Chemical Storage

Posted by Anonymous on Tue, 2015-02-17 15:37

Chemical Storage: What type of extractor fan should we have to ventilate our chemical storage cupboard? My understanding is that we have an Industrial Extractor fan, but should we have a Chemical Store specific extractor fan?

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Year Level:
7
8
9
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Senior Secondary
Laboratory Technicians:
Laboratory Technicians

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Submitted by on 06 March 2015

The fan must be suitable for the hazardous area. This means that it should not generate any sparks, static electricity or hot spots and is capable of running continuously 24 hours a day, if required. This would indicate that a specialised fan is required and not simply an industrial fan. Vents may be required in the storeroom to allow fresh air to replace the air being extracted at the appropriate rate.

This question, while appearing to be a straight forward one, does have a number of different aspects to be considered. As a general answer, the fan does need to be specifically suitable for a chemical store. A school chemical storeroom may contain flammable, corrosive and/or toxic vapours, therefore it is recommended that the choice of fan should consider the following design features.

- Needs to be able to be run continuously (domestic fans do not meet this criteria).
- Needs to be spark proof to meet the requirements of AS1940 Storage and Handling of Flammable and Combustible substances.
- Needs to move the air at the rate required in AS1940 (0.3m_3 per minute per square metre of floor space or 5m_3 per minute whichever is the greater).
- The school may need specialist input to ensure that this criteria is met.

School science chemical store rooms will vary considerably from one school to another depending on many factors in relation to both the types and quantities of chemicals and also the facilities in which they are stored. One common factor is that the range of chemicals will be large including flammables, corrosives, toxics and oxidizing agents, however the quantities are generally small. Some schools may have separate storage cabinets for different Dangerous Goods classes. The size and shape of the storeroom will also vary. so there is no specific system to fit all situations. The ventilation needs to be based upon a site-specific assessment.

In a school chemical store, where a large range of chemicals are stored that are below specified quantities, that is 200 L of Class 3, 200 kg of combined Classes 4 and 5, 500 kg of combined Classes 6.1, 8 and 9 or an aggregate maxima of 2000 kg, AS/NZS 2243.10:2014 Safety in Laboratories - ‘Storage of Chemicals’ is generally the most relevant standard to follow. This standard specifies that the ventilation requirements of AS 1940 Storage and Handling of Flammable and Combustible substances must be followed. These documents are written for industry and cover a lot more than the ventilation requirements. With the school science departments using a large range of chemicals but maintaining relatively small quantities of each, the issues of storage becomes more complex. Science ASSIST has developed a Recommended List of chemicals, which includes detailed information for each chemical including “specific guidance for storage areas”.

Most issues relating to ventilation in school science department chemical storerooms revolve around two major groups of chemicals, the Flammable Liquids (Dangerous Goods Class 3) and the Corrosives (Dangerous Goods Class 8). In any ventilation system, it is important to consider that vapours of flammable liquids are heavier than air, so the ventilation system should be designed to scavenge vapours from the lower parts of the store. In addition, the ventilation system should be designed to operate either continuously, or whenever a person is in the store. Another question to be asked is: are these classes of chemicals stored in dedicated storage cabinets within the storeroom? If they are, then AS/NZS 2243.10 section 3.3.4 addresses ventilation of dedicated chemical storage cabinets. Whilst ventilation of cabinets is not normally required, good housekeeping is important in minimising vapours.

General good housekeeping issues for chemical storerooms.

- Ensure that all chemical bottles are securely sealed before being placed in the

storeroom.
- Clean any spills or drips from any bottles before returning to the storeroom.
- Seal bottles of volatile liquids with “Parafilm” or similar.
- Never decant chemicals in the storeroom, this should be done in the preparation area.
- Do not store other items, e.g. glassware, in the storeroom.

School Specific Guidance Materials:

The Victorian Department of Education and Early Childhood Development (DEECD) have produced a useful set of guidance sheets for the storage of chemicals in a school which can be found at: http://www.education.vic.gov.au/school/teachers/management/Pages/chemica...

In particular, guidance sheet 1 – Chemical Storage, contains a lot of useful information on segregation of incompatible chemicals, requirements for chemical storage cabinets and ventilation systems for both stores and cabinets. Whilst this was written for Government schools in Victoria, the information is generally applicable across Australia, as it details the requirements of the relevant Australian Standards.

The Queensland Department of Education, Training and Employment also have a useful document regarding general guidelines for managing risks with chemicals in the education setting which can be found at: https://mpe.education.qld.gov.au/initiativesstrategies/Documents/guideli... (Link Updated May 2021)

Guidance for ventilation of chemical stores from Australian Standards:

See the following extracts relating to ventilation: **AS/NZS 2243, Part 10: 2014 Storage of Chemicals**[i]

Section 5.4.1 Store Requirements:

A laboratory store shall meet the requirements of—

1. this standard (AS/NZS 2243.10), where the quantity involved does not exceed the aggregate of maximums specified in Table 2.

The following background to this option is provided:

(i) This standard, i.e. AS/NZS 2243.10 allows a high level of flexibility in the range of hazardous chemicals that may be stored, but it severely limits the total storage quantity. It is not applicable for quantities in excess of the allowances in Table 2.

This Standard is most appropriate for stores containing a large and possibly unpredictable range of hazardous chemicals, usually in relatively small quantities.

When option (a) is chosen, the laboratory store shall meet the requirements set out in Section 3 and this Section (Section 5).

Section 5.4.4 – Ventilation

The store ventilation shall comply with the design principle specified in AS 1940 and shall have a capacity of not less than that specified in AS 1940, While AS 1940 permits the use of natural ventilation as the sole means of ventilation, mechanical ventilation should be considered to ensure sufficient airflow under all conditions. A higher rate of ventilation may be necessary if very volatile, toxic or corrosive substances are stored to ensure a safe working environment. Exposure standards may be used for guidance.

There shall be no recirculation of exhaust air except in a cooled store where a risk assessment has been conducted and appropriate risk control measures have been implemented.

Where stores are mechanically ventilated, the ventilation system shall be exclusive to the room.

If individual cabinets are ventilated, they shall be ventilated to external atmosphere in compliance with Clause 3.3.

Section 3.3 Chemical Storage Cabinets

Section 3.3.4 Ventilation

Cabinet ventilation should not normally be required unless determined as an essential risk control measure. Cabinet ventilation is not an alternative to vapour-tight closure of all stored containers.

If ventilation is an essential risk control measure (such as could be the case for volatile, extremely toxic or corrosive substances), the cabinet shall be vented to the external atmosphere, i.e. outside the building.

References

AS1940:2004 Storage and Handling of Flammable and Combustible substances

AS/NZS2243.10:2004 Safety in Laboratories ‘Storage of chemicals’

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[i] These extracts are from AS/NZS 2243.10:2004 Safety in Laboratories, ‘Storage of chemicals’ reproduced with permission from SAI Global Ltd under Licence 1407-c117
