



Nano Precipitated Calcium Carbonate

NANO PRECIPITATED CALCIUM CARBONATE (NPCC)

NPCC refers to ultra-fine precipitated calcium carbonate with an average particle diameter of less than 100 nanometers that is used as an additive in various products. Because of its special physical and chemical properties, NPCC has been widely applied in the paint, paper, plastic and rubber industries. Advanced technology allows the synthesis of calcium carbonates in nano-particles with large surface area.

Each particle is surface coated with modifier such as fatty acid, organic coupling agents, to improve dispersion and compatibility with polymer matrix.

NPCC expects to have a potential market as the substituted product for other expensive additives, such as carbon black, white carbon black, and titanium dioxide.

While the field of nano particle research has exploded in recent years, nano PCCs have been in commercial use for much longer. This have been widely used to make automotive and construction sealants and PVC window profiles.

This ranges from 0.06 microns or 60 nanometers to 0.15 microns or 150 nanometers in median particle size. This is an order of magnitude smaller than the so-called ultrafine ground calcium carbonates, which are typically 0.7 microns. This results in ultrafines that are uniform in shape, size and particle size distribution.

These ultrafine PCC particles also act as a semi-reinforcing filler, for strong physical performance. PVC plastisols, urethanes, silicones, polysulfides, and silylated polyethers are some of the types of high performance, long-lived automotive and construction sealants that use nano PCCs.

NPCC FOR PAINTS

Applications:

Auto Paint, PVC Plastisol, underbody sealing materials for automobiles, constructional sealing compounds. The surface-modified nano-size calcium carbonate particles are capable of controlling the rheological and the mechanical properties of the cured Materials. PVC Plastisols with nano calcium carbonate have extended glass transition temperatures (T_g) excellent thermal stability and low viscosity.

Good tensile strength, elongation-at-break and yield stress.

Features: Nano Particle Size, Nano Particle Size Distributon, Regular Particle Shape, Surface Special Treatment.

Benefits: Reduced Volume Formulation Cost, Improved Product Quality. Due to special physical and chemical properties, NPCC has been widely applied in Industries like

NPCC FOR ADHESIVE & SEALANTS

Applications:

NPCC is a functional additive providing and viscosity, thixotropy, shear thinning and yield value for economical control of slump, sag and extrusion or spray application rates also reinforce the polymers increasing tensile strength and modulus.

Physical properties are improved due to the semi reinforcing performance of NPCC.

- ▶ with NPCC, viscosity and thixotropy of adhesives & sealants can be adjusted to suit specific application needs.
- ▶ adhesive, silicone building sealants, Polysulphide sealant. Functional filler and extender in plastic compound.

Benefits : Reduced volume formulation cost
: Improved product quality

Features : Nano particle size
Nano particle size distribution
Regular particle shape
Special surface treatment

NPCC FOR PLASTICS

Applications:

The super ultra fine particle size and narrow particle size distribution permit exceptionally high filler loading without compromising impact strength or ductility.

- 1) It has the following beneficial applications; In Plastic Compounding as reinforcing functional filler in extruded weatherable Profiles, Conduits and Pipes. It typically can substitute upto 20% of existing reinforcing Additives such as CPE, MBS or SBS.
- 2) In plastic master batch as pigment / TiO₂ / color extender in PVC, PP, PE, etc. It typically can substitute up to 25% of existing pigment with opacity and whiteness level maintained. Best results can be achieved with good mixing to produce good dispersion and distribution of fine particles in the polymer system.

In Plastic Masterbatch (pe, Pp Masterbatch) Best results can be achieved with good mixing to produce good dispersion and distribution of fine particles in the polymer system.

Features: Nano particle size, narrow particle size distribution, Regular particle shape, Special surface treatment.

- o Improve Young's modulus
- o Improve impact strength

- o *Improve finish*
- o *Shorten production cycle due*
- o *Improve thermal conductivity*

NPCC FOR PRINTING INKS

Applications:

Functional Nano Calcium Carbonate is a surface treated super ultra fine particle with very narrow particle size distribution. Precipitated calcium carbonate is specially formulated as functional additive in ink.

Ink Industry: includes Solvent Ink, Offset Ink Or Lithographic Inks.

In highly filled litho inks, they can serve as the main rheological additive and cost Reducing filler. In lightly filled offset inks, they can extend other more expensive Thickeners, as well as replace oils and varnishes. It thickens, PVC Plastisol Silk Screen Inks. Gravure Inks need very low abrasion fillers. Small particle Sized NPCC is excellent here.

NPCC is a surface treated super ultra fine and very narrow particle size distribution Precipitated calcium carbonate specially formulated as functional additive in INK.

Ink Industry Includes Solvent Ink And Offset Ink.

NPCC is used in Lithographic or Offset Inks.

In highly filled litho inks, they can serve as the main rheological additive and cost reducing filler. In lightly filled offset inks, they can extend other more expensive thickeners, as well as replace oils and varnishes. NPCC thickens PVC Plastisol silk screen inks. Gravure needs very low abrasion fillers. Small particle Sized NPCC is excellent here.

Features: Nano particle size , Nano particle size distribution ,Regular particle shape, Special surface treatment, Reduced volume formulation cost improved product quality

NPCC FOR RUBBER

Applications:

- o In the sidewall and cord ply compounds of bias tire (+5-8 phr NPCC);
- o In the tread compound and inner liner of radial tire (+4 phr NPCC);
- o In the butyl inner tube, Meanwhile (+15-20 phr NPCC);
- o Cycle Tire.
- o With adjusting the quantity of carbon black and softener properly.
- o PVC cables and wires

Benefits

1. Nano particle size
2. Nano particle size distribution
3. Regular particle shape
4. Special surface treatment
5. Reduced volume formulation cost
6. Improved the physical and processing properties of rubber compounds.
7. Improved the air tightness and ageing resistance of butyl inner tube and the inner liner of radial tire.
8. Enhanced the flex resistance of Rubber compound.

9. Improve the air-tightness (very important for butyl tube)
10. Improve stiffness
11. Reduce permanent set, butyl not easy to deform or inflate
12. Reduce cost of rubber compound.

Nano calcium carbonate has reinforcement function. However comparison with carbon black, nano calcium carbonate has no obvious advantages in reinforcement function.

Our nano calcium carbonate is mainly used in inner tube of radial tire and butyl tube.

NPCC FOR TYRES

The application of an active nano-calcium carbonate in tyre was experimentally investigated. The results showed that the processibility of rubber compound and the physical properties of vulcanizate improved by adding 5~8 phr active nano-calcium carbonate in the sidewall and carcass ply compounds of bias ply tyre and adjusting the addition level of carbon black and softener properly; the comparable tear strength, abrasion resistance and other physical properties of vulcanizate and the better extrudability were obtained by adding 4 phr active nano-calcium carbonate in the tread compound of radial tyre; and the production cost reduced.

- o 8% NPCC in rubber compound greatly improves tyre's tear resistance and abrasion resistance
- o Because of the better thermal conductivity, heat can dissipate quickly, resulting in less heat build-up during operation

TECHNOLOGY USED: MEMBRANE DISPERSION TECHNOLOGY

Membrane dispersion precipitation method is an efficient preparation method of ultrafine particles. Membrane dispersion technology is based on microporous membrane or microfiltration membrane as dispersion medium. The milk of lime and carbon dioxide flow through the membrane, form small droplets or bubbles, rapid mix and achieve fully react. Membrane dispersion precipitation technology will help to improve the control of system over saturation. It improves the uniformity of the overall system and contributes to manufacture high quality NPCC.

NPCC Replace Other Ingredients in End Products

End Products	Replace ingredients	NPCC Usage as % of End Product Weight
Adhesives & Sealants	Polymer, Silicon Dioxide	5-65%
PVC	Polymer	5-15%
PP/PE	Polymer	5-25%
Rubber & Tyre	Carbon Black, Silicon Dioxide	5-20%
Paints E & Inks	Titannium Dioxide, Kaolin	5-20%
Asphalt	SBS Asphalt Modifier	5%

RANGE OF NPCC FROM REINSTE

Product Name	Applications	Benefits
Reinste 206T	Used as a functional filler for polysulphide sealant	<ul style="list-style-type: none"> • Excellent dispersity • Highly effective pre-cure rheology modification and control for good viscosity stability.
Reinste 206M	Used as a functional filler for silicone sealant	<ul style="list-style-type: none"> • Contributes towards post-cure physical properties in silicon sealant such as excellent sag resistance, low temperature gunnability.
Reinste 206S	<ul style="list-style-type: none"> • Used as a functional filler for various adhesives and sealants such as silicone sealant, polyurethane sealants • Acrylic sealants used in various construction, sanitary and industrial sectors 	<ul style="list-style-type: none"> • Affordable for various adhesives and sealants. • Good at controlling of rheological and tensile properties.
Reinste - 259	Used as a functional filler for one-component or two-component polyurethane adhesive and sealant	<ul style="list-style-type: none"> • Provide high performance in adhesive and sealants. • Has low viscosity and high thixotrophy • Reduce cost with high loading lever.
Reinste 501A	<ul style="list-style-type: none"> • Applied as a plastic additive for PE, PP and PVC. • Acts as a modifier to improve physical properties of plastics. 	<ul style="list-style-type: none"> • Improve Impact strength, tensile strength and bending strength. • Promoted breaking elongation, improved distortion temperature.
Reinste 530	<ul style="list-style-type: none"> • Used in plastic compounds such as PE, PP and PVC processed by injection molding, blow molding and extrusion. • Used as a cost-reducing filler to extend or replace more expensive resins. 	<ul style="list-style-type: none"> • Improve physical properties of plastic compounds such as Impact strength, tensile strength, bending strength and distortion temperature. • Reduce cost
Reinste 260S	<ul style="list-style-type: none"> • Designed for use in tyre industry. • Used as a reinforcing agent in rubber compound. 	<ul style="list-style-type: none"> • Increase elongation, tensile strength, H-extrusion and reduce permanent distortion. • Improve aging, tear and abrasion resistance. • Reduce material cost without impacting reinforcing features.