ABB List of Prohibited and Restricted Substances, ver. 1.25.

This document is valid as of 1st April 2024

The objective of ABB List of Prohibited and Restricted Substances is to aid the ABB supply chain in achieving compliance with legislation. The list consolidates legislation ABB has determined to be applicable to its **suppliers**, outlining where substances should not be used (Prohibited substances) and substances which should be limited or reported upon (Restricted substances).

This document contains an indicative and non-exhaustive list of key substances relevant to ABB. Notwithstanding the foregoing, the list of substances in this document applies without prejudice to (and it does not preclude) the supply chains’ obligation to ensure compliance with the relevant and applicable chemical laws and regulations. Legislative changes in between two versions of the list shall always be considered.

The list should be used for goods supplied to ABB including its packaging, product development, production processes, service activities and construction sites. Legislation has been considered from a global perspective, with the applicable geography noted in the table. If it is known that the product will only be sold in a limited jurisdiction, then only the substances within that jurisdiction need to be considered. However, if the product could be marketed in another jurisdiction or the jurisdiction of sale is unknown, substances from all jurisdictions should be considered.

The document is reviewed and updated, as a minimum, twice per year, in January and July/ August, with change bars identifying changes since the previous issue of the document.

How to read this list

Substance name: Name of chemical element or compound.

CAS No.: CAS Registry Numbers are unique numerical [identifiers](http://en.wikipedia.org/wiki/Identifier) assigned by the [Chemical Abstracts Service](http://en.wikipedia.org/wiki/Chemical_Abstracts_Service) to every chemical described in the open scientific literature.

ABB classification: Classification in Prohibited (P) and Restricted (R). Note that a chemical may be Restricted in certain applications and Prohibited in others.

Legislation: The short form of legislation triggering the impact, see the legislation overview after the table for more details on each regulation.

Example of applications: Example of applications where a specific chemical element or compound is used. The list is not intended to be exhaustive but rather to highlight common uses.

| Substance | CAS No. | ABBclassification | Legislation | Applicable geography | Example of applications | Comments |
| --- | --- | --- | --- | --- | --- | --- |
| 1-Amino-2-methylanthraquinone | 82-28-0 | **R** | California Prop 65 | US | Red dye in thermoplastics. |  |
| 1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate | 68515-51-5, 68648-93-1 | **R** | REACH Candidate List / Authorisation | EU | Plasticiser used in PVC, sealants, flexible adhesives, and paints. | EU: Sunset date 27/02/2023 |
| 1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich | 71888-89-6 | **P** | REACH Candidate List / Authorisation | EU | Plasticiser used in PVC, sealants, flexible adhesives, and paints. | EU: Sunset date 4/7/2020 |
| 1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters | 68515-42-4 | **P** | REACH Candidate List / Authorisation | EU | Plasticiser used in PVC, sealants, flexible adhesives, and paints. | EU: Sunset date 4/7/2020 |
| 1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear | 68515-50-4 | **R** | REACH Candidate List / Authorisation | EU | In plastic articles. | EU: Sunset date 27/02/2023 |
| 1,2-Benzenedicarboxylic acid, dipentylester, branched and linear | 84777-06-0 | **P** | REACH Candidate List / Authorisation | EU | Plasticiser used in cables. | EU: Sunset date 4/7/2020 |
| 1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme) | 112-49-2 | **R** | REACH Candidate List | EU | Solvent previously used in lithium batteries. |  |
| 1,2-diethoxyethane | 629-14-1 | **R** | REACH Candidate List | EU | Hydraulic fluids. |  |
| 1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME) | 110-71-4 | **R** | REACH Candidate ListCAN Tox. Subs. | EU, Canada | As electrolyte in lithium batteries. |  |
| 1,1'-[ethane-1,2-diylbisoxy]bis[2,4,6-tribromobenzene] (BTBPE) | 37853-59-1 | **R** | REACH Candidate List | EU | Flame retardant in polymers, adhesives and coatings. |  |
| 1,3-propanesultone | 1120-71-4 | **R** | REACH Candidate List | EU | As electrolyte in lithium batteries. |  |
| 1,6,7,8,9,14,15,16,17,17,18,18- Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene (“Dechlorane Plus”TM) [covering any of its individual anti- and syn-isomers or any combination thereof] | - | **P** | Stockholm convention | Global unless otherwise listed | Used as a non-plasticizing flame retardant, used in adhesives and sealants and in binding agents. | Added to Stockholm convention |
| **R** | REACH Candidate ListProposed POPs | EU | Proposed EU POPs substance. |
| 2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350) | 36437-37-3 | **R** | REACH Candidate List / Authorisation | EU | UV-protection agents in coatings, plastics, and rubber. | EU: Sunset date 27/11/2023 |
| 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328) | 25973-55-1 | **P** | Stockholm convention | Global unless otherwise listed | UV-absorbers, especially for transparent plastic materials, rubber, and polyurethanes. UV-protection agents in coatings. |  |
| **R** | REACH Candidate List / AuthorisationProposed POPs | EU | EU: Sunset date 27/11/2023Proposed EU POPs substance. |
| 2-(2H-benzotriazol-2-yl)-4-(1,1,3,3-tetramethylbutyl)phenol; Octrizole (UV-329) | 3147-75-9 | **R** | REACH Candidate List | EU | UV-stabiliser in plastics |  |
| 2-(2'-hydroxy -3' -tert-butyl-5'-methylphenyl)-5-chloro benzotriazole; Bumetrizole (UV-326) | 3896-11-5 | **R** | REACH Candidate List | EU | UV-stabiliser in plastics |  |
| 2,2-Bis(bromomethyl)-1,3-propanediol | 3296-90-0 | **R** | California Prop 65 | US | Flame retardant in polyester and polyurethane. |  |
| 2,4,6-tris(tert-butyl)phenol (2,4,6-TTBP) (phenol, 2,4,6-tris(1,1-dimethylethyl) | 732-26-3 | **P** | US TSCA §751.409Japan CSCL | US, Japan | Used as an additive in fuel, oils, and lubricants. Used in some polymers. |  |
| **R** | REACH Candidate List | EU |
| 2,4-dinitrotoluene | 121-14-2 | **P** | REACH Candidate List / AuthorisationUS EPA | EU, Canada, US | Explosives. | EU: Sunset date 21/08/2015 |
| 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327) | 3864-99-1 | **R** | REACH Candidate List / Authorisation | EU | UV-protection agents in coatings, plastics, and rubber. | EU: Sunset date 27/11/2023 |
| 2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320) | 3846-71-7 | **R** | REACH Candidate List/AuthorisationJapan CSCL | EU, Japan | UV-absorbers, especially for transparent plastic materials, rubber, and polyurethanes. UV-protection agents in coatings. | EU: Sunset date 27/11/2023 |
| 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE) | 15571-58-1 | **R** | REACH Candidate List / Authorisation | EU | Heat stabilizer in plastic (mainly PVC processing). | EU: Sunset date 01/05/2025 |
| 2-metoxyethyl acetate | 110-49-6 | **R** | CAN Tox. Subs. | Canada | Paints, lacquers. |  |
| 4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated (covering well-defined substances and UVCB substances, polymers, and homologues) | Multiple | **P** | REACH Candidate List/ Authorisation | EU |  | EU: Sunset date 4/1/2021 |
| 4,4’-isopropylidenediphenol (bisphenol A; BPA) | 80-05-7 | **R** | REACH Candidate ListCalifornia Prop 65 | EU, US | Mostly in PVC as a stabiliser. |  |
| 4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol, with ≥ 0.1% of Michler's ketone (EC No. 202-027-5) or Michler's base (EC No. 202-959-2) | 561-41-1 | **R** | REACH Candidate List / Authorisation | EU | Manufacture of ink and paint, so may be found in paper and packaging. | EU: Sunset date 01/05/2025 |
| 4,4'-bis(dimethylamino)benzophenone (Michler’s ketone) | 90-94-8 | **R** | REACH Candidate List | EU | Dyeing of paper, ink in cartridges and pens, plant dyeing. Therefore may be found in paper and packaging. |  |
| 4,4'-methylenebis[2-chloroaniline] | 101-14-4 | **P** | REACH Candidate List / Authorisation | EU | Hardener in resins and polymers. | EU: Sunset date 22/11/2017 |
| 4-[[4-anilino-1-naphthyl][4-(dimethylamino)phenyl]methylene]cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Blue 26) with ≥ 0.1% of Michler's ketone (EC No. 202-027-5) or Michler's base (EC No. 202-959-2) | 2580-56-5 | **R** | REACH Candidate List | EU | Ink, paint, detergents. Dyeing of paper and packaging. |  |
| 4-[4,4'-bis(dimethylamino) benzhydrylidene]cyclohexa-2,5-dien-1-ylidene]dimethylammonium chloride (C.I. Basic Violet 3) with ≥ 0.1% of Michler's ketone (EC No. 202-027-5) or Michler's base (EC No. 202-959-2) | 548-62-9 | **R** | REACH Candidate List | EU | Dyeing of paper, ink used in cartridges and ballpoint pens, plant dyeing. |  |
| 4-heptylphenol, branched and linear [substances with a linear and/or branched alkyl chain with a carbon number of 7 covalently bound predominantly in position 4 to phenol, covering also UVCB- and well-defined substances which include any of the individual isomers or a combination thereof] | Multiple | **R** | REACH Candidate List | EU | Lubricant additive. |  |
| 6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol | 119-47-1 | **R** | REACH Candidate List | EU | Rubbers, lubricants, adhesives, inks, and fuels. |  |
| Acrylamide | 79-06-1 | **R** | REACH Candidate List / AuthorisationCAN Tox. Subs. US EPA | EU, Canada, US | Plastic packaging. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/701f6c15-98ec-4611-ac63-35fcca2e4047) |
| Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins (SCCP)) | 85535-84-8 | **P** | REACH Candidate ListPOPs | Global including, China or otherwise listed | Plasticiser and flame retardant used in PVC and other flexible polymers. | Limit value: 1% w/w under POPs |
| **R** | Japan CSCLCalifornia Prop 65 | Japan, US |
| Alkanes, C14-17, chloro (Medium Chain Chlorinated Paraffins) | 1372804-76-6; 85535-85-9; 198840-65-2 | **R** | REACH Candidate ListProposed REACH RestrictionProposed POPs | EU | Flame retardant and plasticiser. Used in flexible PVC, rubbers, sealants, paints, adhesives, and coatings. | Proposed to be restricted in the EU under REACH and POPs. |
| Aluminosilicate Refractory Ceramic Fibres | 142844-00-6 | **R** | REACH Candidate List CAN Tox. Subs. | EU, Canada | Insulation materials for industrial use. Fire protection in industrial equipment. |  |
| Antimony Oxide (Antimony trioxide) | 1309-64-4 | **R** | California Prop 65 | US | Flame retardant used in plastics. |  |
| Arsenic compounds (Inorganic arsenic compounds) |  | **P** | REACH Restriction  | EU | Electronic equipment and wood treatment. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/a798c758-371f-41e5-a38d-5f8dc9ba739d)Some EU member states set limits in wood-based materials. |
| **R** | CAN Tox. Subs. US EPA | Canada, US |
| Asbestos (incl. Brown, blue and white asbestos, Tremolite) | 1332-21-4, 77536-66-4, 77536-68-6, 12172-73-5, 77536-67-5, 12001-29-5, 132207-32-0, 12001-28-4 | **P** | REACH Restriction CAN Tox. Subs. US EPACalifornia Prop 65 | EU, Canada, US | Thermal insulation. | [Conditions in Annex XVII](file://GBERALFP01/01/Projects%20%28RINew%29/REG%20Projects/1.%20A%20-%20D/ABB/REG49271-001%20%28P0035982%29%20Restricted%20Substance%20List/1%20Proposal/77536-66-4) |
| Barium diboron tetraoxide | 13701-59-2 | **P** | REACH Candidate List | EU | Paints, coatings adhesives. |  |
| Benzophenone | 119-61-9 | **R** | California Prop 65 | US | UV absorber in plastics. |  |
| Benz[a]anthracene | 56-55-3 | **R** | REACH Candidate List/ Restriction | EU | Normally not produced intentionally but rather occurs as a constituent or impurity in other plastics or paints. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/176064a8-0896-4124-87e1-75cdf2008d59) |
| Benzyl butyl phthalate (BBP) | 85-68-7 | **P** | REACH Authorisation/ Restriction | EU | Used as plasticizer in polymer products, mainly in PVC. Occurs in colours, materials to plastic, rubber, glue, filling medium and raw materials for paints. | EU: Sunset date 21/05/2015[Conditions in Annex XVII](https://echa.europa.eu/documents/10162/aaa92146-a005-1dc2-debe-93c80b57c5ee) |
| **R** | REACH Candidate List California Prop 65 | EU, Canada, US |
| Biphenyl-4-ylamine | 92-67-1 | **R** | REACH Candidate List / Restriction US EPA | EU, Canada, US | Intermediate, dyes, pigments, textiles. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/0e1cbf82-fe57-4c3b-97a4-0917ad8f212c) |
| Bis (2-ethylhexyl)phthalate (DEHP) | 117-81-7 | **P** | REACH Candidate List/ Authorisation/ RestrictionRoHSCAN Tox. SubsUS EPACalifornia Prop 65 | EU, Canada, US | Used as plasticizer in PVC. Occurs also in colours, plastic, rubber, glue, filling medium and raw materials for paints. | EU: Sunset date 21/02/2015[Conditions in Annex XVII](https://echa.europa.eu/documents/10162/aaa92146-a005-1dc2-debe-93c80b57c5ee) |
| bis(2-methoxyethyl) phthalate | 117-82-8 | **R** | REACH Candidate List | EU | Phthalate plasticiser in polymeric materials, paints, lacquers, and varnishes, including printing inks. |  |
| Bis(2-(2-methoxyethoxy)ethyl)ether | 143-24-8 | **R** | REACH Candidate List | EU | Used in inks and paper products and lithium batteries. |  |
| Bis(2-methoxyethyl) ether | 111-96-6 | **P** | REACH Candidate List/ Authorisation | EU | Solvent for battery electrolytes. | EU: Sunset date 22/08/2017 |
| Bis(4-chlorophenyl) sulphone (BCPS) | 80-07-9 | **R** | REACH Candidate List | EU | Used in high temperature plastics. |  |
| Bis(pentabromophenyl) ether (decabromodiphenyl ether; DecaBDE) | 1163-19-5 | **P** | REACH Candidate List / RestrictionRoHSPOPsJapan CSCL, China REACH | Global unless otherwise listed | Flame retardants, insulation materials, electrical equipment, and plastics. |  |
| **R** | US TSCA §751.405 | US |
| Bis(tributyltin)oxide (TBTO) | 56-35-9 | **P** | Japan CSCL | Japan | Occurs as a preservative in textiles, paper, rubber, and polymer materials. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/bdd717aa-7466-40ce-8a46-08c83ecc3aeb)Proposed to be restricted in Canada |
| **R** | REACH Candidate List US EPA | EU, US |
| Bisphenol S (BPS) | 80-09-1 | **R** | California Prop 65 | US | Paper products, adhesives and resins |  |
| Bis(2-ethylhexyl) tetrabromophthalate covering any of the individual isomers and/or combinations thereof | 26040-51-7 | **R** | REACH Candidate List | EU |  Flame retardants and plasticizers in plastics. |  |
| Boric acid | 10043-35-3, 11113-50-1 | **R** | REACH Candidate List | EU | Used as wood preservative, flame retardant among other uses. |  |
| Bumetrizole (UV-326) | 3896-11-5 | **R** | REACH Candidate List | EU | UV light stabiliser in polymers |  |
| Cadmium and cadmium compounds (Inorganic cadmium compounds) | 7440-43-9 (Cd)See note 1 in "Notes" | **P** | REACH Restriction RoHSBatteriesPackagingCAN Tox. Subs.  | EU, Canada | Electric and electronic equipment. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/3bfef8a3-8c97-4d85-ae0b-ac6827de49a9) |
| **R** | REACH Candidate ListUS EPACalifornia Prop 65 | EU, US |
| Cadmium hydroxide (Inorganic cadmium compounds) | 21041-95-2 | **R** | REACH Candidate List/ Restriction | EU | Used for the manufacture of nickel cadmium batteries. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/3bfef8a3-8c97-4d85-ae0b-ac6827de49a9) |
| Cadmium oxide (Inorganic cadmium compounds) | 1306-19-0 | **R** | REACH Candidate List/ Restriction | EU | Used in electronics, in power switch contacts. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/3bfef8a3-8c97-4d85-ae0b-ac6827de49a9) |
| Cadmium sulphide (Inorganic cadmium compounds) | 1306-23-6 | **R** | REACH Candidate List/ Restriction | EU | Used as a pigment (bright yellow), in manufacturing of photo resistors and in thin-film form combined with other layers for use in certain types of solar cells. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/3bfef8a3-8c97-4d85-ae0b-ac6827de49a9) |
| Chrome (VI+) and compounds contain Cr(VI) (hexavalent compounds) | See note 2 in "Notes" | **P** | RoHSPackaging | EU | Electric and electronic and pigment in paint. | EU: P in all applications covered by RoHS and packaging 0.1% w/w. CH: P in packaging, limit value: 0.01% w/w. |
| **R** | CAN Tox. Subs.California Prop 65 | Canada, US |
| Chromium trioxide | 1333-82-0 | **P** | REACH Candidate List / Authorisation RoHS | EU | Electric and electronic equipment covered by RoHS. Wood preservative. Surface treatment of metals. | EU: Sunset date 21/09/2017 |
| Cobalt/Cobalt compounds |  | **R** | Eco Design | EU | In batteries used in computer servers and online data storage products. | Amount must be communicated to customer. |
| Cobalt dichloride | 7646-79-9 | **R** | REACH Candidate List CAN NPRI | EU, Canada | Moisture indicating silica gel or in humidity cards. |  |
| Diazene-1,2-dicarboxamide (C,C'-azodi(formamide)) | 123-77-3 | **R** | REACH Candidate List | EU | Raw material for the manufacture of rubber and plastic, rubber, and plastic products. |  |
| Diazoaminobenzene | 136-35-6 | **R** | California Prop 65 | US | Polymer additive. |  |
| Diboron trioxide | 1303-86-2 | **R** | REACH Candidate List | EU | It is used to make borosilicate glass and glass fibre, as a flux for melting glass and enamels. |  |
| Dibutyl phthalate (DBP) | 84-74-293952-11-5 | **P** | REACH Candidate List / Authorisation / RestrictionRoHS US EPACalifornia Prop 65 | EU, US, Canada | Occurs in various articles of plastic, mainly PVC. Occurs in glue, paints, plastics, rubber etc. | EU: Sunset date 21/02/2015[Conditions in Annex XVII](https://echa.europa.eu/documents/10162/aaa92146-a005-1dc2-debe-93c80b57c5ee) |
| Dibutylbis(pentane-2,4-dionato-O,O')tin | 22673-19-4 | **R** | REACH Candidate List | EU | Used as biocides and as stabilisers in plastics. Used also as a catalyst and in the manufacturing of adhesives, sealants, coatings, dyes, polymer preparations, resins, and rubber. |  |
| Dibutyltin dichloride (DBTC) | 683-18-1 | **R** | REACH Candidate List | EU | Rubber manufacturing, rubber products. |  |
| Dichloromethane (methylene chloride) | 75-09-2 | **P** | REACH Restriction | EU | Paint stripping (prohibited).Other applications such as degreasing (restricted). | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/0ea58491-bb76-4a47-b1d2-36faa1e0f290) |
| **R** | CAN Tox. Subs. US TSCACalifornia Prop 65 | US, Canada |
| Dicyclohexyl phthalate (DCHP) | 84-61-7 | **R** | REACH Candidate List | EU | Plasticiser and light stabiliser used in a wide range of polymers, resins, paints, lacquers. |  |
| Dihexyl phthalate | 84-75-3 | **R** | REACH Candidate List/ AuthorisationCalifornia Prop 65 | EU, US | Plasticizer in PVC. | EU: Sunset date 27/02/2023 |
| Diisobutyl phthalate (DIBP) | 84-69-5 | **P** | REACH Candidate List / Authorisation / RestrictionRoHS | EU | Solvent in adhesives, inks for paper and packaging. | EU: Sunset date 21/02/2015[Conditions in Annex XVII](https://echa.europa.eu/documents/10162/aaa92146-a005-1dc2-debe-93c80b57c5ee) |
| Diisocyanates, O = C=N-R-N = C=O, with R an aliphatic or aromatic hydrocarbon unit of unspecified length | See Note 4in "Notes" | **R** | REACH Restriction | EU | See note 4 in "Notes”. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/503ac424-3bcb-137b-9247-09e41eb6dd5a) |
| Diisohexyl phthalate | 71850-09-4 | **R** | REACH Candidate List | EU | Used as a plasticizer for certain plastics and rubbers. |  |
| Diisopentylphthalate | 605-50-5 | **P** | REACH Candidate List/ Authorisation | EU | Explosives. | EU: Sunset date 4/07/2020 |
| Dimethyl hydrogen phosphite | 868-85-9 | **R** | California Prop 65 | US | Flame retardant in plastics and lubricants |  |
| Dimethylfumarate (DMFu) | 624-49-7 | **P** | REACH Restriction | EU | Drying and anti-mold agents and silica gel. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/f9d87b89-5870-483f-bd8a-a5cfe18095cd) |
| Dinoseb (6-sec-butyl-2,4-dinitrophenol) | 88-85-7 | **R** | REACH Candidate List | EU | Pesticide. |  |
| Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety | n/a | **R** | REACH Candidate List | EU | Commonly used as a stabiliser and catalyst in plastics, paints, coatings, inks, sealants. |  |
| Dioxobis(stearato)trilead | 12578-12-0 | **R** | REACH Candidate List | EU | Stabilizers for PVC and plastic goods. |  |
| Di-μ-oxo-di-n-butylstanniohydroxyborane (DBB) | 75113-37-0 | **P** | REACH Restriction | EU | Stabiliser in PVC or as a drier in paints. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/ce4f0c81-1ba1-4b5d-8d6e-6e1e05a36902) |
| 3,3'-Dimethoxybenzidine-based dyes | Multiple | **R** | California Prop 65 | US | Blue and black dyes in plastics, rubber, and paper. |  |
| Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28) | 573-58-0 | **R** | REACH Candidate List | EU | Red dye in paper and textiles. |  |
| Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38) | 1937-37-7 | **R** | REACH Candidate List | EU | Black dye in plastics and inks. |  |
| Disodium octaborate | 12008-41-2 | **R** | REACH Candidate List | EU | Used in anti-freeze products, heat transfer fluids, lubricants, and greases. |  |
| Disodium tetraborate, anhydrous | 1330-43-4, 1303-96-4, 12179-04-3 | **R** | REACH Candidate List | EU | Used as wood preservative, flame retardant etc. Can be used in treated wood and flame-proof insulation. |  |
| Fatty acids, C16-18, lead salts | 91031-62-8 | **R** | REACH Candidate List | EU | Stabilizers for PVC and plastic goods. |  |
| F-gases including Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and Sulphur hexafluoride (SF6). | Note 6 | **P/R**depending on the substance | F-gas related legislation | EU, US, Canada | Refrigerant |  |
| Halogenated Flame Retardants |  | **R** | Eco Design | EU | Electronic displays. | Must be marked with name of flame retardant. |
| Hexachlorocyclohexanes, including lindane | 58-89-9; 608-73-1; 319-85-7; 319-84-6 | **P** | POPsJapan CSCL US EPA | Global | Insecticide. | Limit value: 0.001% w/w of total halogenated biphenyls in lubrication oils and greases manufactured from waste oils. |
| Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (a - HBCDD, B-HBCDD, v- HBCDD) | 3194-55-6, 134237-52-8, 134237-50-6, 134237-51-7, 25637-99-4 | **P** | REACH Candidate List / AuthorisationPOPsJapan CSCLUS TSCACAN Tox. Subs. | Global | Used as flame retardant in plastics, especially polystyrene. | EU: Sunset date 21/08/2015 |
| Hexachlorobutadiene (HCBD) | 87-68-3 | **p** | Stockholm ConventionUS TSCA §751.413Japan CSCL | Global including China | As hydraulic, heat transfer or transformer fluid. |  |
| Hydrazine | 302-01-2, 7803-57-8 | **R** | REACH Candidate ListCAN NPRI US EPAProp 65 | EU, US, Canada | Corrosion inhibitor in cooling systems. |  |
| Lead and lead compounds | 7439-92-1 (Pb) | **P** | REACH Restriction RoHS CAN Tox. Subs.Packaging | EU, Canada | Electric and electronic equipment, welding and soldering products, metal surface treatment paints and as a stabiliser in plastics. | Paints [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/654a4f38-ebdb-b3b0-bda0-892bd44001de). Limit value in packaging and all applications covered by RoHS 0.1%w/w |
| **R** | REACH Candidate ListBatteryUS EPACalifornia Prop 65 | EU, US |  |
| Lead chromate (hexavalent compound) | 7758-97-6 | **P** | REACH Candidate List / Authorisation RoHS CAN Tox. Subs. | EU, Canada | Dyes and pigments. Corrosion protection. Electric and electronic equipment. | EU: Sunset date 21/05/2015 |
| Lead chromate molybdate sulphate red (C.l. Pigment Red 104) (hexavalent compound) | 12656-85-8 | **P** | REACH Candidate List /Authorisation CAN Tox. Subs. | EU, Canada | Dyes and pigments. | EU: Sunset date 21/05/2015, P in all applications. CH: P in packaging, limit value 0.01% w/w. |
| Lead cyanamidate | 20837-86-9 | **R** | REACH Candidate List | EU | PVC stabiliser. |  |
| Lead hydrogen arsenate | 7784-40-9 | **P** | REACH Restriction | EU | Pesticide for wood. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/a798c758-371f-41e5-a38d-5f8dc9ba739d) |
| **R** | REACH Candidate ListCAN Tox. Subs | EU, Canada | All other applications |
| Lead monoxide (lead oxide) | 1317-36-8 | **R** | REACH Candidate List | EU | Stabilizers and pigments. |  |
| Lead oxide sulfate | 12036-76-9 | **R** | REACH Candidate List | EU | Stabilizers for PVC, plastic goods. |  |
| Lead sulfochromate yellow (C.l. Pigment Yellow 34) (hexavalent compound) | 1344-37-2 | **P** | REACH Candidate List /Authorisation CAN Tox. Subs | EU, Canada | Yellow dyes and pigments. | EU: Sunset date 21/05/2015,P in all applications. CH: P in packaging, limit value 0.01% w/w. |
| Lead titanium trioxide | 12060-00-3 | **R** | REACH Candidate List | EU | Semiconductors, computers, electrical and optical products. |  |
| Lead titanium zirconium oxide | 12626-81-2 | **R** | REACH Candidate List | EU | Electronic products. |  |
| Mercury and mercury compounds | 7439-97-6 (Hg) | **P** | REACH Restriction RoHSBatteriesPackagingCAN Tox. Subs. | EU, Canada | Batteries, lamps, switch contacts and preservation. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/5a7222b0-9d3a-4a90-9e55-258149e92b1a) [-a](https://echa.europa.eu/documents/10162/dbcaaec7-bd5b-4a7d-b164-23fa97950a86)Limit value:- batteries; 0.0005% w/w. - packaging and items in scope of RoHS 0.1% w/w. |
| **R** | US EPACalifornia Prop 65 | US | All other applications |
| Methanediisocyanate (MDI) | 101-68-8, 2536-05-2, 5873-54-1, 26447-40-5 | **R** | REACH Restriction | EU | Polyurethane-foam and adhesives. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/503ac424-3bcb-137b-9247-09e41eb6dd5a) |
| N-methyl pyrrolidon | 872-50-4 | **R** | REACH Candidate List | EU | Solvent in batteries and capacitors. |  |
| Neodymium/Neodymium compounds |  | **R** | Eco Design | EU | Used in hard drive disks in computer servers and online data storage products. | Amount must be communicated to customer. |
| Nonylphenol (4-Nonylphenol, branched and linear) | 25154-52-3,84852-15-3 | **R** | REACH Restriction CAN Tox. Subs. | EU, Canada | Additive in rubbers. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/b91a8a69-f38e-4a35-ab7d-e475e5926988) |
| N-pentyl-isopentylphthalate | 776297-69-9 | **P** | REACH Candidate List/ Authorisation | EU | Plasticiser in plastics. | EU: Sunset date 4/07/2020 |
| N,N'-Ditolyl-p-phenylenediamine | 27417-40-9, 28726-30-9, 70290-05-0 | **P** | Japan CSCL | Japan | Rubbers. |  |
| Nickel | 7440-02-0 | **P** | REACH Restriction | EU | Nickel metal and alloys. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/3bbe9024-52a6-8e63-5581-e686331eb459)- Only limited in high skin contact parts |
| **R** | California Prop 65 | US |  |
| n-Nitrosodiethylamine | 55-18-5 | **R** | California Prop 65 | US | Lubricant additive and plastic stabiliser. |  |
| Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol | - | **R** | REACH Candidate | EU | Synthetic rubbers and polyurethane foam |  |
| Ozone Depleting Substances | Note 5 | **P/R** depending on the substance | Montreal Protocol | Global | Refrigeration, air-conditioning and foams |  |
| Pentachlorothiophenol (PCTP) | 133-49-3 | **P** | US TSCA §751.411Germany- ChemVerbotsV | US, EU (Germany) | Rubber. | In EU: Not included in the CoRAP List (not yet classified as a SVHC). |
| Pentadecafluorooctanoic acid (PFOA) | 335-67-1 | **P** | REACH Candidate List/ RestrictionStockholm ConventionJapan CSCLCalifornia Prop 65 | Global | Surfactant in the emulsion polymerization of fluoropolymers. | A PFAS substance[Conditions in Annex XVII](https://echa.europa.eu/documents/10162/7a04b630-e00a-a9c5-bc85-0de793f6643c) |
| Polycyclic aromatic hydrocarbon (PAH) | Multiple | **R** | California Prop 65 | US | Contaminant in plastic and rubber, especially if black. |  |
| Polychlorinated naphthalenes | Multiple | **P** | China REACH | China | Lubricants and insulation |  |
| Pentalead tetraoxide sulphate | 12065-90-6 | **R** | REACH Candidate List | EU | Plastic products, lead acid batteries, stabilizers for PVC. |  |
| Perfluorooctyl sulphonate (PFOS) | 45298-90-6 | **P** | Stockholm ConventionJapan CSCL | Global | Water and stain resistance on fabrics. Impurity in fluoro-polymers. | A PFAS substanceConcentration limit in articles is 50mg/kg (50 ppm). |
| Per- and polyfluoroalkyl substances (PFAS) | Multiple | **R** | REACH Restriction ListUS Maine PFAS reporting | US, EU | Very broadly used in electronics, fluoropolymers, lubricants, coatings etc. | Reporting required for ‘intentionally used’ PFAS in Maine from 2025.Proposed to be restricted in the EU |
| Perfluorobutane sulfonic acid (PFBS) and its salts | See Note 3 in "Notes" | **R** | REACH Candidate List | EU | Flame retardant in polycarbonate (for electronic equipment). | A PFAS substance |
| Perfluorohexane-1-sulphonic acid and its salts (PFHxS) | 355-46-4 | **R** | REACH Candidate List | EU | May be used as a plasticiser, lubricant, surfactant, wetting agent, corrosion inhibitor and in fire-fighting foams. | A PFAS substance |
| Perfluorononan-1-oic-acid and its sodium and ammonium salts | 375-95-1, 21049-39-8, 4149-60-4 | **R** | REACH Candidate List | EU | Displays, lubricants in bearings and packaging. | A PFAS substance |
| Perfluorooctanesulfonic acid (PFOS) | 1763-23-1 | **P** | Stockholm ConventionJapan CSCL | Global unless otherwise listed | Hydraulic fluids and as a contaminant to fluoropolymers. | A PFAS substance |
| **R** | US EPA- PFAS Strategic Roadmap | US |
| Phenol, alkylation products (mainly in para position) with C12-rich branched alkyl chains from oligomerisation, covering any individual isomers and/ or combinations thereof (PDDP) | 210555-94-5; 27459-10-5; 27147-75-7; 121158-58-5; 74499-35-7; 57427-55-1 | **R** | REACH Candidate List | EU | Lubricants. |  |
| Phenol, isopropylated phosphate (3:1) (PIP (3:1)) | 68937-41-7 | **P** | US TSCA §751.407 | US | Flame retardant and/or plasticizer in polymers such as flexible polyurethane foam and PVC, lubricant, hydraulic fluid, adhesives, and sealants. | In EU: Included in the CoRAP List (not yet classified as a SVHC) |
| Phthalato(2-)dioxotrilead | 69011-06-9 | **R** | REACH Candidate List | EU | Stabilizers for PVC, rubber products, plastic products. |  |
| Pitch, coal tar, high temp. | 65996-93-2 | **P** | REACH Candidate List / Authorisation | EU | Sealants and rubbers. | EU: Sunset date 4/10/2020 |
| Polybrominated diphenyl-ethers (PBDE) Polybrominated biphenyls (PBB) (di- , tetra-, hexa- , octa- , decabromobiphenyl) | 92-86-4, 60044-25-9, 36355-01-8, 59536-65-1, 27858-07-7, 13654-09-6 | **P** | RoHS Stockholm conventionJapan CSCL CAN Tox. Subs.California Prop 65 | Global | Electric and electronic equipment and other items as a flame retardant. |  |
| Polychlorinated biphenyl (PCB) | 1336-36-3 | **P** | Stockholm Convention CAN Tox. Subs. US EPAJapan CSCL | Global | Transformers and capacitors. |  |
| Polychlorinated terphenyls (PCTs) | 61788-33-8 | **P** | REACH Restriction | EU | Insulation oil, lubricant oil, electrical insulation medium, plasticisers, flame retardants, coatings for electrical wire and cable. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/3fd87368-345a-4b56-b545-53b2b8d4aa8c) |
| Pyrochlore, antimony lead yellow | 8012-00-8 | **R** | REACH Candidate List | EU | Dye, pigment, and ink toner. |  |
| Reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE) | Multiple | **R** | REACH Candidate List/ Authorisation | EU | Might be used as heat stabilizer in plastic (mainly PVC processing). | EU: Sunset date 01/05/2025 |
| Reaction products of 1,3,4-thiadiazolidine-2,5-dithione, formaldehyde and 4-heptylphenol, branched and linear (RP-HP) [with ≥0.1% w/w 4-heptylphenol, branched and linear] | Multiple | **R** | REACH Candidate List/ Authorisation | EU | Used as a lubricant additive in lubricants and greases. | EU: Sunset date 01/05/2025 |
| S-(tricyclo(5.2.1.02,6)deca-3-en-8(or 9)-yl O-(isopropyl or isobutyl or 2-ethylhexyl) O-(isopropyl or isobutyl or 2-ethylhexyl) phosphorodithioate | 255881-94-8 | **R** | REACH Candidate List | EU | Lubricants and greases. |  |
| Strontium chromate (hexavalent compound) | 7789-06-2 | **P** | REACH Candidate List / AuthorisationCAN Tox. Subs. | EU, Canada | Corrosion protection in pigment of paints and varnish. | EU: Sunset date 22/01/2019 |
| Styrene | 100-42-5 | **R** | California Prop 65 | US | Polystyrene as unreacted monomer. |  |
| Sulfurous acid, lead salt, dibasic | 62229-08-7 | **R** | REACH Candidate List | EU | Stabilizers for PVC, plastic goods. |  |
| Tris(2,3-dibromopropyl)phosphate | 126-72-7 | **R** | California Prop 65 | US | Flame retardant in plastics. |  |
| Terphenyl hydrogenated | 61788-32-7 | **R** | REACH Candidate List | EU | Used as a plastic additive, solvent, in coatings/inks, in adhesives and sealants, and heat transfer fluids. | Proposed to be restricted in the EU |
| Tetrabromobisphenol A (2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol) (TBBPA) | 79-94-7 | **R** | REACH Candidate ListCalifornia Prop 65Proposed RoHS | US, EU | Flame retardant used in plastics and electronics. | Proposed to be included in EU RoHS. |
| Tetraboron disodium heptaoxide, hydrate | 12267-73-1 | **R** | REACH Candidate List | EU | Used as wood preservatives, flame retardants. Can be used in treated wood, flame-proof insulation, and packaging. |  |
| Tetraethyllead | 78-00-2 | **R** | REACH Candidate List / Authorisation | EU | Fuel. | EU: Sunset date 01/05/2025 |
| Tetralead trioxide sulphate | 12202-17-4 | **R** | REACH Candidate List | EU | Paints, varnishes, PVC stabilizers, plastic products, and lead acid batteries. |  |
| Trilead bis(carbonate) dihydroxide | 1319-46-6 | **R** | REACH Candidate List / Authorisation | EU, Canada | White pigment and PVC stabiliser. |  |
| Trilead diarsenate | 3687-31-8 | **R** | REACH Candidate List / Authorisation | EU | Pesticide on wood. | [Conditions in Annex XVII](https://echa.europa.eu/documents/10162/a798c758-371f-41e5-a38d-5f8dc9ba739d) |
| Trilead dioxide phosphonate | 12141-20-7 | **R** | REACH Candidate List | EU | Stabilizers in plastics. |  |
| Tris(2-chloroethyl)phosphate | 115-96-8 | **P** | REACH Candidate List / AuthorisationCan Tox. Subs.California Prop 65 | EU, Canada, US | Additive flame retardant for plastics. Flame-retardant paints lacquers and adhesives. | EU: Sunset date 21/08/2015 |
| Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP) | Multiple | **R** | REACH Candidate List | EU | Primarily used as an antioxidant to stabilize polymers. |  |
| Trixylyl phosphate | 25155-23-1 | **R** | REACH Candidate List / Authorisation | EU | Lubricants. | EU: Sunset date 27/05/2023 |
| Zinc chromate (hexavalent compound) | 13530-65-9 | **R** | CAN Tox. Subs. | Canada | Surface treatment and pigment in paint. |  |
| Zirconia Aluminosilicate Refractory Ceramic Fibres (Refractory ceramic fibre) |  | **R** | REACH Candidate List CAN Tox. Subs. | EU, Canada | Insulation materials for industrial use. Fire protection in industrial equipment. |  |
| α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4) with ≥ 0.1% of Michler's ketone (EC No. 202-027-5) or Michler's base (EC No. 202-959-2) | 6786-83-0 | **R** | REACH Candidate List | EU | Dye in paper and inks and printed material. |  |

Notes

|  |  |
| --- | --- |
|  |  |

Note 1. Threshold values for cadmium and cadmium compounds

R in all applications

EU: P as pigment in polymer materials and paints, except for safety reasons;

* as stabilizer in mixtures or articles manufactured from polymers or copolymers of vinyl chloride, except for safety reasons. Limit value: 0.01 % w/w.
* in EEE, limit value: 0.01% w/w.

Germany: P as coating of metal surfaces, except to ensure functional reliability.

Batteries: P in portable batteries, limit value: 0.002 % w/w;

Packaging: limit value: 0.01% w/w;

* in wood based materials, limit value: 0.005% w/w.

Note 2. Chrome (VI) and compounds containing Cr(VI)

IEC62474 considers the following Cr(VI) compounds: Barium chromate CAS number 10294-40-3, Calcium chromate CAS number 13765-19-0, Chromium trioxide CAS number 1333-82-0, Sodium chromate CAS number 7775-11-3, Sodium dichromate CAS number 10588-01-9, Strontium chromate CAS number 7789-06-2, Potassium dichromate CAS number 7778-50-9, Potassium chromate CAS number 7789-00-6, and Zinc chromate CAS number 13530-65-9.

Note 3. Perfluorobutane sulfonic acid (PFBS) and its salts

Substance names: 1,1,2,2,3,3,4,4,4-nonafluorobutane-1-sulphonyl fluoride CAS number 375-72-4, N,N,N,-triethylethanaminium 1,1,2,2,3,3,4,4,4-nonafluorobutane-1-sulfonate CAS number 25628-08-4, 1,1,2,2,3,3,4,4,4-nonafluoro-N-(2-hydroxyethyl)-N-methylbutane-1-sulphonamide CAS number 34454-97-2, 1,1,2,2,3,3,4,4,4-nonafluorobutane-1-sulphonic acid CAS number 375-73-5.

Note 4. Diisocyanates, O = C=N-R-N = C=O, with R an aliphatic or aromatic hydrocarbon unit of unspecified length

This group of substance has the following member substances: [4-methyl-m-phenylene diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.008.678) CAS number 584-84-9, Hexamethylene diisocyanate CAS number 822-06-0, [2-methyl-m-phenylene diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.001.854) CAS number 91-08-7, [3,3'-dimethylbiphenyl-4,4'-diyl diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.001.921) CAS number 91-97-4, [4,4’-Methylenediphenyl diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.002.697) CAS number 101-68-8, [2,4,6-triisopropyl-m-phenylene diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.016.806) CAS number 2162-73-4, [m-tolylidene diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.043.369) CAS number 26471-62-5, [1,3-bis(1-isocyanato-1-methylethyl)benzene](https://echa.europa.eu/substance-information/-/substanceinfo/100.018.614) CAS number 2778-42-9, [4,4'-methylenedicyclohexyl diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.023.512) CAS number 5124-30-1, [2,4’-Methylenediphenyl diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.025.031) CAS number 5873-54-1, [1,5-naphthylene diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.019.675) CAS number 3173-72-6, [1,3-bis(isocyanatomethyl)benzene](https://echa.europa.eu/substance-information/-/substanceinfo/100.020.776) CAS number 3634-83-1, [3-isocyanatomethyl-3,5,5-trimethylcyclohexyl isocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.021.692) CAS number 4098-71-9, [2,2’-Methylenediphenyl diisocyanate](https://echa.europa.eu/substance-information/-/substanceinfo/100.018.000) CAS number 2536-05-2.

Note 5.

This group of substances has the following member substances.

| **Chemical Name** | **CAS Number** |
| --- | --- |
| CFC-11 (CCl3F) Trichlorofluoromethane | 75-69-4 |
| CFC-12 (CCl2F2) Dichlorodifluoromethane | 75-71-8 |
| CFC-113 (C2F3Cl3) 1,1,2-Trichlorotrifluoroethane | 76-13-1 |
| CFC-114 (C2F4Cl2) Dichlorotetrafluoroethane | 76-14-2 |
| CFC-115 (C2F5Cl) Monochloropentafluoroethane | 76-15-3 |
| Halon 1211 (CF2ClBr) Bromochlorodifluoromethane | 353-59-3 |
| Halon 1301 (CF3Br) Bromotrifluoromethane | 75-63-8 |
| Halon 2402 (C2F4Br2) Dibromotetrafluoroethane | 124-73-2 |
| CFC-13 (CF3Cl) Chlorotrifluoromethane | 75-72-9 |
| CFC-111 (C2FCl5) Pentachlorofluoroethane | 354-56-3 |
| CFC-112 (C2F2Cl4) Tetrachlorodifluoroethane | 76-12-0 |
| CFC-211 (C3FCl7) Heptachlorofluoropropane | 422-78-6 |
| CFC-212 (C3F2Cl6) Hexachlorodifluoropropane | 3182-26-1 |
| CFC-213 (C3F3Cl5) Pentachlorotrifluoropropane | 2354-06-5 |
| CFC-214 (C3F4Cl4) Tetrachlorotetrafluoropropane | 29255-31-0 |
| CFC-215 (C3F5Cl3) Trichloropentafluoropropane | 4259-43-2 |
| CFC-216 (C3F6Cl2) Dichlorohexafluoropropane | 661-97-2 |
| CFC-217 (C3F7Cl) Chloroheptafluoropropane | 422-86-6 |
| CCl4 Carbon tetrachloride | 56-23-5 |
| Methyl Chloroform (C2H3Cl3) 1,1,1-trichloroethane | 71-55-6 |
| Methyl Bromide (CH3Br) | 74-83-9 |
| CHFBr2, CHBFC-12B1(CHF2Br), CH2FBr, C2HFBr4, C2HF2Br3, 2HF3Br2, C2HF4Br, C2H2FBr3, C2H2F2Br2, C2H2F3Br, C2H3FBr2, C2H3F2Br, C2H4FBr, C3HFBr6, C3HF2Br5, C3HF3Br4, C3HF4Br3, C3HF5Br2, C3HF6Br, C3H2FBr5, C3H2F2Br4, C3H2F3Br3, C3H2F4Br2, C3H2F5Br, C3H3FBr4, C3H3F2Br3, C3H3F3Br2, C3H3F4Br, C3H4FBr3, C3H4F2Br2, C3H4F3Br, C3H5FBr2, C3H5F2Br, C3H6FBr |
| **Group VIII** |
| CH2BrCl Chlorobromomethane |

Note 6.

This group of substances has the following member substances which need comply to all obligations under the F-gas regulation.

| **Industrial Designation and Chemical Name** | **CAS Number** |
| --- | --- |
| HFC-23 trifluoromethane  | 75-46-7 |
| HFC-32 difluoromethane  | 75-10-5 |
| HFC-41 fluoromethane  | 593-53-3 |
| HFC-125 pentafluoroethane  | 354-33-6 |
| HFC-134 1,1,2,2-tetrafluoroethane  | 811-97-2 |
| HFC-134a 1,1,1,2-tetrafluoroethane  | 811-97-2 |
| HFC-143 1,1,2-trifluoroethane  | 430-66-0 |
| HFC-143a 1,1,1-trifluoroethane  | 420-46-2 |
| HFC-152 1,2-difluoroethane  | 624-72-6 |
| HFC-152a 1,1-difluoroethane  | 75-37-6 |
| HFC-161 fluoroethane  | 353-36-6 |
| HFC-227ea 1,1,1,2,3,3,3-heptafluoropropane  | 431-89-0 |
| HFC-236cb 1,1,1,2,2,3-hexafluoropropane  | 677-56-5 |
| HFC-236ea 1,1,1,2,3,3-hexafluoropropane  | 431-63-0 |
| HFC-236fa 1,1,1,3,3,3-hexafluoropropane  | 690-39-19 |
| HFC-245ca 1,1,2,2,3-pentafluoropropane  | 679-86-7 |
| HFC-245fa 1,1,1,3,3-pentafluoropropane  | 460-73-1 |
| HFC-365 mfc 1,1,1,3,3-pentafluorobutane  | 406-58-6 |
| HFC-43-10 mee 1,1,1,2,2,3,4,5,5,5-decafluoropentane  | 138495-42-8 |
| PFC-14 tetrafluoromethane  | 75-73-0 |
| PFC-116 hexafluoroethane  | 76-16-4 |
| PFC-218 octafluoropropane  | 76-19-7 |
| PFC-3-1-10 (R-31-10) decafluorobutane (perfluorobutane)  | 355-25-9 |
| PFC-4-1-12 (R-41-12) dodecafluoropentane (perfluoropentane)  | 678-26-2 |
| PFC-5-1-14 (R-51-14) tetradecafluorohexane (perfluorohexane)  | 355-42-0 |
| PFC-c-318 octafluorocyclobutane (perfluorocyclobutane)  | 115-25-3 |
| sulphur hexafluoride SF6  | 2551-62-4 |

Legislation Overview

**REACH**

EU’s Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation (1907/2006) describes obligations for the production, use and import of chemical substances and their potential impact on both human health and the environment. The Regulation imposes multiple obligations, which includes the need to communicate (but not ban) the presence of [Candidate List substances](https://echa.europa.eu/candidate-list-table) if it is >0.1% w/w in the article, require [authorisation](https://echa.europa.eu/authorisation-list) to use certain substances in the EU and [restrict the use of certain substances](https://echa.europa.eu/substances-restricted-under-reach) in specified ways. For more information refer to the European Chemical Agency (ECHA) [Guidance on substances in articles](https://echa.europa.eu/documents/10162/2324906/articles_en.pdf).

REACH Candidate List -Restriction in the context of this Regulation when the candidate list is referenced is that if the substance is contained within the article above 0.1% by weight, the presence of the substance and any safe use information needs to be communicated (Article 33) to the recipient of the article. Where the restriction list is referenced the specific terms of the restriction should be consulted as the restriction can impose limitations on certain uses of the substance, labelling requirements, health and safety requirements or other obligations.

REACH Restriction certain uses of the substances are prohibited or there are specific conditions associated with the use of the substance, and the specific terms of the legislation should be consulted.

**RoHS**

The Restriction of Hazardous Substances (RoHS) Directive (2011/65/EC) restricts the use of certain hazardous substances in all types of electrical and electronic equipment that would affect human health or the environment. The Directive has several exclusions, which permit exclude certain products from its scope and derogations permit the time limited use of the substances in certain applications. It should be noted that many non-EU countries have their own equivalent to RoHS so it should be considered that this is also applicable in other countries.

For example, Management Methods for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products, order number 32, also known as “China RoHS” regulates certain hazardous substances in electrical and electronic equipment. It should be noted that this includes all types of electrical equipment and its components, as well as batteries. The use of restricted substances is limited in certain equipment only, and specific labelling is required.

**Stockholm Convention**

The [Stockholm Convention](https://chm.pops.int/TheConvention/ThePOPs/AllPOPs/tabid/2509/Default.aspx) is an international agreement which, bans or restricts the use of persistent organic pollutants in both chemical products and articles due to their health and environmental properties. The Convention is implemented through national legislation, which can introduce additional requirements or have a delay in implementing the requirements under the convention. Of specific note is China and the US which although implements some of the requirements, at this point not all substance requirements are implemented into national law, where there are differences this is noted in the applicable geography. In the EU the convention is implements through the Persistence Organic Pollutant (POPs) Regulation (2019/1021/EU)

**Montreal Protocol and Kigali Amendment**

The [Montreal Protocol and Kigali Amendment](https://www.unep.org/ozonaction/who-we-are/about-montreal-protocol) is an international agreement on substance that deplete the ozone layer and trigger their phase out as agreed by [signatories to the agreement](https://treaties.un.org/Pages/ViewDetails.aspx?src=IND&mtdsg_no=XXVII-2-f&chapter=27&clang=_en). The agreement phases out Ozone depleting substances (ODS) Hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) used in refrigeration, air-conditioning and foam applications. Some substances are prohibited from use, whereas others have obligations such as labelling, leak prevention, record keeping, recovery and destruction of the substance and reporting among other obligations. Reference should be made to national implementing legislation for full obligations.

**F-Gas Regulation**

There are a number of countries which if fluorinated gases are used require certain obligations to be met, with the specific requirements outlined by legislation such as the EU’s Fluorinated Greenhouse Gases Regulation (517/2014/EU), the US’s Clean Air Act and Canada’s Federal Halocarbon Regulations and associated Regulations. Restriction within this context means that there are certain obligations to ensure leak checks, leakage repairs and recovery of used gas among other obligations. It is also worth noting that the use of F-gases in many new types of equipment where less harmful alternatives are widely available is banned.

**Batteries**

The Batteries Directive (2006/66/EC) contributes to the protection of the environment by minimising the negative impact of batteries and accumulators. The Directive prohibits the marketing of some types of batteries containing certain hazardous substances among many other obligations relating to labelling and collection.

**Packaging**

The Packaging Directive (94/62/EC) set rules on the production, marketing, use, recycling, and refilling of containers of liquids for human consumption and on the disposal of used containers. The Directive among other aspects also places obligations on packaging materials and sets limits for specific substances.

**CAN Tox. Subs**

CAN Tox. Subs. corresponds to [Canadian Toxic Substances List - Schedule 1](https://www.canada.ca/en/environment-climate-change/services/canadian-environmental-protection-act-registry/substances-list/toxic/schedule-1.html) which prohibits the use of certain substances.

Restriction in this context means that certain uses of the substances are prohibited, and the specific terms of the legislation should be consulted.

**California Prop65**

California Prop 65 corresponds to Proposition 65, formally titled "The Safe Drinking Water and Toxic Enforcement Act”. <https://oehha.ca.gov/proposition-65/proposition-65-list/> The legislation requires warnings to be provided to customers if anyone who is supplied the product could be exposed to a listed substance at a significant level.

Restriction in this context means that the use of the substance if triggered by the legislation requires labelling.

**US TSCA**

US TSCA corresponds to US Toxic Substance Control Act. [TSCA Chemical Substance Inventory | US EPA](https://www.epa.gov/tsca-inventory) which precludes the use of certain substances, including some which are imported as an article. US EPA corresponds to United States Environmental Protection Agency. [United States Environmental Protection Agency | US EPA](https://www.epa.gov/)

**Japan CSCL**

The [Japan Chemical Substance Control Law](https://www.meti.go.jp/policy/chemical_management/english/cscl/laws.html) (CSCL) aim is to prevent environmental pollution and control chemical risks to human health. The CSCL is primarily focused on controlling the manufacture and import of substances, with the import of Class I chemical substances in certain products restricted.

Restriction in this context means that certain uses of the substances are prohibited, and the specific terms of the legislation should be consulted.

**China REACH**

Provisions on Environmental Administration of New Chemical Substances MEE Order No. 12 (China REACH) requires companies to submit new chemical substance notification to the Chinese Chemical Registration Centre (CRC) for any chemicals not already listed [China’s Inventory of Existing Chemical Substances](https://www.cirs-group.com/en/chemicals/the-inventory-of-existing-chemical-substance-in-china-iecsc-2013-and-updates) that they wish to import into or utilize within China, regardless of annual amounts.

In addition to this, there are mandatory standards that limit the Volatile Organic Compounds (VOCs) for adhesives, industrial protective coatings, printing ink and cleaning products which substances used within China must comply to.

**Hong Kong convention’s Inventory of Hazardous Materials**

The [Hong Kong convention](https://www.imo.org/en/About/Conventions/Pages/The-Hong-Kong-International-Convention-for-the-Safe-and-Environmentally-Sound-Recycling-of-Ships.aspx) applies only to equipment which is intended to be installed on a ship, with the convention aimed at ensuring that when ships are recycled they do not pose any unnecessary risk to human health and safety or to the environment. An [appendix](https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/02-1%20RESOLUTION%20MEPC%20269%2868%29%20IHM%20Guidelines.pdf) to the Convention provides a list of hazardous materials, the installation or use of which is prohibited or restricted.

Version history

Version history is found in document 2020/SECRC/T/TN/38-8 and changes to the document in further issues shall identify new substances with change bars. The document is published in ABB Library.