

Technical Information Sheet – TIS 13

Weathering of Azote® Foams

INTRODUCTION

Zotefoams plc products are based on polyethylene (LD/ MP/ HD/ PK) or ethylene copolymers (EM/ EV/ VA). Ultra Violet (UV) stabilisers are not normally incorporated. As such the stability of the foam depends on that of the basic polymer and any pigments present.

Weathering performance is dependent on a number of factors which in real exposure situations are uncontrolled, e.g.:

- Intensity and duration of sun exposure (locations near the equator have a higher radiation intensity)
- Incident angle of radiation
- Temperature radiation
- Ozone level
- Effects caused by air pollution

Although accelerated ageing tests under controlled conditions are commonly performed, the relation between such tests and actual outdoor results is not clearly defined. The information given in this document should only be regarded as a guide.

The types of deterioration due to weathering may include:

- Colour fading
- Embrittlement
- Surface cracking
- Surface powdering
- Shrinkage

Ageing periods which may affect the surface of foams do not necessarily affect the interior. Therefore length of suitability of the material for a given application can vary widely depending on whether surface appearance or bulk properties are of main concern for the application.

OUTDOOR STORAGE OF ZOTEFOAMS PLC MATERIALS

Problems can arise when storing foam outside due to temperature and/or UV radiation affecting the material:

Heat Effects

Stored in direct sunlight with little air circulation (including wrapped in film), the foam can become very hot and the heat cannot escape. In extreme cases the edges of the sheet can become distorted and the sheet can shrink due to polymer softening at elevated temperatures. Particularly susceptible are: the ethylene copolymer foams, which have lower operating temperatures; dark colours, which absorb heat energy;

and materials which have already been split. For cell/ cell materials extreme heat effects can also include a reformation of skin on the surface of the foam.

Sunlight

UV degradation can occur as a result of exposure to sunlight. Effects worsen with length of exposure and intensity.

It is recommended that foam be stored out of direct sunlight particularly during sunny weather. Storage inside is the preferred option although storage in the shade or covering the foam in a loose fitting thick white hood will reduce the effects of heat and sunlight.

Dimensional Stability

Converters should be aware that changing climates can cause slight dimensional changes in foam. Shrinkage due to exposure to cold conditions for extended periods is usually a reversible process, similarly expansion due to temperatures slightly above the recommended storage temperature (23 °C). Material should therefore be equilibrated with the environment prior to fabrication of products with tight tolerances. Equilibration times will depend on the thickness of the material in question and the temperature differences between the storage and fabrication areas. For full pallets of sheets it is generally recommended to allow the material to rest at fabrication conditions for 24 hours prior to use.

GENERAL OVERVIEW OF UV RESISTANCE

The following have an effect on the resistance of a foam item to UV:

Colour	Colour of the foam has the largest effect. Black has superior UV resistance compared to white and other colours. However heat effects may be more obvious on black materials than other colours.
Polymer	The polymer type has the next largest effect. Plastazote® foam LD and MP grades have superior UV resistance to Plastazote® foam HD grades and Evazote® foam EV and VA grades.
Density & Thickness	Increasing foam density has a small positive effect on UV resistance as it has a limited penetration depth. If the object being exposed is very thick, the loss of mechanical performance will be negligible, the effects being restricted to the surface.

It is strongly recommended that black foam grades are used in all circumstances where extended outdoor exposure is expected.

There is a range of application specific test set ups to assess the likelihood of weathering effects for a given use. The tests mentioned above were generally carried out in reference to ISO standards and focussed on the UV deterioration of the material. For further information on the indicative tests mentioned above please contact our technical support team.

Plastazote® Foam - LD and MP White Grades

Indicative tests show that in UK conditions, foam surface deterioration (yellowing/powdering) can occur over a period of 1-2 years. Over longer periods surface cracking can occur extending into the interior of the foam. Thin samples (<5mm) can become brittle over such periods though thicker samples can maintain useful properties. In locations where increased exposure is found, deterioration will occur more rapidly. Higher density foams will deteriorate slightly less than those of a lower density.

Plastazote Foam® - LD and MP Colours and Black

Pigments used in Zotefoams plc products are selected to have excellent light stability. Little colour fading will be found during the service life of LD colour grades. Deterioration of physical properties is similar to that of white grades, which contain no pigment. The exception is black Plastazote® foam. Tests have shown that all black grades have considerably better weathering resistance than white or colour grades of equivalent density. Little deterioration of physical properties has been found in accelerated ageing equivalent to several years actual exposure.

Evazote® Foam Grades

Behaviour of EV and VA foam grades is similar to, though slightly worse than, that of corresponding LD and MP grades. Note, however, that EV grades in particular can shrink at high temperatures, which may be reached if black Evazote® Foam is exposed to strong sunlight in windless conditions.

Plastazote® Foam HD Grades

Weathering resistance of Plastazote® foam HD grades is generally lower than that of LD grades, and deterioration (usually embrittlement), may be expected around 1 years exposure. As with LD grades, higher densities show greater weathering resistance and black HD grades show little deterioration over periods equivalent to several years exposure.

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