CYLATEC

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CylaPurge®

SUPER CONCENTRATE PELLET

OVERVIEW

Over the relatively brief history of the thermoplastics industry, companies have experimented on how they can best clean their equipment to enable them to make color and resin changes, and remove accumulated contaminates, such as carbon or gels. This process of cleaning is known as "purging". Basically, up to now, there have been three known ways of purging - chemically, physically and the "home remedy".

THE CHEMICAL PURGE

A chemical purge introduces chemicals, in combination with a carrier resin, which react with the resin in the machine to break it down and allow for its removal from the equipment. The chemical process normally requires feeding a purge compound into the machine and allowing it to soak at a high temperature for a period of time. The temperature of the machinery is normally elevated to improve the chemical reaction with the resin. After a soaking period of approximately 30 minutes, machine temperature is returned to normal and the purging compound is expelled from the equipment. Once all the chemical purge has been removed, production can then continue.

This purging process involves numerous pitfalls. The first is that the equipment temperature must usually be elevated. This takes time and energy, and, therefore, money. Also, when the chemical purge is introduced, a variety of reactions are possible. These reactions can create smoke, toxic fumes, and in some cases, even create a fire. Many customers have told stories of having to evacuate their plant and/ or having to install costly ventilating equipment.

The problem is really basic. Like many chemical reactions, some are predictable and some are not. With the wide variety of resins and additives now being used, it is virtually impossible to know, in every case, what the reaction may be. The chemical purge manufacturers have attempted to reduce this problem by introducing specific purging compounds to be used with specific resins. By doing this, the temperature, resin and purging compound used must all be closely coordinated and monitored. The chances of human error are greatly accelerated and opportunity for poor results are greatly enhanced.

Even assuming the chemical purge can be done without any major problems, the next hurdle encountered is equally as great and involves "purging the purge", or the removal of all purging compound from the equipment before production can resume. Customers often forget to consider this major expense of time, labor and resin when comparing purging compounds. The actual purging time may be only 30 minutes,

but hours may be spent producing bad parts before all of the chemical purge is out of the system. Occasionally the chemical purge will disappear, only to reappear later on in a production run. This is a key point to remember when evaluating purging compounds: any foreign material or resin introduced into the process MUST be removed before the process can commence again.

A final problem with chemical purges is the environmental aspect. The fumes sometimes given off as well as the disposal of the contaminated and potentially hazardous resin must be considered. As environmental regulations become more stringent, these issues will require more attention.

THE PHYSICAL PURGE

The next type of purge is a "physical" purge. This process usually involves running an abrasive material through the machine that will remove and push out the old resin and intermediate. There are many varieties of this type of purge. The most common physical purge consists of cracked acrylic which only partially melts. The unmelted acrylic abrades off contamination and pushes out the lower viscosity melted resin. This process is better than the chemical purge in that there is little risk of an adverse chemical reaction, but it is also less effective. Another problem is again purging out the purge before production can begin. Because the acrylic does not melt completely it is difficult to remove from the unit. This again takes time, and time is money. Other physical purges are as unconventional as introducing sand or $CaCO_3$ through the machine. This has the obvious problem of wear and tear on equipment and is never to be considered as a viable choice.

THE HOME REMEDY PURGE

The final type of purge we will call the "home remedy". This is usually some combination of a chemical and physical purge. Probably the most common is running "Tide" laundry detergent through the equipment. Using this process, you get it all - smoke, fumes, abrasion and other adverse reactions. Some molders mix Tide with cracked acrylic. We would never recommend this procedure for any process. It again has the one fatal flaw that all other purges must deal with - purging the purge itself.

THE REAL MARKET NEED

Through our market research, we have found that what the customer wants is an effective, easy to use, cost efficient and safe product. The physical purges may be safe, but they are not effective. Chemical purges might be effective, but they are clearly not easy to use, nor safe to use, and are generally time consuming and not cost effective.

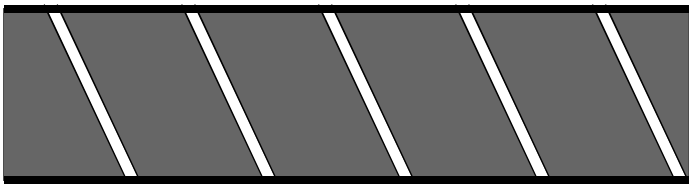
THE CYLAPURGE CONCEPT

To begin to understand what CylaPurge is, and how it works, you must understand the CylaPurge Concept, and the reactions which are taking place during the purging operation. Carefully read and understand the use directions found in each box of CylaPurge.

CylaPurge, when mixed with any resin in the proper proportion, will transform the resin as it passes through the heated barrel. This transformation results in 1.) an "emulsification" of the resin, 2.) a lowering of its affinity for metal, 3.) a peptizing or suspension of color bodies and carbon, and 4.) a drastic lowering of its viscosity.

CylaPurge®

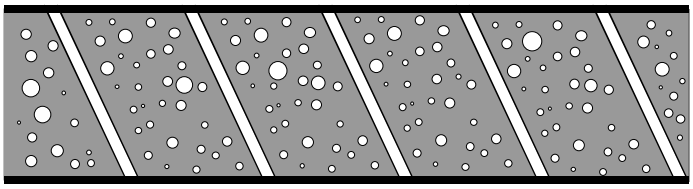
Thermoplastic Extruder Purging Compound



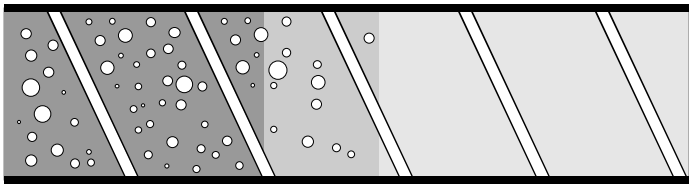
CYLAPURGE IS MIXED WITH A CLEAN NORMAL VISCOSITY RESIN AND FED TO THE EXTRUDER.

NORMAL VISCOSITY RESIN

THE BARREL CONTENTS ARE EMULSIFIED AND CONVERTED TO A LOW VISCOSITY RESIN. CARBON IS DISLODGED.



EMULSIFIED AND FOAMED LOW VISCOSITY RESIN



LOW VISCOSITY RESIN, ALONG WITH CARBON, IS THEN EXPELLED WITH A NORMAL VISCOSITY RESIN.

EJECTION OF LOW VISCOSITY RESIN BY NORMAL VISCOSITY RESIN

The most difficult resin change is, of course, the switch from a resident high temperature/viscosity resin to a new lower temperature/viscosity resin. This is a difficult change because at any given barrel temperature, the new resin, with its lower viscosity will not be able to chase the higher viscosity resin from the unit. However, by adding CylaPurge to the last amount of high viscosity resin fed to the unit, the viscosity of this material will be drastically reduced. New resin then fed to the unit will easily displace this emulsified and lower viscosity resin. Running subsequent purge charges with the new resin as per standard directions will effectively clean all components involved.

The switch from a resident low viscosity resin to a new higher viscosity resin can be made even easier by following the above procedure, especially if the resin change also involves a deep color change.

For Color changes without a resin change, the same viscosity relationships apply. The normal purge sequence is one volume of new resin mixed with CylaPurge, followed by an equal volume of straight new resin. As the mixed resin passes through the barrel, the barrel contents are "emulsified" and carbon and color bodies are held in suspension. The viscosity of the material in the barrel is also drastically reduced. By following with straight resin of normal viscosity, the emulsified barrel contents are easily expelled. By following this procedure, quick changeover will be accomplished.

When purging an extruder with CylaPurge for the first time, colors may be seen which have not been run for four or five months. This is due to the advanced cleaning capabilities unique to CylaPurge purging compound.

CylaPurge is the Answer

In summary, CylaPurge allows you to clean your machine without introducing a foreign resin into the process that must later be removed. CylaPurge does its job without harsh chemicals, abrasives, fumes, and smoke. By altering the physical characteristics of the resin itself, we push low viscosity resin with high viscosity resin. Because it does not introducing any foreign material into the process, CylaPurge will go through and clean all auxiliary equipment like accumulator heads, hot runner systems and die heads. Because we do not alter operating temperatures, and due to the fact that CylaPurge is compatible with all resins, it is easy and safe to use. If the shop employee can mix a packet of CylaPurge with a gallon of resin, he is capable of doing a purge. You do not need an engineer to run this product. CylaPurge works with all resins and at all thermoplastic resin temperatures.

Probably the most important aspect is the fact that we are not introducing a foreign material into the process, and, therefore, the time to get back to production is greatly reduced. When we say it takes 15 minutes to purge a piece of equipment, it is 15 minutes and not another four hours to purge the purge. In a business where time is money and just-in-time inventory is essential, this is a product that is needed today. The days of running through the color spectrum from light to dark before purging and making huge inventories of parts before making a color change are rapidly coming to an end. Today's end user wants finished product as they need it, and this requires quick color and resin changes. As resin costs escalate, it is no longer cost effective to purge with resin for hours and make scrap just to clear a machine. Molders can not afford to pull a screw every time they change colors or resins. Those companies that adapt to this new business environment will grow and prosper ... those that do not will not survive. The choice is really very simple. You can purchase a lot of extra equipment to allow for changing from one color to another or you can find a way to quickly and economically clean the equipment you have. It would seem quite logical that the second choice is the better choice.

EXECUTION IS IMPORTANT

The CylaPurge use directions are straightforward, clear and concise, and have been developed through numerous, carefully monitored trials. They must be read and understood by the operator before proceeding. CylaPurge must be used as intended.

Many operators have used various purges in the past, and may assume that CylaPurge works the way other purges work. Surprisingly, many operators will only glance at the direction sheet or ignore it entirely. This approach will only result in marginal results and a great deal of needless follow-up.

Mixing CylaPurge with resin is easy. We recommend that mixing be done in a clean, dry, 1 gallon plastic container. The operator adds a gallon of clean resin to the container and pours the contents of one CylaPurge packet onto the surface of the resin. A quick mix is all that is necessary to accomplish the mixing.

The quantity of this mix to be added to the unit for each purge cycle depends upon the size of the unit and a suggested starting point can be found in the use direction sheet. This quantity of mix must always be followed by one equal volume of plain resin. (The first volume of mix foams the barrel contents; the equal volume that follows will chase the foamed contents from the unit.)

This sequence of one volume of mix followed by one volume of plain resin constitutes a single purge cycle. Multiple purge cycles will be needed to clean most units, and the number of purge charges will depend upon the depth of the color change and the length of time between cleaning. In most cases, one to three purge charges will suffice.

The full purging sequence should look like this:
(1 MIX - 1 PLAIN) → (1 MIX - 1 PLAIN) → (1 MIX - 1 PLAIN) ...

When adding volumes of either MIX or PLAIN chase resin, it is important that the previous volume be allowed to completely clear the feeder section before adding the next volume. Simply adding MIX and PLAIN volumes to the feed hopper in layers will result in inadvertent mixing as the material is fed to the unit, and will preclude optimum results.

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