

PHthalATES

Class or Substance Name

Esters of Ortho-Phthalic Acid (phthalates): Esters of 1,2-benzenedicarboxylic acid

Substance List by CAS Number

Phthalates are a large class of substances. Commonly used phthalates include:

117-81-7	Di(ethylhexyl) phthalate (DEHP)	85-68-7	Benzyl butyl phthalate (BBP)
117-82-8	Bis(2-methoxyethyl) phthalate (DMEP)	84-76-4	Dinonyl phthalate (DNP)
117-84-0	Di-n-octyl phthalate (DNOP)	84-66-2	Diethyl phthalate (DEP)
26761-40-0	Di-iso-decyl phthalate (DIDP)	131-16-8	Di-n-propyl phthalate (DPRP)
28553-12-0	Di-isononyl phthalate (DINP)	84-69-5	Diisobutyl phthalate (DIBP)
84-75-3	Di-n-hexyl phthalate (DnHP)	84-61-7	Di-cyclohexyl phthalate (DCHP)
84-74-2	Dibutyl phthalate (DBP)	27554-26-3	Di-iso-octyl phthalate (DIOP)
68515-42-4	1,2-benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)		
71888-89-6	1,2-benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)		

Description of Use in Apparel and Footwear

Esters of ortho-phthalic acid (phthalates) are commonly added to plastics to make them soft, increase flexibility, prevent cracking and facilitate moulding by decreasing its melting temperature.

Legislation around the world, including in the European Union and the United States, restricts the use of certain phthalates in apparel, footwear and accessories. Leading apparel and footwear brands have banned the use of phthalates in production of their products.

Why are Phthalates Restricted?¹

- Some phthalates, above certain exposure levels, may impair human fertility or cause harm to unborn children.
- Some phthalates, above certain exposure levels, may result in the development of certain cancers.²
- Some phthalates are very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment.

PHthalATES MAY BE FOUND IN:

- Flexible plastic components (e.g., polyvinyl chloride)
- Print pastes
- Adhesives
- Plastic buttons
- Plastic sleeves
- Coatings (e.g., polyurethane)

Guidance: Sourcing Phthalate-Compliant Materials from Your Material Suppliers (Textiles, Components and Trim Parts)

- Contact your suppliers and explain that you require materials with a sum of all phthalates <500 ppm (0.05%).³
 - This includes textiles and natural/synthetic leather with polymeric coatings or finishes, since phthalates are common ingredients in coating, screen-printing and finishing formulations.
 - Pay special attention to plastic trims like buttons, shoelace aglets (tubes) and filler components that provide structural support in products like handbags, since phthalates are commonly used to provide flexibility.

¹ Classification and risk phrases according to European Union Council Directive 67/548/EEC or Directive 1999/45/EC.

² U.S. EPA has identified DEHP as a probable human carcinogen. California's Office of Environmental Health Hazard Assessment has identified DINP as a carcinogen.

³ Limit taken from AFIRM Restricted Substances Guidance (<http://www.afirm-group.com/rsl-guidance/>). This is the lowest agreed upon limit on phthalates in products among AFIRM brands. Check with brands for their individual limits.

- Suppliers who use phthalates in production for other clients may have contaminated machinery that can introduce phthalates into their manufactured materials. Work with suppliers who have phased out the use of phthalates for all clients.
- Share this guidance sheet with your material suppliers and instruct them to work with their chemical suppliers to source phthalate-compliant chemical formulations using the guidance in the next section.
- Have your suppliers confirm that their manufactured materials meet the sum of all phthalates <500 ppm limit with a certification or, if necessary, by providing a test report from a third-party laboratory.
- Perform risk-based checks of your suppliers' materials by submitting samples to a third-party laboratory for testing to ensure the sum of all phthalates <500 ppm limit is not exceeded.

Guidance: Sourcing Phthalate-Compliant Chemical Formulations from Your Chemical Suppliers

- Contact your chemical suppliers and explain that you require chemical formulations with no intentionally added phthalates. The sum of all phthalates in chemical formulations should be <250 ppm (0.025%).⁴
- Pay special attention to suppliers of chemicals used for coating textiles, natural leather⁵ and synthetic leather, including printing pastes. Consider that leather-finishing formulations may contain phthalates.
- Check the Material Safety Data Sheets (MSDS) of all chemical formulations to ensure that none of the phthalate CAS Numbers above is listed as an ingredient.
- Have your chemical suppliers confirm that their chemical formulations meet the sum of all phthalates <250 ppm limit with a certification or, if necessary⁶, by providing a test report from a third-party testing laboratory.
- Perform risk-based checks of your chemical suppliers' formulations by submitting samples to a third-party laboratory for testing to ensure that the sum of all phthalates <250 ppm limit is not exceeded.
- Discuss with your chemical supplier whether the below safer alternatives are suitable substitutes for your production needs.

Safer Phthalate Alternatives

The following substances have been identified as examples of safer alternatives by the U.S. Environmental Protection Agency and/or by the Danish Environmental Protection Agency. These substances may be suitable for your production needs. Any chosen alternative must be ZDHC MRSL compliant.

77-90-7	Acetyl tributyl citrate (ATBC)
6422-86-2	Bis(2-ethylhexyl) terephthalate (DEHT/DOTP)
103-23-1	Di(ethylhexyl) adipate (DEHA)
166412-78-8, 47919-59-0	Diisononyl cyclohexane-1,2-dicarboxylate (DINCH)
122-62-3	Dioctyl sebacate (DIDS)
3319-31-1	Trioctyl trimetallitate (TOTM)
6846-50-0	Trimethyl pentanyl diisobutyrate (TXIB)

Additional information about these alternatives is available at the following links:

http://www.epa.gov/opptintr/existingchemicals/pubs/actionplans/phthalates_actionplan_revised_2012-03-14.pdf

<http://www2.mst.dk/udgiv/publications/2010/978-87-92708-00-7/pdf/978-87-92708-01-4.pdf>

http://www.greenchemistryandcommerce.org/documents/PilotProjectFullReportOct2-final_000.pdf

⁴ Limit taken from ZDHC Manufacturing Restricted Substances List (MRSL) (<http://www.roadmaptozero.com/df.php?file=pdf/MRSL.pdf>) and is the limit on unintended phthalates in chemical formulations accepted by ZDHC member brands.

⁵ The ZDHC MRSL does not apply to chemical formulations intended for leather processing at this time.

⁶ At a later date, ZDHC will publish guidance on when the testing of chemical formulations is appropriate.