OnFlex™-V
MOULDING GUIDE

English

PolyOne's range of OnFlex™ thermoplastic elastomer (TPE) compounds includes TPE-S, TPE-V, TPE-O and TPE-U. This range, combined with excellent experience in TPE application design and processing, positions PolyOne very well to address the overall thermoplastic product needs of various industries.

This document provides general advice on injection moulding with PolyOne OnFlex™-V Injection Moulding compounds. OnFlex™-V is designed to give the performance of traditional vulcanised rubber, but with the processability of a thermoplastic. OnFlex™-V thermoplastic elastomer compounds are based on a polyolefin phase with a cross-linked EPDM phase dispersed into it. This new "next generation" vulcanized thermoplastic elastomers (TPE-V) overcome the previous colorability limitations of TPE-V based on conventional technology. OnFlex™-V has a consistent base color with a low yellowness index allowing bright colors. The information provided in this document is intended only as a guide to use together with your past experience of moulding processes where applicable, using these materials. Our staff will be happy to assist in any areas where this document does not provide a satisfactory solution.

MACHINE

A standard screw ram injection moulding machine with a general-purpose screw generally is suitable for processing OnFlex™-V Injection Moulding compounds. An L:D ratio above 20:1 is typically much preferred. A compression ratio from 2.5:1 to 3.5:1 is generally recommended.

DRYING

OnFlex™-V compounds are slightly hygroscopic and can absorb some moisture. OnFlex™-V is supplied, pre-dried and packaged in PE/aluminium foil bags. In most cases it can be used straight from the bag without any further action. To ensure best quality the bags should be opened immediately before use, and any unused material should be tightly sealed in the original packaging. Under certain storage conditions, some surface moisture can be present, and may cause problems in processing. In this case, drying is necessary; typically three hours at 80° C should be suitable.

PURGING

Cleaning of injection moulding equipment can be performed with PP, but PE may also be suitable. Contamination with polar engineering thermoplastics should be avoided. If the machine is to be left unused for some time, run until empty and then purge before re-starting.

TEMPERATURES

These temperatures should be used only as a guide; some tailor-made grades may require special processing parameters. Our staff will be pleased to give further advice if necessary. OnFlex™-V Injection Moulding compounds are not as dependent upon temperature as they are on shear. An increase in injection speed or pressure will decrease viscosity more effectively than an increase in temperature..

Material	Mold	Melt	Max. Melt
Soft (75° shore A and below)	30-60°C	170-190°C	250°C
Hard (80° shore A and above)	30-60°C	180-210°C	250°C

INJECTION SPEED AND PRESSURE

Injection speed typically should be fast and injection pressure medium to high. Ideally, a stepped speed profile should be used, with a fast initial speed through the sprue and runner system, then a slower speed to fill the cavities. Medium to high back pressures usually improve plasticization, resulting in better dispersion and homogeneity. Higher back pressure is particularly useful for dispersing additives and masterbatches, and can help avoid melt fracture in softer compounds.

HOLDING PRESSURE

To prevent sink marks from back flow at the gate, or distortion from post packing, a balance must be found between holding time and pressure. Due to the elastomeric nature of these materials, post packing is likely to be more of a problem; therefore, holding time and pressure should be as low as possible. To achieve the correct settings, start without applying any holding pressure, and then increase until any sink marks and short shots are resolved and the part weight no longer changes (part weight versus time curve). Higher holding pressures can result in surface defects around the gate, delamination near the gate point and problems de-moulding.

TROUBLESHOOTING GUIDE

Problem	Cause	Solution
Flow marks	Melt too cold	• **Increase barrel (and melt) temperatures**
	Mould too cold	• **Increase mould temperature**
	Mould design	• **Check thermocouples and heater bands**
Weld lines	Air entrapment	• **Introduce venting** • Increase melt temperature • Increase mould temperature • Increase injection pressure • Increase back pressure • Increase holding pressure
Streaks	Moisture contamination	• **Pre-dry material** • Decrease temperature in feed zone • Increase mould temperature • Increase back pressure
Voids	Moisture	• **Pre-dry material**
	Other causes	• Decrease temperature • Increase mould temperature • Increase holding pressure
Part distortion	Moulded in stress	• **Increase melt and mould temperature** • Check balance of tool • Decrease injection speed and pressure • Decrease back pressure • Decrease holding pressure • Increase cooling time
Degradation/burning	Melt too hot	• **Decrease melt temperature** • Decrease screw speed • Decrease back pressure • Reduce hot runner temperature
	Air entrapment	• **Introduce venting** • Check vent location • Enlarge vents
Delamination	Contamination	• **Avoid contamination** • Ensure machine well purged
	Holding pressure	• **Decrease holding pressure**
Flashing	High injection pressure	• **Decrease injection pressure** • Decrease injection speed • Increase clamping force
Sink marks	Low holding pressure	• **Increase holding pressure** • Increase holding time
	Mould too hot	• **Decrease mould temperature**
	Melt too hot	• **Decrease melt temperature** • Decrease screw speed
Nozzle leakage		• **Increase nozzle contact time** • Use shutoff nozzle • Unblock nozzle
Short shots	Shot weight	• **Increase shot weight** • Increase injection pressure
	Air entrapment	• **Introduce venting** • Check vent location • Enlarge vents
	Gate/runner system	• **Increase gate size** • Increase runner size
Difficulty demoulding	Part is too hot	• **Decrease barrel temperature** • **Decrease die temperature** • Decrease screw rpm • Use less restrictive screen pack • Use lower compression ratio screw • Check thermocouples and controllers
	Mould over-packed	• **Decrease shot weight** • Decrease holding pressure
	Material adhering	• **Use non-stick mould agent** • Add demoulding agent to compound • Increase draft angles • Spark-erode mould

We determined this information about our product(s) using lab-scale equipment, estimation and information obtained from our customers. We provide this information to help you process our products. Your processes can significantly alter polymer physical properties. Test our product thoroughly for suitability in your specific application after processing on your production equipment. You assume all responsibility for product selection and suitability for your intended use. **We make no other warranties, express or implied, including any implied warranties of merchantability or fitness for purpose**, respecting this information or this product. Nothing herein constitutes permission, recommendation, or inducement to practice any patented invention without permission from its owner.

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