

SAFE STORAGE AND USE OF FLAMMABLE LIQUIDS

RISK MANAGEMENT ADVICE NOTE

Introduction

Many businesses use or store liquids / solvents that are flammable, in both small and large quantities. Such materials may give off vapours at relatively low ambient temperatures, which can explode or ignite if they encounter an ignition source when mixed with air in the appropriate concentration.

Often vapours have a specific gravity, lower than air, and are able to travel undetected quite considerable distances to points of ignition.

Note: It is the vapours / fumes that ignite, not the liquid itself.

The ignited vapour may flashback to the container and heat the open surface of the liquid thus giving off more vapours, which continue to burn until the liquid is consumed or the fire is extinguished. Fires involving flammable liquids are usually very intense and are difficult and dangerous to fight.

Legal Obligations – HSNO Act

The New Zealand Dangerous Goods Act / Dangerous Goods Regulations has been replaced by the Hazardous Substances and New Organisms Act (HSNO) 1996.

The Act is triggered depending on the type of substances that you use, how they are used, and the quantities (and size of containers) involved.

Requirements may include one or more of the following:

- designation of a 'person in charge'
- appointment / training of Approved Handlers
- issue of a Location Test Certificate
- development of an Emergency Management Plan
- signage
- Issue of a Stationary Container Test Certificate for any bulk tanks.

More details are available on the Environmental Protection Authority (EPA), formerly ERMA, website (www.epa.govt.nz) or from QBE.

Precautions

A number of precautions need to be taken to minimise the risk associated with the use and storage of flammable liquids regardless of whether these quantities are above or below the HSNO threshold. These include the following:-

Training

It is vital that all employees likely to use, store or handle flammables receive proper training in:

- (a) safety procedures and precautions; and
- (b) basic fire fighting techniques

for any flammable liquid fire.

'Safety Data Sheets' should be available for all such materials, both centrally and locally where each material is used or stored (this is also an Occupational Health and Safety requirement). HSNO requires all Data Sheets to be less than 5 years old and to be "readily available" – i.e. found in less than 5 minutes.

Bulk Storage

A bulk store is designed to protect the contents from being involved in any general fire in the premises. Other purposes are to contain leaks and spills, (hence bunding feature), and to isolate vapours from ignition sources, (hence the need for self-closing doors, adequate ventilation, and flame proof electrical systems). **Bulk stocks should always be held in the store, and only one day's use be held in the main premises.**

Minor Storage

'Working stocks' should be kept in an approved 'Flammable Liquid Storage Cabinet' (or cabinets) of double-walled, heavy gauge steel construction, have a sump to contain spills, and appropriate auto closing doors and warning signs. Proprietary cabinets (e.g. 'Justrite' or "Chemshed") are available from New Zealand Safety Limited (refer to Yellow Pages or their website). See Figures 1 & 2 over page.

Ignition Sources

Wherever a flammable liquid or 'manufactured product' containing flammable liquid is being dispensed, mixed, poured, sprayed or applied, or is present in open containers, flammable vapours are being released. **It only requires a sufficient concentration and a flame, spark or hot surface for fumes to ignite or explode.** It is therefore essential to eliminate ignition sources in any areas where flammables are used or stored.

Potential ignition sources are numerous and can include the following: standard light fittings and electrical switchgear; motors; extension leads; sockets; electric tools; heaters; fans; electric jugs; welding equipment; static electricity; non-flame-proofed forklifts; shrink wrapping guns; ovens; and (most common of all) smoking materials such as cigarettes and matches.

It should be a managerial priority to regularly inspect and review all flammables process and storage areas, and eliminate all possible ignition hazards.

Static Electricity

Wherever a flammable liquid is being decanted from one drum to another, or to a mixing tank, approved static bonding straps should be used to link containers before opening and pouring. Mixing vessels should be grounded to earth by permanent metal connections, which need to be checked regularly for breaks or fraying.

Explosive Concentrations – Ventilation

Vapours will only ignite or explode if between the lower and upper explosive limits (LEL and UEL) which vary between liquids. For example, methanol vapour has to be between 6% and 37% by volume in air to explode, whereas acetone LEL is 2.2% and UEL is 13%. **Adequate natural or flame proofed mechanical ventilation is therefore essential to keep vapours to a minimum in case an ignition source is introduced into the area, and to protect the health of workers.**

Spraying Operations

All spraying of flammables should be conducted in an approved mechanically exhausted spray booth or room with any (flame-proofed) lights interlocked to a (flame-proofed) fan motor. Alternatively, spraying may be done outside the building in an ignition-hazard-free area.

Spray booth filters should be changed or cleaned regularly, and only the minimum amount of flammable liquids necessary for the day's work should be kept near the booth, preferably in an approved storage cabinet. Open drums (e.g. of clean or dirty solvent) should be prohibited.

Spills and Leaks

N.B. Any significant spilled flammables should be treated as an emergency because the large surface area exposed will release copious quantities of vapour and, if the spill occurs in a normal flammables-free area, a number of ignition sources may well be present. Any dropped or impacted drums should be carefully inspected for leaks. Where possible, drums should be stored vertically and hand pumps used to extract contents, rather than using taps and drip cans on horizontally stored drums, which may leak or over-flow. Spill control / absorbent materials should be made available in the work area, e.g. sand or 'Matasorb' matting, pads or socks.

Transfer Procedures

Working quantities of flammables extracted from bulk drums or tanks should be decanted into approved safety cans for transport and storage around premises. Open topped buckets or cans should never be carried or transported around the workplace. Again, use of 'Justrite' safety, non-spill containers should be considered.

Fire Fighting

Suitable fire extinguishers, preferably 9kg Dry Chemical Powder types, should be provided near areas where flammables are used or stored. Fire blankets are also desirable, e.g. for smothering flames on people or surfaces.

Foam extinguishers or portable foam generators may be suitable for smothering flames in open vessels or for covering spills of flammables. **Proper training in safe and effective use of fire appliances is necessary** and employees should know:

- (a) in the event of any fire, to immediately remove any containers of flammables in the vicinity (if safe to do so) before attempting any fire fighting;
- (b) if the fire involves only open containers of flammables which are already alight, it may be practical to stand back and fight fire with an extinguisher (if safe to do so), but if sealed (i.e. un-vented) drums are exposed to flames, an explosion may be imminent and the area should be evacuated.

Housekeeping

The ongoing maintenance of high standards of housekeeping in the work area is essential at all times.

Certain substances, when impregnated in carbonaceous materials, (e.g. cleaning rags), can initiate self-heating and spontaneous combustion. A fire is the result.

Sufficient quantities of metal bins should be provided throughout the work area and used to deposit all waste material. The work area should be cleaned thoroughly at the end of each working day and the contents of the bins should be emptied into an external waste taker unit or similar, located well clear of the external building walls.



Figure 1 – Chem Shed storage cabinet



Figure 2 – Justrite storage cabinet

Disclaimer

The purpose of this Risk Management Advice Note is to assist you in minimising potential loss from exposures which need prompt consideration.

The Advice Note does not imply that all other exposures were under control at the time of inspection.

The options contained in this Advice Note are not intended to be a substitute for appropriate professional advice in relation to any matter. In achieving compliance with these items, fire protection equipment and systems should be installed to comply with the requirements of the relevant local, and/or Government authority. Any equipment installed should also comply with the requirements of the relevant New Zealand Standards and Codes.

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