

RESTRICTIONS OF HAZARDOUS SUBSTANCES (RoHS)

BACKGROUND

The European Union has introduced a directive that restricts the use of certain substances. Called Restriction of Hazardous Substances (RoHS) Directive (Directive 2002/95/EC, dated 27/01/2003), it restricts some specific hazardous substances in electrical and electronic products. Effective July 1st 2006, the RoHS Directive identifies Lead, Mercury, Cadmium, Hexavalent Chromium, Polybrominated Biphenyls (PBB) and Polybrominated Diphenyl Ethers (PBDE) – these are banned from electrical and electronic products sold in Europe. An Annex to the Directive lists certain exemptions from the ban.

The reason for the ban is stated as “... to contribute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment.”

The Directive also states that the list of restricted substances is not fixed and final – there is an assumption that the Directive will be regularly reviewed in the light of new scientific evidence so that other substances may be included in future revisions. Many other countries are now implementing similar laws, so it can be expected that similar but perhaps not identical restrictions will apply to products imported to these other areas in the near future.

The present EU Directive applies specifically to items of electrical or electronic equipment imported into the European Union.

Dangerous substances restricted by the RoHS Directive	
Substance	Examples of Applications
Lead	Addition to some metal products to improve machinability, solder (SnPb), thermal stabilizers of PVC (lead stearate...), yellow pigments for polymers (lead chromate)
Mercury	Switches (mercury whetted), lamps, displays
Cadmium	Electroplated coatings (with hexavalent chromium passivation), high temperature brazing alloys (eg Ag-Cu-Zn-Cd), thermal stabilizers of PVC (cadmium stearate), yellow pigments for polymers (cadmium sulphide)
Hexavalent Chromium	Contained in some passivations of zinc, copper, aluminium alloys, silver and galvanized sheet steel
Polybrominated Biphenyls (PBB)	Flame retardant, cables, plastics
Polybrominated Diphenyl Ethers (PBDE)	Flame retardant, cables, plastics

MAXIMUM ALLOWABLE LEVELS

The Annex to the Directive states that there is a maximum level of 0.1% allowed for all of the above with the exception of cadmium, which is limited to 0.01%. The allowable level is for any “homogeneous compound”. This is defined as any compound that can be removed through mechanical means including abrasion i.e. if you can grind it off then it is an homogenous compound. This means that a layer of paint or a passivation is classified as a homogenous compound and must not have more than 0.1% of any of the above substances in it. This rules out substances such as lead oxide as colorant or dye in paint.

There are a number of exemptions allowed, for example:

1. Batteries – these are covered by directive 95/157/EEC.
2. Mercury in specific types of lamps.
3. Lead in the glass of cathode ray tubes, electronic components, and fluorescent tubes.
4. Lead as an alloying element in steel containing up to 0.35% by weight, aluminium containing up to 0.4% lead by weight and as a copper alloy containing up to 4% lead by weight.
5. Lead in high melting temperature type solders (i.e. tin-lead solder alloys containing more than 85% lead).
6. Lead in solder in certain other specific applications.
7. Lead in electronic ceramic parts (e.g. piezo electronic devices).
8. Cadmium plating with some exceptions.
9. Hexavalent chromium in some corrosion inhibitors.

The full text of the Directive can be downloaded from http://europa.eu/lex/pri/en/oj/dat/2003/l_037/l_03720030213en00190023.pdf

ATLAS STANDARD PRODUCTS

Atlas Steels believes that the standard stocked products set out in the following schedule comply with the RoHS directive except as noted. If you require formal validation however please contact Atlas Steels on a case by case basis. Please note the specific exclusion from the list of galvanised carbon steel product that has been passivated with a chromate compound – we do not believe that this product complies with the RoHS directive.

For further details related to Atlas stock or indent products please contact any Atlas Steels branch, or the central contact below.

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Schedule of Standard Atlas Products	
Product	Comments
Stainless steel flat rolled product (plate, sheet, coil and strip).	PVC (polyvinyl chloride) plastic film is applied to certain products, particularly intended for deep drawing; there is no information on the compliance of this film. PE (polyethylene) plastic film is used on standard products and does not contain objectionable amounts of banned substances. It is presumed in any case that all protective plastic films would be removed prior to the finished product entering service.
Stainless steel tube, pipe and associated fittings.	All of these products comply with the directive. Rubber seals and similar non-metallic components are exceptions that would need to be validated on a case-by-case basis.
Stainless steel sections and bar.	None of the free machining grades of stainless steel contain deliberate lead additions, so all stainless steel bars will comply with the directive.
Carbon steel and low alloy steel bars.	Leaded free machining grades of carbon steel are listed in the table below. All carbon steel and low alloy steel bars comply.
Carbon steel tube, pipe and associated fittings.	All of these products comply with the directive.
Galvanised, electrogalvanised and zinc-aluminium coated sheet steel.	Chromate conversion coatings on these products may not comply. Electroplated or hot-dipped coatings without the chromate conversion do comply.
Aluminium alloy flat rolled product (plate, sheet, coil and strip).	All of these products comply with the directive.
Copper alloy bars.	Alloy 385 complies as its lead content is specified 3.8% maximum, as shown in the table below. All standard non-free machining copper alloys comply.
Cast iron fittings.	Cast iron complies with the directive, but any items coated with paint or similar products are exceptions that would need to be validated on a case-by-case basis..
<p>A note on stainless steel and chromium Stainless steels all by definition contain at least 10.5% chromium. The chromium is not present in the banned hexavalent form, it is all present as solid metal. The British Stainless Steel Association's website gives a more complete explanation for the statement of compliance for all stainless steels.</p>	

The commonly stocked "leaded" free machining grades of steel and copper alloy have lead contents as follows, and hence are permitted under the exceptions clause ...

Leaded Free Machining Carbon Steel and Copper Alloy Bars		
Product	Lead content specified	Comment
12L14 bright carbon steel bar	0.15 – 0.35% Pb	Complies with 0.35% maximum
Alloy 385 (UNS C38500)	2.5 – 3.8% Pb	Complies with 4% maximum

FURTHER REFERENCES

- EU Directive 2002/95/EC “Restriction of Hazardous Substances”, dated 27/01/2003.
- BSSA statements re Hexavalent Chromium, and the relationship of this to chromium-containing steels. See <http://www.bssa.org.uk/index.htm>
- Mill inspection certificates for each product – available on request from Atlas Steels.

ATLAS STEELS TECHNICAL SERVICES DEPARTMENT

Atlas Steels maintains a Technical Services Department to assist customers and the engineering community generally on correct selection, fabrication and application of specialty metals. Our metallurgists are supported by our laboratory and have a wealth of experience and readily available information.

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Further information is given on the Atlas website at www.atlassteels.com.au

Contact details for the extensive Atlas branch network are also listed on this website.

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