Assessment of fluorinated Adtex 'S' polymer lamp coating

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Abstract

Fluorinated Adtex 'S' polymer lamp coating was tested under contract for Adtex Polymer Engineering Ltd. The coating is typically fitted around fly killers. The loss of UVA and UVC transmission due to the presence of the coating was investigated.

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Introduction

Adtech Polymer Engineering Ltd manufactures protective Adtex ‘S’ polymer coating for a wide range of industries. The coatings are typically used to cover lamps in electric fly killers used in the food and pharmaceutical processing plants where there is a requirement for a glass free environment. A loss of 15% or more ultraviolet (UV) transmission is unacceptable because the fly killers depend on the UV to attract the insects for extermination.

Adtech Polymer Engineering Ltd provided two simples of Adtex ‘S’ polymer coating, both being of identical composition, and an electric fly killer fitted with a Rentokil F15 T8 350 BL lamp. The loss of UVA transmission was assessed when the Adtex ‘S’ polymer coating was in place.

Measurements were repeated to assess the loss of UVA transmission when using a germicidal lamp

(30 W TUV G3OT8)

Quality Assurance

Procedures:

Experimental work was carried out according to a system of protocols, which provide an overall experimental framework. *Primary Protocols* defined the manner in which a given task was to be accomplished, and designated *secondary protocols* which were applicable. *Secondary Protocols* controlled the correct use of laboratory equipment. In addition a number of routine laboratory procedures were required to support the use of laboratory equipment, and each of these was described by its own *Tertiary Protocol.*

All protocols were dated and assigned a reference number. The primary and secondary protocols required for the execution of the project made it either necessary or desirable to amend or replace some of these, final versions of the new protocols were also appended and the date of implementation recorded in the Quality Assurance file. Any such changes had to be justified on technical grounds and work’ required for the development of new protocols is recorded in a laboratory log together with an outline of the reasons for adopting a particular approach.

The primary and secondary protocols specified record, which had to be kept. Record forms to be used in conjunction with this project were recorded in the Quality Assurance file and specimen copies appended.

Instrumentation:

Instruments and equipment used for the execution of the project were suitable for the purposes, for which they were used and, where necessary, are serviced and re-calibrated at appropriate intervals. Records of servicing and re-calibration are maintained in an appropriate file.

Project Administration:

Quality assurance for the project was the responsibility of the Project Manager and the Quality Assurance Manager. These persons monitored the progress of the project at regular intervals and have to agree any significant changes.

A system of document control was employed to ensure that all staff working on the project were aware of changes to the current protocols and that the new protocols were implemented.

Measurement procedure

An IL 1700 research radiometer was used to assess the transmission of the Adtex ‘S’ polymer coating. A UVA detector was positioned at a distance of 1.3 cm below the central section of the lamp. The radiometer was zeroed to account for background signal and then the lamp was powered and left to warm up for 20 minutes. The lamp output was integrated over a period of 60 seconds and the value was noted. The first sample of Adtex ‘S’ polymer coating was fixed around the lamp and another measurement was made. The first sample was then replaced with the second sample and the transmission through the two layers of Adtex ‘S’ polymer coating was assessed. The measurements outlined above were repeated a further five times.

The measurements procedure was then repeated using a UV detector and a germicidal lamp. The UV detector was positioned at a distance of 3.2 cm below the central section of the lamp. The UVC transmission was assessed with and without the Adtex ‘S’ polymer coating in place.

Results

Tables 1 and 2 show the results obtained when assessing the loss of UVA and UVC transmission respectively. The values obtained from sets 1 to 6 were summed for each type of measurement and the % loss of UVA/UVC was calculated.

Discussion

The results indicate that a single sample of Adtex ‘S’ polymer coating causes a loss of approximately 3 to 4 % of UVA transmission and a loss of approximately 10 to 12 % of UVC transmissions. Two samples of coating cause approximately 7.5% loss of UVA and 19.4% of UVC.

Conclusion

It can be concluded that the Adtex ‘S’ polymer coating causes a loss of UVA transmission up the 7.5%, when two layers of Adtex ‘S’ polymer coasting are used. A single layer of polymer coating can reduce the UVC transmission close to what the company regard as an unacceptable level and that two layers would greatly increase the loss of UVC to above the 15% threshold.

Table 1: Integrated UVA transmission of the Adtex ‘S’ polymer coating

Integrated output (J/cm_2)								
Measurements	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6	Total (J/cm_2)	% Loss of UVA transmission
Lamp only	0.301	0.295	0.293	0.294	0.294	0.293	1.770	0
Lamp & first sample	0.285	0.281	0.283	0.283	0.282	0.286	1.700	3.95
Lamp & second sample	0.281	0.283	0.286	0.284	0.286	0.283	1.703	3.79
Lamp & both samples	0.273	0.273	0.271	0.274	0.273	0.273	1.637	7.51

Table 2: Integrated UVC transmission of the Adtex ‘S’ polymer coating

Integrated output (J/cm_2)								
Measurements	Set 1	Set 2	Set 3	Set 4	Set 5	Set 6	Total (J/cm_2)	% Loss of UVA transmission
Lamp only	0.251	0.256	0.256	0.255	0.257	0.261	1.536	0
Lamp & first sample	0.223	0.227	0.228	0.231	0.230	0.231	1.370	10.81
Lamp & second sample	0.217	0.226	0.224	0.230	0.229	0.232	1.358	11.59
Lamp & both samples	0.201	0.206	0.206	0.207	0.208	0.210	1.238	19.40