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For additional information on dust and cinders, see Chapter 29, Air Cleaning Devices.

RESISTANCE OF SYSTEM

The maintained resistance of the exhaust system is composed of three factors: (1) loss through the hoods, (2) collector drop, and (3) friction drop in the duct system.

The loss through the hoods is usually assumed to be equal to the suction maintained at the hoods. Where possible the resistance of the particular collector to be used should be ascertained from the manufacturer.

Friction drop in the pipes must be computed for each section where there is a change in area or in velocity. Find the velocities in each section of pipe starting with the branch most remote from the fan. The friction drop for these sections can be determined by reference to Table 6 and Fig. 2, Chapter 32. Total friction loss in the piping system is the friction drop in the most remote branch plus the drop in the various sections of the main, plus the drop in the discharge pipe.

TABLE 7. ACCEPTED STANDARDS FOR TOXIC CONCENTRATION OF FUMES, DUSTS AND MISTS^a

FUMES	MILLIGRAMS PER CUBIC METER
Cadmium oxide.....	0.1
Chlorodiphenyl.....	1.0
Lead or oxides of lead.....	0.15
Mercury or mercury compounds.....	0.1
Pentachloronaphthalene.....	0.5
Trichloronaphthalene.....	5.0
Zinc oxide.....	15.0
DUSTS	MILLION PARTICLES PER CUBIC FOOT ^b
Asbestos.....	5
Cement.....	100
Gypsum.....	100
Lead or compounds of lead.....	0.15 ^c
Manganese.....	6 ^c
Marble.....	100
Silica (more than 70 per cent free silicon-dioxide).....	5
Silica (more than 10 per cent free silicon-dioxide).....	10
Silica (less than 10 per cent free silicon-dioxide).....	100
MISTS	MILLIGRAMS PER CUBIC METER
Chromic acid.....	0.1
Sulphuric acid.....	5.0

^aAdapted from Safe Concentrations of Certain Common Toxic Substances Used in Industry, by M. Bowditch, C. E. Drinker, P. Drinker, H. A. Haggard, and H. Hamilton (*Journal of Industrial Hygiene and Toxicology*, Vol. 22, No. 6, June, 1940). Industrial Code Bulletin No. 35 (New York State Labor Department). Study of Asbestosis in Asbestos Textile Industry (*U. S. Public Health Bulletin* No. 241, 1933). Chronic Manganese Poisoning in an Ore Crushing Mill (*U. S. Public Health Bulletin* No. 247, 1940).

^bDetermined by light field or equivalent technique.

^cMilligrams per cubic meter.

CHAPTER 40. INDUSTRIAL EXHAUST SYSTEMS

TABLE 8. CORROSION RESISTING MATERIALS FOR EXHAUST SYSTEMS^a

MATERIAL	ACIDb											
	ACETIC		CHROMIC		HYDRO- CHLORIC	HYDRO- FLUORIC		NITRIC		PHOS- PHORIC	SUL- PHUROUS	SUL- FURIC
METALS	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.
Aluminum.....	Good		Fair		Poor		No Data		Poor	Good	Poor	Poor
Magnesium and Alloys.....	No Data		Good	Poor	No Data		Poor	Good	No Data		No Data	No Data
Lead and Lead-Coated.....	Poor		Good		Poor		Poor		Poor		Good	Good
Moly Alloy (60 Ni--20 Mo --20 Fe).....	Good		No Data		Fair		No Data		Poor		Poor	Good
Monel Metal.....	Fair		Poor		Fair	Poor	Good		Fair	Poor	Poor	Good
Bronze.....	Poor										Good	
Silicon Iron.....	Fair	Good	No Data		Fair		Poor		Good		Good	Good
Stainless Steel (18 Cr- 8 Ni).....	Good		Good		Poor		No Data		Good		Poor	Poor
Enameled Steel.....	No Data		No Data		Good		Poor		Good		Poor	Good
MISCELLANEOUS												
Asbestos Comp.....					Good except against strong acids and alkalis							
Wood.....	Some woods are decomposed or softened faster than others.											
Rubber.....									Poor			Poor
Plastics.....	In general plastics resist weak acids and are decomposed by concentrated acid.											

^aStandard Practice Sheet No. 115 (Division of Industrial Hygiene, New York State Labor Department).

^bAcid mists in air are more corrosive than as liquid in storage tank. Galvanized iron not resistant to acid.

^cStainless steel of (24 Cr—10 Ni) fairly resistant at low temperature for HCl and H_2PO_4 .

^dUnder most conditions.

^eAt room temperatures.

EFFICIENCY OF EXHAUST SYSTEMS

The efficiency of an exhaust system depends upon its effectiveness in reducing the concentration of dusts, fumes, vapors and gases below the safe or threshold limits¹⁰.

Too much emphasis cannot be placed on the necessity of testing exhaust systems frequently by determining the concentration of atmospheric contamination at the worker's breathing level. Commonly accepted values of threshold limits for usual atmospheric contaminants, such as fumes, dusts and mists are given in Table 7. Similar data covering gases and vapor will be found in Chapter 28.

TYPES OF FANS

Manufacturers generally provide special fans for the collection of various industrial wastes. These are available for the collection of coal

¹⁰Criteria for Industrial Exhaust Systems, by J. J. Bloomfield (A.S.H.V.E. TRANSACTIONS, Vol. 40, 1934, p. 353).