GUIDELINES ON LICENSING OF LPG RETICULATION

May, 2025
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DEFINITION OF TERMS

In this framework, unless the context otherwise requires, the following words shall have the meaning as defined:

“Reticulation “or "reticulated piped gas system": means a system for supply of liquefied petroleum gas through a network of pipes from a centralized storage point;

Multi-cylinder installation: means refers to a setup where multiple LPG (liquefied petroleum gas) cylinders are connected together to form a centralized gas supply system

Restricted Space: refers to an area that has limited access and ventilation, making it potentially hazardous for the installation and operation of LPG systems

Bulk installation: refers to the setup where a large storage tank is used to store liquefied petroleum gas (LPG) in bulk. This tank is connected to a network of pipes that distribute the gas to various points of use, such as residential, commercial, or industrial buildings.

LIST OF ACRONYMS

EPRA	Energy and Petroleum Regulatory Authority
KEBS	Kenya Bureau of Standards
OMCs	Oil Marketing Companies
LPG	Liquefied petroleum gas
OPSO	Over Pressure Shut off
UPSO	Under Pressure Shut off

1 INTRODUCTION AND BACKGROUND

In an era characterized by technological advancement and increasing emphasis on customer convenience, safety and efficiency, the integration of smart technologies with traditional fuel sources has gained significant traction especially in the Kenya market. At the forefront of these advancements is the LPG reticulation system, an innovation designed to give the customer convenience, augment safety and optimize usage.

The current administration envisages to enhance LPG penetration and increase LPG per capita consumption from the current 7.5 kg per year to 15 kg per year. The accessibility and affordability of LPG as a fuel in households is key to achieve this strategic objective.

The sale of LPG through the LPG reticulated system was first put in regulations in Kenya in 2018. The adoption of the technology has been implemented with several companies implementing this concept in construction of buildings.

The feedback on the uptake of this concept on LPG supply to end users has been positive, necessitating the development of a framework to facilitate its operation and full adoption. These guidelines outline the sale of LPG through an LPG reticulated system, consumer protection considerations and reticulation safety.

2 PURPOSE

The purpose of this framework is;

a) To enhance the adoption of sale of LPG through the LPG reticulated system;
b) To enhance safe use of LPG by promoting adoption of relevant Kenya Standards in the LPG value chain;
c) To facilitate collection of energy data as provided for in Section 10 of the Energy Act, 2019; and
d) To generate employment for small and midsize enterprises.

3 SCOPE

The framework shall apply to the installation, supply and sale of LPG through an LPG reticulated system, where storage tanks of individual water capacity is greater than

150 litres at domestic, commercial and industrial consumer premises. The guidelines include requirements for design by a qualified professional engineer, adherence to local building codes, proper pipe selection and routing, leak detection procedures, pressure regulation, safety devices like fire arrestors, clear labelling, regular maintenance checks, and strict permitting processes through the regulatory Authority aimed at ensuring safe and reliable operation of the system.

The provisions of the Petroleum Act 2019, and the prevailing LPG licensing regulations and applicable standards, alongside these guidelines shall the installation and use of LPG reticulation systems.

4 DESIGN AND INSTALLATION OF THE LPG RETICULATED SYSTEM

4.1 SIZING THE INSTALLATION

LPG reticulated systems like all other energy systems should be sized based on the estimated peak demand for the connected customers.

In determining the size of the installation, the installer shall assess the peak demand, the acceptable pressure drop in the system and the projected future demand. The piping system should be sized so as to provide sufficient supply capable of meeting the maximum demand and supply each appliance inlet at the minimum supply pressure required at the inlet.

Determining the maximum gas requirement is critical to avoid overdesigning the system leading to unnecessary capital expenditure. Pipe sizes shall be determined as per the requirements of NFPA 54/ ANSI Z223.1: National Fuel Gas Code.

4.2 COMPONENTS OF THE SYSTEM

4.2.1 LPG Storage Vessel

The storage vessel is the most integral part of the LPG reticulated system. The size of the tank is determined based on the demand profile of the connected users. Safety distance considerations shall be made when locating LPG storage vessels.

The best available option for the type of storage system supplying LPG to a reticulated project and the choice will depend on the space, access, criteria and type of installation. The storage system can be;

a) Multi-cylinder installation which is generally used in applications where the consumption is low; and

b) Bulk installation which is desirable in applications where the consumption is high. This has a bigger space requirement compared to the Multi-cylinder installation

General guidelines on installation of the storage system include:

- The design and location of the LPG tank shall be determined based on the provisions of KS EAS 924-2 or KS EAS 924-3 or the most recent standard approved by the Authority.
- Access of the delivery vehicle shall be such that the vehicle is allowed to enter and leave the installation without having to reverse.
- The installation shall be done in such a way that there shall be a clear line of site by the operator of the connection between the offloading tanker and the inlet connection to the storage tank at all times
- It is preferred that the demand is split into one or more equal capacity LPG storage vessels as a means of redundancy and to ensure continued supply to the customers at all times
- For additional safety burying or mounding the LPG storage vessels is recommended
- Buried storage vessels shall be installed in underground concrete chambers backfilled with dry-washed river sand. Storage vessels located underground shall be secured to prevent damage from flooding or accidental falling.
- Cylinders supplying LPG to a reticulated system should be secured to prevent damage in the event of accidental falling or flooding. Cylinder banks should be designed in pairs with one in active service and the other on standby. Automatic changeover devices will ensure the system maintains a gas supply once the active bank becomes empty

4.2.2 VAPOURISERS

If natural vaporisation of the LPG liquid in the tank is insufficient to meet peak demand, then vapourisers can be used.

The following considerations shall be made when installing vapourizers:

- The vapourisers shall be installed in parallel to facilitate maintenance and manage breakdown issues; and
- Vaporizers shall be installed in accordance with the provisions of KS 2963-1:2022

4.2.3 LPG PIPING

Piped gas systems can either be installed when the building is being constructed, or they can be retrofitted to an existing building that is being upgraded to include a gas utility

Guidelines for installation of pipework shall include the following:

- All pipe work shall be done in accordance with KS EAS 924-3 of 2020 standards;
- Pipes should be located at least 300mm from other utilities when the pipeline is buried; and
- Pipework should be sleeved if passing through walls, basements or sewer lines

4.2.3.1 BASIC RULES FOR GAS PIPING DESIGN AND ROUTING

LPG piping design and routing should consider the following basic rules;

- Minimize the length of gas pipe used - Locate at least 300 mm from other utilities when the pipeline is buried.
- Protect the pipe from physical damage and corrosion - Sleeve the pipework if passing through walls.
- Provide ease of access for inspection and maintenance
- Pipework should not pass-through basements, or sewer lines unless sleeved - There should be adequate test points.
- Allowance for thermal expansion and/or vibration and movement (0°C to 30°C will cause steel to expand by 33mm/100m)
- Provision should be made for emergency shut off valves
- Isolating valves should be fitted at both ends for pipes crossing roadways should be secured
- Pipework should be isolated by section to carry out servicing
- There should be proper depth of cover for underground pipes: 1.0m below load bearing roadways, 0.6m below pedestrian walkway
- If the depth of cover cannot be attained, a sleeve can be provided as added protection for shallower depth. A tracer tape should be installed to identify the pipework - Non-metallic flexible connectors should be avoided
- Consideration for Cathodic Protection shall be provided for pipework in contact with the ground

4.2.4 REGULATION

The pipework shall deliver the LPG from the vaporiser room to the appliances in the blocks, apartments and commercial complexes.

For large multi-storey buildings LPG shall be first routed to the top of the building before being distributed to the different consumer points.

4.2.4.1 First stage pressure regulation

The first stage pressure regulator should be installed as close as possible to the storage system (like a gas cylinder or tank). This is to minimize pressure drop in the piping and to facilitate more accurate pressure control at the point of use. Furthermore, the pressure reduction in the first stage should be limited to prevent condensation of vapor in low temperature conditions

4.2.4.2 Second stage pressure regulation

The vapor, after its initial pressure reduction, is directed to the roof of the buildings where the pressure is reduced again, likely in a second stage or pressure regulation process. This second stage aims to further control or mitigate the vapor movement within the building LPG piping system

4.2.4.2 Third stage pressure regulation

The third and final stage of pressure regulation occurs at the meter which reduces the pressure before entering the appliance. As with other equipment, it is good practice to have first and second pressure regulation designed in parallel to allow for periodic maintenance.

Regulators should be located outdoors where possible. If indoors, they must be vented to the atmosphere. They should be equipped with OPSO and UPSO as necessary. The outlet setting should meet the appliance.

4.2.5 LPG FLOW METERS

LPG flow meters provide a means of accurately measuring the amount of gas consumed by the end users. LPG Flow meters are thus required to be as accurate as possible

It is essential to ensure that meters are well calibrated at least annually, located in well-ventilated spaces, are not subjected to extreme temperatures and are located away from potential ignition sources

General conditions for installation of LPG flow meters shall include the following:

- Meters shall be located in well ventilated spaces and be accessible for reading, inspection, and maintenance;
- Meters shall not be subjected to extreme temperatures;

- Meters shall be protected against impact and physical damage;
- Meters should be adequately supported;
- Meters shall be located at least 300mm from any potential ignition sources (electricity meter/cable/wiring);
- Meters must meet the maximum expected pressure and permissible pressure drop in the LPG piping system;
- Use diaphragm type meters for is recommended in individual domestic applications;
- Meters made of tin or brass case type soldered construction should not be used for pressures over 1 psig;
- Meters shall be located close to the final stage regulators; and
- LPG flowmeters used shall meet the requirements of the standards KS 2968:2023

4.2.6 SAFETY DEVICES

4.2.6.1 Excess Flow Valves

Excess flow valves shall be installed to mitigate the effect of uncontrolled leaks

4.2.6.2 Emergency Shutdown Devices

Automatic Emergency shutdown devices shall be installed near the appliances whose operation shall be triggered by the actuation of the leak detection system

4.2.6.3 Leak Detection Systems

Leak detection systems shall be installed near the appliances to mitigate potential leaks from the LPG supply line

4.2.6.4 Metallic flexible hoses

Metallic flexible hoses shall be fitted where there might be excessive movement between gas supply and appliances

5 TESTING, COMMISSIONING AND MAINTENANCE

5.1 TESTING AND COMMISSIONING

The following shall be considered during testing and commissioning of LPG reticulated system as outlined in NFPA 54 (section 8.1);

All LPG piping should be inspected and tested by licensed LPG installers prior to being put into operation. The following general conditions shall be considered during testing:

- Prior to testing, the interior of the tank and pipework should be cleared of any foreign matter;
- The test medium can be Air, Nitrogen, CO_2, or a suitable Inert gas. Oxygen must never be used in testing LPG piping systems;
- All pipe joints should be exposed for examination during testing
- The LPG pipework shall be tested as a complete unit or in sections
- Test pressure should not be less than 1.5 times the maximum allowable working pressure
- Test duration should be maintained for not less than 30 minutes for each $14m^3$ of pipe volume (or fraction)
- Test duration is not required to exceed 24 hours
- The test pressure for Propane should be six (6) bars minimum
- The test pressure for Butane should be three (3) bars minimum
- Detection of leaks should be determined by a calibrated pressure measuring device and an approved gas detector or leak detection fluid
- If leak detection fluid is used it should be thoroughly rinsed off with water on completion of testing
- Any source of leak should be repaired or replaced and retested;
- Record the pressure test results, date and location and retain for future reference;
- After pressure testing, and when LPG is introduced into the system, the piping should be checked for leaks at the normal operating pressure before appliances are used;
- Once the system has been thoroughly inspected and tested, the installation must be immediately purged to remove any air from the system which would create an inflammable condition.
- To enable effective purging to take place there should be purging points designed into the system. Any appliances and equipment that are not included in the testing should be isolated or disconnected. Purging should be done outdoors if the pressure is over 2psig and the pipe diameter is greater than 63mm;
- Hydro tests and electrical continuity tests shall be done and records of the test maintained;
- In case gas detectors have been installed then they have to be tested;
- Basic Fire safety training shall be conducted to the operator and users of the LPG reticulated system;

- Completion certificates issued by the LPG installer shall be maintained; and
- Tests of the storage system relief systems shall be maintained

5.2 MAINTENANCE

Maintenance procedures for LPG reticulation systems are crucial to ensure safety, and reliability. In ensuring continuous safety in operation of the system, the developer shall:

a) Conduct routine inspections of the entire LPG reticulation system, including storage tanks, piping, valves and metering system. Inspection to check for any leaks, corrosion, and any signs of wear and tear.
b) Test and inspect the Bulk LPG storage system tested after five years. For Multi Cylinders installations, revalidation must be done after every 8 years;
c) Test LPG pipelines at least every three years;
d) Conduct regular visual inspections to check for any corrosion;
e) Carry out leak tests on pressure LPG pipelines;
f) Inspect pressure regulators annually and replace them after a period not exceeding ten years;
g) Replace Pressure relief valves every five years with new or re-certified units;
h) If fitted, pressure gauges should be inspected annually and replaced after a period not exceeding ten years;
i) Develop and regularly update a maintenance schedule for safety critical equipment in the LPG system;
j) Conduct regular Health, Environment and safety audits in accordance with applicable laws;
k) Carry out regular calibration of the storage tanks and metering systems to ensure accurate measurement and delivery of LPG. The calibration records should be well maintained for future reference; and
l) Review and update the emergency response plan regularly and conduct drills and training sessions of the users regularly to ensure preparedness in case of an emergency.

6 END USER SAFETY AWARENESS

End users of a reticulated LPG system may not be familiar with LPG. They may also be unfamiliar with using gas delivered through a meter for the first time.

The operator shall ensure that the end users are adequately trained and inducted on the use and safety aspect of the LPG reticulated system.

The end user training shall consider;

- Leak detection by listening for a 'hissing' noise or by smelling gas.
- Regular testing of all joints using soapy water will show where any leaks are by the appearance of soap bubbles
- Emergency response and preparedness
- Other general advice on keeping appliances clean and tidy, and inspecting for uncontrolled leaks, shall form part of the safety instructions to consumers.
- Placing the cook stove in a well-ventilated location with adequate air circulation to support complete combustion and disperse products of combustion safely.

7 COMPLAINTS AND DISPUTE RESOLUTION

Any complaints involving the operators and consumers and other relevant entities shall as far as possible be solved amicably. In case the involved parties do not reach an amicable solution, the complaint shall be escalated to the Authority.

8 APPLICATION FOR OPERATIONAL LICENCES

The Proponent shall be required to apply to the Authority for a permit to install the LPG reticulated system. Prior to operation, the proponent shall also be required to apply for an operational licence. The form and manner for such applications have been attached under **Appendix 13** of these guidelines

9 ACCIDENT AND INCIDENT REPORTING

Proponent to report of accident or incident within 48 hours of the accident occurring.

10 REGISTER OF LICENSEES AND PROJECTS

The Authority shall maintain and publish on its website a register of approved licensees.

11 TRANSITION

A person engaged in sale of LPG through an LPG reticulated System before publication of this framework shall be required to comply within one year of publication.

12 REVIEW

This framework shall be reviewed every three years from the date of publication or on a need basis.

13 APPENDICES

13.1 Forms for licence application and statistics reporting

13.1.1 Form I: Application form for sale of LPG in through an LPG reticulated system

(A separate application form must be completed in respect of each separate business establishment)

1. Application Type: (*tick as appropriate*)
   a. ☐ New Application
   b. ☐ Renewal Application
2. Name of business/applicant: _____
3. Details of applicant
   (a) Income Tax Person & Identification Number(s):_____
   (b) Business/applicant KRA pin:_____
   (c) Postal address:_____
   (d) Email Address:_____
   (e) Telephone/Mobile Number:_____
   (f) Business registration details (Date of Registration, Registration Number)_____
   (g) Proposed location of the business premises:
      i. Plot No: _____
      ii. Building Name: _____
      iii. Street/Market: _____
      iv. Town/District: _____
      v. County: _____
4. Location: -Longitude: _____ Latitude: _____
5. Details of proprietors or partners owning business or directors/shareholders of the company, as the case may be:

Name	Nationality	No of shares	Passport/ ID No.
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

(*Any additional information should be submitted on a separate sheet of paper*)

6. Select by ticking the licence category

i. Retail of LPG through an LPG reticulated System ☐

(*Any additional information should be submitted on a separate sheet of paper*)

13.1.2 Form II: LPG statistics reporting form

FORM 6: LPG STATISTICS REPORT				
To be completed for each LPG import during the reporting period				
1.	**Cylinder Brand**			
2.	**i.**	**Locally manufactured**	Size_____No._____	Size____Unit cost (Kshs)___
3.	**ii.**	**Imported**	Size____No._____	Size____Unit cost (Kshs)___
4.	**iii.**	**Locally sourced**	No._____	Unit cost (Kshs)___
5.	**iv.**	**Imported**	No._____	Unit cost (Kshs)___
6.	**Total LPG Sales through the LPG reticulated system**	Quantity (Mt)_____		

13.2 Requirements for a construction permit for an LPG reticulated System

13.2.1 Construction permit for an LPG Reticulated System

1. Certificate of incorporation/business registration certificate;
2. CR12 from the registrar of companies and/or CR13 from the Business Registration Service that is not older than three calendar months from the date of issue;
3. Scan of original identification documents (National IDs or Passports) for all the company's directors and/or partners;
4. Scan of original valid Work permit Class "G" or "D" for all foreign directors working in Kenya (Foreign directors not resident in Kenya should provide a notarized declaration. Further, any employee given Powers of Attorney by a foreign director should provide a copy of their identification document).
5. Scan of valid Environmental and Social Impact Assessment license from NEMA specifically authorizing the development of LPG reticulated system
6. Proof of land ownership (copy of title deed in the name of company/director(s)). In the case of long-term land lease, copy of duly executed lease agreement in the name of the Applicant company
7. Development permission from the respective County Government (including County Physical Planning Office);
8. Architectural Drawings indicating the specific locations where LPG is to be piped. The drawings should indicate the available gas ducts in buildings.
9. Electrical engineer's drawings indicating layout of electrical cables and other electrical installations in relation to the gas ducts specified in the Architectural drawings.
10. Mechanical engineering drawings approved by a Professional Engineer:
    a) Specifying the materials to be used in the entire installation and the design limits.
    b) Indicating the Piping and Instrumentation Diagram (P&ID) and in the case of vaporizer(s) the location, type, construction materials and capacity.
    c) Indicating the Pressure Regulation System (PRS) and the salient safety features to prevent accidents.
    d) Indicating the location and specification of the metering system to be used.

e) Indicating the details of the corrosion protection mechanism to be used for the distribution pipes.
f) Indicating the Standards and Codes used in the design.

11. Detailed design drawings of all civil works and approved by a Professional Civil Engineer detailing the facility's drainage, tank saddle, fence, hard standing surfaces and any structures associated with the installation certified by a professional engineer in the civil or structural field;

12. Design of the Fire suppression system indicating the capacity of the firefighting water storage tanks and associated fittings, gas detectors, fire arrestors for each unit to be supplied by the reticulated system, fire extinguishers and firewall (where applicable) certified by a professional engineer in the mechanical field and a fire safety auditor which shall contain detailed calculations to prove the adequacy of the design to prevent Boiling Liquid Expanding Vapor Explosion.

13.3 Requirements for a licence application for an LPG reticulated system

1. Certificate of Incorporation or Business Registration Certificate.
2. CR12 from the Registrar of companies for limited companies (the CR12 should not be older than 1 year from the date of issue).
3. Legible Copies of Identification Documents i.e. IDs/Passports for all the Company directors.
4. Valid Work Permits Class "G" or "D" for all foreign directors working in Kenya (Foreign directors not resident in Kenya should provide a notarized declaration. Any employee given Powers of Attorney by a foreign director should provide a copy of their ID).
5. Proof of access to legal supply of Bulk LPG by submitting scan of either: A copy of a valid licence for Import, Export and Wholesale of Bulk LPG; or A copy of a supply agreement with a holder of a valid license for Import, Export and Wholesale of Bulk LPG.
6. Valid EIA license from NEMA approving the development of the project/facility.
7. A letter from the Kenya Bureau of Standards (KEBS) as proof of conformity assessment of the facility against the applicable Kenya Standard or any International Standard ratified by KEBS
8. A valid copy of certificate of registration of workplace from DOSHS
9. Valid certificate(s) of calibration for the LPG tank(s)
10. A valid Calibration Certificate for the metering system to be connected to LPG Consumers

11. A summary Emergency Response Plan from the applicant (to include a schematic of the entire set up and the proposed emergency evacuation routes)
12. Copy of a Customer Service Charter.
13. Copy of the applicant's Customer enquiry, complaints and dispute resolution mechanism
14. Standard Contract Terms and Conditions indicating but not limited to the following: Billing processes and procedures or Tariff information
15. Valid Tax Compliance Certificate from Kenya Revenue Authority
16. Single Business Permit to operate business from the respective County Government
17. Fire Clearance Certificate for the facility from the respective County Fire Department
18. Valid report(s) on examination for LPG tank(s) from DOSHS approved Inspector