Cookson Electronics

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Datum 07. Sep. 2011

Comment on draft recommendation for inclusion of Cobalt salts - (Co(II) dichloride, Co(II) dinitrate, Co(II) sulphate, Co(II) diacetate, Co(II) carbonate) into Annex XIV of the REACh – Regulation

1. Preamble

Enthone is opposed to the inclusion of the 5 Cobalt's salts (Co(II) dichloride, Co(II) dinitrate, Co(II) sulphate, Co(II) diacetate, Co(II) carbonate) on Annex XIV with high prioritization.

These substances are an essential part of the manufacturing process for numerous varieties of goods, in particular electroplating of zinc and zinc alloy corrosion resistant coatings on steel, as well as several important alloy plating processes, such as various gold alloys and tin-cobalt alloy for chromium replacements. The final goods are used and/or required in a wide range of industries all over Europe, including automotive, mechanical engineering, building machinery and trucks, textile, aviation, military, electro and electronics, jewellery, window construction, and many more.

Most of the companies in the named industries are unaware of the effect of the inclusion of the cobalt salts into the Annex XIV, but are existentially dependent on these substances.

The high corrosion protection performance of cobalt containing passivates for zinc and zinc alloy layers are unique core properties of these kind of corrosion resistant coatings, many of which are used in manufacture of steel components. The very specific properties of cobalt containing alloy coatings and coating processes make the cobalt salts indispensable for industry, and in particular, the electronics.

We support and refer to the statements of the German plating association "ZVO".

In addition to that, Enthone considers that there should be a longer period for consulting the future of surface treatment technologies between the Authorities and the European industries.

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2. Segment 1 – Zinc and Zinc Alloy Plating

2.1 Present situation

Metallic zinc and zinc alloy coatings obtained by electroplating are in most cases, subsequently treated in specifically designed solutions to form conversion coatings. The conversion coatings improve the overall corrosion resistance performance, by retarding the first corrosive attack on the zinc / zinc alloy layer itself. This also contributes to an extended corrosion protection for the basis material.

Historically, all zinc / zinc alloy layers have been immersed to chromium(VI)-based solutions ("chromates") to form chromate conversion coatings. Over the last 40 years, efforts have been made to replace chromium(VI)-based processes by chromium(III) based processes, the so called passivates. Driven by the directive 2000/53/EU (often called ELV directive) to ban the use of hexavalent chromium in passenger cars as well as other EU directives, huge efforts have been made to replace chromates by passivates. Over 90% of the plated surface today is treated with passivates. An important fact, however, is that to reach an equal corrosion protection performance cobalt salts have to be added to the newly developed passivate systems. Without the use of cobalt salts the corrosion performance is 5...10 times lower than with cobalt salts and, most importantly, significantly lower than the replaced chromate conversion coatings. This has a significant impact to durability, longevity, and safety of the produced parts. More over this higher protection has an important impact; in the reduction of both raw material consumption and energy usage. This reduction in energy significantly contributes to the Europeans Union climate control goals - as well as to meet the mandatory CO_2 reduction plans.

Typically, plating companies use automatic lines with appropriate fume extraction, when required. The formulations are liquid so reducing the risk of breathable dust generation during use. This enables safer handling and reduces potential exposure of cobalt salts to a minimum.

Enthone formulates and manufactures chemicals for the named applications. Enthone meets all requirements regarding labour and environmental health.

2.2 Outlook

Enthone, as an chemical supplier for plating shops as well as other plating companies, continue in their efforts to replace cobalt salts in passivates. Where low corrosion protection performance in zinc plating is acceptable, cobalt free passivates are already available. However, this covers only about 20% of the total market, and is primarily used for indoor applications, where lower requirements are acceptable. The remaining 80% of parts and goods require significantly higher corrosion protection, which, at present, can only be achieved by use of cobalt containing passivates. Exclusively for applications with transparent (silverlike) zinc-nickel coatings, cobalt free passivate are already supplied by Enthone.

Enthone has recently developed a cobalt free passivate for zinc and zinc-iron alloy with the required high corrosion protection performance. Enthone is optimistic that this new process may be able to replace cobalt salts in most applications on zinc and zinc-iron alloy coatings while maintaining the high corrosion protection performance. However, this process is still being evaluated in the laboratory and on pilot lines. Industrial experience is limited and requires a greater understanding of the application.

This industrial experience has to be assessed and collected over a variety of applications, in many different industries. Also bath maintenance and application technologies have to be developed and optimized in the field. The change in the automotive industry from chromium (VI) based chromates to chromium (III) based passivates took from 2000 (publication of the ELV directive) to July 2007 (execution date). This describes the time horizon required to identify all impact factors and to adjust all

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necessary changes to field conditions. It is for these reasons that we request the postponement of prioritisation of the named cobalt salt by 5 years, in order to allow the industries to evaluate, amend specifications and optimise production.

2.3 Value Chain

The value of cobalt salts to industry, for zinc and zinc alloy applications is shown below:

The market size in Europe for zinc and zinc alloy plated coatings is about 1.6 Billion Euro. The cost share of cobalt containing passivate solutions within this, is estimated as 2%.
Today, about 45% of these coatings are used in the automotive industry. Every passenger car includes between 500 and 1000 single parts with zinc / zinc alloy coating. Longevity, functional properties, corrosion protection, as well as safety related issues are related to years of research, development, and field testing of specific surface treatments. Without their unique properties of the applied coatings, the reliability and functionality of these cars would be jeopardised.
As per VDA (association of the German automotive industry) 5,552,409 light vehicles and 353,576 heavy vehicles have been produced in Germany alone. Taking 500 zinc plated parts per car would equate to about 2.8 Billion parts, of which about 75% were directly affected by the prioritisation of the cobalt salts.

The import of coated parts from outside of Europe is often cheaper than potential alternative coatings, produced inside the EU. Restriction of cobalt salts would lead to the importation of more components from non European markets and to a greater production of cars outside of Europe. Today, the average price of a passenger car produced in Germany is about € 25,000 which amounts to a production volume of 140 Billion Euro. The remaining 55% of the zinc plating market is considered to contribute to again another 140 Billion European production.

There is a real threat, that automotive, engineering, building machinery and other industries will relocate production to countries where regulations are less stringent, and the employment of a workforce who have limited experience, and this could lead to possible environmental damage and increased health risk.
The chemical suppliers and the applicators of the plating processes would follow the industry to other markets. The European Union would not only risk about 20.000 jobs which are directly in zinc plating industry but also over 1,000,000 jobs in all industries which are dependent on reliable, high quality coatings.

3. Segment 2 – Cobalt Salts in Alloy Plating Processes

3.1 Present situation

Metallic alloy coatings produced by electroplating, cover a variety of applications. Cobalt salts are indispensable part of various gold alloys which are used in electronic applications, jewellery, and other applications. Other cobalt alloys are e.g. tin-cobalt as chromium replacement and zinc-cobalt as corrosion resistant coating for steel.

Even though gold-cobalt alloys contain less than 1% cobalt they play a very important role in the hardening of the gold layers. These coatings are applied, for example, on selected surface areas of electronic connectors. This application of gold alloy has a significant impact to function, durability, longevity, and safety of the produced parts.

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The use of Gold-cobalt alloys is very common in Europe. About 50% of Hardgold coatings are manufactured by the use Au-Co alloy mostly for electronic applications and a minor part for jewellery. There are some opportunities to replace the Au/Co alloy by Au/Ni specifically in the electronics market. Also this alloy delivers harder and therefore more wear resistant gold coatings. This transition is feasible and electronic industry should be able to manage the transition in a time-frame of 5 years. We see that a move to Au/Ni is not perfect from an environmental point of view but a complete transition to alternatives like Au/Fe within such a short period is not feasible. We will start investigations about the use of this less critical alloy and see where we can achieve technical satisfying results, but realistically considered we will need at least 10 years with a significant risk of failure.

Au/Ni is not a recommended replacement in the area of jewellery. Here we will look for alternative alloys. Also here a 5 years transition period is considered as realistic.

A specific case is the Sn/Co alloy. This coatings deposited from this alloy replaced recently the Sn/Ni coatings on fashion jewellery and articles like buckles etc. The reason was the allergic potential of nickel. To step back makes no sense at all. All in all the market of those coatings is quite small and we plan a replacement by precious metal coatings which will create much higher costs for this application. Low cost imports from outside of the EU may be the consequence.

3.3 Value Chain

The value of cobalt salts to industry, for gold alloy applications is shown below:

We estimate the amount of plated Hardgold based on gold-cobalt alloy to 8000 kg/a Europe wide. Taking the present gold price in account this is equivalent to roughly 320 Million €. Under the estimation that the value of gold is maximum 10 percent of the value of an electronic part (e.g. a connector), we look on a market of at least 3.2 Billion € in Europe.

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About Enthone

Enthone GmbH is a business of Cookson Electronics www.cooksonelectronics.com. The company is a global and leading supplier of high performance specialty chemicals and coatings. Enthone manufactures markets and distributes its functional, decorative and electronic processes that are used in printed wiring board, semiconductor, photovoltaic, automotive, energy, aerospace, jewellery, and plumbing applications. For more information, please visit http://www.enthone.com.

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