SPHERILEX® 30 AB and SPHERILEX® 60 AB

New antiblocking agents for high clarity polymer films



EVONIK
Leading Beyond Chemistry

Antiblocking agents are essential additives in the production of plastic films. These additives help facilitate film winding operations and improve the handling properties of films during subsequent processing. Under the brand names SPHERILEX® 30 AB and SPHERILEX® 60 AB, Evonik has introduced two grades of precipitated silica to the antiblock market. These products are produced by a new, patented manufacturing process that simultaneously allows spherical particle shape, controlled particle size, and narrow particle size distribution to be achieved. This unique combination of product properties offers significant benefits, especially for application as an antiblocking agent in blown and cast films including polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), and polyamide (PA).

SPHERILEX® 60 AB was developed for standard films based on PE and PP, whereas SPHERILEX® 30 AB is specially designed for very thin films and biaxially oriented film applications.

Main benefits of SPHERILEX® antiblocking agents

- Spherical particle morphology
- Narrow particle size distribution
- Low coefficient of friction (COF) of films
- High film transparency
- Excellent performance in combination with a slip agent (low oil absorption)
- Easy dispersibility and high masterbatch loading
- Low abrasion of processing equipment

Analytical data of SPHERILEX® 30 AB and SPHERILEX® 60 AB and application examples

Application testing was performed in PP cast and LDPE blown films on the pilot plant scale using standardized methods. The new SPHERILEX® grades were compared with SIPERNAT® 44 MS and a common silica gel that is well established in this field of application. **Table 1** lists typical physicochemical data of the antiblocking agents tested.

Table 1 Typical physicochemical data of antiblocking agents – the values in the table are typical data. Specifications are available on request.

Product	Particle size d_{50}, Coulter LS / µm	Wet screen residue >25 µm	Loss on drying, 2 h at 105 °C	Product type
	ISO 13320	ISO 187-18	ISO 787-2	
SPHERILEX® 30 AB	~ 4	< 0.01 %	< 2 %	Spherical precipitated silica
SPHERILEX® 60 AB	~ 6	< 0.01 %	< 2 %	Spherical precipitated silica
SIPERNAT® 44 MS	~ 3	< 0.01 %	n. a.	Zeolite
Silica gel, 5 µm	~ 5	< 0.01 %	< 1.5 %[1]	Silica gel

[1] *Moisture (160 °C)*

Figure 1 shows the particle size distribution of the new SPHERILEX® grades along with the silica gel reference. The spherical particle morphology can be seen in a SEM micrograph (**Figure 2**) and in comparison to a silica gel in **Figure 3**.

Figure 1 Particle size distribution (HORIBA) of SPHERILEX® 30 AB and SPHERILEX® 60 AB compared with a 5 µm silica gel

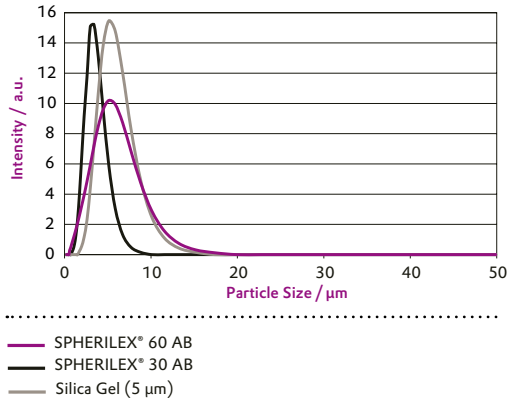
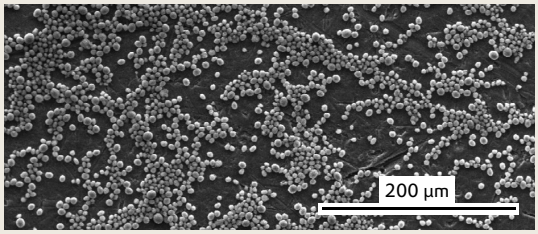


Figure 2 SEM micrographs of SPHERILEX® 60 AB at different magnifications



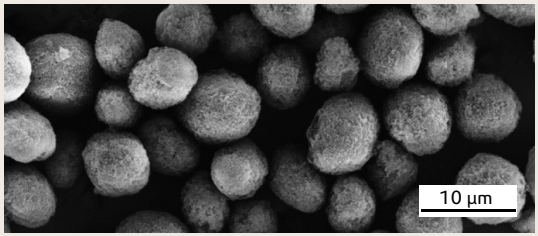
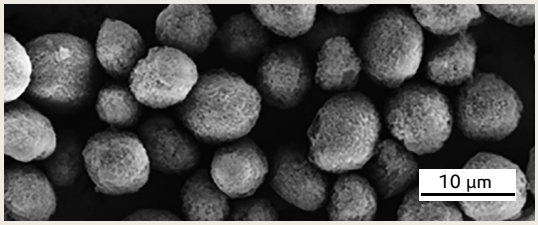
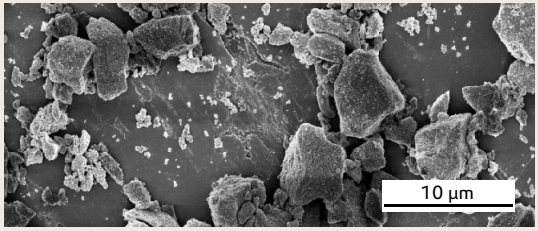


Figure 3 SEM comparison of SPHERILEX® 60 AB and silica gel





Application example in PP cast film:

Figures 4 and **5** demonstrate the high level of performance of SPHERILEX® 30 AB and SPHERILEX® 60 AB as antiblocking agents. They achieve excellent antiblocking performance (low COF) and high film clarity (low haze). They also have low interaction with other polymer additives and therefore perform very well in combination with a slip agent. They are easy to disperse in thermoplastic compounding processes, which facilitates high masterbatch loadings.

Figure 4 Coefficient of friction in PP cast film, 30 µm / addition of 0.2 % silica + 0.1 % slip agent

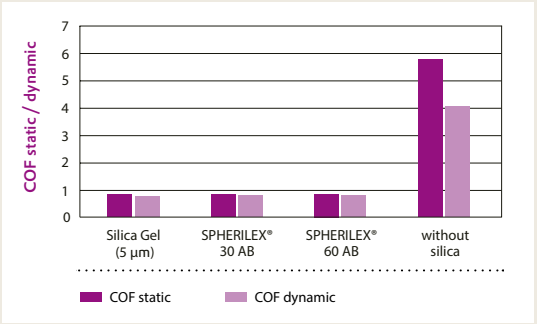
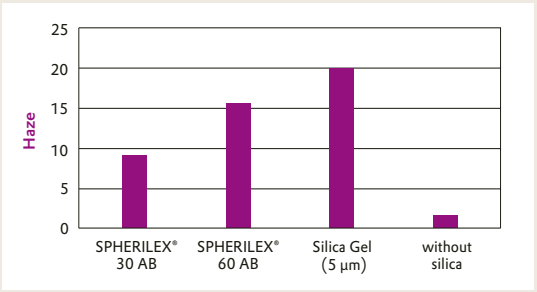


Figure 5 Haze in PP cast film, 30 µm / 0.2 % silica + 0.1 % slip agent



Application example in LDPE blown film:

Figure 6 and 7 show that SPHERILEX® 30 AB matches the very favorable performance of zeolite based antiblocking agent SIPERNAT® 44 MS, both for the coefficient of friction as well as clarity of the PE film. The very low moisture content is an additional benefit for SPHERILEX® 30 AB.

Figure 6 Coefficient of friction in LDPE blown film, 25 µm / addition of 0.15 % silica + 0.05 % slip agent

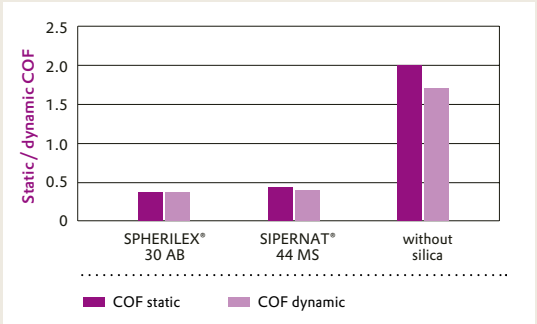
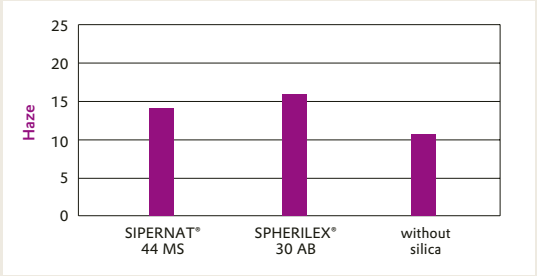


Figure 7 Haze in LDPE blown film, 25 µm / 0.15 % silica + 0.05 % slip agent



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F-7-EN-04-2025/05-RAU

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