BS 8520-1:2009

BSI Standards Publication

Equipment used in the controlled removal of asbestos-containing materials –

Part 1: Controlled wetting equipment – Specification

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Contents

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Foreword

Publishing information

This part of BS 8520 is published by BSI and came into effect on 31 December 2009. It was prepared by Subcommittee HS/1/1, *Asbestos* under the authority of Technical Committee HS/1 *Occupational health and safety management*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

This British Standard is based on PAS 60-1:2004, which is withdrawn.

Relationship with other publications

This British Standard is one part of a series, *Equipment used in the controlled removal of asbestos-containing materials*, the other parts of which are:

- *Part 2: Negative pressure units – Specification;*
- *Part 3: Operation, cleaning and maintenance of class H vacuum cleaners – Code of practice.*

This British Standard is one of three parts developed from the PAS 60 documents, *Equipment used in the controlled removal of asbestos-containing materials*:

- *Part 1: Controlled wetting of asbestos-containing materials – Specification*;
- *Part 2: Negative pressure units – Specification*;
- *Part 3: Operation, cleaning and maintenance of class H vacuum cleaners – Code of practice.*

Hazard warnings

WARNING. This British Standard calls for the use of substances and/or procedures that can be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Use of this document

It has been assumed in the preparation of this British Standard that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

In particular, attention is drawn to the following statutory regulations:

The Control of Asbestos Regulations 2006 [1]

The Control of Asbestos Regulations (Northern Ireland) 2007 [2]

The Electrical Equipment (Safety) Regulations 1994 [3]

The Electricity at Work Regulations 1989 (as amended) [4]

The Electricity at Work Regulations (Northern Ireland) 1991 [5]

The Health and Safety at Work etc. Act 1974 (as amended) [6]

The Machinery Directive 98/37/EC (as amended) [7]

The Supply of Machinery (Safety) Regulations 2008 [8]

The Provision and Use of Work Equipment Regulations 1998 (as amended) [9]

The Provision and Use of Work Equipment Regulations (Northern Ireland) 1999 (as amended) [10]

The Simple Pressure Vessels (Safety) Regulations 1991 (as amended) [11]

The Control of Substances Hazardous to Health Regulations 2002 (as amended) [12]

The Management of Health & Safety at Work Regulations 1999 (as amended) [13]

The Special Waste (Scotland) Regulations 2004 (as amended) [14]

The Hazardous Waste Regulations (England and Wales) 2005 (as amended) [15]

The Hazardous Waste Regulations (Northern Ireland) 2005 (as amended) [16]

Introduction

This British Standard has been developed to provide the asbestos removal industry with a specification for equipment used in the controlled wetting of asbestos-containing materials. It is intended to promote the manufacture of equipment and materials that will effectively wet asbestos-containing materials and suppress asbestos fibres both during and after the asbestos removal process.

1 Scope

This British Standard specifies requirements for equipment for the controlled wetting of asbestos-containing material (ACM) by injection or spraying of liquid to suppress the release of airborne asbestos fibres.

It is applicable to the wetting of ACM by:

- multipoint injection of sprayed coatings, insulating board, thermal insulation and coatings on pipes, tanks and vessels;
- spraying with low-pressure spray heads of insulating board and other materials less than 10 mm thick.

2 Terms and definitions

For the purposes of this part of BS 8520, the following terms and definitions apply.

2.1 needle
thin, pointed hollow device through which liquid can flow

NOTE Blockages to the flow and damage to needles can be reduced by the use of designs in which liquid can flow out through the peripheral wall.

2.2 low-pressure spray head
device which aerosolizes a liquid

NOTE Low pressure is considered as a maximum pressure of 3 bar.

2.3 valve
device that starts, shuts off, regulates or controls the flow of liquid

2.4 wetting agent
low-hazard agent which increases the ability of water to wet and penetrate into the ACM

2.5 wetting equipment
equipment which delivers wetting solution (**2.6**) to ACM in a controlled manner

2.6 wetting solution
mixture of wetting agent (**2.4**) and particle-free water delivered as a solution from the wetting equipment to ACM to prevent asbestos fibres from becoming airborne

NOTE In order to reduce emissions of airborne fibres to as low as reasonably practicable and to prevent dry stripping, it is important to ensure that the wetting solution has been fully absorbed by the ACM, so that no dry areas remain. The rate of absorption will depend on a number of variables and no single definitive test has yet been developed to indicate the extent of the absorption.

3 Design

3.1 General

The wetting equipment shall be capable of delivering a wetting solution to ACM through tubes attached to valves and needle(s) or a low pressure spray head.

Where more than one needle is used, the rate of flow of the wetting solution from the needles shall be controllable and similar at each needle, regardless of elevation.

NOTE 1 Annex A describes how to measure similar flows. Annex B is a summary of the use of wetting solutions.

Valves shall be capable of delivering similar amounts of wetting solution by being set or locked to a position. If valves cannot be set or locked, a method of recording shall be installed to ensure an even flow through the needles when operated under field conditions.

NOTE 2 An automatic timer can be incorporated which is capable of starting and stopping the flow of wetting solution to the ACM at set times.

3.2 Needle-dispensed volume tolerance

When measured using the procedure in Annex A, the variation in the volume of wetting solution delivered by each needle shall be within ±10% of the average.

3.3 Spray head rate of flow

Where the wetting equipment incorporates a low-pressure spray head, the rate of flow of the wetting solution from the nozzle shall be:

a) consistent; and

b) of a velocity sufficient to dampen the ACM without disturbing it.

NOTE "Disturbing" refers to both dislodging particles and creating airborne fibres.

3.4 Equipment using mains pressure

Where wetting solution is intended to be delivered by mains water pressure, the water pressure shall be sufficient to achieve delivery of the wetting solution to the ACM. The inlet pressure shall be controllable with a pressure-regulating valve. A pressure booster shall be available in case the mains water pressure is not adequate to achieve delivery of the wetting solution.

A wetting solution filter capable of filtering to a maximum particle diameter of 70 µm shall be fitted to the wetting equipment to filter the wetting solution before it reaches the point of injection or spray.

3.5 Failure warning facility

The wetting equipment shall incorporate a warning facility which is activated if the pressure or flow rate decreases to zero.

NOTE The wetting equipment can also incorporate an electricity failure indicator.

4 Instructions for installation and use

4.1 General guidance documentation on the following shall, as a minimum, be provided with each piece of wetting equipment.

a) The technical specifications.

b) The intended use and limitations of the wetting equipment.

c) The information on the electricity supply required and any safety devices required (e.g. earth leakage circuit breakers);

NOTE Attention is drawn to The Electrical Equipment (Safety) Regulations *[3].*

d) The range of water pressures suitable for the inlet.

e) The recommended liquids or additives for use with the equipment.

f) The range of water pressures available from the outlet, whether needle or spray.

g) The recommended number of needles that can be used in series and still maintain a similar flow rate from each needle [see **4.1**f)].

h) The range of flow rates [see **4.1**g)].

i) The recommended number of low-pressure spray heads that can be used and still maintain a similar flow rate from each spray head [see **4.1**f)].

4.2 Instructions for installation, operation and maintenance, including as a minimum the following, shall be supplied with each piece of wetting equipment.

a) Instructions containing appropriate detail, supplemented by diagrams, to enable the user to correctly install and use the wetting equipment.

b) An instruction that the wetting equipment shall be used under the supervision of trained, competent personnel.

c) Advice on where the use of needles or spray equipment is not suitable.

d) Instructions that, before use, the operator:

1) visually inspects the wetting equipment to ensure that it is in a serviceable condition and operates correctly, including the safety warning facility, and records the inspection;

2) ensures that the manufacturer's recommendations for use are followed;

3) checks the flow of fluid through the needles or low-pressure spray heads, especially if a blockage in a needle is suspected; and

4) replaces the needles if they fall outside ±10% of the average flow rate when tested in accordance with Annex A (see **A.7**).

e) Instructions on personal protective equipment to be worn when using the wetting equipment.

f) Advice on hazard prevention during use, e.g. handling of sharp needles and minimizing tripping and slipping hazards.

g) Advice on control of substances hazardous to health pertaining to the wetting agent, if supplied as part of the wetting equipment.

h) Maintenance procedures and advice that such procedures are strictly adhered to with specific instruction on how to:

1) check the flow of fluid through the needles or low-pressure spray heads if a blockage in a needle is suspected;

b) replace any needles that are found to fall outside the required ±10% of the average flow rate (see **A.7**).

NOTE Attention is drawn to The Control of Asbestos Regulations, *Regulation 13 [1], [2].*

i) An instruction that the wetting equipment be examined or serviced at least once every 12 months by a competent person, including visual inspection of injection equipment before each use (see also **4.3**).

NOTE Attention is drawn to The Control of Asbestos Regulations*, Regulations 2, 11 and 13 [1], [2].*

j) Advice on the inspection and testing of electrical equipment.

NOTE Attention is drawn to The Electrical Equipment (Safety) Regulations [3] and the Provision and Use of Work Equipment Regulations [8].

k) Advice on storage of the wetting equipment when not in use.

4.3 Each piece of wetting equipment shall be supplied with a printed service record chart that includes the manufacturer's recommended servicing intervals [see also **4.2**i)].

5 Warning labels

Each piece of wetting equipment shall bear a securely attached label containing the following text in black 14-point print font on a yellow coloured background:

"**WARNING**: For use by trained, competent operators only."

"**WARNING**: The manufacturer's instructions must be read, understood and followed in the use of this equipment."

6 Conformity marking

The largest piece of the wetting equipment shall be clearly, indelibly and permanently marked with:

a) the number and date of this British Standard, i.e. BS 8520-1:2009 [1)];

b) the name or trademark of the manufacturer or their appointed agent;

[1)] Marking BS 8520-1:2009 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third party certification of conformity.

c) last two digits of the year of manufacture, e.g. 09 for 2009; and

d) a unique serial number, the date of previous services and the next due service.

NOTE Items such as needle assemblies and hoses are intended to be replaceable.

Annex A (normative) Method of test for similar flow from needles

A.1 Principle

This test demonstrates whether the flow of wetting solution [see **A.4**c)] can be set at a controlled rate at which ACM can naturally absorb (typically 5 mL/min to 40 mL/min) and whether the amount being delivered at each needle is similar.

A.2 Apparatus

A.2.1 *A set of wetting equipment*, including injection units and needles, and a single isolating in-line valve (**A.2.2**).

The number of needles used in a single row (in series) for the test shall be based on the manufacturer's recommendations as stated in **4.1**g).

A.2.2 *Single isolating in-line valve*, capable of stopping the flow of wetting solution to all of the needles simultaneously, placed between the wetting equipment and all the needles.

A.2.3 *Timer or stopwatch*, reading at least in seconds, up to at least five minutes.

A.2.4 *500 mL measuring cylinders*, graduated in 5 mL divisions, manufactured in a transparent or translucent material, one for each needle being tested.

NOTE Manufactured, for example, to accuracy class B, BS EN ISO 4788:2005.

A.2.5 *Bench and/or other apparatus*, to support the measuring cylinders at the operator's eye level.

A.3 Reagents

The wetting solution shall be made in accordance with the wetting solution manufacturer's instructions.

A.4 Pre-test set up

a) Prepare the wetting equipment in accordance with the wetting equipment manufacturer's instructions.

b) Place each needle at the top of a graduated cylinder so that the needle tip is below the rim of the measuring cylinder.

c) Set the same rate of flow for each needle, if individually controlled.

d) Check that the dispensing rates for individual needles are set to within 10% of each other (individual needles might require flow adjustment to compensate for the pressure differential across the wetting equipment). Record any adjustments.

*NOTE This is a check on the settings of individual needles; the actual dispensed volumes are checked in **A.5**.*

e) Once any adjustments are complete and all needles are delivering a similar volume of wetting solution, close the single isolating in-line valve (**A.2.2**) and empty out the measuring cylinders. Replace each needle at the top of its respective measuring cylinder and proceed with the test described in **A.5**.

A.5 Test procedure

a) Set the apparatus so that it is level and at the operator's eye level, so that the final observation can be made without parallax error.

b) Open the single isolating in-line valve to the needles and start the timer or stopwatch at the same moment.

c) Permit the wetting solution to flow for at least one minute and then stop the stopwatch, close the single isolating in-line valve (**A.2.2**), and allow the whole apparatus to settle for at least one minute.

A.6 Results and calculations

a) Observe and record the amount of fluid in each cylinder to the nearest 5 mL division using the bottom of the meniscus viewed at eye level. Record the elapsed time on the timer or stopwatch.

b) Calculate the average volume collected by summing the individual volumes recorded and dividing by the number of measurements.

c) Calculate the average flow rate in mL/min by dividing the average volume collected (in mL) by the elapsed time (in min).

d) Calculate the range of ±10% around the average value using the following equations:

Lower range = Average value × 0.9;

Higher range = Average value × 1.1.

Check that the individual values are then within this range. If not, adjust the needles that are outside the range and repeat the test (see **A.5**) until all the needles are within ±10% of the average.

A.7 Final set up and test report

A test report shall accompany each piece of wetting equipment giving the date the test was carried out, for which equipment and by whom.

A piece of equipment shall be considered as each component that can be dismantled by an operator without special tools and shall be marked so that it can be supplied as a matched set.

The test report shall contain the results from **A.6**a) and the calculated values collected in **A.6**b), **A.6**c) and **A.6**d). The settings used to obtain similar flow rate from each needle [see **A.4**d)] shall be recorded on the test certificate.

The report shall cross-refer to the manufacturer's instructions [see **4.2**h)] for:

a) setting up the equipment to obtain similar flow rates; and

b) instructions for retesting and resetting the flow rates if needles become damaged or blocked.

Annex B (informative) Summary of the use of wetting agents

B.1 Introduction

A significant proportion of ACMs are hydrophobic and repel water. The ability of wetting agents (e.g. soap, detergents and surfactants) to improve the wetting and penetration of water into asbestos is well-established.

The overall performance of an injection system for suppressing fibre and dust release depends on the ability to uniformly wet the ACM (such as sprayed coatings and thermal insulation), so that no dry material is disturbed. In general, the further and faster the liquid can penetrate and wet the material, the less likely it is that any dry areas will remain.

B.2 Laboratory testing conclusions

The Health and Safety Laboratory (HSL) carried out research in the 1990s to measure the effectiveness of wetting solutions.

The HSL found:

- the rate of penetration was inversely related to temperature; simple heating of the liquid/water made a significant increase to the rate of penetration;
- the rate of penetration of different liquids through ACM depended on the nature of the ACM; water, for example, penetrated pipe lagging and loose amosite much faster (5 mm/min) than it penetrated pre-formed tiles (0.16 mm/min);
- the average evaporation rate of water and water-based liquids was approximately the same;
- the effectiveness of wet removal depended as much on the operator's capabilities as on the wetting agents used, the type of asbestos or the form of the asbestos insulation;
- even poorly executed wet removal methods significantly reduce the fibre levels when compared to dry removal; operatives needed to be effectively trained in wet removal techniques.

B.3 Use of wetting agents

Wetting agents spread slowly and take time to work. Effective wetting of lagging, for example, takes hours (not minutes).

Operatives need to be trained thoroughly in the use of wet removal techniques, including the use of fluids in the wetting operation.

Wetting agents need to be used in accordance with the manufacturer's recommendations and not be excessively diluted.

Bibliography

Standards publications

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN ISO 4788:2005, *Laboratory glassware – Graduated measuring cylinders*

Other publications

[1] GREAT BRITAIN. The Control of Asbestos Regulations 2006. London: The Stationery Office.

[2] NORTHERN IRELAND. The Control of Asbestos Regulations 2007. Belfast: The Stationery Office.

[3] GREAT BRITAIN. The Electrical Equipment (Safety) Regulations 1994. London: The Stationery Office.

[4] GREAT BRITAIN. The Electricity at Work Regulations 1989. London: The Stationery Office.

[5] NORTHERN IRELAND. The Electricity at Work Regulations (Northern Ireland) 1991. London: The Stationery Office.

[6] GREAT BRITAIN. The Health and Safety at Work etc. Act 1974. London: The Stationery Office.

[7] EUROPEAN COMMUNITIES. The Machinery Directive. Directive 98/37/EC of the European Parliament and of the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machinery. Luxembourg: Office for Official Publications of the European Communities, 1998. (OJ No. L207, 23.07.98).

[8] GREAT BRITAIN. The Supply of Machinery (Safety) Regulations 2008. London: The Stationery Office.

[9] GREAT BRITAIN. The Provision and Use of Work Equipment Regulations 1998. London: The Stationery Office.

[10] GREAT BRITAIN. The Simple Pressure Vessels (Safety) Regulations 1991 (as amended). London: The Stationery Office.

[11] GREAT BRITAIN. The Control of Substances Hazardous to Health Regulations 2002 (as amended). London: The Stationery Office.

[12] GREAT BRITAIN. The Management of Health and Safety at Work Regulations 1999 (as amended). London: The Stationery Office.

[13] SCOTLAND. The Special Waste (Scotland) Regulations 2004 (as amended). London: The Stationery Office.

[14] GREAT BRITAIN The Hazardous Waste Regulations (England and Wales) 2005 (as amended). London: The Stationery Office.

[15] NORTHERN IRELAND The Hazardous Waste Regulations (Northern Ireland) 2005 (as amended). London: The Stationery Office.

Further reading

BARD, D. Raman spectroscopic characterisation of inorganic fibres and particles and their coverage by wetting agents. Project number R43.053, November 1998. *Sheffield Hallam University and HSE health related research abstracts 1998/1999, Chemical risks*. [2)]

BURDETT, G., REVELL, G. Wet removal of asbestos: final report IR/L/MF/95/08, 1995. Health and Safety Executive Research and Laboratory Services division. 1995. [3)]

HEALTH AND SAFETY EXECUTIVE. *Asbestos: The Licensed Contractors Guide,* 2006, HSG 247 ISBN 0717628744. Sudbury: HSE Books. [4)]

HEALTH AND SAFETY EXECUTIVE. *Asbestos Essentials: Task Manual. Task guidance sheets for the building maintenance and allied trades*. 2007. HSG 210 ISBN 978 0 717 66263 0. Sudbury: HSE Books. [4)]

HEALTH AND SAFETY EXECUTIVE. *Work with materials containing asbestos. Control of Asbestos Regulations 2006. Approved Code of Practice and Guidance*. L143 ISBN 978 0 717 66206 7. Sudbury: HSE Books. [4)]

STRANKS, S.E.J. *The effect of the use of a wetting agent to reduce airborne fibre concentrations during the removal of asbestos ceiling tiles*. 1997. [5)]

ACAD Best Practical Means booklet No. 1: *Asbestos fibre control methods*. ACAD, Darlington. [6)]

ACAD. Alternative Code of Practice 1: *For work with asbestos requiring a licence*. ACAD, Darlington. [6)]

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2) Available from http://www.hse.gov.uk/research/abs_9899/chem_abs.htm

3) Available from http://www.hse.gov.uk/research/hsl/index.htm

4) Available from http://www.hsebooks.co.uk

5) Available from the University of Aberdeen, Department of Environmental and Occupational Medicine, Foresterhill, Aberdeen AB9 2ZD

6) Available from TICA House, Yarm Road Business Park, Darlington, County Durham DL1 4QB, http://www.tica-acad.co.uk

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