

Ageing and characterisation of PVC-based compounds utilised for exterior applications in the building construction field 1: Thermal ageing

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Abstract

One major problem encountered with polymeric materials is their sensitivity to outdoors weathering. Exposure to outdoors conditions leads to a degradation of the use properties of the material. This set of articles describes a comparison of the behavior of several stabilised polyvinylchlorides exposed to various conditions of ageing including light and temperature. The first article focusses on the effect of thermal ageing on the infrared and UV-visible characteristics of the selected samples. © 2001 Elsevier Science Ltd. All rights reserved.

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1. Introduction

The low cost and the good performance of poly(vinyl chloride) products have increased the utilisation of this polymer in buildings, mainly in exterior applications, such as window profiles, cladding structures and siding. However, ultimate user acceptance of the PVC products for outdoor building applications will therefore depend on their ability to resist deterioration of their mechanical and aesthetic properties over long periods of exposure. To ensure the weatherability of these materials, the PVC resin needs to be compounded and processed properly using suitable additives, leading to a complex material whose behaviour and properties are quite different from the PVC resin by itself.

The degradation of such products is complex and has not yet been completely understood for most of the technical formulations. On the other hand, to perform reliable accelerated weathering test methods, it is important to balance properly the most important factors that influence the degradation of the PVC-based materials in the service conditions, like temperature and light [1,2].

In the present work we used four different types of stabilised PVC designed for outdoor applications. First, we performed thermal ageing in air in an oven with forced ventilation, using different temperatures. Subsequently, we performed an artificial accelerated weathering test using specimens of the same sample films that were exposed to thermal oxidation.

Two spectrometric techniques (infrared and visible) have been used to assess and compare the effects of degradation in the PVC samples originated by the thermal ageing and artificial accelerated weathering to light referred to previously.

In the present work we report only the first part of this study, which includes the infrared and the ultraviolet–

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