4.6.1	22
4.6.2 Environmental Protection Measures	22
4.6.3 Canopy	23
4.6.4 Drainage and Oil/Water Separators	23
4.6.5 Spill Containment Kit	23
4.6.6 Firefighting Protection	23

4.6.7	Installation, Calibration, and Protection of Pumps	25
4.6.8	Trainings	25
4.6.9	First Aid Kit	25
4.6.10	Safety and Protection Measures	26
4.6.11	Vapour Vents	26
4.6.12	Electrical Installations of a Service Station	27
4.6.13	Supply of Electricity	27
4.6.14	Identification of Tanks	27
4.6.15	Identification of Dispensers	28
4.6.16	Leaks Detection	28
4.6.17	Safety Signs	28
4.6.18	Road Tanker Stand.....	28
4.6.19	Surface Drainage.....	28
4.6.20	In-situ Leak Test	29
4.6.21	Overfill Protection	29
4.6.22	Water Detection	29
5	Reporting Incidents	29
6	Color Identification of Fire-Fighting Equipment	29
7	Safety Representative	30
8	Protection and welfare of personnel	30
9	Contact with Petroleum Products	30
10	Repairs and Alterations	30
10.1	Permits	30
10.2	Equipment.....	31
10.3	Pipelines, Pumps and Valves.....	31
10.4	Hot Work	31
10.5	Electrical Equipment	31
10.6	Plant.....	31
	Bibliography	32

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PUBLIC REVIEW DRAFT

0 Introduction

This standard shall be applicable to all premises for the distribution of petroleum products for the purpose of selling petroleum products to automotive vehicles.

Hydrocarbons are volatile under certain conditions and contain or can easily form harmful chemical compounds, making them prone to environmental destruction and fire hazards. The siting of service stations is therefore paramount not only in facilitating marketing but is also vital in the aspects of protection from fire hazards, destruction of environment and disruption to other operations.

Minimum Requirements for Petroleum Retail Outlets

1 Scope

1.1 This standard covers the requirement for planning, siting, design and construction of service stations for rural and urban areas, installation and operation of equipment in service stations for handling, storage and dispensing of petroleum products and their derivatives, other than equipment used in transportation.

1.2 This standard act as a minimum guide for petroleum retail outlets which stores petroleum products and contains advice specifically in the operational management, maintenance, designing and constructing of the facilities;

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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:

NIST Handbook 130, Uniform Engine Fuels and Automotive lubricants Regulations.

3 Terms and Definitions

In this Standard the following terms shall have the meaning ascribed thereto below:

3.1.1 Air Gap

A minimum of 1 inch (25.4 mm) free air space provided between the planes of Division 1 or Division 2 hazardous locations and an unclassified area of a dispensing device.

3.1.2 Basement

a storey of a building or structure having one-half or more of its height below ground level and to which access for firefighting purposes is unduly restricted.

3.1.3 Building

includes occupied buildings where egress within 2 minutes cannot be reasonably expected, and control buildings that require presence of personnel for orderly shutdown of important or hazardous processes, unprotected storage areas where products from fire can harm the community or the environment, or buildings that contain high-value contents or critical equipment or supplies.

3.1.4 Bulk Plant or Terminal

that portion of a property where liquids are received by tank trucks, tank wagons or pipeline and are stored or blended in bulk for the purpose of distributing such liquids by tank trucks, tank wagons, pipeline, portable tank, or container.

3.1.5 Closed Container

a container as herein defined, so sealed by means of a lid or other device that neither liquid nor vapour will escape from it at ambient temperature.

3.1.6 CNG

Compressed Natural Gas.

3.1.7 Combustible Liquid means see Clause 3.1.22

3.1.8 Container

any vessel of 227 L (60 gal) or less capacity used for transporting or storing liquids.

3.1.9 Dispenser, Remote-Control Type

a dispensing device that does not contain a power-operated pump as part of the assembly, and which is intended for connection to a fluid piping system containing the power operated pumps at a remote location. Also commonly identified as a “dispenser.”

3.1.10 Dispenser, Self-Contained

a dispensing device that includes a power operated pump as part of the assembly. Also commonly identified as a “pump” or “suction dispenser.

3.1.11 Dispensing Device

a product consisting of a meter, motor, or fluid control, and an area for storing a hose nozzle valve with or without a pump.

3.1.12 Dispensing Device, Overhead Type

a dispensing device that consists of one or more individual units intended for installation in conjunction with each other, mounted above a Fuel Dispensing Area typically within the service station canopy structure, and characterized by the use of an overhead hose reel. This definition applies to an overhead dispenser that uses a retractable hose on an overhead reel.

3.1.13 Flammable Liquid as defined in Clause 3.1.21

3.1.14 Fleet Vehicle Motor Fuel Dispensing Facility

a motor fuel dispensing facility at a commercial, industrial, governmental, or manufacturing property where motor fuels are dispensed into the fuel tanks of motor vehicles that are used in connection with the business or operation of that property by persons engaged for such business or operation.

3.1.15 Fuel Dispensing Area

area for dispensing of fuel, typical within the service station canopy structure, and includes the area within the pump boundaries within which all dispensing activities are conducted.

3.1.16 Fuel Dispensing System

a complete dispensing system comprising of Dispensing Device along with its associated piping and pumping system.

3.1.17 Gas

a material that has a vapour pressure greater than 300kPa absolute (41.5 psia) at 50°C (122°F) or is completely gaseous at 20°C (68°F) at a standard pressure of 101.3 kPa absolute (14.7 psia).

3.1.18 Housing

Section of the device that encloses and is intended to protect operating parts, control mechanisms, or other mechanical or electrical components, the damage of which would render the device incapable of being operated as intended, lead to tampering, introduce the possibility of escape of liquid, or expose bare live electrical parts.

3.1.19 IBCs

Intermediate Bulk Containers.

3.1.20 Liquid

any material that has fluidity greater than that of 300 penetration asphalt when tested in accordance with ASTM D5, Standard Test Method for Penetration of Bituminous Materials, when not otherwise identified, the term liquid means both flammable and combustible liquids.

3.1.21 Flammable Liquid

any liquid that has a closed-cup flash point below 100°F (37.8°C), as determined by the test procedures and apparatus set forth in ASTM D 56, ASTM D 93, ASTM D 3278 and ASTM D 3278.

Flammable liquids are classified as Class I Liquids as follows:

3.1.21.1 Class I Liquid:

Any liquid that has a closed-up flash point below 100°F (37.8°C) and a Reid vapour pressure not exceeding 40 psia (2068.6 mm Hg) at 100°F (37.8°C). Class I Liquids are further classified as follows:

3.1.21.1.1 Class IA Liquids shall include those liquids that have flash points below 73°F (22.8°C) and boiling points below 100°F (37.8°C);

3.1.21.1.2 Class IB Liquids shall include those liquids that have flash points below 73°F (22.8°C) and boiling points at or above 100°F (37.8°C);

3.1.21.1.3 Class IC Liquids shall include those liquids that have flash points at or above 73°F (22.8°C), but below 100°F (37.8°C).

3.1.22 Combustible Liquid

any liquid that has a closed-cup flash point at or above 100°F (37.8°C), as determined by the test procedures set forth in ASTM D 56, ASTM D 93, ASTM D 3278 and ASTM D 3278. Combustible liquids are classified as Class II or Class III as follows:

3.1.22.1 Class II Liquid:

Any liquid that has a flash point at or above 100°F (37.8°C) and below 140°F (60°C)

3.1.22.2 Class IIIA Liquid:

Any liquid that has a flash point at or above 140°F (60°C), but below 200°F (93°C)

3.1.22.3 Class IIIB Liquid: Any liquid that has a flash point at or above 200°F (93°C).

Table 1 - Typical Flammable and Combustible Liquids Found at Motor Fuel Dispensing Facilities

Liquid	Flash Point (°F)	NFPA 30 Class	Boiling Point (°F)	Min. Ignition Temp. in Air (°F)
Antifreeze	230	IIIB	300	—
Brake fluid	300	IIIB	540	—
Chassis grease	400	IIIB	>800	>800
Crankcase drainings	—	IIIB	—	—
Diesel fuel #1	100	II	—	—
Diesel fuel #2	125	II	—	—
Diesel fuel #4	130	II	—	—
Gasoline	-40 to -50	IB	100 to 400	~825
Gear lubricant	395	IIIB	>800	>800
Kerosene (fuel oil #1)	100	II	304 to 574	440
Lithium-moly grease	380	IIIB	>800	>900
Lubricating oils	300 to 450	IIIB	—	—
Power steering fluid	350	IIIB	>550	—
Transmission fluid	—	—	—	—
Dexron II	395	IIIB	>800	>800
Type F	380	IIIB	>800	>800
White grease	465	IIIB	>800	>800
Windshield washer fluid (methanol/water mixtures)	—	—	—	—
100% methanol	54	IB	148	725
50% methanol/50% water	80	IC	—	—
20% methanol/80% water	118	II	—	—
5% methanol / 95% water	206	IIIB	—	—

This table is not a part of the requirements of this standard but is included for informational purposes only. It lists common liquids typically found at motor fuel dispensing facilities and Repair Garages and their relevant fire hazard properties.

3.1.23 Mobile Fuel Dispensing Facility

a vehicle, tank truck, or other mobile device from which a flammable liquid used as motor fuel may be dispensed as an act of retail sale into the fuel tank of a motor vehicle parked on an off-street parking facility.

3.1.24 Marine Motor Fuel Dispensing Facility

a motor fuel dispensing facility at or adjacent to shore, a pier, a wharf, or a floating dock where motor fuels are dispensed into the fuel tanks of marine craft.

3.1.25 Motor Fuel Dispensing Facility

that portion of a property where motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles or marine craft or into containers, including all equipment used in connection therewith.

3.1.26 Oily Water Separator

equipment that separate oil from water. Designed in accordance with API 421 - Monographs on Refinery Environmental Control (Management of Water Discharges).

3.1.27 Repair Garages

3.1.27.1 Major repair Garage

A Building or portions of a Building where major repairs, such as, engine overhauls, painting, body and fender work, and repairs that require draining of the motor vehicle fuel tank, are performed on motor vehicles, including associated floor space used for offices, parking, or showrooms.

3.1.27.2 Minor Repair Garage

A Building or portions of a Building used for lubrication, inspection, and minor automotive maintenance work, such as, engine tune-ups, replacement of parts, fluid changes (e.g., oil, antifreeze, transmission fluid, brake fluid, air conditioning refrigerants, etc.), brake system repairs, tire rotation, and similar routine maintenance work, including associated floor space used for offices, parking, or showrooms.

3.1.28 Tanks:

3.1.28.1 Aboveground Storage Tank

a horizontal or vertical tank that is intended for fixed installation, without backfill, above or below grade, and is used within the scope of its approval or listing.

3.1.28.2 Fire-Resistant Tank

an Aboveground Storage Tank that provides fire-resistive protection from exposures to a high-intensity liquid pool fire (See Clause 5.3).

3.1.28.3 Standpipe

a riser portion of the system piping that delivers the water supply for hose connections, and sprinklers on combined systems, vertically from floor to floor.

3.1.28.4 Portable Tank

any closed vessel having a liquid capacity over 227 L (60 Gal) and not intended for fixed installation, including IBCs.

3.1.28.5 Protected Aboveground Tank

an Aboveground Storage Tank that is in accordance with UL 2085, Standard for Insulated Aboveground Tanks for Flammable and Combustible Liquids, or an equivalent test procedure, that consists of a primary tank provided with protection from physical damage and fire-resistive protection from exposure to a high-intensity liquid pool fire.

3.1.28.6 Fiberglass Reinforced Plastic Tank

shall comply with the applicable requirements of UL 1316, Standard for Glass Fiber-Reinforced Plastic. Underground Storage Tanks for Petroleum Products, Alcohols and Alcohol-Gasoline Mixtures.

3.1.29 Vapour Barrier

a solid, un-pierced partition located between Division 1 or Division 2 hazardous locations and unclassified areas of a Dispensing Device. The vapour barrier is intended to reduce the entry of flammable gases or vapours into unclassified areas.

3.2 In this Standard the following terms of measurements have been used:

3.2.1 “C” means Degree Celsius.

3.2.2 “cm” means Centimetre.

3.2.3 “F” means Degree Fahrenheit.

3.2.4 “ft” means Feet.

3.2.5 “in.” means Inch.

3.2.6 “KPa” means Kilopascals.

3.2.7 “L” means Litres.

3.2.8 “m” means Meter.

3.2.9 “mm” means Millimetre.

3.2.10 “mm Hg” means Millimetres of Mercury.

3.2.11 “psia” means Pounds per square inch, absolute.

3.2.12 “psig” means Pounds per square inch, gauge.

3.2.13 “Gal” means US Gallons.

3.3 In this Technical Standard the following abbreviations refer to the institutions mentioned there against:

3.3.1 “ANSI” refers to the American National Standards Institute.

3.3.2 “API” refers to the American Petroleum Institute.

3.3.3 “ASME” refers to the American Society for Mechanical Engineers.

3.3.4 “ASTM” refers to the American Society for Testing and Materials.

3.3.5 “IEC” refers to the International Electrical Commission.

3.3.6 “ISO” refers to the International Standards Organisation.

3.3.7 “NACE” refers to the National Association of Corrosion Engineers.

3.3.8 “NFPA” refers to the National Fire Protection Association.

3.3.9 “STI” refers to the Steel Tank Institute.

3.3.10 “UL” refers to the Underwriters Laboratories.

3.3.11 “ULC” refers to the Underwriters Laboratories of Canada.

3.3.12 “Hazardous Area” Locations in which flammable gases or vapours are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures

4 Planning of Service Station

4.1 Licensing

4.1.1 All filling stations shall be licensed to operate according to the national requirements from the licensing authority.

4.1.2 Any modification or alteration on the existing filling stations shall require approval of the licensing authority.

4.1.3 The following is the licensing:

- a) An application form obtainable from the licensing authority.
- b) Plans and drawings will be checked for site location, site size, structures and traffic flow.
- c) Business case will be reviewed for business sustainability.
- d) Proof of land ownership or right of use.
- e) Approved environmental compliance / categorization.

4.2 Service Station Sitting Planning

4.2.1 Stations should be located within a growth center in urban or rural areas, land zoned for commercial/industrial use or be designated specifically for the purpose in a subdivision.

4.2.2 Stations should be located at a minimum of 100 m from any public institution such as schools, churches, public libraries, auditoriums, hospitals, public playgrounds, etc. However, other small and medium commercial activities may be located within the specified limits.

4.2.3 Distance between one petrol station and another should not be less than 150 m

4.2.4 The horizontal clearance from the tanks and vent pipes (from hazardous zones) of a service station to the line conductors of the high and medium voltage power line must be at least 15 meters from power lines of 11 KV to 220 KV and 20 meters from 400 KV lines.

4.2.5 Area of land to be developed should be sufficient to allow maneuvering of vehicles within its cartilage but should not be less than 1100 m² with a minimum distance of 19 m from centre on the primary street.

4.2.6 Filling Stations will not be allowed in any area where the traffic situation is such that it will cause obstructions in entering or leaving a station or on tight curves where visibility is not adequate.

4.2.7 Vehicular access/egress/crossover should be reasonably safe with adequate approach distances (100 m) especially where main roads and intersections are involved.

4.2.8 Wherever possible, stations should be erected on level rather than sloping site to prevent rolling or discarded materials such as cans, drums, etc.

4.2.9 When situated in shopping centers, stations should be located in an isolated area of the development as long as planning criteria are met.

4.2.10 An Environmental Impact Assessment shall be conducted.

4.2.11 A Fire impact assessment shall be conducted

4.2.12 Exterior design of the building should be compatible with adjacent development and should be such that it is not detrimental to property values in the area.

4.2.13 Urban Stretches

- a) Intersection with any category of road (irrespective of carriageway width) 150m.
- b) Undivided carriageway 300m
- c) Divided carriageway:
100m if not on same side of carriage way; 300m if on same side of carriage way
- d) Minimum plot size of fuel station shall be..... 40m x 40m
- e) Maximum building coverage..... 60%
- f) Minimum landscaping.....10%
- g) Where the site adjoins the side or rear boundary of a residential lot, a solid fire wall 3 m in height should be constructed and maintained along that lot boundary.

4.2.14 Traffic Impact Assessment

A service station is a major generator of road traffic congestion and as such presents a high degree of traffic on the road section onto which it is sited. This determines the number of stations that can be permitted on any section of the road or high way in any section of the city. The objective is to keep traffic to minimum and therefore, the following shall be observed in siting service stations:

- a) service stations shall be sited at distance of not less than 1000 m from each other on the same section of the single carriage road, this applies to either side of the dual carriage road;
- b) a service station shall not be located opposite a break or opening in the central verge of dual carriage;
- c) a filling station shall not be sited too close to an intersection to a traffic island on the main road. The minimum distance between an access to a service station and the tangent of a traffic island shall be 100 m;
- d) no siting of stations shall be allowed on road curves and bends and shall not be located adjacent to residential houses; and
- e) the minimum distance of a property line (Service station) from the centre line of the single carriage road must not be less than 19 m.

4.3 Composition

The service station shall compose of such structures, equipment and installations designed and constructed in such a way as to make the facility efficient in handling the storage and dispensing of petroleum products, with no damage to the environment and able to offer safety and hygiene to personnel. A service station layout shall be designed in accordance to existing to this standard and composed of but not limited to the following structures:

- a) Forecourt;
- b) Tank farm;
- c) Drainage system;
- d) Office block;
- e) Public sanitary wash rooms;
- f) Canopy;
- g) Generator house;
- h) Boundary Fence;
- i) Parking Lots (10% reserved for the handicapped)
- j) Entrances and Exits.
- k) Building Specifications

4.3.1 Forecourt

The service station forecourt shall be a non-slippery surface structure, constructed of materials that are impermeable to, and cannot react with petroleum products. Preferred materials are but not limited to concrete.

The minimum area of service station forecourt will depend on number of pumps dispenser or dispenser islands. Dispenser islands in a forecourt shall be designed and laid in such a way to provide a driveway of not less than 6 m on either side. Consequently, adjacent dispenser islands shall be separated from each other by 6 m.

The hazardous area around the dispenser islands shall be covered with a canopy extending outside a minimum of 1.5 m on all sides and raised as to comply with building regulations.

The slope of the forecourt shall be maintained between 1:50 and a maximum 1:20 in hilly places, fixed in such a way that effluent flows to appropriate channels and not to the road.

4.3.2 Tank Farm

4.3.2.1 In the tank farms, tanks shall be installed underground (1m apart) and clearly separated from the forecourt (6m apart), well protected and maintained.

4.3.2.2 In intensely developed areas, tank farms can be integrated within the forecourt subject to approval of approving authority after ensuring that sufficient structures have been included in the design to prevent the deformation of tanks by various loads.

4.3.2.3 The tank farm area will depend on the number and size of installed underground tanks estimated as per specifications.

4.3.2.4 The tank farm shall be separated by distance 4m apart from buildings, any tank openings or offset filling points shall be on the opposite direction, 6m away from dispensing units.

4.3.3 Buildings Specifications

Each service station shall include buildings, constructed in conformity with building and construction standards and regulations existing at the time, to serve but not limited to functions of office block, sanitary wash rooms, canopy, generator house and service station store.

Buildings shall be constructed of inflammable materials and their wiring systems shall conform to Electrical Installations and Equipment in Buildings Standard of 2004.

4.3.4 Exits and Entrances

The entrances and exits to the service station shall be of sufficient size and be positioned in such a way that drivers are not obstructed from other road users by structures and features within and in the neighborhood. In detail, the following shall be considered:

- a) minimum width of the entrance and exits including the side walk shall be 9.0 m;
- b) maximum angle of intersection of the drive way with the street pavement shall be 90°;
- c) minimum distance of the driveway to any exterior property line shall be 6 m; and
- d) minimum distance between kerbs sites shall be 9 m (width of entrances).

4.3.5 Boundaries

In respect to the surroundings environment, appropriate boundary fencing shall be provided for the interest of security of the station and the surrounding environment. For a service station in an urban setting, an appropriate wall fence / fire wall in brick / blockwork (bonded by cement - sand mortar) raised at least 1.8 m high for wall fence and 3m high for fire wall shall be erected around the station excluding the frontage, all subject to the local authority's approval.

4.4 Design Specifications for Service Stations

4.4.1 General

Plans submitted for approval to the approving authority shall be endorsed by a registered engineer who hereby certifies that such plans comply with the provisions of this standard and other relevant government laws or regulatory requirements existing at the time.

4.4.2 Design Area Specifications

4.4.2.1 Total Service Station Coverage Area

The total area required will depend on forecourt area, the size and orientation of the building and, tank farm area (depending on number and capacity of installed underground tanks). To allow for turning of vehicles and to avoid traffic congestion within the station area, the minimum area of a service station shall be set as follows:

- a) the minimum size for a filling station shall be 40 m x 40 m; however, in intensely developed areas the frontage can be reviewed after investigation subject to approval of the relevant authority(ies). This area excludes area required for other services other than storage and dispensing petroleum products (motor fuel); and
- b) every service station shall have enough parking space to accommodate vehicles as required by the national building regulations and provide at least 10% of parking lots reserved for handicapped.

4.5 Minimum Requirements for Construction of a Petroleum Retail Outlet

4.5.1 Underground Storage Tanks shall as a minimum requirement be double-walled of rolled carbon steel plates welded together.

4.5.2 All storage tanks at retail dispensing sites shall be placed underground.

4.5.3 The tank shall have a protective coating. As a minimum requirement, the tank shall be painted with a primer, and then coated with epoxy, coal tar epoxy or similar bituminous coating. Where the water table is high, additional protective coating measures must be undertaken.

4.5.4 An environmental impact assessment shall be done before construction commencement of tank installations is permitted.

4.5.5 A site soil analysis should be done to determine the type of soil, density, resistively bearing pressure and depth of water table.

4.5.6 Where aggressive soils have been encountered and where the water table is high, high-density polythene or fiberglass outer wall should be used.

4.5.7 Suitable sand shall be used for both bedding and backfilling of steel tanks.

4.5.8 Installed tank and pipe work shall be hydrostatically tested.

4.5.9 Underground Storage Tanks to be located such that delivery trucks do not block forecourt traffic.

4.5.10 Underground Storage Tanks location shall allow trucks to reach all fill pipes using normal hose length.

4.5.11 Underground Storage Tanks location shall provide a forecourt gradient that allows complete drainage of delivery truck compartments.

4.5.12 Underground Storage Tanks location shall allow minimum maneuvering of truck before and after delivery including ability to exit in forward direction.

4.5.13 Placement of Underground Storage Tanks under canopy shall be avoided.

4.6 Minimum Requirements of an Operating Petroleum Retail Outlet

4.6.1 A petrol filling station shall have at least:

- a) One (1) underground storage tank for each petroleum product sold at the station with a minimum capacity of 9 m³
- b) One digital dispensing pump (two-way) for each petroleum product sold at the station.
- c) All dispensing pumps shall be covered
- d) One standby generator
- e) Office
- f) wastewater drainage system with oil/water separators
- g) Firefighting equipment

4.6.2 Environmental Protection Measures

4.6.2.1 Environmental impact assessment shall be done before licensing and construction of any filling station.

4.6.2.2 Periodic environmental audits shall be performed regularly on already existing filling stations.

4.6.2.3 Employees and public health and safety protection measures must be assured. These must include insurance coverage for the staff and third party.

4.6.2.4 Product testing/update laboratories is a prerequisite for operation of a filling station.

4.6.2.5 Waste segregation containers shall always be clearly labelled with their contents and empty oil containers should be stored in separate waste bin clearly marked.

4.6.3 Canopy

4.6.3.1 Canopy shall have at least a minimum height of five (5) meters, its structures shall be constructed of non-combustible materials that conform with Buildings Standard 2004.

4.6.3.2 The area under the canopy shall be concrete and the hazardous area demarcated around the dispenser islands must be covered with a canopy extending outside a minimum of 1.5 m on all sides and raised as to comply with national Buildings Standard 2004.

4.6.4 Drainage and Oil/Water Separators

4.6.4.1 The forecourt shall be designed with drain channels to capture all wastewater from the forecourt, wash bays and service bays.

4.6.4.2 The wash water shall be directed to a suitably designed three chamber oil/water separators to separate oil before the effluent is permitted to flow in public storm water system.

4.6.4.3 Drainage system shall be connected to septic tanks or other suitable disposal facilities. Contamination with product in such systems is to be avoided.

4.6.4.4 Effluent going into the public waterways shall be monitored regularly and records maintained to ensure that it does not exceed the required limits.

4.6.5 Spill Containment Kit

4.6.5.1 A complete spill containment kit shall be provided in a bin with a tight-fitting lid, with spill procedure on how to deal with spillages clearly displayed on it, and must be accessible in case of spillages.

4.6.5.2 Absorbents are basically recommended for containing spillages. Adequate supplies of absorbents shall be available at all times.

4.6.5.3 Only competent personnel shall use oil spill kits.

4.6.6 Firefighting Protection

4.6.6.1 Adequate water reticulation system shall be installed to ensure sufficient water supply in case of fire outbreaks.

4.6.6.2 An emergency shut-off switch shall be provided at retail site; it shall be situated in a readily accessible safe position, remote from the pumps(s), for shutting off the power to all pumps in cases of an emergency.

4.6.6.3 When the "emergency stop" is activated, it shall cut all power to the forecourt. Each suction pump/dispenser shall have an individual circuit protection with overload and short circuit and effective means of isolation.

4.6.6.4 Fire hose reel shall be installed, maintained, serviced and so located strategically to cover the furthest point of the structure to prevent spreading of the fire.

4.6.6.5 Fire hydrants shall be installed on approval by the fire authority. This equipment should be selected and located to enable fires adjacent to the storage vessel to be extinguished and so prevent spreading of the fire. The final system of protection should be acceptable to the local fire authority. Access to the installation and to areas around the installation should be provided for the purpose of firefighting and the area should be kept clear at all times.

4.6.6.6 An appropriate inventory of fire extinguishers, at least (1 powdered type 9 kg and 1 CO₂ 5 kg or 1 powdered type 9 kg per pump stand), shall be available at the retail site and the extinguishers shall be serviced every six months.

- a) All fire-extinguishers shall be protected from the weather.
- b) Dry-chemical powders shall be of a type that complies with SANS 1522 and is compatible with the intended application.

4.6.6.7 Fire alarms shall be provided of such volume and tone that they are clearly distinguishable from background noise to alert personnel within the retail site in case of emergencies. Hand-cranked or compressed gas units may also be used.

4.6.6.8 A notice, on which the telephone numbers of the fire service and other emergency services are clearly recorded, shall be displayed near every telephone, at the control centre and clearly displayed on site.

4.6.6.9 An emergency assembly point area shall be identified and located strategically within the premises with prominent displayed signage.

4.6.6.10 Emergency assembly point signage shall be clearly displayed at a retail site as part of the Emergency plans which shall be prepared to cover foreseeable types of emergencies, which shall cover situations that range from a small incident to one of disaster proportions where considerable assistance from outside organizations is needed.

4.6.7 Installation, Calibration, and Protection of Pumps

4.6.7.1 The installation of dispensers shall comply with the manufacturer's instructions and comply with this standard on equipment designed for use in petroleum retail outlet.

4.6.7.2 Dispensers shall be of digital type, installed under the standard canopy and calibrated by the competent authority at least twice a year.

4.6.7.3 Dispenser pumps shall be verified with an approved measuring instrument and by certified personnel Authorized by the relevant Authorities.

4.6.7.4 Dispenser Pumps Stands shall be protected by pump island projecting at least 300 mm from the base and of height at least 150 mm above finished floor level and with Steel bollards or crash barriers to protect them from being damaged by vehicles.

4.6.7.5 No fuel pumps or other mechanical equipment shall be installed so as to permit refueling of motor vehicles standing in a public street or highway.

4.6.7.6 The minimum distance required between adjacent dispensers' islands shall be at least six (6) meters.

4.6.7.7 After the installation of dispensers, ensure that the dispensers and pumping units, hoses, nozzles together with associated valves are checked for leaks before any service operation.

4.6.7.8 Hoses shall always be properly hung and regularly checked for damages or leaks.

4.6.8 Trainings

4.6.8.1 Safety, Health and Environmental trainings shall include but not limited to operational procedures, emergency procedures, spillage procedures and safe working practices, information on specific hazards, first aid and fire-fighting, and the proper use of protective equipment. Such trainings should be conducted through the accredited institutions.

4.6.8.2 Periodic refresher trainings shall be maintained.

4.6.9 First Aid Kit

4.6.9.1 Industrial First Aid kit shall be provided at retail site which shall be available and accessible in case of emergency.

4.6.10 Safety and Protection Measures

4.6.10.1 The following specific safety and protection measures shall be provided for in accordance with the OHS requirements:

- a) first-aid treatment;
- b) medical assistance;
- c) emergency treatment;
- d) prevention of inhalation of fumes;
- e) protective clothing;
- f) protective footwear;
- g) breathing apparatus; and
- h) safety goggles or eye shields.

4.6.11 Vapour Vents

4.6.11.1 Underground Storage Tanks shall be fitted with appropriately sized vapour vents.

4.6.11.2 Vents shall terminate in open air in such a position that flammable vapours will not accumulate or travel to unsafe place.

4.6.11.3 Vent pipes outlets shall be located that they are at least, at 600 mm above adjacent building roof level, 3,5 m above ground level, 1,5 m from any door, window, or other opening in a building, 1,5 m of any electrical and electronic equipment or any other source of ignition, 3m from combustible material and the site shall be kept free from obstructions and combustible rubbish. Grass (landscaping) shall always be kept short.

4.6.11.4 The vent pipes shall so terminate that the fumes are exhausted vertically upwards. Discharge shall not be vertically downwards. The termination shall be protected by means of a screen. The fact that petroleum vapours are heavier than air shall be taken into account, and free rapid dispersion shall be allowed for at the termination of the vent.

4.6.11.5 The vent outlets shall be located such that the outlets:

- a) are not situated beyond the existing building line boundary on a stand;
- b) allow unrestricted venting to the open air;
- c) are at least;
 - i. when affixed to a building or structure at 600 mm above adjacent roof level within the hazardous zone (1,5 m radius);
 - ii. 3,5 m above ground level;
 - iii. 1,5 m from any door, window, or other opening in a building or air intake system/point;
 - iv. 3 m from any chimney opening, any hot surface;
 - v. are, if possible, within sight of the filling point (under certain circumstances, where the vent outlet is not within sight of the filling point, the approving authority may require that an alternative warning system/procedure be employed to guard against the possibility of overfilling), and
 - vi. are not installed within 1,5 m of any electrical and electronic equipment or any other source of ignition.

4.6.12 Electrical Installations of a Service Station

All electrical and electronic installations shall comply with the requirements of the relevant standard and any other health and safety requirements. Any device capable of emitting electro-magnetic waves is installed, care shall be taken to ensure that it cannot induce a current or charge which could ignite a flammable material. The dispenser circuit shall be provided with an isolating circuit breaker for disconnection from the source of electrical energy.

4.6.13 Supply of Electricity

The service station site shall be supplied with electricity via underground cables suitably protected against mechanical and environmental damage and routed outside the hazardous areas. The back-up power supply shall not be located in the vicinity of the hazardous areas.

4.6.14 Identification of Tanks

Each tank of a service station shall be marked with an identifying number to distinguish it from any other tank. In the event of multi-compartment tanks, each compartment shall be marked with a separate number and type of petroleum product with the following specific color:

- (a) Blue color; for Kerosene;
- (b) Purple color for Diesel; and
- (c) Green color for Gasoline

4.6.15 Identification of Dispensers

4.6.15.1 The dispensers' panels and dispenser pumps shall be clearly marked to indicate the type of petroleum products distributed with the following colors:

- (a) Blue color; for Kerosene;
- (b) Purple color for Diesel; and
- (c) Green color for Gasoline

4.6.15.2 The pump price is to be displayed and visible to customers in local currency and the volume of product dispensed in liters.

4.6.16 Leaks Detection

Any suspected tank or compartment shall be subjected to an ullage test using water or a pressure test and any defective storage and dispensing equipment shall be taken out of service; Underground tanks and supply pipelines shall be monitored regularly to detect leaks and an automatic leak detection system must be installed.

4.6.17 Safety Signs

4.6.17.1 Safety signs shall be conspicuously posted at the individual dispensing area incorporating the following wordings: "*NO SMOKING, NO NAKED LIGHTS, SWITCH OFF ENGINE, NO CELLPHONES and DANGEROUS GOODS*". The lettering shall be at least 150mm. The signs shall be posted not less than 1.8m and not more than 2m above the ground level.

4.6.17.2 The signs shall be of such color, type and sizes that can be read from a distance of 7,5 m.

4.6.17.3 Entrances and exits are made of artificially illuminated retro reflective material and readable from a distance of 50 m.

4.6.18 Road Tanker Stand

The road tanker stands for delivering petroleum products into storage tanks shall be in the open, away from buildings, dispensing activities and emergency escape routes. It shall be large enough to allow a road tanker to be positioned wholly within it during delivery.

4.6.19 Surface Drainage

Surface drainage of any area surrounding dispensers and road tanker delivery points shall be arranged to carry any spills or leaks of petrol, through trapped gullies or by channels, to petrol oil-water separators before draining from the service station.

4.6.20 In-situ Leak Test

A full system pressure leak test at 40 kPa in accordance with an approved test method shall be carried out on the tank after installation.

4.6.21 Overfill Protection

4.6.21.1 Care shall be taken to ensure that the basic indication that an overfill has occurred or is imminent, is not the spilling off the product out of the dip pipe but a slowing down or stoppage of the delivery meter. To achieve this, a backpressure has to develop in the storage tank.

4.6.21.2 The dip cap shall be able to seal against a hydrostatic pressure of at least the pressure of the tank or that of the delivery head (whichever is the greatest), and shall be securely closed before delivery takes place.

4.6.21.3 The tank shall be fitted with an overfill protector. The critical level shall be such that a space remains in the tank to accommodate the delivery hose volume (the standard 2 % ullage will suffice).

4.6.22 Water Detection

4.6.22.1 Water shall be detected by periodically wiping water-finding paste onto the bottom of the tank dipstick where a change of color indicating the depth of free water present or by an appropriate technology subject to approval. The free water present in any tank shall not exceed 25mm in depth when measured with the water-finding paste.

4.6.22.2 Underground tanks and supply pipelines are monitored regularly to detect leaks.

4.6.22.3 Any suspected tank or compartment is subject to an ullage test using water or a pressure test and any defective storage and dispensing equipment shall be taken out of service.

5 Reporting Incidents

Always report major or significant leaks and spillages incidents to the Regulatory Authority within 48 hours and clearly provide the following:

- a) The location and date of the incident;
- b) A brief description of the incident, injuries to people or property;
- c) The corrective actions taken, if any.

6 Color Identification of Fire-Fighting Equipment

All fire-fighting equipment shall be painted a distinctive red (A11 signal red or A14 poppy red), and Notices shall be displayed in accordance with the requirements of DUS 962 and the location of equipment that is not visible shall be clearly indicated.

7 Safety Representative

All selected key employees shall be trained and remain competent to deal with all possible emergencies and shall be conversant with the principles of fire-fighting and the operation of the fire-fighting equipment provided in their work environment.

An adequate number of employees shall be trained to stand in for absent trained key employees during periods of leave (including absences due to sickness) and on public holidays. Records shall be kept of all training, as required by the OHS requirements.

8 Protection and welfare of personnel

It is assumed that, the type of plant and equipment installed, and the methods of operation are fully in accordance with the relevant recommendations given in this standard, and that familiarity and general compliance with ordinances are ensured.

All accidents and dangerous occurrences shall be reported to the designated person or safety representative, who shall arrange for medical attention for the injured and for the elimination of unsafe conditions or unsafe actions, or both.

9 Contact with Petroleum Products

Contact with petroleum products and the associated dangers require that the following points be attended to:

- a) prevention and treatment of contamination;
- b) prevention and treatment of occupational diseases;
- c) prevention of fuel contamination;
- d) correct handling of materials and packages by hand;
- e) accident reports;
- f) good housekeeping;
- g) welfare facilities; and
- h) material safety data sheet.

10 Repairs and Alterations

10.1 Permits

Any major maintenance of or extensions or major repair work to a petroleum filling station shall be carried out after an appropriate permit has been issued as determined by the relevant body.

To ensure safety, construction and repair work shall only be performed if written permission has been granted by the manager or his authorized representative. This will follow but not be limited to the following procedure:

- a) lay down clearly defined responsibilities;
- b) adopt specific and explicit rules and regulations;
- c) ensure that instructions and orders given are simple and clear; and
- d) ensure that the cathodic protection system is turned off before the start of any work on pipelines, pumps, valves, etc.

10.2 Equipment

Repairs or alterations shall not be permitted on any plant or equipment while such plant or equipment is in use. When repairs or alterations necessitate the dismantling of essential items of system such as valves, pumps and pipelines, a specific notice shall be issued to all concerned.

10.3 Pipelines, Pumps and Valves

In the event of a broken connection, no reliance shall be placed on closed valves. Complete drainage shall be effected and openings shall be closed properly by means of blank flanges or line blinds. Any spillage of product shall be collected and disposed of in an acceptable way. When continuity in a pipeline is broken, the work area shall be bridged with a heavy electrical jumper cable to reduce the risk of sparks from stray or induced currents.

10.4 Hot Work

When any hot work is to be carried out in a hazardous area that contains a petroleum product, a high degree of control and supervision shall be maintained.

NOTE: All petroleum products become flammable when heated to their Flash points.

10.5 Electrical Equipment

An accredited person shall certify that the electrical equipment has been isolated and locked out safely before any repair, adjustment or test is commenced. Warning notices (symbolic signs) shall be hung onto or affixed to main switches or circuit-breakers, to prevent accidental switching on while repairs are in progress. After repairs have been completed, an accredited person shall certify that the apparatus is in order, both mechanically and electrically, before it is brought back into use.

10.6 Plant

When a mobile plant is temporarily stationed in a hazardous area for maintenance, repair or other purposes, care shall be taken to ensure that the plant is of such construction that it is not likely to cause a fire by the emission of sparks or flames, or by any other source of ignition.

Bibliography

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