

# Recommendations for the presentation of plastics design data —

## Part 4: Environmental and chemical effects —

### Section 4.2 Resistance to natural weathering

IMPORTANT NOTE. Before reading this Recommendation it is **essential** to read the General Introduction to this series of Recommendations, issued separately.

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**Summary of pages**

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 10 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.

**Amendments issued since publication**

| Amd. No. | Date | Comments |
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## Introduction

This Section describes the methods of determination and reporting of changes produced in plastics materials by exposure to natural weather conditions, to provide the designer with information to aid in the selection of suitable materials for a given application in which the material is freely exposed to the outside atmospheric conditions. The test results do not apply to materials in protected situations.

The Section covers the manner in which the material is to be exposed, the general procedure to be followed, the climatological information to be recorded, the duration of tests, the property changes to be determined, and the incidence of any visible biological attack.

Weathering tests of the type described are needed to evaluate the performance of materials intended for outside use. The results of such tests should be treated only as an indication of the effect of weathering. Results obtained at one time may not be strictly comparable with those obtained at another, although, in general, samples exposed for any period of several years and examined at the same time of year will show comparable behaviour. Even in long-term tests the results may be affected by the season in which the tests are started.

Short-term exposure tests should not be used as a guide to long-term weathering behaviour of materials. The results of tests carried out for less than 12 months will depend on the particular season of the year in which they are carried out. Obviously, the longer the period of exposure, the more reliable are the results obtained.

It should be noted that the method of exposure is designed to expose the material to the most severe effects associated with any particular climate. It should therefore be borne in mind that the severity of exposure in actual use is, in most cases, likely to be less than that recommended in this procedure, and allowance should be made accordingly. For example, vertical exposure is considerably less severe in its effect on plastics, particularly in tropical regions, where the sun is at a high angle when it is most powerful, and also because rain water drains more rapidly from samples. In the northern hemisphere north-facing surfaces are likely to be less severely degraded than south-facing ones because they are less exposed to solar radiation, but the fact that they may remain wet for longer periods may be of significance for materials that are affected by moisture.

## 1 Procedures

**1.1 General.** Data should be presented on the effects of weathering in accordance with the broad types of climatic conditions listed in Appendix A. The method of exposure should be in accordance with Appendix B and observed changes in the following should be reported:

- 1) dimensions;
- 2) visual appearance;
- 3) mechanical properties.

**1.2 Changes in dimensions.** The effect of weathering on dimensions should be determined in accordance with Appendix C.

Data should be presented on the percentage changes in length, width and thickness after the periods of exposure recommended in Appendix B.

**1.3 Appearance.** The effect of weathering on visual appearance should be determined in accordance with Appendix D.

The particular aspects of appearance which are listed in **D.3** should be examined and the extent of changes should be shown by the simple letter code given in **D.3**.

**1.4 Mechanical properties.** The effect of weathering on mechanical properties should be determined in accordance with Appendix E.

The mechanical properties to be examined should be selected from the list as appropriate. Data on other properties may be presented additionally.

The data presented should be the values of properties after weathering, expressed as percentages of the values before weathering. The figure 100, therefore, represents no change, lower figures a reduction, and higher figures an increase, in the value of the property.

Only variations that are significant within the accuracy of the test method should be reported e.g. values of 95 % to 105 % are normally considered to represent "no change".

**1.5 Biological attack.** Biological attack may occur and when this is evident it should be reported in accordance with Appendix F.

## 2 Form of presentation

The results of the investigation of the weathering of a material should be presented in tabular form, e.g. as shown in Figure 2. This should be accompanied by the following information:

- 1) manufacturer's description and identification of the material, including the type common name (e.g. in accordance with BS 3502<sup>1</sup>); additives if known;