

Code of practice for

**Stabilization and
thermal insulation of
cavity walls (with
masonry or concrete
inner and outer leaves)
by filling with
polyurethane (PUR)
foam systems**

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Plastics and Rubber Standards Policy Committee (PRM/-) to Technical Committee PRM/72, upon which the following bodies were represented:

- Association of Building Component Manufacturers
- Brick Development Association
- British Board of Agrément
- British Plastics Federation
- British Rigid Urethane Foam Manufacturers' Association
- Calcium Silicate Brick Association Limited
- Cavity Foam Bureau
- Chief and Assistant Chief Fire Officers' Association
- Department of the Environment (Building Research Establishment)
- Department of the Environment (Construction Directorate)
- Engineering Equipment and Materials Users' Association
- Flat Roofing Contractors' Advisory Board
- Loss Prevention Council
- Ministry of Defence
- National Cavity Insulation Association
- National Federation of Roofing Contractors
- National House-building Council
- Phenolic Foam Manufacturers' Association
- Polyethylene Foam Insulation Association
- Royal Institute of British Architects

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Ceramic Research Ltd.
- British Urethane Foam Contractors' Association (BUFCA)
- Department of the Environment
- Department of the Environment (Property Services Agency)
- RAPRA Technology Ltd.

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Foreword

This British Standard has been prepared under the direction of the Plastics and Rubber Standards Policy Committee from a draft prepared by the British Rigid Urethane Foam Manufacturers' Association.

Greater use is being made of insulation in construction as a consequence of changes in building regulations.

The use of polyurethane (PUR) foam provides a means of providing thermal insulation in buildings of cavity wall construction having inner and outer masonry or concrete leaves, as well as providing a method of restoring the integrity of walls where the wall ties have become inoperative due to corrosion. A system of this type was first certified by the Agrément Board in 1975.

This British Standard indicates criteria for the selection of suitable buildings and defines the procedures and precautions to be followed to provide for the satisfactory injection of a PUR foam system into the cavity wall.

The procedural advice and the controls needed on site have been fully detailed.

BS 7457:1994 specifies rigid polyurethane foam systems which are suitable for use as described in this code of practice.

It is recommended that installers have a quality management system complying with the requirements of Part 2 of BS 5750.

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 12, 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.

0 Introduction

A suitable polyurethane foam system may be injected into a masonry cavity wall by injecting the liquid polyurethane system through properly spaced holes in the outer leaf. The polyurethane foam system expands in the cavity and sets to become a substantially closed-celled cross-linked rigid polyurethane foam which is strongly adhered to the inner and outer leaves, so that these leaves become bonded together. Such a system comprises an isocyanate, a polyol (an isocyanate reactive resin usually containing two or more hydroxyl groups) and an expanding agent, which is a liquid at normal UK ambient temperatures and is usually incorporated as a liquid into the polyol component. Thus the operation consists on site of continuously mixing the two components correctly and inserting the resultant foam system into the cavity. The expansion results from the vapourization of the expanding agent due to the heat generated by reaction of the polyol and isocyanate. Because the strength of the rigid polyurethane foam is significant the system has been widely used for the restoration of the integrity of cavity walls in which the wall ties have become ineffective due to corrosion. The installed rigid polyurethane foam thus confers two benefits namely insulation and interleaf bonding. Provided that the precautions referred to in this code of practice are followed no hazard should arise during or after installation.

It should be stressed that, while polyurethane foam is a satisfactory replacement for normal metal wall ties, it does not prevent corrosion of existing ties in a wall nor halt the deterioration caused by such corrosion. All installations in walls to deal with corroding wall ties have to be accompanied by a suitable treatment of the existing ties such as removal, isolation (see A.9).

1 Scope

This British Standard gives recommendations for the installation of rigid polyurethane (PUR) foam systems complying with BS 7457:1994, which are dispensed on site, to fill cavities of maximum width 150 mm of suitably constructed external walls of maximum continuous cavity height 12 m which have masonry or concrete inner and outer leaves, thereby providing additional thermal insulation to such walls and simultaneously, especially in the case of walls with damaged wall ties, improving their structural integrity.

It defines what are suitably constructed external walls and indicates essential procedures and precautions necessary to optimise the filling process. Walls built of random rubble are not covered by this code.

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

2 Definitions

For the purposes of this British Standard the following definitions apply.

2.1

cavity

an air space between two leaves of an external wall

2.2

polyurethane foam

the cellular polymer resulting from the reaction of the two components of the foam system, i.e. the isocyanate and polyol components

2.3

polyurethane foam system

a mixture of polyol component and isocyanate component which is to be injected into the cavity wall

2.4

indicator stick

a rod, typically 5 mm in diameter and 250 mm long, inserted through an injection or sight hole in the leaf of a wall into the cavity to monitor the movement of the polyurethane foam in the wall cavity at that point during the filling process

2.5

installation contractor

a company or organization that undertakes the injecting of a suitable polyurethane foam system into wall cavities in order to restore the structural integrity and enhance thermal insulation

2.6

sight hole

an additional hole drilled through either leaf of a wall into the cavity, used only to check that the polyurethane foam system has reached that point in the cavity

2.7

unit area plan

a method of dividing up the exterior walls of the building to show the sequence of foaming through the injection holes

2.8**cavity closer**

a building feature closing a cavity around an opening in the wall

NOTE Examples are a sill or a lintel.

2.9**stop-end**

a vertical cavity closer, such as a reveal block, which limits the horizontal travel of a polyurethane foam system during injection

2.10**cream time**

the time taken after the polyurethane foam system (2.3) has been mixed for visible expansion to commence

2.11**end of rise time**

the time taken after the polyurethane foam system (2.3) has been mixed for the foam expansion to be visibly completed

2.12**tack free time**

the time taken after the polyurethane foam system (2.3) has been mixed for the surface of the expanded polyurethane foam not to adhere to the test stick

2.13**cavity brush**

a device introduced into a wall cavity to provide a barrier to the movement of the polyurethane foam

3 Suitability of cavity walls**3.1 General**

It is essential that only if the installation contractor (2.5) considers the building to be suitable or capable of being made suitable, should installation be carried out (see 3.2). Rectification of any defects should be carried out beforehand or form part of the contract.

3.2 Determination of suitability

All the aspects in BS 8208-1 should be taken into account when assessing the general suitability of cavity walls for insulation. In particular in this standard points of significance regarding suitability have been detailed in Appendix A.

It is also essential that a survey document be prepared to record the results of the survey to be carried out which should include the following:

- a) a study of all relevant drawings, if available, concerning the building structure;

b) identification of any gaps which will allow the polyurethane foam system to escape from the cavity (e.g. gaps around windows, skirting boards and at the top of cavities);

c) an inspection of the cavities using a borescope to assess the following:

- 1) the general condition of the cavity (see A.2.5);
- 2) the presence of any efflorescence;
- 3) the condition of damp-proof courses;
- 4) the failure of (and likely mode of failure of) any wall ties;
- 5) the necessity to remove wall ties (see A.9);
- 6) the positions of flues or other services present (e.g. electrical cables) (see A.7);
- 7) whether a vapour barrier has been installed on the inner face of the outer leaf, since if such a vapour barrier is present foam should not be installed. In the case of a new construction allowance should be made for this in the design of the building;
- 8) the need to remove debris (see clause 6);
- 9) whether the cavities have been closed at the top (see A.3);
- 10) the presence and location of any flues which need protection by applying non-combustible thermal insulation to prevent the polyurethane foam from coming into contact with the flue material (see A.2.6 and Appendix B).

4 Polyurethane foam system

It is essential that the polyurethane foam system used in the filling process complies with BS 7457:1994.

5 Thermal performance of installed polyurethane foam

The thermal conductivity value used for design purposes should take into account the limited diffusion of gases that can take place in the foam with time. Generally this will be higher than or equal to the 30 day value. Additional information on this recommendation is contained in Annex A of BS 7457:1994.