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Bulletin No. 203

STATE OF OHIO

SPECIFIC REQUIREMENTS AND GENERAL SAFETY STANDARDS OF THE INDUSTRIAL COMMISSION OF OHIO FOR WORKSHOPS AND FACTORIES

Covering Previously Adopted Bulletin Nos. 203, 204, 205, 206, 207, 208, 209, 210, 213 and Power Saws (Covering All Industries) Power Driven Traveling Cranes (Workshops and Factories Only)

Adopted by The Industrial Commission of Ohio as Revised and Issued as a General Order, Effective January 1, 1951.
New—Chapter XIV—Personal Protective Equipment
New Chapter XV—Ventilation and Exhausts
Adopted by The Industrial Commission of Ohio as Revised and Issued as a General Order, Effective January 3, 1955.

Effective January 1, 1951
Except New Chapter XIV and XV
Effective January 3, 1955
Copy 1

THE INDUSTRIAL COMMISSION OF OHIO
M. HOLLAND KRISE, Chairman
AUGUSTUS G. PARKER, Vice Chairman
RICHARD W. TOBIN, Member

DEPARTMENT OF INDUSTRIAL RELATIONS
WILLIAM O. WALKER, Director
DIVISION OF FACTORY AND BUILDING INSPECTION

COLUMBUS, OHIO NOVEMBER 20, 1950

THE INDUSTRIAL COMMISSION OF OHIO

R E S O L U T I O N

WHEREAS, the Specific Requirements and General Safety Standards of The Industrial Commission for Workshops and Factories herein are formulated, compiled and issued in compliance with Article II, Section 35, of the Constitution of Ohio, and in further compliance with Sections 161-1, 871-22, 871-25, 871-26, 871-34 and 1028-6 of the Ohio General Code, authorizing The Industrial Commission of Ohio to make, adopt and publish safety orders, rules and regulations and to prescribe what safety devices, safeguards and other means which are best adapted for reasonable protection of employees in every place of employment, and

WHEREAS, by virtue of the above authority vested in The Industrial Commission of Ohio, the following Resolution was adopted on this 20th day of November, 1950:

NOW, THEREFORE, BE IT RESOLVED by The Industrial Commission of Ohio, that each of the following identified codes relating to the specific subjects covered by each, and issued as a general order effective on the date indicated, and filed in the Office of the Secretary of State on the date indicated, be, and the same is, hereby repealed effective at 12:00 o'clock midnight December 31, 1950:

Bulletin No.	Subject	Issued	Filed
203	General Safety Standards	Jan. 1, 1924	Aug. 4, 1941
204	Fire Drills in Factories	Jan. 1, 1924	Aug. 4, 1941
205	Foundries	May 1, 1931	Aug. 4, 1941
206	Woodworking Machinery	May 1, 1931	Aug. 4, 1941
207	Presses, Hammers, Machines and Machine Tools	Jan. 1, 1933	Aug. 4, 1941
208	Polishing and Grinding	Jan. 1, 1924	Aug. 4, 1941
209	Blowers and Exhausters	Jan. 1, 1924	Aug. 4, 1941
210	Steel Mills	Jan. 1, 1924	Aug. 4, 1941
213	Laundries, Dry Cleaning and Dyeing Establishments	May 1, 1931	Aug. 4, 1941

AND IT IS FURTHER RESOLVED by The Industrial Commission of Ohio that the code of Specific Safety Requirements following in entirety herein, titled and known as "Specific Requirements and General Safety Standards of The Industrial Commission of Ohio" be, and the same is, adopted and issued as a general order; that on or about the 10th day of October, 1950, publication was made in pamphlet form for distribution on demand and that said code of Specific Safety Requirements shall be in full force and effect on and after the 1st day of January, 1951, as provided by law.

This upon Motion of Mr. Morse, seconded by Mr. Dickerson, and voted on as follows:

/S/ Richard W. Morse AYE
CHAIRMAN
/S/ J. Maynard Dickerson AYE
VICE CHAIRMAN
/S/ Will T. Blake AYE
MEMBER

ATTEST:
/S/ Joseph J. Scanlon
SECRETARY
DATED: NOVEMBER 20, 1950

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Chapter XV

VENTILATION AND EXHAUSTS

SCOPE

This chapter covers means for the control of gases, dusts, mists, fumes, and vapors that are named in the chapter and that have been established as injurious in the concentrations present.

The plates and the recommended maximum allowable concentration table, given in the Appendix, are given for information or guide purposes only and are not to be considered as establishing specific requirements.

Section 165. The requirements of Sections 4125.02 to 4125.11, inclusive, of the General Code of Ohio (1953 Revision), pertaining to the manufacture of white lead, red lead, litharge, sugar of lead, arsenate of lead, lead chromate, lead sulphate, lead nitrate and lead fluosilicate, are hereby by reference, made a part of the requirements of this code.

Section 166. DEFINITIONS.

1. **"General Ventilation"**, means the ventilation of the General atmosphere in the place of employment.
2. **"Dilution"** ventilation, means ventilation provided to dilute the concentration of dusts, fumes, vapors or gases in the atmosphere of all or part of the place of employment.
3. **"Local Exhaust"**, ventilation means that type of ventilation in which suction is applied at the point of generation or escape of dusts, fumes, mists, vapors or gases.
4. **"Exhaust System"**, means a complete suction system, including all hoods, ducts, fans, separators and receptacles when required, and any other part necessary for the proper installation and operation thereof.
5. **"Hood"**, means that part of an exhaust system into which the contaminated air or dust, fumes, mist, vapor or gas first enters.
6. **"Duct"**, means any pipe, flume or channel forming a part of a ventilating system, used to convey air, dust, fumes, mists, vapors or gases.
7. **"Fan"**, means the machine which creates the movement of air in a mechanical system of ventilation.
8. **"Separator or Collector"**, means that part of an exhaust system in which the contaminant or entrained material, is separated from the air which conveys it.
9. **"Dust"**, means particles of solid matter which have been pulverized.

10. **"Fumes"**, means solid particles generated by condensation from the vapor or gaseous states, usually of metallic elements and often accompanied by oxidation.
11. **"Mist"**, means liquid droplets or wet solids suspended in air.
12. **"Vapor"**, means the gaseous form of a substance normally in the liquid or solid state.
13. **"Gas"**, means a formless fluid occupying the space of enclosure.
14. **"Airborne Hazards"**, means injurious concentrations of fibrosis producing or toxic dusts, toxic fumes, mists, vapors or gases or a combination of these suspended in the atmosphere in working areas.
15. **"Captured Velocity"**, is the velocity at any point in front of the hood necessary to overcome opposing air currents and to capture the contaminated air by causing it to flow into the exhaust hood.
16. **"Transport Velocity"**, is the amount of air required to keep the material being exhausted, airborne in the exhaust system.
17. **"Injurious Concentrations"**, as applied to fibrosis producing or toxic dusts, toxic fumes, mists, vapors, or gases, means concentrations which are known to the employer to be in excess of those which would not normally result in injury to an employee's health if the employee had not been previously exposed to such fibrosis producing or toxic dusts, toxic fumes, mists, vapors, or gases.
18. The Symbol "FPM", means the rate of lineal air movement in feet per minute.

CONTROL OF AIRBORNE HAZARDS

Section 167. Airborne hazards shall be minimized by one or more of the following methods:

(a) Substitute non-injurious or less injurious material.
(b) Confine or isolate the contaminant.
(c) Remove at source (local exhaust ventilation).
(d) Remove by dilution ventilation.
(e) Remove by general ventilation.
(f) Use of wet methods to allay dusts.

Note: Good housekeeping is of definite value in minimizing airborne hazards created by dust.

RESPIRATORY EQUIPMENT

Section 168. (a) When the removal of air contaminants is impracticable, where exposures are intermittent and of short duration, or in cases of emergency, then each employee who is liable to exposure shall be protected by a respirator or other protective equipment as and when required in Chapter XIV of Bulletin 203. It shall be the responsibility of the employee to wear such special equipment as

is provided by the employer. (See Revised Code 4101.12 and 4101.13, old Section 871-16-17 G.C.)

(b) In addition to the type of exhaust used in an abrasive blast room, all employees working inside the room shall be provided with a Bureau of Mines approved supplied air helmet. The air supply to the supplied air helmet shall be free from harmful ingredients and shall be of a positive pressure type.

GRINDING, POLISHING AND BUFFING OPERATORS

Section 169. Whenever the nature of the work will permit and when there is injurious concentration of fibrosis producing or toxic dusts, abrasive wheels and belts shall be effectively hooded and exhausted.

EXCEPTIONS:

(1) Abrasive wheels or belts upon which water, oil or other liquid substance is used at the point of the grinding contact.

(2) Small abrasive wheels used occasionally for tool grinding, or an operation employing not more than one man at work upon such abrasive wheels.

Section 170. Abrasive wheel and buffing wheel exhaust systems, shall be kept separate when the dust from the buffing wheel is of flammable material.

EVAPORATION OF TOXIC MATERIALS IN MANUFACTURING PROCESSES

Section 171. When toxic materials are evaporated in injurious concentrations during their application, drying or handling, they shall be exhausted by means of local exhaust if practicable.

TOXIC GASES FROM INTERNAL COMBUSTION ENGINES

Section 172. Whenever the nature of the work will permit and when there is an injurious concentration of toxic gases produced by stationary internal combustion engines, such gases shall be effectively exhausted.

REQUIREMENTS FOR EXHAUST SYSTEMS

Section 173. The exhaust ductwork shall be of a size suitable for conducting the contaminated air outdoors or to provide not less than the minimum transport velocity necessary to remove the particulate material produced by the operation to a dust collector.

Section 174. The air outlet from every air separator or dust collector and the gases, vapors, fumes or mists collected by an exhaust system, shall be discharged in such a manner so that discharged materials will not re-enter the working area in injurious concentrations.

Section 175. There shall be air supply openings or inlets through which air enters the building or room in which the local exhaust system is in operation, carefully located and remote from any source of outdoor contamination.

APPENDIX I

The concentration of atmospheric contaminants in the air breathed by employees, should not exceed the following recommended maximum allowable concentrations for an eight-hour daily exposure:

Maximum concentration should not be used as the sole criterion for establishing evidence of hazard to health but the evaluation of a possible hazard should also be subject to other pertinent factors such as the nature of the contaminant and the frequency and duration of the exposure or clinical evidence of harmful effects.

GASES AND VAPORS	CONCENTRATION Parts per million (by volume)
Acetone	1000
Acrolein	0.5
Acrylonitrile (Vinyl Cyanide)	20
Ammonia	100
Amyl Acetate	200
Butyl Acetate	200
Ethyl Acetate	400
Aniline	5
Arsine	0.05
Benzene (Benzol)	35
Butanone (Methyl Ethyl Ketone)	300
Butyl Alcohol	100
Carbon Disulfide	20
Carbon Monoxide	100
Carbon Tetrachloride	50
Chlorine	5
Chloroform	100
Dichlorobenzene	·75
Dichloroethyl Ether	15
Dimethyl Aniline	5
Ether (Ethyl)	400
Ethylene Dichloride	100
Ethylene glycol monomethyl ether (Methyl "Cellosolve")	50
Formaldehyde	10
Hydrogen Chloride	10
Hydrogen Cyanide	15
Hydrogen Fluoride (Calculated as H F)	3
Hydrogen Sulfide	20
Methyl Alcohol	200
Methyl Bromide	20

GASES AND VAPC	
Methyl Chloride	
Naphtha:	
Coal Tar	
Petroleum	
Nitrobenzene	
Nitrogen Oxides	
Ozone	
Phosgene	
Phosphine	
Styrene (Monomer)	
Sulfur Dioxide	
Tetrachloroethane	
Tetrachloroethylene (F	
Toluene (Toluol)	
Trichloroethylene	
Turpentine	
Xylene (Xylol)	
METALLIC DUST	
Beryllium (Daily wei	
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Cadmium	
Chromic Acid and Chr	
(Calculated as chr	
Lead	
Manganese	
Mercury	
Zinc Oxide	
OTHER DUSTS AI	
Chlorinated Diphenyls	
Chlorinated Naphthale	
Trichloronaphthal	
Pentachloronaphtl	
MINERAL DUSTS	
Asbestos	
Silica, free or uncom	

GASES AND VAPORS	CONCENTRATION Parts per million (by volume)
Methyl Chloride	200
Naphtha:	
Coal Tar	200
Petroleum	750
Nitrobenzene	1
Nitrogen Oxides	25
Ozone	1
Phosgene	1
Phosphine	0.05
Styrene (Monomer)	400
Sulfur Dioxide	10
Tetrachloroethane	10
Tetrachloroethylene (Perchloroethylene)	200
Toluene (Toluol)	200
Trichloroethylene	200
Turpentine	200
Xylene (Xylol)	200

METALLIC DUSTS AND FUMES	CONCENTRATION Milligrams per cubic meter
Beryllium (Daily weighted average)	.002
(Top on short term)	.025
Cadmium	0.1
Chromic Acid and Chromates	
(Calculated as chromic oxide, CrO_3	0.1
Lead	0.15
Manganese	6.0
Mercury	0.1
Zinc Oxide	15.0
OTHER DUSTS AND FUMES	
Chlorinated Diphenyls	1.0
Chlorinated Naphthalenes:	
Trichloronaphthalene	5.0
Pentachloronaphthalene	0.5

MINERAL DUSTS	CONCENTRATION Million particles per cubic foot
Asbestos	5
Silica, free or uncombined: Over 50%	5
5 to 50%	20
Below 5%	50

"Explanatory Note:

(1) At least three atmospheric samples, spaced at intervals to yield an average measurement of exposure over the entire cycle of operation under test shall be collected in the breathing zone of the worker or wherever such exposures are suspected or known to exist.

(2) For the purpose of this chapter, the sampling and analysis of contaminated air and the interpretation of the data in relation to the recommended maximum allowable concentrations shall be done using established sampling and analysis procedures acceptable to the Industrial Commission of Ohio.

(3) Temporary concentrations in excess of the maximum allowable concentrations recommended shall not be permitted if exposure to such concentrations for a period of one hour or less may result in an adverse effect on health as determined by The Industrial Commission of Ohio.

(4) For the purpose of the above maximum allowable concentrations for silica, the free silica content shall be the percent of free silica in the fraction of the airborne dust in the breathing zone of the worker that is smaller than 5 microns in maximum diameter.

(5) For all other dust determinations millions of dust particles per cubic foot of air by the light field microscope counting technique shall include all microscopically visible particles up to 10 microns in size."

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