

Additional Reading: Manufacturing Overview

One of the most unusual things about wollastonite is that it can be made to cleave into needle-like crystals. Using special processing techniques, very fine fibers with an extremely high aspect-ratio (length:diameter) can be produced. The aspect ratio of these specially ground particles is commonly between 5:1 and 15:1 and may be more than 20:1 depending on the milling technique. NYCO produces a variety of high aspect-ratio (HAR) grades to suit a variety of applications.

Wollastonite also has unique chemistry: it is a highly valued source of chemically combined CaO and SiO₂ in nearly equal proportions. The high purity of NYCO's products provide minimal gas evolution (LOI <1%), low moisture, low oil absorption, high brightness, and high whiteness. A high natural pH of 8-10 and a natural buffering capacity can also be important attributes. For end-uses where wollastonite is used primarily for its chemistry, high aspect-ratio is not normally necessary. Grinding to produce low aspect ratio products is generally carried out using conventional grinding techniques. The aspect ratio of the ground particles is commonly between 3:1 and 5:1.

Surface treated grades are important in applications where wollastonite needs to be compatible with specific matrices. Coupling agents or surface modifiers enhance the performance of wollastonite in the matrix. Both HAR and LAR grades are generally available with various surface treatments depending on the compatibility required.

Manufacturing

NYCO extracts its wollastonite ores using conventional surface mining methods. Mining is followed by several stages of crushing for initial size reduction. The wollastonite is then separated from its associated minerals by one of the following methods as follows:

1. Successive stages of fine crushing followed by dry magnetic separation to remove minerals such as garnet and diopside. These minerals are to varying degrees magnetic and generally several steps of magnetic separation is required. Thermal drying of the ore is carried out to ensure effective magnetic separation.
2. Alternatively, initial grinding is followed by wet processing (flotation) to remove minerals such as calcite, diopside, and feldspars. Filtration and thermal drying of the resulting wollastonite concentrate is required after wet processing.

After the wollastonite ore has been beneficiated, grinding to preserve aspect ratio for HAR grades is carried out by a variety of specialized grinding techniques. Specialized air classification also plays an integral part in these processes. NYCO has spent many years perfecting their range of HAR products. Ultimately the highest quality products will be produced by those who have the technical depth and expertise to retain high aspect-ratio to the greatest extent possible. NYCO believes that it is the market leader in this regard.

Surface treatment is important in applications where wollastonite needs to be compatible with specific organic chemistries. Stronger bonding with the matrix enhances mechanical properties, reduces shrinkage, increases weather resistance, and lessens or eliminates surface or internal defects. In addition, surface treated wollastonite permits higher filler loadings; improves dispersion; and improves powder flow characteristics, as well as flow during mixing and molding in compounding systems.

The surface treatment method plays a major part in the success of a treated wollastonite product. After treatment, handling wollastonite is a concern as broken particles expose untreated mineral surface, which are potential weak points. NYCO has many years of experience in consistently providing customers with high quality surface treated wollastonite products.