

# GUIDE

to managing  
chemicals in footwear

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**FDRA**  
FOOTWEAR DISTRIBUTORS AND RETAILERS OF AMERICA

**BLC**  
Leather Technology Centre

As footwear companies continue to grapple with ever-changing regulations impacting the industry at the state and federal level, the need for tools that help effectively manage chemicals throughout the supply chain has never been greater. Europe's REACH initiative, the Consumer Product Safety Improvement Act (CPSIA), and more recently California's Proposition 65, have challenged the entire industry to develop a more proactive strategy to meet these new requirements and work towards timelines that ensure continued industry competitiveness and consumer awareness.

Working closely with FDRA's Product Safety Working Group (PSWG), this Guide was designed to help footwear companies understand which chemicals are most likely present in footwear currently being produced. In addition, the PSWG sought to develop a matrix that prioritized chemicals into different tiers – placing the highest priority on Tier 1 chemicals currently covered by state, national or international laws. Equally important is FDRA's belief that not all chemicals covered by regulation are used in the production of footwear. Therefore, this Guide should assist companies in the development of a testing program that makes sense and steers clear of unneeded testing.



## know your product

More specifically, in order to help companies develop a commonsense approach to managing compliance, the tier system is laid out in the following way:

**Tier 1:** Tier 1 includes those chemicals that are currently covered by State and Federal laws within the U.S. or, based on industry counsel and intelligence, likely be the subject of regulation and/or legal action in the very near future.

**Tier 2:** Substances in Tier 2 are partially regulated outside the United States, including within the European Union, and may be present in some footwear materials. Some of these chemicals are also covered by California's Proposition 65, but have yet to be the subject of increased regulatory scrutiny. Companies can assume that future regulations may include these chemicals.

**Tier 3:** These substances are partially regulated outside the United States, including within the EU, and may be present in some footwear specific materials. California's Proposition 65 covers some chemicals contained within Tier 3. These chemicals could be a focus of US regulation in the medium to long term.

Lastly, this document will be updated on a routine basis, as additional consumer good regulations are drafted and implemented. The current regulatory trend is not going away, and FDRA and BLC will be on stand-by to assist footwear companies and their suppliers when needed. It is our hope that this tool will help you and others confidently understand the key goal of managing chemicals in footwear production – Know Your Product.

**Tier 1:** These substances include those chemicals that are currently covered by State and Federal laws within the U.S. or, based on industry counsel and intelligence, likely to be the subject of regulation and/or legal action in the very near future.

Restricted Chemical	Recommended Test Method	Maximum recommended (from legislation and/or industry best practice)	Leather	Textiles	Coated Textiles	Polymer/ Plastic/ Rubber	Ink/Paint	Metal hardware	Adhesive	Electrical components	Packaging	Legislation examples	Example Alternatives **
Lead in paint (this applies to the finish or coating)	CPSC CH 1003.09 ICP analysis – total digestion	<90 mg/kg	x	x	x	x	x			x	x	CPSC, REACH, Prop 65	Organic pigments/ non toxic heavy metal pigments
Lead in substrate (recommended for all children's products)	CPSC CH E1001.08.3; CPSC CH E1002.08.2 ICP analysis – total digestion	<100mg/kg	x	x	x	x	x	x	x	x	x	CPSC, REACH, Prop 65 RoHS	No lead containing dyes
Cadmium	ICP analysis – total digestion	<100 mg/kg	x	x	x	x	x	x	x	x	x	CPSC, REACH, Prop 65, RoHS, cadmium directive	Organic pigments/non toxic heavy metal pigments
Restricted phthalates screen	EN ISO 14372 Screening for DEHP, BBP, DBP, DINP, DIDP, DNOP, DnHP & DIBP	<0.1%	x*		x	x	x		x		x	CPSC, Prop 65, REACH	Alternatives include citrates, sebacates, adipates, and phosphates
Azo dyestuffs - Arylamines	Leathers BS EN 17234-1:2010 and BS EN 17234-2:2011 Textiles BS EN 14362-1:2012 and BS EN14362-3:2012	None detected (detection limit: 30 mg/kg)	x	x	x							REACH, Prop 65	Azo dyes that do not release restricted amines (estimated that approximately 4% of azo dyes are problematic). Use of alternative non-azo dyes ie: other acid and direct dyes.
Chrome VI soluble	EN ISO 17075	None detected (detection limit: 3 mg/kg)	x									Prop 65, Germany specific restrictions. Soon to be incorporated into REACH	Chrome VI is not intentionally added to leather. Reputable sources of chrome to be used and best practice applied during leather manufacture. Alternative tanning systems are available

mg/kg is equivalent to ppm.

\* Finished and coated leathers

\*\* Please note that any alternative chemical products are listed as examples only. The list is not exhaustive. New chemicals should be sourced in consultation with a reputable chemical company and tested accordingly for quality and safety purposes.

Tier 2: These substances are partially regulated outside the U.S., including within the European Union, and may be present in some footwear materials. Some of these chemicals are covered by California's Proposition 65, but have yet to be the subject of increased regulatory scrutiny. Companies can assume that future regulations may include these chemicals.

Restricted Chemical	Recommended Test Method	Maximum recommended (from legislation and/or industry best practice)	Leather	Textiles	Coated Textiles	Polymer/ Plastic/ Rubber	Ink/Paint	Metal hardware	Adhesive	Electrical components	Packaging	Legislation examples
Formaldehyde	Leather EN ISO 17226-1 (HPLC analysis) Textile EN ISO 14184-1	Materials without skin contact <150 mg/kg Materials with skin contact <75 mg/kg Children's products (up to 36 months) with skin contact <20 mg/kg	x	x	x	x			x		x	Retailer and brand specified (legislated in Japan). Prop 65
Chlorinated phenols PCP, TCP and TeCP	EN ISO 17070	None detected (detection limit: 5 mg/kg)	x	x								REACH, Prop 65
Disperse Dyes	DIN 54231	<5mg/l in extract			x	x						Legislated in Germany
Dimethyl Fumarate (DMF) **	pr CEN ISO TS 16186 (or equivalent)	<0.1 mg/kg									x	REACH
Total heavy metals screening	ICP analysis - total digestion Screening for Sb, As, Ba, and Hg	<100mg/kg per metal	x	x	x	x	x	x	x	x	x	Prop 65, Metal Specific Directives
Extractable heavy metals screening (for children's products)	BS EN71-3	Sb – 60mg/kg; As – 25mg/kg; Ba – 1000mg/kg; Cd – 75mg/kg, Cr – 60mg/kg*; Pb – 90mg/kg; Hg – 60mg/kg; Se – 500mg/kg	x	x	x	x	x	x	x	x	x	EN71-3
Nickel release of metallic components in direct prolonged contact with skin	BS EN 12472: 2005 + A1:2009 BS EN 1811:2011	<0.5 micrograms/cm2/week						x				REACH
ΣNPEO, NP, OPEO and OP	HPLC analysis	None detected (Detection limit:10 mg/kg)	x	x	x							REACH (processing) and focus of NGO campaigns
PFOS/PFOA	pr CEN TS 15968 (or equivalent)	<1000 mg/kg	x	x	x							REACH and focus of NGO campaigns

\*The 60mg/kg limit for extractable chromium does not apply to chrome tanned leathers, as they will not be able to meet this limit. In these cases, a negative chrome VI test (<3mg/kg) should be sufficient

\*\* Dimethyl fumarate is a fungicide that can be found in sachets added to finished product packaging to prevent mould growth. This chemical is not added to materials during manufacture and is therefore highly unlikely to be found in material components. The use of DMF in anti-mould sachets is prohibited in Europe due to severe risk of skin sensitivity.

**Tier 3:** These substances are partially regulated outside the U.S., including within the European Union, and may be present in some footwear specific materials. California's Proposition 65 covers some chemicals contained within tier 3. These chemicals could be a focus of U.S. regulations in the long term.

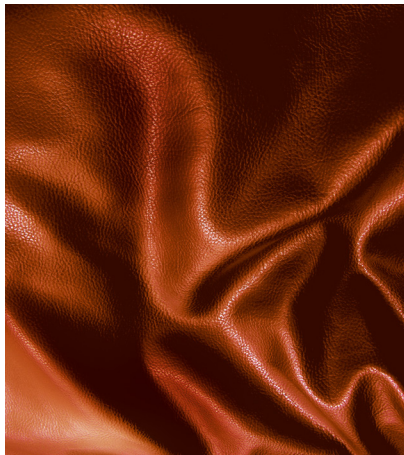
Restricted Chemical	Recommended Test Method	Maximum recommended (from legislation and/or industry best practice)	Leather	Textiles	Coated Textiles	Polymer/ Plastic/ Rubber	Ink/Paint	Metal hardware	Adhesive	Electrical components	Packaging	Legislation examples
Flame retardants	GC-MS/GC-ECD	PBE, OBE and PBDE - <0.1% TRIS, TEPA, PBB – none detected for skin contact	x	x	x	x						REACH Prop 65
Organotin compounds (MBT, DBT, TBT, MOT, TeBT, DOT, TPhT & TcyT)	pr CEN ISO TS 16179 (or equivalent)	TBT - <25 µg/kg (0.025 mg/kg) Others - <50 µg/kg (0.050 mg/kg)	x	x	x	x	x		x		x	REACH, Prop 65
Pesticides screening	LC-MS analysis	Σ Total <1.0 mg/kg	x	x								REACH, Prop 65
Volatile organic compounds (toluene, benzene & naphthalene)	GC-MS analysis	<5.0 mg/kg per compound	x			x			x			REACH, Prop 65
Nitrosamines	EN 12868 (or equivalent)	<0.1mg/kg				x						EU Directive 1993/11/EEC
Bisphenol A	LC-MS analysis	None present			x	x			x			Country/US State specific controls
REACH Screening for SVHC	Various methods	<0.1% by weight of the product	x	x	x	x	x	x	x	x	x	REACH
PAH	GC-MS analysis	≤ 1 mg/kg	x*		x	x					x	REACH

\* Finished and coated leathers

## Additional Restricted Substances Information:

Substance	Description
Lead	Lead is a toxic metal which can cause irreversible neurological damage as well as renal disease, cardiovascular defects and reproductive toxicity. Lead can be used as a stabiliser in PVC production. It can be found in metal alloys of metallic components as well as a component of pigments in textiles and paints.
Cadmium	Cadmium is relatively abundant in our everyday life from various sources such as diet, fertilised soils and cigarette smoke. Cadmium is a naturally occurring heavy metal which is often used as a stabiliser or pigment in plastics and dyestuffs; it is also sometimes used in biocides and fertilisers. Cadmium is known to be toxic to humans and aquatic life and due to its cumulative effects it is also considered to be very harmful to the environment.
Phthalates	Phthalates are mainly used as plasticizers (softeners) for PVC and other polymers. They can be also found in adhesives, coated leathers, plasticised components and some synthetic rubbers. Phthalate plasticizers are not chemically bound to PVC so they may leach out. The fear is that young children and infants will chew or place an offending item containing phthalates into their mouths and absorb some of the chemicals into their bodies. Studies have found phthalates to be endocrine disrupting. Bis (2-ethylhexyl) phthalate (DEHP) has also been listed as a possible carcinogen. It should be noted that only a few phthalates are restricted.
Azo dyes	Azo colourants are colouring agents widely used in the production of textiles, leather, plastics, paper and many other everyday items. The term colourant includes both pigments and dyes. Aromatic amines are produced during the degradation or breakdown of certain azo dyes and it is some of these degradation products that are restricted in textile and leather articles. This breakdown occurs if the dyes are able to enter the body through ingestion or skin migration. There are currently 24 recognised aromatic amines restricted by various legislations worldwide. Some of these are known to be carcinogenic whilst some are only suspected to be carcinogenic.
Heavy metals	Some metals have no known biological function such as arsenic, cadmium, chromium, lead and mercury. Other metals are required in order for cells to function normally, such as copper, nickel, iron and zinc. Most metals are toxic in high concentrations; however the metals that do not have a biological function can also be toxic in very low concentrations. This method screens for those metals already identified as being of potential risk.
Chrome VI	Chromium is a transition element and can exist in three stable forms known as metallic chromium, chromium III and chromium VI. The vast majority of the leather produced today is tanned using chromium salts and in the finished leather this is present as chromium III. Chromium (III) sulphate is safe to use and is non-hazardous. It is possible that small amounts of this chromium III can be reduced to the harmful chromium VI at any point during the tanning process (due to high pH or contaminated chemical supplies) or the lifetime of the finished leather under specific conditions (such as high temperature). Chrome VI is believed to be a dermatological irritant and, if present in large enough quantities, is a potential carcinogen.
Formaldehyde	Formaldehyde can be toxic, allergenic, and carcinogenic. Because formaldehyde resins are used in many construction materials, it is one of the more common indoor air pollutants. At concentrations above 0,1 ppm in air, formaldehyde can irritate the eyes and mucous membranes, resulting in watery eyes, if inhaled at this concentration may cause headaches, a burning sensation in the throat, and difficulty breathing, as well as triggering or aggravating asthma symptoms. Formaldehyde is also classified as a probable human carcinogen. Formaldehyde can cause allergies, and is part of the standard patch test series.
Chlorinated phenols	Used historically as a herbicide, pesticide, fungicide and disinfectant in natural materials such as wood, paper, leather and cotton, PCP is known to be toxic to humans and has been linked to some forms of cancer. Tetrachlorophenol (TeCP) is an insecticide and a bactericide and is used as a preservative for latex, wood, and leather. Trichlorophenol (TriCP) has been used as a fungicide, herbicide, insecticide, antiseptic, defoliant, and glue preservative. It is a yellow solid with a strong, sweet odour. It decomposes on heating to produce toxic and corrosive fumes including hydrogen chloride and chlorine. It is carcinogenic in animals, and is considered an environmental pollutant.
Disperse dyes	Disperse dyes are generally water-insoluble colourants that are mainly used for colouring polyester, nylon, and cellulose acetate textile fibres. Some of these dyes can cause and allergenic response and it is estimated that up to 5% of the population could have an allergic response to these substances.
Dimethyl fumarate	Dimethyl fumarate, also known as DMF, is an ester of Fumaric acid with a chemical formula of C <sub>6</sub> H <sub>8</sub> O <sub>4</sub> . DMF has good antifungal properties, and has been used as a mould inhibitor in sachets for footwear and furniture. Recently, DMF has been highlighted as being an allergenic sensitizer causing eczema at low concentrations. As a result, member states have voted in favour of a draft European Commission decision to ensure that products containing DMF are not placed on the EU market and a ban on the import of products containing dimethyl fumarate is likely to be enforced.

Substance	Description
Alkylphenol and Alkylphenol ethoxylate (NP, OP, NPEO, OPEO)	Alkylphenols (AP) and alkylphenol ethoxylates (APEO) are used in plastics, as additives, plasticizers and surface-active ingredients in industrial detergents and emulsifiers. Ethoxylated alkylphenols, alkylphenol ethoxylates (APEO), are used as industrial surfactants in manufacture of textile, leather, wool and metal, as emulsifiers for polymerization, in laboratory detergents, and pesticides. Nonylphenol and nonylphenol ethoxylates (NPEO) are believed to be bio-accumulative and a hazard to human and environmental safety.
Flame retardants	Flame retardants are chemicals used in textiles and leather goods to inhibit or resist the spread of fire. Many of these chemicals are considered harmful, having been linked to liver, thyroid, reproductive/developmental, and neurological effects.
Organotin compounds	Organotins (also known as organic tin or organostannic compounds) are a large family of chemical compounds with a structure that is based on tin (Sn) with a number of hydrocarbon substituents. These compounds have many uses in the production of consumer products and, depending on their composition, have uses ranging from antifungal agents to stabilisers in the production of plastics. Although organotin compounds have a large scope of uses depending on the wide range of possible structures available, certain compounds have been highlighted by the EU as having adverse effects on human health and the environment. As a result, the Commission of European Communities has put together a proposal to restrict the use of organostannic compounds in consumer articles.
PFOS/PFOA	PFOS belongs to the perfluorinated surfactants. Perfluorinated surfactants are very stable to chemicals, heat and also light (UV radiation). They have excellent dirt, oil and water repelling properties. Compounds derived from perfluorooctane sulphonate (PFOS), therefore, have numerous applications in the surface finishing of packaging materials, carpets, textiles, leather and furniture. Polymeric compounds are often used for such applications; they are chemically firmly bonded to the substrate to prevent washing out. PFOS are categorised as potentially carcinogenic to humans. This substance is considered as very persistent and very bioaccumulative (vPvB). Perfluorooctanoic acid (PFOA), also known as C8, is an artificial acid that has many industrial uses.
Pesticides	A pesticide is any substance or mixture of substances intended for: preventing, destroying, repelling, or mitigating any pest. Though often misunderstood to refer only to insecticides, the term pesticide also applies to herbicides, fungicides, and various other substances used to control pests. By their very nature, most pesticides create some risk of harm - Pesticides can cause harm to humans, animals, or the environment because they are designed to kill or otherwise adversely affect living organisms.
VOC	VOC is short for volatile organic compounds, which are chemical compounds that have high enough vapour pressures under normal conditions to significantly vaporise and enter the air. VOCs that escape into the air contribute to air pollution outdoors and inside our homes. Emissions and odour are sometimes used instead of VOC but are often used to mean the same thing. VOCs include a variety of chemicals, some of which may have short- and long-term adverse health effects.
Nitrosamines	Nitrosamines can be used in rubber products, latex, pesticides and certain cosmetics. Some nitrosamines can cause cancers in a wide variety of animal species, a feature which suggests that they might also be carcinogenic in humans. Epidemiological data suggests that nitrosamines in preserved food cause stomach cancer.
Bisphenol A	Bisphenol A (BPA) is used primarily to make plastics. It is a key monomer in production of epoxy resins and in the most common form of polycarbonate plastic. Polycarbonate plastic is used to make a variety of common products including baby and water bottles, sports equipment, medical and dental devices, dental fillings and sealants, eyeglass lenses, CDs and DVDs, and household electronics. BPA is also used in the synthesis of polysulfones and polyether ketones, as an antioxidant in some plasticizers, and as a polymerization inhibitor in PVC. Bisphenol A is also a precursor to the flame retardant tetrabromobisphenol A, and was formerly used as a fungicide. BPA is an endocrine disruptor that interrupts hormones. It has been linked to breast cancer, heart disease, obesity, prostate cancer, hyperactivity and behavioural problems. BPA is primarily restricted in baby bottles and food contact plastics; however in March 2010 the EPA listed BPA as a chemical of concern.
Polycyclic Aromatic Hydrocarbons (PAH's)	PAH's are found in oil, coal and tar deposits and in oils used for the production of tyres and some plastic or rubber components. They are not added to the products intentionally but are present as impurities. PAH's are toxic to the environment and bioaccumulative as they readily evaporate into the air from soil or surface water, breaking down through reaction with sunlight and other chemicals in the air.
Nickel	The presence of nickel in certain products which come into direct and prolonged skin contact, such as jewelry, may cause sensitisation of humans to nickel and may lead to allergic reactions. The objective of the nickel directive is to reduce the incidence of nickel dermatitis by preventing non-compliant items from reaching the marketplace. There are many factors which can affect the level and rate of nickel release from a nickel alloy. Apart from the actual nickel content and composition of the alloy itself, these could include surface finish, non-homogeneity, and plating among others.
REACH - SVHCs	REACH is a European Union regulation concerning the Registration, Evaluation, Authorisation and restriction of Chemicals. It came into force on 1st June 2007 and replaced a number of European Directives and Regulations with a single system. Some substances have hazards that have serious consequences, e.g. they cause cancer (carcinogenic), or they have other harmful properties and remain in the environment for a long time (persistent) and gradually build up in animals (bioaccumulative). These are substances of very high concern. This category also includes substances demonstrated to be of equivalent concern, such as "endocrine disruptors". One of the aims of REACH is to control the use of such substances via authorisation and encourage industry to substitute these substances for safer ones.



### **about FDRA**

Founded in 1944, the Footwear Distributors and Retailers of America (FDRA) is the oldest, largest, and most effective footwear trade association in the U.S. It represents the full breadth of the footwear industry, supporting more than 100 companies and over 200 brands, from research, design and development, to manufacturing and distribution, to retailers selling to consumers all over the globe. What FDRA does is simple: It advocates for lower costs for consumers, allowing its members to sell more shoes and create jobs. FDRA is also the leader in industry educational events and business intelligence products on a variety of important footwear regulations and trends. More information on FDRA, and the product safety programs and products, can be found by visiting [FDRA.org](http://FDRA.org) or calling 202.737.5660.

### **about BLC**

BLC is the leading independent leather technology centre, working with hundreds of companies in over 40 countries delivering a range of leather and footwear related services. Established for over 90 years BLC has the technical pedigree in leather and materials technology to ensure fast accurate solutions to technical, management or environmental issues. BLC offers a total solution for the leather and footwear supply chain - from raw materials through leather and materials supply to product manufacturer and retail. A specialist area is restricted chemistry. BLC's expertise, experience and passion for leather and related materials coupled with excellent customer service and rapid response sets it apart as a market leader in this specialist field. Based in the UK, BLC has an extensive and varied customer base that includes suppliers, retailers and brands from all over the world. More information can be found by visiting [blcleathertech.com](http://blcleathertech.com) by e-mail: [info@blcleathertech.com](mailto:info@blcleathertech.com) or calling +44 1604 679953

### **disclaimer**

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