

[1] General Instructions (Overview)

- 1) Retract the injection unit.
- 2) Completely discharge any residual materials from inside the cylinder, clean the hopper with suction or compressed air, and then add CELPURGE into the hopper.
- 3) Repeat metering and injection to displace residual materials with CELPURGE. When doing so, use the position of the residual materials as-is for the metering position, and make the screw rotation and the injection speed as high as possible. **Set the backpressure 0 (zero)**. Normally 5 – 10 times purging may be enough.
- 4) After the preceding materials are almost displaced by CELPURGE, then perform short purges to clean the nozzle. Set the metering position 30 mm or between half to a full diameter of the screw, set the screw rotation speed and the injection speed being as high as possible. **Do not apply backpressure.**
- 5) After the preceding materials are completely displaced by CELPURGE, then leave one shot of CELPURGE in the cylinder, and then change the cylinder temperature setting or change molds.
- 6) Clean the hopper with suction or compressed air, and then add the next material.
- 7) Set the molding conditions for the next material, then repeat metering and injection or apply backpressure and run the screw to displace CELPURGE with the next material.

Precautions

- 1) Do not blend with other resins. Blending diminishes the cleaning power.
- 2) It is not preferable to mold CELPURGE during cleaning the cylinder/screw. It may diminish the cleaning power and cause troubles at ejection of moldings. CELPURGE does not contain any components that can corrode the mold.
- 3) If you use CELPURGE at temperatures higher than the operational temperature range, avoid allowing it stay in the cylinder for a long period of time, base resins of CELPURGE might thermally decompose.

[2] Necessary Quantities for Changeover of Materials/Color

Holding pressure of Injection Machine [t]	180	230	450	550	650	850
Approximate Quantity of CELPURGE [kg]	1.0	1.5	2.5	3.0	3.0	4.5

* The necessary quantity varies depending on the preceding material, on the molding conditions for the preceding material, and on degree of contamination of the screw and the cylinder (= on difficulty of cleaning).

* Higher quantities are needed to remove carbon contamination.



[3] Standard Manual for Changeover of Materials and Colors

Note

Do not leave CELPURGE in the cylinder for a long period of time. If it should necessarily stay in the cylinder for a long duration, leave one shot of CELPURGE and lower the temperature of the cylinder. Lower the nozzle temperature (to 180-200°C) to block the nozzle, ensure that no air enters the cylinder through the nozzle.

- 2) <Molding finished> After molding, retract the injection unit, detach the nozzle from the mold.
- 3) <Discharge the preceding material> Repeat metering and injection or apply the backpressure and perform metering to discharge the preceding material from the cylinder.
- 4) <Clean the hopper> Clean the hopper with suction or compressed air.
- 5) <Change of conditions (1)>

Metering	Metering position	No change (same molding conditions as before)
	Screw rotation	As high as possible
	Backpressure	Zero
Injection	Injection speed	As high as possible
	Injection pressure	As high as possible
	Cushion	As small as possible
Cylinder temperature		No change

6) < 1st cleaning : **Basic cleaning** >

Add CELPURGE and repeat metering and injection (about 5 to 10 times).

[Note] Set the backpressure 0 (zero).

6) < 1st cleaning : Basic cleaning, check>

Check whether the preceding material is **almost** displaced by CELPURGE.

How to check => 1st cleaning is completed when only streaks of the preceding material appear on the strand of discharge. If the whole strand is colored, then 1st cleaning is not completed.

7) <Change of conditions (2)>

Metering	Metering position	30 mm or .5 to 1 diameter of the screw (differs depending on the performance of the molding machine)
	No. of screw turns	As high as possible (same as Change of conditions (1))
	Backpressure	Zero (same as Change of conditions (1))
Injection	Injection speed	As high as possible (same as Change of conditions (1))
	Injection pressure	As high as possible (same as Change of conditions (1))
	Cushion	As small as possible (same as Change of conditions (1))
Cylinder temperature		No change (same as Change of conditions (1))



Indication of proper conditions for 2nd cleaning

Metering position: The check-ring should clatter back and forth sufficiently during repeating metering and injection.

Injection speed: The strand of CELPURGE exiting the nozzle should swell sufficiently.

- 8) < 2nd cleaning : nozzle cleaning > Add CELPURGE and repeat metering and injection (about 15 times or more).
- 9) < 2nd cleaning : nozzle cleaning, check > Check whether the preceding material was **completely** displaced by CELPURGE. (No trace of the preceding material should be observed on the discharged material.)
- (*) If unable to clean the nozzle sufficiently, raise the nozzle temperature by approximately 20-30°C.
- 10) <Changeover of materials or color, changing molds, and weekend shutdown>

(1) Changeover of color / when **neither** changing the **temperature** setting **nor** changing **molds**

- Discharge remaining CELPURGE from the cylinder by repeating metering and injection.
- Clean the hopper with suction or compressed air.
- Add the next material into the hopper, then repeat metering and injection or apply the backpressure and perform metering to completely discharge CELPURGE (molding machine conditions differ depending on the next material).
- Start molding of the next material

(2) Changeover of material / when changing the set temperature or changing molds

- Allow one shot of CELPURGE to remain in the cylinder (CELPURGE works as a sealant and blocks oxygen off).

Note

This procedure is required for preventing the yield of carbon contamination, because air entering through the nozzle into cylinder easily oxidizes molten resins.

Ensure that CELPURGE is kept within the operational temperature range if leaving CELPURGE in the cylinder for a long period of time. If necessarily leaving CELPURGE in the cylinder exceeding the operating temperature range, ensure that it ends in a short period, and lower the nozzle temperature (to 180-200°C) to avoid air entering the cylinder and prevent carbonization.

- Clean the hopper with suction or compressed air.
- Change the temperature setting of the cylinder and nozzle for the next material.
- Change molds if necessary and wait until the mold and cylinder temperature stabilizes.
- Add the next material into the hopper, then repeat metering and injection to discharge CELPURGE completely (molding machine conditions differ depending on the next material).



- Start molding of the next material

(3) When turning the heater of the machine off / for weekend shutdown, etc.

Note

This procedure is required when turning the machine off, regardless whether it may be changeover of the materials or color. Even the same plastics is going to be molded when restarting, it is recommended to perform this procedure in order to prevent defects due to carbonization and other contaminations.

- Allow one shot of CELPURGE to remain in the cylinder (CELPURGE works as a sealant and blocks oxygen off).

Note

This procedure is required for preventing the yield of carbon contamination, because air entering through the nozzle into cylinder easily oxidizes molten resins.

Ensure that CELPURGE is kept within the operational temperature range if leaving CELPURGE in the cylinder for a long period of time. If necessarily leaving CELPURGE in the cylinder exceeding the operating temperature range, ensure that it ends in a short period, and lower the nozzle temperature (to 180-200°C) to avoid air entering the cylinder and prevent carbonization.

- Clean the hopper with suction or compressed air.
- Cut the power to the heater (turn off the power to the heater).

[When restarting after shutdown]

- Turn on the power to the heater.
- After the temperature stabilizes, perform injection to discharge the remaining CELPURGE from the cylinder.
- Add a few more shots of CELPURGE into the hopper, perform metering and injection, and confirm that no contaminants are inside the cylinder.
- After checking contamination, start molding of the next material using the same procedure as in 10) (1).



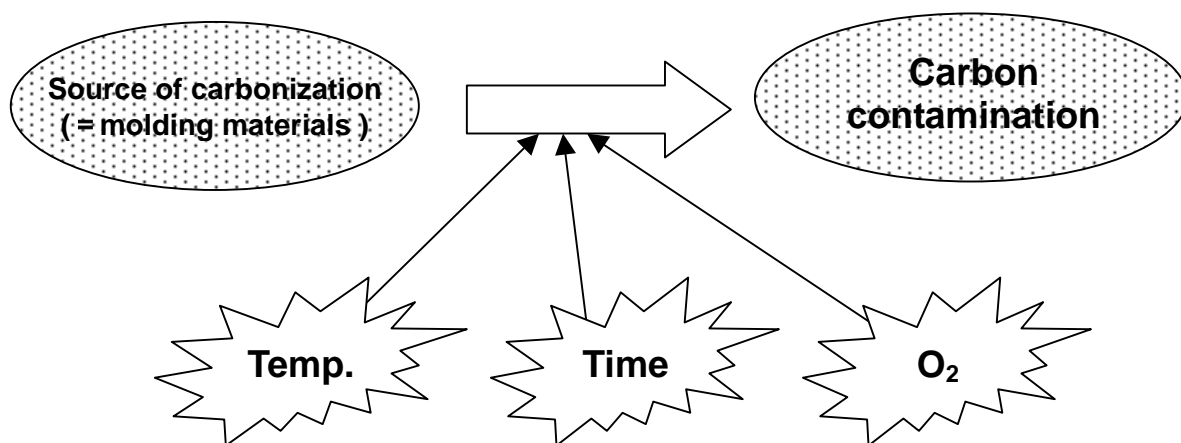
[4] Measures against Carbon Contamination and Manual for Elimination**1. Measures against Carbon Contamination: Key Points**

There are various factors that cause carbonized contamination in plastics processing machine, however, measures not to cause it can be summarized into the following 3 points.

- (1) Do not allow molding materials to remain in the cylinder or nozzle.
- (2) Clean the cylinder and screw regularly.
- (3) Prevent degradation of molding materials through oxidation.

2. Causes of Carbonization and Countermeasures

Here shows the list of the factors and illustrates how they affect the yield of carbon contamination.



➤ **Source of carbonization (= molding materials)**

Bromine, chlorine and other halides are often used as flame-retardants, and halides allowed to remain in the cylinder can cause carbonization because they thermally degrade very easily. Flame-retardants are normally indicated on the MSDS (material safety data sheet) as ingredients, this should be checked in advance.

However, all molding materials are carbon compounds and can be carbonized if left in the cylinder for a long period. Thus, the most important measure against carbon contamination is not to leave molten materials in the cylinder.

➤ **Temperature**

Temperature is a very important factor to avoid carbonization. The higher the temperature is, the faster the degradation causes, avoid leaving materials in the cylinder at high temperatures. However, if it is necessarily unavoidable, replace the materials in the cylinder to a material that does not easily degrade (*).

(*) CELPURGE, if used within operational temperature range, does not easily cause carbon contamination, works as sealant and blocks oxygen off.

➤ **Time**

Molding materials (polymer itself or ingredients) get carbonized stepwise: the first stage is

browning, followed by gradual blackening, and finally adhering as completely carbonized buildup onto the surfaces of the screw, the cylinder, and the nozzle. Even if a same molding material is continuously being molded, a layer of carbonization will gradually form at stagnant area, and, for example, in case of molding flame retardant PP, completely carbonized material peels off of metal surfaces in two weeks and makes moldings defective. Once completely carbonized materials reach the 'peeling away' stage, they become impossible to completely eliminate with any purging compounds. As a countermeasure to prevent buildup and adhering of carbonized materials, it is important to clean regularly with purging compounds (CELPURGE).

* CELPURGE can eliminate the browning that occurs over short periods of time (adhering carbon contamination is impossible to remove).

➤ Oxygen

Deterioration, decomposition, and carbonization of resins can occur even without oxygen, however, oxygen is a significant factor to accelerate carbonization. During changing molds, shutting down for the weekend, or when the temperature rises at the beginning of the week, if the screw is left empty, air can enter the cylinder through the nozzle and develop carbonization. If you use CELPURGE as a sealant, CELPURGE will seal the nozzle and block oxygen off, retard the yield of carbon contamination.

* CELPURGE can effectively block the nozzle if the nozzle temperature is lowered to 180-200°C.

3. Procedure for Elimination of Carbon Contamination (in case of weekend Shutdown and restarting at the beginning of the next week)

- 1) Discharge as much of the remaining material as possible.
- 2) Clean the hopper.
- 3) Add **AG4** and perform a cleaning.

* This is basically the same cleaning procedure written in [3], but set metering position large if the entire surface of the screw is carbon-contaminated.

- 4) Clean the hopper.
- 5) Add **MA2** and perform a cleaning.

* This is basically the same cleaning procedure written in [3], but set metering position large if the entire surface of the screw is carbon-contaminated.

- 6) Repeat steps 3) to 5) until no more carbon contamination comes out. The necessary quantity of CELPURGE differs according to the conditions of the carbonization. A good weight ratio of **AG4** to **MA2** is between 1/1 and 1/2.

[NOTE] Do not blend AG4 and MA2 prior to cleaning. (It diminishes their effectiveness.)

- 7) Allow one shot of MA2 to remain in the cylinder and turn the heater off.

[When restarting after weekend shutdown]



- 8) After the cylinder temperature stabilizes, purge MA2, then add several shots of MA2 into the hopper, perform metering and injection, and check for carbon contaminants.
- 9) If carbon contaminants are found, repeat steps 3) to 5) until no more comes out.

