

HEATING VENTILATING AIR CONDITIONING GUIDE 1944

AN INSTRUMENT OF SERVICE PREPARED FOR THE PROFESSION—CONTAINING A

Technical Data Section

OF REFERENCE MATERIAL ON THE DESIGN AND SPECIFICATION OF HEATING,
VENTILATING AND AIR CONDITIONING SYSTEMS BASED ON—THE TRANS-
ACTIONS—THE INVESTIGATIONS OF THE RESEARCH LABORATORY AND CO-
OPERATING INSTITUTIONS—AND THE PRACTICE OF THE MEMBERS AND
FRIENDS OF THE SOCIETY

TOGETHER WITH A

Manufacturers' Catalog Data Section

CONTAINING ESSENTIAL AND RELIABLE INFORMATION CONCERNING
MODERN EQUIPMENT

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WITH

Complete Indexes

TO TECHNICAL AND CATALOG DATA SECTIONS

Vol. 22

\$5.00 per Copy

PUBLISHED ANNUALLY BY

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS

51 MADISON AVENUE . . . NEW YORK, N. Y.

CHAPTER 40

Industrial Exhaust Systems

Classification of Systems, Hood Design Principles, Requirements for Suction and Velocity, Duct System Design, Collectors, Resistance of System, Efficiency of Exhaust Systems, Types of Fans, Protection Against Corrosion

IN many industries some type of exhaust system designed to collect and remove dusts and fumes is essential to the efficiency, economy, and safety of operation. General design information is included in this chapter which is intended to relate primarily to industrial exhaust systems.

CLASSIFICATION OF SYSTEMS

In general there are two basic layouts of exhaust systems, the central and the multiple unit system. In the central system a fan is located near the center of operations with a piping system radiating to the various machines to be served. In the multiple unit system, which is sometimes employed where the machines to be served are widely scattered, or where the operations are apt to be independent or intermittent, small individual exhaust fans are located at the center of the machine groups or at each machine. The unit arrangement has the advantage of flexibility.

Exhaust systems are also classified by the means employed to collect the material. The dust or refuse may be collected and controlled by enclosing hoods or open hoods with positive inward air movement or by exhausting the general air of the room. With some classes of machinery it is not feasible to hood the machines closely and in these cases open hoods over or adjacent to the machines are provided to collect as much as possible of the dust and fumes. This class includes such machines as rubber mills, package filling machinery, sand blast, crushers, forges, pickling tanks, melting furnaces, and the unloading points of various types of conveyors.

The open hoods should be placed as close to the source of dust or fumes as possible, with due regard to the movements of the operator and should be placed so that the operator is in no case in the path of the exhausted material. When the hood must be placed at some distance above the machine it should be large enough to cover a large area as diffusion is usually quite rapid.

Some consideration should be given to the natural movement of the fumes. For those that are lighter than air, the hood may be over or above

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. 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).

^bDetermined by light field or equivalent technique.

^cMilligrams per cubic meter.



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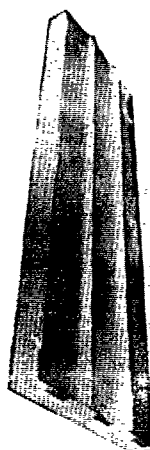
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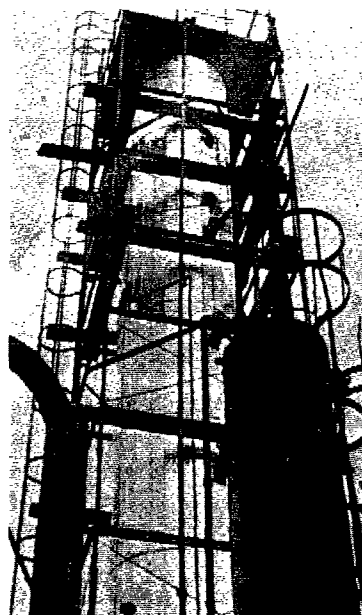
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HEAT INSULATION for ALL PURPOSES

ALFOL PRE-FABRICATED INSULATION PANELS FOR TANKS, TOWERS, AND ALL TYPES OF HEATED EQUIPMENT



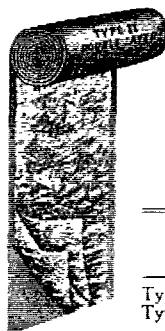
Prefabricated Panel.
At Right—
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- **Metal Jacketed Panels** containing insulation best suited for each particular condition.
- **Removable and Replaceable** by means of Lock-Joint construction.
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See technical data on Table 1, Section C, Pages 91-94, this volume.

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Richmond, Virginia

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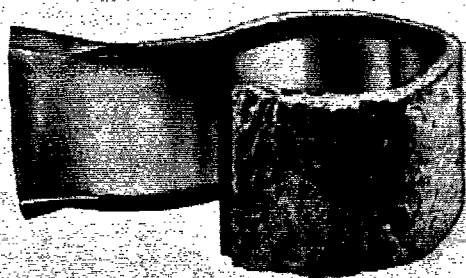
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REYN-O-Cell

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