APPLICATION OF CADMIUM 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 Cadmium plating's produced in accordance with this Specification shall be in the range of **2.5 to 10 gm/ft^2**. The thickness of the plating should be approximately **0.003 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 Cadmium 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 Cadmium 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 Cadmium 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.

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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 2.5 gm/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 0.003 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 CADMIUM PLATING APPLICATION PARAMETERS

4.1 The following procedure lists the basic processing parameters (reference GROWEL technical data sheet).

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

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 **Cadmium plating make up:-**

4.1.3.1 **a) For General Purpose plating :-**

4.1.3.3.1 Product: - Cadmium Brilliant Salt.

4.1.3.3.2 Concentration: 150 gm / liter.

4.1.3.3.3 Temperature: Room Temperature

4.1.3.3.4 Soak Time: 65 to 70 minutes, depending upon size of load, temperature, and strength of bath.

4.1.3.2 **b) Cadmium Brightener :-**

4.1.3.4.1 Product: - Cadmium Brightener No. 1

4.1.3.4.2 Concentration: 10 ml / liter.

4.1.3.3 **c) Cadmium Brightener:-**

4.1.3.3.5 Product: - Cadmium Brightener No. 2

4.1.3.3.6 Concentration: 8 ml / liter.

4.1.4 **Operating Condition**

Density	8 ° Be
Temperature	20 - 40 ° C
Cathode C D	1 - 3 Amp / dm^2
Anode C D	1 - 3 Amp / dm^2
Filtration	Occasionally
Voltage for vat	1.5 - 2.5 Volts
Voltage for Barrel	8 - 14 Volts
Rate of Decomposition	0.8 microns / minuts at 2 A / dm^2
	0.4 microns / minuts at 1 A / dm^2

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

	Optimum
Cadmium Content as metal	12 - 15 gm / liter
Total Sodium Cyanide	90 - 110 gm / liter
Total Caustic Soda	20 - 30 gm / liter

Brightener is stable, one or two small additions are required for 8 hours work to maintain uniform brightness of deposit.

Consumption of Cad Brightener is approximately 250ml / 1000 ampere hours.

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.