



## HARMFUL SUBSTANCES AND MATERIALS GUIDE

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# HARMFUL SUBSTANCES AND MATERIALS GUIDE

## Introduction

To ensure the appropriate use of chemical substances and products, and to restrict and avoid the use of hazardous substances is an integral part of Rio 2016™'s business practices.

Suppliers should avoid using or supplying products that require the use of materials or substances that are harmful to human beings or the environment for their manufacture, distribution or disposal process.

The purpose of this **Harmful Substances and Materials Guide** is to disclose the manner in which Rio 2016™ will approach the use of these materials and substances, as specified in the **Rio 2016™ Sustainable Supply Chain Guide**.

## What are chemical substances?

Substances that contain chemical components in their natural state or obtained through any production process. Those containing any additional additives necessary for the preservation or stability of the product and any impurities in the process utilised.

## What are hazardous substances?

Substances that may prove harmful to the environment, people or the community in one or more forms. Damage may occur as a result of habitual activities or accidentally.

## What are prohibited chemical substances?

Those whose use is controlled or whose sale is forbidden under the terms of one or more regulatory guidelines intended to protect health and/or the environment.

Substances not approved for use, withdrawn (or in the process of being withdrawn) from the internal market by industry or which fail to meet the standards required by international approval processes.

## What are restricted use chemical substances?

Substances whose use is restricted by regulations or those where sufficient reasonable scientific doubt exists regarding their adoption and risks. Includes hazardous chemical substances whose use has yet to be prohibited due to a lack of viable alternatives. In the case of these substances, controls should be applied that prevent adverse effects on health or the environment. Restrictions may also be applied to these products and research encouraged to develop alternative options in the short term.

The lists of substances designated as prohibited or of restricted use by Rio 2016™ can be found in Appendices 2 and 3 of this guide and should be rigorously observed by all suppliers.

Suppliers should avoid using or supplying products manufactured or distributed with the use of materials or substances harmful to human beings or the environment.

The constant need to assess options to improve chemical processes and applications to cause less impact on human beings and the environment throughout the supply chain (production, sale, distribution, use and disposal) is particularly important. These criteria will be integrated within our technical specifications and considered during the decision making process, as specified in the **Rio 2016™ Sustainable Supply Chain Guide**.

## Basic management guidelines

Rio 2016™ considers the following aspects essential for good management of chemical substances:

- Health of personnel
- Training of personnel
- Signage

- Prevention of loss and damage
- Documentation
- Transport, handling, packaging and storage
- Disposal
- Prohibited and restricted substances

## Health of personnel

It is important to carry out exposure assessments to safeguard the health of all those involved in processes in which chemical products are used, including employees, contractors, exposed communities and consumers.

Periodic monitoring of the health of all employees involved in the production process must be carried out in the case of hazardous substances.

Rio 2016<sup>TM</sup> encourages **OHSAS 18001** (Occupational Health and Safety Management System) and **ISO 14001** (Environmental Management System) certification for the organisation's risk control strategy with a view to improving its performance. These certifications will be obligatory in some of our contracts and considered the differentiating factor in the remainder.

All those involved in the transport, transfer, storage, use, handling, disposal and response to emergencies involving hazardous substances should use individual protective equipment, defined in accordance with the safety requirements contained in the material safety data sheets (MSDSs, described in Appendix 1).

## Training of personnel

In order to ensure the good management of chemical substances, it is necessary to conduct specific training during the acquisition, storage, use, handling and disposal of chemical substances, whether hazardous or otherwise.

Training of personnel is conducted in accordance with the conditions specified in the MSDSs and the level of risk involved in the proposed activity. Details of all training provided is registered and filed.

During the acquisition and utilisation stages, it is essential that details of the chemical substances involved are provided in a clear and concise manner. As such, instructions on how to obtain and use the information contained on the labels and MSDSs, as well as the procedures to be adopted in response to any threat or emergency situation should be clearly exhibited in the workplace.

## Signage

Substances and mixtures must be classified in accordance with their properties and the risk they pose to health and the environment. The Globally Harmonised System of Classification and Labelling of Chemicals (GHS), described in Appendix 1, provides directives for the classification of chemical substances and mixtures in accordance with the information available on the mixtures themselves and their components.

It is important to ensure that the name of the product and its hazardous characteristics are clearly displayed in the workplace, as well as signage that complies with GHS and all applicable legal requirements.

Furthermore, it is also necessary to comply with the regulations governing the identification of packaging of products destined for the end user. Please refer to the **Rio 2016™ Packaging Guide**.

## Prevention of loss and damage

It is necessary to analyse the risks to health, safety and the environment associated with chemical substances. These studies should be duly documented and reviewed following exercises involving a response to emergencies involving hazardous substances. Emergency procedures should be developed in accordance with the information contained in the MSDSs, with the use of equipment capable of providing an effective response to fire and the containment of any spillage and/or leakage.

## Documentation

MSDSs should be provided in a prominent place in the workplace for the information of all those involved and should clearly define the risks and precautions relating to

the handling, disposal, transport and storage of those substances and the response to emergency situations.

Labels on chemical substances should display hazard warning symbols as specified by the GHS and/or local legislation.

It is also recommended that an inventory of chemical substances be maintained. At the very least, this inventory should contain the name of the chemical substance, its risk classification, the quantities received, dispatched and held in stock, type of disposal and date of production, disposal and destruction. This inventory should be updated at least once a month.

When transporting chemical products, drivers should be in possession of the safety data sheet for the product carried, in case of emergencies en route.

## Transport, handling, packaging and storage

The transportation of hazardous chemical substances should also be subject to labelling practices pursuant to legal or technical requirements. Labelling on vehicles used to carry such goods should be clearly visible, as should any signs displayed, safety instructions and hazardous goods warning labels, in accordance with GHS standards and/or local legislation.

The transportation of chemical substances should comply with the applicable legal or technical requirements in each country and should be executed using the legal documentation required for this type of transport by the various governmental authorities concerned. It is important to obtain all necessary records from the local authorities pertaining to the carriage of hazardous substances, as well as all applicable safety procedures and technical guidelines.

The risk of contamination, possible reactions and their impacts should also be considered when handling hazardous substances. It is important to establish procedures for the safe handling of substances that pose a risk to health and the environment. Personnel working with these substances should use individual protective equipment (IPE) as specified in the corresponding MSDSs.

Handling areas should be fitted with drainage and/or containment systems for chemical substances in the event of leaks or spillage. These areas should also be provided with exhaust systems and collective protective equipment (CPE) if applicable.

The type of packaging used should be capable of protecting the chemical substance against spillage, collision and undesirable reactions during its transport, distribution, handling, storage and disposal.

Storage areas for chemical substances should be well ventilated covered and access to them should be controlled by fire-proof doors, featuring the appropriate signage to identify the risk posed by each class of substance in accordance with the GHS. These areas should be fitted with drainage channels and containment systems for cases of leakage, impermeable flooring, and a fire-fighting system and permit segregation of incompatible chemical products.

In order to facilitate identification of chemical substances in storage areas, storage packaging, containers and tanks should be labelled in accordance with local legislation and/or the GHS. The chemical compatibility of substances should be considered in relation when arranging containers for storage purposes, having assessed the technical or legal requirements intended to ensure their compatibility.

## Disposal

Procedures for the disposal of chemical substances should be developed in such a way as to minimise the impacts on health and the environment. A residue management plan must be produced that contains the generating source of each residue, risk classification, form of segregation, collection, temporary storage, internal and external transportation, final disposal, documentation and records, while also complying with all legal requirements.

In the case of Rio 2016<sup>TM</sup>, final disposal of hazardous chemical substances or contaminated materials without specific treatment is prohibited. Hazardous chemical substances must not be discharged untreated into the soil, water resources or atmosphere. Treatment options such as reuse, recycling, co-processing, re-refinement and incineration should be prioritised, in that order. Companies receiving chemical residues should be qualified to do so and hold the appropriate licences.



## Appendix 1: Definitions

The definitions of the principal terms used in this document appear below.

### ***Material Safety Data Sheet (MSDS)***

Data sheet containing all data relating to the properties of a given chemical substance. This sheet covers all the safety, health and environmental aspects relating to the transportation, handling, storage and disposal of chemical substances, is known internationally by its MSDS designation and fully complies with Brazilian National Standards Organisation (ABNT) standard NBR 14.725.

### ***Globally Harmonised System of Classification and Labelling of Chemicals (GHS)***

System intended to ensure the accessibility of information on the physical hazards and toxicity of chemical substances to safeguard health during handling, transportation and use. As such, the GHS classifies chemical substances and mixtures according to type of risk, while also providing a harmonised classification and labelling system, with the use of safety sheets and labels. The Brazilian Health Surveillance Agency (ANVISA) offers the GHS implementation guide produced by the Brazilian Chemical Industry Association (ABIQUIM) on its website:

[http://abiquim.org.br/pdfs/manual\\_ghs.pdf](http://abiquim.org.br/pdfs/manual_ghs.pdf)

### ***Stockholm Convention***

International treaty that establishes that chemical substances classified as Persistent Organic Pollutants (POPs) be subject to controlling measures during production, import and disposal. POPs are chemical substances which persist in the environment by means of bioaccumulation in the food chain and pose a risk to health and the environment. In Brazil, the text of the convention was approved by Legislative Decree 204/2004 and ratified by Legislative Decree 5.472/2005.

### ***Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade***

International treaty that determines the control of imports of chemical substances and the prior informed consent of the importing country pursuant to the agreement on international trade in hazardous chemicals. In Brazil, the text of the convention was approved by Legislative Decree 197/2004 and ratified by Legislative Decree 5.360/2005.

### ***Montreal Protocol***

International treaty intended to substitute emissions of Chlorofluorocarbons (CFCs), Halons, Carbon Tetra Chlorides (CTCs) and Hydrochlorofluorocarbons (HCFCs) that are harmful to the ozone layer. Brazil adhered to the protocol by means of Executive Decree 99.280/1990 and created the National Plan for the Elimination of CFCs in 2002, for the purpose of eliminating pollutant gases.

### ***Registration, Evaluation, Authorisation and Restriction of Chemical Substances (REACH)***

European regulation that ensures the commitment of the industry in relation to risks posed by chemical substances by provision of the appropriate safety information. As this regulation is internationally recognised for its promotion of good practices, Rio 2016™ has adopted it as a reference, though no similar regulation currently exists in Brazil.

### ***Restriction of the Use of Certain Hazardous Substances (RoHS)***

European Union directive that restricts the use of cadmium (Cd), mercury (Hg), hexavalent chromium (Cr(VI)), polybrominated biphenyls (PBBs), polybrominated diphenyl ether (PBDE) and lead (Pb) in the manufacture of products. As this regulation is also internationally recognised for its promotion of good practices, Rio 2016™ has adopted it as a reference, though no similar regulation currently exists in Brazil.

## Appendix 2: List of prohibited substances

#	Group	Substance	Application	Legal basis	Reason for Ban	Impacts	Substitutes
1	Organochlorines	Dichlorodiphenyltrichloroethane (DDT)	Pesticide with agricultural application in the control of insects, principally in the cultivation of cotton, apples, peanuts and soya  Vector control of malaria, typhoid and other diseases transmitted by insects  Control of forest pests  Sanitary agent to eradicate and control aphids	Stockholm Convention Rotterdam Convention Law 11.936/2009 Ministerial Decree 329/1985 - Ministry of Agriculture	Prohibits the use, manufacture, import, export, storage and sale, pursuant to Law 11.936/2009	<b>On human health:</b> can affect the central nervous system, leading to behavioural changes and sensory disturbances. Can affect balance, involuntary activity of the musculature and depression of vital centres, particularly respiration. Substance that causes tumours.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
		Aldrin	Pesticide with agricultural application in the control of insects, principally in the cultivation of cotton and corn	Stockholm Convention Rotterdam Convention Ministerial Decree 329/1985 - Ministry of Agriculture	Persistent organic product banned by the Stockholm Convention and listed by the Rotterdam Convention	<b>On human health:</b> can affect the central nervous system and cause hormonal disturbances. Carcinogenic substance.	Biological control, use of natural pesticides
		Dieldrin	Pesticide with agricultural application in the control of insects, principally in the cultivation of cotton and corn		Persistent organic product banned by the Stockholm Convention and listed by the Rotterdam Convention	<b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	
		Chlordane	Pesticide with a broad spectrum of agricultural applications, such as vegetables, cotton, corn, fruit, sugar cane and greens  Control of termites - applied directly to the soil	Stockholm Convention Rotterdam Convention	Persistent organic product banned by the Stockholm Convention and listed by the Rotterdam Convention	<b>On human health:</b> may cause neurological symptoms, such as convulsions, alterations to the electroencephalogram and liver toxicity. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
		Heptachlor	Biocide used in the treatment of soil for seeds, grains and sorghums  Insecticide  Wood preserver	Stockholm Convention Rotterdam Convention Ministerial Decree 329/1985 - Ministry of Agriculture	Persistent organic product banned by the Stockholm Convention and listed by the Rotterdam Convention	<b>On human health:</b> may cause endocrine and reproductive dysfunction. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides  Heat treatment is recommended for the preservation of wood

## Appendix 2: List of prohibited substances (continuation)

#	Group	Substance	Application	Legal basis	Reason for ban	Impacts	Substitutes
1	Organochlorines	Toxaphene	Pesticide with agricultural application in the control of insects, principally in the cultivation of cotton, cereals, grains and oil seeds  Control of ticks and mites in cattle	Stockholm Convention Rotterdam Convention Ministerial Decree 329/1985 - Ministry of Agriculture	Persistent organic product banned by the Stockholm Convention and listed by the Rotterdam Convention	<b>On human health:</b> May cause dysfunctions to the kidneys, liver, central nervous system and debilitation of the immune system. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
		Hexachlorobenzene	Pesticide with agricultural application in the control of fungi, principally in the protection of onion, sorghum and wheat seeds  Wood preserver  Industrial application as a solvent and additive in the manufacture of rubber, PVC and dyes	Stockholm Convention Rotterdam Convention	Persistent organic product banned by the Stockholm Convention and listed by the Rotterdam Convention	<b>On human health:</b> may affect the liver, kidneys and the endocrine, immune, reproductive and nervous systems. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides  Heat treatment is recommended for the preservation of wood
		Hexachlorocyclohexane (BHC)	Pesticide with agricultural application in the control of insects, principally in the cultivation of fruit and vegetables  Pharmaceutical application  Combat malaria and Chagas Disease	Stockholm Convention Rotterdam Convention Ministerial Decree 329/1985 - Ministry of Agriculture	Persistent organic product banned by the Stockholm Convention and listed by the Rotterdam Convention	<b>On human health:</b> may affect the central nervous system. May cause pulmonary irritations, heart problems, convulsions and alterations to sexual hormone levels. Possible human carcinogen.	Biological control, use of natural pesticides
		Lindane (BHC isomer)	Pesticide with agricultural and animal husbandry application in the control of ticks and lice, principally in beef cattle and the cultivation of cotton  Wood preserver	Stockholm Convention Rotterdam Convention Ministerial Decree 329/1985 - Ministry of Agriculture	Persistent organic product banned by the Stockholm Convention and listed by the Rotterdam Convention	<b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides  Heat treatment is recommended for the preservation of wood
		Polychlorinated biphenyls (PCBs)	Industrial use in transformers, capacitors, hydraulic fluid and plasticising resins  Pesticide extender used as a stabiliser in various formulations of special plastics and rubbers, particularly PVC and chlorinated rubber	Stockholm Convention Rotterdam Convention Inter-Ministerial Decree (Ministry of Industry and Commerce/Ministry of National Integration/Ministry of Mines and Energy) 0019 - dated 19/1/1981	Persistent organic product banned by the Stockholm Convention, listed by the Rotterdam Convention and prohibited in Brazil	<b>On human health:</b> may cause alterations in the liver, reproductive functions and painful scaling of the skin. Carcinogenic substance.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Use of high dielectric constant non-chlorine oils.  Askarel-free pesticide extender with natural citric products (Azadirachtin, Fipronil and Neutral Silica).

## Appendix 2: List of prohibited substances (continuation)

#	Group	Substance	Application	Legal basis	Reason for ban	Impacts	Substitutes
1	Organochlorines	Pentachlorophenol and its salts and esters	Wide spectrum biocide (insecticide, fungicide, bactericide, molluscicide).  Wood preserver  Disinfectant	Stockholm Convention Rotterdam Convention Conama 396/2008 Conama 357/2005	Persistent organic product banned by the Stockholm Convention, listed by the Rotterdam Convention and prohibited in Brazil	<b>On human health:</b> may damage the kidneys, liver, nervous system and haematological changes. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides  Heat treatment is recommended for the preservation of wood
2		Endosulfan	Pesticide for agricultural and animal husbandry applications to control ticks, aphids and insects in the cultivation of fruit and vegetables and in commercial livestock operations	Rotterdam Convention Ministerial Decree 329/1985 - Ministry of Agriculture	Persistent organic product banned by the Rotterdam Convention	<b>On human health:</b> may affect the central nervous system. May cause hormonal damage, affect the reproductive system and provoke both skin and eye irritations. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
		1.2 - Dichloroethane	Industrial application used as an intermediary for the synthesis of other chemical products, such as vinyl chloride, used to produce polyvinyl chloride (PVC) and other construction materials.  Extraction solvent used in the synthesis of other chlorine solvents  Additive in leaded petrol. Useful for the removal of lead.  Constituent of products intended to clean fabrics, remove grease from metal and break down oil, fat, wax, resin and rubber  Component of some cleaning, adhesive, paint, varnish and paint removal solutions  Broad spectrum pesticide	Rotterdam Convention Conama 420/2009 Ministerial Decree 2.914/2011 Conama 396/2008 Conama 357/2005	Persistent organic product banned by the Rotterdam Convention	<b>On human health:</b> may affect the central nervous system and cause damage to liver and kidneys. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	When using the substance as a pesticide, biological controls and the use of natural pesticides are recommended.  When the substance is used for industrial purposes, its application should be followed by acceptable practices relating to the recycling and/or reuse of the residues produced.

## Appendix 2: List of prohibited substances (continuation)

#	Group	Substance	Application	Legal basis	Reason for ban	Impacts	Substitutes
3	Auxins	2,4,5 - Trichlorophenoxyacetic acid and its ester salts	Powerful broad spectrum pesticide	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may cause renal insufficiency, increased heart rate and irritation to the eyes, skin and respiratory tract. Possible human carcinogen.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Biological control, use of natural pesticides
4	Ariloxialcanoic Acid and Pyridinecarboxylic Acid	Dinoterbe	Selective systemic action herbicide for weed control	1907/2006/CE	Being a carcinogenic and mutagenic substance, its use is prohibited under the terms of EU Directive 1.907/2006.	<p><b>On human health:</b> may pose a risk during pregnancy. May cause hyperthermia, cataracts and glaucoma. Carcinogenic substance.</p> <p><b>On the environment:</b> accumulates at trophic levels in the food chain, where it may cause the death of living organisms.</p>	Biological control, use of natural pesticides
5	Chloroacetanilides	Alachlor	Herbicide used to control perennial grass and broad-leaved weeds in corn fields and other agricultural applications	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may cause irritation to eyes and skin as well as potential damage to kidneys, liver, spleen, nasal lining and eyelids. Carcinogenic substance.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems</p>	Biological control, use of natural pesticides
6	Carbamates	Aldicarb	Pesticide used for livestock applications to control ticks, lice, insects and nematode worms, principally in beef and dairy cattle herds and the cultivation of cotton, soya and oil seeds	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may cause damage to the central nervous system, renal system, cardiac arrest and pulmonary paralysis. Possible human carcinogen.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Biological control, use of natural pesticides
7	Dinitrophenols	Binapacryl	Powerful broad spectrum pesticide	Rotterdam Convention Law 7.082/89	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may affect the metabolism, cause damage to the foetus, cataracts and glaucoma. Possible human carcinogen.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Biological control, use of natural pesticides



## Appendix 2: List of prohibited substances (continuation)

#	Group	Substance	Application	Legal basis	Reason for ban	Impacts	Substitutes
7	Dinitrophenols	Dinitro-ortho-cresol (DNOC) and its salts (such as ammonia, potassium and sodium salts)	Efficient herbicide used in agriculture to control weeds in the cultivation of grains, citrus fruit and hops  Has secondary effects as an insecticide, acaricide and fungicide	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<b>On human health:</b> may cause damage to the kidneys, liver, nervous system, respiratory system and cardiovascular system. Not classified for carcinogenic effects.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
		Dinoseb and its salts and esters	Efficient phenolic herbicide used in agriculture for selective weed control in the cultivation of soya, citrus fruit, walnuts and vegetables.  Selective insecticide used in the cultivation of grapes  Seed drying agent	Rotterdam Convention	Persistent organic product harmful to human health banned by the Rotterdam Convention	<b>On human health:</b> may cause increased heart rate, convulsions, liver and kidney problems and infertility. Not classified for carcinogenic effects.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
		1,2 - Dibromoethane (EDB)	Powerful broad spectrum pesticide	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<b>On human health:</b> may cause irritation to eyes, respiratory tract, skin as well as affecting the lungs, liver and kidneys if ingested. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems	Biological control, use of natural pesticides
8	Carboxamides	Captafol	Pesticide used for agricultural applications to control fungi in the cultivation of fruit and vegetables  Used as an additive for fungicidal products used to preserve wood	Rotterdam Convention Law 7.082/89	Persistent organic product banned by the Rotterdam Convention	<b>On human health:</b> may cause asthma, contact dermatitis and irritation to the skin, eyes and respiratory tract. Carcinogenic substance.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
9	Formamidines	Clordimeforme	Pesticide for agricultural and animal husbandry applications to control ticks, aphids and insects in the cultivation of fruit and vegetables and in commercial livestock operations Application in the pharmaceutical industry as an additive for non-injectable parasite control pharmaceuticals and therapeutic cosmetics	Rotterdam Convention Law 7.082/89 Federal Agro-toxics Law 8.802/1989	Persistent organic product banned by the Rotterdam Convention and prohibited under the terms of Federal Agro-toxics Law 8.802/1989	<b>On human health:</b> may affect the central nervous system and cause hemorrhagic cystitis. Carcinogenic substance.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides

## Appendix 2: List of prohibited substances (continuation)

#	Group	Substance	Application	Legal basis	Reason for ban	Impacts	Substitutes
9	Formamidines	Chlorobenzilate	Pesticide for agricultural and animal husbandry applications to control ticks, aphids and insects in the cultivation of fruit and vegetables and in commercial livestock operations	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may affect the central nervous system and cause irritation to the eyes, skin and fatty tissues if allowed to accumulate. Possible human carcinogen.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Biological control, use of natural pesticides
10	Ethers	Ethylene Oxide	<p>Broad spectrum pesticide primarily used in the control of bacteria, spores, fungi and non-fungal yeasts</p> <p>Sterilizer for medical / hospital materials and cutlery</p> <p>Production of ethylene glycol for the subsequent production of polyester polymers</p>	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may cause irritation to the respiratory tract, burn the eyes and skin, adversely affect the nervous system and cause cataracts. Possible human carcinogen.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	<p>When using the substance as a pesticide, biological controls and the use of natural pesticides are recommended.</p> <p>When the substance is used for industrial purposes, its application should be followed by acceptable practices relating to the recycling and/or reuse of the residues produced</p>
11	Not classified	Fluoroacetamide	Rat poison used to control urban vermin such as rats and other rodents of interest to the sanitary authorities	Rotterdam Convention Ministerial Decree 37/1974	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may affect the central nervous system. Carcinogenic substance.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Biological control, use of natural pesticides
12	Organophosphates	Monocrotophos	<p>Pesticide for agricultural and animal husbandry applications to control ticks, aphids, insects and weeds in the cultivation of fruit and vegetables and in commercial livestock operations</p> <p>Hormonal growth regulator in plants</p>	Rotterdam Convention RDC 215/2006 ANVISA	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may cause breathing difficulties, pulmonary oedema, irritation to the eyes, paralysis and tremors. Carcinogenic substance.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Biological control, use of natural pesticides



## Appendix 2: List of prohibited substances (continuation)

#	Group	Substance	Application	Legal basis	Reason for ban	Impacts	Substitutes
12	Organophosphates	Parathion	Pesticide for agricultural and animal husbandry applications to control ticks, aphids, insects and weeds in the cultivation of fruit and vegetables and in commercial livestock operations  Hormonal growth regulator in plants	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<b>On human health:</b> may affect the nervous system and cause headaches, convulsions, visual problems, vomiting, abdominal pain, loss of consciousness, tremors and pulmonary oedema. Carcinogenic substance.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
13	Chemical combinations	Powdered formulations containing: benomyl > 7%, carbofuran > 10%, thiram > 15%	Powerful pesticides used by the agriculture and livestock industry to control fungi (broad spectrum of applications) and ectoparasites.	Rotterdam Convention Law 7.082/89	Synthetic formulations. Persistent and extremely prejudicial to health and the environment. Banned by the Rotterdam Convention.	<b>On human health:</b> may adversely affect the central nervous system, reproductive system and liver function and trigger gastro-intestinal disturbances. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
		Phosphamidon (soluble liquid solutions that exceed 1.000 grams of the active ingredient per litre)	Pesticide for agricultural and animal husbandry applications to control ticks, aphids, insects and weeds in the cultivation of fruit and vegetables and in commercial livestock operations  Applied directly to the soil  Hormonal growth regulator in plants	Rotterdam Convention Law 7.082/89	Persistent organic product banned by the Rotterdam Convention	<b>On human health:</b> may irritate the eyes, affect the nervous system and cause respiratory discomfort and heart failure. Possible carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biological control, use of natural pesticides
14	Organometallic compounds	Tetraethyl Lead	Used as an octane booster in petrol	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention	<b>On human health:</b> may affect multiple organs and tissues, principally the brain, blood, liver, kidneys, testicles, sperm, immune system and lungs. Carcinogenic substance.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Use of ethyl alcohol in petrol additives
		Tetramethyl Lead	Industrial application, primarily in boilers  Shipboard paint	Rotterdam Convention	Persistent organic product banned by the Rotterdam Convention		

## Appendix 2: List of prohibited substances (continuation)

#	Group	Substance	Application	Legal basis	Reason for ban	Impacts	Substitutes
15	Asbestos	Asbestos	Industrial application in the production of materials, primarily those used in civil construction - fibre-cement roofing tiles; cladding for buildings; plasterboard and stucco; fireproof cladding; thermal and acoustic insulation; corrugated Eternit roofing sheets - as well as protective fireproof cladding; linings on automotive clutch and brake systems	Rotterdam Convention International Labour Organisation Law 9.055/1995 769/1976/EU 69/1997/EU 31/1999/EU	Synthetic formulations. Persistent and extremely harmful to health and the environment. Banned by the Rotterdam Convention.	<p><b>On human health:</b> may cause respiratory diseases such as asbestosis, a pulmonary disease caused by aspiration of amianthus (fine asbestos) powder. Carcinogenic substance.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Use of amianthus-free fibre-cement or other substitute materials, such as calcium silicate, carbon fibre, cellulose fibre, ceramic fibre, glass fibre, steel fibre, Wollastonite, Aramide, polyethylene, polypropylene, polytetrafluoroethylene
		Crystallite (white asbestos)					
16	Aromatic Amines	Benzidine and its salts	<p>Industrial application for the production of paint, dyes and pigments</p> <p>Hardening agent in the rubber industry</p> <p>Pharmaceutical application, primarily as an analytical indicator in diagnostic processes</p> <p>Reagent substance in chemical laboratories for the determination of metals, particularly heavy metals</p>	Rotterdam Convention 769/1976/EU	Persistent organic product banned by the Rotterdam Convention	<p><b>On human health:</b> may irritate eyes, skin and respiratory tract and affect the liver and kidneys. Carcinogenic substance.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	<p>Substitutes necessary in industrial applications for the manufacture of paint, dyes and pigments</p> <p>Use low-toxicity dyes and pigments</p>
17	Fluorocarbons	Chlorofluorocarbons (CFCs) CFCl <sub>3</sub> (CFC-11) CF <sub>2</sub> Cl <sub>2</sub> (CFC-12) C <sub>2</sub> F <sub>3</sub> Cl <sub>3</sub> (CFC-113) C <sub>2</sub> F <sub>4</sub> Cl <sub>2</sub> (CFC-114) C <sub>2</sub> F <sub>5</sub> Cl (CFC-115)	Industrial use for refrigeration (refrigeration gases).	1989 Montreal Protocol Ibama Decree # 29 - dated 4/5/1995	Substance whose use is forbidden due to the risk it poses to the ozone layer	<p><b>On human health:</b> may cause an increase in infectious diseases due to heat waves. Carcinogenic substance.</p> <p><b>On the environment:</b> causes global warming and climate change. Produces changes in rainfall patterns, higher sea levels and heat waves. These effects have a negative impact on eco-systems, health, agriculture and water resources.</p>	Use of refrigeration systems in the following order: systems using CO <sub>2</sub> , ammonia and isobutane
		C <sub>2</sub> H <sub>3</sub> Cl <sub>3</sub> - 1,1,1-trichloroethane	Industrial application for the production of organic solvents, fire extinguishers and foam, insulation (extruded polystyrene).				
		Hydrochlorofluorocarbons (HCFCs)	Aerosol sprays				

## Appendix 3: List of restricted use substances

#	Group	Substance	Application	Restriction on use	Impacts	Substitutes
1	Azo-compounds (dyes)	Azoic dyes	Industrial application for the production of paint, dyes and pigments, primarily for textiles and tanned leather goods	The use in textiles and tanned leather goods should not release aromatic amines at concentrations greater than 30ppm (mg/l), pursuant to EU Directive 1.907/2006	<p><b>On human health:</b> may irritate skin and respiratory tract. Carcinogenic substance.</p> <p><b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms. Highly soluble in water and difficult to remove when treating effluent.</p>	Use low-toxicity dyes. Use natural dyes such as acridine, azine and oxazine.
2	Carbamates	Carbaryl	<p>Pesticide with agricultural applications for the control of insects and aphids across a wide spectrum of produce (fruit, legumes, oil-producing seeds and tubers).</p> <p>Wood and seed preserver</p>	Maximum acceptable daily ingestion is 0.003 mg/kg, pursuant to the Anvisa Technical Regulation	<p><b>On human health:</b> may affect the central nervous system and intestinal system, as well as causing burns following direct contact with the eyes or skin. Possible human carcinogen.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Biodegradable (natural) pesticides
3	Formamidines	Amitraz	Pesticide for agricultural and animal husbandry applications to control ticks, aphids, insects and weeds in the cultivation of fruit and legumes and in commercial livestock operations	The use of this substance is banned, pursuant to Federal Agro-toxics Law 7.802/1989	<p><b>On human health:</b> may adversely affect the central nervous system and digestive system, as well as irritating the skin and mucous membranes. Possible human carcinogen.</p> <p><b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.</p>	Biodegradable (natural) pesticides
4	Ethers	<div> <div>Polybrominated Biphenyl Ethers (PBB) including Hexabrominated Biphenyl Ether (HBB)</div> <div> Polybrominated Biphenyl Ethers (PBDE)  Tetra BDE  Penta BDE  Penta BDE (commercial mixtures)  Polybrominated Diphenyl Ether (PBDE)  Hexa BDE  Hepta BDE  Octa BDE  Nona BDE  Deca BDE  Octa BDE (commercial mixtures) </div> </div>	<p>Flame retardant (primarily in plastics)</p> <p>Additive in plastics and resins; flame retardant in paints and varnishes</p>	Use in electrical and electronic equipment should not exceed 0.1%, pursuant to EU Directive 60/2006	<p><b>On human health:</b> may adversely affect the liver and kidneys. May cause cardiovascular disease and infertility. Carcinogenic substance.</p> <p><b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.</p>	Non-brominated substances in flame retardants

### Appendix 3: List of restricted use substances (continuation)

#	Group	Substance	Application	Restriction on use	Impacts	Substitutes
5	Halogenated aliphatic compounds	Methyl Bromide	Powerful pesticide used in agriculture to control aphids, fungi, insects, nematode vermin and rodents in the cultivation of fruit, vegetables, grains and cereals.  Herbicide applied to the soil to control weeds  Wood and seed preserver	The use of this substance on tobacco, seed beds, flowers and plants is prohibited. For phytosanitary and quarantine treatment purposes the elimination deadline is 2015, pursuant to Normative Instruction # 1- 10 September 2002.	<b>On human health:</b> may affect the central nervous system, causing pulmonary oedema, circulatory failure, nervous disturbances and convulsions. Not classified for carcinogenic effects.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Heat treatment
6	Organophosphates	Methyl-Azinphos	Pesticide for agricultural and animal husbandry applications to control ticks, aphids, insects and weeds in the cultivation of fruit and legumes and in commercial livestock operations	Use restricted to a maximum 0.12 kilos of the active substance per hectare and per application, pursuant to EU Directive 414/1991	<b>On human health:</b> may affect the central nervous system and respiratory system as well as producing allergic, cutaneous and respiratory reactions. Carcinogenic substance).  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biodegradable (natural) pesticides
7	Organ sulphates	Perfluorooctanesulphonic acid (PFOS) PFOS potassium salt PFOS ammonium salt PFOS lithium salt PFOS diethanolamine salt Perfluorooctane sulphonyl fluoride (PFOSF)	Pesticide used in textile and leather products, fire fighting foam, metal sheeting and additives for metal plating and linings	Use in partially-finished products or parts of articles must not exceed 0.1% by weight, pursuant to ECOF/122/2006	<b>On human health:</b> may affect thyroid hormones and hepatic system as well as causing stomach upsets and irritation to the eyes and skin. Possible human carcinogen.  <b>On the environment:</b> accumulates in living organisms. Propagates through the air, water and migratory species. Accumulates in terrestrial and aquatic ecosystems.	Biodegradable (natural) pesticides
8	Metals	Mercury and its compounds	Industrial application in instrumentation (automation), electronic equipment and fluorescent bulbs  Wood preserver (anti-fouling agent)	Its use as a component in preparations intended for the following purposes is prohibited: to prevent organisms, plants or animals from gaining a foothold on items or equipment used in fish or shellfish farming pursuits; for the preservation of wood; for the impregnation of heavy industrial textiles and the thread used in their manufacture; for the treatment of industrial water (independent of the use to which it is put), pursuant to EU Directive 1.907/2006  Its use in batteries containing more than 0.0005% by weight of mercury, including cases where those batteries are incorporated in items of equipment, is strictly prohibited, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may have an adverse effect on the central nervous system and cause irritation to the skin, eyes and respiratory tract. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Electric thermometers  Alkaline magnesium batteries  Lithium batteries

### Appendix 3: List of restricted use substances (continuation)

#	Group	Substance	Application	Restriction on use	Impacts	Substitutes
8	Metals	Nickel	Industrial application in a variety of cheap electronic instruments and batteries.  Protection of metallic pieces (oxidation resistance), special steels (stainless).	Use in decorative items that come into contact with pierced parts of the body should not exceed a rate of 0.2µg/cm <sup>2</sup> /week (migration limit).  Use in articles that come into direct and prolonged contact with the skin. The nickel release rate of said articles should not exceed 0.5µg/cm <sup>2</sup> /week over a minimum period of two years, pursuant to EU Directive 1.907/2006/UE	<b>On human health:</b> direct, prolonged contact with the skin may cause allergies and irritation. May accumulate in the kidneys, liver and lungs. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Adopt the use of other hypoallergenic metals for decorative items
		Cadmium and its composites	Batteries, electrical and electronic equipment  Anti-corrosive linings on metallic structures	Use in electrical zinc-manganese and alkaline-manganese batteries should not exceed 0.002% by weight of cadmium, pursuant to Conama Resolution 401/2008	<b>On human health:</b> may cause alterations to central nervous system and respiratory system. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Adopt the use of alkaline batteries with 0% cadmium content
		Lead	Batteries, electrical and electronic equipment  Petrol additive used as octane booster  Industrial application, principally in boilers  Shipboard paint	The use of lead carbonate and lead sulphate is not permitted in components used in the preparation of paint, except in the restoration of historical constructions, pursuant to EU Directive 1.907/2006  Use in electrical zinc-manganese and alkaline-manganese batteries should not exceed 0.1% by weight of cadmium, pursuant to Conama Resolution 401/2008	<b>On human health:</b> may cause alterations to the central nervous system, hypertension and a reduction in fertility. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Use lead-free alternatives such as lithium batteries  Use ethyl alcohol as an additive for petrol
		Arsenic and its compounds	Electronic equipment  Insecticide  Wood and leather preserver	Use as a component in preparations intended for any of the following is not permitted: to hinder the proliferation of microorganisms, plants or animals on devices or equipment used in fish or shellfish farming; to be applied to the hulls of vessels; to be applied to any submerged or partially submerged device or equipment; to preserve wood or be used in the treatment of industrial water (independent of use), pursuant to EU Directive 1.907/2006/UE	<b>On human health:</b> may cause cerebrovascular disease, diabetes, kidney disease and blemishes on the skin. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Use copper-based anti-fouling and self-cleaning paint for marine applications
		Beryllium and its compounds	Electronic equipment  Metallic alloys  Nuclear reactors	The use of beryllium compounds in fluorescent lighting is not permitted	<b>On human health:</b> prolonged inhalation may cause berylliosis (lung disorder). Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Use LED lighting in keeping with Rio 2016™ energy efficiency policy



### Appendix 3: List of restricted use substances (continuation)

#	Group	Substance	Application	Restriction on use	Impacts	Substitutes
8	Metals	Hexavalent Chromium	Pigment in paints Plastics Tanning leather Metallurgy, stainless steel, protection of metallic pieces (oxidation resistance). Preservation of wood	Use in electrical and electronic equipment is prohibited, pursuant to EU Directive 95/2002  Use as an anti-corrosive in refrigeration systems is permitted	<b>On human health:</b> may cause renal and hepatic lesions, rhinitis and chronic sinusitis, atrophy of the nasal mucous membranes and alterations to the skin. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	In all cases involving application of the substance, the most common recommendation is to alter the industrial processes and introduce replacement technologies
9	Polybrominated diphenyl ethers	Hexabromocyclododecane Alpha-hexabromocyclododecane Beta-hexabromocyclododecane Gamma-hexabromocyclododecane	Flame retardants in textiles, plastics, foam and expanded polystyrene (Styrofoam)	Use and placement on the market as a component in preparations is not permitted at concentrations greater than 0.1% by mass, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may cause hormonal disturbances. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Alterations in the design of equipment to reduce the use of flame retardant  Use of safe flame retardants, such as hydrated silica
10	Alkanes	Chlorinated paraffin	Lubricating cutting oil Plasticiser, plastics, paints, sealants and rubber	Use and placement on the market as a component in preparations at concentrations greater than 1% in metal working or leather fatliquoring applications is not permitted, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may cause irritation to the respiratory system and burns, irritations and dermatitis when coming into contact with the skin. Carcinogenic substance.  <b>On the environment:</b> substance capable of accumulating at trophic levels in the food chain. Unlikely to have any toxic effect upon the environment or ecosystem.	Use of natural additives for metal working and leather fatliquoring
		Isobutane	Industrial refrigeration	Permitted for use in refrigeration when use of other refrigeration systems is technically unviable	<b>On human health:</b> may irritate the skin; act as an asphyxiant and cause loss of consciousness. Possible human carcinogen.  <b>On the environment:</b> risk of explosion and combustion in refrigeration systems.	Use of refrigeration systems prioritised in the following order: systems using CO <sub>2</sub> , systems using ammonia, systems using isobutane
11	Esters of phthalic acids (phthalates)	Dibutyl Phthalate (DBP) Diethylhexylphthalate (DEHP) Butylbenzalphthalate (BBP) Diisodecyl Phthalate (DIDP) Diisononyl Phthalate (DINP) Di-n-octyl Phthalate (DNOP)	Plasticiser in PVC Adhesives Use in industry in the manufacture of paint Industrial application, used as an additive in the manufacture of plastics, adhesives, sealants and paint	Use and placement on the market as a component in preparations at concentrations greater than 0.1% by mass in plastic material used in toys and childcare products is not permitted, pursuant to EU Directive 1.907/2006  Use and placement on the market as a component in preparations at concentrations greater than 0.1% by mass in plastic material used in toys and childcare products that children may place in their mouths is not permitted, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may cause abnormalities in the reproductive system. Potentially carcinogenic substance.  <b>On the environment:</b> contamination sources are atmospheric emissions and both liquid and solid effluent from industrial plants which are harmful to the environment and living organisms.	Low toxicity plastics such as GTE and ASE

### Appendix 3: List of restricted use substances (continuation)

#	Group	Substance	Application	Restriction on use	Impacts	Substitutes
12	Esters	Dimethyl fumarate (DMF)	Pesticide with agricultural application in the control of fungi, principally used to protect onion, soya and wheat seeds  Drying and preserving agent for wood and seeds	Use in products should not exceed 0.1 mgs of dimethyl fumarate/kilo of product, pursuant to EU Directive 251/2209	<b>On human health:</b> may cause allergic complications and breathing difficulties. Possible human carcinogen.  <b>On the environment:</b> N/A	Product design should be altered or techniques should be adopted that use ozone or other low-toxicity options  Silica gel is the best replacement for drying agent applications
13	Ariloxialcanoic Acid and Pyridine Carboxylic Acid	Acrylonitrile	Industrial application as additive in paint  Used in the manufacture of resins such as acrylonitrile-butadiene-styrene, plastics, acrylic fibres and nitrile rubber	Use not permitted when mixed with cadmium to colour finished products, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may cause allergic reactions to the skin, genetic defects, damage to the organs and central nervous system. Carcinogenic substance.  <b>On the environment:</b> potentially toxic to aquatic organisms following contamination to bodies of water.	Use of low-toxicity paints not containing the cadmium-acrylonitrile mix
14	Organostannics	Tributyltin Oxide and compounds	Industrial application as stabiliser in anti-foul paint	Use and placement on the market as a component in preparations acting as biocides for any of the following purposes is not permitted: to hinder the proliferation of microorganisms, plants or animals on devices or equipment used in fish or shellfish farming; to be applied to any submerged or partially submerged device or equipment; to treat industrial water, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may cause irritation to eyes and skin and harmful if inhaled or ingested. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Use of paints containing low-toxicity arsenics
15	Phenols	Alkylphenol Ethoxylates (especially octylphenol and nonylphenol - APEs)	Industrial application, used as an additive in the manufacture of plastics, adhesives and a variety of cleaning products	The use and placement on the market as components in preparations is not permitted at concentrations exceeding 0.1% by mass for the following applications: industrial cleaning, domestic cleaning, leather and textile treatment, emulsifier in agricultural immersion products, manufacture of paste and paper, cosmetics products and ingredients in pesticides and biocides, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may cause alterations to the endocrine system, including effects on both male and female reproductive systems and an increased risk of cancer.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Use of low-toxicity cleaning products (substituted by alcoholic ethoxylates)
		Bisphenol A (BPA)	Industrial application in the production of polycarbonates, epoxy resin and flame retardants	Use prohibited for the manufacture of plastic bottles, babies milk bottles, drinking cups for infants and a variety of plastic products, pursuant to Anvisa Resolution 41/2011. Its use should be avoided in any utensil coming into contact with food.		Use of glass and polypropylene babies milk bottles

### Appendix 3: List of restricted use substances (continuation)

#	Group	Substance	Application	Restriction on use	Impacts	Substitutes
16	Volatile Organic Compounds (VOCs) and solvents	Benzene	Industrial solvent for paint, glue and varnish  Raw material for the production of nylon and Styrofoam	Use in toys or components of toys placed on the market at concentrations equal to, or exceeding 0.1% by mass is not permitted, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may cause damage to bone marrow, lead to anaemia and damage the immune system. Carcinogenic substance.  <b>On the environment:</b> potentially toxic to aquatic organisms following contamination to bodies of water. Burning this substance can produce carbon monoxide, carbon dioxide and vapour from the unburnt product and particulate material, as well as other hazardous substances.	Use organic solvents not obtained from hydrocarbons, such as alcohols and ketones
		1,1 Dychloroethylene (vinyl chloride)	Industrial application used in the production of resins, adhesives, refrigerants, synthetic fibres  Application in the pharmaceutical industry in the production of cosmetics, primarily for collagen replacement purposes	Use in cosmetics prohibited, pursuant to EU Directive 1.976/768	<b>On human health:</b> may affect the central nervous system, kidneys and liver. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Use low-toxicity products and natural additives in cosmetics  Use low-toxicity paint removers, such as silicone
		Toluene	Industrial solvent for the production of rubber, paint, linings and oils  Production of commonly used polymers, such as nylon, plastics and bottles	The use and placement on the market as components in preparations is not permitted at concentrations equal to, or exceeding 0.1% by mass in adhesive products and spray paint, pursuant to EU Directive 1.907/2006	<b>On human health:</b> may cause headache, nausea and affect muscular coordination. Not classified for carcinogenic effects.  <b>On the environment:</b> potentially toxic to aquatic organisms following contamination to bodies of water. Can degrade the quality of the water table if allowed to percolate through the soil.	Use toluene-free materials as acetate solvents or other low-toxicity solvents
		Methylene Chloride	Solvent used in the production of special varnishes and lacquer  Aerosol and plastic foam propulsion agent	Use in cosmetics prohibited, pursuant to EU Directive 1.976/768  Use as paint remover prohibited	<b>On human health:</b> may affect the central nervous system and nullify the blood's ability to transport oxygen. Carcinogenic substance.  <b>On the environment:</b> miscible in water. May contaminate bodies of water.	Use low-toxicity substances and natural additives in cosmetics  Use low-toxicity paint removers, such as acetate solvents
		Formaldehyde	Industrial application for the production of resins  Industrial pharmaceutical application for the production of cosmetics  Agglutinant resin used in industrialised wood production (MDF, MDP, OSB etc.)	Use in tablet form in medical-hospital disinfection and sterilisation applications is prohibited, pursuant to Anvisa Resolution 37/2008	<b>On human health:</b> may cause irritation to tissues. Carcinogenic substance.  <b>On the environment:</b> biodegradable. Does not accumulate in the food chain.	Use in heat treatment hospital disinfection applications. Use low-toxicity solvents



### Appendix 3: List of restricted use substances (continuation)

#	Group	Substance	Application	Restriction on use	Impacts	Substitutes
16	Volatile Organic Compounds (VOCs) and solvents	Perchloroethylene	Industrial application for the production of cleaning agents  Degreasing solvent	Persistent organic compound banned by the Stockholm Convention  The installation of new washing machines in laundries without gas absorption systems is prohibited, pursuant to Anvisa Resolution 161/2004	<b>On human health:</b> may produce anaesthetic effects. Carcinogenic substance.  <b>On the environment:</b> accumulates at trophic levels in the food chain and may cause death to living organisms.	Use non-chlorinated substances, such as CO <sub>2</sub> , Wet Cleaning, liquid silicone and benzene-free hydrocarbon
17	Antibacterials	Triclosan	Application in the pharmaceutical industry in the manufacture of a variety of medications and personal hygiene products	Use in personal hygiene products, cosmetics and perfumes should not exceed 0.3%, pursuant to Anvisa Resolution 162/2011	<b>On human health:</b> may cause alterations to the endocrine system as well as irritating the eyes and skin. Possible human carcinogen.  <b>On the environment:</b> difficult to remove when treating effluent. May be favourable to the development of super-resistant bacteria.	Replace with ethylhexylglycerine with anti-microbial properties
18	Plastics	Acrylonitrile butadiene styrene (ABS)	Manufacture of moulded products for a variety of uses (high-pressure transport of fluids), such as air-conditioning, electric blowers, etc.	Use is permitted when the substance cannot be reused	<b>On human health:</b> N/A  <b>On the environment:</b> substances resistant to degradation and slow to decompose. Incorrect disposition of these substances can be harmful to the environment and living organisms	Use biopolymers as substitutes or compostable biodegradable polymers
		Epoxy resin (with the exception of Bisphenol A which is included in Phenols group)	Production of packaging, electronic components, paint and construction materials			
		Polycarbonate (with the exception of Bisphenol A which is included in Phenols group)	Industrial application used in the production of materials, principally those used in civil construction - fibre-cement roofing, building lining material, plasterboard and stucco, fireproof lining, automotive brake and clutch linings	Use only permitted when substance can be reused  Use of substance where it may come into contact with foodstuffs and beverages is prohibited	<b>On human health:</b> N/A  <b>On the environment:</b> substances resistant to degradation and slow to decompose. Incorrect disposition of these substances can be harmful to the environment and living organisms	Use biopolymers as substitutes or compostable biodegradable polymers
		Polystyrene, including expanded polystyrene (Styrofoam)	Use only permitted when substance can be reused			
		Polyvinyl Chloride (PVC)	Manufacture of products used in civil construction – tarpaulins, pipes, linings, window and door frames, among others – as well as toys, medical/hospital accessories and packaging	Use is only permitted provided the material can be recycled at the end of its working life and its social and environmental impact throughout the product’s useful working life has been assessed, including its potential to adversely affect public health and the environment	<b>On human health:</b> non-recycled content may contain mercury, cadmium and lead stabilisers. The adverse effects attributable to these substances have been listed in their respective sections  <b>On the environment:</b> production of the substance results in fugitive emissions during manufacture which release substances that are harmful to the environment, as well as plasticising phthalates. The adverse effects attributable to these substances have been listed in their respective sections.  Substance resistant to degradation and slow to decompose.	Use phthalate-free plastics  Substitute to be assessed by sponsors (Dow)

### Appendix 3: List of restricted use substances (continuation)

#	Group	Substance	Application	Restriction on use	Impacts	Substitutes
19	Fluorocarbons	Perfluoride Carbons (PFCs) Perfluoromethane, Perfluoroethane, Perfluoropropane, Perfluorobutane, Perfluorocyclobutane and Perfluoropentane	Production of fluoride polymers, food wrapper linings and components of fire fighting foam  Polymerisation surfactant in the emulsion of fluoropolymers  Used as a preservative in leather and textile products  Used as an additive in linings	The use and placement on the market of products and equipment containing this substance, or whose function is dependent upon it is prohibited, pursuant to EU Directive 842/2006	<p><b>On human health:</b> increase in infectious disease due to heat waves.</p> <p><b>On the environment:</b> substances cause global warming and climate change. Produces changes in rainfall patterns, higher sea levels and heat waves. These effects have a negative impact on eco-systems, health, agriculture and water resources.</p>	Use of refrigeration systems in the following order: systems using CO <sub>2</sub> , ammonia and isobutane
		Sulphur Hexafluoride (SF <sub>6</sub> )	Production of fluoride polymers  Insulation in high-voltage equipment (sub-stations)			
		Hydrofluorocarbons (HFCs)	Industrial use for refrigeration purposes (refrigeration gases)  Industrial application for the manufacture of organic solvents, fire extinguishing solutions and foam, insulation (extruded polystyrene)  Aerosol packs (sprays)	The use and placement on the market of products and equipment containing this substance, or whose function is dependent upon it is prohibited, pursuant to EU Directive 842/2006	<p><b>On human health:</b> increase in infectious disease due to heat waves.</p> <p><b>On the environment:</b> substances cause global warming and climate change. Produces changes in rainfall patterns, higher sea levels and heat waves. These effects have a negative impact on eco-systems, health, agriculture and water resources.</p>	Use of refrigeration systems in the following order: systems using CO <sub>2</sub> , ammonia and isobutane

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