



You Have Safety Questions? We Have Safety Answers!

QUESTION# 22 : *The Occupational Health and Safety Act (Reg. 851 Section 127) requires that facilities “shall be adequately ventilated by either natural or mechanical means such that the atmosphere does not endanger the health and safety of workers.” What constitutes ‘adequate ventilation’, particularly with respect to school science laboratories, preparation rooms and storage areas?*

RESPONSE: Ventilation rates inside buildings are usually described in terms of the volume (in litres) of air per second, per person or in terms of the number of air changes occurring per hour. These are not equivalent units – the latter depends only on the room size, the former depends on the number of people occupying it.

Regulations made under the *Ontario Building Code Act (Section 6.2.2.1)* require that “the rates at which outside air is supplied to rooms and spaces in buildings by ventilation systems shall be not less than the rates required by ASHRAE¹ Standard 62.” The regulation is concerned with general workplace ventilation, not the local exhaust ventilation needed to remove substances hazardous to health. The code of practice suggests that ventilation should not normally fall below 5-8 litres per second per occupant, the exact figure depending on the floor area, the processes and equipment involved, and whether the work is strenuous.

Teaching accommodation requires a minimum of 8 litres of fresh air per second, for each of the usual number of people in those areas when such

« « « By the STAO Safety Committee

*The STAO Safety Committee welcomes enquiries, with respect to safety issues, from STAO members. Please send your questions to the Safety Committee Chair (refer to page 4 ‘Committee Chairs’). Your questions and the STAO Safety Committee responses may be published in *Crucible*, particularly if the information is deemed of general interest to other STAO members. Anonymity, however, will be guaranteed.*

areas are occupied. Applying the 8 litre rule to a science class of 24 students plus their teacher implies that 200 litres of air are needed per second or 720 m³ per hour. For a typical laboratory of area 100 m² and 3 m high, i.e., volume 300 m³, this equates to a minimum of 2.5 air changes per hour. With an even larger class, and perhaps a smaller laboratory or a lower ceiling, then up to 5 air changes per hour may be needed, without taking into account the problems of noxious fumes.

In school science laboratories adequate measures must also be taken to remove unwanted gases and vapours. Further, where fume hoods are used there needs to be an adequate supply of make-up air so as not to interfere with their operation. Accordingly, in a laboratory, a ventilation rate of 5-10 air changes an hour is more reasonable.

There can be problems with ventilation of **preparation rooms** and many cases call for individual attention. In a modest prep room with two occupants, a ventilation rate of 16 litres per second would be needed. Even for a small prep room this could be as little as 2 air changes per hour. However, in practice it often seems difficult to achieve satisfactory ventilation in prep rooms. Unlike teaching laboratories, air is not swept in and out by the

hourly arrival of 30 or so students. Rooms are often long and thin, and doors and windows not well placed to allow air to circulate. Raising the ventilation rate to 3 or 4 air changes per hour should overcome any such problems.

Chemical storage areas may well require special provision for ventilation. Chemicals, however carefully looked after, do tend to give rise to slight fumes which can be of concern to those working near them unless arrangements are made to ensure that the air is changing regularly. If not, then the escape of chemical vapour may be unacceptably high and must be dealt with.

The Occupational Health and Safety Act (Reg. 851 Section 22) requires that an area where flammable liquids are dispensed shall have “mechanical ventilation from floor level to the outdoors at the rate of eighteen cubic metres per hour per square metre of floor area.” Applying this for a typical chemical storage area 12 m² and 3 m high equates to a minimum of 6 air changes per hour.

Refer to the STAO publication *Science Laboratory Facilities Design Guide (1999)* for further information relating to ventilation requirements of school science facilities.

¹ ASHRAE: American Society of Heating, Refrigeration & Air Conditioning Engineers