

Setting Limits on Hazards in the Workplace: OELs and TLVs®

Today's workplaces often use materials and equipment that may be harmful to workers' health. Occupational Exposure Limits and Threshold Limit Values are used to help find out if the work environment is harmful.

What is an Occupational Exposure Limit (OEL)?

Occupational Exposure Limit (OEL) is a general term for the amount of a workplace health hazard that most workers can be exposed to without harming their health. There are different OELs for different workplace health hazards, such as the amount of a chemical in the air and the loudness of noise. OELs may protect workers from both

- short-term health problems like irritation or drowsiness
- long-term health problems like liver damage or hearing loss.

What is a Threshold Limit Value (TLV)?

Threshold Limit Values (TLVs) are the most common type of OEL. TLVs are designed as guidelines to be used by people trained in industrial hygiene. There are TLVs for many workplace hazards including chemicals, vibration, heat, and ultraviolet light. There are over 675 TLVs for chemicals alone.

The American Conference of Governmental Industrial Hygienists (ACGIH) sets the TLVs and prints a booklet each year that includes the new and changed TLVs. The booklet also contains

other useful information, for example, the skin notation says if the chemical causes harm by getting into the body through the skin. The booklet also says whether some chemicals cause cancer.

What should your employer do?

Employers in Manitoba are legally responsible to ensure that workers are not exposed to harmful materials at amounts more than the OEL. The Manitoba Regulation 217/2006 Part 36 'Chemical and Biological Substances' says employers should use the most recent TLV for the OEL. Employers are also required to have a qualified person set an OEL if a TLV is not available.

The employer must consult with the workplace health and safety committee, the health and safety representative or the workers when assessing chemical and biological substances.

See our fact sheet on "Chemicals" for more information on the use of chemicals in the workplace.

How do you measure the amount of chemical in the air?

Collecting a personal air sample is the best way to find out the amount of chemical in the air that a worker is breathing. Workers wear portable equipment on their collars to collect a sample from the air as they

work. The results give the average amount of chemical in the air. Spot or grab air samples are collected with many different types of equipment. They show the amount of chemical in the air at one point in time, but not the average amount of chemical in the air over time.

Types of TLVs for Chemicals in the Air

TLV-TWA or time-weighted average is the amount of chemical in the air that most workers can be exposed to, day after day without harm to their health. It is based on working an 8-hour work shift and 40-hour work week. During the work shift the amount of chemical in the air may go up and down, above and below the TLV, but the average amount of chemical in eight hours should not be above the TLV.

TLV-STEL or short-term exposure limit is the amount of chemical in the air averaged over 15 minutes that should not be exceeded during the work shift.

TLV-C or ceiling is the amount of chemical in the air that should never be exceeded during the work shift.

Units of measure for chemicals in the air or air concentration

ppm or parts per million is the "parts" of a gas or vapour in the air for every million "parts" of air. It only applies to gases and vapours.

mg/m³ or milligrams per cubic meter is the weight of a chemical in a cubic meter of air. It is used for particles in the air including metal dusts, welding fumes and acid mists. It also applies to gases and vapours, such as carbon monoxide and formaldehyde.

fibres/cc or fibres per cubic centimetre is the number of fibres in a cubic centimetre of air. It is used for fibres like asbestos.

Do OELs always protect workers' health?

A worker's health can still be harmed even if his or her exposure to a health hazard is below the OEL. OELs are guidelines and not a line between safe and unsafe levels of exposure. Each worker is different. One worker's health can be harmed by exposure to a certain amount when another's is not. A worker may also have a medical problem that could be made worse by exposure to a chemical. For example, overexposure to carbon monoxide affects the heart. Therefore, exposure to carbon monoxide below the OEL could be a problem for people who have a heart condition.

OELs do not include all workplace factors. For example, they do not include the amount of chemical taken into the body through the skin. OELs do not account for heavy physical work. Workers may breathe in more chemical when doing heavy physical work. Also OELs do not protect pregnant women or the reproductive health of men and women.

For these reasons, it is always important to pay attention to health symptoms, even if you are told that the chemicals in your workplace are at safe levels.

Do OELs protect workers from getting cancer?

OELs do not protect all workers from cancer. There is no safe level of exposure for chemicals that cause cancer. Workers have a smaller chance of getting cancer if they are exposed

- to smaller amounts of cancer causing chemicals
- for shorter amounts of time

Therefore, use cancer causing chemicals as little as possible. Even though OELs and TLVs are supposed to protect most workers, it is good to keep exposures as low as possible.

Can OELs be used for work shifts longer than eight hours?

OELs are usually set for 8-hour work shifts and cannot be used for longer shifts. A new OEL should be set by a qualified person for longer shifts.

What if there is more than one chemical in the air?

Many workplaces have more than one harmful chemical in the air. The OELs for the chemicals that can harm the body in a similar way, for example xylene and toluene, need to be grouped together. Sometimes workers will not be overexposed to each chemical by itself, but will be overexposed when grouping the OELs. The TLV booklet explains the method for grouping OELs.

Additional Resources

TLVs® and BEIs®. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. ACGIH. Cincinnati, OH.

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