COLIBER® POWDER COATINGS

TECHNICAL DATA SHEET

Type of coating	**PA - POLYESTER POWDER COATINGS**
Color	RAL 9006
Symbol	PA142/0/2326/20FX
Surface	Coarse structure
Gloss level	Semi-gloss
Characteristics	- Outdoor, industrial application - Good weather resistance - Good chalking resistance - Very good covering power - Decorative and metallic effect
Applications	Agricultural machinery, furniture and garden tools, machine casings, mailboxes, etc.

Powder properties	**Particle size (Malvern)**	Fine powder suitable for electrostatic spray (corona)
	Density (g/cm³) ISO 8130-2	1,481
	Theoretical coverage (m²/kg)	~8 by the film thickness 90 µm and 100 % use of powder coating.
	Storage stability	24 months from the date of production, in the orginal, unopened package, keep away from heat sources, in the temperature of 5 – 25°C, protect from moisture. No direct sun exposure. The product should be stay at ambient temperature (paint shop) 12h before use.

Coating film tested in lab conditions on: steel panel	**Thickness** ISO 2808	recommended 90-120µm	
	Gloss (60°) ISO 2813[1] VISUAL[2]	semi-gloss	
	Cross cut ISO 2409	0	
	Mandrel bending ISO 1519	<5 mm	
	Erichsen cupping ISO 1520	>5 mm	
	Impact resistance ISO 6272-1	front reverse	>50 kg/cm <50 kg/cm
	Buchholz hardness ISO 2815[3]	n/d	
	Pencil hardness ISO 15184[3]	n/d	

(1) applies to smooth and no metallic coatings film
(2) applies to structural and metallic coatings film
(3) not applicable structural coatings film

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Surface pretreatment	- The overall quality of the coating film depends on the type and quality of the pretreatment. - Surfaces must be dry, degreased and free from rust and other contaminants. - In order to improve coating adhesion to the surface and improve resistance it is recommended: aluminium - chromating, chrome-free pretreatment or anodic pretreatment. steel and galvanized steel - individual choice of surface pretreatment (e.g. phosphating). - However, in order to achieve optimum results, you must follow the instructions and recommendations of the pretreatment material manufacturer.
Application	- Electrostatic gun - corona (recommended voltage - 60 kV). - In case of use tribo gun a flattened structure is obtained. - Application parameters depend on the geometric shapes of the detail and the film thickness to be reached. - Responsibility for the correct application parameters lies on the coating applicators. - Despite careful production methods, slight deviation of color and effect between the different manufacturing batches may occur (typical for powder coatings). - Various application parameters may cause color/effect changes. - Proper grounding of application equipment and coated elements helps to keep repeatability of the obtained color/effect. - It is recommended to do the entire order on the same equipment, with the same application parameters and using powder coating from one production batch. - Not be mixed with other powder coatings. - Control the air speed during application of powder coatings. - Keep the appropriate distance: the gun - coated elements. - Keep a uniform thickness of coating.
Curing conditions	- Curing time recommendation in a convection oven: **180°C/10min.** **170°C/15min.** (object temperature) - Must be strictly observed parameters of stoving the coating film to ensure that the full mechanical and chemical properties. - Suitability of the product for stoving in gas ovens and radiant ovens should be verified - may be a significant difference in color - perform a comparative test with the standard color (please contact us for details).
Approvals	- The powder coatings are in compliance with 2011/65/EC and 2015/863/EC (so called ROHS). - Heavy metal and TGiC free.
Technical recommendations	- In the case of cleaning powder coated surfaces it is necessary strict compliance with the Technical recommendations 01: Cleaning of powder coated surfaces. - Detailed information of the usage of metallic powder coatings are in the Technical recommendation 04: The application of metallic powder coatings. -Detailed information of the usage of the product are in the Technical recommendation 06: The use of powder coating with medium and coarse structure.
Comments	- To print, to glue, to label, to laminate with foil, over-coating or any other post-treatment, some preliminary testing is recommended. - Powder-coated details should be packaged after being completely cooled down to ambient temperature, into appropriate packaging materials previously tested by the user. - Packaged details should be stored under cover to avoid condensation, which may result in traces on the finished coating.
Safety Data Sheet	POLYESTER POWDER COATINGS PA/FX - TI
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TECHNICAL RECOMMENDATION 04:
USE OF METALLIC (FX) AND PEARLESCENT (FP) POWDER COATINGS

1. Description

Metallic and pearlescent powder coatings are thermosetting products, which allow to obtain coatings with interesting visual effects thanks to the use of special pigments. The pigments used in powder coatings, due to their characteristic structure, make it possible to obtain surface finishes with sparkling, shimmering or pearlescent effects. Their variety and specific nature make powder coatings with the aforementioned effects much more demanding in terms of application compared to ordinary coatings, while the end result depends on a number of factors.

Eko-Color metallic powder coatings are marked as **FX**.

Eko-Color pearlescent powder coatings are marked as **FP**.

This product data sheet is intended to assist powder coaters with the challenges of applying metallic and pearlescent powder coatings, as well as to highlight the key stages of application.

2. Metallic and pearlescent powder coatings

Depending on the production method, metallic and pearlescent powder coatings can be divided into:

- dry blend coatings – the most common type of coatings on the market and in the offer of Eko-Color.
  In this type of coatings, the base powder is mixed with a metallic or pearlescent pigment, until the mixture is heterogeneous. The molecules responsible for the effect are not permanently bound to the base powder, which can make application more difficult, cause the appearance of individual, small clusters (agglomerates) on the coating and a less reproducible final appearance of the coating.
- bonded coatings – these coatings are created by 'fusing' a metallic or pearlescent pigment into the base powder, which prevents pigment separation. The coating is more homogeneous and stable during application, resulting in a more reproducible metallic or pearlescent effect. The cost of this type of coatings compared to dry blend products is significantly higher.

3. Colour stability/tolerance

Eko-Color uses high quality pigments for the production of its metallic and pearlescent powder coatings, ensuring continuous monitoring of the conditions during the production process.

The specific structure of the pigments and their different layering on the surface of the coated element make it extremely difficult to maintain the metallic and pearlescent effect of the coating in an even shade, and slight deviations within the coated batches are possible.

4. Application

- Metallic and pearlescent powder coatings should be applied by electrostatic spraying (with a corona gun). The recommended voltage is 60 kV. The amperage values should not be high, as the pigment is distributed unevenly under high current, often resulting in a mosaic effect. It is recommended not to exceed the value of 30 uA. When it comes to the voltage, the higher the voltage, the lower the amperage. However, the final settings are decided by the paint shop staff.
- When applied with a tribo gun, the final appearance of the coating differs from that applied with a corona gun. The possibility of using a tribo gun must always be verified beforehand to validate the colour and final visual effect.
- Changing the gun (from corona to tribo and from tribo to corona) is prohibited as it leads to significant deviations in colour and finish effect.
- When applying powder coatings with special effects, it is important to bear in mind that different types of application, application parameters, equipment, as well as the shape and weight of the coated elements will result in different results and effects.
- It has been observed that when using equipment by different manufacturers for application, different final effects are achieved.
- The more complex the shape of the coated element, the greater the differences in the visual perception of the effect.
- It is recommended to work with nozzles dedicated to the specific shape of the coated objects. Flat objects: flat spray nozzles, round objects (bars, pipes): round spray nozzles.
- The optimum effect is achieved by applying the product on the automatic line while maintaining the appropriate distance of the gun from the coated element. With a manual application, it is difficult to maintain a consistent and even coating thickness, which in the case of coatings with special effect may create alternating stripes with lighter and darker shades.
- The feeding system of powder coatings with special effect must ensure an even supply of powder to the gun. It is recommended to use fluidisation feeders/tanks that allow even mixing of the metallic/pearlescent pigment and the base powder, while at the same time breaking up any clumps. Vibrating tables, which are quite commonly used in paint shops, are not recommended, as they can cause separation of the metallic/pearlescent pigment and the base powder.
- Fluidisation of the powder in the tank should be carried out in a gentle manner. Excessive aeration of the tank, resulting in visible bulges in the aerated mixture, should be avoided. Incorrect fluidisation process can lead to the separation of the pigment from the powder base, which may result in the concentration of the pigment on the surface of the coated element (which may ultimately result in a unique appearance of the final coating).
- An important parameter is related to the cleaning of the gun electrode tip. It is important to avoid the accumulation of metallic/pearlescent pigments or the coating itself on the electrode tip.
- The entire application system and the coated elements should be properly earthed, which will help to ensure the correct metallic and pearlescent effect shade and will prevent the binding of individual coating fractions in the tank. Particular attention should be paid to the correct earthing of injector pumps (if they are used for application).
- The coating applied should have a uniform thickness. This is particularly important in the case of dark colours, where significant variations in thickness lead to a non-uniform coating with visible streaks and shadows. Detailed product characteristics are provided in the Technical Data Sheet.
- The product should not be mixed with other powder coatings.

- It is important to maintain cleanliness on the entire application system before filling with powder coating or when changing to a different type of powder coating in order to eliminate potential coating defects, such as contamination.
- In addition to thorough cleaning of the application system during daily operation, maintenance work recommended by the system manufacturer (e.g. cleaning of powder feed lines, nozzles, electrodes) and replacement of wear parts should be carried out at appropriate intervals.
- Particular attention should be paid to the condition of the powder hoses due to the fact that powder coatings with special effect contain sharp fractions, which can cause premature wear of these components. As a result of friction, small notches are created inside the hoses, which trap the coating fractions, causing agglomeration at points. The conductive core also plays a very important role, as, if damaged, it will not allow excess ions to be released freely into the grounding system.

5. Recovery

- Metallic and pearlescent powder coatings are not as suitable for recovery as ordinary powder coatings.
- In principle, metallic and pearlescent powder coatings should not be recycled, which will eliminate possible changes in colour due to loss of effect.
- In the case of filter recovery, an accumulation of the special effect pigment can occur, while in the case of cyclone recovery, the amount of the pigment in question can be reduced, as the finest base powder and special effect pigment particles are not returned and are instead treated as impurities and permanently removed. In both cases, this leads to a change in the special effect pigment-base powder ratio and thus a visual difference in the colour of the coating.
- If recovery is required, care must be taken to ensure that the recovered powder is dosed appropriately in relation to the fresh powder. Up to 15% of recovered powder coating can be used, as long as optimal mixing with fresh powder coating is ensured. However, in this case, the responsibility for achieving an acceptable and reproducible result lies with the paint shop.
- When working with recovered products, frequent inspections are necessary to check the appearance of the resulting coating.
- The use of the recovered products alone, as well as repeated recovery of the powder coating is prohibited.
- It is good practice before starting the work to prepare reference models and use them from time to time to verify colour and effect.

6. Curing conditions

- The recommended curing parameters must be strictly adhered to. **The curing time is calculated from the moment the coated element is heated to the set temperature.**
- In order to achieve uniform coating, uniform temperature distribution in the oven and maintenance of polymerisation within the curing window are required. For this purpose, a thermographic test of the oven should be carried out.
- An excessively short curing time or curing at an excessively low temperature can result in coatings with a lighter shade (more metallic, pearlescent), incorrect gloss and insufficient physical and chemical properties.
- An excessively long curing time or curing at an excessively high temperature in turn can result in colour changes, yellowing and creating a more matt finish.
- Thick-walled objects require a longer time to heat up compared to thin-walled objects, which directly results in a visually different end result.
- If the object is not heated to the required temperature, the coating will not achieve its optimal mechanical and chemical resistance, resulting in a generally lighter colour shade (more metallic, pearlescent) than required and no structural effect (in the case of metallic and pearlescent structured powder coatings).

7. In a few words

- The application of metallic and pearlescent powder coatings requires constant control during the application process, as well as the ongoing control of the obtained effect as compared to the template.
- It is necessary to properly ground all components that have an impact on the application process, including coated objects, booth, conveyor and guns.
- Once a year it is recommended to check the earthing of the installation to earth.
- It is necessary to check the cleanliness of the hooks (required for correct earthing to max. 800 kilo-ohm).
- When changing powder coatings, all parts of the application system responsible for feeding or recovering powder coatings should be thoroughly cleaned.
- Recovery of dry blend metallic and pearlescent powder coatings is not recommended.

8. Storage conditions

Store in accordance with the information on the label and Technical Data Sheet, in the original unopened packaging, away from sources of heat at 5 - 25°C, protect from moisture. The product should be kept at ambient (paint shop) temperature for 12 h before use.

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TECHNICAL RECOMMENDATION 06:
THE USE OF POWDER COATING WITH MEDIUM AND COARSE STRUCTURE

1. Description

Powder coatings are thermosetting products designed for painting metal elements for protection and decorative purposes. The coatings have a relatively coarse and visible texture.
The purpose of this product data sheet is to facilitate the work for painters who use powder coating easier and to describe the key stages of painting.

2. Substrate preparation

When applying coarse-textured powder coatings, it is essential to carefully clean the substrate. Greasy surfaces or surfaces contaminated with foreign materials cause defects in the finished coating or make it impossible to achieve the desired texture.

3. Application

- Medium and coarse coatings should be applied by electrostatic spray painting (corona). Application settings are determined by the paint shop staff.
- **When using a tribo powder coating gun, a flattened texture is achieved.** This type of application must always be verified in advance in order to assess the final visual effect.
- Changes in the application method (from corona to tribo and vice versa) lead to significant differences in the final result.
- It is necessary to finish the entire project using the same equipment and maintaining constant application parameters.
- Based on observation, application with equipment of different manufacturers yields different final results.
- Different types of application, equipment, application parameters and shapes of elements affect the coating effects.
- The optimum effect is achieved when the distance between the applicator and the coated element is sufficiently large (approx. 30 cm), while maintaining a constant and even coating thickness.
- A constant supply of powder coating to the applicator must be ensured. The use of fluidised-bed powder feeders is recommended.
- The entire system and coated elements must be properly earthed.
- **The final appearance of the texture (size and type) depends to a large extent on the thickness of the applied coating.**
- For an even texture, an average thickness of 90 - 120 µm is recommended.
  Details are specified in the data sheets of the respective products.
- When applying medium and coarse powder coatings, variations in coating thickness on individual elements of the structure should be avoided in order to maintain a uniform appearance of the coating.
- **It is very important to ensure cleanliness of the entire coating system,** including guns, hoses, etc. before filling it with powder coating or when changing to a different type and colour of powder coating, in order to avoid contamination of the structure with a different colour (mainly when changing from smooth powder coating to medium and coarse one) or coating defects in the form of craters, pinholes, orange peel (mainly when changing from coarse-textured powder coating to a fine one). In both cases, the defects are highly visible on the structure.
- In addition to thorough cleaning of the system, during daily operation, maintenance works recommended by the system manufacturer (e.g. cleaning of powder supply lines, nozzles, electrodes) should be carried out and worn parts replaced at appropriate intervals.

4. Recovery

- Medium and coarse powder coatings are not designed to be recovered to the same extent as fine-textured coatings.
- In principle, coarse-textured coatings should not be recovered, which will prevent irregularities in the final appearance.
- If recovery is required, an adequate dosage of recovered powder in relation to fresh powder should be ensured. The amount of recovered powder should be kept to the minimum, and optimal mixing with fresh paint should be ensured. The responsibility for achieving an acceptable and reproducible result lies with the paint shop.
- When working with recovered powder coating, frequent inspections are necessary to check the appearance of the result.
- The use of recovered powder alone or repeated recovery of powder is prohibited.
- It is good practice to prepared tolerance models before launching production and use them throughout the process to verify the final appearance of the result.

5. Curing conditions

- The recommended curing parameters must be strictly adhered to. **The curing time is counted from the moment the element is heated to the set temperature.**
- Uniform temperature distribution in the oven is required to achieve a homogeneous texture of the coating.
- In order to determine the required curing parameters, it is always advisable to carry out tests under production conditions adapted to the element and the oven (it may be helpful to prepare a temperature profile of the oven using a suitable instrument).
- **In the case of medium and coarse powder coatings, the element must be placed in the oven which has been preheated to the required temperature (the temperature should not be lower than 130°C).**
- The curing time depends on the heat capacity of the elements (the design of the elements, their shape, size, thickness and quantity is important) and the temperature parameters in the oven. It is up to the paint shop to adjust the required heating parameters to the element/structure.
- Excessively slow curing of the element in the oven will result in a failure to achieve the desired texture.
- Excessively short curing time or curing at excessively low temperature results in coatings with an undeveloped and/or flattened texture, excessively high gloss and insufficient mechanical properties.
- Excessively long curing or curing at excessively high temperature may result in colour changes, yellowing and matt coatings, especially in the case of matt structures.
- Depending on the heat capacity of the elements and the temperature parameters in the oven, different and uneven textures can be achieved.
- Differences in curing conditions should be avoided, which means that thin-walled elements should be coated separately from thick-walled ones in order to achieve a reproducible coating appearance.
- Thick-walled elements take longer to heat up than thin-walled ones, which directly translates into a different visual effect.

6. Summary

- The application of medium and coarse powder coatings requires constant control during the process, as well as ongoing verification of the results with the model.
- The application of medium and coarse powder coatings should always be carried out using the same equipment and the same application
- parameters.
- It is essential that the coated elements and the entire coating system are properly earthed.
  In the case of medium and coarse powder coatings, the element must be placed in the oven which has been preheated to the required
- temperature (the temperature should not be lower than 130°C).
- When changing the powder coating, all powder feeding or recovery parts of the coating system must be carefully cleaned.
- Recovery of coarse-textured powder coatings is not recommended.

7. Storage conditions

Store in accordance with the parameters specified on the packaging label and product data sheet, in the original, unopened packaging, away from heat sources and moisture, at 5-25°C. The product should be kept at room (paint shop) temperature for 12 hours before use.

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