Durethan® KU 2-2903

Antiblock and lubricant masterbatch

Polyamide ISO 1874: PA 6/6I, FBS, 14

1 Product characterization

Durethan® KU 2-2903 is an antiblock and lubricant masterbatch based on copolyamide. It is successfully used in both flat-film and blown-film coextrusion, as well as in the production of polyamide mono-films.

Durethan® KU 2-2903 contains a mineral-based antiblock agent and a slip wax. The two components are coordinated in such a way that PA films modified with Durethan® KU 2-2903 will display the best possible slip properties during initial and post-processing and, at the same time, will not block even on bigger coils.

The masterbatch carrier is a copolyamide with a melting point of 190 °C. This gives the product excellent miscibility with nearly all of the polyamides in current use, even at very low processing temperatures of below 200 °C.

2 Mode of action: lubricant

Adding substances that have only a limited miscibility with the polymer is a widely used means of optimizing the slip behavior of plastics. These substances migrate to the surface during right at the processing stage, i.e. in the molten plastic, where they form an extremely thin film. The additive used by LANXESS is highly effective in this respect, which means that even very small quantities are sufficient to produce a noticeable effect. The remaining other properties of the film are hardly affected.

3 Mode of action: anti-block agent

Very smooth and flat surfaces tend to stick together well due to adhesion. Adding small quantities of extremely fine-particle solids causes a large number of small bumps to develop on the film surface, thus preventing close contact between the plastics surfaces and greatly reducing the amount of adhesion (Fig. 1 to Fig. 3).

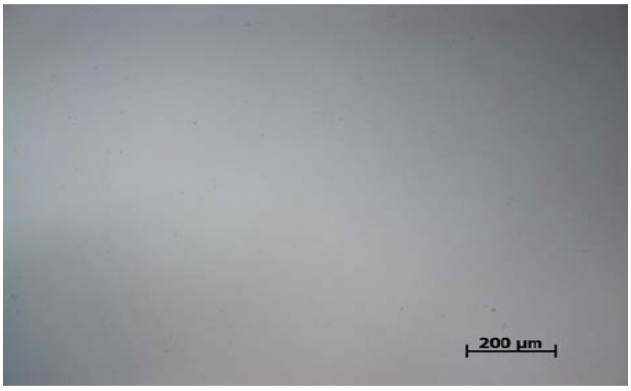

Fig. 1 Film surface without anti-block agent

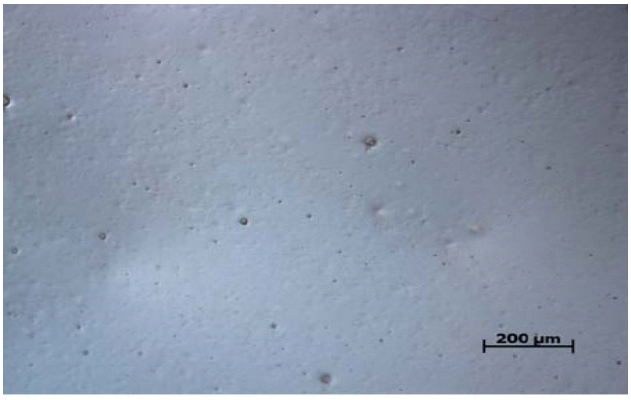

Fig. 2 Film surface with anti-block agent

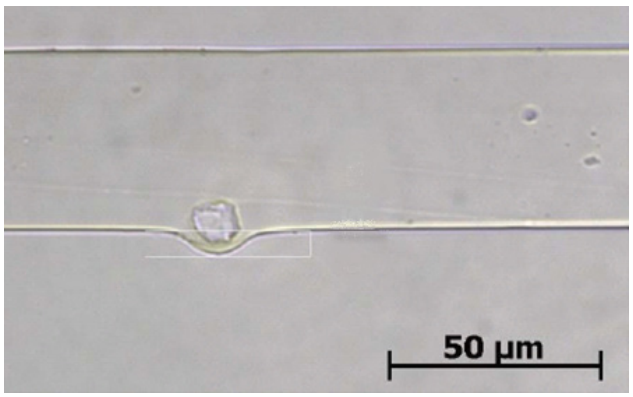

Fig. 3 Small bumps in the surface caused by a mineral particle

4 Coefficient of friction

The frictional properties of a film surface are determined not only by the specific materials and surfaces involved, as well as the surface pressure and the frictional velocity, but also by the machine and processing parameters which define the degree of crystallization and the surface structure. As a result, extremely different coefficients of friction can result for same material. Therefore, a comparison between materials only makes sense if identical processing parameters are used.

Fig. 4 shows, on the basis of 50-µm-thick chill-roll copolyamide films, that even small quantities of Durethan® KU 2-2903 have a clearly positive influence on both the static friction and the dynamic friction of the PA surface.

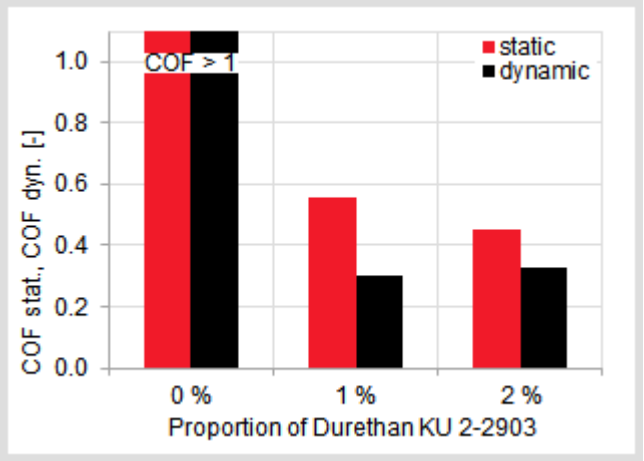

Fig. 4 Static and dynamic coefficient of friction with and without the addition of 1 % and 2 % Durethan® KU 2-2903 (film on steel)

5 Optical properties

Despite the mineral agent, the addition of Durethan® KU 2-2903 generally only has a marginal impact on the film's transparency. Figure 5 shows the change in transparency and haze of flat films with a thickness of 50 µm when they are mixed with the standard quantities of Durethan® KU 2-2903.

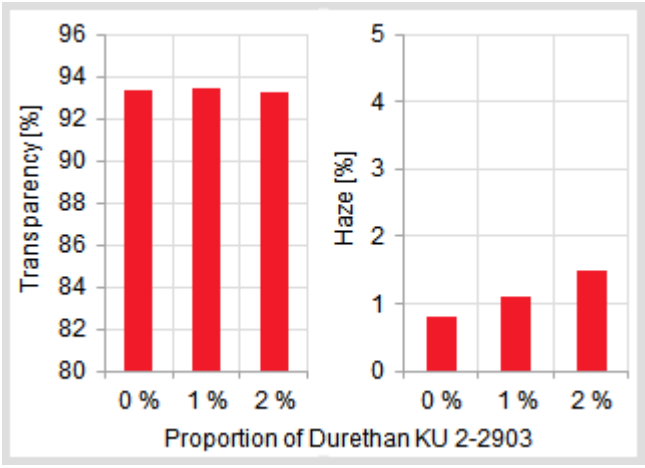

Fig. 5 Change in film transparency and haze value due to the addition of Durethan® KU 2-2903

6 Processing

Experience has shown that the addition of 1 - 2 % Durethan® KU 2-2903 is sufficient to significantly improve the blocking and slip behavior of polyamide films. The precise amount added must be established in each individual case with regard to the properties required.

7 Delivery form

Durethan® KU 2-2903 is supplied in 25-kg aluminum-laminated bags, or 1000-kg Oktabins with a PE inliner. These forms of packaging usually permit a storage time of 12 months (in the case of bags) and four months (Oktabins), provided that the packaging is undamaged and unopened. It is then not necessary to dry the Durethan® KU 2-2903 prior to use.

8 Food contact

Durethan® KU 2-2903 can be used as an additive for polyamides in contact with foods:

8.1 EU countries

With respect to its monomer and additive constituents, Durethan KU 2-2903 complies with

- EU Directives 2002/72/EC, 2004/1/EC, 2004/19/EC, 2005/79/EC and 2007/19EC on plastics materials and articles intended to come into contact with foodstuffs
- The revised German "Commodity Ordinance" of 13.07.2005 (Official Federal Gazette, Part I, No. 44, 2005, pp. 2150 ff) and its subsequent modifications

and also fulfils EU Framework Regulation EC/1935/2004.

If the recommended amounts are added, it is unlikely that the limit specified in BfR X for the lubricant in the compound as a whole will be exceeded.

8.2 USA

Durethan KU 2-2903 may be used as a component of laminate structures that are in compliance with applicable FDA food additive regulations provided that the aforementioned products:

- are not the food-contact / layer
- are separated from the food by a 0.051 mm thick food-contact layer that is manufactured from material the FDA considers to be an effective functional barrier to migration.

Based on our product inquiries to the FDA we know that examples of effective functional barriers to migration include:

- aluminum foils
- polyethylene complying with 177.1520
- polypropylene complying with 177.1520
- blends of complying polyethylene and polypropylene

There may be other materials that the FDA has designated as barrier-to-migration materials. However, the FDA does not publish lists of "barrier materials".

We recommend following our dosing recommendation, because otherwise the optimum quantity of additives might be exceeded.

A detailed food-legislation assessment will be provided on request.

9 Reference data

Durethan KU 2-2903

Properties	Units	Standards	
Density	kg/m³	ISO 1183	1.15
Bulk density	kg/m³	ISO 60	700
Melting point	°C	ISO 3146 C	190
Viscosity number	ml/g	ISO 307	130