DuPont™ Elvaloy® ethylene copolymer resins

Product Handling Guide

THE IMPORTANCE OF PROPER HANDLING & STORAGE OF ELVALOY® 741, 742 AND 4924 RESINS

Maintaining proper handling and storage conditions for DuPont™ Elvaloy® resins is very important to ensure overall product quality and to keep the resin in a free-flowing state. If the Elvaloy® resin is subjected to sunlight, rain or excessive temperatures, then the resin may not process properly or achieve the desired characteristics in the final product. It is crucial for Elvaloy® resins to be kept under proper storage and handling conditions because improper storage and handling may cause the resin to "block" (massing of pellets into large clumps that can hinder the ease of material transfer) or lose the ability to flow freely.

HANDLING & STORAGE RECOMMENDATIONS

Elvaloy® resins are supplied in the form of small free-flowing pellets. For long-term storage, the resin should be stored at a temperature between 50°F-95°F (10°C-35°C). The material should not be exposed to temperatures above or below this guideline. Material that has been exposed to temperatures above 95°F (35°C) or below 50°F (10°C) should be conditioned between 50°F-95°F (10°C-35°C) for a minimum of 36 hours prior to handling. Elvaloy® resin should be stored in a closed environment, away from sunlight and rain.

In hot areas, we recommend keeping Elvaloy® under a shelter to protect it from sunlight and rain, preferably with large fans for air movement to reduce temperature as much as possible.

When handling Elvaloy® resins, design the handling system to ensure resin flows freely. Elvaloy® should be handled between 50°F-95°F (10°C-35°C). The resin should not be exposed to extreme temperatures or excessive loads. Elevated temperatures can cause the resin to deform and affect the ability of the resin to flow freely. Temperatures below 50°F (10°C) may cause slower transfer rates in the resin handling system.

When feeding Elvaloy® to an extruder or any other heating equipment, consider the location of your feeder. Avoid having Elvaloy® above a heated extruder zone. Run the feeding zone as cool as possible for proper extrusion to lessen the chance of pellet bridging in the feed throat or extruder screw.

Avoid pellet degradation of Elvaloy® by ensuring that the pneumatic conveying system has a gas velocity below 100 ft/s (30 m/s). Minimize the inventory time and static load by consuming material on a "first in, first out" basis. If possible, fill silos to the level needed for normal operations to reduce static load. Do not stack bags or boxes, if possible, to reduce static load.

Elvaloy® resins are resistant to attack by most aqueous acids and bases at ambient temperatures, but can be susceptible to attack by strong oxidizing acids at elevated temperatures. Elvaloy® resins should not be exposed to direct sunlight for long periods of time unless an ultraviolet stabilizer is used. Store and handle in a controlled manner, avoiding excessive temperature and the outside elements.

WHAT IS "BLOCKING"?

When Elvaloy® resin is subjected to a large static load and excessive temperature, the pellets can deform elastically. The contact surface area between the pellets increases when pellets are deformed. The combined effect of the compressive forces and increased contact surface area prevents the pellets from sliding against each other and an interlocked mass of pellets forms. This event is called "blocking."

Blocking is a function of pressure, temperature and time. The viscoelastic properties of these resins allow the pellets to agglomerate under pressure from the weight of overlying material. The surface tackiness of the pellets causes blocky masses or "chunks" to form. Warmer temperatures reduce the viscosity or "soften" the pellets, allowing greater contact surface area to form between the pellets. Storage of Elvaloy® resins in hot environments could increase the likelihood of blocking.

The product qualities of viscoelasticity and surface tackiness, which make Elvaloy® valuable in many applications, also contribute to the resin's tendency to block. The Elvaloy® product portfolio includes grades with varying comonomer

content, types of comonomer and a range of melt indices. Grades with a low softening point, such as Elvaloy® 742, are especially sensitive to blocking, whereas resins with high vinyl acetate content and high melt index have lower softening points and pellets that are more "tacky." Their tackiness prevents the pellets from sliding past each other and can increase the chance of blocking. Some Elvaloy® grades contain an anti-block additive that reduces the surface tackiness and keeps the pellets from sticking together.

After the pellets are interlocked and blocked, freezing temperatures may exacerbate the issue. At colder temperatures, the pellets are more viscous and less likely to unblock in a reasonable amount of time after the compressive forces are removed.

Blocking is not a permanent fusing of the pellets. The masses can become free-flowing with time if the pressure from packaging and overburden are removed. If the pellets are melted and fused together, then it is likely the resin has been exposed to excessive temperatures. This specific scenario is not considered blocking; it is called melting and may be irreversible.

WHAT TO DO IF ELVALOY® "BLOCKS"

Blocking should not be a problem if Elvaloy® is handled properly. However, if the resin does block, then there are a few things that can be done to resolve the issue.

First, inspect the resin to determine that the problem is due to blocking and not melting. If the pellets have melted and fused together, then it may be irreversible. Blocked Elvaloy® is generally reversible, and the resin can return to a free-flowing condition after the pressure from the static load and excessive temperatures are removed from the product for some time. The length of time needed for Elvaloy® to become free-flowing depends on the severity of the blocking.

For blocked Elvaloy® resins in bags, unstack the bags from the pallet to relieve the static load. If possible, place these bags in a temperature-controlled environment that is between 60°F-95°F (16°C-35°C). Leave the bags in this temperature-controlled environment for enough time to allow the resin to become friable again. Rubber hammers can be used to break large agglomerates by directly hammering the bag.

Another possibility is to gently tumble the agglomerates. This tumbling should be able to gradually break the agglomerates into free-flowing pellets. If the resin is blocked in stacked boxes, then unstack the boxes to reduce the compressive forces. If possible, place these boxes in a temperature-controlled environment that is between 60°F-95°F (16°C-35°C). Leave the boxes in this temperature-controlled environment for enough time to allow the resin to become friable again. The time can be shortened by vibrating the boxes or using gentle mechanical force to break up the massed pellets.

If assistance is required at any time, call your DuPont customer service representative. If possible, provide the batch numbers, photographs of the problem and samples.

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