Safety, Health and Environment National Authority

WORKPLACE SAFETY NOTICE (WSN)

TOPIC **GUIDANCE FOR THE SAFE USE OF LPG AT WORKPLACES**			Reference Number 2021/WSN/07
Approved by: Chief Inspector (Industry)	Issue date: 20 October 2021	Expiry date: None	Revision No: 0

Purpose: This Workplace Safety Notice provides recommendations and lessons learnt following an investigation undertaken by SHENA into a recent dangerous occurrence, that resulted in asset damage at an educational institution. The WSN serves as a reminder, to all respective stakeholders including Principals, Employers, Occupiers, Owners, Suppliers, Persons who work with and users of Liquefied Petroleum Gas (LPG), of their legal duties under the Workplace Safety and Health Order, 2009 (WSHO) and Regulations made thereunder, with regards to ensuring the safe operation and use of LPG at workplaces and to avoid reoccurrence of similar incidents.

TARGET AUDIENCE

Any workplaces that handle, store or use flammable substances such as LPG.

INCIDENT FINDINGS

Investigation findings have revealed that the immediate cause of the incident was, that the canteen operator had used a wrong type of LPG hose, causing it to rupture and leak, which led to an accumulation of LPG gas inside the enclosed canteen kitchen. The gas was then inadvertently ignited by a spark from the electrical relay of the chiller and freezer, which subsequently resulted in an explosion, causing damage to assets. Fortunately, there were no injuries reported from the incident.

LPG'S HAZARDS

LP gas is widely used in trade as well as domestic use as a fuel for portable heating equipment. LPG is heavier than air, so it will accumulate in low areas rather than dissipate. It forms a flammable mixture with air in concentrations of between 2% and 10%. It can, therefore, be a fire and explosion hazard if stored or used incorrectly

LEGAL DUTIES

Under the Workplace Safety and Health Order, 2009 (WSHO, 2009), employers and occupiers, must, so far as is reasonably practicable, provide and maintain a safe working environment and without risks to the employees and any person who is affected by their undertakings. This means that the employer or occupier must control so far as is reasonably practicable the risk associated with the storage, loading and unloading, use of LPG's cylinders and related activities.

Under the Workplace Safety and Health (Risk Management) Regulations, 2014, all principals, occupiers, employers, and self-employed persons are required to undertake a risk assessment particularly for their activity in relation to the safety and health risks posed to any person and shall take all reasonably practicable steps to control any foreseeable risk to any person in the workplace, prior to commencing their work on site.

LEARNING POINTS

Based on the findings gathered from this incident investigation, four specific learning points were derived. SHENA strongly recommends adherence to the following matters (Refer to the photographs in Appendix A for examples concerning the learning points)

1. Correct use of LPG accessories: Ensure that high pressure hoses are only to be used with high pressure regulators and low-pressure hoses are only to be used with low pressure regulators.
2. Inspection of LPG hose for cracks and leaks: LPG hoses must be inspected periodically. Pay attention to sharp bends of the LPG hose that can cause the LPG hose to crack and break overtime. Hence it is essential that LPG hose are regularly inspected and replaced if signs of physical damage such as cuts, abrasion, cracking, stretching, flattening, or kinking are present.
3. Safety distance between the stove and ignition source: Ensure that the distance between the stove and ignition source is a minimum of 1.5 metres length apart from each other.
4. Adequate ventilation: Should there be a leak, the gas should be able to disperse to air and should not be trapped in confined space. The preferred location for the LPG's cylinder is in the open air, to allow vapours to be dispersed effectively. When located in buildings, the operator should ensure that the LPG is in a location where an adequate level of ventilation is achieved by either the presence of a sufficient size and number of permanent openings such as louvres or mechanical ventilation. If stored indoors, flammable gases such as LPG may only be stored in purpose-built compartments or buildings constructed with fire resistant walls and explosion relief.

RELEVANT INDUSTRY PRACTICES

In addition to the above learning points, the following work practices and safety tips are also recommended to be adopted by principals, employers, occupiers and persons at work at any workplaces that handle or store flammable substances such as LPG which includes but are not limited to:

1. IMPLEMENT AN EMERGENCY RESPONSE PLAN

All workplaces must have an effective emergency response plan in place to deal with relevant emergencies and in particular fire or explosion. Emergency response plans must include an audible alarm system or arrangement, unobstructed evacuation routes and designated safe assembly areas, as well as clearly defined emergency response roles for personnel.

In addition, for workplaces handling or usage of LPG or other flammable substances, as part of the emergency response plan, there must also be effective means to cut off the main supply of LPG or other flammable substances in an emergency.

As the fire could impede workers' access to such emergency LPG supply cut off points, there must be multiple locations or arrangements, where the cut-off can be activated safely. Appropriate persons should be appointed

to activate the cut-off in the event of an emergency. The emergency response plans and procedures must be documented and communicated to all workers. Periodic drills must be conducted to test and familiarise workers with the emergency response plan.

2. PROVIDE FIRE RETARDANT CLOTHING TO PERSONS AT WORK WHO HANDLE FLAMMABLE SUBSTANCES

Persons working with the filling, refilling, maintenance or production of LPG cylinders or other flammable substance systems, must wear suitable safety clothing e.g. fire retardant clothing (FRC). In the event of any fire or explosion, the FRC is able to slow down the spread of flames and heat on the wearer's body. Thus, the donning of FRC protects workers against burns or minimises burn injuries, as well as aiding their escape during such emergencies.

3. SELECT, OPERATE AND MAINTAIN ELECTRICAL EQUIPMENT FOR USE IN HAZARDOUS AREAS

Electrical equipment and wiring can potentially become a source of ignition where flammable vapours may be present in the work environment, such as the LPG filling area. Equipment which could potentially generate electrostatic charges should be properly insulated, bonded, and earthed to ensure safe dissipation of the charges. For example, the resistance to earth should also be checked periodically such that it does not exceed 10 ohms.

It is important to ensure that electrical installation and equipment are suitable and safe for use in the classified hazardous zones (places where an explosive atmosphere may occur in quantities such as to require special precautions to protect the safety of workers). The selection and maintenance of electrical equipment for use within the hazardous zones, should be based on appropriate international standards, such as the IEC 60079. All workplaces where LPG is used e.g. kitchens and other such workplaces must ensure electrical wiring sockets and equipment are always suitably maintained.

4. PROVIDE MINIMUM SAFETY DISTANCE FROM LPG CYLINDERS STORAGE AREAS

In the event of a fire, safety distances between the storage area for LPG cylinders and other parts of the workplace can minimise the spread of fire. Workplaces should designate areas for the storage of LPG cylinders and provide adequate separation distance between the designated storage areas and other areas (such as other processing areas, cooking areas, stored inventories of other flammable substances and offices). For more details, workplaces could refer to established standards, such as NFPA 58 Liquefied Petroleum Gas Code.

RELEVANT SAFETY TIPS

The following safety tips could be useful for both commercial and domestic users of the LPG's cylinders.

1. LPG ACCESSORIES

- LPG accessories such as the LPG regulators and hoses shall ONLY be purchased from authorised distributors which conform to the safety standards, see photos attached to appendix A.
- Use the correct accessories for their purposes i.e. high pressure regulator with high pressure hose and low-pressure regulator with low pressure hose.
- Replace the LPG regulator every 5 years or when it shows signs of malfunction.
- Replace LPG hose every 2 years or when it starts becoming stiff or shows signs of cracks. Transparent hoses are not to be used for LPG as this type of hose is designed for air only.
- Use hose clips which can be hand tightened to connect the LPG hose to the LPG regulator and the stove. Over tightening the connections can cause the LPG hose to break and can cause gas leaks.
- Multiple connections using the "T" or "Y" connectors are not advisable as this creates more possibilities of gas leaks.

2. LPG'S CYLINDER

- Purchase your LPG cylinder from authorised LPG distributors.
- Check that the seal and safety cap are intact.
- Ensure that the cylinder is always transported or carried in the upright position to the desired place and not dragged or rolled as it can damage the cylinder.
- Place the LPG cylinder vertically on a stable surface and ensure that the area is always well-ventilated.
- When not cooking, ensure that the LPG regulator is turned OFF. To be safer, take off the LPG regulator from the LPG cylinder at the end of each day.
- Never use lit matchsticks or candles to look for gas leak
- LPG cylinder should be kept as far away as possible from other ignition sources like induction cooker, lit lamp, etc. (minimum safety distance is 1.5m).
- If you have empty cylinders, please store them in a cool and airy place.
- Don't forget to switch off the flame whilst you change the LPG cylinder.

3. IN CASE OF LEAK

- Do not use the gas stove in the event you suspect a gas leak. Switch off the regulator and burner knob and open the windows and doors for ventilation.
- Do not switch off / on any electrical switches if you suspect that there may be a gas leak.
- LPG is a heavier than air, it tends to settle towards the bottom of the floor so use all means of ventilation available to disperse the gas.
- If a leak occurs and fire breaks out, put off the flames using fire extinguishers or fire blanket, if it is safe to do so. If this is not possible, call the Fire and Rescue Department at 995 for emergency assistance.
- For commercial users and in case of accidents, even minor ones, it is important for workers to raise an alarm or a siren and follow their emergency response procedure.

APPENDIX A

EXAMPLE OF LOW-PRESSURE LPG REGULATORS

EXAMPLE OF HIGH-PRESSURE LPG REGULATOR

LOW PRESSURE HOSE SS233 / BS3212

HIGH PRESSURE HOSE SYG559 / BS 3212 TYPE 2

TRANSPARENT HOSE – NOT TO BE USED FOR LPG.

HAND TIGHTEN HOSE CLIP

RECOMMENDED FIRE FIGHTING ITEMS AT PREMISES / HOME

It is advisable to keep fire extinguisher and fire blanket at home in case of any fire. Extinguish only if it is safe to do so. If not, contact the Fire and Rescue Department at 995 for emergency assistance.

CONCLUSION

All Stakeholders are reminded to be aware of the hazards and risks associated when handling LPG and other flammable substances and take heed of the learning points, recommendations and implement effective risk control measures to prevent any similar occurrences.

Should there be any questions concerning this Workplace Safety Notice please contact SHENA at +673 238 2000 or email info@shena.gov.bn SHENA would like to thank all stakeholders for their cooperation in ensuring Brunei Darussalam is a safe place to work and live.

END