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## Cost-Effective Whites

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**Cost-effective whites are designed to meet the market needs for balancing quality and cost**

## Summary

Titanium dioxide ( $\text{TiO}_2$ ) provides opacity by reflecting light which is possible due to its ability to scatter light. This is accomplished by refraction and diffraction of light as it passes through or near titanium dioxide particles. If there are enough particles present, all the light striking the surface will be reflected outward and the object will appear opaque and white.



## Product Overview

In general, the greater the **Refractive Index (R.I.)** of the pigment, the greater the light scattering and the better the opacity. Virgin polyethylene exhibits a 1.5 refractive index. Listed here are the refractive indices of several common white opacifiers. As you can see, Rutile  $\text{TiO}_2$  is by far the best opacifier. Compared to Anatase  $\text{TiO}_2$ , Rutile has a more tightly packed crystal structure resulting in a higher density and a more efficient opacifier.

|           | Substance                       | Refractive Index |
|-----------|---------------------------------|------------------|
| Media     | Air                             | 1.0              |
|           | Water                           | 1.3              |
|           | Polymers, Polyolefin            | 1.5              |
| Pigments  | Lithopone                       | 1.8              |
|           | Zinc Oxide                      | 2.0              |
|           | Zinc Sulfide                    | 2.4              |
|           | Titanium Dioxide, Anatase       | 2.5*             |
|           | <b>Titanium Dioxide, Rutile</b> | <b>2.7*</b>      |
| Extenders | $\text{CaCO}_3$                 | 1.5              |
|           | $\text{CaSO}_4$                 | 1.6              |

There are many varieties of Rutile  $\text{TiO}_2$  available in today's market. These are differentiated by such things as particle size and surface treatment. The particle size affects light scattering, and therefore the shade (blue or yellow) observed. The human eye perceives the bluer shades of  $\text{TiO}_2$  as being brighter or cleaner. The other significant variable is the surface modification or treatment—virtually all  $\text{TiO}_2$  has some degree of surface treatment. Organic or inorganic additives are applied to the surface, and treatment levels of 0.50% to 1.0% are common. The surface treatment can be customized to aid such things as reducing die build-up, improve dispersability, and better weatherability. In the case of weathering grades of  $\text{TiO}_2$ , where chalking and crazing are a concern, treatment levels of up to 10% are common.

With recent market condition dynamics, Ampacet has put together a portfolio of cost-effective white masterbatches. We begin by utilizing a wider selection of carrier resins, grades of  $\text{TiO}_2$ , and including fillers as well as extenders. Understanding customer product performance requirements, such as extrusion process, FDA requirements, opacity and dispersion needs, will help determine proper white masterbatch solutions.

## Products/Codes

| Production Code | Resin      | Application                            | Comments                  | FDA                   |
|-----------------|------------|--|---------------------------|-----------------------|
| 111707          | LLDPE      | Blown Film                             | 68-70% strength white     | Application dependent |
| 1100566-G       | LLDPE      | Blown Film & All Molding               | 70% strength white        | Application dependent |
| 11777           | LLDPE/LDPE | Blown Film (variable raw materials)    | ECONOBLEND™ High Strength | Application dependent |
| 110017          | LLDPE      | Blown Film (110017-A for Blow Molding) | 50% strength white        | Application dependent |
| 111717-A        | LLDPE      | Blown Film                             | <40% strength white       | Application dependent |
| 111717-B        | LLDPE      | Blown Film                             | <30% strength white       | Application dependent |



For more information on Ampacet **Cost-Effective White** masterbatches, their uses and complete Regulatory Status, contact your Ampacet Account Executive or visit [www.ampacet.com](http://www.ampacet.com).

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