

## ACGIH TLVs and BEIs for Chemical Substances, Physical Agents and Biological Exposure Indices – Chemical and Biological

### Scope and Application:

The American Conference of Governmental Industrial Hygienists (ACGIH) is a private, not-for-profit, non-governmental corporation. Members include industrial hygienists and other occupational safety and health professionals dedicated to promoting safety and health in the workplace. The ACGIH is not a standards-setting body, but has established committees to review the existing peer-reviewed, published scientific literature. The ACGIH publishes guidelines known as Threshold Limit Values (TLVs) and Biological Exposure Indices (BEIs) to assist industrial hygienists in deciding on safe levels of exposure to various physical and chemical agents in the workplace.

### Definitions:

- **Threshold Limit Values (TLVs)** - The airborne concentrations of chemical substances representing conditions under which it is believed that *nearly all* workers may be repeatedly exposed, day after day, over a working lifetime, without adverse effects.
- **TLV-Time Weighted Average (TWA)** – The TWA concentration for a conventional 8-hour workday, 40-hour workweek, to which it is believed *nearly all* workers may be repeatedly exposed, day after day, for a working lifetime without adverse effects.
- **TLV-Short Term Exposure Limit (STEL)** - A 15-minute TWA exposure that should not be exceeded at any time during the workday, even if the 8-hour TWA is within the TLV-TWA and should occur less than 4 times per day with at least 1-hour between repeated exposures in this range.
- **TLV-Ceiling ©** - The concentration that should not be exceeded during any part of the working exposure.
- **Biological Exposure Indices** – The levels of determinants found in samples (urine, blood, exhaled air) collected from workers.
- **Chemical** - Refer to the latest Documentation for more information on why the TLV value for a given airborne concentration of a chemical substance was given. Keep in mind the following:
  - There will be variations in the biological response to a particular chemical by individual workers (including age, gender, ethnicity, predisposition, lifestyle choices, medications and pre-existing medical conditions)
  - Chemical substances with TLVs of the same given number (e.g. 20 ppm) cannot be assumed to have the same toxicological effects or biological potency
  - TLVs do not represent the fine line between a healthy and unhealthy environment
  - TLVs do not represent a point where ill health will occur
  - Three categories of TLVs are: TWA, STEL, C
  - Excursion limits – for chemical substances with a TLV-TWA & no STEL, excursions in worker exposure levels may be 3 times the TLV-TWA for no more than 30 minutes during a workday & under no circumstances more than 5 times the TLV-TWA, provided the TLV-TWA is not exceeded
  - A calculated adjustment of the TLV is done: 1) when a mixture of 2 or more chemical substances exists, and 2) in unusual work conditions and work schedules

(cont'd)

- A chemical may have the following designations:
  1. carcinogen - An agent capable of producing benign or malignant neoplasms. The categories include:
    - A1 = confirmed human carcinogen
    - A2 = suspected human carcinogen
    - A3 = confirmed animal carcinogen with unknown relevance to humans
    - A4 = not classifiable as a human carcinogen
    - A5 = nor suspected as a human carcinogen
  2. sensitizer - A designation of "SEN", referring to the potential for an agent to cause sensitization by an immunological mechanism.
  3. cutaneous – A designation of "SKIN", referring to a chemical to add to the overall worker exposure by the skin contact, including eyes and mucous membranes.

**Biological Monitoring:**

Biological monitoring is done to determine exposure & health risk to workers. It involves measuring the concentration of a chemical determinant in the body of an exposed worker and indicates the uptake of that chemical.

**BEI values:**

- generally indicate a concentration below which nearly all workers should not experience adverse health effects
- what is measured may be the chemical itself, one or more metabolites or a characteristic reversible biochemical change cause by the chemical
- the samples tested: blood, urine, exhaled air

**Biological monitoring of workers:**

- Determines the amount of a chemical in the worker's body & can be related to past exposure(s) in the workplace
- Determines non-occupational exposure among workers
- Determines how well engineering controls & personal protective equipment are working
- Indirectly monitors work practices

**This bulletin contains a summary of excerpts taken from the Standard, for general information purposes only. This bulletin is not reflective of the complete requirements that the Standard prescribes.**

Note: *Manitoba Regulation M.R. 217/2006 Section 1.4 inconsistency:*

If there is an inconsistency between this regulation and a requirement contained in a publication, code or standard referenced in this regulation, the provisions in this regulation prevail.