

General Recommendations

Storage & Pre-treatment

Storage

Elastollan® products are supplied in the form of diced, pelletized, or pearl shaped granules. The products are packaged in polyethylene-lined octabins or gaylords, polyethylene lined drums and multilayer aluminum-lined bags.

Due to the hygroscopic nature of TPUs, these products should be stored in a cool, dry area. Ideally, Elastollan® should not be kept in storage for more than one year. It is advisable that material stored in a very cold environment be allowed to reach room temperature before opening the container. This will avoid vapor condensation on the granules and also reduce the energy required during the preheating/drying stage.

The curves in the adjoining figures 3 and 4 show the extent of the hydroscopic nature of TPU products. They show the water absorption rate for both polyether and polyester type TPUs at 23°C (73°F) and 50% R.H. and 40°C (104°F) and 90% R.H.

The most important factor this data brings out is the rapid initial absorption rate at both ambient conditions shown. For this reason, it is important to minimize the exposure of the granules to atmospheric conditions before processing.

Figure 3
Moisture Absorption
Polyester-TPU
Hardness 80 Shore A – 64 Shore D

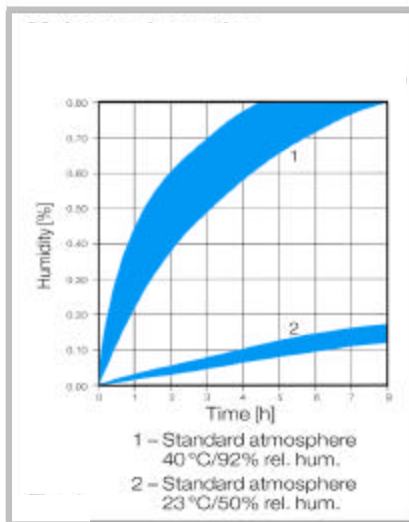
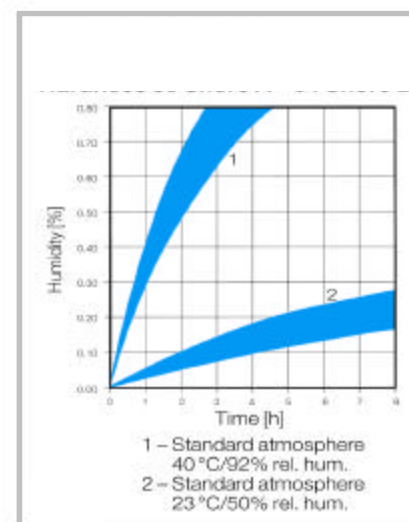


Figure 4
Moisture Absorption
Polyether-TPU
Hardness 80 Shore A – 64 Shore D



Drying

Elastollan® products, as is the case with all TPU products, should be dried before processing. The drying step is required to both dry the Elastollan® granules and also maintain a low moisture content until the product enters the processing equipment (injection molding machine, extruder, etc.).

In order to guarantee optimum product performance in the finished part and also prevent surface defects, the water content of Elastollan® must be less than 0.03% when processing. Table I shows the recommended drying conditions for Elastollan® products.

It is important to understand the total effect that water has on TPU products during processing. When TPU products are exposed to moisture at processing temperatures [between 360°F and 430°F (180°C and 220°C) for Elastollan® TPUs], a chemical reaction actually occurs between the water and polyurethane molecules. During this reaction, two things occur: carbon dioxide (CO₂) gas is released and the TPU is chemically degraded. In turn, the properties of the finished products are diminished. As mentioned above, to prevent these problems from occurring the moisture level should be less than 0.03% during processing.

Table I

Drying recommendations		
Elastollan® hardness/Product type	Drying period	Drying temperature
Plasticized Grades	2-4 hours	70°C to 85°C (160°F to 180°F)
Up to 90 Shore A	2-4 hours	80°C to 90°C (175°F to 195°F)
Harder than 95 Shore A	2-4 hours	90°C to 105°C (195°F to 220°F)

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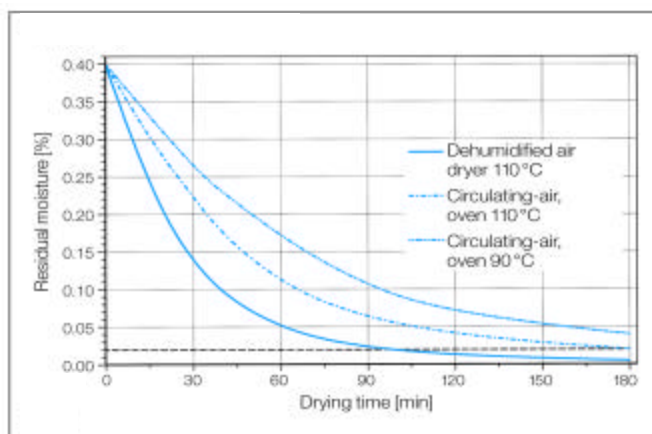
To ensure fast and efficient drying under all weather conditions, a dehumidifying hopper dryer is preferred. Figure 5 shows the difference between hot air and hot dehumidified air drying.

As noted in this figure, a dehumidifying hopper dryer requires less than 2 hours to achieve a moisture level of 0.03%. The hot air at recommended temperature (90°C) never reaches this moisture level.

Taking into account the water absorption rate of TPU products and the need to process these products in a dry state, the following steps must be followed and precautions taken:

- Elastollan® granules should not be exposed to the atmosphere for long periods of time.
- Any unused opened packages should be tightly closed until needed.
- The hopper dryer should be located above the feed throat of the processing equipment.
- If this is not possible, material fed from a dryer to the machine hopper should be kept in a closed system (cover over the hopper) and used within 15-30 minutes.

Figure 5
Drying Diagram for Elastollan



Note also that any TPU master batches or concentrates (pigments and/or additives) should also be pre-dried before processing. Ideally, these concentrates should be pre-blended with the product granules and dried together before processing.

Regrind

Depending on the application requirements, up to 25% regrind can be blended with virgin Elastollan. It is important that the final part specifications or requirements be taken into account before deciding on the regrind level to be used. It should be noted, however, that in extrusion applications a lower limit may be dictated by the mixing efficiency of the extruder.

For extrusion applications, the preferred concentration is between 10 and 15%. However, where possible, it would be best to accumulate regrind and run the product using 100% regrind to avoid a melt mixing problem.

Regrind should be continuously ground and blended with virgin material, dried, and processed. If the regrind is allowed to stand in open containers, as mentioned above, it will absorb moisture and

create a processing problem if not dried thoroughly.

Another important factor is the size of the regrind granules; this should be as close to the virgin granule size as possible.

Coloring and additives*

The addition of special additives or the pigmentation of a finished product can very easily be done through the use of masterbatches or concentrates. It is essential that the carrier of these concentrates be a TPU product and ideally of the same type as the virgin Elastollan® being used in the application.

Using a non-TPU-based concentrate would run the risk of having an incompatible plastic being added or one that will degrade or interact with the base TPU product during processing. Along with pigment concentrates other additive containing concentrates have been used in Elastollan® products to accomplish the following results:

- matte finish
- improve UV resistance
- improve color stability
- improve flow properties
- improve demolding characteristics
- reduce blocking or sticking
- reduce coefficient of friction

If your application requires pigmentation or the enhancement of one of the above properties, please contact your Elastollan® Business Development Representative, Technical Service Representative, or the Elastollan® TPU Tech Desk to discuss your requirements.

*A list of TPU Based Concentrate suppliers can be found in the General Information section of this binder.