

**Durethan® KU 2-2903**

**Anti-block and lubricant masterbatch**

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

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**1 Product characterization**

Durethan KU 2-2903 is an anti-block 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 anti-block 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 the processing stage 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 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, preventing close contact between the plastics surfaces and greatly reducing the amount of adhesion (Fig. 1 to Fig. 3).

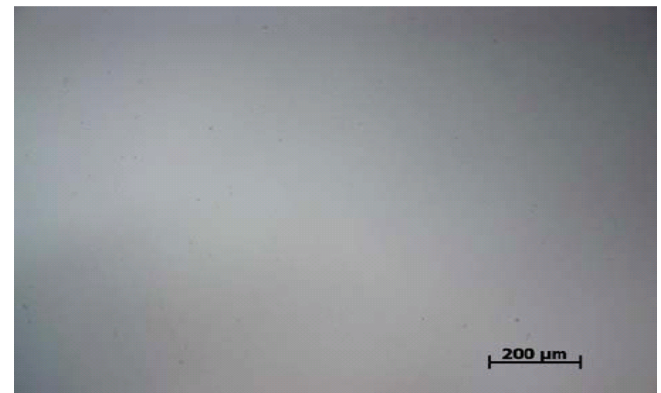


Fig. 1 Film surface without anti-block agent

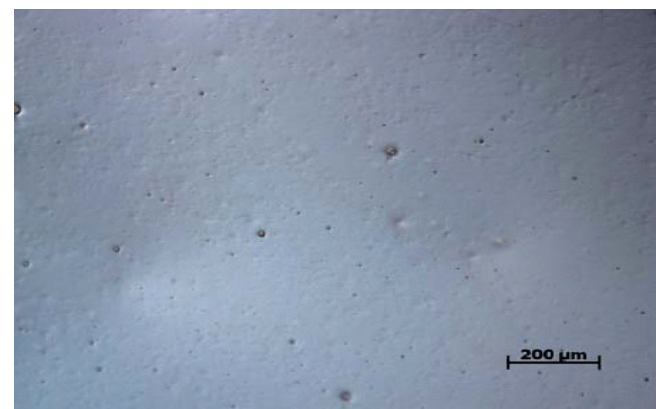


Fig. 2 Film surface with anti-block agent

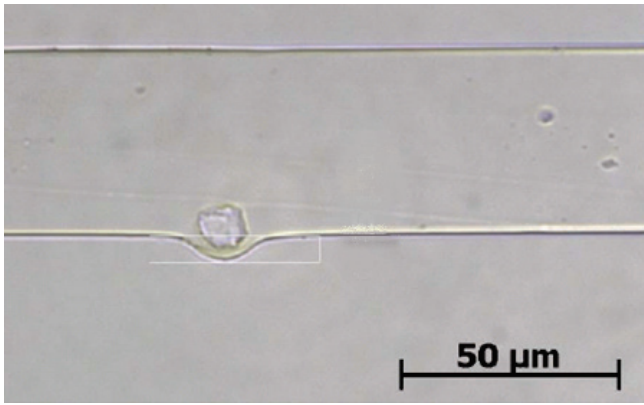


Fig. 3 Small bump in the surface caused by a mineral particle

#### 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 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 the same material. Therefore, a comparison between materials only makes sense if identical processing parameters are used.

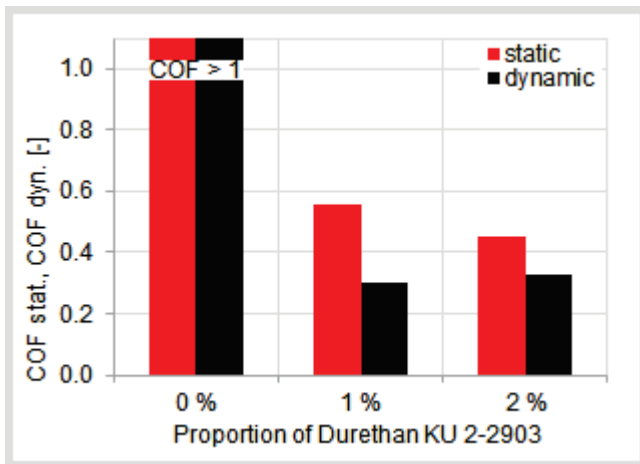


Fig. 4 Static and dynamic coefficient of friction with and without the addition of 1 % and 2 % Durethan KU 2-2903 (film on steel)

Fig. 4 shows, on the basis of 50- $\mu$ m-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.

#### 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  $\mu$ m when they are mixed with the standard quantities of Durethan KU 2-2903.

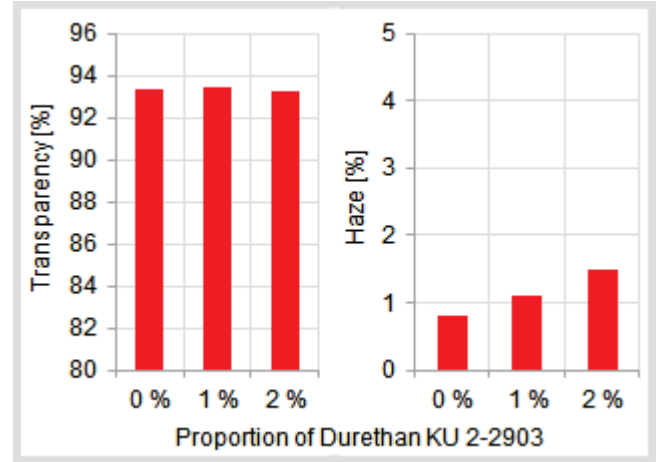


Fig. 5 Change in film transparency and haze value due to the addition of Durethan KU 2-2903

#### 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 1,000-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 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 2 mil (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.

## 8.2 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 2007/19/EC 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.

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

## 9 Reference data

### Durethan KU 2-2903

Properties	Units	Standards	
Density	kg/m <sup>3</sup>	ISO 1183	1.15
Bulk density	kg/m <sup>3</sup>	ISO 60	700
Melting point	°C	ISO 3146 C	190
Viscosity number	ml/g	ISO 307	130

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The manner in which you use and the purpose to which you put and utilize our products, technical assistance and information (whether verbal, written or by way of production evaluations), including any suggested formulations and recommendations, are beyond our control. Therefore, it is imperative that you test our products, technical assistance and information to determine to your own satisfaction whether they are suitable for your intended uses and applications. This application-specific analysis must at least include testing to determine suitability from a technical as well as health, safety and environmental standpoint. Such testing has not necessarily been done by us. Unless we otherwise agree in writing, all products are sold strictly pursuant to the terms of our standard conditions of sale. All information and technical assistance is given without warranty or guarantee, and is subject to change without notice. It is expressly understood and agreed that you assume and hereby expressly release us from all liability, in tort, contract or otherwise, incurred in connection with the use of our products, technical assistance and information. Any statement or recommendation not contained herein is unauthorized and shall not bind us. Nothing herein shall be construed as a recommendation to use any product in conflict with patents covering any material or its use. No license is implied or in fact granted under the claims of any patent.

#### Developmental Product

Any product designated as a developmental product is not considered part of the LANXESS Corporation line of standard commercial products. Complete commercialization and continued supply are not assured. The purchaser/user agrees that LANXESS Corporation reserves the right to discontinue this product without prior notice.

#### Typical Properties

Property data is provided as general information only. Property values are approximate and are not part of the product specifications.

#### Health and Safety

Appropriate literature has been assembled which provides information concerning the health and safety precautions that must be observed when handling LANXESS products mentioned in this publication. Before working with these products, you must read and become familiar with the available information on their hazards, proper use, and handling. This cannot be overemphasized. Information is available in several forms, e.g., material safety data sheets (MSDS) and product labels. Consult your LANXESS Corporation representative or contact the Product Safety and Regulatory Affairs Department at LANXESS. For materials that are not LANXESS products, appropriate industrial hygiene and other safety precautions recommended by their manufacturer(s) must be followed.

#### Regulatory Compliance

Some of the end uses of the products described in this brochure must comply with applicable regulations, such as the FDA, NSF, USDA and CPSC. If you have any questions on the regulatory status of any LANXESS engineering thermoplastic, consult your LANXESS Corporation representative or contact the LANXESS Regulatory Affairs Manager.

#### Note:

The information contained in this publication is current as of July, 2014. Please contact LANXESS Corporation to determine if this publication has been revised.