TLVs®
Threshold Limit Values
for
Chemical Substances
and
Physical Agents
in the
Workroom Environment
with
Intended Changes
for
1974



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practical way of monitoring airborne agents for compliance with the limits, there are certain substances for which it is inappropriate. In the latter group are substances which are predominantly fast acting and whose threshold limit is more appropriately based on this particular response. Substances with this type of response are best controlled by a ceiling "C" limit that should not be exceeded. It is implicit in these definitions that the manner of sampling to determine compliance with the limits for each group must differ; a single brief sample, that is applicable to a "C" limit, is not appropriate to the time-weighted limit; here, a sufficient number of samples are needed to permit a time-weighted average concentration throughout a complete cycle of operations or throughout the work shift.

Whereas the ceiling limit places a definite boundary which concentrations should not be permitted to exceed, the time-weighted average limit requires an explicit limit to the excursions that are permissible above the listed values. The magnitude of these excursions may be pegged to the magnitude of the threshold limit by an appropriate factor shown in Appendix D. It should be noted that the same factors are used by the Committee in making a judgment whether to include or exclude a substance for a "C" listing.

"Skin" Notation. Listed substances followed by the designation "Skin" refer to the potential contribution to the overall exposure by the cutaneous route including mucuous membranes and eye, either by airborne, or more particularly, by direct contact with the substance. Vehicles can

alter skin absorption. This attention-calling designation is intended to suggest appropriate measures for the prevention of cutaneous absorption so that the threshold limit is not invalidated.

Mixtures. Special consideration should be given also to the application of the TLVs in assessing the health hazards which may be associated with exposure to mixtures of two or more substances. A brief discussion of basic considerations involved in developing threshold limit values for mixtures, and methods for their development, amplified by specific examples are given in Appendix C.

Nuisance Particulates. In contrast to fibrogenic dusts which cause scar tissue to be formed in lungs when inhaled in excessive amounts, so-called "nuisance" dusts have a long history of little adverse effect on lungs and do not produce significant organic disease or toxic effect when exposures are kept under reasonable control. The nuisance dusts have also been called (biologically) "inert" dusts, but the latter term is inappropriate to the extent that there is no dust which does not evoke some cellular response in the lung when inhaled in sufficient amount. However, the lung-tissue reaction caused by inhalation of nuisance dusts has the following characteristics: 1) The architecture of the air spaces remains intact. 2) Collagen (scar tissue) is not formed to a significant extent. 3) The tissue reaction is potentially reversible.

Excessive concentrations of nuisance dusts in the workroom air may seriously reduce visibility (iron oxide, carbon black), may cause unpleasant deposits in the eyes, ears

DSW 296352

STLCOPCB4066296

Substance	ppm[a]	mg/m^3[b]
Butadiene (1, 3-butadiene)	1,000	2,200
** Butane	—	—
Butanethiol, see Butyl mercaptan	—	—
2-Butanone	200	590
2-Butoxy ethanol (Butyl Cellosolve) — Skin	50	240
Butyl acetate (n-butyl acetate)	150	710
sec-Butyl acetate	200	950
tert-Butyl acetate	200	950
** n-Butyl alcohol—Skin	—	—
sec-Butyl alcohol	150	450
tert-Butyl alcohol	100	300
C Butylamine — Skin	5	15
C tert-Butyl chromate (as CrO_3) — Skin	—	0.1
n-Butyl glycidyl ether (BGE)	50	270
** Butyl lactate	—	—
Butyl mercaptan	0.5	1.5
p-tert-Butyltoluene	10	60
** Cadmium (Metal dust and soluble salts)	—	—
*C Cadmium oxide fume (as Cd)	—	0.05
Calcium carbonate	—	E
Calcium arsenate	—	1
Calcium oxide	—	5
Camphor (Synthetic)	2	12
Caprolactam		
Dust	—	1
Vapor	5	20

Capital letters refer to Appendices.
*1974 Addition.
**See Notice of Intended Changes.

Substance	ppm[a]	mg/m^3[b]
Carbaryl (Sevin®)	—	5
Carbon black	—	3.5
Carbon dioxide	5,000†	9,000
Carbon disulfide — Skin	20	60
Carbon monoxide	50	55
Carbon tetrachloride — Skin	10	65
Cellulose (paper fiber)	—	E
Chlordane — Skin	—	0.5
Chlorinated camphene — Skin	—	0.5
Chlorinated diphenyl oxide	—	0.5
Chlorine	1	3
Chlorine dioxide	0.1	0.3
C Chlorine trifluoride	0.1	0.4
C Chloroacetaldehyde	1	3
α-Chloroacetophenone (phenacylchloride)	0.05	0.3
Chlorobenzene (monochlorobenzene)	75	350
o-Chlorobenzylidene malononitrile (OCBM) — Skin	0.05	0.4
Chlorobromomethane	200	1,050
2-Chloro-1, 3-butadiene see Chloroprene	—	—
Chlorodiphenyl (42% Chlorine) — Skin	—	1
Chlorodiphenyl (54% Chlorine) — Skin	—	0.5
1-Chloro, 2, 3- epoxy-propane, see Epichlorhydrin	—	—

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†See 1974 Revised Documentation.

DSW 296353

STLCOPCB4066297

Substance	ppm[a]	mg/m³[b]
Vanadium (V_2O_5), as V		
Dust	—	0.5
C Fume	—	0.05
Vinyl acetate	10	30
Vinyl benzene, see Styrene	—	—
Vinyl bromide	250	1,100
** Vinyl chloride	—	—
Vinylcyanide, see Acrylonitrile	—	—
Vinyl toluene	100	480
Warfarin	—	0.1
Wood dust (nonallergenic)	—	5
Xylene (xylol) — Skin	100	435
Xylidine — Skin	5	25
Yttrium	—	1
Zinc chloride fume	—	1
Zinc oxide fume	—	5
* Zinc stearate	—	E
Zirconium compounds (as Zr)	—	5

a) Parts of vapor or gas per million parts of contaminated air by volume at 25 °C and 760 mm. Hg. pressure.

b) Approximate milligrams of substance per cubic meter of air.

d) An atmospheric concentration of not more than 0.02 ppm, or personal protection may be necessary to avoid headache.

e) <7 μm in diameter.

f) As sampled by method that does not collect vapor.

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g) According to analytically determined composition.

h) For control of general room air, biologic monitoring is essential for personnel control.

Radioactivity: For permissible concentrations of radioisotopes in air, see U.S. Department of Commerce, National Bureau of Standards Handbook 69, "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," June 5, 1969. Also, see U.S. Department of Commerce National Bureau of Standards, Handbook 59, "Permissible Dose from External Sources of Ionizing Radiation," September 24, 1954, and addendum of April 15, 1958. A report, Basic Radiation Protection Criteria, published by the National Committee on Radiation Protection, revises and modernizes the concept of the NCRP standards of 1954, 1957 and 1958; obtainable as NCRP Rept. No. 39, P.O. Box 4867, Washington, D.C. 20008.

MINERAL DUSTS

Substance	
SILICA, SiO_2	
Crystalline	
Quartz	TLV in mppcf: $\frac{300^{j)}}{\%\ \text{quartz} + 10}$ TLV for respirable dust in mg/m³: $\frac{10\ \text{mg/m}^{3\,k)}}{\%\ \text{Respirable quartz} + 2}$

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