

Polyamide fine composite powder PFC03-A : Innov'PA 2550 GBAL for systems of Rapid Prototyping

Description, Applications :

The **Innov'PA 2550 GBAL** is a fine composite powder based on polyamide 12 (thermoplastic) especially formulated to function on rapid prototyping systems by laser sintering or radiation. It enables to obtain productions of models and functional parts in "plastic engineering" with long cycle of life and excellent chemical resistance.

This polyamide powder gives final productions in uniform gray color in mass.

The Innov'PA 2550 GBAL is based on a new formulation with improved mechanical characteristics. The whole of the improvements of the mechanical properties gives a better cohesion of the layers involving a more plastic behavior and responsive mechanics of the parts manufactured approaching the injected reinforced one as a Polypropylene with talc's charge. A simple blasting of the part obtain is enough, these parts can be finished and painted if needed.

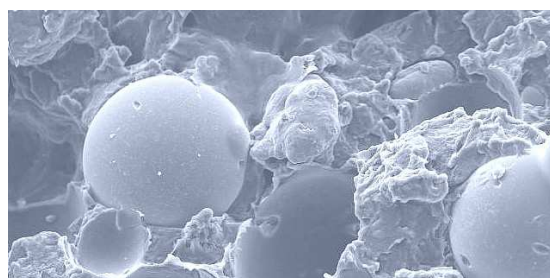
A refined specifies granulometry, precise and very tightened allows to obtain an excellent resolution of contour and surface.

These innovative properties make possible to consider **Rapid Manufacturing**.

The process ability of the powder on the rapid prototyping systems is optimized; thus all the powder of a building can be re-used after sifting. The refreshing factor for regeneration, because of the adapted formulation of **Innov'PA 2550 GBAL**, is lower than the usual rates used on the various systems of rapid prototyping.

The typical applications of Innov'PA 2550 GBAL are parts and models of design, functional, precise, requested mechanically, chemically and in temperature. Repeatability of the product is granted thanks to is low shrinkage and high precision of the parts.

- Granulometry refined around 45 µm
- Excellent resolution of contour and surface for Rapid Manufacturing, low shrinkage material
- Mechanical properties and mechanical behavior such as injected reinforced parts as a Polypropylene with talc's (PP20%T) allowing Rapid Manufacturing
- Exploitable on any type of system of prototyping: Pluri-manufacturers
- Use continues powder cycles sifting-regenerating with a lowered Regeneration factor
- Aspect and coloring gray uniform of the product, cohesion of layer, possibility to have functional clip with this material
- Behavior in temperature of the Product until 116°C : part for motor as Inlet manifold
- Chemical resistance of composite Polyamide 12
- Economic cost of exploitation (ratio Q Powder/ Number of building)
- Provisioning independent of the manufacturers



1. General Properties :

| Measurement | Method & Condition | Metric Value |
|--|--------------------|-------------------------------|
| Average particle size | Diffraction laser | 35 < __ < 65 μm |
| powder packed Density 23°C | Method ExcelTec | 1.05 ± 0.05 g/cm ³ |
| Part density 23°C | Method ExcelTec | 1.35 ± 0.05 g/cm ³ |
| Moisture absorption 24 hrs, 50% HR, 23°C | ASTM D570 | 0.3 ± 0.05 % |

2. Thermal Properties :

| Measurement | Method & Condition | Metric Value |
|---|--------------------|-----------------------------------|
| T°f Melting point | DSC | 181 < __ < 185 °C |
| T°g Glazing point | DSC | _ ± _ °C |
| Heat Deflection Temperature at 1.82 MPa | ASTM D648 | 116 ± 1 °C |
| T° Process | Glazing method | - 12 ± 2 °C (ex : 174 °C ± 2)* |

3. Mechanical Properties :

| Measurement | Method & Condition | Metric Value |
|----------------------------------|--------------------|---------------------------------------|
| Tensile strength | ISO 527 | 30 ± 1 MPa * |
| Young Modulus | ISO 527 | 2 550 ± 100 MPa * |
| Elongation at break | ISO 527 | 8 ± 1 % * |
| Flexural Modulus | ISO 178 | 2 275 ± 25 MPa * |
| Charpy – Impact strength | ISO 179 | 15 cond. 24 hrs ± 2 KJ/m ² |
| Charpy – Notched impact strength | ISO 179 | 5 ± 0.5 KJ/m ² * |
| Shore Test (Shore D) | ISO R 868 | 77 ± 2 Shore D |

* statistics after several cycles >10 refresh

4. Chemical Resistances :

Composite matrix in Polyamide 12 with a good chemical resistance to alkaline, hydrocarbons, oils, gasoline's, gas oil and solvents. Attack by the acids. Sealing of wall starting from 1.6 mm thickness.

5. Propriétés Electrique / Electrical Properties:

| Measurement | Method & Condition | Metric Value |
|--|--------------------|----------------------------|
| Volume resistivity 50% HR, 23°C | CEI 93 | 1.8 E ⁺⁷ Ohms/m |
| Horizontal and Vertical Surface Volume resistivity | CEI 93 | 1.5 E ⁺⁸ Ohms |

Isolant

Anti Statique

Dissipateur

Conducteur

1E⁺¹⁵ 1E⁺¹⁴ 1E⁺¹³ 1E⁺¹² 1E⁺¹¹ 1E⁺¹⁰ 1E⁺⁹ 1E⁺⁸ 1E⁺⁷ 1E⁺⁶ 1E⁺⁵ 1E⁺⁴ 1E⁺³ 1E⁺² 1E⁺¹ Ohms/m

6. Aspect de surface / Surface Finish :

| Measurement | Method & Condition | Metric Value |
|--|--------------------|--------------|
| natural Coloration | Visual | grey in mass |
| Upper Facing processed & blasting, Surface Ra S Ra | ISO 4287 | 8 ± 1 μm |
| Upper Facing after Finishing, Surface Ra S Ra | ISO 4287 | 1 ± 0.5 μm |

The mechanical properties can vary according to the positioning of the tensile bars, operating conditions and exposure parameters of the systems used. These data rest on the current state of our knowledge. They do not give the exact characteristics of material and does not represent a guarantee.

Polyamide fine composite powder PFP03: Innov'PA 1550 for systems of Rapid Prototyping

Description, Applications :

Innov'PA 1550 is a fine powder based on polyamide 12 (thermoplastic) especially formulated to function on rapid prototyping systems by laser sintering or radiation. It enables to obtain productions of models and functional parts in "plastic engineering" with long cycle of life and excellent chemical resistance.

This polyamide powder gives final productions in natural color (white-cream towards the yellow in mass).

Innov'PA 1550 is based on a new formulation with improved mechanical characteristics. The whole of the improvements of the mechanical properties gives a better cohesion of the layers involving a more plastic behavior and responsive mechanics of the parts manufactured approaching the injected one. A simple blasting of the part obtain is enough, these parts can be finished and painted if needed. A refined specifies granulometry, precise and very tightened allows to obtain an excellent resolution of contour and surface.

These innovative properties make possible to consider **Rapid Manufacturing**.

The process ability of the powder on the rapid prototyping systems is optimized; thus all the powder of a building can be re-used after sifting. The refreshing factor for regeneration, because of the adapted formulation of **Innov'PA 1550**, is lower than the usual rates used on the various systems of rapid prototyping.

The typical applications of Innov'PA 1550 are parts and models of design, functional, precise, requested mechanically, chemically and in temperature.

- Granulometry refined around 45 µm
- Excellent resolution of contour and surface for Rapid Manufacturing
- Mechanical properties and mechanical behavior such as injected parts
- Exploitable on any type of system of prototyping: Pluri-manufacturers
- Use continues powder cycles sifting-regenerating
- Regeneration factor lowered
- Aspect and natural coloring of the product, cohesion of layer
- Chemical resistance of Polyamide 12
- Economic cost of exploitation (ratio Q Powder/ Number of building)
- Provisioning independent of the manufacturers



1. General Properties :

| Measurement | Method & Condition | Metric Value |
|--|--------------------|-------------------------------|
| Average particle size | Diffraction laser | 40 < ___ < 50 μm |
| powder packed Density 23°C | Method ExcelTec | 0.5 ± 0.05 g/cm ³ |
| Part density 23°C | Method ExcelTec | 0.98 ± 0.05 g/cm ³ |
| Moisture absorption 24 hrs, 50% HR, 23°C | ASTM D570 | 0.50 ± 0.05 % |

2. Thermal Properties :

| Measurement | Method & Condition | Metric Value |
|---|--------------------|-----------------------------------|
| T°f Melting point | DSC | 181 < ___ < 185 °C |
| T°g Glazing point | DSC | 34 ± 2 °C |
| Heat Deflection Temperature at 1.82 MPa | ASTM D648 | 86 ± 1 °C |
| T° Process <i>* according to machine reading</i> | Glazing method | - 14 ± 2 °C (ex : 174 °C ± 2)* |

3. Mechanical Properties :

| Measurement | Method & Condition | Metric Value |
|---|--------------------|---|
| Tensile strength | ISO 527 | 45 ± 1 MPa * |
| Young Modulus | ISO 527 | 1 550 ± 150 MPa * |
| Elongation at break | ISO 527 | 16 ± 2 % * |
| Flexural Modulus | ISO 178 | 1 350 ± 25 MPa * |
| Charpy – Impact strength | ISO 179 | 80 dry / ± 2 KJ/m ² * 50 cond. 24 hrs |
| Charpy – Notched impact strength | ISO 179 | 6 ± 0.5 KJ/m ² * |
| Shore Test (Shore D) <i>* statistics after several cycles >10 refresh</i> | ISO R 868 | 68 ± 3 Shore D |

4. Chemical Resistances :

Matrix in Polyamide 12 with a good chemical resistance to alkaline, hydrocarbons, oils, gasoline's, gas oil and solvents. Attack by the acids. Sealing of wall starting from 1.6 mm thickness.

5. Electrical Properties :

| Measurement | Method & Condition | Metric Value |
|--|--------------------|-----------------------------|
| Volume resistivity 50% HR, 23°C | CEI 93 | 1.4 E ⁺¹³ Ohms/m |
| Horizontal and Vertical Surface Volume resistivity | CEI 93 | 1.7 E ⁺¹⁵ Ohms |

Isolant

Anti Statique
Dissipateur
Conducteur

1E⁺¹⁵ 1E⁺¹⁴ 1E⁺¹³ 1E⁺¹² 1E⁺¹¹ 1E⁺¹⁰ 1E⁺⁹ 1E⁺⁸ 1E⁺⁷ 1E⁺⁶ 1E⁺⁵ 1E⁺⁴ 1E⁺³ 1E⁺² 1E⁺¹
Ohms/m

6. Surface Finish :

| Measurement | Method & Condition | Metric Value |
|---|--------------------|--------------------------------|
| natural Coloration | Visual | White creams to yellow in mass |
| Upper Facing processed & blasting, Surface Ra S Ra | ISO 4287 | 9 ± 1 μm |
| Upper Facing after Finishing, Surface Ra S Ra | ISO 4287 | < 1 ± 0.5 μm |

The mechanical properties can vary according to the positioning of the tensile bars, operating conditions and exposure parameters of the systems used. These data rest on the current state of our knowledge. They do not give the exact characteristics of material and does not represent a guarantee.