

PROCESSING GUIDELINES

TUBALL[™] MATRIX 815/821 beta for powder coatings

Principles Procedure Industrial examples

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PRINCIPLES

- For conductive powder coatings TUBALL[™] MATRIX 815 beta or TUBALL[™] MATRIX 821 beta should be applied, which are available in black flakes close to a powder form.
- Uniform distribution of TUBALL[™] MATRIX 815/821 beta in the system plays a key role in enhancing the electrical conductivity of the final coating. In order to obtain a highquality TUBALL[™] MATRIX 815/821 beta dispersion, OCSiAI recommends that close attention be paid to the dilution procedure.
- The usual processing procedure for TUBALL[™] MATRIX 815/821 beta in powder coatings does not require changes to the standard powder coating production process.
- TUBALL[™] MATRIX 815/821 beta should be added at the pre-mixing stage.
- It is possible to use two-stage processing of TUBALL[™] MATRIX 815/821 beta:
 - Production of masterbatch based on TUBALL[™] MATRIX 815/821 beta and base resin;
 - 2. Use of masterbatch with TUBALL[™] MATRIX 815/821 beta in the standard powder coating production process.
- The processing parameters given below are examples to demonstrate the basic principles of diluting TUBALL[™] MATRIX 815/821 beta. For some systems, individual optimisation of parameters may be required.



PROCEDURE

STEP 1

Use the percolation curve below (Figure 1) to determine the target dosage of TUBALL[™] MATRIX 815/821 beta as a starting point for your formulation. Resistivity values in units Ohm/sq are shown for dry coating thickness of 50 µm. The TUBALL[™] MATRIX 815/821 beta dosage should be calculated according to the whole formulation.

Recommended TUBALL™ MATRIX 815/821 beta starting dosage	Target resistivity (at coating thickness of 50 μm)	
0.2 wt.%	108–106 Ω/sq	
0.5 wt.%	10 ₆ –10₄ Ω/sq	

Figure 1. The effect of TUBALL™ MATRIX 815/821 beta dosage on resistivity



* ANSI ESD STM 11.11



STEP 2

Use TUBALL[™] MATRIX 815/821 beta in the standard way from the beginning of the powder coating production process.

Add TUBALL[™] MATRIX 815/821 beta to other components of the system at the dry mixing the stage. Mix all components as usual. No special optimization is required for using of TUBALL[™] MATRIX 815/821 beta at this stage.

Continue further steps of your standard procedure through extrusion and grinding.



Preliminary masterbatch production (optional)

Prepare a masterbatch of TUBALL[™] MATRIX 815/821 beta in base resin via extrusion before using in powder coating.

Go through STEP 1 and STEP 2 and use the prepared masterbatch as usual with all other components.



INDUSTRIAL EXAMPLES

Example №1

System: Epoxy-polyester hybrid

Component	Industrial example	Concentration, wt.%
Resin Carboxylated polyester	Crylcoat 1703 by Cytec	68.95
Resin Epoxy oligomer	D.E.R 663 UE by Dow	29.55
Additive Benzoin	Cafforo	0.50
Additive Flowing agent	Resiflow PV 88 by WorLEE	1.00

Achieved resistivity: 107 Ohm/sq at 0.2 wt.% MATRIX 815/821 beta

Procedure: Powder coating was produced in five steps:

- 1. Dry mix all components using high speed mixer or ball mill,
- 2. Melt mixing via twin-screw extruder with temperature of 120-130 °C,
- 3. Cooling of melted mix and grinding,
- 4. Application of coating using electrostatic spray gun (dry layer thickness 50 μm),
- 5. Curing in electric convection oven at 180 °C for 15 minutes.

Example Nº2 (with masterbatch production)

System: Polyester.

Achieved resistivity: 106 Ohm/sq at 0.2 wt.% TUBALL™ MATRIX 815/821 beta.

Procedure: Samples were weighed and premixed in a high-speed mixer and extruded with an APV 19 mm extruder. Samples were prepared via two-stage technology:

- 1. Production of masterbatch with TUBALL[™] MATRIX 815/821 beta. The masterbatch was extruded at 250 RPM with both zones set to 100°C, at 65-75% torque,
- 2. Production of powder coating composition. The powder coating samples were extruded at 500 RPM at 100°C and 45-55% torque,
- 3. Electrostatic powder spraying onto cold rolled steel substrate with a Nordson Encore at 80kV and 20µA,
- 4. Curing specimens in an electric convection oven for 10 minutes at 200°C substrate temperature.



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