

Specification for

Urea-formaldehyde (UF) foam systems suitable for thermal insulation of cavity walls with masonry or concrete inner and outer leaves

UDC 678.652'41'21:692.232.2:699.86

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Plastics Standards Committee (PLM/-) to Technical Committee PLM/46, upon which the following bodies were represented:

- Association of Building Component Manufacturers Ltd.
- Brick Development Association
- British Board of Agrément
- British Plastics Federation
- British Rigid Urethane Foam Manufacturers' Association
- British Urethane Foam Contractors' Association (BUFCA)
- Calcium Silicate Brick Association Limited
- Chief and Assistant Chief Fire Officers' Association
- Department of the Environment (Building Research Establishment)
- Department of the Environment (Building Research Establishment — Fire Research Station)
- Department of the Environment (Housing and Construction Industries)
- Department of the Environment for Northern Ireland
- Department of the Environment (Property Services Agency)
- Engineering Equipment and Materials Users' Association
- Fire Offices Committee
- Flat Roofing Contractors' Advisory Board
- Greater London Council
- Institute of Refrigeration
- Ministry of Defence
- National Cavity Insulation Association
- National Coal Board
- National Federation of Roofing Contractors
- National House-building Council
- Phenolic Foam Manufacturers' Association
- Royal Institute of British Architects
- Shipowners' Refrigerated Cargo Research Association
- Structural Insulation Association

This British Standard, having been prepared under the direction of the Plastics Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 July 1985

© BSI 07-1999

First published August 1978
First revision July 1985

The following BSI references relate to the work on this standard:
Committee reference PLM/46
Draft for comment 85/35764 DC

ISBN 0 580 14652 9

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

- Building Employers' Confederation
- Eurisol (UK) Association of Manufacturers of Mineral Insulation Fibres
- Welwyn Hall Research Association

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
0 Introduction	1
1 Scope	1
2 Definitions	1
3 Property requirements	1
4 Processing requirements	2
5 Shelf-life limitations of foam system components	3
Appendix A Method for determination of effective density	4
Appendix B Method for determination of linear shrinkage	4
Appendix C Method for determination of water absorption	5
Appendix D Method for determination of wet density	5
Appendix E Method for determination of foam system gel time	6
Appendix F Method for determination of foam system stability	7
Appendix G Method for determination of foam system appearance	7
Appendix H Method for determination of solid resin yield	7
Appendix J Method for determination of free formaldehyde content of UF resin	7
Appendix K Method for determination of water tolerance of UF resin	8
Appendix L Method for determination of total acidity of foaming hardeners	9
Appendix M Method for determination of resin viscosity by the break time method	9
Figure 1 — Test sample for effective density and shrinkage tests	4
Figure 2 — Determination of foam system gel time	6
Table 1 — Property requirements: type tests	2
Table 2 — Property requirements: quality control tests	2
Table 3 — Limiting values and permissible deviations for foam system components	2
Table 4 — UF resin: shelf-life limitations	3
Table 5 — Water tolerance conversion	9
Publications referred to	Inside back cover

Foreword

This revision of BS 5617, which has been prepared under the direction of the Plastics Standards Committee, supersedes BS 5617:1978 which is withdrawn.

The successful insulation of external cavity walls still relies on two standards, i.e. this standard, which specifies requirements for the foam systems which would be suitable for the application and the second standard, BS 5618 which is the code of practice used by the installation contractor to satisfactorily install suitable foam systems.

Accordingly, BS 5617 addresses the interface between the foam system supplier and the installation contractor, and BS 5618 that between the installation contractor and his client.

In this revision the foam systems have been restricted to use in cavities with masonry or concrete inner and outer leaves, requirements relating to the activities of the installation contractor have been removed (and placed as recommendations in the revision of BS 5618), and the property requirements made more stringent.

Attention is drawn to the fact that the urea-formaldehyde resins used for foam system production have a limited shelf-life: during storage they will ultimately undergo changes and become unsuitable for use. It is therefore important that the manufacturer's recommendations with regard to storage should be observed if the maximum storage life is to be obtained.

Also foam systems differ according to the source of supply of the UF resin and the foaming hardener, and certain properties listed in Table 2 to Table 4 have therefore been given tolerances rather than specific values.

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.

0 Introduction

A urea-formaldehyde foam system is generated at the point of injection from a mixture of aqueous resin solution, aqueous foaming hardener solution and air. The resin and hardener solutions are supplied at controlled rates to suitable foam system generating equipment from pressurized pots or by a pumping system.

The foam system, which is fluid at the time of injection into the cavity, sets shortly afterwards by chemical reaction. This chemical reaction continues and simultaneously loss of residual water occurs by absorption by and subsequent evaporation from the wall to produce the final foam.

Urea-formaldehyde foam systems complying with this standard have a fine, uniform, cellular structure which is vapour permeable. The foam is durable and has sufficient strength to be self-supporting in the cavity.

Because chemical reactions are taking place during the foam system injection process, some variation in foam properties can occur due to differences in in situ operating conditions. Foam system tests are carried out on site prior to injection to ensure that the quality of the system to be injected complies with this standard. These aspects are detailed in BS 5618.

The thermal insulation is achieved by the foam restricting air circulation in the cavity and by limiting radiation losses without adding substantially to the conducted heat loss. Its performance is therefore primarily determined by the extent to which the cavity is filled rather than by variations in the foam density.

1 Scope

This British Standard specifies the property requirements, the properties of the components and the production parameters, of urea-formaldehyde foam systems suitable for injection into external masonry or concrete cavity walls to provide improved thermal insulation.

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

urea-formaldehyde (UF) foam

an infusible cellular matrix of cured urea-formaldehyde resin insoluble in water and other common solvents

2.2

urea-formaldehyde (UF) foam system

a mixture of urea-formaldehyde resin, hardener, surfactant, water, air and water additives

2.3

foaming hardener

a mixture of surface active agents and acids that enables a foam system to be produced by the introduction of air into an aqueous solution and will cause UF resin, when mixed into the foam system, to set to an insoluble, infusible matrix

2.4

cavity

an air space between two leaves of an external wall

2.5

effective density (ED)

the mass of a specified sample divided by its initial volume using the method described in Appendix A

2.6

declaration

the document supplied by the foam system supplier to the purchaser or to any authorized testing or approvals organization, containing relevant details for the proper use of the foam system

3 Property requirements

NOTE The quality of the foam system depends on the choice of components (see 4.1) and their method of application as declared by the foam system supplier (see 4.2).

3.1 Type tests

The UF foam system shall be such that the foam produced, when tested in accordance with the methods given in Table 1, with samples prepared in accordance with the declaration of the foam system supplier as specified in 4.2, shall comply with the property requirements also given in Table 1. The samples required for the type tests given in Table 1 shall be conditioned to constant mass, at $23 \pm 2^\circ\text{C}$ and $63 \pm 5\%$ r.h., after being allowed to dry naturally for a period of three weeks.

3.2 Quality control tests

NOTE Details of when these tests are to be carried out are given in 6.5 of BS 5618:1985.

When tested in accordance with the methods given in Table 2, with samples prepared in accordance with the declaration of the foam system supplier as specified in 4.2, the UF foam system shall comply with or, as appropriate, be such that the foam produced complies with the quality control requirements also given in Table 2.