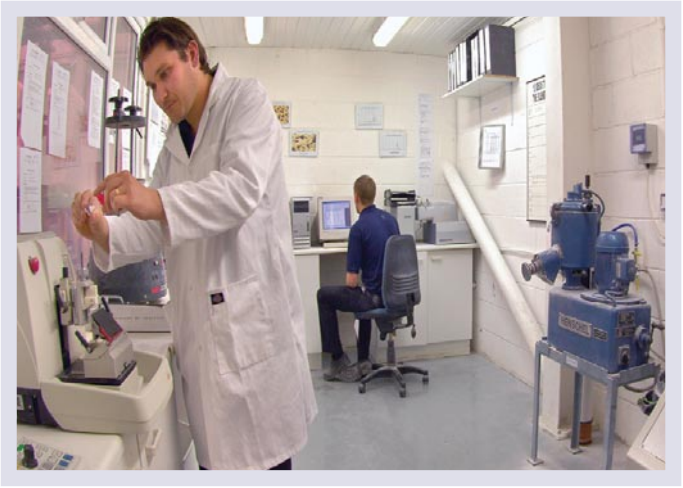
No. 5

Technical Bulletin

PVC Stabilisation



Polyvinylchloride (PVC) is a material that can - when combined with appropriate additives - be used to form finished products as diverse as:

- **flexible and rigid medical devices**
- **electrical cable insulation and sheathing**
- **rigid and flexible pipes**
- **foam and window profiles**

As such, PVC is one of the most versatile and industrially important plastic materials around today : (www.bpf.co.uk/bpfgroups/Vinyls_Groups.cfm)

The combination of PVC and the required additives is normally referred to as a PVC compound. One of the more important additives used in all PVC compounds is the PVC stabiliser. As PVC stabilisers are not an every day topic and there are different, complicated chemical technologies available, it is not surprising that there can be some confusion concerning stabilisers and PVC. This Technical Bulletin seeks to clarify the situation by answering these simple questions.

- What is a stabiliser in PVC and what does it do ?
- What are the different stabiliser technologies available and are there any issues surrounding these technologies ?

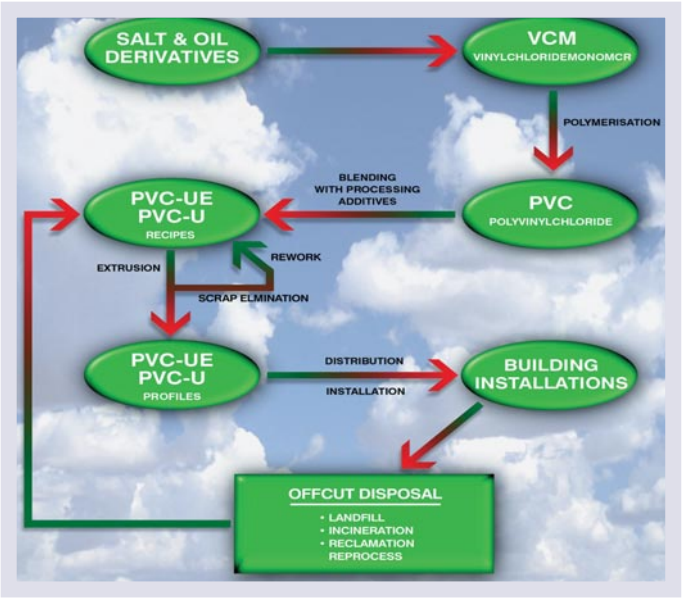
What is a stabiliser and what does it do ?

PVC is a thermoplastic material - it requires heat in order to soften and allow it to be formed into a desired shape, usually by extrusion or injection moulding, following which it is cooled to maintain that shape. Unfortunately, by itself the PVC molecule breaks down and degrades when heated to the required softening temperature and this degradation results in a discoloration of the product and ultimately in a loss of physical properties. The primary purpose of a stabiliser in a PVC compound is, therefore, to protect the molecule when it is being heated in the manufacturing process and allow the desired shape to be formed whilst maintaining appearance and physical properties. Stabilisers can also work in conjunction with a number of other additives in the PVC compound such as Titanium Dioxide to combat the long term effects of weathering (i.e. also discolouration and loss of physical properties).

What are the different stabiliser technologies available and what are their issues? (www.stabilisers.org)

Currently in the UK and Europe there are three main stabiliser technologies widely used in PVC-U extrusions (unplasticicised PVC typically used for window profile and other building products) and PVCUE extrusions (unplasticised, expanded or cellular PVC typically used for fascias, soffits, cladding and other building products); These are lead, tin and calcium organic.

The latest enviromental and legislative developments as the affect PVC stabilisers are Vinyl 2010, The Marketing and Use Directive 76/679 EEC and REACH.



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Vinyl 2010

This is the European PVC industry's 10-year Voluntary Commitment for sustainable development and product stewardship across the life cycle of PVC (www.vinyl2010.org). Vinyl 2010 contains a number of commitments against key criteria, the main one related to stabilisers being a reduction in lead stabiliser consumption from 2000 levels by 15%, 50% and finally 100% by 2005, 2010 and 2015, respectively. In 2008, European Stabiliser Producers Association (ESPA) members were able to report that lead stabiliser use in the EU-15 had reduced by over 50% since 2000, some two years ahead of the 2010 interim target. ESPA also reported that this reduction has been achieved through a switch to calcium-based (i.e. calcium organic) stabilisers. No targets for tin or calcium organic stabilisers are included in Vinyl 2010.

The Marketing and Use Directive 76/769 EEC

Under this Directive, DiButyl Tin (DBT) stabilisers of the type used by a number of PVC-UE profile manufacturers will be banned in articles for supply to the general public containing greater than 0.1% by weight of tin by January 1st 2012, or by derogation in some applications by January 1st 2015. In practice it is by no means clear if all roofline and window trim products fit in the former or the latter of these bans.

DiOctyl Tins (DOT) stabilisers of the type some producers appear to be using to replace DBT, at least in the cellular core, are also subject to restrictions under Directive 76/769 EEC (See - Official Journal of the European Union - L 138/11). After 1st January 2012, these too will be banned from certain products that come into contact with skin, including childcare articles and wall coverings and this could include cladding.

REACH (Registration, Evaluation and Authorisation of CHemicals)

Is the EU regulatory framework for the management and control of chemicals. This is a huge undertaking managed by the European Chemicals Agency (ECHA) and the exact outcome of the process for each and every chemical manufactured and used in Europe is not known in advance. However, there is an increasing understanding of the likely outcome in many cases (www.echa.europa.eu).

Since DBT is Category II Carcinogenic, Mutagenic or Reprotoxic (CMR) a registration document must be presented to ECHA by the end of November 2010. The production of this document, which includes a safety report, is an expensive process. Hence, in light of the deadlines in Directive 76/769 EEC and the volumes involved, it may not make commercial sense for companies to register these products. Thus the combination of REACH and Directive 76/769 EEC mean that most, if not all, of these stabilisers may not be able to be manufactured after November 2010, irrespective of these deadlines.

Lead stabilisers (Category I CMR) also require a registration document by the end of November 2010. In this case a combination of existing safety reports and higher volumes mean that it is likely to make commercial sense for companies to register the main lead stabilisers. Currently it appears that the Industry's voluntary commitment on lead (see Vinyl 2010) and the progress made to date in reducing the consumption thereof, is such that the sunset date for lead stabilisers under REACH is likely to be around 2015, and therefore in line with Vinyl 2010.

DOT stabilisers (Category III CMR) with production volumes greater than 1000 mtpa will also require a registration document by the end of November 2010. It is currently unlikely that these will be subject to authorisation under REACH.

The components that make up commercial calcium organic stabilisers are either exempt from REACH (See annex 4 and 5 of REACH) or are not likely to be subject to authorisation under REACH.

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