

High Performance Polyamide PA6T

ARLEN™

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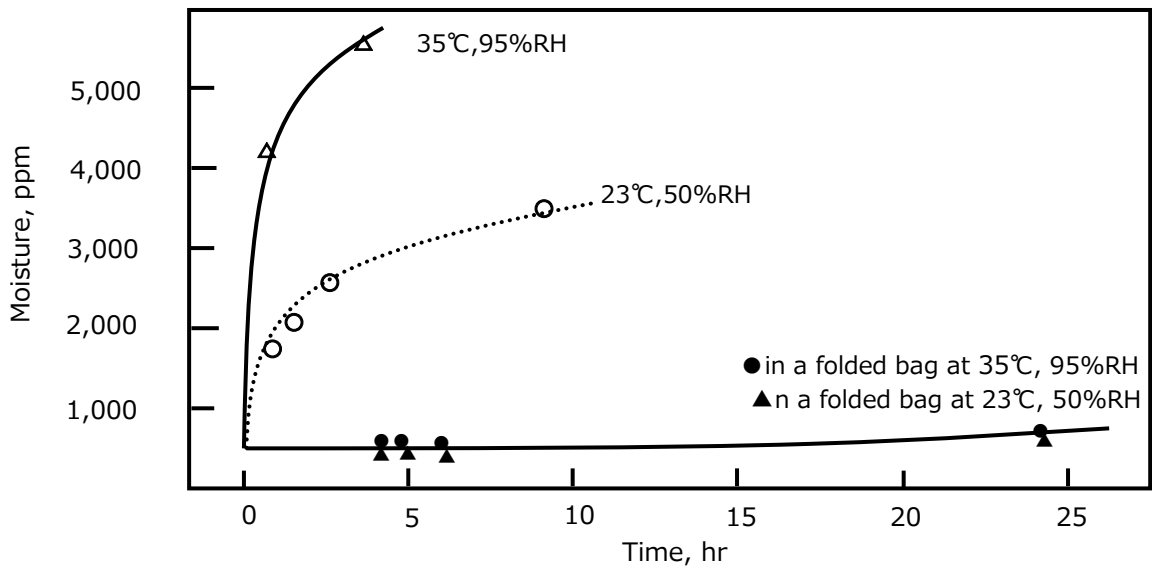
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1. How to handle pellets

1.1 Moisture absorption

ARLEN™ pellet is contained in a dry state in a moisture-proof bag (aluminum laminate), so it may be used without drying when molding immediately after opening the bag. However, ARLEN™ is hygroscopic, so we recommend to dry it before use, preferably by dehumidifying dryer. In addition, in order to prevent contamination and moisture absorption, please fold the paper bag so as to push out the air.

Figure 1. ARLEN™ Moisture Absorption



1.2 Drying

If the pellets absorb moisture, it may cause problems such as molding problems, drooling, and poor appearance of the product. Therefore, if the pellet absorbs moisture, dry it before use. In general, the performance of hot air circulation dryers is affected by the humidity of the outside air, so we recommend using a dehumidifying dryer.

Table 1. Recommended Drying Conditions

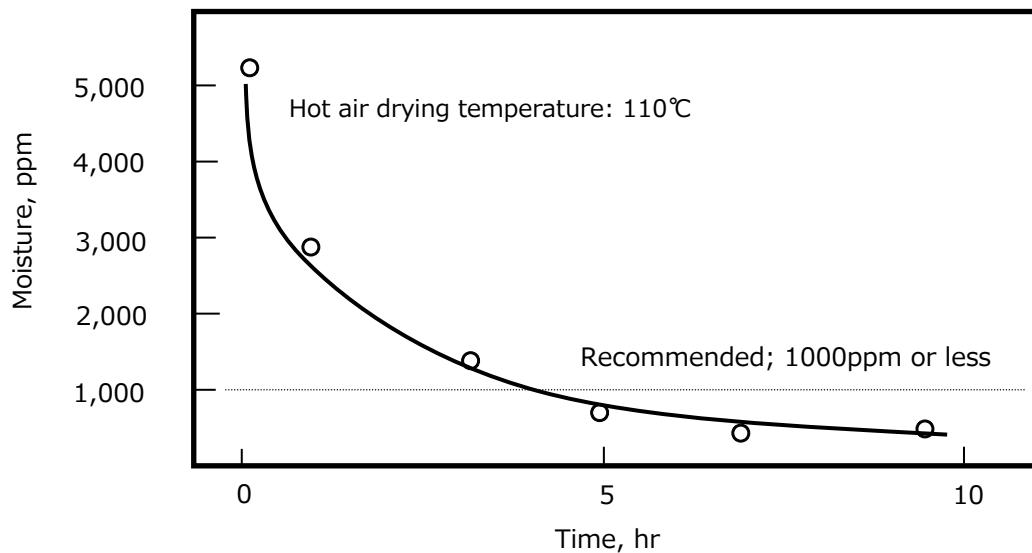
	Drying Temperature	Drying Time
Recommended value	110 °C	6-8 hours

1.3 Notes on Drying

If the drying temperature is too high or the drying time is too long, the pellets may become discolored. Be careful not to dry over 120°C and over 12 hours.

Even drying is complete, the resin may re-absorb water again, so transfer quickly to a hopper with a dryer.

Figure 2. Drying Curve



2. injection molding

2.1 Machine

ARLEN™ has a high molding temperature, so the surface of the cylinder, screw or check ring may be worn or corroded. This can cause resin to stagnate in the molding machine. Therefore, it is recommended that the molding machine has corrosion resistance and wear resistance.

1)Cylinder

If the cylinder capacity is too large compared to the product weight, the melted resin will stay in the molding machine for a long time, causing drooling or brittleness. On the other hand, if the cylinder capacity is too small, it will cause poor dispersion, poor appearance of the molded product, and insufficient strength. Please keep the balance between one shot volume and cylinder capacity within the following range.

$$\left(\frac{\text{One shot volume}}{\text{Capacity of molding}} \times 100 = 30 \sim 60 \% \right)$$

2)Screw

Recommended compression ratio is 2 to 2.3. If the compression ratio is too large, the melted resin tends to stay in the compression section.

Please set the back pressure as low as possible.

For a deep groove type screws with a large plasticizing capacity, either increase the molding temperature or lengthen the metering time within the cooling time.

3)Nozzle

We recommend a tapered type to be less resin residence.

When using a long nozzle, the heater capacity tends to be insufficient, resulting in nozzle clogging or poor appearance. In such cases, using a band heater is effective.

4)Check ring

If the check ring and screw are co-rotating type, the melted resin tends to stay in the check ring groove, so a non-co-rotating type is recommended.

2.2 Operation - Starting, interrupting and ending -

ARLEN™ has a high molding temperature and may cause resin degradation.

Resin adhering to screws, cylinder or check rings may get mixed into the molded products (discoloration and black spots), so thoroughly purge and clean the cylinders and screws before molding. Also, if resin remains in the cylinder when starting, interrupting, or stopping, the resin will remain in the cylinder for a long time, causing thermally degradation, resin adsorption to the cylinder and screw, and carbonization. Therefore, during cylinder temperature rise, temporary interruption, molding stop, etc., do the following:

1) Starting

In order to prevent resin degradation when starting, set the cylinder temperature to 250-270°C, and start heating about 1 hour before molding starts. At this time, to prevent oxidative degradation due to air, the inside of the cylinder must be filled up to the hopper bottom with high-viscosity polypropylene (MFR 3-6).

Set the molding temperature condition 10 to 20 minutes before molding begins.

Purge with high viscosity polypropylene (MFR 3-6) before molding starts and clean the screw and cylinder walls. At this time, to make it easier to remove the resin adhering to the cylinder wall surface between the front part and the nozzle, perform high-speed injection at least 5 times with 80% of the total weight (set to low speed near the end of injection position for safety)

2) Interrupting

Do the following:

- ① Within 10 minutes of interruption, purge when restarting; more than 5 times injections with the nozzle released.
- ② When stopping within 30 minutes, purge the cylinder and nozzle with high-viscosity polypropylene (MFR 3-6), and then fill the inside before stopping.
- ③ When interrupting operation for 30 minutes or more, in addition to the above, set the cylinder temperature to 270°C or less, preferably 250°C or less.

3)End of molding

After molding, thoroughly purge the cylinder and nozzle with high-viscosity polypropylene (MFR3-6). If necessary, use a purge material or glass fiber contained polypropylene. When stopping the molding machine, fill the inside of the cylinder with high-viscosity polypropylene (MFR 3-6) to the bottom of the hopper to prevent oxidative degradation due to air.

2.3 Injection Molding Conditions

If ARLEN™ stays inside the cylinder for a long time, the molded product may become discolored or carbonized. Therefore, to melt and cool as quickly as possible is recommended. Standard molding conditions are as follows.

Table 2. Standard molding conditions for representative brands

	A335 A350 AE2230	MN400	E430N E630N RG430N	C215 C230 C240
Hopper Bottom	80°C	80°C	80°C	80°C
Cylinder Rear	315-330°C	300-320°C	315-330°C	300-320°C
Central	330-340°C	315-330°C	330-340°C	315-330°C
Front	330-340°C	315-330°C	330-340°C	315-330°C
Nozzle	325-340°C	310-330°C	325-340°C	310-330°C
Mold temperature	140-170°C	40-100°C	100-150°C	100-150°C
Injection pressure	Medium pressure			
Injection speed	Slow to medium speed			
Screw speed	80~150rpm			
Back pressure	1~10MPa			

1)Molding temperature

ARLEN™ has a slightly narrow molding temperature range, therefore it is recommended to check that the displayed temperature is accurate and to calibrate the thermometer if necessary. The standard molding temperature is 10-15°C above the melting point. At this time, if the product volume is smaller than the capacity of the molding machine, the residence time in the cylinder becomes longer, and black spots due to thermal degradation are more likely to occur. In that case, set the hopper temperature as low as possible. Also, if product volume is too large for the capacity of the molding machine, it will cause poor melting. In such a case, it is better to increase the cycle time by adjusting the cooling time.

2)Metering

If there is large difference between the product volume and the capacity of the molding machine, the residence time in the cylinder will become longer, making it easier to degradation. Depending on the injection filling amount, set the molding temperature condition as in chapter2.3.1.

If the cushion quantity is large compared to the metering setting value, the residence time of the molten resin in the cylinder will become longer, resulting it more likely to degradation. If the cushion amount or metering time is not stable, the screw or check ring may be worn, so please check it.

3)Back pressure

When back pressure is used, the measuring time becomes longer, so the resin tends to degrade. For example, the melted resin may flow back at the flight part of the screw during metering, or thermal degradation (carbonization) of the melted resin due to residence at flight corner. Therefore, avoid using back pressure or use as little pressure as possible.

4)Suck back

Set the suck-back just enough to prevent a drooling. ARLEN™ has a high molding temperature, so if you set the suck-back longer, the cylinder inside will be degradation and a lot of gas will be generated from the melted resin, causing gas burn. If there is a lot of drooling, it may be due to moisture absorption of the raw material, back pressure, too high nozzle temperature, etc.

5)Screw Rotation Speed

High screw rotation speed may cause thermal degradation due to shear. In addition, there is not enough air exhaust from the cylinder, and the air gets caught in the melted resin, causing gas burns in the molded product. Set the screw-rotation to a level that does not interfere with the process.

6)Cooling time

Please be careful not to use too long cooling or residence time. If the cooling time becomes longer, lower the cylinder temperature.

7)Mold clamping pressure

When a raw material resin is melted and injected into a mold, it is necessary to exhaust air from mold even if the raw material has little gas.

If the mold clamping pressure is too high, gas burns may occur in the molded product.

Set the clamping pressure as low as possible so that burrs do not occur on the product.