

Consultation No.5 : Hexavalent chromium (CR) passivation coatings

Title : Hexavalent chromium as an anti-corrosion in black color Zinc plated parts.

JBCE(Japan Business Council in Europe)

11 February 2005

- Do feasible substitutes currently exist in an industrial and/or commercial scale?
 - **There is no substitute of chemical treatment that can satisfy the needs for basic ant-corrosion performance, self-recoverability for flaw and appearance of black color.**
- Do any restrictions apply to such substitutes?
 - **Non.**
- What are the costs and benefits and advantages and disadvantages of such substitutes?
 - **1.The substitute (e.g. Cr+3) is inferior to Cr+6 in basic ant-corrosion performance, and has no self-recoverability for flaw.**
 - **2.The surface is not colored complete black. Especially on a wide and flat surface, we often find a Zebra-stripe pattern.**
- Please indicate a precise wording for this exemption.
 - **Hexavalent chromium as an anti-corrosion in black color Zinc plated parts.**

Check List

CRITERIA	INFORMATION supporting technical and scientific evidence
<p>1. Please describe the material / component of the electrical and electronic equipment that contains the hazardous substance.</p> <p>Please indicate the type and quantity of the hazardous substance used in the homogenous material. Please indicate the quantity of the substance in absolute numbers and in percentage by weight in homogenous material.</p>	<p>Black color Zinc plated parts (including screws).</p> <p>Hexavalent chromium that is contained in Zinc plated stratum.</p> <ul style="list-style-type: none"> • Quantity of the substance : 40~70 mg/m² • Absolute numbers ; <ul style="list-style-type: none"> e.g.(1) in Parts : 0.8~1.5 mg (parts size 100×100×t2 mm) e.g.(2) in Power tools : 3mg (average of 6 inch Circular Saw) • Percentage by weight : 0.1~0.2 % (in Zinc plated stratum)

<p>Please indicate the functionality of the substance in the material of the equipment.</p> <p>Please also provide an estimate of the annual quantities of the hazardous substance used in this particular application.</p>	<p>Functionality ; Anti-corrosion and Black coloring.</p> <p>Annual quantities for Power tools is about 40 kg/year.</p>
<p>2. Please explain why the elimination or substitution of the hazardous substance via design changes or materials and components is currently technically or scientifically impracticable.</p>	<p>1. The substitutes (e.g. Alkali caustic black treatment or Cr⁺³ oxide treatment) are inferior to Cr⁺⁶ oxide treatment in basic anti-corrosion performance. Farther more,the surface of parts is not colored complete black by Cr⁺³ oxide treatment,especially on a wide and flat surface,we often find white and black stripe (Zebra pattern).</p> <p>2. As another substitute,painting black by paints is no good for slide or ccontact portion that receives friction,because the paints comes off easily.</p>
<p>3. Please indicate if the negative environmental, health and/or consumer safety impacts caused by substitution are likely to outweigh the environmental, health and/or consumer safety benefits.</p> <p>If existing, please refer to relevant studies on negative impacts caused by substitution.</p>	<p>Corrosion spoils the life of EEE, sequentially we waste resources more.</p>
<p>4. Please indicate if feasible substitutes currently exist in an industrial and/or commercial scale.</p> <p>Please indicate the possibilities and/or the status for the development of substitutes and indicate if these substitutes will be available by 1 July or at a later stage.</p>	<p>There is no substituite that can satisfy the needs for basic anti-corrosion performance.</p> <p>The improved substitute will not be available by 1 July 2006.</p>
<p>5. Please indicate if any current restrictions apply to such substitutes.</p>	<p>Nothing.</p>

<p>If yes, please quote the exact title of the appropriate legislation/regulation.</p>	
<p>6. Please indicate the costs and benefits and advantages and disadvantages of such substitutes.</p> <p>If existing, please refer to relevant studies on costs and benefits of such substitutes.</p>	<p>1. Cr⁺³ oxide treatment takes a longer time than Cr⁺⁶ oxide treatment in the manufacturing process. Therefore it costs 50% more than Cr⁺⁶ oxide treatment.</p> <p>2. Alkali caustic black treatment or painting by paints costs almost same as Cr⁺⁶ oxide treatment.</p> <p>But alkali caustic black treatment is much worse in anti-corrosion performance, and also we can not adopt painting to the slide or contact portion.</p>
<p>7. Please provide any other relevant information that would support your application for an additional exemption.</p>	<p>I attached the complementary explanation and data for your reference.</p>

Complementary Explanation and Data

1. Why we need black.

I explain it by using our products “Power tools” as an example.

In the power tools field, black is the most acceptable and popular color, especially around the cutting blade or near cutting materials(works).

e.g (1) Circular Saw

In wood cutting, the color of wood is usually white (white wood), yellow or brown (teak or veneer.etc). Therefore we adopt black or silver for the saw base color, because we need clear contrast between wood and saw base to keep safe and comfortable operation.

e.g (2) Board Screw Driver

The situation is same as Circular Saw.

In screw driving on board, the color of board is usually white, ivory or gray. Therefore we adopt black for the front cap(locator) color, because we need clear contrast between board and front cap to keep easy aiming screw at the target on board.

Further more ,black eliminates the reflection of sun shine in out-door use.

As I mentioned above, we need black color around blade or near works, viewing from "Ergonomics Design".

eg.(1) 6inch Circlular Saw



eg.(2) 6mm Board Screw Driver



2. Anti-corrosion Comparison by Salt Spray Test

Treatment \ Time	Current black Zn plating (Zn plating with Cr+6 Oxide Treatment)	Substitute(1) (Alkali Caustic Treatment Without Zn plating)	Substitute(2) (Zn plating with Cr+3 Oxide Treatment)
SST Time	192 hr (white rust)	48 hr (white rust)	118 hr (white rust)

*Test Condition:

(1) Test is according to JIS C0023 "Salt Spray Test".

- Salt density : 100-200 g/L,
- ph : 1.8-2.2,
- Temperature : 30-40 .

(2) SST Time means the time length up to 5% of test samples get white rust.

(3) Test sample are black color Zinc plated M4x25mm screws except Substitute(I).

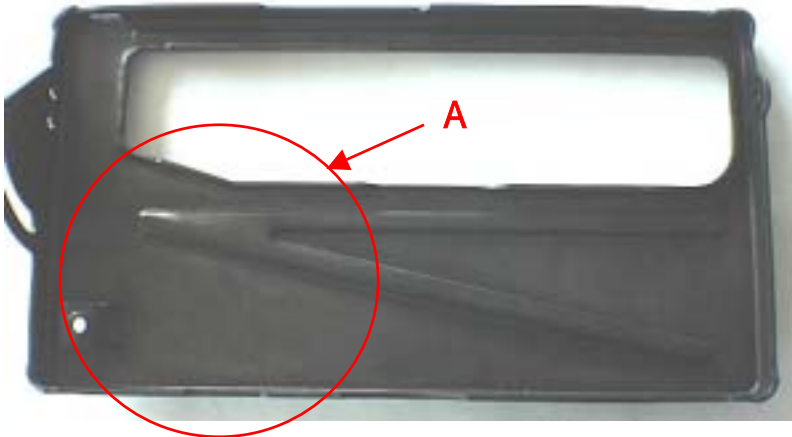
Substitute(I) is alkali caustic black treated M4x25mm screws(not Zinc plated).

3. Black color Appearance Comparison.

Current Saw Base
(Cr+6 Oxide Treatment)



Substitute Saw Base
(Cr+3 Oxide Treatment)



A enlarged view

