

Advice & Counsel



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WEEE + RoHS + ELV = Co + N + F + U + S + I + O + N

Complicated Regulations Make Life Tough for Surface Finishers

Dear readers,

Despite volumes of articles and e-mails flying around the planet, there remains a considerable amount of confusion about what is banned, what is exempt, and what are the requirements imposed on the metal finishing industry by three European Directives known as WEEE, RoHS and ELV. Consider the following questions that have been sent my way over the last few weeks:

Dear Advice & Counsel,

One of our company engineers spoke to a chemist about our hexavalent chromium plating process. The chemist said that there would be Cr⁺⁶ in the end product because we use Cr⁺⁶ in the process, but it would require breaking the metal to find the Cr⁺⁶. Is that true?

*Signed,
Dec Chrome*

Dear Advice & Counsel,

If we send parts for testing to determine if our coating complies with RoHS or ELV banned substances, is the leach test performed on the coating (plating, plating plus chromate) or on the entire part? We sent out some parts to a lab and they drilled a hole into the part and tested the metal shavings from the drilling for hexavalent chromium. We passed the test. Are we OK?

*Signed,
Confused*

Dear Advice & Counsel,

The RoHS Directive bans the presence of PBBs and PBDEs. We do decorative chromium plating from a hexavalent solution. Do we need to test for the presence of these substances in our plated deposit?

*Signed,
Bewildered*

Dear Advice & Counsel,

I just received a newsletter that states that hexavalent chromium in corrosion protective coatings has now been exempted from the ELV. Can I assume that this exemption extends also to RoHS/WEEE?

*Signed,
Bothered*

Dear Advice & Counsel,

We do electroless nickel plating and use a solution that utilizes lead as a stabilizer. If the solution contains less than the RoHS allowable concentration of lead and cadmium, can I assume that the EN deposit will be in compliance?

*Signed,
Bewitched*

Dear Advice & Counsel,

I've heard a lot about the Europeans banning lead, mercury, cadmium and chromium from automotive parts and parts that go into electronics/appliances. Just what does banned mean? Can I have a few ppms present in the coating and still be in compliance?

*Signed,
At Wits End*

Dear Advice & Counsel,

We plate parts destined for Japan and the Pacific Rim. Do they need to meet RoHS requirements?

*Signed,
In the Clear (I Hope)*

Dear In the Clear and all others,

If the parts you finish do not go to Europe, and in the absence of a requirement from your customer, then you do not need to worry about RoHS or ELV.

I hope the following will address the rest of the above questions:

1. ELV

The ELV's objective is to prevent waste from junk automobiles from causing pollution and to protect workers who will be disassembling junk automobiles in recycling operations. The Directive has the goal of recycling 95% of any junk automobile by the year 2015.

Article 4 (2) (a) of this Directive 2000/53/EC on end of life vehicles (ELV) prohibits the use of lead, mercury, cadmium or hexavalent chromium in vehicle materials and components, unless an exemption is provided for in Annex II of the Directive. This list of exemptions can be amended by the European Community according to technical and scientific progress.

The Directive has numerous exemptions identified in Annex II of the Directive. The primary one of interest to most metal finish-



Shown (at 100X) is a crack pattern in the surface of a decorative chromium deposit, which can absorb traces of hexavalent chromium during plating.

ers is an exemption for hexavalent chromium in coatings that are intended primarily for corrosion protection which is scheduled to end on July 1, 2007.

In July of 2005, a committee established by the "Commission of the European Communities (EC)," proposed that the exemption for hexavalent chromium in corrosion protective coatings be prolonged for an additional year, but **only** for one type of automotive part—bolt/nuts in chassis applications—because no viable alternatives appeared to be available. The exact language of the proposal is as follows:

"As regards the exemption for the use of hexavalent chromium in corrosion preventive coatings, which expires on 1 July 2007 (entry 17 of the current Annex II, as amended by Commission Decision 2002/525/EC), the assessment shows that for many applications substitutes exist. For the use of hexavalent chromium in corrosion protection related to bolt and nut assemblies for chassis applications there are no substitutes available at this moment. Therefore, it is proposed to prolong the exemption for this specific application with one year and review this exemption in order to ensure that no accidental disconnection of essential mechanical parts can occur in the lifetime of vehicles."

The bottom line under the EC ELV Directive is:

- a. Hexavalent chromium, lead, cadmium and mercury are banned from coatings applied to automotive parts.
- b. There is an exemption for hexavalent chromium in coatings intended for corrosion purposes only. This exemption will end on July 1, 2007 unless it is extended by the EC.
- c. The exemption for hexavalent chromium in corrosion protective coatings on nuts/bolts used in automotive chassis has been extended until July 1, 2008.
- d. The ELV Directive DOES NOT ban any chromium plating (decorative or hard). Chromium plating has a zero valence. Zero-valent chromium is not banned. However, chromium plating may contain traces of hexavalent chromium in micro-pores (see discussion under RoHS).
- e. The ELV Directive DOES NOT ban any trivalent chromium in coatings.

2. WEEE

The European Community Directive on Waste Electrical and Electronic Equipment (WEEE) decrees that all 25 members of the European Community produce regulations, by August of 2004, that would require appliances and electrical devices be manufactured in such a manner that they can be recycled at a rate of 70–80% based upon the type of appliance or device. As of 1-06, not all countries

in the EC have produced such regulations, but most all are either done or in the process of producing them.

3. RoHS

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) is a decree requiring all member nations to produce regulations that will "ban" lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) from all new electrical and electronic equipment sold to EU companies and manufactured in the EU.

As with the ELV, there are a few exemptions in the directive, which we will not cover here (the entire Directive and exemption list is available via the internet).

The bottom line on RoHS is:

- a. Any coating produced for an appliance or electronic device must be free of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs).
- b. As I understand it, a coating is considered to be free of a banned metal if that metal is not intentionally added to the coating and the coating has less than the following concentrations **in the coating**, not in the coating plus the substrate!

Chromium+6	1000 ppm (0.1%)
Cadmium	100 ppm (0.01%)
Lead	1000 ppm (0.1%)
Mercury	1000 ppm (0.1%)

- c. It is my understanding that if the coating contains any banned metal, because the banned metal has been intentionally incorporated into the deposit (as when you use an EN process that contains cadmium and or lead), then that coating is not compliant, even if it contains less than the above concentrations. The amount of lead or cadmium present in the EN deposit is not directly related to the ppm in the plating solution.
- d. Any coating that does not contain intentionally added banned metals can be tested to confirm the absence or to establish the concentration. It would be a very good idea to make sure you test your coating in accordance with the specification that your customer is trying to comply with as different manufacturers have different procedures to be followed. In all cases, you NEVER include the base metal in calculating the ppm/% of banned substance present. Most specifications require that the parts to be tested have at least 50 cm² of surface area. The coating is stripped and tested.
- e. While decorative chromium deposits are not banned by either ELV or RoHS, plated chromium deposits do contain traces of hexavalent chromium, because the chromium typically has a micro-cracked or micro-porous structure and some minute amounts of plating solution is trapped in these microscopic crevices. We have tested decorative chromium plated parts and the highest reading obtained so far is about 500 ppm and the low was 190 ppm.
- f. Some (not all) black chromium plating processes contain hexavalent chromium. The deposit produced from such a process would have intentionally added hexavalent chromium, and is effectively banned.
- g. If you do not have PBB or PBDE in any of your process solutions (and it is highly likely that you do not), then there is no need for testing for these organics.

I welcome any additional questions that are out there! P&SF