



MEDICAL DEPARTMENT BULLETIN

This data sheet was revised December, 1967. Please destroy all previous copies.

RECOMMENDED BREATHING AIR STANDARDS

I. INTRODUCTION

The Medical Department and the Safety and Property Protection Branch of the Central Engineering Department have been asked on a number of occasions about the quality of breathing air in connection with its use in air supplied or contained respiratory apparatus. The recommendations in this report reflect the regulations in certain states and other countries where formal regulations or recommendations covering this subject exist.

In Monsanto plants, breathing air usually comes from one of two sources. The first of these sources is from a commercial vendor who sells either breathing air in his own cylinders or fills plant owned cylinders provided him by the plant. The other source is from a plant owned compressor which provides air directly to a piped air system or is used to fill air cylinders that are subsequently used. Meaningful recommendations must, therefore, cover both the quality of the air used as well as safe methods of compression.

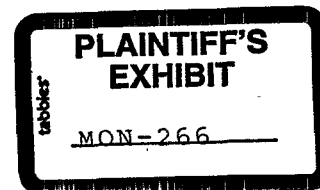
II. RECOMMENDED AIR STANDARDS

There are 2 types of compressed air as graded by the Compressed Gas Association. Type I is gaseous and divided into 9 grades. Type II is liquid and divides into 2 grades. Those types and grades acceptable to Monsanto are Type I Grade F, G, H, and J.

This compressed air will meet or surpass the following specification.

- A) Oxygen - The oxygen content shall be between 19-23%.
- B) Contaminants - The concentration of contaminants in breathing air shall not exceed these values.
 - 1) Carbon Monoxide .5 ppm (0.0005%)
 - 2) Carbon Dioxide 500 ppm (0.05%)
 - 3) Gaseous Hydrocarbons 10 ppm (0.001%) as methane
 - 4) Water Saturation
 - 5) Odor-Free from objectionable
 - 6) Oil - 0.02 mg/L

MAP 001469



III. RECOMMENDED COMPRESSOR STANDARDS

(A) Water Lubricated Compressors - For obvious reasons this type of compressor is the best for compression of air destined for human use.

- (1) The air intakes should be screened and located so as to insure that the intake air is as free as possible of smoke, fumes and other contaminants.
- (2) The air compressor should be preceded by a filter designed to remove dust and other particulate matter.
- (3) Air from the compressor should be passed to the receiver through filters designed and maintained to remove dust and other particulate matter, hydrocarbons, and droplets of oil or water.

(B) Oil Lubricated Compressors - (As well as synthetic fire resistant lubricants) These requirements are in addition to those listed above under water lubricated compressors.

- (1) Oil lubricated (or synthetic fire resistant lubricants) compressor cylinders should be ventilated or otherwise cooled sufficiently to maintain temperatures below that at which carbon monoxide or other hazardous breakdown products might be produced.
- (2) To avoid the possibility of overheating a motor-stop-control actuated by a temperature sensing probe affixed in the air stream immediately downstream from the compressor discharge should be provided. This should be set to stop oil lubricated compressors at an air temperature of 300°F. In multistage compressors, additional sensing devices connected to the motor-stop-control should be installed in the air pass between each stage.
- (3) Oil used for lubrication should have a low sulfur content.
- (4) If a synthetic fire resistant lubricant is used the same principles described for oil would be applicable except that the temperatures used to set the motor-stop-controls should be checked with the manufacturer of the lubricant, as well

as the methods of analysis. In the case of Monsanto's own Pydraul AC or Pydraul 625, the motor-stop-control should be set at 300°F and the analysis for oil contained in Section IV of this report is satisfactory.

C) Other Consideration of Oil Lubricated Compressors

- 1) There are some legal considerations of operating oil lubricated compressors. These are as in the state of Louisiana, the compressor shall deliver air which has not been in contact with any oil, grease or other similar lubricant. Other states which allow the use of oil lubricated compressors require high temperature shut-off.
- 2) Some method of filtration should be supplied between the metallic supply line and respirator to remove pipe scale, rust, oil droplets, water droplets, and removal of objectionable odors by activated charcoal when required. A few suppliers are now able to provide a unit containing Hopcalite to catalytically burn Carbon Monoxide. A drying agent must be used before the Hopcalite to protect it.

IV. RAPID DETERMINATION OF BREATHING AIR COMPONENTS AND CONTAMINANTS

- (A) Oxygen - Compressed outside air should be considered to meet the no-less-than 20% oxygen standard without test. Where doubt exists a sample may be blown into a plastic bag (polyvinyl chloride) and the oxygen determined by any acceptable oxygen indicator such as the portable oxygen indicator, manufactured by the Mine Safety Appliance Company, 200 North Braddock Avenue, Pittsburgh 8, Pennsylvania.
- (B) Carbon Monoxide - This determination may be made directly by using any of the following detectors or any other type of detector or wet analytical method approved by the Medical Department:
 - (1) Carbon Monoxide Tester No. DS-47133, or Universal Tester Model #1 or #2 using carbon monoxide tubes, manufactured by the Mine Safety Appliance Company, Pittsburgh 8, Pennsylvania.

- (2) Kitagawa Precision Gas Detector Unico Model No. 400 with the carbon monoxide detector tubes distributed in the United States by Union Industrial Equipment Co., 150 Cove Street, Fall River, Massachusetts 02720.
- (C) Carbon Dioxide - This determination can be made directly by using one of the following detectors:
 - (1) Kitagawa Precision Gas Detector Unico Model No. 400 with carbon dioxide detector tube. Address of distributor given above.
 - (2) Model #1 or #NF Toxic Gas Detector Kit with carbon dioxide tubes manufactured by the Davis Emergency Equipment Co., Inc., 45 Halleck Street, Newark, N. J.
- (D) Oil-This determination may be made with reasonable accuracy by passing 100 liters of air at atmospheric pressure and room temperature through a carefully weighed Whatman No. 41 filter paper and measuring the increase in weight. Air containing 0.02 mg. of oil per liter will add 2 mg. to the weight of the filter.
- (E) Water - Compressed air should not contain water in separated form. To test for saturation any good dew point equipment is acceptable.
- (F) Odor - The cylinder or line valve should be opened and the escaping air smelled. If it is objectionable it should not be used.
- (G) Total Hydrocarbons - The total hydrocarbon concentration can be estimated, semiquantitatively, by using a combustible gas indicator. Most such devices indicate a concentration of approximately 25 ppm with a 5% of full scale deflection for most hydrocarbons.

V. CONCLUSIONS

Where air is purchased from a vendor, the vendor should be asked to determine the quality of his air periodically and show the plant evidence that the air meets the standards set above. If the vendor does not have the facilities for testing his product and no other source is available, then the plant should periodically check the quality of the air purchased.

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If the plant uses a compressor the product air should be periodically checked to make sure it meets these requirements.

If there is any question concerning this document, contact the Medical Department in St. Louis.

12/67

MAP 001473

MONSANTO CHEMICAL INTERMEDIATES COMPANY
INDUSTRIAL HYGIENE SECTION
LOSS PREVENTION AND SAFETY DEPARTMENT
TEXAS CITY, TEXAS

APRIL 21, 1981

THE DETERMINATION OF TOTAL AND RESPIRABLE
DUST BY FILTER

METHOD NO. IH-1 (TC)

MAP 001474

W.D. Martin

The Determination of Total and Respirable Dust by Filter
Method No. IH-1 Page 2

3. In order to measure respirable dust, the procedure is the same as that above with the exception of the addition of a cyclone to the filtering apparatus.

A M.S.A. cyclone and clamp designed to operate with the Dupont 4000 personnel pump is connected in line with and ahead of the filter cassette using tubing. In this configuration, the cyclone, rather than the cassette, is attached to a convenient location in the worker's breathing zone.

CALIBRATION

This method is a purely gravimetric procedure. Therefore, the only calibrations necessary are of the pump and the Cahn 21 balance. Both of these procedures are found in the respective owner's manual.

Bill Martin

BM/br
4/21/81

APPENDIX TO TEXAS CITY INDUSTRIAL HYGIENE
METHOD IH-1

Sampling

The DuPont pump is calibrated with a soap bubble meter before and after the sampling according to paragraph C, Chapter I of the OSHA's Industrial Hygiene Technical Manual (OSHA Instruction CPL 2-2.20A, March 30, 1984). Dust measurements may be of short duration (10 mins, 20 L) or up to a full work shift (8 hours, 960 L). The Cahn balance is calibrated before use with the test weights provided with the instrument.

Analytical Procedure

The filters are kept in a dessicator and returned to it after sampling for at least one hour.

Special Precaution

Care should be taken to avoid any overloading of the filter, as evidence by any loose particulate.

Dan N. Campbell
9/17/84

MONSANTO CHEMICAL INTERMEDIATES COMPANY
INDUSTRIAL HYGIENE SECTION
LOSS PREVENTION AND SAFETY DEPARTMENT
TEXAS CITY, TEXAS

APRIL 21, 1981

THE DETERMINATION OF AIRBORN DUST PARTICLES USING
THE PIEZO BALANCE

METHOD NO. IH-2 (TC)

MAP 001477

W.D. Martin

THE DETERMINATION OF AIRBORN DUST PARTICLES USING
THE PIEZO BALANCE

ENVIRONMENTAL HEALTH
TEXAS CITY, TEXAS

METHOD NO. IH-2

SCOPE

This method measures both total and respirable dust. The dust is measured using the Thermo System's Model 3500 Piezo balance. This is an instrument which measures the mass concentration of smoke, fumes, dust, and other aerosols. Aerosol measurements over the range of 0.005 mg/M³ to 20 mg/M³ can be determined by this method.

PROCEDURE

The Piezo balance operator would typically enter the dusty or smoky area, make several measurements in the exposure zone of the area's occupants, and average the measurements.

The operation of the Piezo balance, itself, is quite simple yet sufficiently involved so as to preclude an adequate treatment here. The prospective operator should read Parts I, II and III of the owner's manual before attempting any measurements.

CALCULATIONS

No calculations are necessary because the Piezo balance is a direct measurement device.

Bill Martin

BM/br
4/21/81

MAP 001478

APPENDIX TO TEXAS CITY INDUSTRIAL HYGIENE
METHOD IH-2

Follow the instructions in the Operator's Manual in preparing the instrument for the measurements and the selection of the proper operating range (pp 6-14). The collection (pump) rate is fixed at 1 l/min and sampling time is used to change the operating range. This instrument is returned to Thermo-systems yearly for a factory calibration.

NOTE: Be sure and not reverse the soap and clean water (rinse) sponges in cleaning, rewetting, and replacing them (pp 22-23).

Dan N. Campbell
9/18/84

MAP 001479

MONSANTO FIBERS AND INTERMEDIATES COMPANY
LOSS PREVENTION & SAFETY DEPARTMENT
INDUSTRIAL HYGIENE SECTION
TEXAS CITY, TEXAS

SEPTEMBER 18, 1984

ASBESTOS

METHOD IH 30

Personnel: D. N. Campbell
R. H. Moore

MAP 001480

ASBESTOS

Title

NIOSH Method P&CAM 239 used to determine worker exposure to airborne asbestos fibers.

Sampling

Samples are taken as specified in method P&CAM 239 and as prescribed in Texas City GLP (Quality Assurance and Control) Manual and OSHA's Industrial Hygiene Technical Manual, Chapter III. Flow rate is approximately 2 L/m, calibrated before and after.

Analysis

Samples are sent in the sealed cassettes to an outside lab for counting. A blank is sent with each group of samples as outlined in GLP. This lab must be one certified by AHA for asbestos.

R. H. Moore
9/20/84

Approved:

Dan N. Campbell
D. N. Campbell

9-26-84

MAP 001481