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1. European Union End of Vehicle Life Directives

1.1 European Union (EU) End of Life Vehicle (ELV) directives concerning the use and disposal of hexavalent chromate (Cr^{6+}) containing substances are to be implemented within Europe. In order to ensure that MG Rover vehicles are in full compliance with these ELV directives, Cr^{6+}containing coatings will not be permissible. Alternative Cr^{6+} free coatings, which will ensure that MG Rover vehicles are compliant with ELV directives, shall be utilised.

1.2 New Parts
From the date of issue all new or resourced parts must comply with the Cr^{6+} free requirements of this issue of the standard. This includes Standard Fastener coating designation 7.

1.3 Current parts
Current parts should be changed at the earliest opportunity, however they may be supplied in Cr^{6+} containing coatings which comply with other aspects this standard. From 01/01/2006 (12 months prior to the ELV directive implementation date) parts must be Cr^{6+} free to the requirements of the standard.

All changes to surface finish must be by prior agreement between the supplier, finisher, relevant MG Rover Engineering department, Materials Engineering and Product Change Control.

2. Scope

This Standard details the performance requirements for Cr^{6+} free, zinc flake coatings giving sacrificial protection to steel components. The coating shall take the form of zinc or zinc and aluminium flakes in a binding matrix. The coating shall be applied non-electrolytically from an organic or aqueous medium and baked/cured to give an adherent film. The film is not to be considered conductive in earthing applications and non-conductive topcoats are acceptable where performance requirements demand such a coating.

The specification covers components and fasteners including precision threaded items.

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3. Test Methods

The following test methods required in conjunction with this Standard.

MGR ES.06.01	MGR ES.30.CT.118	BS EN ISO 1463
MGR ES.08.06.109	MGR ES.30.CT.900	7479
MGR ES.30.CR.101	MGR ES.30.FP.105BS	

4. Applications and Restrictions

4.1 Applications

Zinc flake coatings are for use in the following applications:

4.1.1 where greater corrosion protection than electroplated or mechanically plated zinc coatings is required

4.1.2 Where avoidance of hydrogen embrittlement is necessary

4.2 Restrictions
These finishes are not appropriate for certain applications any proposals for the following applications must be referred to the Materials Engineer for evaluation and test.

4.2.1 The shape of certain parts may create difficulties in coatings by bulk process methods e.g. flat components such as washers, components that nest together.

4.2.2 Parts with shallow recesses such as crosshead screws and threads on small threaded c omponents (see also clause 4.3), which may fill with the coating, require special a pplication techniques.

4.2.3 The use of zinc coatings in locations capable of an electrolytic couple with stainless steels, brasses, bronzes, copper alloys or chromium plate will result in aggressive galvanic action and rapid deterioration of the finish.

4.2.4 Curing of certain systems is carried out at 300°C with a time at temperature of 15 to 30 minutes. This may cause tempering back to case hardened components and, though many spring steel applications successfully use this type of coating, settling in some hard drawn springs may be experienced. Coatings which cure at a temperature of 180°C - 200°C are better suited for such parts

4.2.5 The coating cannot be considered conductive for earthing or electronics applications. Non conductive top coats may be used to improve corrosion performance but must not affect the sacrificial nature of the coating.

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5 Precision Threaded Items

5.1 Standard parts designated RES.06.01 sixth digit code 7 shall be finished according to MGR ES.21.ZS.05.

5.2 Standard parts and drawn components which include ISO Metric threads, coated in accordance with this specification, shall comply with the torque / clamping requirements of MG RES.30.FP.105 without the addition of supplementary lubrication.

5.3 Dimensions :

5.3.1 Precision threaded components with small pitches, particularly internal threads, will suffer thread fill on a proportion of parts. This results in assembly problems due to tight threads.

5.3.2 The finish shall not impair the fit and function of the thread. Selection of coatings used, and the application technique shall ensure the finished components shall conform to thread gauging requirements specified in MG RES.08.06.109 on all parts supplied.

5.3.3 Coatings to this specification may be used on coarse threaded items of M8 internal threads or M6 external threads and above,

5.3.4 Threaded components smaller than those in clause 5.3.3 cannot be supplied to meet the requirements of this specification. Where a lower coating thickness and corrosion protection is acceptable this may, with the agreement of Fastener Development, be specified on the drawing.

6 General Requirements

6.1 Appearance and Finish

6.1.1 The coating will be silver-grey in appearance.

6.1.2 The finished article shall be completely clean, dry and free from clearly visible defects such as roughness, cracks, discoloration, discontinuous areas, peeling, flaking or blistering. All surfaces of the component shall be coated unless specified otherwise. Build up of tears, runs and puddles may be accepted where this does not impair function or corrosion performance.

6.2 Flexibility and Damage Resistance: Coatings shall withstand the ‘in service’ extension and compression of springs and the flexing encountered by the fitting of spring clips, without evidence of flaking or loss of adhesion to the base metal. Coated parts shall withstand reasonable handling and storage conditions without evidence of chipping or other coating damage.

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6.3 Process : The use of inhibited acid cleaning on threaded fasteners shall be restricted to parts of strength grade 8.8 or below. Fasteners of grade 10.9 or above must be mechanically (Blast) cleaned prior to the application of the coating.

7. Specific Requirements

7.1 Specific requirements are detailed in Table 2 and 8.3. Drawings currently marked RES.21.ZS.05 Class A or Class 240 shall meet the requirements of this issue.

7.2 The coating may be identified on a section cut through the component, polished, and viewed at not less than X400. The coating consists of a laminar flake structure, flake dimensions of the order 0.2 - 0.4 µm thickness and 20 - 30 µm length.

7.3 Coating weight shall be deemed as the referee method for the evaluation of precision threaded fasteners. For other components coating weight determinations may be carried out but local thickness requirements shall also be met.

7.4 There shall be no rusting of the substrate after saltspray. The presence of slight surface zinc oxidation (white staining) shall not constitute failure.

7.5 The coating shall be Hexavalent chrome free in accordance with the ELV directive.

8. Use of Specification on Drawings

8.1 Drawings of components and assemblies to be finished to meet the requirements of this specification shall be marked

Finish to MGR ES.21.ZS.05

i.e. no further suffix is required for the basic product

8.2 If, due to the restrictions in clause 4.2, or for technical reasons, a particular finish is required, this may, in agreement with the Materials Engineering be specified on the Engineering Drawing ie

Finish to MGR ES 21 ZS 05 DELTATONE

If additional coating performance over the basic grade (including Class B or Class 480) is required this shall be marked as a time to rust in neutral saltspray ie

Finish to MGR ES 21 ZS 05 480

where 480 is the time to rust in when tested to BS 7479 NSS

8.3 Where a specific colour is required this shall be added as a suffix ie.

Finish to MGR ES 21 ZS 05 BLACK

8.5 In every instance all other aspects of the standard shall be met unless specifically exempt. Combinations, listed in the order above, are acceptable.

TABLE 2. TEST REQUIREMENTS

TITLE: Sacrificial Zinc Flake Coatings

PROPERTY	TEST METHOD	REQUIREMENTS
Local coating thickness (see clause 7.3)	BS EN ISO 1463	5μm MIN
Coating weight (see clause 7.3)		20g/m2 MIN
Salt spray resistance (see clause 7.4)	BS7479	240 Hrs
Humidity / Adhesion	RES.30.CT.900 RES.30.AD.102	168 Hrs
Requirement. No blistering, peeling or flaking no loss of adhesion before or after test (cross hatch as appropriate or tape pull only on small fasteners)		
Resistance to fluids i) Initial fill engine oil 168 Hrs @ 120°C ± 2°C ii) Unleaded gasoline 168 Hrs @ 20°C ± 5°C iii) Diesel Fuel 168 Hrs @ 20°C ± 5°C iv) Anti-freeze: 50% v/v water / ethylene glycol, 168H @ 100°C ± 2°C	RES.30.CR.101	No significant softening or other detrimental effect on the coating
v) Brake Fluid 5 mins immersion 48 Hrs vertical drain	RES.30.CR.103	
Torque / tension performance precision threaded Fasteners only	RES.30.FP.102	μ = 0.15 ± 0.03