

## Abnormal phenomena during processing

If abnormal phenomena are observed, suitable checks and adequate trouble shootings should be done according to the following indications.

### ( 1 ) Bubbling

In case of bubbling in the “Soarnol™” layer, the following check -points should be studied.

#### 1-1) Moisture absorption:

Moisture absorption of “Soarnol™” due to package breaking during transportation or long time storage in an open package may cause bubbling troubles on processing.

A few hours' drying in hopper type dryer or air circulation type dryer at 90 – 110deg C settles this trouble.

#### 1-2) Abnormal temperature increase

In a higher temperature than 240deg C, “Soarnol™” may cause bubbling, too. Lower the set temperatures of the barrel and the die.

#### 1-3) Unsuitable screw design

In case of a rapid compression type screw, gas bubbling is sometimes observed besides excessive moisture of “Soarnol™” pellets.

When bubbling continues even under the lower set temperatures of feed and compression zones, the present screw must be replaced with the suitable one chosen on the basis of the information in General Advice on Processing of “Soarnol™”(Ref. Other Technical Note).

Using a suitable screw under adequate set temperature, according to our experience, “Soarnol™” of 0.4 - 0.5% moisture content can be processed without bubbling.

## (2) Abnormal increase of screw motor load

Generally speaking, “Soarnol™” needs higher screw motor load in processing than PE and PP. This high load can be reduced by using adequate screw and adequate processing conditions.

### 2-1) Type of screw

The rapid compression type screw for polyamide or PE often causes troubles in case of “Soarnol™”.

The number of pitches in the compression zone must be at least four, although this necessary number of pitches changes a little depending on L/D and CR. The rapid compression type screw of 1 to 3 pitches might cause troubles especially in case of higher rotation of screw.

Standard ratio of each zone in proportion for the screw suitable for “Soarnol™”:

Free zone =30 – 40%

Compression zone =20 – 25%

Metering zone =35 – 50%

Actual examples of screw suitable for “Soarnol™”:

L/D	Feed zone	Compression zone	Melting zone
24	7 (29)	5 (21)	12 (50)
26	9 (32)	6 (21)	13 (46)

Note: The figure is the number of the pitches and that in parenthesis is the ratio in %.

### 2-2) Temperature conditions for extrusion

In order to prevent an abnormal increase of torque, a temperature profile of barrel successively increasing higher from feed zone to the front or another one having the highest temperature in the center of metering zone are recommended. On the other hand, too low temperature setting (for example, below 190deg C) often causes unusually high torque.

(3) Remarkable neck-in

“Soarnol™” has tendency to show remarkable neck-in as compared with LDPE.

Pay careful attention to the following instructions:

- Make an air gap as narrow as possible.
- Lower the temperature of the die.
- Adjust the balance between extruder output and line speed.

(4) Many small gels

During the extrusion process of “Soarnol™”, small gels may be observed sometimes. These gels are classified into two types:

4-1) Unmelted particles

In case of too low extrusion temperature (below 190deg C), many small gels are often observed due to incomplete melting of “Soarnol™”. (Ref. General Advice on Processing of “Soarnol™”)

Poor mixing efficiency, for instance by too short screw, by unnecessary high temperature especially at feed to compression zones, or by operating a large extruder at low rotation speed, will also cause unmelted particles. . (Ref. General Advice on Processing of “Soarnol™”)

4-2) Decomposed EVOH

Since EVOH is a heat sensitive resin, too high extrusion temperature (above 240deg C) or prolonged heat exposure (due to shut down or residence in dead space of an extruder) will decompose EVOH and causes gels.

As for processing of “Soarnol™”, processing with an equipment shown below is recommended. When you use other type of equipments, please contact us accordingly.

a) Extruder: L/D=24-30

b) Screw Design

CR=3.0-3.5

Plating: Chrome Plating or Nickel Alloy Plating

c) Recommendable Temperature Profile of Extruder(Unit: deg C)

d) Screen Pack

80/120 - 150/50 mesh