limits may be regulated further according to the capacity of the fan and the effective performance of the hoods and the duct system.

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

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

[a]Adapted from Safe Concentrations of Certain Common Toxic Substances Used in Industry, by M. Bowditch, C. K. 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, 1938). Chronic Manganese Poisoning in an Ore Crushing Mill (*U. S. Public Health Bulletin* No. 247, 1940).

[b]Determined by light field or equivalent technique.

[c]Milligrams per cubic meter.

TABLE 8. CORROSION RESISTING MATERIALS FOR EXHAUST SYSTEMS[a]

MATERIAL	ACID[b]															
	ACETIC		CHROMIC		HYDRO-CHLORIC		HYDRO-FLUORIC		NITRIC		PHOSPHORIC		SULPHUROUS		SULPHURIC	
METALS	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.	Dil.	Conc.
Aluminum	Good		Fair		Poor		No Data		Poor	Good	Poor		Poor		Poor	
Magnesium and Alloys	No Data		Good	Poor	No Data		Poor	Good	No Data		No Data		No Data		No Data	
Lead and Lead-Coated	Poor		Good		Poor		Poor		Poor		Poor		Good		Good	Poor
Moly Alloy (60 *Ni*—20*Mo*—20 *Fe*)	Good		No Data		Fair		No Data		Poor		Poor		No Data		Good	
Monel Metal	Fair		Poor		Fair	Poor	Good[d]		Fair	Poor	Fair		Poor		Good[e]	Poor
Bronze	Poor												Good			
Silicon Iron	Fair	Good	No Data		Fair		Poor		Good		Good		No Data		Good	
Stainless Steel[c] (18 *Cr*-8 *Ni*)	Good		Good		Poor		No Data		Good		Poor		Good		Poor	Good[e]
Enameled Steel	No Data		No Data		Good		Poor		Good		Poor		No Data		Good	
MISCELLANEOUS																
Asbestos Comp.					Good except against strong acids and alkalies											
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.															

[a]Standard Practice Sheet No. 115 (Division of Industrial Hygiene, New York State Labor Department).

[b]Acid mists in air are more corrosive than as liquid in storage tank. Galvanized iron not resistant to acid.

[c]Stainless steel of (24 *Cr*—10 *Ni*) fairly resistant at low temperature for HCl and H_3PO_4.

[d]Under most conditions.

[e]At room temperatures.

drop in the most remote branch plus the drop in the various sections of the main, plus the drop in the discharge pipe.

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 limits[10].

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.

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