

Cold Galvanizing Compound ROVAL

Surface Preparation & Coating Guide



1.0 INTRODUCTION

1.1 Scope

This guide covers Cold Galvanizing Compound ROVAL for use on steel or galvanized surfaces either in factories or construction site.

Surface preparation is the essential first stage treatment of a substrate before the application of any coating. The performance of a coating is significantly influenced by its ability to adhere properly to the substrate material. It is generally well established that correct surface preparation is the most important factor affecting the total success of surface treatment. The presence of even small amounts of surface contaminants, oil, grease, oxides etc. can physically impair and reduce coating adhesion to the substrate.

Chemical contaminants that are not readily visible, such as chlorides and sulphates, attract moisture through coating systems resulting in premature failure. In summary, the importance of a chemically clean substrate to provide the best possible contact surface for the applied coating cannot be over-emphasized.

The first half of this guide describes surface preparation of metal surfaces for the subsequent application of paint for corrosion protection, both in new construction and maintenance processes. The last half of this guide describes ROVAL painting and coating inspection.

2.0 SURFACE PREPARATION

2.1 General

Surface preparation greatly affects the anti-corrosion performance.

ROVAL products requires direct contact between the zinc dust in the film and the metal substrate for optimum performance. Without direct contact, no galvanic action can occur.

For optimum paint performance, surfaces to be painted or coated shall be completely dry and free from burrs, weld spatter, flux, rust, loose scale, dirt, dust, grease, oil and other foreign matter deleterious and harmful to paint. After preparation of substrate surface, any grit or dust shall be removed and ROVAL applied before any corrosion or recontamination occurs, normally within four (4) hours after blasting. Surface preparation shall be verified before the ROVAL coat is applied to ensure all traces of dust and foreign matter have been removed by brushing, blowing with dry clean compressed air or vacuum cleaning.

	Steel surface		Galvanized surface	
Purpose	Hot-dip-galvanizing alternative	Long-term rust prevention	Improved anti-corrosion performance of new galvanized surfaces. Renovation of old galvanized surfaces.	
Surface condition	Mill scale, Red rust, Old paint film, Welded part		Red rust, Old paint film, Welded part	No red rust (Only white rust)
Surface preparation	ISO 8501 Sa2.5 Remove all the rust and mill scale by sandblasting	ISO 8501 St3 Use a power tool to expose a clean metal surface.	ISO 8501 St2 use a hand tool to remove white rust.	

2.2 Pre-Cleaning of Surfaces and Solvent Cleaning

This cleaning process is mandatory before further cleaning or surface preparation. Prior to the actual cleaning operation, surface contaminants such as oil, grease, hydrocarbon etc. shall be removed preferably by degreasing with suitable degreaser or solvent cleaning according to SSPC-SP1. The degreased surface shall be further washed or rinsed down with fresh water to remove all traces of the degreaser chemicals. The surface shall be allowed to dry thoroughly before proceeding with any further coating work. This process also applies to all metal surfaces to be coated that do not require blast cleaning or power tool cleaning.

Excessive rust scale shall be removed by impact cleaning tools or high pressure water jetting. All edges shall be ground to a minimum radius of 2 mm. Flame cut areas shall be ground flush.

2.3 Surface Preparation by Blast Cleaning

Blast cleaning shall be carried out through ISO 8504-2 to the required visual standard in accordance with ISO 8501-1 or equivalents. All surfaces, where accessible shall be prepared by abrasive blast cleaning to a minimum of SA 2.5 ISO 8501-1(SSPC-SP10)

2.4 Blasting Abrasives

Blasting abrasives for use in blast cleaning carbon steel and low alloy steel are specified in ISO 8504-2. Recommended blasting abrasives are as follows, but not limited to:

- a) Chilled iron grit or shot
- b) Steel and malleable iron grit or shot
- c) Natural mineral abrasives
- d) Non metallic abrasives (aluminum oxide, garnet etc)

2.5 Techniques and Constraints

Blast cleaning shall not be carried out when the temperature of the surfaces to be coated is less than 3° Celsius above the dew point or when the relative humidity of the air is greater than 85 %.

Abrasive blasting shall not be done in open areas close to painting operations or wet coated surfaces to prevent dust and grit contamination. Normally grit blasting shall be permitted only during daylight hours except that rough grit blasting will be allowed during the night provided that the surface is subsequently blasted to the specified standard under good light conditions. The illumination of the surface during final blasting shall be at least 500 Lux and all environmental restrictions are observed.

All welded areas and appurtenances shall be given special attention for removal of welding flux in crevices. Welding spatters, slivers, laminations and underlying mill scale not removed during fabrication and exposed before and during blast cleaning operations shall be removed by the best mechanical means and the edges smoothed or rendered flush. Where rectification is necessary on abrasive blast cleaned surfaces, the dressed areas shall be re-blasted to remove all rust, slag and grit and to provide an adequate anchor pattern.

Blasting shall continue a minimum of 25 mm into any adjacent coated areas and the edges shall be feathered. After dry blast cleaning, no acid washes, cleaning solutions, solvents or other chemical treatment shall be used on metal surfaces. This restriction includes inhibitive washes to prevent rusting. Any blast-cleaned steelworks on which rust develops shall be re-blasted prior to being painted.

2.6 Surface Preparation by Hand and Power Tool Cleaning

The most technically effective surface preparation method is blast cleaning. Manual preparation shall only be used when blast cleaning is either not feasible or not strictly required eg. galvanize steel and stainless steel.

Manual cleaning shall be performed using hand wire brushes or mechanically operated tools (grinders, chippers, wire brushes) in accordance with ISO 8504-3. Where welds occur within these areas or when these areas cannot accommodate a power disc, power impact tools shall be applied (vibratory and rotary hammers, needle guns, chisels) followed by brush cleaning.

If the surface being prepared lies adjacent to a coated surface which is not to be refurbished, the power tool cleaning shall overlap the coated surface by at least 25 mm. The minimum requirement for successful coating application is St 3 ISO 8501-1

(SSPC-SP3) at the time of coating. Care shall be taken to ensure that the substrate surface does not become polished during power tool cleaning.

3.0 PAINT APPLICATION

3.1 Pre -Application Procedures

3.1.1 General

Any surfaces to be coated shall be dry and rendered dust free prior to application of ROVAL coat. This can be accomplished by blowing off the surface with clean dry air or using an industrial vacuum cleaner together with a clean dry stiff brush. The blasted surfaces shall be examined for traces of smudge, oil, grease or other contamination and also tested for the presence of soluble salts. If present they shall be removed by solvent washing or for salts by water washing or steam cleaning and the areas re-blasted

3.1.2 Adequate Agitation of Products

Because ROVAL products contains a lot of powdered zinc, the contents may settle at the bottom of the can. Use a power paint mixer to obtain uniform density. Dilution is not required. Only when the product thickens, use thinner within 5% of paint weight.

If during stirring air is entrapped in the product, sufficient time should be allowed for air bubbles to escape, before application is started. This is to reduce the risk of pin-holing of the coating layer to be produced.

3.1.3 The Others

Stir appropriately during painting to prevent settling. Close the lid when you interrupt the paint to prevent the evaporation of thinner.

The rest of the paint can be kept in a closed container. Store in a well-ventilated place and keep cool.

3.2 Conditions

Unless accepted by the Customer, paint shall NOT be applied when:

- a) Incomplete surface preparation or oil, grease and dust still present on substrate to be painted.
- b) The surface temperature is less than 3 °C above Dew point.
- c) The air or surface temperature is below 5 °C as it would adversely affect curing of Paint.

- d) The relative humidity of air is greater than 85 %.
- e) The metal substrate temperature is higher than 50 °C.
- f) There is a likelihood of an adverse change in weather conditions within two hours after application that would result in a drastic drop in air temperature below those as specified above.
- g) There is a deposition of moisture in the form of rain, condensation etc. upon the surface.
- h) The available light is less than 500 Lux.

Blast cleaned or power disc grinded surfaces shall be coated within four (4) hours after blasting or power grinding or within such other limits as may be specified and before any visible rusting occurs.

3.3 Application Methods

3.3.1 General

Coatings shall be uniformly applied without runs, sags, solvent blisters, dry spray or other blemishes. All blemishes and other irregularities shall be repaired or completely removed and recoated. Special attention shall be paid to crevices, corners, edges, weld lines, bolt heads, nuts and small brackets to apply the specified minimum dry film thickness by brush application if spray will not completely cover all surfaces.

[Method]

Brush / Roller	Dilution is not required. Only when the product thickens, use thinner within 5% of paint weight.	
Conventional spray	Use Gravity feed spray gun. Nozzle size: 1.5 ~ 2.0 mm Pressure: 0.3 MPa Paint strainer: #100 Dilution: 0 ~ 5% (ROVAL , EPO ROVAL) 5 ~ 10% (ROVAL SILVER)	
Air-less spray	Tip size: above 0.017 inches (e.g. 517) Pressure: above 20 MPa Gun filter: #50 ~ 60 Dilution: 0 ~ 5%	
Type of Thinner	ROVAL THINNER (or Aromatic thinner like Xylene)	ROVAL ROVAL SILVER
	EPO ROVAL THINNER	EPO ROVAL

3.3.2 Spray Application

Paints shall be applied by Air Spray (Conventional) or Airless Spray. Hose and containers, lines and pots shall be thoroughly cleaned before addition of new materials. Uniform parallel passes should be made with the spray gun. Each spray pass shall overlap the previous pass by 50%. Large surfaces should always receive passes in two directions at right angles to each other.

Each coat is to be applied uniformly and completely over the entire surface. All runs and sags shall be brushed out immediately or the paint removed and the surface re-sprayed. Before spraying each coat, all areas such as corners, edges, welds, small brackets, bolts, nuts and interstices shall be pre-coated, usually by brush to ensure that these areas have at least the minimum specified film thickness.

3.3.3 Brush Application

Brush application may be used under the following circumstances:

- a) When spraying for any reasons cannot properly coat areas.
- b) When spray application is deemed to be difficult, adverse to the required quality finish, uneconomical or may affect other plant, equipment property, personnel etc. due to location of work accessibility.
- c) For "touch-up" or repair to localized damaged paint areas or areas of incorrectly applied paint.
- d) For application of initial stripe coat of paint to corners, edges, crevices, holes, welds or other irregular surfaces.

Paint brushes used shall be of a style and quality that will permit proper and appropriate application of paint. Good quality hog bristle is preferred and nylon or other synthetic bristle types are prohibited. Round or oval brushes are considered most suitable for rivets, bolts, irregular surfaces etc. Wide flat brushes are suitable for large flat areas but not to exceed width of 120 mm. Brushes shall be kept in good condition at all times and discarded if damaged or excessively worn. The brushing shall be done so that a smooth coat, as uniform in thickness as possible is obtained.




Paint shall be worked into all crevices and corners. Runs and sags shall be brushed out. During application of each coat, all areas such as corners, edges, welds, small brackets, bolts, nuts and interstices shall receive additional coating material to ensure that these areas have at least the minimum specified film thickness and to ensure continuity of coating.

3.4 Repair of Defects

All damages to coating film shall be repaired. All loose paint shall be removed to a firm edge.
 All surface irregularities and contaminants shall be removed.
 Areas with inadequate coating thickness shall be cleaned and repaint.

4.0 PRODUCT SELECTION

Select the product from the chart below in accordance with the anti-corrosive performance and surface color. **Select EPO ROVAL if you apply other manufacturer's topcoat paint.** The film of ROVAL series weathers the same as hot-dip galvanized materials by exposure. This characteristics makes repaired unapparent.

Product name	Product features
 ROVAL	Zinc content: 96% Color: Gray Equivalent anti-corrosion performance to hot-dip galvanizing. Comply with ASTM A780
 ROVAL SILVER	Zinc content: 83% Color: Silver Finishes in a color similar to hot-dip galvanizing.
 EPO ROVAL	Zinc content: 96% Color: Gray Possible to apply top coat from other companies. Comply with ASTM A780

(1) **ROVAL + ROVAL** (Color: Gray)

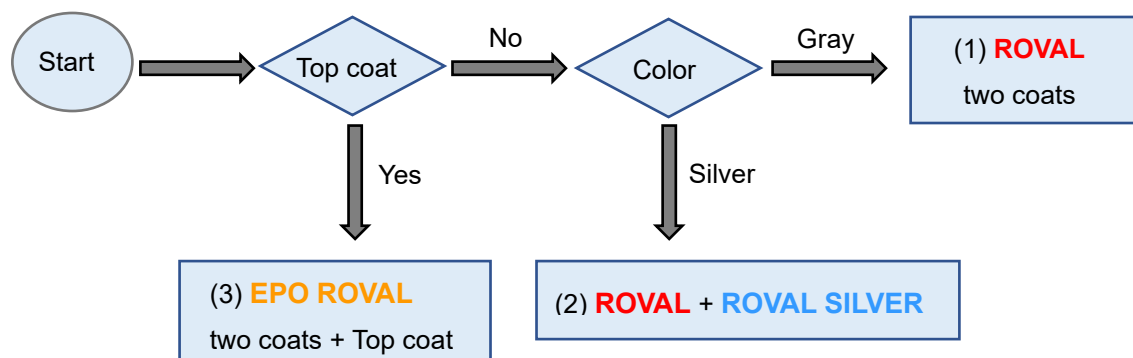
This system brings you the highest anti-corrosion performance along with the lowest cost among other systems.

(2) **ROVAL + ROVAL SILVER** (Color: Silver)

ROVAL SILVER contains zinc with aluminum pigment which makes surface color silver. Its anti-corrosion performance is far superior to other conventional paints.

(3) **EPO ROVAL + EPO ROVAL**

EPO ROVAL can be coated by other top coat paints which are compatible with galvanized surfaces. The anti-corrosion performance is the same as ROVAL + ROVAL.



5.0 Coating Specifications

(1) **ROVAL + ROVAL**

(2) **ROVAL + ROVAL SILVER**

	Theoretical Coverage (g/m ²)	Practical Coverage		DFT (µm)
		BRUSH (g/m ²)	SPRAY (g/m ²)	
(1 st coat) ROVAL	250	300	325	40
(2 nd coat) ROVAL or ROVAL SILVER	250	300	325	40
Total	500	600	650	80

(3) **EPO ROVAL + EPO ROVAL + Top coating** (other companies)

	Theoretical Coverage (g/m ²)	Practical Coverage *1		DFT (µm)
		BRUSH (g/m ²)	SPRAY (g/m ²)	
(1 st coat) EPO ROVAL	250	300	325	40
(2 nd coat) EPO ROVAL	250	300	325	40
Total	500	600	650	80
Intermediate coat	Use modified epoxy paint for galvanized surfaces. *2			
Final Coat	Use urethane or fluorine paint (Refer to manufacturers guide)			

*1 Practical coverage includes 20% of loss for brush application, and 30% for spray application

*2 Different types of paint may be exposed to a serious bubble phenomenon, please do mist treatment.

* Do not use Alkyd, phthalic, oil-based paints, because they will case the film peeling off.

* Consider EPO ROVAL film as galvanized surface, ask the manufacturer about the compatibility with galvanized surface.

5.1 Options



By spraying MC from the top of ROVAL, the repaired part can be color-matched in the same way as the surrounding plating. After ROVAL painting, dry for 24 hours and then spray MC.

5.2 Coating Interval

Apply second layer after the adequate cure time.

Recoating too soon may result in premature failure due to solvent entrapment in first coat.

[Dry Film Evaluation]

Push the thick part of the film strongly with a finger. Make sure there is no impression of finger prints or move of the layer. Rub the surface repeatedly with a fingertip, make sure there is no impression or finger mark.

Temperature(°C)	5	10	20	30	40
ROVAL Series Coating Interval (min)	60	40	30	10	5
Apply MC on ROVAL or Apply other companies paint on EPO ROVAL	36 hours	24 hours			

6.0 INSPECTION and RECORD

6.1 The following inspection and record shall be carried out in this procedure. Surface shall be accessible until final inspection is carried out.

6.2 Carry out regularly inspections and keep records in accordance with followings.

- a) Temperature and relative humidity shall be measured by means of a temperature gauge and hygrometer. Reading shall be taken at regular intervals, depending on change in climatic condition.
- b) Coating must be applied within four (4) hours of the surface preparation.
- c) Individual coat and completed coating shall be visually inspected for appearance. Coatings shall be smooth and free from cracking, blistering, dry spray and sagging.
- d) Dry film thickness measure at least 4 points randomly and all the results should be above 80µm. DFT shall comply with SSPC-PA2 respectively.

6.3 Coating shall be removed and repainted if the specification reveals the following:

- a) Coating not adhering to surface to which it is applied.
- b) Surface has not been properly blasted and/or clean.
- c) Loose or scaling paints remains.

- d) Foreign matter (contamination) embedded into coated surface.
- e) Freshly coating surface is wet from rain, high humidity or low dew points.
- f) For other reason that will impair the coating performance.

7.0 SAFETY

- 7.1 All safety and regulations of Malaysian and local laws and insurance underwriter regulations shall be adhered to in the storing, handling, use and application of paints, thinners, solvents, etc.
- 7.2 Smoking, open fires, or sparks will not be permitted in confined areas that are being or recently have been painted and are emitting flammable solvents.
- 7.3 All equipment recommended lifting up by using the lifting lug attached due the painting work to avoid any damage or uneven distribution of paints on the equipment main body.
- 7.4 Use of Personal Protective Equipment (PPE) shall be mandatory to avoid any incident / accident / health hazard during blasting and painting activities.

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