**Injection cleaning**

1. **Cleaning the extruder and nozzle**
2. Thoroughly clean the hopper and color dozer.
3. Remove all of the material that is in use and fill the machine with EKO SAVE™, but only after performing the following steps.
4. Raise the back pressure to the maximum possible level.
	1. The pressure obtained (also from EKO SAVE™ material) is important for cleaning.
5. Move the screw forward (for complete filling)
6. Ensure that the nozzle temperature is at least 210 degrees.
7. A full dose of cleaning material is 1-2 full cylinder volumes, with the quantity of purge depending on the condition of the equipment and the levels of dirt.
8. Push the cleaning material out of the machine at a changing speed, from maximum to minimum and back again.
9. Ensure that the cleaning material appear in the nozzle before raising to the maximum speed.
10. Maximum speed creates maximum cleaning pressure, jolting the dirt.
11. Leave a small amount of cleaning material and end with 3-4 partial injections.
12. Tip: Letting the cleaning material sit in the machine for 10-15 minutes will improve the cleaning level.
13. If the nozzle is still dirty, remove it, and clean it manually during the soaking stage.
14. This happens when the nozzle is not damaged and/or old.
15. Ensure that the machine is full with cleaning material.
16. If the feed area is heated to more than 130c° degrees, cool it to 30c° degrees or push the cleaning material forward in order to prevent freezing in the feed area (BRIDGING).
	1. In any event, do not let the cleaning material sit in this area!!
17. Continue removing the cleaning material at a changing speed as explained in the previous section.
18. The cleaning is completed when the cleaning material exiting the machine is clean.

If it is not clean, repeat the cleaning process, starting from step 2.

1. Remove the cleaning material out by pushing it with the next raw material.
2. Start this step with high back pressure.
3. Start removing at the maximum allowed speed, and then alternate to a changing speed.

**Tips**

1. Mixing EKO SAVE™ materials hurts their efficiency and is not recommended.
2. Do not use EKO S and EKO LIL to clean in mold's hot runners.
3. Turn to our Product Table for find the ideal EKO SAVE™ solution.
4. You can also clean the nozzle without removing it. Raise the temperature by 20-30 degrees, add half a dose (1 cylinder) of cleaning material, and perform short and quick injections until clean.
5. Maintain all of the safety guidelines during the cleaning process. Do not stand in front of the nozzle during cleaning process.
6. **Cleaning the mold –** Only after cleaning the extruder and nozzle.
7. Heat the mold's injection tips to 250c° to allow for a better cleaning process.
8. Do not exceed the manufacturer's recommended maximum temperature during the cleaning process.
9. Fill another dose of cleaning material (1-2 cylinders).
10. Spray silica on the mold to prevent sticking and ensure that all of the mold's outlets are open.
11. Inject the cleaning material through a closed mold, half a dose at a time.
12. If it is not possible to inject into a closed mold, inject it through an open mold at a changing speed, from maximum to minimum.
13. If contamination is still visible in the cleaning material, repeat the cleaning process from step 1.
14. **Frequency of Cleaning**
15. Once a week for machines that are "problematic" (preventative cleaning).
16. When changing from a "hard color" (usually dark) to a light one.
17. When black spots/color appear. In this event, consider performing the Shutdown and stopping procedure.
18. **Shutdown/stopping the machine on the cleaning material**
19. Run the machine at a low/medium speed with the screw in the front position.
20. Feed the machine with a dose of cleaning material.
21. Once material start exiting the nozzle, shut off the machines.
22. Machine should be cooled to ambient room temperature.

**Starting the machine after shutdown/stop**

1. Put heating units on and wait until the machine reaches the operational temperature.
2. Wait another 30 minutes after the desired temperature has been reached.
3. Feed a small amount of cleaning material through the feed inlet. The additional cleaning material will help push out the old cleaning material.
4. Run the machine at a low speed while monitoring the engine load (flow gauge). If the load is too high, wait longer.
5. Visually inspect the cleaning material for any kind of contamination.
6. If the cleaning material is contaminated, repeat the regular cleaning procedure.
7. If the purge material exits the machine clean put the next resin in for production.
8. **Tips for cleaning the stagnation and sub-pressure areas**
* Known areas: The screws flights, nozzle, screw and mold surfaces and inserts, mold injection tips.
1. Raise the temperature of the problematic areas by 20c° to 30c° degrees above the raw material's operational temperature.
	* If the resin or equipment are heat sensitive, raise the temperature by 10 degrees at a time.
	* Raising the temperature will help to clean the pigment and resin. It is not recommended to raise the temperature for cleaning burnt or decomposing resin.
2. Feed half a cylinder of cleaning material and purge using half shots at a high speed.
3. **Points of emphasis for hot mold cleaning**
4. Clean the molds using cleaning materials that do not include glass filled fibers.
5. We recommend spraying silicon spray on the mold that is being cleaned. .
6. If there is an external heating system for the mold, raise the mold's temperature by 20c° to 30c° above the raw material's operational temperature.
7. Feed half a cylinder of cleaning material and eject using half shots at a high speed.
8. **Points of emphasis for closed mold cleaning**
9. Perform only after a full cleaning process was performed on the screw.
10. Feed an amount of cleaning material equal to half a dose.
11. Emphasis: If the mold has lots of injection points, we recommend that you do not clean through the mold.
12. You can also inject through an open mold, using quick half shots.
13. **Points of emphasis for machine shutdown/startup**
14. Prior to performing a machine shutdown, run the machine's regular cleaning procedure.
15. We recommend using an EKO SAVE™ material that is rich in fillers, such as EKO WARM RICH.
16. If you need to perform the cleaning procedure using a reinforced material (due to severe contamination problems), follow it immediately with running a cleaning procedure using a material that is not reinforced, at a dosage equal to half a cylinder.
17. **Points of emphasis prior to dismantling for shutdown/maintenance**
18. Running the cleaning procedure prior to dismantling will make the screw dismantling and cleaning much easier.
19. The cleaning procedure must be performed by using an EKO SAVE™ purge.
20. Raise the operating temperature significantly above the regular temperature used during the cleaning process (20c° to 40c°).
21. Dismantle the cylinder only after the cleaning material has been completely removed from the machine.
22. Dismantle the screw while the machine's temperature is hot (at least 220c°) or at a cleaning temperature.
23. **Tips for improved cleaning**
24. Raise and lower the screw speed while removing the remaining cleaning material to shock and release the residue.

High speed - helps release leftover contamination and removes pigments.

Low speed - allows the cleaning material to expand and push the contaminations out.

1. When using a purging material at high temperatures

 keep the feeding area cold or empty to prevent the

 Bridging phenomenon from occurring.

* In order to improve the flow of exiting material, raise the nozzle's temperature above the raw material's operational temperature.

**Good luck!**