



Wollastonite: Engineered Reinforcements for Polymer Applications



A Specialty Mineral That Provides Excellent Balance in Stiffness and Impact

- IMPROVED MECHANICAL PROPERTIES
- IMPROVED MELT STRENGTH
- LOWER DENSITY – THIN WALL COMPOSITES
- CLASS A SURFACE APPEARANCE
- CONDUCTIVE MODIFIED

PLASTICS

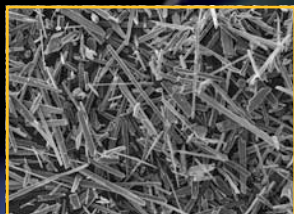


Purity and Acicularity

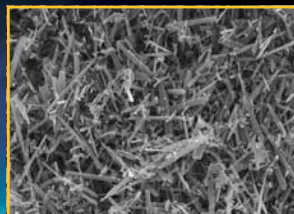
The wollastonite deposits mined by NYCO in Willsboro, New York and Sonora, Mexico are unique for their purity and acicularity. Wollastonite is the only white mineral that is acicular in shape with varying aspect ratios. Due to wollastonite's needle-like structure, it has become one of the world's leading performance additives for fiber reinforced polymer composites and engineered polymers.

Properties

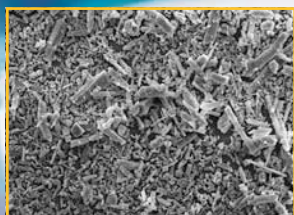
Wollastonite's reinforcing properties, its low hydroabsorptivity, its thermal stability and conductivity, low resin demand and chemical purity make it an ideal reinforcement in a variety of applications ranging from automotive to aerospace. A high aspect ratio wollastonite will provide an increase in flexural modulus and heat distortion temperature, reduce CLTE and shrinkage and provide surface finish comparable to painted steel. Excellent impact resistance and elongation are achieved using a fine particle size wollastonite.



NYGLOS® 8



ASPECT™ 3000



NYAD® 5000 WOLLASTOCOAT®



ELEKTRA-STAT®

Chemical Modification Technology

NYCO is a leader in chemical modification technology, offering a variety of modifications from organo silanes to wetting agents for improved mechanical properties, processing and throughput rates. Optimum properties are created by properly matching the correct chemical modification to the polymer matrix at the right concentration level. New developments are underway to create the next generation chemical modifications to meet customer's specifications like cold temperature impacts and other physical properties along with continued enhancements in handling and processing.

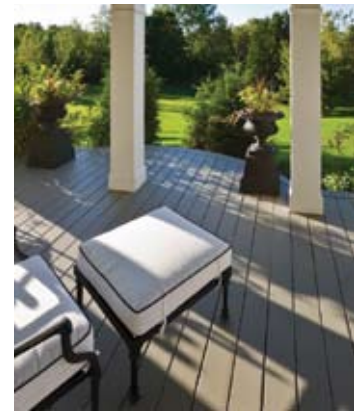
A Conductive Reinforcing Wollastonite

ELEKTRA-STAT® has been developed by NYCO for antistatic and conductive related market applications. ELEKTRA-STAT® is targeted as an additive, extension or replacement for conductive carbon black and carbon fiber which exhibits conductive properties with improved mechanical properties, especially flex modulus and impact. This new product line utilizes a new chemical modification process, a reinforcing base substrate and highly conductive carbon black. The resulting conductive additive is easily compounded into engineering plastics, alloys and blends as well as polyolefin materials.



MINERA PRODUCTS/ TYPICAL PROPERTIES	ASPECT™ 3000	ASPECT™ 4000	MD 400 WOLLASTOCOAT®	MD 1250 WOLLASTOCOAT®	NYGLOS® M3
G.E. BRIGHTNESS	87	82	87	89	87
BULK DENSITY (lbs./cu.ft.) (g/cc)					
LOOSE	(18) (0.29)	(25) (0.40)	(41) (0.65)	(39) (0.62)	(22) (0.35)
TAPPED	(28) (0.45)	(44) (0.70)	(62) (1.00)	(54) (0.87)	(35) (0.56)
OIL ABSORPTION (lbs./100 lbs.)	45	35	24	25	40
MICROTRAC D ₅₀ (µm)	7	16	9	4	6
ASPECT RATIO (L/D)	7:1	7:1	3:1	3:1	5:1

WOLLASTONITE... ONE MINERAL,



Performance Benefits by Reinforced and Filled Systems

General

- Low CLTE (no gap)
- Improved heat distortion temperature
- Improved dimensional stability and shrinkage control
- Cost-effective replacement for milled glass
- Partial replacement for chopped glass
- Total replacement of competitive minerals in straight mineral or mineral glass formulations
- Low permeability and excellent weatherability properties
- Excellent paintability (on-line, in-line and off-line)

Engineered Polymers, Alloys and Blends

- Eliminates introduction of moisture
- Meets glow wire requirements
- High Stiffness and Impact
- Excellent fire and smoke suppressant properties
- Improved polymer toughness
- Improved surface appearance and surface reflectivity
- Low or elimination of out-gassing

Thermosets

- Excellent surface hardness and abrasion resistance
- Improved flexural and compressive strength
- High stiffness and notched/unnotched Izod impacts
- High brightness, low haze
- High temperature resistance

Polyolefins

- Excellent balance in stiffness and impacts
- Less whitening, excellent mar and scratch resistance
- Odorless, no monomer absorption, non-toxic
- Excellent creep resistance
- Excellent thermal oxidative stability
- Low fogging properties

Thermoplastic Elastomers

- Excellent Shore A Hardness
- High tensile strengths
- High elongation at break
- Excellent compression set
- High tear strengths

WILLSBORO PRODUCTS/ TYPICAL PROPERTIES	NYGLOS® 4W	NYGLOS® 8	NYGLOS® 1000	NYAD® 5000 WOLLASTOCOAT®	ELEKTRA-STAT®
G.E. BRIGHTNESS	92	91	93	94	N/A
BULK DENSITY (lbs./cu.ft.) (g/cc) LOOSE TAPPED	(13) (0.20) (22) (0.35)	(14) (0.22) (30) (0.48)	(30) (0.48) (50) (0.80)	(33) (0.53) (55) (0.88)	(15) (0.24) (24) (0.38)
OIL ABSORPTION (lbs./100 lbs.)	55	45	27	25	95
MICROTRAC D ₅₀ (µm)	7	12	4.5	3	N/A
ASPECT RATIO (L/D)	9:1	13:1	3:1	3:1	13:1

A WORLD OF APPLICATIONS



One Mineral, A World Of Applications

- State-of-the-art processing operations
- World-class chemical modification technology
- Industry leader
- World-wide distribution network
- Customer-focused global technical support
- Premium quality wollastonite

Wollastonite is a naturally occurring mineral, is non-hazardous, and is not regulated by shipping agencies. Based upon toxicological studies, there is no evidence of any significant health risks to workers.

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ISO 9001/14001 CERTIFIED

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ISO 9001/14001 CERTIFIED

**For any further information,
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Processing Guidelines

- Twin screw compounding is the preferred process for compounding high aspect ratio (HAR) wollastonite.
- Wollastonite products having lower aspect ratios have been successfully compounded on continuous mixer, banbury, and single screw compounding lines.
- It is normally not recommended to add wollastonite products into the main feed throat due to the possibility of aspect ratio attrition, especially for HAR products. Downstream feeding into the melt via side feeder or open top barrel is generally more successful.
- As with all twin screw compounding, proper screw design is required to achieve optimum performance and properties. This is especially important for HAR products. NYCO has in-house expertise to help maximise the benefit of using wollastonite.
- A good general rule of thumb is to process HAR wollastonite in the same manner as chopped fiberglass strands.
- When feeding more than 30% wollastonite, it may be necessary to "back vent" the barrel immediately upstream of the point of addition. This is especially useful when processing nylon, polyester, or other polymers that may contain excess moisture.
- When processing high loadings of more than 30%, it may be beneficial to split-feed the wollastonite into two feed zones.
- Low aspect ratio wollastonite can be throat fed like platy-type materials.