



Green Chemistry & Commerce Council (GC3)

Business & Academic Partnerships for Safer Chemicals

Chemical Hazard Assessments of Alternative Plasticizers for Wire & Cable Applications



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Monica Becker of [Monica Becker & Associates Sustainability Consultants](#) and the GC3 facilitated the GC3 Business & Academic Partnership Project Group and wrote this report.

The Green Chemistry and Commerce Council (GC3) is cross sectoral, business-to-business network of more than 80 companies and other organizations that work collaboratively to promote green chemistry and design for environment (DfE) practices in industry. The GC3 is a project of the Lowell Center for Sustainable Production at the University of Massachusetts Lowell.

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Background

Following the 2010 GC3 Innovators Roundtable, a project group was formed to develop and pilot a new type of collaboration between companies and universities to evaluate safer alternatives to toxic chemicals. The goal was to generate robust assessments of alternatives to support chemical substitution decision-making by GC3 companies and their supply chain partners, through pooling of knowledge, data and funds.

The model was developed through a pilot project focused on identifying and evaluating alternatives to a phthalate plasticizer of concern in wire & cable applications -- DEHP (Di(2-ethylhexyl)phthalate).

Results

This report contains the results of hazard assessments of nine plasticizers, conducted as part of this collaborative effort. The hazard assessments were conducted using Clean Production Action's (CPA) [GreenScreen™ for Safer Chemicals chemical hazard assessment method](#), and were conducted by the toxicology and risk assessment firm [ToxServices](#). ToxServices is licensed by CPA to conduct GreenScreen™ assessments. The GC3 project group offered comments and additional data in response to draft assessments produced by ToxServices, and ToxServices considered this input when developing final versions of each assessment.

Four of the nine assessments — for DEHT, DOZ, Hexamoll® DINCH®, and TEHTM — were subjected to a verification process (i.e., a rigorous peer review) by CPA, which entailed a review by a CPA-contracted toxicologist and further refinements to the GreenScreens™ by ToxServices. The other five assessments have not been verified and are considered *draft* assessments.

GreenScreen™ assessments of Dow's Ecolibrium™ and HallStar's Dioplex™ and Paraplex™ plasticizers have not been verified and the reports are redacted. Unlike the other six plasticizers assessed in this project — which consist of a single chemical — these three products are formulations of multiple chemical ingredients. The manufacturers did not disclose the identities of the ingredients to the GC3 project group. Instead, the manufacturers provided chemical ingredient information to ToxServices under a non-disclosure agreement (NDA) and ToxServices issued redacted assessment reports.

Tables 1 and 2 below list the plasticizers evaluated, the GreenScreen™ benchmark scores and provide links to the full GreenScreen™ assessments. Table 1 lists the verified assessments; Table 2 the draft assessments.

These GreenScreens™ are being offered publicly to inform companies' chemical substitution decisions and to other stakeholders that are interested in learning more about these plasticizers. *Neither CPA nor the GC3 permit the use of these GreenScreen™ results to make product marketing claims.*

Table 1. Results of *Verified* GreenScreen assessments

Plasticizer Acronym	Chemical Name	CAS No.	GreenScreen Benchmark (see explanations below)	Notes	Link to GreenScreen Assessments
DEHT (Eastman 168)	Di(2-ethylhexyl) terephthalate	6422-86-2	3 _{DG}	Data gaps for neurotoxicity and respiratory sensitization	Verified GreenScreen
Hexamoll® DINCH® (BASF)	Diisononyl cyclohexanedi carboxylate	166412-78-8 (outside the U.S.), 474919-59-0 (inside the U.S.)	2*	Moderate endocrine activity	Verified GreenScreen
DOZ	Bis(2-ethylhexyl) azelate	103-24-2	U	Data gaps for cancer and endocrine activity	Verified GreenScreen
TEHTM	Tris(2-ethylhexyl) trimellitate	3319-31-1	U	Data gaps for cancer and endocrine activity	Verified GreenScreen

*BASF toxicologists disagree with the assessment of endocrine activity for Hexamoll® DINCH®. Their assessment is that Hexamoll® DINCH® is not endocrine active, that the endpoint for endocrine activity should be scored as "Low", and that the GreenScreen Benchmark should be 3 or higher. BASF states that their assessment is supported by the published opinions of a number of government and scientific authoritative bodies, including the European Food Safety Authority (EFSA). [BASF's detailed comments](#) can be found on the GC3 website.

Table 2. Results of *Draft (i.e., unverified)* GreenScreen assessments

Plasticizer Acronym	Chemical Name	CAS No.	GreenScreen Benchmark (see explanations below)	Notes	Link to GreenScreen Assessments
DPHP	Di(2-Propyl Heptyl) phthalate	53306-54-0	U**	Data gaps for cancer and endocrine activity	Draft GreenScreen
DINP	Diisononyl phthalate	68515-48-0	1**	<i>High endocrine activity, developmental and reproductive toxicity</i>	Draft GreenScreen
Dow Ecolibrium™	Modified vegetable oil derivatives (confidential formulation)	Confidential	<i>4 Formulations BM 3 for 3 form. ** BM 2 for 1 form. *</i>	<i>The BM for the formulation is for the monomer with the lowest GS BM score</i>	Draft, Redacted GreenScreen
HallStar Dioplex™ and Paraplex™	Polymeric adipate (confidential formulation)	Confidential	<i>5 chemical ingredients BM 3 for 4 ingred. ** BM 2 for 1 ingred. *</i>	<i>The BM 2 chemical is a fatty alcohol monomer with moderate developmental toxicity</i>	Draft, Redacted GreenScreen

* Based on Draft (i.e., unverified) GreenScreen assessment

Key to GreenScreen Benchmarks:

Benchmark

- | | |
|-----------------|--|
| 1 | Avoid – Chemical of high concern |
| 2 | Use but search for safer substitutes |
| 3 | Use but still opportunity for improvement |
| 4 | Safer chemical |
| U | Is not a BM 1 chemical but does not meet the minimum data requirements to receive a BM 2 designation |
| 3 _{DG} | Meets the hazard classification requirements of BM4, based on all available Data, but does not achieve the minimum data requirements for BM4 |

Performance Information for Plasticizers

Performance information on these nine plasticizers can be accessed on the [GC3 website](#). This webpage provides links to performance and other technical data provided by the plasticizer manufacturers on their websites.

More information on the [GC3 Business & Academic Partnerships for Safer Chemicals](#) project is available on the GC3 website. A short article on the project is available on [Greenbiz.com](#). Please contact [Monica Becker](#) if you would like more information about the project.

Information on the GreenScreen™ is available on [CPA's website](#).