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Chrome (VI) - free surfaces

Yellow-, black-, and olive-chromated coatings contain significant amounts of chrome (VI). A conversion to chrome (VI) — free surfaces was decided on and will come into practice on the 1st of July 2006 for electrical and electronic devices and on the 1st of July 2007 for old vehicles (up to 3,5 to).

Guidelines for chrome (VI) – free surfaces are:

- EU Directive 2000/53/EG on end-of-life vehicles (ELV Directive)
- EU Directive 2002/95/EG regarding electrical and electronic equipment (ROHS guideline)
- EU Directive 2002/96/EG on the avoiding of waste from electrical and electronic equipment (WEE directive)
- EU Directive 76/769/EWG on the use and preparation of certain hazardous materials
- EU Directive 2003/11/EG; modification of Directive 76/769/EWG

Consequences for Fasteners
The requirements from these guidelines are relevant for the following coatings:

- galvanised chromed fasteners
- elements with non-electrolytic tempered galvanisation (e.g. Dacromet)

REYHER is keeping an eye on developments in this area and will analyse any possible effects on fastener technology.

Through our close co-operation with suppliers and galvanisers, REYHER can follow up with the progress made in process technology and will be able to provide up-to-date alternative protective coatings according to customers' individual requirements.

Up to now there is no trend clearly visible for a proper process in fastener technology. Currently the development of alternative technology has not brought the wished for results.

Possible chrome (VI) — free corrosion-protection-procedures:
With the change-over to new surfaces possible side effects should be considered (e.g. friction values, appearance, corrosion resistance, etc.). We advice caution and suggest to carry out assembling tests before starting-up series-production applications.

Chrome (VI) — free blue passivation
This coating, also called thin layer passivation, is comparable to blue chromating based on trivalent chrome. Corrosion protection up to onset of white rust is comparable with the effects of hexavalent tempered chromating.

A simple test to evaluate the differences between a (VI) or a (III) valent chromating is in preparation. Respective drafted guidelines are published.

Sealing
Subsequent “thin-layer-sealing” that is applied wet on wet to the passivated or chromated protective surface layer. The thickness of the sealing is approx. 2µm and offers corrosion protection to onset of white rust for up to 100 hours.

Thick layer passivation
Chrome (VI) - free immersion tempering for galvanised zinc coats. Thick layer passivation can reach corrosion protection levels comparable with those reached previously through yellow chromation. Their colours range from transparent to lightly iridescent. The well-known yellowish colour can not be realised using this technology.

The zinc-flake coating system
Non-electrolytic zinc coats with integrated aluminium flakes. This technology is described in the ISO 10683 norm. In most cases these coatings are used in connection with organic topcoats (seal-systems). They can be delivered in different colours as well as with lubricant-additives. The multilayer coating is approx. 6 to 12 µm and corrosion protection can extend from 600 to 800 hours salt spray test before the onset of red rust. This procedure is not suitable for small screws and nuts up to size M4.

Alternative coatings for fasteners

System	Corrosion resistance	Comments
Zn galvanisation, thin layer passivation, transparent	Low to average	▪ years of experience with series ▪ good applicability to small sizes
Zn galvanisation, thick layer passivation, transparent	Average	▪ partly poor experiences with fasteners ▪ corrosion resistance strongly dependent on geometry of parts and character of edges, as well as the process reliability of the thick film passivation
ZnNi galvanisation, thick layer passivation, transparent	High	▪ limited equipment availability for ZnNi ▪ partly poor experiences with fasteners ▪ corrosion resistance strongly dependent on geometry of parts and character of edges, as well as the process reliability of the thick film passivation
ZnFe galvanisation, black passivation	Average	▪ limited equipment availability for ZnFe ▪ the claim “after 240 hrs salt spray test no visible changes” cannot be complied with
ZnNi galvanisation, black passivation	Average	▪ limited equipment availability for ZnNi ▪ the claim “after 240 hrs salt spray test no visible changes” cannot be complied with
Zinc-flake coating, silver colour	High	▪ years of experience with series ▪ general problems with smaller sizes: bonding and not true to gauge
Zinc-flake coating with organic/ inorganic topcoat, silver colour	Very high	▪ years of experience with series ▪ general problems with smaller sizes: bonding and not true to gauge ▪ systems of other manufacturers are being tested ▪ optional: with the topcoat, various colours and lubricant-additives are possible

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