

Risk control briefing note 3: Storage of hand sanitiser



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Symbols used in this guide



Good practice



Bad practice



Discussion topic



Frequently asked question

1 Introduction

Following the worldwide Covid-19 pandemic in early 2020, control of the infection was the primary aim to defeating the spread. The Government introduced the three requirements, wash your hands, use a tissue for coughs and avoid touching your face. This has now evolved into Hands, Face and Space. Common within these messages is the need to wash hands or sanitise, which has led to increased storage quantities of hand sanitiser for many workplaces. Hand sanitiser is a very important commodity in preventing the spread of Covid-19, however, this is also a flammable liquid and when stored in large enough quantities can lead to very high fire loads in buildings that are not equipped to cater for this type of fire.

Due to the increased demand for hand sanitiser, many businesses might find themselves storing larger than normal quantities of the product in locations ranging from simple storage cupboards/rooms within office blocks, schools, healthcare premises, and industrial premises to large storage in warehousing. It is therefore most important to understand the implications of storing the product, what quantities are reasonable, and what additional measures need to be put in place to cater for the increased risk.

2 Risk

FAQ

- Is hand sanitiser flammable and dangerous?

To reduce the spread of Covid-19 the centre for Disease Control and Prevention recommends a hand sanitiser that contains 60% to 95% alcohol when hand washing is not available.

Most hand sanitisers available on the market today have a minimum of 60% isopropyl alcohol, whilst some may contain ethanol alcohol however, the percentage of alcohol depends generally on the manufacturer. It is very important to understand the flammability of these liquids so that appropriate storage levels can be set depending on the type of occupancy/ user groups.

When determining how to protect the storage of hand sanitiser, it is most important to understand the information about the product, where it is going to be stored, how it is going to be stored, how high it is going to be stored and what potential ignition/heat sources are local to the storage.

However, it is difficult to confirm the exact details for the varying hand sanitisers available on the market and tie these down to accurate figures. As noted, each manufacturer produces a different product which varies in alcohol type and alcohol content (%). To simplify the fire risk, we have taken the information below from a number of manufacturers and summarised the figures which are similar in both alcohol types listed.

FAQ

- What is a flashpoint and why is this relevant?

Flashpoint

The flashpoint of a flammable liquid is the lowest temperature at which there is sufficient vapour to form an ignitable mixture with air near the surface of the liquid when an ignition source is applied.

The flashpoint of hand sanitiser ranges from **12°C to 19°C**. This indicates that at these temperatures the sanitiser would produce flammable vapours at the surface of the liquid and when an ignition source is applied to the surface of the sanitiser flames would flash over the surface area of the sanitiser.

FAQ

- Do I really need to know what the flammability limits are and how is this relevant?

Flammability limits

The two flammability limits expressed for flammable liquids are the Upper Flammability Limit (UFL) and Lower Flammability Limit (LFL). These are best described as the lower and upper concentration (%) of vapour (or gas) mixed in air which is capable of sustained combustion once ignited by sufficient heat.

The flammability limits of hand sanitiser:

UFL – **15% to 19%**

LFL – **3% to 4%**

If the vapour/air mixture falls within these percentages then combustion will be sustained, however below the LFL the mixture would be too lean to burn, above the UFL the mixture would be considered too rich to burn.

Autoignition temperature

The autoignition temperature is the minimum temperature required at which a material (solid, liquid or gas) may ignite and burn without the presence of an external ignition source. For isopropyl alcohol this is 399°C (ethanol alcohol is circa 360°C).

Another key risk associated with hand sanitiser fires is that they burn completely invisibly, see link below:

https://www.youtube.com/watch?v=o_S2dgGJGnl

In the event that liquids escape their containment, spillages can rapidly spread over a large area and at ambient temperatures highly flammable liquids will give off flammable vapours across this area to concentrations within flammability limits that can be readily ignited by a spark or other heat source. As most hand sanitisers are stored in plastic containers, when subject to fire these will quickly fail releasing an increasing volume of highly flammable fuel to be involved in the fire, the rate of fire development being a function of the individual container size.



- The storage considerations shall be as detailed in this document, however, considerations for safety are covered in section 4.

3 User groups

To assist in risk classification, the following user groups have been determined based on the profiles associated with the storage of hand sanitiser.

1. Schools/academies – Low risk based on incidental storage
2. Shops/retail/hospitals – Medium risk incidental and larger storage
3. Retail warehouse – High risk large to bulk storage
4. Wholesaler/distribution warehouse – High risk of bulk storage

The user groups are indicative of occupancy type and not exhaustive. The grouping provides information on the predicted storage levels of hand sanitiser. For user groups 3 and 4 high risks, please refer to RISCAuthority Risk Control documents RC55^(ref.2) and RC56^(ref.3).

4 Safety principals



- To appreciate the safety implications of hand sanitiser, firstly a review of the risk shall be undertaken, appropriate mitigation measures implemented, and notification to the building insurer should be considered.

Where there is incidental (up to 50 litres) or bulk storage of flammable liquids, basic fire safety principals should be considered as a minimum. The presence of hand sanitiser should be recognised within the Fire Risk Assessment (**FRA**) along with how and where it is stored.

Depending of the quantities stored it may be necessary to undertake a **DSEAR** risk assessment (Dangerous Substances and Explosives Atmosphere Regulations)^(ref.4). For bulk storage premises the COMAH regulations (Control Of Major Accident Hazards)^(ref.10) will need to be considered.

Applying the five basic fire safety principals known as **VICES** should ensure that the workplace will be safer:

Ventilation – Is there plenty of fresh air where the hand sanitiser will be stored and used? Good ventilation means any vapours given off can be rapidly dispersed.

Ignition – Have all ignition sources been removed from the storage area?

Containment – Is the hand sanitiser kept in suitable containers? If spilled, will it be contained and prevented from spreading?

Exchange – Can the hand sanitiser been exchanged for a less flammable one that meets the sanitising requirement with a lower alcohol content?

Separation – Is the hand sanitiser stored away from other processes and general storage areas, either by a separating wall, partition or relocated externally?

It is strongly recommended that premises owners/occupiers/managers inform their insurance company when storage of hand sanitiser commences to ensure the correct levels of insurance are in place and that the risk has been assessed and reflected in the insurance cover for the premises.

Security

The location for the storage of hand sanitiser should be carefully considered. Hand sanitiser is easily ignitable due to its alcohol content and low flash point, it can be a prime candidate for arson attempts, therefore security and limited access to the stored product should be considered and made a priority.



- The storage of even incidental quantities of hand sanitiser in locations that may be accessible to the general public must be avoided.

5 Incidental storage



Getty/hodimirzero

When referring to incidental storage, this is best visualised as small quantities of storage within localised cupboards within the workplace such as cleaner’s cupboards or storage shelving within small store-rooms. It would therefore be permissible to envisage a small quantity of containers of hand sanitiser to be stored.

In use

The number and size of dispenser containers shall be limited to the minimum needed to fulfil the required objective. High footfall locations such as the entrance to a supermarket may require a few 5 litre dispensers, but two or three 100 ml dispensers might be adequate within an office reception area.

Replenishment stock

There is likely to be a need to hold replenishment stocks readily to hand in most premises. Such stocks shall be limited to a maximum total volume of 50 litres and be kept in normally locked fire resisting flammable liquid storage cabinets that incorporate drip trays and bunds to capture any leaks or spillages.

The HSE have a guidance document – HSG51^(ref.1) on the storage of flammable liquids which describes the recommended maximum quantities that may be stored in cabinets and bins as follows:

- no more than 50 litres for highly flammable and those flammable liquids with a flashpoint below the maximum ambient temperature of the workroom/working area.
- no more than 250 litres for other flammable liquids with a higher flashpoint of up to 60°C.

The guidance also describes minimum separation distances based on the volume of flammable liquid being stored as follows:

Quantity stored (litres)	Distance from occupied building, boundary, process unit, flammable liquid storage tank or ignition source (metres)
Up to 1 000	2
1 000 – 100 000	4
Above 100 000	7.5



Getty/STRIKINGEImage



- The provision of spill kits in the vicinity of the stored product is recommended for good practice.

When bulk purchasing hand sanitiser for the workplace, dividing the product into small quantities and distributing these into cool, ventilated storage locations would reduce the risks. Ideally these storage locations would be in a locked, adequately controlled/environmental location removed from potential ignition and heat sources.



- 'VICES' principles should also be applied where larger quantities of sanitiser are stored?



- Only store what is necessary and reduce storage levels to an appreciable minimum.

To assess the most appropriate protection requirements of bulk storage of hand sanitiser, you first need to understand:

- what quantity is being stored
- where and how it is stored, for example, in racks, palletised on racks, type of pallet used, solid or slatted shelving, pick shelving, floor stored (block storage)?
- what containers is the sanitiser stored and/or packaged in: metal, plastic, cardboard boxes, glass and shrink-wrapping?
- whether the storage and packaging might add to the fire load and contribute to the fire spread.

Segregation/separation storage

Where it is proposed to store large quantities of hand sanitiser, the primary consideration should be segregation. This could be achieved utilising a separate storage facility away from the main storage warehouse, or a detached sacrificial building separate from the facilities with adequate space separation. Additionally, dividing the product into small quantities and distributing these to separate appropriate storage locations would reduce the risks.

Warehouse storage

The warehousing of highly flammable liquids in combustible containers presents specific fire challenges. Consequently, all risk factors should be considered in detail and all authorities having jurisdiction should be fully consulted to agree the most appropriate means of risk management and fire protection.

Current recommendations for the fire protection of hand sanitiser range from:

- Sprinkler Systems (bulk storage)
- CO₂ (incidental/large storage)
- Dry Chemical (incidental/large storage)
- Alcohol Resistant Foam (Foam Enhanced Sprinkler System) (bulk storage)
- Watermist (incidental/large storage)

RISCAuthority Documents RC55^(ref.2) and RC56^(ref.3) cover the fire safety and storage of flammable liquids and should be reviewed when considering bulk storage of hand sanitiser.

Sprinkler systems

Most warehouses within the United Kingdom are fitted with a sprinkler system which will be designed and installed for protection of a specific risk profile. The risk profile could be a manufacturing or storage facility and the sprinkler system will have been designed to take account of the stored product, the storage configuration and the height of the storage in relation to the building height.

When considering the bulk storage of hand sanitiser, it is important to appreciate that the sprinkler system may need to be modified or upgraded to adequately protect the increased fire risk.

Existing storage facilities

Where it is planned to add bulk quantities of hand sanitiser within an existing storage facility, the quantities should be kept as low as is practicable and segregated from other stored goods. Hand sanitiser should preferably be kept within a separate location/compartment with adequate fire separation and bunding to reduce fire spread.

New storage facilities

Where new facilities are planned for storage including hand sanitiser, the proposal should again consider segregation from other stored goods and also storage into smaller suitably fire rated compartments that provide adequate drainage and containment.

The installation of a sprinkler system is required and where appropriate, foam enhancement of the system should be considered to cover the storage locations of hand sanitiser. Design and installation of a sprinkler system should be in compliance with either the LPC Rules for Automatic Sprinkler Installations 2015^(ref.5) incorporating BS EN 12845^(ref.6), BS EN 13565-2^(ref.7), N.F.P.A.^(ref.8) or F.M. Global^(ref.9), as appropriate.

When storing hand sanitiser in bulk at a facility, it is recommended that contact is made with the local fire and rescue service to inform them of the potential fire loads. Additionally, it is essential that the building insurer is consulted at the appropriate stages to discuss fire protection options with their specialist representative to ascertain level of comfort and risk.

7 References/publications

1. HSG51 – *The storage of flammable liquids in containers.*
2. RC55 – *Recommendations for fire safety in the storage, handling and use of flammable and highly flammable liquids.*
3. RC56 – *Recommendations for fire safety in the storage, handling and use of highly flammable and flammable liquids: storage in containers other than external fixed tanks.*
4. The Dangerous Substances and Explosive Atmospheres Regulations 2002 (DSEAR).
5. *LPC Rules for Automatic Sprinkler Installations 2015 incorporating BS EN 12845.*
6. BS EN 12845: 2015 + A1: 2019 Incorporating corrigenda December 2015 and January 2016.
7. BS EN 1355-2: 2009 *Fixed firefighting systems – Foam systems.*
8. NFPA – <https://www.nfpa.org/Codes-and-Standards/All-Codes-and-Standards/List-of-Codes-and-Standards>
9. FM Global – <https://www.fmglobal.com/research-and-resources/fm-global-data-sheets>
10. Control Of Major Accident Hazards Regulations 2015 (COMAH)



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