

Interoffice Communication

To Steve Ashby
From Tom Grumbles
Date January 6, 1982
Subject PERSONAL AIR SAMPLING FOR WELDING FUMES

The basic method used in sampling for welding fume is a high volume personal sampling pump and filter cassette. For total fume and iron oxide measurements the method outlined in Attachment I is used. The only addition would be to use a pre-weighed filter to allow for a gravimetric determination of total welding fume. These pre-weighed filters and the analytical services can be obtained through several contract laboratories.

The majority of welding done in the shop is probably carbon steel, and a total welding fume and iron oxide determination is suitable for assessing exposures. However, if stainless steel is being welded a chromium analysis should also be done. This method is outlined in Attachment II.

I would recommend using Hager Laboratories or C-TEK Laboratories to obtain pre-weighed filters and sample analysis. The address for these laboratories is below. There are other sampling considerations, such as filter placement on the welder, that we should discuss before you begin sampling.

Tom / ajo
Thomas G. Grumbles

ajo

Attachments

Hager Laboratories, Inc.
4725 Paris Avenue
Denver, CO 80239
(303) 371-1441

C-TEK Laboratories
Continental Technical Services
9742 Skillman
Dallas, Texas 75243
(214) 343-2025

ATTACHMENT I

Sampling Data Sheet #25.01

Class E

March 11, 1974

Substance:

Iron oxide

Standard:

29 CFR 1910.93(a), Table G-1 of October 18, 1972

8-hour time-weighted average: 10 mg/m

Analytical Procedure:

Atomic absorption

Lower working limit: 1.5 µg/filter

Sampling Equipment:

A personal sampler pump is used to pull air through a 37-mm, 3 piece filter holder. The contaminant is collected on a 0.8-micrometer pore size mixed cellulose ester filter (37 mm in diameter). The filter holder is held together by tape or a shrinking band. If the middle piece of the three-piece holder does not fit snugly into the bottom piece of the filter holder, the contaminant will leak around the filter. A piece of the flexible tubing is used to connect the filter holder to the pump. Sample at a flow rate of 1.5 liters per minute with face cap on and small plugs removed. After sampling, replace small plugs.

Sample Size:

A minimum sample size of 30 liters is required. Personal sampler pump batteries should be checked and recharged after four hours.

Blank:

With each batch of samples, submit one filter labelled as blank. This filter should be subjected to the same handling as the samples, except that no air is drawn through the filters.

Shipping:

Ship in a container designed to prevent damage in transit.

Sampling Data Sheet # S352

Substance:

Chromium, Metal and Insoluble Compounds

Standard:

8-hour time-weighted average: 1 mg/cu m

Reference: 29 CFR 1910.93

Analytical Method:

A known volume of air is drawn through a cellulose ester membrane filter to trap the chromium metal and insoluble chromium compounds present. The filter and sample are digested with hydrochloric and nitric acids to solubilize the sample and destroy the filters and any organic material. The analyte is then dissolved in a nitric acid solution, and aspirated into an atomic absorption spectrophotometer for determination of concentration. The method has been validated over the range of 0.493-1.830 mg/cu m using a 90-liter sample at 26°C and 761 mm Hg atmospheric temperature and pressure.

Sampling Equipment:

A calibrated personal sampling pump whose flow can be determined to an accuracy of $\pm$ 5% at 1.5 liters per minute; a 37-mm three piece cassette filter holder and a 37-mm/0.8 micrometer mixed cellulose ester membrane filter (MCEF) supported by a cellulose backup pad.

Sample Size:

A sample size of 90 liters is recommended. Sample at a flow rate of 1.5 liters per minute.

Sampling Procedure:

1. Assemble the filter and three piece filter cassette and close firmly to insure that the center ring seals the edge of the filter. Examine the holder for a good filter seal. If the cassette will not seal tightly, it should be discarded. Secure the cassette holder together with tape or shrinkable band.
2. Remove the cassette plugs and attach to the personal sampling pump tubing. Clip the cassette to the worker's lapel.
3. Air being sampled should not be passed through any hose or tubing before entering the filter cassette.

4. Set the flow rate as accurately as possible using the manufacturer's directions. Record the temperature and pressure of the atmosphere being sampled. If the pressure reading is not available, record the elevation. Position the middle of the rotameter ball of the personal sampling pump to the 1.5-liter per minute calibration mark as accurately as possible. Since it is possible for the filter to become plugged by heavy particulate loading or by the presence of oil mists or other liquids in the air, the pump rotameter should be observed frequently, and readjusted as needed. If the rotameter cannot be adjusted to correct a problem, terminate the sampling.
5. After termination of sample collection, the cassettes should be firmly sealed with the plugs in both the inlet and outlet.
6. Carefully record sample identity and all relevant sample data.
7. Blank. With each batch of ten samples, submit one filter from the same lot of filters which was used for sample collection and which is subjected to exactly the same handling as the samples except that no air is drawn through it. Label this as a blank.

Special Considerations:

When interfering compounds are known or suspected to be present in the air, such information, including their suspected identities, should be transmitted with the sample.

Shipping Instructions:

The cassettes in which the samples are collected should be shipped in a suitable container, designed to prevent damage in transit.

Reference:

Chromium, Metal and Insoluble Compounds, NIOSH Method No. S352.

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