APPLICATION OF ZINC PLATING TO CARBON AND LOW ALLOY STEELS

1.0 SCOPE

1.1 This Specification covers the application and/or process to obtain steel surface plating with reduced galling characteristics, improved adherence of petroleum based lubricants (rust preventatives).

2.0 ACCEPTANCE CRITERIA

2.1 The plating vendor is responsible for compliance with this technical data sheet. Manager QC is responsible for compliance of this specification through regular audits at the vendor.

2.2 Zinc plating's produced in accordance with this Specification shall be in the range of **5.0 to 8.5 gm/ft2**. The thickness of the plating should be approximately **0.008 to 0.013** mm within this weight range. The weight and thickness of the applied plating will vary and will be dependent upon the alloy content of the steel.

2.3 Surface Appearance: The Zinc plating shall be even and continuous over the entire surface of the part.

2.3.1 Unless otherwise specified on the drawing or router, the entire surface of the part shall be zinc plated. After plating, the part shall be examined by the plating personnel to verify that all surfaces are coated, including holes and cavities.

2.3.2 The zinc plated surfaces will not normally appear as smooth as the original metal surfaces prior to the plating process.

2.3.3 Any plated surfaces which have rusty spots following completion of the process shall be reprocessed through the entire plating system.

2.3.4 Residue forming a roughened or crinkled surface shall be cause for reprocessing.

2.3.5 Smut, blotchiness, or loose plating on the surface shall be cause for reprocessing.

2.3.6 Parts that have been re-machined, butted, or sanded shall be reprocessed.

3.0 PLATING QUALIFICATION

3.1 The inspections for plating qualification shall be performed by SARA SAE Quality Control. Qualification records shall be maintained to support the quality of the plating.

3.1.1 Plating Weight: The weight of the applied plating shall be determined by using test specimens having a minimum surface area of four square inches and a maximum of fifty square inches. ASTM B-767 shall be used for the chemical strip.

3.1.1.1 The plating weight shall be determined using the following formula:

$$\text{Wt. } \frac{\text{mg}}{\text{ft}^2} = \frac{\text{Initial Plated Specimen Wt. (mg) - Final Stripped Specimen Wt. (mg)}}{\text{Total Specimen Area (ft}^2\text{)}}$$

3.1.1.2 The minimum acceptable weight shall be 900 mg / ft^2.

3.1.2 Plating Thickness: The plating thickness shall be determined by using a specimen of known dimensions, measured prior to plating.

3.1.2.1 The thickness shall be determined by the plating thickness gauge or following formula :

$$\text{Plating Thickness} = \frac{\text{(Measurement After Plating) - (Initial Measurement Prior to Plating)}}{2}$$

3.1.2.2 The minimum acceptable plating thickness shall be **0.008** mm.

3.1.2.3 A standard test coupon plated under similar condition will be provided by the plating vendor with each lot of plating as per clause 3.1.1.

4.0 ZINC PLATING APPLICATION PARAMETERS

4.1 The following procedure lists the basic processing parameters (reference ATOTECH technical data sheet DUO ZINC 600).

4.1.1 The surface of part shall be machined & surface finish should be as per drawing or specification.

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4.1.2 Visually inspect parts to verify that all dirt, grease, oxide, scale & pitting or dents is removed. If part is not properly cleaned, return to 4.1.1.

4.1.3 **Zinc plating make up:-**

4.1.3.1 **a) Zinek 501:-**

4.1.3.3.1 Product: - Zinek Zinc Salt.

4.1.3.3.2 Concentration: 200 gm / liter.

4.1.3.3.3 Temperature: 25 – 45 °C

4.1.3.3.4 Soak Time: 15 to 45 minutes, depending upon size of load, temperature, and strength of bath.

4.1.3.2 **b) Duo Brightener 666:-**

4.1.3.4.1 Product: - Duo Zinc Brightener.

4.1.3.4.2 Concentration: 3 – 5 ml / liter.

4.1.3.4.3 Temperature: 25 – 45 °C.

4.1.3.4.4 Soak Time: 15 to 45 minutes, depending upon size of load, temperature, and strength of bath.

4.1.3.3 **c) Unicol – A Purifier:-**

4.1.3.3.5 Product: - : Unicol Purifier.

4.1.3.3.6 Concentration: 2 ml / liter.

4.1.3.3.7 Temperature: 25 – 45 °C

4.1.4 **Operating Condition**

Temperature	25 - 45 ° C
Cathode C D	2 - 5 Amp / dm^2
Anode C D	4 - 7 Amp / dm^2
Agitation	Cathode Rod Movement
Filtration	Periodic
Voltage for vat	3 - 6 Volts
Voltage for Barrel	12 - 16 Volts

4.1.5 **Maintenance:** - Zinc metal content, caustic soda and sodium cyanide should be maintained as follows by analytical control.

	Optimum
Zinc Content as metal	30 - 34 gm / liter
Total Sodium Cyanide	80 - 90 gm / liter
Total Sodium Hydroxide	70 - 80 gm / liter
Duo Zinc Bri. 666	100 ml / 1000 A.H. for vat
	150 ml / 1000 A.H. for barrel
Unicol – A Purifier	0.2 ml / liter daily addition

4.1.6 **Equipment:** - Mild steel tanks lined with plastic or hard rubber is suitable. Cooling arrangement is recommended for barrel plating tanks to maintain the temperature below 40 °C.