

Project Information Sheet

Cardanol based PVC plasticizer (PLACARD)

Programme area:	Green Business – Bio based products
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Website:	www.placard-ecoinnovation.eu
Benefits (max. 150 characters incl. space):	Substitution of fossil resources with bio based products (not useful for human feeding); Production of eco-sustainable products for building field
Keywords:	Soft PVC; cardanol; phthalates; plasticizers; bio-based; window gaskets
Sector:	CIP-EIP-2012.4.10- Bio based products
Type of solution	Natural plasticizer derived from cardanol and related soft PVC.
Duration:	01/01/2014 –31/12/2016
Budget:	€ 987.402 (EU contribution: 50%)
Contract number:	ECO/12/332833/SI2.665957

Summary

Worldwide, about 70% of the soft PVC is produced using phthalate plasticizers, in particular di-ethyl-hexyl-phthalate (DEHP), which are synthetic esters of phthalic acid, characterized by acute toxicity. As a consequence the EU banned phthalates for some applications, in which the plasticizer migration can make them harmful to human health. Besides phthalates are synthetic, oil derived products, and therefore have a significant impact on the carbon dioxide balance. Consequently, in recent years, phthalates have been subjected to major revisions, leading to severe restrictions in their use by the EU. On the other hand, most of the alternative plasticizer suffer for a plasticizer effectiveness lower than that of DEHP, and for the increased cost. Currently, the cost of alternative plasticizers such as adipates, trimellitates and citrates is 50%, 100%, and 140% higher than that of DEHP, respectively. In these cases a plasticizer content of 50 phr, involves a cost increase of soft PVC about 60%.

The innovative idea promoted by this project, which applies to products to be used in the civil construction market, is to substitute phthalates by eco-friendly, **natural plasticizers derived from cardanol**. The result of the idea is the reduction of environmental and toxicological impact of soft PVC, though maintaining mechanical, physical and durability properties comparable to those of conventional, phthalate based, PVC.

Expected and/or achieved results

The most relevant results at the end of the project are:

1. A well designed manufacturing process of the innovative plasticizer (PLACARD) was developed at pilot scale;
2. 1 tonne of PLACARD with repeatable properties was produced;
3. PVC/PLACARD blends characterized by properties comparable with phthalates based were formulated; some strengths were found (lower migration, thermal and UV stability, improved recyclability);



4. 2 tonne of gaskets made with PVC/PLACARD blends with different hardness were produced;
5. A careful cost evaluation of PLACARD industrial manufacturing was made;
6. TOX and ECOTOX tests showed that PLACARD toxicity level is however slightly better than a reference primary PVC plasticizer like DOP;
7. An inquiry dossier was prepared and accepted by ECHA;
8. A large number of plasticizer producers and PVC converters were approached; Several Non Disclosure Agreements (NDAs) were signed and PLACARD samples was sent for technical evaluation.

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