

DATA SHEET
THRESHOLD LIMIT VALUES

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TLVs: LEARN TO USE THEM AND AMAZE YOUR FRIENDS

What's the use of having material safety data sheets (MSDSs) if we don't understand them? We need to learn to use MSDS technical terms. We can start with one of the toughest but most useful: the TLV or Threshold Limit Value. TLVs are air quality standards developed by the American Conference of Governmental Industrial Hygienists. They are the model for many other air quality limits such as OSHA's permissible exposure limits (PELs).

WHAT ARE TLVs?

TLVs are the amounts of chemicals in the air that almost all healthy adult workers are predicted to be able to tolerate without adverse effects. There are three types. The most common is the TLV-TWA (TLV-Time-Weighted Average) which is averaged over the normal eight-hour day/forty-hour work week.

There also are TLVs for 15 minute exposures (TLV-STEL or Short Term Exposure Limits) and TLVs that should not be exceeded for even an instant (TLV-C or Ceiling limits). Unless the initials "STEL" or "C" appear after "TLV", it is the eight-hour TLV-TWA that is meant.

WHAT TLVs ARE NOT.

TLVs are not "safe" limits. Even a few "healthy adult workers" will be unable to tolerate concentrations at the TLV. TLVs also do not apply to people with certain health problems, allergies, people taking certain medications or drugs, people who work longer than eight hours per day, children or the fetus.

TLVs are not "forever," they change. They represent the current best estimates ACGIH can make based on research.

Many hazardous chemicals do not have TLVs. Experts estimate there are over 100,000 chemicals used in commerce. There are TLVs for only 642 of these! Many toxic chemicals have not been studied well enough to set TLVs. Chemicals without TLVs should never be considered "safe." Using untested chemicals makes workers the "lab rats!"

EXAMPLES OF TLVs IN ORDER OF INCREASING HAZARD

<u>DUSTS & FUMES (solid particles)</u>	<u>TLV-TWA (milligrams/meter³)</u>
nuisance dusts (e.g. plaster or chalk)	10
graphite or talcum powder	2
lead (e.g. lead/chrome pigments, lead solder)	0.05
cadmium (e.g. cadmium pigments)	0.002

<u>GAS or VAPOR (molecules in air)</u>	<u>TLV-TWA (parts/million-ppm)</u>
carbon dioxide (from your breath or dry ice)	5000
acetone	500
ethyl acetate	400
mineral spirits	100
turpentine	20
carbon tetrachloride	5
phosgene (chemical warfare gas) or ozone	0.1
diisocyanates (from urethane resins/foams)	0.005

HOW DO I USE TLVs?

Its easy: the lower the TLV, the less is allowed in the workplace air, and the less you should inhale. On this basis, safer substitutes can be chosen by selecting products with higher TLVs (if evaporation rates and other traits are similar). For example, the TLVs above show us that odorless thinner is safer to use than turpentine.

USING TLVs AND ODOR THRESHOLDS.

The level at which most people can smell a chemical is called its “odor threshold” (OT). The OTs of many chemicals are known. Some US MSDSs report OTs and Canada requires them on their MSDSs when known. There are also many sources for this information including your Safety Officer.

Try to get this threshold number if you can, because chemicals whose OTs are lower than the TLV can be smelled before you reach a level considered excessive. Conversely, if the OT is higher than the TLV, there is some level of danger by the time you can detect the chemical by odor. Of course, some very dangerous chemicals have no odor at all.

MY MSDSs ARE NOT THAT EASY TO READ!

No problem. Call your Health and Safety Officer. Have names of the chemicals in your product or the MSDS in front of you and we'll work it out.

NEW KID ON THE BLOCK.

The European Union (EU) has now taken the lead in developing safety standards. The EU has looked at the bizarre situation in the US where we have standards for only a tiny fraction of the 100,000+ chemicals in commerce and decided to take matters into their own hands. They did not want to operate on the faulty US principle that chemicals are “innocent until proven guilty.”

The EU chose to frame their approach to this problem in the reverse. In short, their position is that chemicals should be “guilty until proven innocent.” This is called the “precautionary principle.” It assumes in the absence of test data, you cannot assume a chemical is safe and precautions should be instituted as if the chemical were toxic until or unless the manufacturer proves otherwise. This simple principle forms the basis for their regulatory programs.

An EU program under which chemical testing is required is called REACH, (Registration, Evaluation, Authorization [and Restriction] of Chemical Substances). Now REACH requires each industry to provide basic test data be submitted on certain chemicals or the manufacturer will not be allowed to import or sell their either the chemical or products containing the chemical anywhere in the EU. The first required test data is due in 2012.

GERMAN MAKs.

The EU also usually adopts the German maximum contaminant levels (MAKs) as their workplace standards. Especially of interest is that there are no MAKs for known carcinogens. They require employers to use the best technology available to keep workers from exposure to carcinogens. In the US, the OSHA permissible exposure limit is set after considering the opinions of industry regarding the cost of protecting workers at a lower level. In other words, the standard is set at a level which industry thinks will not be economically damaging to it—no matter how many workers’ lives are expected to be lost.

GAS or VAPOR in ppm: ACGIH	TLV-TWA	German MAK-TLV
carbon dioxide (from your breath or dry ice)	5000	5000
acetone	500	500
ethyl acetate	400	400
odorless paint thinner (highly refined)	300	
mineral spirits	100	
turpentine	20	Sh*
d-limonene (citrus solvent)	20	Sh*
carbon tetrachloride	5	0.5
phosgene (chemical warfare gas) or ozone	0.1	0.1
diisocyanates (from urethane resins/foams)	0.005	Sa**

* Sh = skin sensitizer – use best available technology to prevent exposure

** Sa = sensitization of airways – use best available technology to prevent exposure

If all of this is too confusing, send your MSDS to Monona Rossol: ACTSNYC@cs.com, and I’ll interpret the data for you.