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Thermal and radiometric properties of glazing —

Part 2: Method for direct measurement of U -value (thermal transmittance)

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Basic Data and Performance Criteria for Civil Engineering and Building Structures Standards Policy Committee (BDB/-) to Technical Committee BDB/2, upon which the following bodies were represented:

Aggregate Concrete Block Association	Department of the Environment (Construction Industries Directorate)
Association for the Conservation of Energy	Department of the Environment for Northern Ireland
Association of Building Component Manufacturers Ltd.	Electricity Supply Industry in England and Wales
Association of County Councils	Engineering Equipment and Materials Users Association
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Foreword

This Part of BS 6993 has been prepared under the direction of the Basic Data and Performance Criteria for Civil Engineering and Building Structures Standards Policy Committee. Part 1 of this Standard describes a method for the calculation of the steady-state U -value of glazing. This Part of BS 6993 describes an alternative method, of equal status, to establish the U -value of the central part of the glazing by direct measurement. A further Part now being developed is:

— *Part 3: Method for measurement of photometric and radiometric properties in the solar spectral region.*

This Part of BS 6993 describes the methodology to obtain U -values by measurement, on a basis comparable to those obtained by calculation. It is based on BS 874-3.1 which describes the construction and use of a hot-box apparatus for the measurement of U -values.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, 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 6993 describes a method for measuring the U -value (thermal transmittance) of the central area of single, double or multiple glazing using hot-box apparatus complying with BS 874-3.1. The edge effect, due to the thermal bridge through the spacer of double or multiple glazing, is effectively eliminated in this method.

The method is designed to measure the U -value of the glazing alone, i.e. the glass (or alternative glazing material) and any enclosed air space, and the additional information required in the test reports of clause 8 and A.9 of BS 874-3.1:1987.

Appendix A specifies values to be used in the calculation of a U -value in accordance with BS 6993-1, when such a calculated value is to be compared with that obtained by direct measurement in accordance with this Part of BS 6993.

Appendix A gives a worked example, which illustrates the use of this Part of BS 6993.

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

2 Definitions

For the purpose of this Part of BS 6993 the following definitions apply.

2.1

thermal transmittance, U -value¹⁾

the heat flux density through a given structure divided by the difference in environmental temperatures on either side of the structure under steady-state conditions

2.2

environmental temperature, effective ambient temperature¹⁾

the environmental temperature influencing a surface is a suitably weighted mean of the adjacent air (or other fluid) temperature and the mean radiant temperature of the surroundings, in order to indicate correctly the change in heat flow rate to or from the surface for a small change in surface temperature. For a fluid opaque to radiation, the effective ambient temperature is the same as the fluid temperature

3 Symbols

Symbol	Description	Unit
d	thickness of layers of glass (or alternative glazing materials)	m
q	heat flux density	W/m ²
r	thermal resistivity of glass (glazing material)	m ² K/W
R	surface resistance	m ² K/W
T	temperature	°C or K
T_m	mean temperature of gas space	°C
ΔT	temperature difference	K
U	U -value (thermal transmittance)	W/m ² K
U_m	measured U -value	W/m ² K
w	gas space width	m
Δw	gas space width difference between centre and edge	m
Λ	thermal conductance	W/m ² K
<i>Subscripts</i>		
a	environmental (effective ambient)	
g	gas space	
s	surface	
t	total	
i	interior (hot side)	
e	exterior (cold side)	

4 Equipment

4.1 Apparatus

The construction and operation of the apparatus shall be in accordance with BS 874-3.1, except where modified by this Part of BS 6993.

4.2 Surround panels

The surround panel shall be not less than 100 mm thick and constructed of material of conductivity not greater than 0.04 W/m K. Plywood facing on either side of the surround panel to provide rigidity is permitted, but no material of thermal conductivity greater than 0.04 W/m K (other than thin tape) shall bridge the aperture.

¹⁾ Repeated from BS 874-1.