BRITISH STANDARD AEROSPACE SERIES

BS EN
2155-7:1997

# Test methods for transparent materials for aircraft glazing —

## Part 7: Determination of optical deviation

The European Standard EN 2155-7:1997 has the status of a British Standard

ICS 49.025.99; 49.045

# National foreword

This British Standard is the English language version of EN 2155-7:1997.

The UK participation in its preparation was entrusted to Technical Committee ACE/62, Aerospace structural transparencies and non-reinforced plastics, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

**Cross-references**

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

NOTE Under the AECMA part numbering system, normative references to the Parts of AECMA-originated European Standards may appear in clause **2** in the form of a three-digit number e.g. -001 where the BSI and CEN systems would use the form -1. It can be assumed that, wherever referenced, the three-digit and single digit forms can be used interchangeably. For the purposes of part-marking of components produced in accordance with this standard, the three-digit form should be used.

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**Summary of pages**

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 and 3 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.

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 November 1997



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EUROPEAN STANDARD

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# EN 2155-7

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English version

# Aerospace series — Test methods for transparent materials for aircraft glazing — Part 7: Determination of optical deviation

Série aérospatiale — Méthodes d'essais pour matériaux transparents pour vitrages aéronautiques — Partie 7: Détermination de la déviation optique

Luft- und Raumfahrt — Prüfverfahren für transparente Werkstoffe zur Verglasung von Luftfahrzeugen — Teil 7: Bestimmung der optischen Ablenkung



**CEN**

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**



Ref. No. EN 2155-7:1997 E

## Foreword

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 1998, and conflicting national standards shall be withdrawn at the latest by January 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## 1 Scope

This standard specifies the method used for the determination of optical deviation caused to a beam of light passing through a transparent element material perpendicular to the optical axis of the system.

## 2 Definition

For the purposes of this standard, the following definition applies:

Optical deviation is defined as the angular deviation of a beam of light emerging from a transparent material compared with the direction of the incident beam.

## 3 Apparatus

**3.1** Optical system of point light source, cross-wires, focusing lens, specimen holder and a screen

**3.2** Upon the screen are traced concentric circles of specified radii such that they correspond to angles of deviation of 1,5; 3,0; 6,0 and 10,0 minutes of arc relative to the distance between specimen and screen.

The radius $r$ of each circle is given by the formula:

$$r = 0{,}291\ d.D$$

where:

- $r$ is the radius of circle, in millimetres;
- $d$ is the deviation, in minutes of arc;
- $D$ is the distance between specimen and screen, in metres.

The Table 1 shows values of $r$ corresponding to $d$ expressed in minutes of arc and radians for two values of $D$.

**Table 1**

| $d$ | | $r$ in mm for: | |
|---|---|---|---|
| **Minutes of arc** | **Radians** | $D$ = 5 m | $D$ = 8 m |
| 1,5 | 0,00043 | 2,2 | 3,5 |
| 3,0 | 0,00087 | 4,4 | 7,0 |
| 6,0 | 0,00175 | 8,7 | 14,0 |
| 10,0 | 0,00291 | 14,5 | 23,3 |

## 4 Specimens

The specimens are the elements themselves.

## 5 Procedure

**5.1** The specimens shall be tested after careful removal of surface dust by wiping with a lint-free cloth.

**5.2** The optical system is set up so that the image of the cross-wires is focused onto the screen and coincides with the centre of the concentric circles.

The test specimen is interposed between the cross-wires and the screen at distance $D$ from the screen.

**5.3** The deviation is displayed as the movement of the image from the centre of the concentric circles to one of the zones defined by the concentric circles specified in **3.2**.

**5.4** The specimens shall be scanned at intervals of 100 mm in mutually perpendicular directions (unless otherwise specified).

## 6 Expression of results

The values of the deviation shall be recorded and graphically represented in order to establish the relation between their position and their direction on the test specimen.

## 7 Test report

The test report shall include the following information.

- — number of this standard;
- — description of the sampling method;
- — number of test specimens used;
- — dimensions of the test specimens used;
- — individual values of the optical deviation and their presentation in a diagram according to **6**;
- — observations on any circumstances liable to influence the results.

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