

Hazardous Substances Management in the Supply Chain

Christophe Garnier, Pierre Bardollet and Eric Bonneville

Abstract For decades, Schneider Electric has been committed to playing a key role in the environmental challenges we are facing. Schneider Electric has always been a step ahead in environmental protection and recognized for our environmental actions and the results in our products and activities. For our products, we closely monitor compliance with regulations and directives, and extend applications beyond geographical areas when appropriate. The purpose of this paper is to present an overview of the eco-design process implemented in the Schneider, and especially on the management of hazardous substances.

Keywords Eco-design · Hazardous substances · Supply chain · Energy · Life cycle analysis (LCA) · Product environmental impact · PEP ecopassport · Green premium · Eco label

1 Introduction

Being environmentally responsible in manufacturing can be interpreted in more than one way. On one hand, a manufacturer can claim to be “green” because its products and operations meet all the minimum requirements established by various authorities.

But we think the commitment to preserve and protect the environment—our one and only environment—must go deeper than that.

The use of chemicals in manufacturing is one area that has drawn much attention in recent years. Fortunately for manufacturers seeking to ensure the chemical substances used in their products and processes are both safe and environmentally benign, the European Union has set the bar very high in developing the Restriction of Hazardous Substances (RoHS) and Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) requirements.

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2 No Bad Ingredients

The Restriction of Hazardous Substances (RoHS) directive prohibits the use of six specific substances, plus four types of phthalates, that until recently were commonly used in other electrical equipment. However, RoHS requirements differentiate between electrical and nonelectrical equipment, and manufacturers can take advantage of numerous exemptions. For example, small amounts of lead are acceptable in specific applications, even though lead is one of the six hazardous substances singled out by RoHS.

We view the current RoHS requirements not as minimum requirements, but rather as leading the way for the world's future collective health and welfare. Therefore, our goal is to not include any substance identified by RoHS as being hazardous in any of our products. That means we do not take advantage of the additional allowances offered for nonelectrical equipment and, insofar as possible, we want to avoid exemptions.

Even though RoHS compliance is absolutely required only for products made or sold in the European Union, we recognize that RoHS provides the strictest environmental regulation of this type in the world. Therefore, we apply this same approach to all of our products worldwide, which means everyone benefits.

3 No Bad Chemicals, Either

With the passage of the Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) in 2007, manufacturers became directly responsible for guarding against the effects of chemical use. This covers both chemical ingredients and chemicals used in the manufacturing process, such as for cleaning or rinsing, but also chemicals in manufactured articles. Of the 14,000 chemicals now registered in the REACH database, 169 already are considered "substances of very high concern" (SVHC), and that list continues to grow.

Again, we view our compliance with REACH requirements as more than just minimally acceptable behavior. For example, the program is primarily based on declarations made by each manufacturer. As such, it also permits inclusion of SVHC in products, to some extent, as long as its inclusion is noted in the product declarations. Rather than take advantage of this, we decided to go beyond that requirement as well. As soon as a "substance of concern" comes under official consideration as a possible SVHC, we trace the potential presence. As soon as it is submitted to specific authorization, we substitute that chemical anywhere it has been used as soon as possible, and we ban its further use in any of our products and processes. As with the RoHS requirements, this is also something we do on a global basis.

4 Being Selective in Material Use

Of course, there are many other material choices to be made in manufacturing beyond those specifically covered by RoHS and REACH, and environmentally friendly material selection is another area of concern. For many years we have tried to make material selection decisions in a similarly environmentally friendly way, remembering that the local environment is also important. For example, many of our products have fire protection requirements. A decade or more ago, we consciously decided to avoid the use of toxic flame retardants in our products, which benefits all involved.

We also design our products to incorporate recycled and biomass materials—such as plastics made from biomass rather than from oil—as much as possible. That’s good for the environment, but we are going even further in a move designed to improve personnel safety: Instead of thermosetting materials, we’re moving toward a wider use of thermoplastic materials, which are totally inert. This will mean workers will have far less exposure to potentially hazardous reactive chemistry. As an example, some medium voltage parts that historically were made using thermoset polyester plastics are now manufactured in high-performance thermoplastic.

Schneider Electric Green Premium™ ecolabel program, launched in 2012, provides an easy and convenient way for customers and end users to quickly confirm the level of each of our products’ overall environmental compliance. For more information, <http://www.schneider-electric.com/green-premium>.

5 How to Track Substances Content?

There are many substances regulations worldwide, covering different substances, or groups of substances. Using the substances names, it is sometimes not easy to check if different regulations apply to the same substances, cover the same groups of substances,...

Also, each manufacturer, or industry, have their own list of substances they manage. And each list can be in different formats: text, table, database,...

At the end, it is a nightmare to collect information through the supply chain.

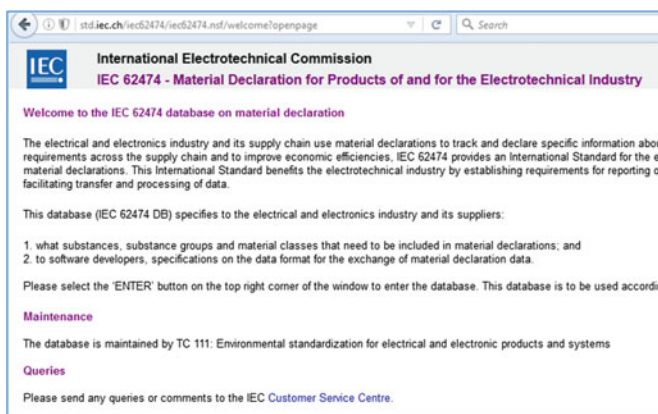
This is why the IEC has developed a standard for the electric and electronic industry that standardize a list of substances with unique names, and a unique declaration format so that all lists can be transmitted in the supply chain, and aggregated.

This standard is IEC62474, it is made of 2 parts:

The standard itself

A database containing the minimum list of substances to declare so that compliance with any substance regulation can be assessed

The list of substance is freely available at <http://std.iec.ch/iec62474>.



Home page of the IEC 62474 project

SubstanceGroup	SpecificSubstance	CASnumber
	Diarsenic pentoxide	1303-28-2
	Diarsenic trioxide	1327-53-3
Asbestos	See Reference Substance worksheet	See Reference Substance worksheet
Azocolourants and azodyes which f	See Reference Substance worksheet	See Reference Substance worksheet
	Beryllium Oxide	1304-56-9
	Boric Acid	10043-35-3, 11113-50-1
Brominated flame retardants (other t	See Reference Substance worksheet	See Reference Substance worksheet
Brominated flame retardants (other t	See Reference Substance worksheet	See Reference Substance worksheet
Cadmium/Cadmium compounds	See Reference Substance worksheet	See Reference Substance worksheet
Cadmium/Cadmium compounds	See Reference Substance worksheet	See Reference Substance worksheet
Chromium (VI) Compounds	See Reference Substance worksheet	See Reference Substance worksheet
	Cobalt dichloride	7646-79-9
Dibutyltin (DBT) compounds	See Reference Substance worksheet	See Reference Substance worksheet
Diocetyltn (DOT) compounds	See Reference Substance worksheet	See Reference Substance worksheet
	Dimethyl Fumarate (DMF)	624-49-7
Disodium tetraborates	See Reference Substance worksheet	See Reference Substance worksheet
Fluorinated Greenhouse Gases (PFI	See Reference Substance worksheet	See Reference Substance worksheet
	Formaldehyde	50-00-0
Hexabromocyclododecane (HBCDD	See Reference Substance worksheet	See Reference Substance worksheet
Lead/Lead Compounds	See Reference Substance worksheet	See Reference Substance worksheet
Lead/Lead Compounds	See Reference Substance worksheet	See Reference Substance worksheet

IEC 62474 List of substances by names and CAS Number

Typical Applications	Basis	Basis Description	Reportable Applications	Reporting Threshold
Additive in wood, metal, glass and p	Criteria 1: Currently Regulated	Candidate list for European REACH All		0.1 mass% of article
Additive in wood, metal, glass and p	Criteria 1: Currently Regulated	Candidate list for European REACH All		0.1 mass% of article
Insulator, filler, pigment, paint, talc	Criteria 1: Currently Regulated	ANNEX XVII of REACH Regulation (I) All		Intentionally added
Pigment, dyes, colorants	Criteria 1: Currently Regulated	ANNEX XVII of REACH Regulation (I) Textiles and Leather		0.003% by weight of the finished tex
Ceramics	Criteria 3: For Information Only	European Industry Agreement (DIG) All		0.1 mass%
In wood veneers/ pressed wooden p	Criteria 1: Currently Regulated	Candidate list for European REACH All		0.1 mass% of article
Flame retardant in printed wiring bo	Criteria 3: For Information Only	Industry Standards IEC 61249-2-21 Printed wiring board laminate		0.09 mass% total bromine content i
Flame retardant for housing, connec	Criteria 3: For Information Only	Joint JEDCE/CECA JS-709A Standard Plastic materials except printed wir		0.1 mass% of bromine in plastic ma
Pigments, anti-corrosion surface tre	Criteria 1: Currently Regulated	2011/65/EU (EU RoHS Directive anc All, except batteries		0.01 mass% of total Cd in homogen
Relay contact, photodiode voltaic ce	Criteria 1: Currently Regulated	2006/66/EC EU Battery Directive an Batteries		0.001% by weight of battery
Pigment, paint, ink, catalyst, plating	Criteria 1: Currently Regulated	2011/65/EU (EU RoHS Directive anc All		0.1 mass% of total Cr+6 in homogen
Pneumatic panels to indicate water	Criteria 1: Currently Regulated	Candidate list for European REACH All		0.1 mass% of article
Stabilizer for PVC, curing catalyst f	Criteria 1: Currently Regulated	ANNEX XVII of REACH Regulation (I) All		0.1 mass% of tin in the part
Stabilizer for PVC, curing catalyst f	Criteria 1: Currently Regulated	ANNEX XVII of REACH Regulation (I) (a) textile and leather articles intend		0.1 mass% of tin in the part
Biocide, mold prevention treatment	Criteria 1: Currently Regulated	COMMISSION DECISION 2009/251/AS		0.00001 mass% of the part
In wood veneers/ pressed wooden p	Criteria 1: Currently Regulated	Candidate list for European REACH All		0.1 mass% of article
Refrigerants, blowing agents, exting	Criteria 1: Currently Regulated	EU Reg. No. 842/2006	All	Intentionally Added
Textiles	Criteria 1: Currently Regulated	Lithuanian Hygiene Norm HN 96:20/ Textiles		0.0075 mass % of textile

In what product the substance is used, reason for including the substance in the list, minimum threshold for declaration.

The database is updated as soon as a substance is expected to be regulated, allowing users of the standard to update their requirements towards suppliers.

6 Schneider Electric Eco Label: Green Premium

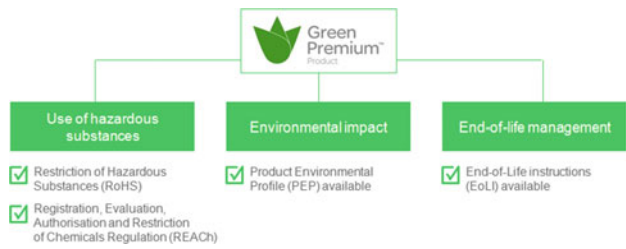
Our ambition is to address potential impacts through **every phase of our products' life cycles**. This means addressing product manufacturing and the related resource extraction, transportation throughout the value chain to end-users, installation in specific processes and operations, usage, and additional impacts created during product disposal, recycling, and/or degradation. The last life cycle stage is considered by the EEE industry to be an important issue to be addressed, especially with regard to both the impacts associated with hazardous substance emission and the potential for a circular economy, which would lead to resource preservation and an overall reduction of environmental impacts, including climate change.

Another organizational issue identified is **customer access to environmental information** so that buyers can have complete confidence in the specific product as well as in their ability to use the information as part of their own sustainability initiatives. This brings incremental value to companies at all stages of their supply chains. The only way businesses can comply with regulatory and consumer pressure is through comprehensive knowledge of the products and materials they use, and by making the right business decisions with that information. Access to sustainability information is critical to a company's long-term growth and product strategy.

Given these considerations, our ecolabel has been built on the following objectives:

Ensure our partners and customers that the use of **hazardous substances** in products is being **managed with awareness**, aiming for a **reduction to a minimal level**;

Provide detailed, transparent and reliable **data** on products’ **environmental impacts** across the life cycle, with complementary criteria;
Help users to **manage the end of life** of products by maximizing **reuse of components** and **reducing the related hazards** and **environmental impacts**.



How the Green Premium ecolabel covers environmental issues

7 Communication Using the PEP: Product Environmental Profile

The environmental impacts of Schneider Electric products are communicated to the customers and stakeholders through a PEP (product Environmental Profile). This document, based on ISO 14025, presents all environmental information through the complete life cycle of the product.

The PEP are managed by a Program Operator. Schneider Electric selected the “PEP ecopassport” organization.

Purpose	Approach of the PEP program
To the market demand	<ul style="list-style-type: none">• Program certified ISO 14025• Declaration based on a product LCA• Third party verification mandatory
Development of rules for a product category (PSR)	<ul style="list-style-type: none">• Proposal of creation to the Steering Committee• Development in an open working group• Critical review of the PCR/PSR mandatory• Registry and accessibility thru the program website
Publication of a declaration	<ul style="list-style-type: none">• Cover 1 product, an homogeneous product family or a typical product from a group of industrials• Comply with technical and editorial rules of the program PEP• Verified by an accredited verifier
Market of destination of a declaration	<ul style="list-style-type: none">• For the construction, infrastructures and industry• Visibility recognition and international usage

8 Conclusion

The knowledge of the content of the components a manufacturer is being is key to have a precise information about the final product.

The first objective is to allow an exact substance assessment to ensure compliance with substances regulations. But that also allows to go beyond mandatory requirements by voluntary removal of some substances, or replacement of substances by more environmentally friendly substances. This can be done by applying an EcoDesign policy at the early stage of the product development. The final environmental footprint, and environmental benefits of the products can be communicated to the market and the customer through the Green Premium program, and Product Environmental Profiles.

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Eco-friendly Methodologies, Solutions and Example for
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Bessède, J.-L. (Ed.)
2018, VII, 181 p. 73 illus., 70 illus. in color., Hardcover
ISBN: 978-3-319-58171-2