ETHIOPIAN STANDARD

ES 7022:2023

Requirements for Fuel Station Facilities

ICS:

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Foreword

This Ethiopian Standard has been prepared by the Technical Committee for Fluid systems and Heat Transfer (TC 48), approved by the National Standardization Council and published by the Ethiopian Standards Institute (IES)

In preparing the working draft, relevant technical information source documents including recommendations from Ethiopian Oil Companies Association (EOCA), Oil companies and the Ethiopian Petroleum and Energy Authority (EPEA) has been incorporated.

Acknowledgement is made to EPEA for its efficient and effective collaboration with IES and for its unreserved effort in achieving the desired outcome, developing this standard.

Requirements for Fuel Station Facilities

1. Scope

This Ethiopian standard specifies requirement for Fuel Station Facilities.

This standard does not cover the installation of pressurized storage tanks and cylinders used for liquefied petroleum gases (LPG)

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.

ES ISO 844, *Cellular plastics — Determination of compression properties*
ES ISO 1209-1, *Determination of flexural properties — Part 1: Basic bending test*
ES ISO 1209-2, *Determination of creep behavior — Part 2: Flexural creep by threw*
ES ISO 3219, *Plastics — Polymers/resins in the liquid state or as emulsions or dispersions — Determination of viscosity using a rotational viscometer with defined shear rate*
ES ISO 4590, *Cellular plastics — Determination of volume percentage of open and closed cells of rigid materials*
ES ISO 845, *Cellular plastics and rubbers — Determination of apparent density*
ES ISO 7-1, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Designation, dimensions and tolerances*
ES (API RP 1604),Closure of underground petroleum storage tanks.
ES 951-2:2011, Fiber-reinforced plastics (FRP) tanks for buried (underground) storage of petroleum product
ES ISO 7165:2009Firefighting— Portable fire extinguishers — Performance and construction.
ES ISO 3183:2019 Petroleum and natural gas industries — Steel pipe for pipeline transportation systems
ES ISO 7005-1:2011 Pipe flanges — Part 1: Steel flanges for industrial and general service piping systems
ES ISO 16961:2015 Petroleum, petrochemical and natural gas industries — Internal coating and lining of steel storage tanks
ES ISO 15614-7:2016 Specification and qualification of welding procedures for metallic materials — welding procedure test — Part 7: Overlay welding
ES ISO 45001:2018 Occupational health and safety management systems — Requirements with guidance for use.
ES ISO 3864-3: Graphical symbols — safety colors and safety signs —design principles for graphical symbols for use in safety signs
ES ISO 3864-4: 2016 Graphical symbols - safety colors and safety signs - part 4colorimetric andphotometric properties of safety sign materials

3. Terms and Definition

For the purpose of this standard the following terms and definition shall apply

3.1

Acceptable

acceptable to the parties concluding the purchase contract, but in relation to the certification mark and to inspections carried out by approving authority, acceptable to the Standards.

3.2

Ancillary equipment

means any devices including, but not limited to, such devices as **piping, fittings, flanges, valves, and pumps** used to distribute, meter, or control the flow of regulated substances to and from an UST.

3.3

Backfill material:

clean, sieved subsoil or sand of specified grading

3.4

Calibration chart (tank table)

gives the needed information about the level (height) and the corresponding volume of the petroleum product in the storage tank.

3.5

Canopy

architectural projections that provide weather protection, identity or decoration and is supported by the building to which it is attached and at the outer end by not less than one stanchion

3.6

Competent person

person who has the necessary knowledge of and ability with regard to the particular process or type of plant and equipment to which this standard refers, to render him capable of the work involved, and who has been duly authorized (in writing) by the approving authority to perform a specific and identified task

3.7

Dispensing pump

unit that consists of one or more meters and one or more hoses and that has its own pump(s) within the unit or that is fed from a remote pump.

3.8

Digital transaction

Is a process by which transactions take place without the use of cash and the fuel station shall be implementing the system.

3.9

Digital transaction
involves the collaboration of several parties including large financial firms and a number of sectors within the economy.

3.10
Dipstick
a stick reading is a measurement of the fuel or fluid in a tank that is obtained by inserting a marked measuring stick into the tank. A stick reading is also called a fuel dip. To monitor tanks for leaks, government agencies or business practices can require periodic measurements for all underground storage tanks

3.11
Double-walled tanks
is understood to be **a tank which has an 'extra' tank built around it**. A double wall may be required for the storage of hazardous fluids. The construction of a double wall does away with the need for a drip tray

3.12

Fiber-reinforced resin tank

tank made from a number of fiber glass strands (reinforcement) bound together using a resin and catalyst.

3.13
Filler
point for filling the tank with product

3.14
Filler box
box surrounding the filler point

3.15
Flash point
The lowest temperature at which the product gives off vapor sufficient to burn

3.16
Forecourt
open area in a service/filling station where automobiles stop to refuel

3.17
Hydrometer
is an instrument used to measure the specific gravity (or relative density) of liquids; that is, the ratio of the density of the liquid to the density of water.

3.18
OWI
Is Oil and Water Interceptor that can use to separate oil from water in effluent.

3.19
Permit
an official document or certificate issued by the authority having jurisdiction which authorizes performance of a specified activity

3.20
Plant
refers to machinery, equipment or apparatus used for an industrial activity. In construction, plant typically refers to heavy machinery and large equipment used on construction sites

3.21

Rapid drainage system
system that allows drainage of spillage from the filler box to the relevant underground tank and that is controlled by a suitable valve

3.22
Service station
facility constructed under this standard that offers sufficient capabilities to handle the storage of petroleum products (fuels and lubricants) in underground tanks, of individual tank capacity minimum of 50m^3or not exceeding 85 m3 and dispensing them to final consumers

3.23
Submersible pump
remote pump that feeds one or more dispensers and that is either completely submersed in the product or has its rotating parts submersed in the product within a tank.

3.24
Tank integrity test
a test to determine that a tank is sound and not leaking. For an underground tank, the term means a certified third-party test that meets environmental protection agency leak detection requirements.

3.25
Tank farm
the area where underground tanker is installed shall be clearly separated from the forecourt, well protected and maintained.

4 GENERAL REQUIREMENTS

4.1 SITE SELECTION

4.1.1 Selection of appropriate location is a primary factor that should be taken in to consideration as part of conducting feasibility study.

4.1.2 Fuel Stations should generally be located within a growth center or an urban area or other corridors as may be required by relevant authorities in line with distribution master plan.

4.1.3 Area of land shall be sufficient to accommodate all basic design features such as installation of equipment and allow safe maneuverings of vehicles within its confinement.

4.1.4 The length of the plot along the road shall not be less than 40 meters and the distance tangent to the road shall not be less than 35 meters.

4.1.5 The site shall be built with 500m safety distance from proximity of areas where surface and ground water are likely contaminated due to drainage emanating from the station, or other protected areas where there is potential negative impact to Environmental and public occupancy.

4.1.6 The minimum distance between existing fuel station and newly proposed to build shall be a minimum of 500m.

4.2 Construction

A fuel station shall have the following but not limited to:-

4.2.1 All storage tanker at fuel station shall be placed underground.

4.2.2 Steel tanker shall have a protective coating.

4.2.3 An environmental impact assessment shall be done before construction of fuel station is permitted.

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

4.2.5 The fuel station shall be far from public service institutions; archeological, historical and cultural sites.

4.2.6 Submersible pumps, suction pumps and dispensers shall comply with Relevant Ethiopian standard (or as per pump design specification).

4.2.7 Resetting dispensers and dispensing pumps shall comply with the requirements of the Weights and Measures.

4.2.8 fuel stations located within a growth center or an urban area or other corridors in city shall have a canopy, unless the natural factors are justified.

4.2.9 All electrical and electronic installation shall comply with the requirements of the Occupational Health and Safety ES ISO 45001, and Electrical Installation shall comply with Ethiopian national Grid Code.

4.2.10 A fuel station shall have a minimum of three (3) underground storage tankers.

4.2.11 For each petroleum product sold at the station there shall be at least one underground storage tanker with capacity of 50 m^3

4.2.12 Each petroleum product sold at the fuel station shall have one digital dispensing pump.

4.2.13 Utilities such as power, communication & water supply

4.2.14 Offices welfare facilities for personnel

4.2.15 One wastewater drainage system

4.2.16 Fire extinguishers

4.2.17 Concrete or asphalt ,Entrance /exit for vehicles and personnel

4.2.18 Solid block fence and Forecourt area sufficient to maneuver vehicle

4.2.19 Car washing and oil Change (Optional) which required additional plot area depending on size as prescribed under 4.1.4.

4.2.20 Display that show the trade (logo of the company) and services delivered

4.3 Quality and Volumetric Measuring Equipment shall include the below listed but not limited to:-

4.3.1 The retail station shall have its own dedicated bulk product measuring tools to ensure product received and stored fulfills the required quality and quantity and losses are with allowable limit.

4.3.2 Hydrometer to measure density of all products.

4.3.3 Storage tank calibration charts

4.3.4 Dipstick to measure trucks and tanks

4.3.5 Sampling tool glass or plastics (1000ml) jar for each products

4.3.6 Water finders or water paste color if any contamination of water with fuel

4.3.7 documentation and reporting and Others

4.4 Electrical installation

a) Uncertified electrical equipment or systems shall not be installed in hazardous locations.
b) All electrical work on installations shall be done by an accredited electrician or under the general control of an accredited electrician.

4.4.1 Electricians

Electricians shall provide a prescribed "Certificate of Compliance" for the work that they carry out. Electrical work in hazardous locations shall be certified as per Regulatory Authority's requirements.

4.4.2 Electric cables

a) Electric cables and wiring shall be so installed that they do not come into extended contact with substances that might be harmful to their insulation.
b) All cables within a fuel station shall be encased in suitable sleeve piping and buried either underground or within walls.
c) No bare cables shall run along surfaces on either ground or walls of building within a fuel station.

4.4.3 Buried cables

a) All power and electronic cables passing under paving and driveways shall be encased in suitable sleeve piping.
b) Marks shall be erected where buried cables pass to guide future maintenance and development activities

4.5 Underground Storage Tankers (UST)

4.5.1 Steel construction of 6mm thickness, and capable of operating up to 0.4bar internal pressure and 10mbar vacuum and tested with compressed air or water to pressure of 0.7bar.

4.5.2 Tank diameter should not exceed 2.86 meter to be fabricated from standard steel sheet metal size of 1.5mx3m.

4.5.3 All tanks shall be externally painted with corrosion protection buried below ground to 1meter depth.

4.5.3.1 The back filler shall be spread in layers of 150mm each layer being compacted to the requirement of Ethiopian building code.

4.5.3.2 Underground tanker is designed to be used with adequate backfill support, and they shall be installed using acceptable construction practices and acceptable fill materials.

4.5.3.3 To ensure that the bottom of the hole is flat, level and free from rocks and other foreign objects, and that the highest point of excavation shall be covered with at least 150 mm of backfill material compacted.

4.5.3.4 If so required for precaution against products leaks (in pipes or tanker), a suitable non-metallic sheet shall be placed on a bed of a river sand of thickness at least 150 mm. the sheeting shall be so placed that it has a fall of at least 150 mm to one corner in which an observation well shall be installed.

4.5.3.5 A Minimum backfill cover over tank shall be 750mm.

4.5.3.6 Concrete slab surface thickness shall be 150 mm and shall comply with CES 149.

4.5.3.7 The width and length shall be in accordance with the tanker plan dimensions plus the clearance of at least 500 mm all around.

4.5.4 Tank Integrity Testing

Tanks integrity testing shall be conducted for first time within 20 years and after every five years .

4.5.5 Internal Tank Cleaning

Tank is to be cleaned internally including removal of any solids, silt, or wax on tank floor or fittings prior to any inspection and/or repairs, changed of stored product or decommissioning can be done during Tank Integrity Testing.

4.5.6 Tank Ancillary Equipment- Valves and Strainers

Inspect to ensure they are:

a) Clean and free from sludge,
b) Operate freely and seat/seal correctly,
c) Maintenance in accordance with the manufacturer's instructions.

4.6 . Fuel Dispensing and Metering for suction Pumps

The following parts shall be inspected:

a) All parts to be cleaned and lubricated.
b) Housings to be checked as undamaged and securely fixed to bases.
c) Vapor barriers are installed and complete.
d) Hoses and fittings are sound and free from leaks
e) Cables are sound and their routing is free from moving items of equipment.
f) Delivery nozzle shut off devices operate correctly.
g) Pumps do not leak and do not make excess noise or vibration when operating.
h) Display is unbroken, illuminated and resets to zero when nozzle is removed from its holster.
i) Emergency hand gear, where fitted, operates correctly.
j) Pressure relief and bypass valves operate correctly.
k) Suction filter is not blocked.

5 Specific Requirements

5.1 Area, Design and Construction

5.1.1 The minimum area of a fuel station shall not be less than 1400 square meters with the frontage of not less than 40m.

5.1.2 A fuel station layout shall be composed of but not limited to the following structures:

5.1.2.1 A forecourt area

5.1.2.1.1 The fuel 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.

5.1.2.1.2 The area of fuel station forecourt can vary upwards depending 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.

5.1.2.1.3 The hazardous area around the dispenser islands shall be covered with a canopy if exist extending outside a minimum of 1.5 m on all sides and raised as to comply with CES 152.

5.1.2.1.4 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

5.1.2.1.5 Fuel dispenser shall be located at a minimum of 30 m from any residential building.

5.1.2.1.6 The distance of the dispenser from the walk way of adjacent road shall not be less than 8 meters.

5.1.2.1.7 Stations shall 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.

5.1.2.2 Building specification

5.1.2.2.1 Each fuel station shall include buildings, constructed in conformity with building and construction standards and regulations existing at the time, to serve but not limited to :-

5.1.2.2.2 Functions of office block, sanitary wash rooms, canopy, and standby power sourcer house and fuel station store.

5.1.2.2.3 Buildings shall be constructed of inflammable materials and their wiring systems shall conform to *Ethiopian national grid code.*

5.1.2.3 Entrances and exits

5.1.2.3.1 Entrance to and exit from the station shall be designed to allow safe enter of maximum vehicle size that can be accommodated. Signage shall be of illuminated or reflective type and vividly displayed for good visibility from distance including height to protect canopy from collision

5.1.2.3.2 Minimum width of the entrance and exits including the side walk shall be 10.0 m.

5.1.2.3.3 Minimum distance of the driveway to any exterior property line shall be 6.0 m.

5.1.3 Steel tanker

The steel tanker shall comply with the requirements specified in Annex A

5.1.3.1 Fiber glass tankers

Fiber glass tankers shall comply with the requirements specified in Annex B

5.1.3.2 Double wall tankers

Double wall tanker shall comply with the requirements specified in Annex A

5.1.4 Pumps and dispensers

5.1.4.1 Leak detector:

Each submersible pump should have a leak detector that automatically checks the integrity of the pipe work on the pressure side of the pump.

5.1.4.2 Shut-off valve

Each dispenser shall be fitted with an emergency shut-off valve that incorporates a shear section and has its body anchored rigidly below the dispenser in accordance with the manufacturer's specification.

5.1.4.3 Pump Island

Each dispenser shall be protected by a concrete or brick pump island projecting at least 300 mm from the base and of height at least 150 mm above finished floor level (see Figure 1). Alternatively, the pump island can be widened at the ends only, as illustrated in Figure 2.

5.1.4.4 Steel bollards/crash barriers

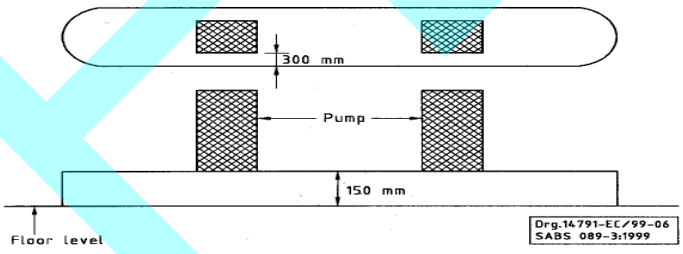
Steel bollards or crash barriers shall be installed, provided that they are acceptably fixed onto a concrete base.

5.1.4.5 Dispensing hose and Nozzle

5.1.4.5.1 Dispensers hose and hose assemblies shall meet ES ISO 1823

5.1.4.5.2 Nozzle used for dispensing fuel shall meet ES ISO 9159

Figure 1 Pump Island



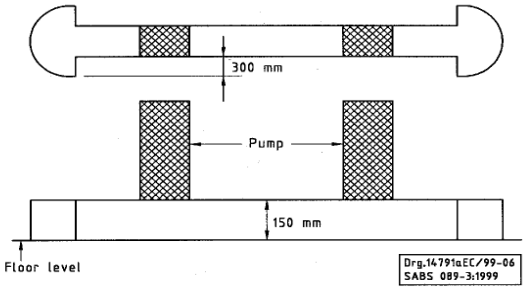


Figure 2 Alternative pump island.

5.1.4.6 Pipe works, fittings and discharging

5.1.4.6.1 Piping and fittings shall be suitable for working pressures and shall comply with the requirements of at least ES ISO111.

5.1.4.6.2 Steel pipework shall be laid out/spread in a geometrical pattern and shall be indicated on the plan of the site. All nonmetallic piping shall be laid out in accordance with the manufacturer's recommendations.

5.1.4.6.3 For suction pump, the distance of the pipeline from the tanker to the dispenser shall not be more than 20 meters, it shall be as straight as possible and the joints shall be properly fitted to prevent leakage.

5.1.4.7 Canopy

5.1.4.7.1 Where Canopies are built, it shall provide shelter to site workers and pump attendant from prolonged exposure to outdoor ultraviolet radiation and adverse weather conditions that could cause chronic ill health issues and deterioration of equipment.

5.1.4.7.2 Design, fabrication, and installation of canopy shall be in accordance with Ethiopian building code. Canopy foundation shall be adequately anchored to concrete footing along the dispenser island to withstand the worst wind and seismic loadings.

5.1.4.7.3 Height of the canopy ceiling from ground shall not be less than 5.20 meter.

5.1.4.7.4 The canopy ceiling shall be provided with adequate illumination within the vicinity of dispensers as per the standard.

5.1.4.7.5 The distance of canopy column from the road shall not be less than 8meters and the distance from any building shall not be less than 3meters.

5.1.4.7.6 The foundation of canopy shall be buried in concrete as per the Ethiopian building code.

5.1.4.7.7 The canopy shall contain the logo and brand color of the whole sale company.

5.1.4.8 Filling point.

5.1.4.8.1 The lines shall be capable of withstanding 1 bar positive pressure and a 0.6 bar vacuum pulse.

5.1.4.8.2 If the vent outlet is not within sight of the filling point, the approving authority may require that an alternative warning system/procedure shall employ to guard against the possibility of overfilling

5.1.4.8.3 The fill points for storage tanks should be positioned adjacent to the road tanker delivery stand.

5.1.4.8.4 Underground tanks, positioned remote from the tank (often described as offset) with a connecting fill pipe, or fitted to the side of an aboveground tank within a fill point cabinet.

5.1.4.8.5 To mitigate against the risk of leaks or spillage during tanker offloading, the fill point of the tank shall have direct line of sight from the tanker pump control position. The tanker driver, in control of the fuel delivery, must have clear unobstructed view of the tank fill point connection to ensure any emergency action can be taken swiftly.

5.1.4.9 Breather pipes or vent pipes

5.1.4.9.1 Breather pipes or vent pipes shall be of internal diameter at least 50 mm and shall terminate at a distance of at least 2.5 m away from any opening to a building, the distance being measured horizontally and the height from the ground shall be at least 3.5 meters.

5.1.4.9.2 The vent pipes shall end up that the fumes are exhausted vertically upwards or horizontally and discharge shall not be vertically downwards.

5.1.4.9.3 The end point of vent shall be protected by means of a screen.

5.1.4.9.4 No brick or other architectural screening of the vent end point shall be permitted.

5.1.4.9.5 One vent per tanker is required and these shall not be man folded since overfills can lead to cross-contamination.

5.1.4.9.6 The vent outlets shall be so located that they.

a) are not situated beyond the existing building line boundary on a stand excluding the street boundary,
b) allow unrestricted venting to the open air,
c) are at least
   i. 600 mm above roof level,
   ii. 3.5 m above ground level,
   iii. 2.5 m from any door, window, or other opening in a building, and
   iv. 3 m from any chimney opening, any hot surface, or any source of ignition,

d) Shall notbeinstalledwithin2.5m of any electrical and electronic equipment.

e) All breather/vent pipes shall be cross bonded using 2.5 mm copper cable and connected to a copper earth spike of length at least 1.2 m and of diameter 10 mm, driven into the ground as near as possible to the pipe(s) and connected to the pipe(s) using 2.5 mm green-plastic-insulated copper conductor.

f) Locations shall take into account conditions at or near the installation which could adversely affect safe dispersal of any discharge (e.g. the height and location of surrounding buildings).

g) Pressure-vacuum valves (PVV) shall be fitted to vents on tanks in which a product with a Flashpoint below 38°C is stored.

6 Operation

6.1 Drainage and interceptors

6.2 Surface water

Drainage shall be planned in accordance with Ethiopian Environmental Regulation Number No. 327-2014. Every advantage of natural seepage for disposal of surface water shall be utilized. Existing stormwater drains, rivers and streams shall be used to cope with the outflow, though it might be necessary to provide special catchment basins or seepage areas in large settings where heavy precipitation rates (that might temporarily be beyond the capacity of the local system) can be expected.

6.3 contaminant separation

i) Where it is necessary to use interceptors to separate contaminants from water, consult the relevant regulations as contained in the National Environmental Act.

ii) The collecting system shall be so designed as to minimize the amount of surface water (that results from precipitation and normal drainage channels) passing through the Interceptors .This is best achieved by providing separate systems for surface water and for water from contaminated sources such as dispensing and tanker filling areas.

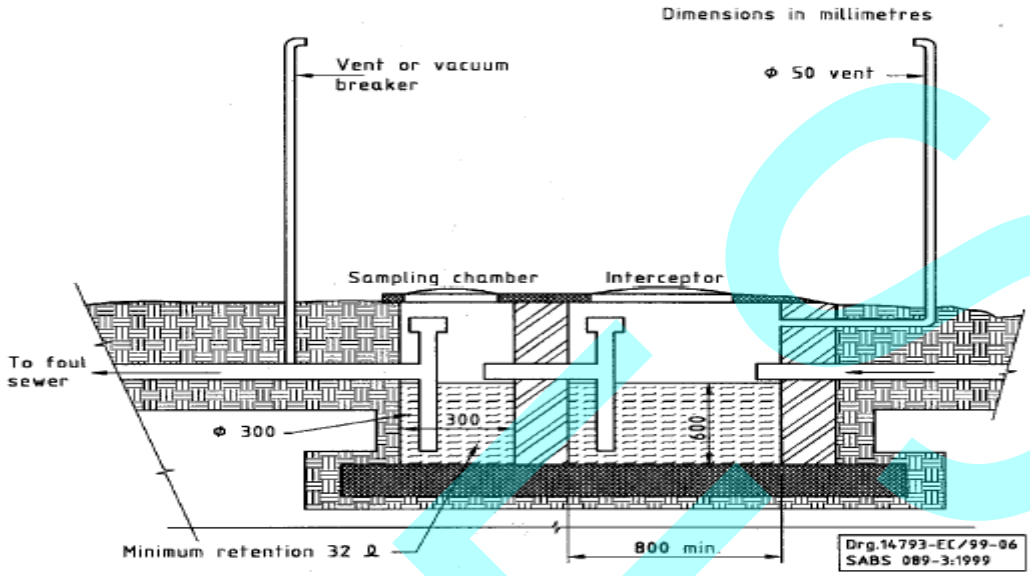
iii) The driveway area around the dispensers/dispensing pumps where spillage might occur during the refueling operation, shall be so graded that any effluent run-off will not flow the street, or into watercourses or into storm water systems without first passing through an interceptor.

iv) In contrary sufficient channels and slopes shall be constructed and maintained to stop outside effluent run-off from entering the fuel station forecourt.

v) Slopes of 1:50 to1:20 shall be maintained throughout the forecourt directing water and spillage towards the corresponding drainage channels.

vi) Where it is necessary to use interceptors to separate contaminants from water it shall meet the regulations of the relevant authority as contained in the Environmental Regulation Number No. 327-2014.

Figure 4:Sampling chamber and interceptor



6.4 Sewage

Where a local system for the disposal of sewage exists, it is obviously desirable that the drainage system be connected to it, but where this is impracticable, septic tanker or other suitable disposal units shall be installed.

6.5 Washing of vehicles

a) All wash-bays shall be so designed that effluent, detergents and contaminated water are contained. Run-off water that contains effluent shall be of such quality that it complies with the Relevant regulations of national environmental authority and by-laws of the local authority before the water pass into the relevant drains.

b) The minimum Length of a car washing bay shall be 6 meters

c) the width of a car washing bay shall be at least 3 meters,

d) There shall have enough space around the car washing bay for vehicles to maneuver in and out of the bay safely. A minimum of 1.5 meters of space shall be provided on either side of the bay.

6.6 Overfill protection during discharging fuel from trucks

a) 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 tanker.

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

c) The tanker shall be fitted with an overfill protector. The critical level shall be such that a space remains in the tanker to accommodate the delivery hose volume (the standard 3 % ullage will suffice).

6.7 Emergency

a) There shall be an "emergency stop" station so demarcated as to be easily visible in the forecourt and easily accessible for operation in case of an emergency. When the "emergency stop" is activated, it shall cut all power to the forecourt.

b) Each pump shall have an individual circuit with overload and thermal protection.

6.8 Hazardous installations

Electrical work in hazardous locations requires specialized knowledge and experience, so this type of installation shall only be designed and installed by persons competent in this field.

6.9 Marking of equipment

a) To provide easy identification, dispenser and dispenser pumps shall be clearly marked to indicate the product(s) dispensed.

b) Calibrated metering device displays, shall be visible to consumers and indicates the price in local currency and the volume of the products dispensed in metric/liter units.

6.10 Notice and labels

A fuel station shall have notices well displayed in appropriate and visible areas to indicate:

a) entrances and exits shall be made of artificially illuminated retro reflective material and read from a distance of 50 m;

b) Warning notices and signs such as, “Switch off engine”, “No smoking”, “Danger inflammable” and any other as authorities may deem necessary. These signs will be of such type and sizes that they can be read from a distance of 7.5 m

6.11 Fire-fighting equipment

All fire equipment and hydrant points shall be clearly identified by the appropriate colors and signs in accordance with National Fire Protection Regulation or an approved national standard. It is recommended that retro- reflective materials be used for this purpose.

6.12 Portable and mobile fire extinguishers

Heavy fire extinguishers include gas cartridge and stored pressure operated models and light included stored pressure water, co_2 and Stored Pressure Foam.

a) Each fuel station shall have portable fire extinguisher of not less than 9kgs per each pump island not more than two dispensing hoses.

b) Portable fire extinguishers shall be inspected once every six months by a designated person and those found to be defective on inspection shall be replaced.

c) Portable and mobile fire-extinguishers shall comply with ES ISO 7165.

d) Chemical powders shall be of a type that complies with ES ISO 5923 and is compatible with the intended application.

e) All fire-extinguishers shall be protected from adverse weather.

6.13 Couplings

a) Couplings for hoses, branch pipes, nozzles and connectors shall comply with the Ethiopian standard ES 2851:2021

b) All couplings shall be compatible with the local authority's fire-fighting equipment.

6.14 Fire alarms

6.15 Color identification of fire-fighting equipment

(A11 signal red or A14 poppy red), and Notices shall be displayed in accordance with the requirements of ES 3864.

6.16 Employees for fire-fighting

a) 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.

b) 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.

c) Records shall be kept of all training, as required by the ES ISO 9001.

6.17 Protection and welfare of personnel

a) All accidents and dangerous occurrences shall be reported to the designated person or safety representative,

b) Safety representative shall arrange for medical attention for the injured and for the elimination of unsafe conditions or unsafe actions, or both

6.18 Safety and protection measures

6.18.1 The fuel station shall have the following specific safety and protection measures but not limited to

a) first-aid treatment

b) protective clothing

c) protective foot wear

6.18.2 The fuel station should also provide the following specific safety and protection measures when discharging fuel from trucks

a) gloves ; and
b) Safety goggles or eye shields

6.19 Repairs and alterations

6.19.1 Any major maintenance of or extensions or major repair work to a fuel station shall be carried out after an appropriate permit has been issued by authorized body.

6.19.2 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) Where cathodic protection are installed, ensure system is turned off before the start of any work on Pipelines, pumps, valves, etc.

6.20 Equipment

a) Repairs or alterations shall not be permitted on any plant or equipment while such plant or equipment is in use.
b) 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.

6.20.1 Pipelines, pumps and valves

i. In the event of a broken connection, no reliance shall be placed on closed valves.
ii. Complete drainage shall be effective and openings shall be closed properly by means of blank flanges or line blinds.
iii. Any spillage of product shall be collected and disposed of in an acceptable way.
iv. 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.

6.20.2 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.

6.20.3 Electrical equipment

i. A certified person shall verify that the electrical equipment has been isolated and locked out safely before any repair, adjustment or test is commenced.
ii. 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.
iii. After repairs have been completed, a certified person shall confirm that the apparatus is in order, both mechanically and electrically, before it is brought back into use.

6.20.4 Plant

i. 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.

ii. No plant belonging to a contractor shall be used on the premises without the written permission of the manager or his authorized representative.

6.21 Personnel safety

All staff engaged in fuel station operational and maintenance duties shall be fully acquainted with the requirements of the safety regulations.

6.21.1 Supervision

Maintenance and inspection work shall be planned and supervised by responsible members of staff, who shall ensure that all relevant precautions are observed.

6.21.2 Use of casual and contractors' labor

i. When casual and contractors' laborers are employed, they shall be familiarized with all the relevant precautions adopted by the fuel station.

ii. When such laborers are employed in or adjacent to a hazardous area, strict supervision shall be arranged to ensure that all relevant precautions are observed.

6.22 Removal or abandonment of tankers and pipe work

6.22.1.1 Removal

i. A tanker or pipe work which is leaking or which is to be taken out of service permanently, shall be removed from the site, except in cases where there are well justified structural or practical Reasons against removal. In such cases the tanker or pipe work may be abandoned on site subject to approval by the local authority, and in compliance with the relevant requirements of National Environmental Protection Authority.

ii. Before any tanker or pipe work is removed, it shall be inspected and certified as free from all liquid hydrocarbons. All safety precautions shall be strictly adhered to at all times.

iii. When a tanker or pipe work is being removed, due precautions shall be taken against risks associated with the following:

a) The likely presence of hydrocarbons in the surrounding soil; and
b) The possible presence of explosive vapors in the tanker or pipe work (or both).

iv. Once a leaking tanker or leaking pipe work has been removed, it shall rehabilitate the surrounding area.

6.22.1.2 Corrosion protection

a) Where cathodic protection is required ,the tankers and pipe works shall full fill the requirement of ES ISO 12696

b) Installation of cathodic protection in hazardous location shall full fill safety requirements specified in ES ISO 12696.

Annex A

(Normative)

Design and construction of tanks

A.1 General

A.1.1 The minimum internal design pressure for a tank shall be equal to the static head measured from the top of the bulk delivery vehicle to the bottom of the installed tank.

A.1.2 A tank shall be capable of withstanding a working pressure (vacuum) of S20 kPa (that is,. atmospheric minus 20 kPa absolute).

A.1.3 A tank shall be able to resist the upward thrust of pressure generated by water surrounding the tank, taking due cognizance of any point loading imposed by the holding-down system.

A.1.4 A tank shall be able to withstand imposed loads generated by a legal maximum loaded wheel and axle system. A limit on the tank diameter might also be necessary if remote suction pumps are used instead of submersible pumps.

A.1.5 All tanks shall be internally free from loose dirt and foreign matter. All openings shall be sealed as soon as tests have been satisfactorily completed. Allowance shall be made for thermal breathing.

A.1.6 The manufacturer shall provide a general calibration chart per tank size.

A.1.7 The major dimensions of a tank shall be as specified by the purchaser.

A.2 Materials

A.2.1 Plates for shell and ends

For normal applications, tanks shall be constructed of carbon steel plates complying with the requirements of grade 43A of BS 4360:1979. Attention is drawn to situations where low temperature conditions apply and where steels complying with the requirements of BS 4360 with specified impact properties at low temperatures are necessary.

A.2.2 Standard tank sizes

Standard tank sizes shall conform to the dimensions given in Table 1A. The corresponding dished ends and compartment plates shall conform to the dimensions given in Table 2A as appropriate.

The ullages of the tanks given in Table 1A and Table 1B relate to tanks constructed with allbutt-welded shells overlapping the dished ends. Depending on the type of shell plate arrangement Used and the plate sizes available, there will necessarily be small variations in overall nominal capacities

A.2.3 Design

The tanks shall be constructed to dimensions selected from Table 1A

Nominal capacity (L)	Shell inside diameter D (mm)	Tangent length A (mm)	Overall length L (mm)	External end depth H (mm)	Approximate volume of two ends	Thickness		Approximate ullage(above nominal capacity) %
					Litres	t_b shell plate (minimum) Underground tanks (mm)	End plate and compartment plate (t_e) mm	
50,000	2750	8300	8938	319	2050	6	8	+3
55,000	2750	9200	9838	319	2050	6	8	+3
60,000	2750	10000	10638	319	2050	6	8	+3
70,000	2750	11750	12388	319	2050	6	8	+3
80,000	2750	13500	14138	319	2050	6	8	+3
90,000	2750	15250	15888	319	2050	6	8	+3

Table 1B-Dimensions and capacities of horizontal underground tanks with dished and flanged ends

Nominal capacity (L)	Shell inside diameter D (mm)	Tangent length A (mm)	Overall length L (mm)	External end depth H (mm)	Approximate volume of two ends	Thickness		Approximate ullage(above nominal capacity) %
					Litres	t_b shell plate (minimum) Underground tanks (mm)	End plate and compartment plate (t_e) mm	
50,000	2860	7800	8435	250	1070	6	6	+3
55,000	2860	8600	9100	250	1070	6	6	+3
60,000	2860	9300	9800	250	1070	6	6	+3
70,000	2860	10900	11400	250	1070	6	8	+3
80,000	2860	12500	13000	250	1070	6	8	+3
90,000	2860	14000	14500	250	1070	6	8	+3

Dimensions are approximate for reference.

Dished and flange end

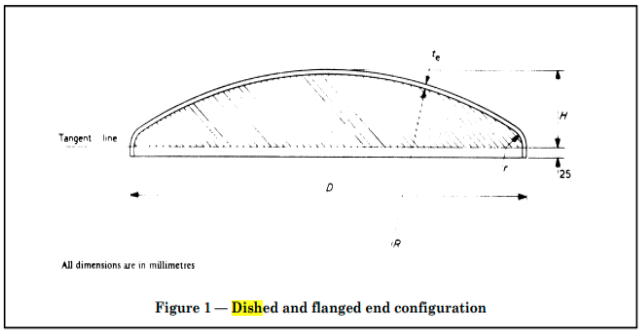


Figure 1 — Dished and flanged end configuration

Table 2A Dished and flanged end configuration (metric)

Inside diameter of tank D(mm)	Crown radius R(mm)	Knuckle radius r(mm)	Outside depth of end H (mm)	Approximate capacity of end (hatched portion) (litres)
1500	2000	50	184	184
2000	2700	50	230	402
2500	3500	50	270	728
2860	3500	50	319	1025

A.2.4 Manhole

Unless otherwise specified, the manhole center-line shall be positioned 450 mm from one end of the shell and shall be fabricated in accordance with Table 3.

NOTE The use of 460 mm inside diameter manholes is recommended on tanks up to and including 2 000 mm inside diameter. On tanks over 2 000 mm diameter and on tanks where

Personnel have to wear protective clothing for entry, the use of 600 mm inside diameter manholes is recommended.

Bolt holes shall be drilled off the tank longitudinal axis. Bolts or studs, nuts and washers shall be provided. The height of the neck from the tank shell to the top face of the flange shall be not less than 75 mm.

When manhole frames are formed as pressings from one single plate, the thickness at any point after pressing shall be not less than that of the tank shell plate.

In cases where manhole necks protrude inside the tank a vent shall be provided on each side of the neck, on the longitudinal axis, to prevent air locks.

A full-face manhole gasket shall be provided in a material agreed between the purchaser and the manufacturer.

Table Dimensions for manholes

All dimensions are in millimeters

Inside diameter of manhole d_1	460	600
Minimum plate thickness of manhole body t_p	6.0	6.0
Diameter of manhole flange and lid d_2	570	720
Minimum plate thickness of manhole flange and lid t_f	10	10
P.C.D. for bolts d_3	530	680

Diametre of bolt holes	18	18
Designation of bolts	M16	M16
Number of bolts	16	24

A.2.5 Tank testing

A.2.5.1 Pressure test

Each tank shall be thoroughly cleaned internally of all loose matter and then tested to a pressure of 0.7 bar2), measured at the top of the tank.

It is recommended that tanks be tested hydraulically, but a pneumatic test may be substituted at the discretion of the manufacturer unless otherwise specified by the purchaser. Where a pneumatic test is made the procedure in 10.3 shall be followed.

A.2.5.2 Hydraulic testing

The pressure shall be raised slowly and steadily until the test pressure is reached.

The pressure shall be maintained while a thorough examination is made to ensure that the tank is sound and shows no leaks or undue distortion.

After the test the tank shall be thoroughly dried out.

A.2.5.3 Pneumatic testing

Pneumatic testing is potentially a much more dangerous operation than hydraulic testing because, irrespective of tank size, any failure during test is likely to be of a highly explosive nature.

The manufacturer shall ensure that as far as is reasonably practicable, no person is exposed to injury should the tank fail during the test operation. The manufacturer shall take special precautions to minimize the risk of such injury.

Test certificate. A test certificate, recording the results of the pressure test carried out, shall be established and a copy shall be supplied to the purchaser on request.

A.2.5.4 Welds

All butt welds shall have a throat section not less than the thickness of the plates being joined and shall be welded from either:

a. both sides;
b. one side with removable backing strips, or
c. One side with consumable backing strips with the prior agreement of the purchaser.

In butt joints the root edges or root faces shall not be out of alignment by more than 25 % of the thickness of the thinner material, or 3 mm, whichever is less.

The leg length of fillet welds shall not be less than the thickness of the thinnest plate or parts that they join and they may be mitre or convex in profile.

In fillet welded joints the gap due to faulty workmanship or incorrect fit-up shall not exceed 1.5 mm

A.2.5.5 Quality of welds

The welded joints shall be free from defects that would impair the service performance of the construction, but slight incomplete root penetration in butt welds shall not be a cause for rejection.

The weld metal shall be properly fused with the parent metal without serious undercutting or overlapping at the toes of the weld.

Whenever practicable all welding shall be carried out in the flat position.

All slag shall be removed from welds and the visible surfaces shall be clean, regular and of consistently uniform contour.

Examination of welds shall be by visual means. Non-destructive techniques such as X-rays or ultrasonic shall not form criteria of acceptance for welds produced to this standard.

Annex B
(Normative)
Fiberglass tanker

B. 1 CONSTRUCTION

B1.1 General

B.1.1.1 A tank shall be provided with one or more lugs for lifting that are attached to the tank or can be attached to a fitting on the tank.

B.1.1.2 A tank shall be capable of being anchored.

B.2 Pipe Connections

B.2.1 A fitting for pipe connection shall be a standard threaded pipe coupling a threaded flange, a standard half pipe nipple, or a bolted and gasket flanged connection. The connection shall be bonded directly to the tank.

B.2.2 All openings in a tank shall be located in the top. They shall be located on the longitudinal centerline of the top when the tank is cylindrical. When the tank is spherical, the openings shall be located on the vertical centerline of the tank.

Exception: When the application of a tank is such that openings in the top for pipe connection are required to be grouped, the openings shall be located not more than 12 inches (305 mm) from the longitudinal centerline of the top of a cylindrical tank or the vertical centerline of a spherical tank. This exception applies when the upper end of each pipe coupling or other fitting for pipe connection terminates above the top of the shell.

B.2.3 An opening in a tank shall be closed with a wooden plug, metal cover, or the equivalent, to protect the threads or flange face and exclude foreign matter while the tank is in storage or in transit.

B.2.4 A tank shall have a fitting of a size not less than that specified in Table 4.1 for attachment of a vent pipe.

B.2.5 An opening for connection of a vent pipe in a manhole cover shall be grouped with at least one other opening.

Tank Capacity	**Nominal Pipe Size, inches[2]**
Liter	
0-1696	1 -1/4
1696-11,356	1 – 1/2
11,360-37,584	2
37,858-75,708	2 – 1/2
75,712- 132,489	3
132,493 – 189,270	4
Nominal pipe size are specification are in accordance with the standard for welded and seamless wrought steel pipe,	

B.3 Pipe Connections

B.3.1 A fitting for pipe connection shall be a standard threaded pipe coupling, a threaded flange, a standard half pipe nipple, or a bolted and gasket flanged connection. The connection shall be bonded directly to the tank.

B.3.2 All openings in a tank shall be located in the top. They shall be located on the longitudinal centerline of the top when the tank is cylindrical. When the tank is spherical, the openings shall be located on the vertical centerline of the tank.

Exception: When the application of a tank is such that openings in the top for pipe connection are required to be grouped, the openings shall be located not more than 12 inches (305 mm) from the longitudinal centerline of the top of a cylindrical tank or the vertical centerline of a spherical tank.

This exception applies when the upper end of each pipe coupling or other fitting for pipe connection terminates above the top of the shell.

B.3.3 An opening in a tank shall be closed with a wooden plug, metal cover, or the equivalent, to protect the threads or flange face and exclude foreign matter while the tank is in storage or in transit.

B.3.4 A tank shall have a fitting of a size not less than that specified in Table 4.1 for attachment of a vent pipe.

B.3.5 An opening for connection of a vent pipe in a manhole cover shall be grouped with at least one other opening.

B.3.6 For a double-wall tank, tests are first to be conducted on the primary containment (inner) tank. Upon successful completion of the tests, the complete tank assembly shall be subjected to the following tests:

a) The Water-Load Test, Section 11, conducted with the annulus empty, followed by the Leakage Test, Section 8;

b) The Strength of Lifting Fittings Tests, Section 10;

c) The Internal Pressure Test, Section 13, first with the inner tank at test pressure and the annulus vented to the atmosphere, and then with both the inner tank and the annulus at test pressure;

d) The Annulus Proof-Pressure Test, Section 16.

B.4 Leakage Test

B.4.1 A tank, including fittings, shall be tested as described in 8.2 and shall not leak

B.4.2 The tank is to be pressurized for 5 minutes to the applicable value specified in Table 8.1, and the entire surface is to be brushed or sprayed with a leak-detection-fluid Continuous formation of bubbles at any location on the tank surface is evidence of leakage. Table 8.1
Leakage-test pressure

Maximum diameter of tank feet(m)	Applied pressure psi (kpa)
10(3.0 or less) More than 10	5(34) 3(21)

B.5 Strength of Pipe Fittings Tests

B5.1 Torque

B.5.1.1A length of pipe shall be threaded into a fitting for pipe connection and shall be tightened to thetorque specified in Table 9.1. The fitting shall not crack or split and the threads shall not strip.

Table 9.1
Torques on pipe fittings

Nominal pipe size inches2	Toques, Pounds-Inches (N-m)	
¾	2000	(226)
1	2400	(271)
1-1/4	2900	(328)
1-1/2	3100	(350)
2	3300	(373)
2-1/2	3500	(395)
3	3600	(407)
3-1/2	3700	(418)
4	3800	(429)
6	4200	(475)
8	4600	(520)
Nominal pipe size specifications are in accordance with the for welded and seamless wrought steel pipe.		

B.6 bending moment

B.6.1 The bond between a fitting for pipe connection and the tank shall not be damaged as a result of being subjected to a bending moment as described in 6.2.2.

B.6.2 A 4-foot (1.2-m) length of Schedule 40 steel pipe is to be threaded into the fitting. A force is then to be applied to the top of the pipe. For a cylindrical tank, the force is first to be applied parallel to the longitudinal axis of the tank, and then transverse to the longitudinal axis of the tank. For a spherical tank, the force is first to be applied in any one direction and then perpendicular to the direction in which the force was first applied. The applied force is to be increased so that the bending moment is increased from zero to 2000 pound-feet (2712 N-m) in 250 pound-feet (339 N-m) increments. If the Schedule 40 pipe bends before the required bending moment is reached, the test is to be stopped and the fitting is to be examined for compliance with the requirements specified in 6.2.1.

B.6.3 After each of the tests specified in 6.1.1 and 6.2.1, the tank is to be subjected to the Leakage Test, Section 8.

B.7 Strength of Lifting Fittings Tests

B.7.1 A fitting intended to be used to lift and move a tank shall be subjected for 1 second to a load equal to twice that imposed by lifting the empty tank. When more than

one fitting is provided on a tank, the load is to be divided between the fittings in proportion to the loads to which they are subjected by lifting the tank as intended. The fitting shall not be damaged or damage the tank.

B.7.2 Following the test described in 7.1, the tank is to be subjected to the Leakage Test, Section 8.

B.8 Water-Load Test

B.8.1 A tank shall be:

a) Placed in a sand bed so that one-eighth of the tank diameter is buried, and

b) Filled to capacity with water for 1 hour.

The tank shall not be damage

B.9 External Pressure Test

B.9.1 A tank shall be tested as described in 9.2. The tank shall not implode or otherwise be damage

B.9.2 The empty tank is to be installed in a test pit using the specified anchoring system and the specified backfill procedure. The pit is then to be filled with water to such a level that the tank is submerged to its maximum specified burial depth. The tank is to remain submerged for 24 hours.

While the tank is still submerged, it is to be subjected for 1 minute to a partial internal vacuum so that the internal pressure on the tank is 5.3 inches of mercury (17.9 kPa) less than the external pressure imposed by the hydrostatic head.

B.10 Internal Pressure Test

B.10.1 A tank shall withstand without rupture for 1 minute an internal pressure as specified in Table 13.1.

Table 13.1
Internal Pressure Test

Maximum Diameter of the tank	Applied Pressure, Psl(KPa)
10(3.0) or less More than 10	25(172) 15(103)

B.11 Physical Properties of Materials Tests

B.11.1 General

B.11.1.1 Coupons cut directly from a representative tank laminate are to be used for the tests described in 11.1.2 11.6.2. The coupons are to measure at least 7.5 by 9 inches (190 by 229 mm) and are to be cut to minimize the amount of curvature; that is, the 7.5 inch dimension is to be parallel to the cylinder circumference. Each coupon is then to be cut to provide two smaller coupons; the first is to measure 2.5 by 9 inches (64 by 229 mm) and the second 5 by 9 inches (127 by 229 mm). Each

of these coupons is to be marked for identification. The 2.5 by 9 inch coupons are to be used for tests in the as-received condition and the 5 by 9 inch coupons are to be tested after conditioning.

B.11.2 Air-oven aging

B.11.2.1 Specimens from coupons conditioned as described in 11.2.2 are to be subjected to the tests specified in 11.3.1 and 11.3.2. The flexural properties and impact strength of the conditioned specimens shall be at least 80 percent of the flexural properties and impact strength of specimens from the unconditioned coupons.

B.11.2.2 One coupon is to be conditioned for 30, one for 90, and one for 180 days, in an air-circulating oven at a temperature of 70°C (158°F).

B.11.3 Physical properties

B.11.3.1 Specimens are to be subjected to the flexural modulus and fiber strength tests described in TestMethods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical InsulatingMaterials, ANSI/ASTM D790-91, using a crosshead speed of 0.1 inch per minute (2.5 mm/minute) andwith the inside surface facing down. Five specimens are to be cut from each coupon, parallel to thelongest dimension of the coupon.

B.11.3.2 Specimens is to be subjected to the Izod impact-strength test described in Test Methods for Impact Resistance of Plastics and Electrical Insulating Materials, ASTM D256-90b. Five specimens are to be cut from each coupon, parallel to the longest dimension of the coupon.

B.12 Earth-Load Test

B.12.1 A tank shall be subjected to the test specified in 12.2 and 12.3 and shall not implode, leak, or otherwise be damaged.

B.12.2 An empty tank of each diameter is to be installed in a test pit or an apron is to be constructed around the four sides of the tank. Back-filling is to be done according to the manufacturer's installation instructions. The tank is to be covered so that it is 3 feet (0.9 m) below the surface of the fill. The tank is to remain buried for at least 1 hour.

B.12.3 The tank is then to be subjected to the Leakage Test, Section 8.

B.13 Annulus Proof-Pressure Test

B.13.1 The annulus of a double-wall tank intended for positive- or negative-pressure monitoring for leakage detection shall be tested as described in 13.2. There shall be no rupture of the tank.

B.13.2 The annulus is to be subjected to rated maximum pressure or vacuum, as applicable, for 24 hours. For a positive-pressure tank, the annulus pressure is then to be increased to twice the rated maximum value, and maintained for 1 minute. For a negative-pressure tank, the annulus vacuum is then to be increased by 5.3 inches of mercury (17.9 kPa) and maintained for 1 minute.

B.14 MANUFACTURING AND PRODUCTION TESTS

B.14.1 Leakage Test

B.14.1.1 Each tank shall be tested, as a routine production-line test, for leakage as described in 8.2. If leakage is noted, the tank shall be repaired and retested.

B.15 Internal Vacuum Test

B.15.1 Each tank shall withstand, without rupture, an internal partial vacuum according to the equation:

V = (1/2 D + h) x 0.88 inches Hg/ft

In which:

V is the vacuum in inches Hg,

D is the tank diameter in feet, and

h is the maximum specified burial depth in feet, but not less than 3 feet.

Exception: A lower internal vacuum is to be used when the lower value, applied to the tank above ground, is representative of the specified value applied to the buried tank.

B.16 Surface Cure Test

B.16.1 Each tank shall be subjected, as a routine production-line test, to the barcol hardness test described in Test Method for Indentation Hardness of Rigid Plastics by Means of a Bar compressor, ASTM D2583-87. The hardness of the laminate shall be within the resin manufacturer's specified tolerances.

B.17MARKING

B.17.1General

B.17.1.1 All required markings shall be permanent, such as paint or paper labels imbedded in clear resin on the outside surface of the tank.

B.17.1.2 Each tank shall be legibly marked with the name of the manufacturer or a distinctive marking by which it shall be identified as the product of a particular manufacturer

B.17.1.3 When a manufacturer produces tanks at more than one factory, each tank shall have a distinctive marking to identify it as the product of a particular factory.

B.17.1.4 Each tank shall be marked with information that is required by the manufacturer. This marking shall include at least the following:

a) "Maximum test pressure X psig" or the equivalent, in which X is 5 for tanks 10 feet (3 m) in diameter or less and 3 for tanks larger than 10 feet in diameter.

b) "Keep tank vented," or the equivalent.

c) "Follow installation instructions," or the equivalent.

d) The word "CAUTION" and the following or the equivalent: "To reduce the risk of damage to the tank, do not fill tank prior to backfilling," UL COPYRIGHTED MATERIAL -
e) Do not all adopt tank for the equivalentHER REPRODUCTION OR

B.17.1.5 When a tank has a steel deflection plate under only one opening as covered in 6.1(b), the opening shall be marked to indicate that dipstick measurements shall be made only at that location. 20.5 revised April 2, 1996

B.17.1.6 A double-wall tank intended for pressure monitoring for leakage detection shall be marked, at the pressure connection, with the rated maximum positive or negative annulus pressure.

B.18 Installation Instructions

B.18.1 Two copies of the manufacturer's installation instructions shall be provided with each tank, one of which shall be embedded in clear resin on the outside surface of the tank.

B.18.2 The installation instructions shall include:

a) The method of intended lifting, including the intended distribution of the load between the fittings, when more than one fitting is provided, and

b) Indication that the backfill to be used shall be either pea gravel or compacted, clean dry sand, as specified by the manufacturer.