



**Occupational
Health Clinics
for Ontario
Workers Inc.**

**Centres de
santé des
travailleurs (ses)
de l'Ontario Inc.**



Occupational Exposure Limit (OEL) Adjustment Tool

Why & How



Occupational
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Occupational Disease Prevention

Impact = Knowledge + Change + Action

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Occupational Exposure Limit-Adjustment

- Background
- Ontario Context
- Québec Model
- History & Other Models
- OEL Adjust Tool & Demo



Background

- Limitations
- Irregular Work Shifts
- Occupational Disease Action Plan (**ODAP**)
 - Respiratory Hazards Working Group
- Accessible Practical Tools for Reducing Exposures

Ontario Context (cont'd)

Basis for proposal

- OELs are time-weighted limits based on a standard 8 hour work day and 40 hour work week.
 - Irregular work shifts, which can be longer than an 8 hour work day and/or a 40 hour work week, are now commonplace in a range of industries in Ontario.
- Prior to January 1, 2020 Ontario's approach for adjusting OELs for irregular work shifts reduced the TWA proportionately based on the increased exposure time.
 - Under this approach, all substances, regardless of toxicity, are treated the same.
- Based on stakeholder interest MLTSD proposed use of the Québec Model.
 - Québec's model takes into consideration an agent's effect on the body.
 - Considers toxicological information such as sensitization, irritation, organ toxicity, etc., in addition to exposure and recovery times.
- The model is referenced in the ACGIH TLV Book as an approach for addressing "irregular work schedules".
 - Besides Québec, model is used in a number of other Canadian jurisdictions (e.g. British Columbia, Alberta) and internationally.

Change Where found?



Schedule 1 :
Airborne Measurement and Calculation of Exposure

5. **Subject to section 6 of this Schedule**, the time-weighted average exposure to an airborne biological or chemical agent in a work day or work week shall be calculated as follows:

1. The cumulative daily or weekly exposure shall be calculated using the following formula:

$$C_1T_1 + C_2T_2 + \dots + C_nT_n$$

C_1 : concentration found in an air sample

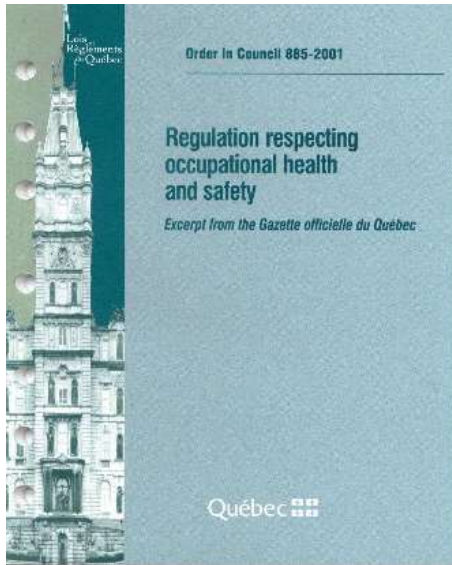
T_1 : the total time in hours to which the worker is taken to be exposed to concentration C_1 in a work day or a work week.

2. The time-weighted average exposure shall be calculated by dividing the cumulative daily exposure by eight and the cumulative weekly exposure by 40 respectively.

NEW 6. A determination of time-weighted average exposure for extended work shifts may be calculated using the methodology set out in the *Guide for the Adjustment of Permissible Exposure Values for Unusual Work Schedules* (March 2015) published by Quebec's Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST), using the applicable TWA set out in the Ontario Table or the ACGIH® Table.

The « Québec » Model

History ...



- **1994**, request for studies on unusual work schedules
- **1995**, adoption of the **guiding principle** and a faisability study (OSHA procedure)
- **1996**, application of this procedure to every substances of the RROHS
- **1999**, 1st version the Adjustment guide
- **1997-2001**, field application and evaluation
- **2001**, 1st version the Adjustment TOOL
- **2004, 2006, 2015 ...**
other versions of the Adjustment guide

Guiding toxicological principle

... to guarantee an **equivalent degree of protection** for workers with a conventional schedule of 8 hours per day, 5 days per week, and for workers with unusual schedules.

Method

OSHA logic

Adj Cat.	Category	Type of adjustment
1A	Substances regulated by a ceiling value	No adjustment
1B	Irritating or malodorous substances	
1C	Simple asphyxiants, substances presenting a safety risk or a very low health risk, whose half-life is less than 4 hours. Technological limitations	
2	Substances that produce effects following short-term exposure	Daily adjustment
3	Substances that produce effects following long-term exposure	Weekly adjustment
4	Substances that produce effects following a short- or long-term exposure	Daily or weekly adjustment (the more conservative of the two)

- attribution of primary health effects
- attribution of category of adjustment
 - No adjustment
 - Daily adjustment
 - Weekly adjustments
 - Daily or weekly (the most severe)

Haber's rule

$$F_a = 8/H_d, \text{ daily adjustment}$$

$$F_a = 40/h_w, \text{ weekly adjustment}$$

Application conditions

- Adjusted OEL value cannot be higher than the TWA OEL value
- No adjustment for short-time exposure (**STEL**) or Ceiling (**C**) limits
- Planned working schedules (>= 80% of the real work shift)
- Definitions:

Repetitive work cycle

Mean weekly hours of exposure per repetitive work cycle



<https://www.irsst.qc.ca/media/documents/PubIRST/T-22.pdf>

Ontario Adjustment Tool

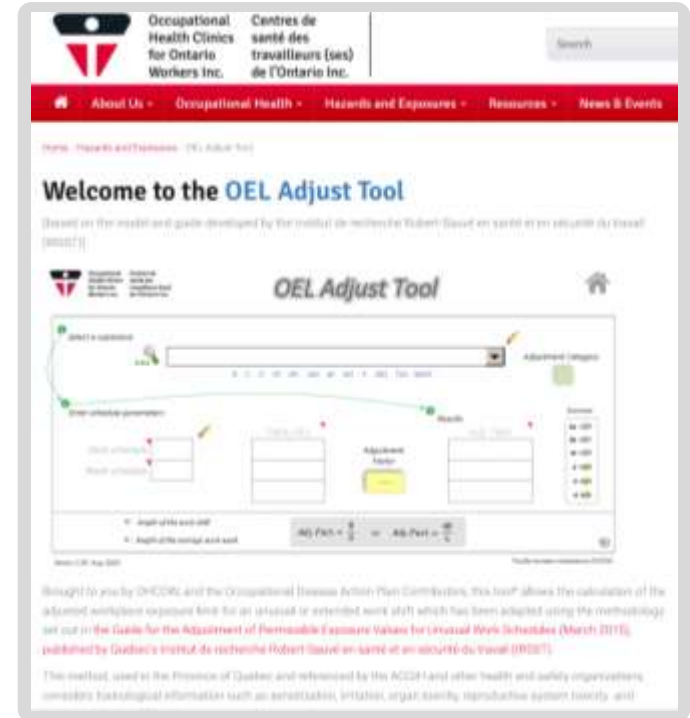
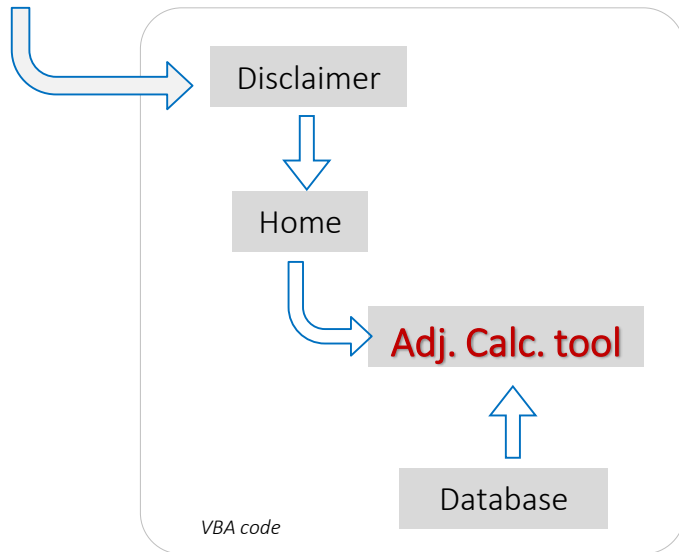
OEL Adjust

The tool ...



A Microsoft Excel workbook containing many worksheets

Structure/Interface

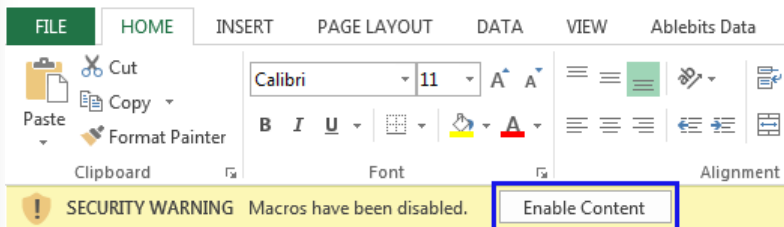


<https://www.ohcow.on.ca/oel-adjust-tool.html>





The tool **works ONLY** if ...



Or ...

... if the macro security level of EXCEL is set to "enable all".

Procedure

This file works ONLY if the macro security level of EXCEL is set to "enable all".

You can change macro security settings in the Trust Center, unless a system administrator in your organization has changed the default settings to prevent you from changing the settings.

Click Options (Excel 2010 to 2016 versions) or Microsoft Office Button (Excel 2007), and then click Trust Center > Trust Center Settings > Macro Settings.

Also from the Developer Tab:

Use to show Developer Tab >



OEL Adjust Tool



1 Select a substance

Styrene, monomer

100-42-5 B C D EF GH UKL M NO P QRS TUV WXYZ

Adjustment Category **4**

2 Enter schedule parameters

Daily schedule **12**

Week schedule **42**

3 Results

TWA-OEL 35 ppm

Adj-TWA 23,3 ppm

Adjustment Factor **0,667**

Examples: 1a, 1b, 1c, 2, 3, 4

H : length of the work shift
 h : length of the average work week

$Adj. Fact. = \frac{8}{H}$ or $Adj. Fact. = \frac{40}{h}$



Ontario OELs

The OELs are in the tool !

Ontario
Ministry of Labour, Training and Skills Development

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Current Occupational Exposure Limits for Ontario Workplaces Required under Regulation 833

Current Occupational Exposure Limits for Ontario Workplaces Required under Regulation 833

Version 2.0 (2018)
Revised (last reviewed) January 2019

Relevant Occupational Exposure Limits for Ontario Workplaces Required under Regulation 833: [Download](#) | [Print](#) | [Feedback](#)

Workers are required under section 4 of Regulation 833, Control of Exposure to Biological or Chemical Agents (the "Regulation"), to limit the exposure of workers to specified hazardous biological or chemical agents at workplaces with the values set out in the Ontario Table (defined in Table 2 of the Regulation) or, if the agent is not listed in the Ontario Table, the (10) AGZB Table that is incorporated by reference in the Regulation.

For ease of reference, the following table contains all specific occupational exposure limits as required under section 4 of the Regulation, i.e. it sets out information found in both the Ontario Table in Regulation 833 and the AGZB Table.

In addition, the table includes settings (e.g. Inhalation only, Inhalation and Skin Exposure) not included in either the Ontario Table or the AGZB Table. The Weighted averages that (G) or (S) substances are calculated using the recommended method referenced.

An employer has a duty and shall take all reasonable measures necessary in the circumstances to protect workers from exposure to a hazard from biological or chemical agents.

This table should not be solely relied upon to determine the required limits for substances. In order to determine if exposure limits, including weighted limits for a substance, please refer to the official version of the Regulation.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z Other

Go to [substance](#) and [elimination](#) at the bottom of the page.

Ontario Table Settings	Agent (CAS No.)	Time-Weighted Average Limit (TWA)	Short-Term Exposure Limit (STEL) / Ceiling Limit (CL)	Notes
	Acetaldehyde (75-07-0)		< 21 ppm	
	Acetamide (60-35-5)	10 ppm	15 ppm	
	Acetic anhydride (108-24-7)	1 ppm	7 ppm	
	Acetic acid (64-19-7)	100 ppm	100 ppm	
	Acetone (67-64-1)	250 ppm	< 0 mg/m ³	Skin
	Acetone cyanohydrin, as CN (75-86-5)	10 ppm		Skin
	Acetophenone (98-86-2)	10 ppm		
	Acetylene (74-86-2)	10 ppm		
	Acetylsalicylic acid (Aspirin) (50-78-2)	2 ppm		
	Acetaminophen (107-03-8)	10 ppm		0.1
	Acrylamide (79-06-1)	3 ppm	0,03	
	Acrylic acid (79-10-7)	10 ppm	2	
	Acrylonitrile (107-13-1)	3 ppm	2	
	Adipic acid (124-04-9)	3 ppm	5	

List of the substances from the Ontario OELs			TWA	STEL	Ceiling				
#	Substance Name	CAS	ppm	mg/m ³	l/ml	ppm	mg/m ³	l/ml	TWA?
1	Acetaldehyde	75-07-0	1A				25		N
2	Acetamide	60-35-5	4	1					Y
3	Acetic acid	64-19-7	10		10				Y
4	Acetic anhydride	108-24-7	10	1	1				Y
5	Acetone	67-64-1	10	250	100				Y
6	Acetone cyanohydrin, as CN	75-86-5	1A				5		N
7	Acetonitrile	75-05-8	2	20					Y
8	Acetophenone	98-86-2	10	10					Y
9	Acetylene	74-86-2	10						N
10	Acetylsalicylic Acid (Aspirin)	50-78-2	2	5					Y
11	Acetaminophen	107-03-8	10				0.1		N
12	Acrylamide	79-06-1	3	0,03					Y
13	Acrylic acid	79-10-7	10	2					Y
14	Acrylonitrile	107-13-1	3	2			10		Y
15	Adipic acid	124-04-9	3	5					Y

<https://www.labour.gov.on.ca/english/hs/pubs/oe/table.php>

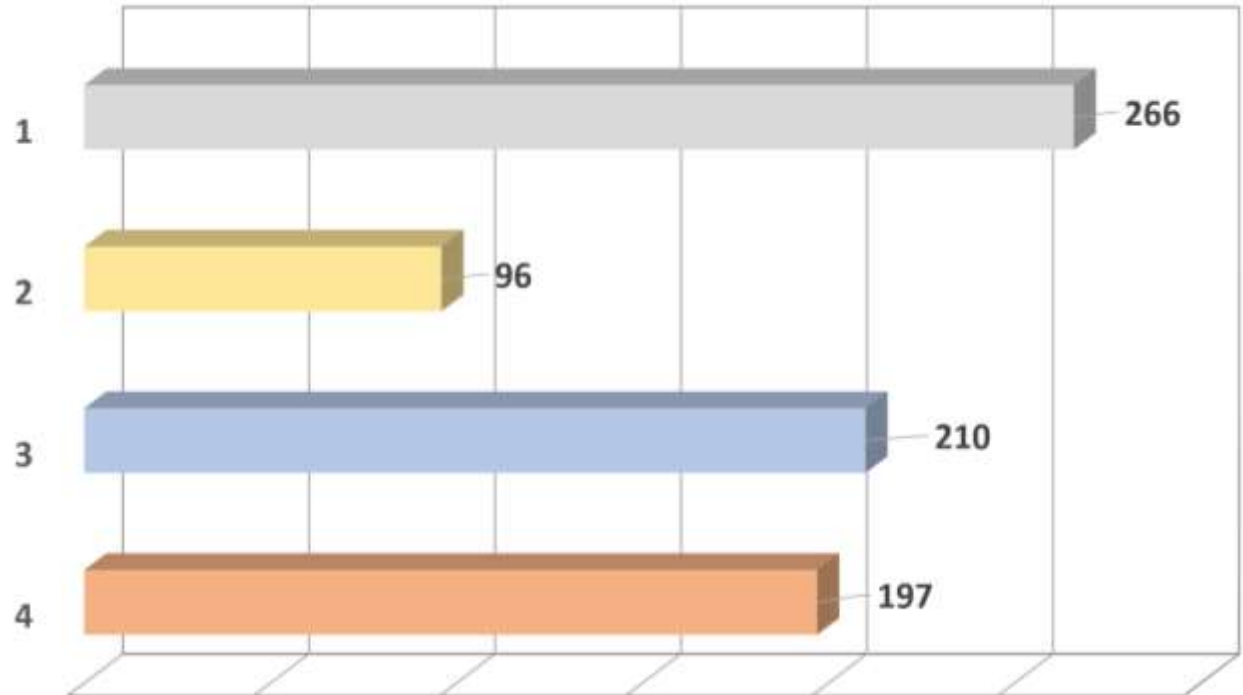


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TWA values

Cat.	Type of adjustment
1	No adjustment
2	Daily adjustment
3	Weekly adjustment
4	Daily or weekly adjustment (the more conservative of the two)

Distribution of Adjustment Codes



Short

Live Demo

Example 1

Acetonitrile

OEL-TWA = 20 ppm

Select a substance: Acetonitrile
Adjustment Category: 2
Enter schedule parameters:
Daily schedule: 10
TWA-OEL: 20 ppm
Adjustment Factor: 0,8
Results: Adj-TWA: 16 ppm

Effects considered for adjustment:

Acute effet : metabolic damage

Category 2

Daily adjustment

If the lenght of the workshift is 10 hours

$$\text{Adj OEL} = 20 * (8/H_d) = 16 \text{ ppm}$$

Conclusion

- Please Share

<https://www.ohcow.on.ca/oel-adjust-tool.html>

- Comments /

Any questions?

The screenshot shows the homepage of the OEL Adjust Tool. At the top, there is a navigation bar with the logo of the Occupational Health Clinics for Ontario Workers Inc. and the Centre de santé des travailleurs (ses) de l'Ontario Inc. The main heading is "Welcome to the OEL Adjust Tool". Below this, there is a brief description of the tool's purpose. The central part of the page features a diagram of the tool's workflow, which includes input fields for substance name, concentration, and work schedule, and output fields for adjusted exposure limits. A sidebar on the right lists various substances. At the bottom, there is a disclaimer and a note about the tool's development and funding.

Thank You!