

Fume from welding and allied processes —

Part 1: Guide to methods for the sampling and analysis of particulate matter

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Welding Standards Committee (WEE/-) to Technical Committee WEE/40, upon which the following bodies were represented:

- British Constructural Steelwork Association Ltd.
- British Occupational Hygiene Society
- British Shipbuilders
- Health and Safety Executive
- Process Plant Association
- Society of Motor Manufacturers and Traders Ltd.
- Welding Institute
- Welding Manufacturers' Association (BEAMA Ltd.)

This British Standard, having been prepared under the direction of the Welding Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 April 1986

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Foreword

This British Standard has been prepared under the direction of the Welding Standards Committee. It was developed from DD 54-1:1977 and DD 54-2:1981 which are withdrawn. It is published in two Parts as follows:

- *Part 1: Guide to methods for the sampling and analysis of particulate matter;*
- *Part 2: Guide to methods for the sampling and analysis of gases.*

The prime concern of this Part of BS 6691 is to recommend the procedures to be used for sampling particulate matter in the breathing zone of the operative. This may necessitate the wearing of certain apparatus that can obtain samples while the operative is working without interfering with natural breathing or with the performance of the job. It is normally essential to know the general background level of fume in a workshop, and this Part also covers this form of static sampling which could involve several units located over the work area operating for extended periods.

Recommended procedures for sampling and suggested methods of analysis are included. It is not the function of this Part to state what constituents should be measured or what level of any particular constituent should be regarded as acceptable, as it is essential that expert occupational health/hygiene advice be sought. It can be stated, however, that valuable information concerning the effectiveness of environmental controls or special work practices can be gained by following the standardized sampling procedure and quantifying gravimetrically for total particulate alone.

It should be noted that the methods given in this guide may not be entirely appropriate for some constituents of fume. In such cases the series “Methods for Determination of Hazardous Substances (MDHS)” published by the Health and Safety Executive will usually provide a specific method.

It has been assumed in the drafting of this British Standard that the execution of its provisions is entrusted to appropriately qualified and experienced people.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 6691 provides guidance on methods for the sampling and analysis of particulate matter in fume from welding and allied processes.

NOTE 1 Advice on sampling strategy may be obtained from HSE Guidance Note EH 42.

NOTE 2 The titles of publications referred to in this standard are listed on the back cover.

2 Breathing zone sampling

2.1 Sampling head

The sampling head should be constructed of a material that will not contaminate the sample; plastics, stainless steel and aluminium are suitable.

The head should be open ended and capable of holding a 37 mm diameter¹⁾ filter. One suitable design is shown in Figure 1.

2.2 Filtering medium

The type of filter should be such that it is free from relevant contaminants and compatible with subsequent analytical procedures and will give more than 95 % filtration efficiency of 0.3 μm at a flow rate of 2 L/min. The filter should have a nominal pore size of 0.8 μm .

NOTE A PVC or glassfibre filter is preferable for total fume measurement, whilst a PVC or cellulose ester filter is normally preferable when metallic constituent analysis is required.

2.3 Pump²⁾

The pump should be of a type and size capable of being worn by the welder.

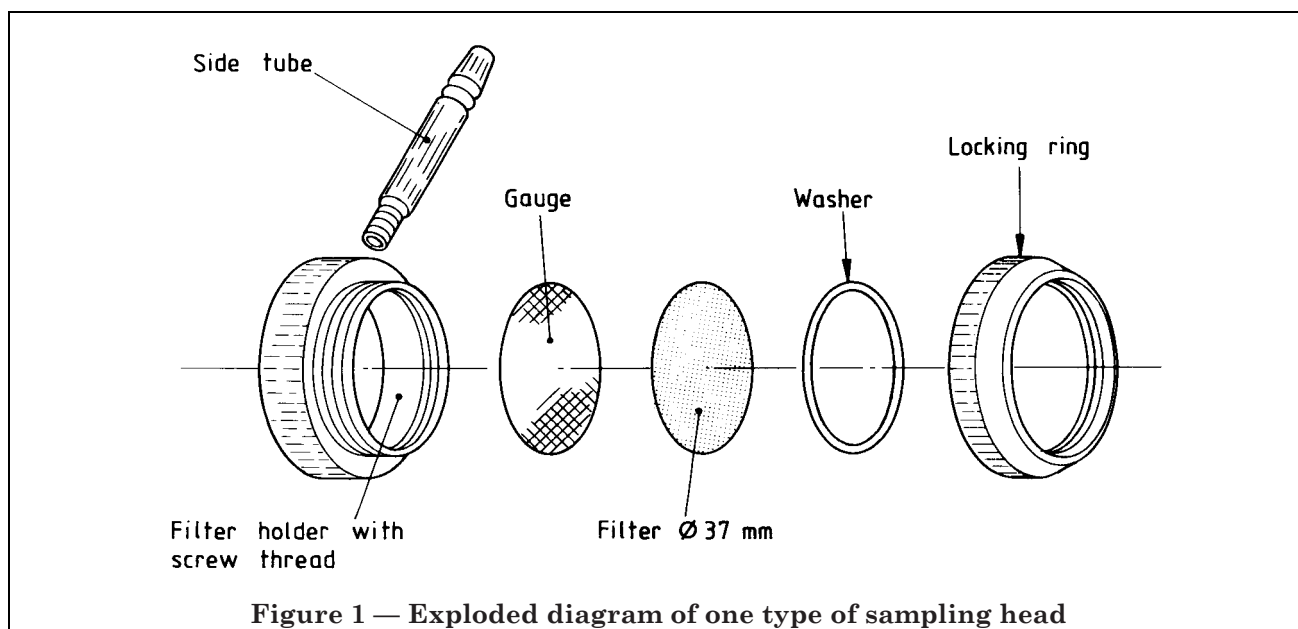
The performance of the pump should be such that it provides a smooth flow having a peak-to-trough ratio of 2 to 1 or better.

Some visual indication of the flow rate is desirable. The pump should normally be capable of running for 8 h without the need to recharge the batteries. Under certain circumstances, for example in heavy fume concentration, this period may be shorter.

2.4 Sampling rate

The sampling equipment should sample at a fixed rate between 1.8 L/min and 2.2 L/min.

The flow rate meter on a pump unit merely gives an indication that the equipment is working effectively, but the sampling rate should be calibrated with the filter in place before and after sampling using the soap bubble method or an integrating gas meter (see Figure 2). If the flow is pulsation free, a calibrated variable area flow meter can be used.



¹⁾ This size of filter has been included because:

standardization of one diameter will facilitate reproducibility and comparability of results;

37 mm diameter filters with suitable sampling heads are frequently used in the United Kingdom and they have also been adopted by the American Welding Society;

the risk of filter blocking is less than with a smaller diameter.

This does not preclude the use of other filter sizes.

²⁾ Advice on selection and use of sampling pumps is given in British Occupational Hygiene Society Technical Guide No. 5.