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**Information On Enforcement**

Compendium of analytical methods Recommended by the Forum to check compliance with Reach annex xvii restrictions

March 2016

Version 1.0

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**Validity**

The present document is intended as a dynamic document. It will be revised at regular intervals to reflect changing technical standards, new available methods as well modifications of existing ones. The revisions will be published on ECHA website.

ECHA Forum invites interested parties to submit additional information to be incorporated in future updates of this document. These can be submitted via forum@echa.europa.eu.

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**Compendium of analytical methods recommended by the forum to check compliance with Reach annex xvii restrictions**

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Preface

The ECHA Forum aims at contributing to harmonised enforcement of Regulation (EC) No 1907/2006 – REACH, throughout the EU. Working in this framework the ECHA Forum decided to create a living database containing analytical methods that it recommends to check compliance with Annex XVII restrictions under REACH.

The purpose of this document is to provide a ready reference of some available analytical methods that authorities or industry may use in order to assess the compliance of chemicals manufactured, used or placed on the European market to the restrictions set forth in Annex XVII to REACH.

These methods for the analysis of chemicals are a collection of methods in use in the official laboratories supporting the Member States enforcement systems and in other laboratories linked to some stakeholders organisations consulted for this purpose.

A data gathering survey amongst the cited parties was followed by an assessment conducted by expert members of the ECHA Forum Working Group on enforceability of restrictions. The methods have been scrutinised against performance requirements agreed by the Forum1 and taking into consideration the available information on sample preparation and analysis protocols and techniques. The methods judged suitable for checking compliance with restrictions are listed in this Compendium of analytical methods recommended by the ECHA Forum for checking compliance with REACH Annex XVII restrictions, hereinafter referred to as “Compendium”.

The Compendium encompasses:

* Official methods (with references published in REACH legal text);
* Standard methods (published by International, European or National standardisation bodies);
* Methods published by a recognised technical organisation, a national or EU reference laboratory (EPA, etc.);
* Internal methods developed by the respondent laboratories.

The methods included in the Compendium are recommended by the ECHA Forum to be used in the verification of compliance with the restrictions in order to ensure the quality and comparability of the analytical results.

The Compendium of analytical methods recommended by the ECHA Forum for the enforcement of REACH restrictions is a tool offered by the Forum that all can use voluntarily thus evolving towards further harmonisation in the EU. Enforcement authorities, industry and public can benefit from such information.

1 Forum methodology for recommending analytical methods for enforcement of REACH Annex XVII restrictions, a summary is published at the Forum website [echa.europa.eu/web/guest/about-us/who-we-are/enforcement-forum](http://echa.europa.eu/web/guest/about-us/who-we-are/enforcement-forum)

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# Introduction to the Compendium

Article 67(1) of the REACH Regulation restricts the manufacture, placing on the market and use of certain hazardous substances, mixtures and articles. The dutyholders whose activities are subject to REACH restrictions should at all times be capable to check accurately and reliably if they comply with these obligations, for preventing negative impact of their activities on public health, on worker protection, on the environment, as well as on the free circulation of chemicals on the internal market.

National enforcement authorities (NEAs) assess activities of the above natural and legal persons in the EU being their primary goal to detect violations of the communal acquis, for example, the restrictions enumerated in Annex XVII to REACH.

In this context, the common need of all the parties is to determine accurately and reliably whether or not there is compliance with REACH restrictions.

In addition, aiming at a level playing field in the EU, it is desirable that natural and legal persons are subject to a harmonised surveillance approach wherever in the EU territory. Few entries in Annex XVII to REACH specify which analytical method must be applied for checking the requirement set out in the restriction. That is why EU Member States have adopted over the past decennia analytical methods to be used by their NEAs, for those restrictions where no official analytical method is specified in the legal text.

Some restrictions do not contain a limit value that needs to be checked, the so-called no-limit-value restrictions (NLV) and a case-by-case analysis is appropriate in those cases. To date, according to the experts of the Forum WG on the enforceability of restrictions, it remains unclear which analytical method should be applied for checking compliance with a NLV-restriction. As a consequence, those restrictions are currently covered in this compendium with certain limitations.

In 2009, the European Commission invited the ECHA Forum members to communicate which analytical methods for checking compliance with REACH Annex XVII restrictions were accepted in their country. A compilation of the replies received constituted a first database of methods. This first inventory indicated that the number and variety of analytical methods used in different Member States were huge and in most of the cases a method accepted in one Member State was not automatically accepted by another Member State, thus the harmonised enforcement of REACH Annex XVII restrictions could be jeopardized. In June 2010, the Forum concluded on the need to produce a compendium for suitable analytical methods recommended to be used for the enforcement of restrictions.

# Rationale and methodology

With the view of producing guidance for suitable analytical methods for the enforcement of restrictions, as preliminary criteria for recommending methods, the Forum agreed the recommended methods should preferable be standardised ones. If such methods are not available, other methods can be used.

The ECHA Forum has mandated a team of experts working under the supervision of the ECHA Forum (Forum WG Group on Enforceability of Restrictions) to first conceive a methodology for recommending analytical methods for enforcing REACH restrictions.

The Forum methodology to recommend analytical methods for checking the compliance with REACH restrictions consisted first in the definition of a set of functional qualities (characteristics) of an analytical method. General principles applied in widely accepted international standards have been considered and a set of key performance characteristics have been identified for the purpose of assessing the suitability of an analytical method to check compliance with restrictions.

The characteristics identified are: applicability, limit of detection, recovery, reproducibility and measurement uncertainty. For each of the selected characteristics, the Forum agreed upon generally acceptable performance requirements for analytical methods to be recommended. Widely accepted criteria have been applied to define the requirements for the considered characteristics of an analytical method to be suitable for checking compliance with REACH Annex XVII restrictions.

Due to the broad ranges of products covered by REACH Annex XVII, and to the different limit values (including a total ban for certain substances) set forth in different REACH Annex XVII entries a case-by- case approach is applied where appropriate. The Forum also addressed the issue of NLV restrictions and adopted, as short term solution for assessing methods for NLV restrictions, to include in the Compendium the methods for which the applicability criteria are met and which show low limit of detection (LOD). Official methods (published in REACH legal text) are also included in the Compendium. Finally, while recognizing that for enforcement purpose a qualitative method cannot be conclusive and a confirmatory analysis is needed, the Forum decided to include in the Compendium qualitative analytical methods or techniques, with relevant LOD value accompanied by a note to make explicit reference to the qualitative method.

The adopted Forum methodology was then implemented by the same experts to elaborate the Compendium of analytical methods recommended by the Forum for the enforcement of REACH Annex XVII restrictions.

A data gathering survey was conducted among EU Member States and ECHA Accredited Stakeholders and, on the basis of the methodology, the reported analytical methods have been scrutinised by the Working Group with the aim of selecting objectively methods fit for the purpose. As foreseen by the adopted methodology, in few cases an expert judgment was applied and the selected methods have been considered suitable for the purpose of detecting the restricted substance, notwithstanding they slightly deviate from the performance requirements agreed upon by the ECHA Forum.

# How to consult the Compendium

TThe Compendium table in Chapter 4 of this document is divided in as many sections as there are entries in REACH Annex XVII.

Each table section contains:

* + The entry number followed by the substance or group of substances (analytes) under the scope of the restriction;
	+ The sub-entry number followed by the substance or group of substances (analytes) and the matrix or products under the scope of the restriction;
	+ The substance (analyte) under the scope of the reported method;
	+ The matrix or product under the scope of the reported method;

7 Compendium of Analytical Methods

* The analytical method reported in the same format as referenced by regulations, standardization bodies or recognized technical organisations. Please note that for laboratory developed method the term “internal method” is used;
* The source for internal methods;
* The analytical technique or techniques;
* The sample preparation, if available;
* A note reporting the type of method. The methods “A” are fully adherent with the performance requirements agreed upon by the ECHA Forum; the methods “B” slightly deviate from the performance requirements agreed upon by the ECHA Forum; the methods “C” are official methods included in REACH legal text; the methods “D” are qualitative methods followed by the available LOD.

**Note for qualitative methods**

Qualitative methods are analytical methods which allow to identify the presence of a substance on the basis of its chemical, biological or physical properties. These methods do not enable a conclusive judgement for enforcement purpose and entail a confirmatory analysis.

For some entries, the Compendium contains qualitative analytical methods (or techniques, when this is the only available information) accompanied with available LOD values. Those methods are marked as “D” in the column “note”.

In general, according to the Forum methodology it is not possible to conclude on the recommendability of the qualitative methods. A qualitative method could be used to screen potential non-compliant goods but a positive result cannot be conclusive for enforcement purpose and a confirmatory analysis is deemed necessary.

For a better consultation of the Compendium table please refer also to Appendix 1 to this document, which contains the list of abbreviation and relevant definitions of terms used in the document.

Compendium of Analytical Methods 8

# Compendium of analytical methods recommended by the Forum to check compliance with REACH Annex XVII Restrictions

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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **1. Polychlorinated terphenyls (PCTs)** |
|  | 1.substances/mixtures including waste oils, equipment |
|  |  | PCT | non-aqueous liquids | Internal method | DIN EN 12766 | GC-ECD | SPE | B |
| **2. Chloroethene (vinyl chloride) CAS No 75-01-4 ; EC No 200-831-0** |
|  | 2.Propellant in aerosols |
|  |  | vinyl chloride | gas | Internal method | DIN EN ISO 6401 | GC-FID or GC- MS | no | A |
| **3. Liquid substances or mixtures which are regarded as dangerous in accordance with Directive 1999/45/EC or are fulfilling the criteria for any of the following hazard classes or categories set out in Annex I to Regulation (EC) No 1272/2008: (a) hazard classes 2.1 to 2.4, 2.6 and 2.7, 2.8 types A and B, 2.9, 2.10, 2.12, 2.13 categories 1 and 2, 2.14 categories 1 and 2, 2.15 types A to F; (b) hazard classes 3.1 to 3.6, 3.7 adverse effects on sexual function and fertility or on development, 3.8 effects other than narcotic effects, 3.9 and 3.10; (c) hazard class 4.1; (d) hazard class 5.1.** |
|  | 3.3. liquid substances or mixtures |
|  |  | liquid substance and mixtures | non-aqueous liquids | DIN 51562Viscometry - Measurement of kinematic viscosity by means of the Ubbelohde viscometer |  | viscometry | without | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **4. Tris (2,3 dibromopropyl) phosphate CAS No 126-72-7** |
|  | 4.1. Textile articles |
|  |  | Tris (2,3 dibromopropyl) phosphate | textiles | Internal method | DIN EN 16377 | GC-MS | solvent extraction | A |
|  |  | Tris (2,3 dibromopropyl) phosphate | textiles, plastics | Internal method | DIN EN 71 - safety of toys, part 10 | GC-MS | extraction with acetonitrile, filtration | A |
| **5. Benzene CAS No 71-43-2** |
|  | 5.1 and 5.2 Toys /parts of toys |
|  |  | Benzene | polymers/toys | ASTM D4526-12 |  | HS GC-FID | Extraction | A |
|  |  | Benzene | toys | DIN EN 71-11 |  | GC-MS | Headspace or Purge& Trap | A |
|  |  | Benzene | toys | MSZ EN 71-11:2006 |  | GC-MS | Extraction | A |
|  | 5.3 substances/mixtures |
|  |  | Benzene | mixtures of xylenes | ASTM D 6563-2012 |  | GC-FID | n.d | A |
|  |  | Benzene | cynoacrylate glues | Internal method | CY-SGL method “METH 11 01 11”, accredited according to EN ISO 17025:2005 | GC-MS | Dilution in acetone | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Benzene | mixtures | EPA 8260C |  | GC-MS | EPA Method 5035A (solvent extraction- water dilution) / EPA Method 5021 (Headspace analysis) | A |
| **6. Asbestos fibres**1. **Crocidolite CAS No 12001-28-4**
2. **Amosite CAS No 12172-73-5**
3. **Anthophyllite CAS No 77536-67-5**
4. **Actinolite CAS No 77536-66-4**
5. **Tremolite CAS No 77536-68-6**
6. **Chrysotile CAS No 12001-29-5 CAS No 132207-32-0**
 |
|  | 6.1. Fibres / articles |
|  |  | Crocidolite | Asbestos fibres (only in solid samples) | NIOSH 9002 |  | PLM (polarized microscopy) |  | A |
|  |  | Amosite | Asbestos fibres (only in solid samples) | NIOSH 9002 |  | PLM (polarized microscopy) |  | A |
|  |  | Anthophyllite | Asbestos fibres (only in solid samples) | NIOSH 9002 |  | PLM (polarized microscopy) |  | A |
|  |  | Actinolite | Asbestos fibres (only in solid samples) | NIOSH 9002 |  | PLM (polarized microscopy) |  | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Tremolite | Asbestos fibres (only in solid samples) | NIOSH 9002 |  | PLM (polarized microscopy) |  | A |
|  |  | Chrysotile | Asbestos fibres (only in solid samples) | NIOSH 9002 |  | PLM (polarized microscopy) |  | A |
|  |  | Asbestos | construction material/soil/ powder |  |  | SEM-EDS | Depending on the sample | N/A |
| **7. Tris(aziridinyl)phosphinoxide CAS No 545-55-1 ; EC No 208-892-5** |
|  | 7.1. and 7.2. Textile articles |
|  |  | Tris(aziridinyl) phosphinoxide | textiles | Internal method | DIN EN 16377 | GC-MS | solvent extraction | A |
| **8. Polybromobiphenyls; Polybrominatedbiphenyls (PBB) CAS No 59536-65-1** |
|  | 8.1. and 8.2. Textile articles |
|  |  | PBBs | textiles | Internal method | DIN EN 16377 | GC-MS | solvent extraction | A |
| **12. 2-Naphthylamine CAS No 91-59-8 ; EC No 202-080-4 and its salts** |
|  | 12. substances/mixtures |
|  |  | 2-Napthylamine | liquids: Tattoo inks and pmu products; solids: leather | EN ISO 17234-1:2010 |  | GC-MS | Reduction with sodium ditionite and extraction with MTBE | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **13. Benzidine CAS No 92-87-5 ; EC No 202-199-1 and its salts** |
|  | 13. substances/mixtures |
|  |  | Benzidine | liquids: Tattoo inks and pmu products; solids: leather | EN ISO 17234-1:2010 |  | GC-MS | Reduction with sodium ditionite and extraction with MTBE | A |
| **18. Mercury compounds** |
|  | 18. substances and mixtures |
|  |  | Mercury | paints, preservation of wood | ISO 3856/7- 1984 |  | HG-AAS | acid extraction | A |
|  |  | Mercury | paints |  |  | XRF/XRD |  | D /5% |
| **18a. Mercury CAS No 7439-97-6 EC No 231-106-7** |
|  | 18a.1. Substance |
|  |  | Mercury | pure element | Internal method | AMA 254 by Altec Ltd. 2002 | AAS | homogenisation | A |
|  |  | Mercury | solids, solutions, apparel products | EPA 7473 |  | AAS |  | A |
| **19. Arsenic compounds** |
|  | 19.1. and 19.2. Substances and mixtures |
|  |  | Arsenic | paints | ISO 17294-2 |  |  |  | D / 0.05% |
|  | 19.3. wood |
|  |  |  |  |  |  |  |  |  |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **20. Organostannic compounds** |
|  | 20.1, 20.2 and 20.3 substances/mixtures |
|  |  | Organostannic compounds | paints | Internal method | ISO 17353 | GC-MS/MS |  | B |
|  | 20.4 substances in articles |
|  |  | Tri-substituted organostannic compounds |  |  |  |  |  |  |
|  | 20.5 substances in mixtures and articles |
|  |  | Dibutyltin (DBT) compounds |  |  |  |  |  |  |
|  | 20.6 substances in articles |
|  |  | Dioctyltin (DOT) compound |  |  |  |  |  |  |
| **21. Di-μ-oxo-di-n-butylstanniohydroxyborane/Dibutyltin hydrogen borate C8H19BO3Sn (DBB)** |
|  | substances/mixtures |
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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **22. Pentachlorophenol CAS No 87-86-5 ; EC No 201-778-6 and its salts and esters** |
|  | 22. substances/constituent of substances /mixtures |
|  |  | Pentachlorophenol | liquids and solids | EN 12673 |  | GC-MS | liquid: derivatisation and SPE . Solids: soxhlet extraction and derivatisation | A |
|  |  | Pentachlorophen | solids | Internal method | US EPA 8041, US EPA 3500, DIN ISO 14154 | GC-MS | Direct injection (extraction and derivatization) | A |
|  |  | Pentachlorophen | aqueous liquids | Internal method | US EPA 8041, US EPA 3500, ČSN EN 12673 | GC-MS | Direct injection (extraction and derivatization) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **23. Cadmium CAS No 7440-43-9 EC No 231-152-8 and its compounds** |
|  | 23.1 Cadmium in plastic material |
|  |  | Cadmium | plastics | DIN EN 62321;VDE 0042-1:2009-12:2009-12Electrotechnical products - Determination of levels ofsix regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers) (IEC 62321:2008);German version EN 62321:2009 |  | ICP-MS (IS-method) | 1. shred the material to pieces <5mm
2. transfer 100mg material to microwave vessel and add 5ml HNO3 and 2ml H2O2)
3. microwave digestion
4. dilute to 50ml with H2O
5. add internal standard and dilute to appropriate concentration range
 | A |
|  |  | Cadmium | plastics | Internal method | EN-1122 | FLAME ATOMIC ABSORPTION | Acid (c. H2SO4 and c. HNO3) digestion in a microwave oven | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Cadmium | plastics | Internal method | EN-1122 | FLAME ATOMIC ABSORPTION | Acid (c. H2SO4 and c. HNO3) digestion in a microwave oven | A |
|  |  | Cadmium | plastics | Internal method | plastic: PN-EN 1122:2004 Plastics.Determination of cadmium. Wetdecomposition method; | AAS | plastic: digestion in muffle oven | A |
|  |  | Cadmium | plastics (not polyfluorinated plastic) | Internal method | SFS-EN 1122:2001:Plastics.Determination of cadmium. Wet decomposition method. | ICP-OES | Wet digestion with concentrated H2SO4 and 30 % H2O2.After digestion sample is diluted with water. | A |
|  | 23.8 Brazing fillers and 23.10 Jewellery |
|  |  | Cadmium | metals, alloys, metal coatings | Internal method | ICP-OES) (ISO 11885:2007) БДС EN ISO 11885:2009 | ICP-OES | Microwave decomposition of the matrix to acid solution of cations | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Cadmium | metals | Internal method | Electrotechnical products. Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers) | AAS | metal: acid digestion in open vessel | A |
|  |  | Total Cadmium | plastics, paints, aqueous liquids, wood, leather, paper and metals |  |  | EDXRF |  | D / 50ppm |
| **24. Monomethyl — tetrachlorodiphenyl methane ; Trade name: Ugilec 141 ; CAS No 76253-60-6** |
|  | 24.1. substances/mixtures |
|  |  | Monomethyl — tetrachlorodiphenyl methane Trade name: Ugilec 141 | non-aqueous liquids | Internal method | DIN EN 12766 | GC-ECD | SPE | A |
| **25. Monomethyl-dichloro-diphenyl methane ; Trade name: Ugilec 121 ; Ugilec 21** |
|  | 25. substances/mixtures |
|  |  | Monomethyl-dichloro- diphenyl methane Trade name: Ugilec 121 Ugilec 21 | non-aqueous liquids | Internal method | DIN EN 12766 | GC-ECD | SPE | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **26. Monomethyl-dibromo-diphenyl methane bromobenzylbromotoluene, mixture of isomers ; Trade name: DBBT ; CAS No 99688-47-8** |
|  | 26. substances/mixtures |
|  |  | Monomethyl- dibromo-diphenyl methane bromobenzylbromotoluene, mixture of isomersTrade name: DBBT; | non-aqueous liquids | Internal method | DIN EN 12766 | GC-ECD | SPE | A |
| **27. Nickel CAS No 7440-02-0 EC No 231-111-4 and its compounds** |
|  | 27. 1 and 27.2 substance in post assemblies which are inserted into pierced parts of the human body and articles intended to come into direct and prolonged contact with the skin |
|  |  | Nickel | post assemblies which are inserted into pierced partsof the human body and articles intended to come into direct and prolonged contact with the skin | EN 1811:2011 + A1:2015 - OJ C 14of 15/01/2016 p. 110 |  |  |  | C |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Nickel | parts of spectacle frames and sunglasses intended to come into close and prolonged contact with the skin | EN 16128:2011- OJ C 14 of 15/01/2016 p.110 |  |  |  | C |
|  |  | Nickel | simulation of wear and corrosion forthe detection of nickel release from coated items | EN 12472:2005 + A1:2009- OJ C 14of 15/01/2016 p. 110 |  |  |  | C |
| **28. Substances which appear in Part 3 of Annex VI to Regulation (EC) No 1272/2008 classified as carcinogen category 1A or 1B (Table 3.1) or carcinogen category 1 or 2 (Table 3.2) and listed as follows: - Carcinogen category 1A (Table 3.1)/carcinogen category 1 (Table 3.2) listed in Appendix 1; - Carcinogen category 1B (Table 3.1)/carcinogen category 2 (Table 3.2) listed in Appendix 2** |
|  | 28.1. substances/constituents of substances/mixtures |
|  |  | Benz(a)anthracene | solids | Internal method | US EPA 8270 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Benz(a)anthracene | liquids | Internal method | US EPA 8270, EN ISO 6468 | GC-MS | Direct injection (Extraction technique) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Benzene | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |
|  |  | Benzo(a)pyrene | solids | Internal method | US EPA 8270, | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Benzo(a)pyrene | liquids | Internal method | US EPA 8270, EN ISO 6468 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Benzo(b)fluoranthene | solids | Internal method | US EPA 8270 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Benzo(b)fluoranthene | liquids | Internal method | US EPA 8270, EN ISO 6468 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Benzo(k)fluoranthene | solids | Internal method | US EPA 8270 | GC-MS | Direct injection (Extraction technique) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Benzo(k)fluoranthene | liquids | Internal method | US EPA 8270, EN ISO 6468 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Chrysene | solids | Internal method | US EPA 8270 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Chrysene | liquids | Internal method | US EPA 8270, EN ISO 6468 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Dibenz(a.h)anthracene | solids | Internal method | US EPA 8270 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Dibenz(a.h)anthracene | liquids | Internal method | US EPA 8270, EN ISO 6468 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | 1.2-Dibromo-3- Chloropropane | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | 1.2-Dibromoethane (EDB) | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |
|  |  | 1.2-Dichloroethane | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |
|  |  | Hexachlorobenzene (HCB) | solids | Internal method | US EPA 8081 | GC-ECD | Liquid extraction | A |
|  |  | Hexachlorobenzene (HCB) | liquids | Internal method | US EPA 8081 | GC-ECD | Liquid extraction | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Trichloroethene | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |
|  |  | Vinyl chloride | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **29. Substances which appear in Part 3 of Annex VI to Regulation (EC) No 1272/2008 classified as germ cell mutagen category 1A or 1B (Table 3.1) or mutagen category 1 or 2 (Table 3.2) and listed as follows: — Mutagen category 1A (Table 3.1)/ mutagen category 1 (Table 3.2) listed in Appendix 3 ; — Mutagen category 1B (Table 3.1)/ mutagen category 2 (Table 3.2) listed in Appendix 4** |
|  | 29.1. substances/constituents of substances/mixtures |
|  |  | Benzene | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |
|  |  | Benzo(a)pyrene | solids | Internal method | US EPA 8270 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Benzo(a)pyrene | liquids | Internal method | US EPA 8270, EN ISO 6468 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | 1.2-Dibromo-3- Chloropropane | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **30. Substances which appear in Part 3 of Annex VI to Regulation (EC) No 1272/2008 classified as toxic to reproduction category 1A or 1B (Table 3.1) or toxic to reproduction category 1 or 2 (Table 3.2) and listed as follows: - Reproductive toxicant category 1A adverse effects on sexual function and fertility or on development (Table 3.1) or reproductive toxicant category 1 with R60 (May impair fertility) or R61 (May cause harm to the unborn child) (Table 3.2) listed in Appendix 5 - Reproductive toxicant category 1B adverse effects on sexual function and fertility or on development (Table 3.1) or reproductive toxicant category 2 with R60 (May impair fertility) or R61 (May cause harm to the unborn child) (Table 3.2) listed in Appendix 6** |
|  | 30.1. substances/constituent of substances/mixtures |
|  |  | Benzo(a)pyrene | solids | Internal method | US EPA 8270 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Benzo(a)pyrene | liquids | Internal method | US EPA 8270, EN ISO 6468 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Bis(2-ethylhexyl) phthalate | solids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Bis(2-ethylhexyl) phthalate | liquids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Butyl benzyl phthalate | solids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Butyl benzyl phthalate | liquids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | 1.2-Dibromo-3- Chloropropane | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |
|  |  | Di-isobutylphthalate | solids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Di-isobutylphthalate | liquids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Di-n-butyl phthalate | solids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Di-n-butyl phthalate | liquids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | Di-pentylphthalate | solids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Di-pentylphthalate | liquids | Internal method | US EPA 8061 | GC-MS | Direct injection (Extraction technique) | A |
|  |  | 1.2.3-Trichloropropane | solids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (sample is extracted with defined volume of methanol, aliquot volume of sample is transferred into the headspace vial with defined volume of water and internal standards are added) | A |
| **31. (a) Creosote; wash oil CAS No 8001-58-9 EC No 232-287-5 (b) Creosote oil; wash oil CAS No 61789-28-4 EC No 263-047-8 (c) Distillates (coal tar), naphthalene oils; naphthalene oil CAS No 84650-04-4 EC No 283-484-8 (d) Creosote oil, acenaphthene fraction; wash oil CAS No 90640-84-9 EC No 283-484-8EC No 292-605-3 (e) Distillates (coal tar), upper; heavy anthracene oil CAS No 65996-91-0 EC No 266-026-1 (f) Anthracene oil CAS No 90640-80-5 EC No 292-602-7 (g) Tar acids, coal, crude; crude phenols CAS No 65996-85-2 EC No 266-019-3 (h) Creosote, wood CAS No 8021-39-4 EC No 232-419-1 (i) Low temperature tar oil, alkaline; extract residues (coal), low temperature coal tar alkaline CAS No 122384-78-5 EC No 310-191-5** |
|  | 31.1. substances/mixtures/wood |
|  |  | benz(a)pirene, PAHs, phenol | wood | MSZ EN 1014- 3:1999\*; MSZ1014-4:1999\* |  | HPLC-UV or HPLC-FLD | solid-liquid extraction and SPE | A |
|  |  | benz(a)pirene, PAHs, phenol | aqueous liquids | EPA 550.1; MSZ1484-9:2009 |  | HPLC-UV or HPLC-FLD | SPE | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **32. Chloroform CAS No 67-66-3 EC No 200-663-8** |
|  | 32.1. substances/constituents of substances / mixtures |
|  |  | Chloroform | cyanoacrylate glues | Internal method | CY-SGL method “METH 11 01 11”, accredited according to EN ISO 17025:2005 | GC-MS | Dilution in acetone | A |
|  |  | Chloroform | aqueous liquids | Internal method | US EPA 8260, US EPA 5021A,US EPA 5021, US EPA 8015,MADEP 2004, rev. 1.1,ISO 15009 | HSGC-MS or HSGC-FID | Headspace (no- extraction step, sample is just transferred into the headspace vial and internal standards are added) | A |
|  |  | Chloroform | mixtures (non- aqueous and aqueous liquids) | EPA METHOD 8260C |  | GC-MS | EPA Method 5035A (solvent extraction- water dilution) / EPA Method 5021 (Headspace analysis) | A |
| **34. 1,1,2-Trichloroethane CAS No 79-00-5 EC No 201-166-9** |
|  | 34.1. substances/constituents of substances / mixtures |
|  |  | 1,1,2-Trichloroethane | mixtures (non- aqueous and aqueous liquids) | EPA METHOD 8260C |  | GC-MS | EPA Method 5035A (solvent extraction- water dilution) / EPA Method 5021 (Headspace analysis) | A |
|  |  | 1,1,2-Trichloroethane | adhesives, paints, |  |  | GC-MS | ~ 0,05 g sample / 100 ml solvent | D / 0.04% |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **35. 1,1,2,2-Tetrachloroethane CAS No 79-34-5 EC No 201-197-8** |
|  | 35.1. substances/constituents of substances / mixtures |
|  |  | 1,1,2,2-Tetrachloroethane | mixtures (non- aqueous and aqueous liquids) | EPA METHOD 8260C |  | GC-MS | EPA Method 5035A (solvent extraction- water dilution) / EPA Method 5021 (Headspace analysis) | A |
|  |  | 1,1,2,2- | adhesives, paints, |  |  | GC-MS | ~ 0,05 g sample / 100 ml solv. | D / 0.04% |
|  |  | Tetrachloroethane | aqueous liquids | Internal method | US EPA 624, US EPA 8260 | HSGC-MS or HSGC-FID | Headspace (no- extraction step, sample is just transferred into the headspace vial and internal standards are added) | A |
|  |  |  |  |  |  |  |  |  |
|  |  | 1,1,2,2-Tetrachloroethane | aqueous liquids | Internal method | US EPA 624, US EPA 8260 | HSGC-MS or HSGC-FID | Headspace (no- extraction step, sample is just transferred into the headspace vial and internal standards are added) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **36. 1,1,1,2-Tetrachloroethane CAS No 630-20-6** |
|  | 36.1. substances/constituents of substances / mixtures |
|  |  | 1,1,1,2-Tetrachloroethane | aqueous liquids | Internal method | US EPA 624, US EPA 8260 | HSGC-MS or HSGC-FID | Headspace (no- extraction step, sample is just transfered into the headspace vial and internal standards are added) | A |
|  |  | 1,1,1,2-Tetrachloroethane | mixtures (non- aqueous and aqueous liquids) | EPA METHOD 8260C |  | GC-MS | EPA Method 5035A (solvent extraction- water dilution) / EPA Method 5021 (Headspace analysis) | A |
|  |  | 1,1,1,2-Tetrachloroethane | adhesives, paints, |  |  | GC-MS | ~ 0,05 g sample / 100 ml solv. | D / 0.04% |
| **37. Pentachloroethane CAS No 76-01-7 EC No 200-925-1** |
|  | 37.1. substances/constituents of substances / mixtures |
|  |  | Pentachloroethane | adhesives, paints, |  |  | GC-MS | ~ 0,05 g sample / 100 ml solv. | D / 0.04% |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **38. 1,1-Dichloroethene CAS No 75-35-4 EC No 200-864-0** |
|  | 38.1. substances/constituents of substances / mixtures |
|  |  | 1,1-Dichloroethene | aqueous liquids | Internal method | US EPA 624, US EPA 8260 | HPLC-UV or HPLC-FLD | Headspace (no- extraction step, sample is just transferred into the headspace vial and internal standards are added) | A |
|  |  | 1,1-Dichloroethene | mixtures (non- aqueous and aqueous liquids) | EPA METHOD 8260C |  | GC-MS | EPA Method 5035A (solvent extraction- water dilution) / EPA Method 5021 (Headspace analysis) | A |
|  |  | 1,1-Dichloroethene | adhesives, paints, |  |  | GC-MS | ~ 0,05 g sample / 100 ml solv. | D / 0.04% |
| **43. Azocolourants and Azodyes** |
|  | 43.aromatic amines listed in Appendix 8 of REACH in textile and leather articles or dyed parts thereof |
|  |  | 4-aminoazobenzene | leather | EN ISO 17234-12010 |  |  |  | C |
|  |  |  | leather | EN ISO 17234-2:2011 |  |  |  | C |
|  |  |  | textiles | EN 14362-1:2012 |  |  |  | C |
|  |  |  | textiles | EN 14362-3:2012 |  |  |  | C |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **45. Diphenylether, octabromo derivative C12H2Br8O** |
|  | 45.1. substances / constituents of substances / mixtures |
|  |  |  |  |  |  |  |  |  |
|  | 45.2. articles / flame-retardant parts of articles |
|  |  | PBBs | textiles | DIN EN 16377 |  | GC/MS | solvent extraction | B |
| **47. Chromium VI compounds** |
|  | 47.1. Cement and cement containing mixtures |
|  |  | Chromium VI | cement and cement containing mixtures | EN 196-10:2006- OJ C23, 28.1.2005, p.8 |  |  |  | C |
| **48. Toluene CAS No 108-88-3; EC No 203-625-9** |
|  | 48. (substances / mixtures) in adhesives or spray paints |
|  |  | Toluene | cyanoacrylate glues | Internal method | CY-SGL method “METH 11 01 11”, accredited according to EN ISO 17025:2005 | GC-MS | Dilution in acetone | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Toluene | paints | PN-EN ISO 11890-2:2013-06E |  | GC-FID | preparation of the sample according to PN-EN-ISO1513:2010P, analysis according PN-ENISO 11890-2:2013-06E extraction of toluene from paints using methanol and dichloromethane (2:3); centrifugation of the sample | A |
|  |  | Toluene | adhesives and spray paints | Internal method | PN-EN ISO 11890-2 | GC-FID or GC- MS | Sample (1-2g) was weighed in a tube with accuracy of 0,01mg and diluted with an appropriate amount of solvent.The content of the tube was then homogenized by vortexing. | A |
| **49. Trichlorobenzene CAS No 120-82-1 ; EC No 204-428-0** |
|  | 49. substances / mixtures |
|  |  | 1,2,3-Trichlorobenzene and1,2,4-Trichlorobenzene | mixtures (non- aqueous liquids) | EPA METHOD 8260C |  | GC-MS | EPA Method 5035A (solvent extraction- water dilution) / EPA Method 5021 (Headspace analysis) | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Trichlorobenzene | adhesives, paints, |  |  | GC-MS | ~ 0,05 g sample / 100 ml solv. | D / 0.04% |
| **50.Polycyclic-aromatic hydrocarbons (PAH)**1. **Benzo[a]pyrene (BaP) CAS No 50-32-8**
2. **Benzo[e]pyrene (BeP) CAS No 192-97-2**
3. **Benzo[a]anthracene (BaA) CAS No 56-55-3**
4. **Chrysen (CHR) CAS No 218-01-9**
5. **Benzo[b]fluoranthene (BbFA) CAS No 205-99-2**
6. **Benzo[j]fluoranthene (BjFA) CAS No 205-82-3**
7. **Benzo[k]fluoranthene (BkFA) CAS No 207-08-9**
8. **Dibenzo[a,h]anthracene (DBAhA) CAS No 53-70-3 2**
 |
|  | 50.1. Extender oils |
|  |  | Polycyclic aromatic extract (PCA) | extender oils | Petroleum Standard IP346:1998.This standard can be used only until 23 September2016 |  |  |  | C |
|  |  | PAH | extender oils | EN 16143:2013 |  |  |  | C |
|  | 50.2. Tyres and treads for retreading |
|  |  | Bay protons | vulcanised rubber | ISO 21461(Rubber vulcanised – Determination of aromatic oil in vulcanised rubber compounds) |  |  |  | C |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **52. The following phthalates (or other CAS- and EC numbers covering the substance):****(a) Di-‘isononyl’ phthalate (DINP) CAS No 28553-12-0 and 68515-48-0 ; EC No 249-079-5 and 271-090-9 (b) Di-‘isodecyl’ phthalate (DIDP) CAS No 26761-40-0 and 68515-49-1 EC No 247-977-1 and 271-091-4****(c) Di-n-octyl phthalate (DNOP) CAS No 117-84-0 EC No 204-214-7** |
|  | 52.1 Plasticised materials for toys and childcare articles production; 52.2 Plasticised materials in toys and childcare article |
|  |  | DINP DIDP DNOP | plastics | sample preparation: EN 14372:2005 (nonPVC plastics) and SW05OF01 (PVC)* instrumental analysis IT07EC01
 | SW05OF01: SANDRA BIEDERMANN-BREM, MAURUS BIEDERMANN, KATELL FISELIER,& KONI GROB;Compositional GC-FID analysis of the additives to PVC, focusing on the gaskets of lids for glass jars; Food Additives and Contaminants, December 2005; 22(12): 1274–1284IT07EC01: Z. Ezerskisa,V. Morkunas, M. Suman, C. Simoneau; Analytical screening of polyadipates and otherplasticisers in poly(vinyl chloride) gasket seals and in fatty food by gas chromatography–mass spectrometry; analytica chimica acta; 6 0 4 ( 2 0 07 ); 29–38 | GC coupled with MS | sample preparation: EN 14372:2005 (nonPVC plastics) and SW05OF01 (PVC) +instrumental analysis IT07EC01EN 14372:2005:Soxhlet extraction of the plastic with diethyletherSW05OF01:Dissolution of the PVC intetrahydrofuran, precipitation PVC by ethanol | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | DINP DIDP DNOP | plastic toys, FCMA | Internal method | ČSN EN 15777 | GC-ECD, GC- MS | Soxhlet extraction in diethylether | A |
|  |  | DINP DIDP DNOP | plastics | CPSC-CH-C1001-09.1 |  | GC/MS | solvent extraction | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | DINP | PVC toys and | Internal method | Sample preparation: |  |  |  |
| DIDP | childcare | 1. |
| DNOP | products | USA Test Method: CPSC- |
| CH-C1001-09.1 (2009), |
| USA Test Method: CPSC- |
| CH-C1001-09.3 (2010) |
| 2. |
| Plasicizers in PVC Toys |
| and Childcare Products: |
| What Succeeds the |
| Phthalates? Market |
| Survey 2007, Sandra |
| Biedermann-Brehm, |
| Maurus Biedermann, |
| Susanne Pfenninger, |
| Martin Bauer, Werner |
| Altkofer, Karls Rieger, |
| Urs Hauri, Christian |
| Droz, Koni Grob, |
| Chromatographia 2008, |
| 68, August (No. ¾), |
| Vieweg + Teuber, GWV |
| Fachverlage GmbH. |
| Analytical method:VDI |
| 4301 Blatt 6:2012- |
| 09 Measurement of |
| indoor air pollution |
| - Measurement of |
| phthalates with GC/MS |
| (VDI guideline) |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | DINP DIDP DNOP | PVC in toys and childcare articles | Internal method | EN 12586:2007 + A1:2011Child use and care articles. Soother holder. Safety requirements and test methods | GC-MS | Softeners are extracted from the plastic with diethyl ether. Extracted softeners are diluted with cyclohexane and analyzed with GC-MS. | A |
|  |  | DNOP | toys and childcare articles;- plastics | Internal method | 1) G.O. Adewuyi et al. The pacific J. Of Science and Technology, Vol.13 (2), 2012: 251; 2) Ying-Sing Fung et al., Fresenius J.Anal.Chem. (1994) 350: 721-723; 3) S.Marten, M.Naguschewski,Knauer Application Note 05/2010; 4) Y.J.Yao et al., Env. Mon. And Ass. 19: 83-91, 1991 | HPLC-UV | Sample preparation CPSC- CH-C1001-09.3 +instrumental analysis IT12ML01Extraction with organic solvent (Tetrahydrofuran) | A |
|  |  | DINP DIDP DNOP | PVC | Internal method | CPSC-CH-C1001-09.2 | GC-MS | Dissolve in tetrahydrofuran and precipitate in hexane | A |
|  |  | DINP DIDP DNOP | paints, plastics, paper, textiles | CPSC-CH-C1001-09.3 |  | GC-MS | MW extraction followed by GC- MS with internal standard | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **54. 2-(2-methoxyethoxy)ethanol (DEGME) CAS No 111-77-3 ; EC No 203-906-6** |
|  | 54. Constituent of paints, paint strippers, cleaning agents, self-shining emulsions or floor sealants |
|  |  | 2-(2-methoxyethoxy) ethanol (DEGME) | paints, paint strippers, cleaning agents, self-shining emulsions and floor sealants | Internal method | DIN 55682:200-12 ; DIN 55683:2009-08 | GC-MS | Solvent extraction | A |
| **55. 2-(2-butoxyethoxy)ethanol (DEGBE) CAS No 112-34-5 EC No 203-961-6** |
|  | 55.1. Constituent of spray paints or spray cleaners in aerosol dispensers |
|  |  | 2-(2-butoxyethoxy) ethanol (DEGBE) | spray paints or spray cleaners in aerosol dispensers | Internal method | DIN 55682:200-12 ; DIN 55683:2009-08 | GC-MS | solvent extraction | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **56. Methylenediphenyl diisocyanate (MDI) CAS No 26447-40-5 EC No 247-714-0** |
|  | 56.1. Constituent of mixtures |
|  |  | Methylenediphenyl diisocyanate | adhesives and sealants including hotmelts, One Component Foams (OCF) in pressurizedcans, semi-solid products and pre-polymers | Internal method | Humberto E. Ferreira, José Condeço, Inês Fernandes, David Duarte and João Bordado, HPLC-UV and HPLC-ESI+-MS/MS analysis of free monomeric methylene diphenyl diisocyanate in Polyurethane Foams and Prepolymers afterstabilization with NBMA a new derivatizating agent , Anal. Methods, 2014, AcceptedManuscript, 2014, DOI: 10.1039/C4AY01163E | Sample prep conducted in ambient air, with anhydrous acetonitrile dissolution.Pre-column derivatization with an excess of secondary aromatic amine (N -MethylBenzylA mine or NBMA), without catalist, for 90 minutes, followedby an HPLC separation, with UV254nm detection and quantitation. The method does not use toluene, xylene, DMF, DMSOor chlorinated solvents. | Sample prep conducted in ambient air, with anhydrous acetonitrile dissolution of 1500mg aliquote,or 600mg aliquote (pre-polymers). Pre- column derivatization with a 5 times molar excess of secondary aromatic amine (N- MethylBenzylA mine or NBMA), without catalist, for 90 minutes. Dilutions in acetonitrile. | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Methylenediphenyl diisocyanate | adhesives and sealants including hotmelts, One Component Foams (OCF) in pressurizedcans, semi-solid products and pre-polymers | Internal method | Humberto E. Ferreira, José Condeço, Inês Fernandes, David Duarte and João Bordado, HPLC-UV and HPLC-ESI+-MS/MS analysis of free monomeric methylene diphenyl diisocyanate in Polyurethane Foams and Prepolymers afterstabilization with NBMA a new derivatizating agent , Anal. Methods, 2014, AcceptedManuscript, 2014, DOI: 10.1039/C4AY01163E | Sample prep conducted in ambient air, with anhydrous acetonitrile dissolution.Pre-column derivatization with an excess of secondary aromatic amine (N-MethylBenzylA mine or NBMA), without catalist, for90 minutes, followedby an HPLC separation, with Mass Spectrometry detection, identification and quantitation (MS/MS).The method does not use toluene, xylene, DMF, DMSOor chlorinated solvents. | Sample prep conducted in ambient air, with anhydrous acetonitrile dissolution of 1500mg aliquote,or 600mg aliquote (pre-polymers). Pre- column derivatization with a 5 times molar excess of secondary aromatic amine (N- MethylBenzylA mine or NBMA), without catalist, for 90 minutes. Dilutions in acetonitrile. | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
| **57. Cyclohexane CAS No 110-82-7 EC No 203-806-2** |
|  | 57.1. Constituent of neoprene-based contact adhesives |
|  |  | Cyclohexane | neoprene- based contact adhesives | DIN EN ISO 10301 (F4) |  | HSGC-ECD or HSGC-MS | Purge & Trap or HS | B |
|  |  | Cyclohexane | adhesives, paints, |  |  | GC-MS | ~ 0,05 g sample / 100 ml solv. | D / 0.04% |
| **58. Ammonium nitrate (AN) CAS No 6484-52-2 EC No 229-347-8** |
|  | 58.1. (Substances / mixtures) for use as a solid fertilizer, straight or compound |
|  |  | Nitrogen | hydrochloric acid solution of ammonium nitrate | BSS EN15750:2010Method А; BSS 5172:1989 т.4.2 |  | Distillation apparatus. Automatic titrator. | Reduction, hydrolysis, distillation, titration | A |
|  |  | Nitrogen | aqueous solution of ammonium nitrate | BSS EN15475:2009; BSS 5172:1989 т.4.2 |  | Distillation apparatus. Automatic titrator. | Distillation, titration | A |
|  |  | Nitrogen |  | Calculative method according to 2003/2003,Annex IV method 2.6.2 |  | Calculative method |  | A |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Nitrogen | aqueous solution of carbamide and ammonium nitrate | BSS EN15750:2010Method А; BSS 1378:1977 т.3.1 |  | Distillation apparatus. Automatic titrator. | Reduction, hydrolysis, distillation, titration | A |
| **59. Dichloromethane CAS No 75-09-2 EC No: 200-838-9** |
|  | 59.1. Paint strippers |
|  |  | Dichloromethane | mixtures (non- aqueous liquids) | EPA METHOD 8260C |  | GC-MS | EPA Method 5035A (solvent extraction- water dilution) / EPA Method 5021 (Headspace analysis) | A |
|  |  | Dichloromethane | adhesives, paints, |  |  | GC-MS | ~ 0,05 g sample / 100 ml solv. | D / 0.04% |
| **60. Acrylamide CAS No 79-06-1** |
|  | Substance / mixtures |
|  |  | Acrylamide | aqueous extract of solid samples | EPA 8032A |  | GC-ECD | brominated derivative extraction into ethyl acetate | A |
| **61. Dimethylfumarate (DMF) CAS No 624-49-7 ; EC 210-849-0** |
|  | Articles / parts thereof |
|  |  | Dimethylfumarate | leather, desiccant, textiles | Internal method | 1.Biomed, Chromatograpy, 2011;25,1315-1318 2.ISO/TS16186 | HPLC-DAD | 1,000 g extraction in methanol in an ultrasonic bath for 60 min | B |



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| **Restriction****(Annex XVII entry number and analyte/s covered)** | **Restriction****(Annex XVII sub entry: paragraph number, analyte and matrix/product covered)** | **Analyte** | **Matrix/Product** | **Analytical method** | **Reference for internal methods** | **Analytical technique** | **Sample preparation** | **Note** |
|  |  | Dimethylfumarate | shoes/ leather/ plastics | Internal method | ISO/TS 16186 | GC-MS | 1g sample + 10 ml acetone + Istd | A |
|  |  | Dimethylfumarate | leather and textiles |  |  | HPLC-DAD | Extraction with methanol | D / 0.02[mg/kg] |
| **63. Lead CAS No 7439-92-1 ; EC No 231-100-4 and its compounds** |
|  | 63.1. Individual parts of jewellery articles |
|  |  | Lead | metals | Internal method | Aufschluss:- ASU §64 LFGB K 84.00- 29 (2011)Messung:* J. Nölte: ICP- Emissionsspektrometrie für Praktiker, Wiley-VCH Verlag GmbH, Weinheim, 2002
* DIN EN ISO 11885: 2008 (D)
 | ICP-OES | ASU §64 LFGB K 84.00-29 (2011)(ca. 100 mg Material+ 3 ml HNO3 + 0,5ml HCl bei 200°C in Mikrowelle) | A |
|  |  | Lead | metals | EPA 6020A |  | ICP-MS | EPA 3051A:microwave digestion with HNO3 and HCl 3:1 | A |
|  |  | Lead | metals |  |  | XRF or XRD |  | D / Lead 0.01%Lead compo unds 5% |

# Appendix 1-Glossary

1. LIST OF ACRONYMS

|  |  |
| --- | --- |
| **Term or abbreviation** | **Definition** |
| AAS | Atomic absorption spectroscopy |
| ASTM standards | Standards developed by the American Society for Testing and Materials |
| DAD | Diode array detector |
| DIN standards | Standards developed by the “Deutsches Institut für Normung” (German Institute for Standardisation) |
| ECD | Electron capture detector |
| ECHA | European Chemicals Agency |
| EDXFR | Energy dispersive X-ray fluorescence |
| EI | Electron Ionisation |
| EN Standards | Standards developed by the European Committee for Standardisation |
| EU | European Union |
| FID | Flame ionisation detector |
| GC-ECD | Gas chromatography with electron capture detector |
| GC-FID | Gas chromatography with flame ionisation detector |
| GC-MS | Gas chromatography mass spectrometry |
| HG-AAS | Hydride generator atomic absorption spectroscopy |
| HPLC | High performance liquid chromatography |
| HPLC-DAD | High performance liquid chromatography diode array detector |
| HPLC-FLD | High-performance liquid chromatography with fluorescence detection |
| HSGC | Headspace gas chromatography |
| ICP-MS | Inductively coupled plasma mass spectroscopy |
| ICP-OES | Inductively coupled plasma optical emission spectroscopy |
| ISO standards | Standards developed by the International Organisation for Standardisation |

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| --- | --- |
| **Term or abbreviation** | **Definition** |
| LOD | Limit of detection |
| MS | Mass Spectrometry |
| MSZ standard | Standard developed by the Hungarian Standards Institution |
| MTBE | Methyl Tertiary Butyl Ether |
| NEA | National enforcement authority |
| NIOSH | National Institute for Occupational Safety and Health of the United States of America |
| NLV | REACH Annex XVII restrictions without a limit value |
| PBB | Polybrominated biphenyl |
| PCA | Polycyclic aromatics |
| PMU products | Permanent Makeup Products |
| PVC | Polyvinyl chloride |
| REACH | Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals |
| SEM-EDS | Scanning Electron Microscopy and Energy Dispersive Spectrometry |
| SPE | Solid Phase Extraction |
| US EPA | Environmental Protection Agency of the United States of America |
| UV | Ultraviolet |
| XRD | X-ray diffraction |
| XRF | X-ray fluorescence |

## 2. KEY TERMS

**Applicability:** the set of information about the identity of analyte(s), the concentration range and the kind of matrix/material/item of a specific analytical method for its intended application.

**Limit of detection (LOD):** the lowest concentration or mass of an analyte, which can be detected with acceptable certainty, even though it cannot be quantified with acceptable precision.

**Measurement uncertainty:** the non-negative parameter characterising the dispersion of the quantity values being attributed to a measure and based on the information used

**Qualitative methods:** analytical methods which allow to identify the presence of a substance on the basis of its chemical, biological or physical properties. These methods do not enable a conclusive judgement for enforcement purpose and entail a confirmatory analysis

**Performance characteristic:** functional quality that can be attributed to an analytical method. This may be for instance accuracy, trueness, precision, repeatability, reproducibility, recovery, LOD and LOQ.

**Performance requirements:** requirements for a performance characteristic according to which it can be judged that the analytical method is fit for the purpose and generates reliable results.

**Recovery:** the fraction of the analyte that is recovered after addition of a known amount of the analyte, under defined conditions to the sample, when the test sample is analysed using the entire method.

**Reproducibility:** precision under reproducibility conditions, namely the distribution of measurement results obtained under reproducibility conditions.

**Reproducibility conditions:** conditions where test results are obtained with the same method on identical test items in different laboratories with different operators using different equipment.

**Screening methods:** analytical methods that are used to detect the presence of a substance or class of substances at the level of interest. These methods have the capability for a high sample throughput and are used to sift large numbers of samples for potential non-compliant results.

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