



To: All fogging operators

Circular on Prevention of Fire during Thermal Fogging

Flash Fires in Refuse Chutes

Thermal fogging is inherently dangerous especially when it is carried out in confined spaces. Three flash fires occurred recently when thermal fogging was carried out in condominium refuse chutes. The fogging operators involved in the accidents suffered various degree of burns on their arms, face and neck, and in one case, the operator was given two months of medical leave. This circular serves to provide advice and guidance to fogging operators on measures to prevent the occurrence of similar accidents.

Cause of Fire

Thermal fogging machines generate mist (fine liquid droplets) and vapour from the chemical solution containing a mixture of pesticide and diesel which is used as a carrier. Diesel is a flammable liquid with a flash point* between 52 and 96°C, and an auto-ignition temperature** of about 257°C. The machine operates at about 100°C (gas stream temperature at the outlet) which is above the flash point of diesel. The flash fires were likely due to the diesel vapour accumulated in the confined refuse chutes and ignited by the hot fogger nozzle (surface temperature > 400°C) which is above the auto-ignition temperature of diesel.

Preventive Measures

To prevent a recurrence of the flash fire and to safeguard the health and safety of fogging operators, follow the machine manufacturer's instructions and observe the following measures.

1. Do not use diesel or any flammable solvent as a carrier for fogging in refuse chutes and other confined spaces; use a non-flammable solvent or water-based fogging instead.
2. Always wear appropriate personal protective equipment e.g. respirator, safety goggles, gloves, safety boots, earplugs and coverall.
3. Fill solution (chemical or petroleum) to not more than $\frac{3}{4}$ tank capacity to prevent over-filling or spillage; check that the caps of the solution and petroleum tanks are secured.
4. Turn off the fogging machine and allow it to cool before refuelling to prevent accidental ignition of any spilled petroleum fuel.

5. Do not allow new workers to operate the machine without close supervision and training.
6. Allow only trained workers to handle pesticides and chemicals. They must be warned of the hazards involved and the precautionary measures to be taken. Refer to the safety data sheets of these substances for details.
7. Label all chemical containers in accordance with Singapore Standard SS586 Part 2 – Globally Harmonized System (GHS) on Classification and Labelling of Chemicals. Please visit <https://www.wshc.sg/wps/portal/ghs?openMenu=1> for more information on GHS.

Duties of Employers

Every employer must:

- conduct a risk assessment in relation to the safety and health risks posed to any person who may be affected by his undertaking, and take all reasonably practicable steps to eliminate any foreseeable risk - this is required under the Workplace Safety and Health (Risk Management) Regulations.
- take reasonably practicable measures to ensure the safety and health of his employees at work, as well as other persons (not being his employees) who may be affected by any undertaking carried on by him in the workplace - this is required under the Workplace Safety and Health Act.
- report accidents, dangerous occurrences and occupational diseases that occur in the workplace - this is mandatory under the WSH (Incident Reporting) Regulations.

Should you need further information, please contact:

- MOM at **6317 1111** for safety and health of workers.
- NEA at **1800 CALL NEA (1800 2255 632)** for registration of and training matters for Vector Control Technicians and Vector Control Workers.

* The **flash point** of a liquid is the lowest temperature at which it gives off enough vapour to form an ignitable mixture with air.

** **Autoignition temperature** is the lowest temperature at which a substance will self-ignite and sustain combustion in the absence of a spark or flame.

This circular is jointly issued by the Ministry of Manpower (MOM) and the National Environment Agency (NEA).

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