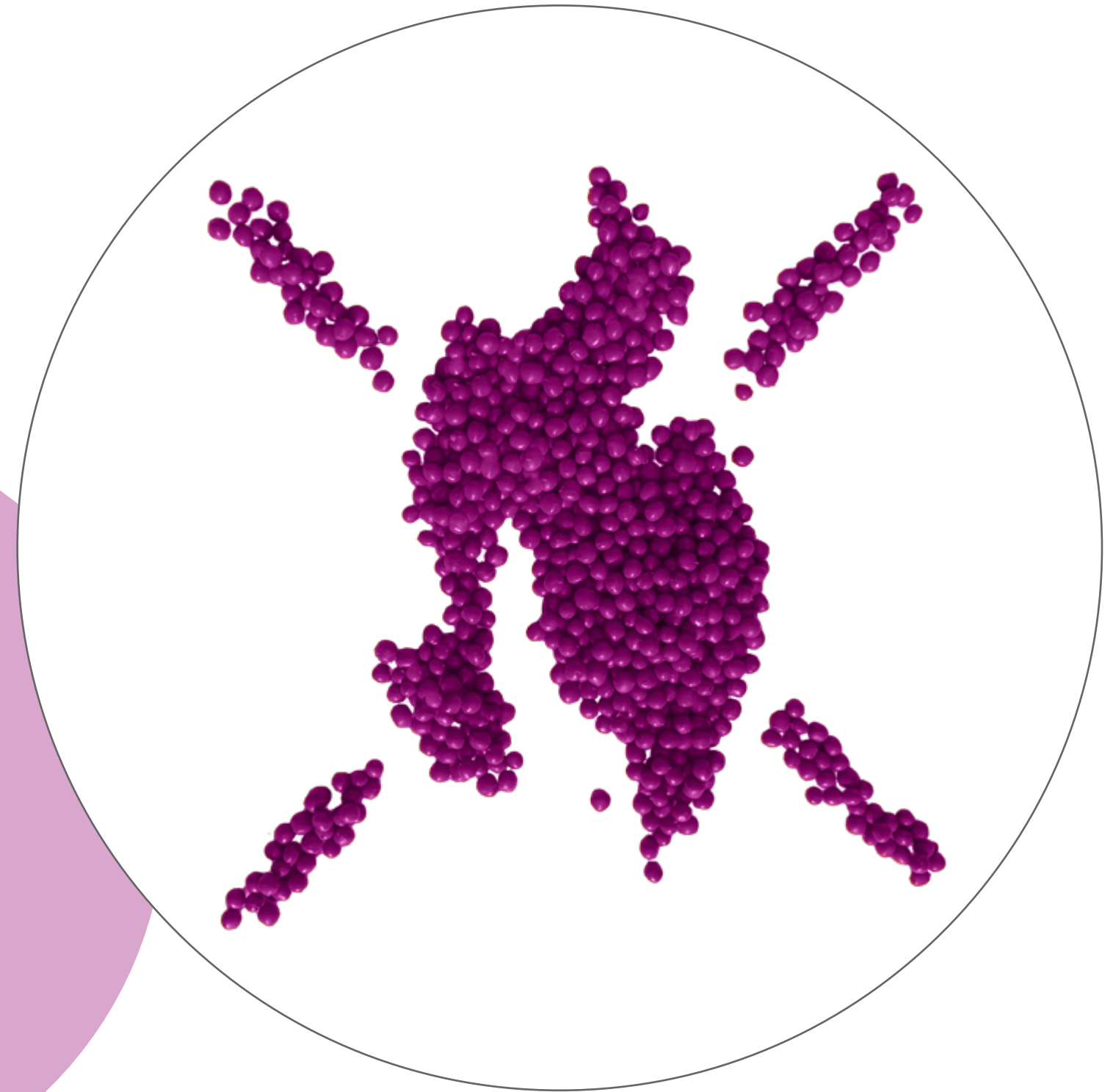


A Material Difference

Dryflex[®] Flam

Halogen-Free Flame Retardant TPEs



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Introduction

Dryflex Flam is a range of halogen-free flame retardant thermoplastic elastomers (TPEs) designed to meet the most demanding applications where resistance to ignition and burning are important features.

The Dryflex Flam materials contain additives to give them better resistance to burning compared to general TPE grades.

The range includes halogen and antimony free grades which are low smoke and compliant with the Restriction of Hazardous Substances (RoHS) directives, offering flame retardancy without the use of polybrominated diphenyl ether (PBDE).

Firstly, a Word About Customisation...

In this guide we show typical properties for our most common grades, these tables are not exhaustive and by no means list all available properties and materials. Our aim is to supply a material that precisely matches application requirements and where an existing grade cannot satisfy the specific demands of your application, we have the proven expertise to customise a material that will.

Please use this guide as an introduction to the Dryflex Flam range of TPEs and [contact us](#) to discuss your specific requirements.

Key Properties

- Halogen and antimony free grades
- 40 to 90 Shore A hardnesses
- High flexibility
- Conforms to European directives 2011/65/EU (RoHS) and 2003/11/EC
- Low smoke

- Good adhesion to thermoplastics including PP, PE, ABS and PC
- Good mechanical properties
- Available in combination with antistatic or electrical conductivity
- Temperature range from -40°C to 100°C

Flam : 600 Series

Flame retardant TPE, halogen-free, fulfils the specification of UL 94 V0 with 3mm wall thickness. Easy processing by injection moulding and extrusion.

Grade	Hardness ¹ ISO 53505 (A) Shore A	Density ISO 1183-1 (A) g/cm ³	Tensile Strength ² DIN 53504 MPa	Elongation at Break ² DIN 53504 %	CS 23°C / 72h ISO 815-1 Type B %	CS 70°C / 22h ISO 815-1 Type B %	Flame Retardant Rating ³ UL 94 3mm	Glow Wire Test IEC 60695-2-11 3mm at 650°C	Glow Wire Test IEC 60695-2-11 3mm at 850°C
UV Flam 40600	40	1.05	2.7	650	24	54	V0	Pass	Pass
UV Flam 50600	50	1.05	3.9	740	19	51	V0	Pass	Pass
UV Flam 60600 ⁴	60	1.03	5.5	835	21	49	V0 ⁴	Pass	Pass
UV Flam 70600	70	1.03	6.6	835	29	55	V0	Pass	Pass
UV Flam 80600	80	1.03	7.5	770	37	63	V0	Pass	Pass
UV Flam 90600	90	1.03	9.0	725	46	72	V0	Pass	Pass

¹ 3 seconds

² Across the flow direction

³ Internal tests show materials to be compliant with UL requirements. Materials are not UL listed.



⁴ UV Flam 60600 is UL approved.
File number E249957

Flam : 700 Series

Flame retardant TPE, halogen-free, fulfils the specification of UL 94 V0 with 1.5mm wall thickness. Easy processing by injection moulding and extrusion.

Grade	Hardness ¹ ISO 53505 (A) Shore A	Density ISO 1183-1 (A) g/cm ³	Tensile Strength ² DIN 53504 MPa	Elongation at Break ² DIN 53504 %	CS 23°C / 72h ISO 815-1 Type B %	CS 70°C / 22h ISO 815-1 Type B %	Flame Retardant Rating ³ UL 94 1.5mm	Glow Wire Test IEC 60695-2-11 1.5mm at 650°C	Glow Wire Test IEC 60695-2-11 1.5mm at 850°C
UV Flam 40700	40	1.10	1.4	460	12	39	V0	Pass	Pass
UV Flam 50700	50	1.10	2.2	525	13	39	V0	Pass	Pass
UV Flam 60700 ⁴	60	1.07	3.6	700	16	36	V0 ⁴	Pass	Pass
UV Flam 70700	70	1.07	4.2	730	19	40	V0	Pass	Pass
UV Flam 80700	80	1.06	5.3	680	31	48	V0	Pass	Pass
UV Flam 90700	90	1.05	6.4	625	42	58	V0	Pass	Pass

¹ 3 seconds

² Across the flow direction

³ Internal tests show materials to be compliant with UL requirements. Materials are not UL listed.



⁴ UV Flam 60700 is UL approved.
File number E249957

Typical Applications

- Plug tops
- Electrical insulation
- Cords and connectors
- Railroad applications
- Cavity wall sockets
- Gasket profiles



Flammability Testing

UL94 / IEC 60695-2-11

“The Standard for Flammability of Plastic Materials for Parts in Devices and Appliances”, as described by Underwriters Laboratories (UL) is one of the most widely accepted flammability performance standards for plastic materials. This standard determines a materials ability to propagate or extinguish a flame once ignited.

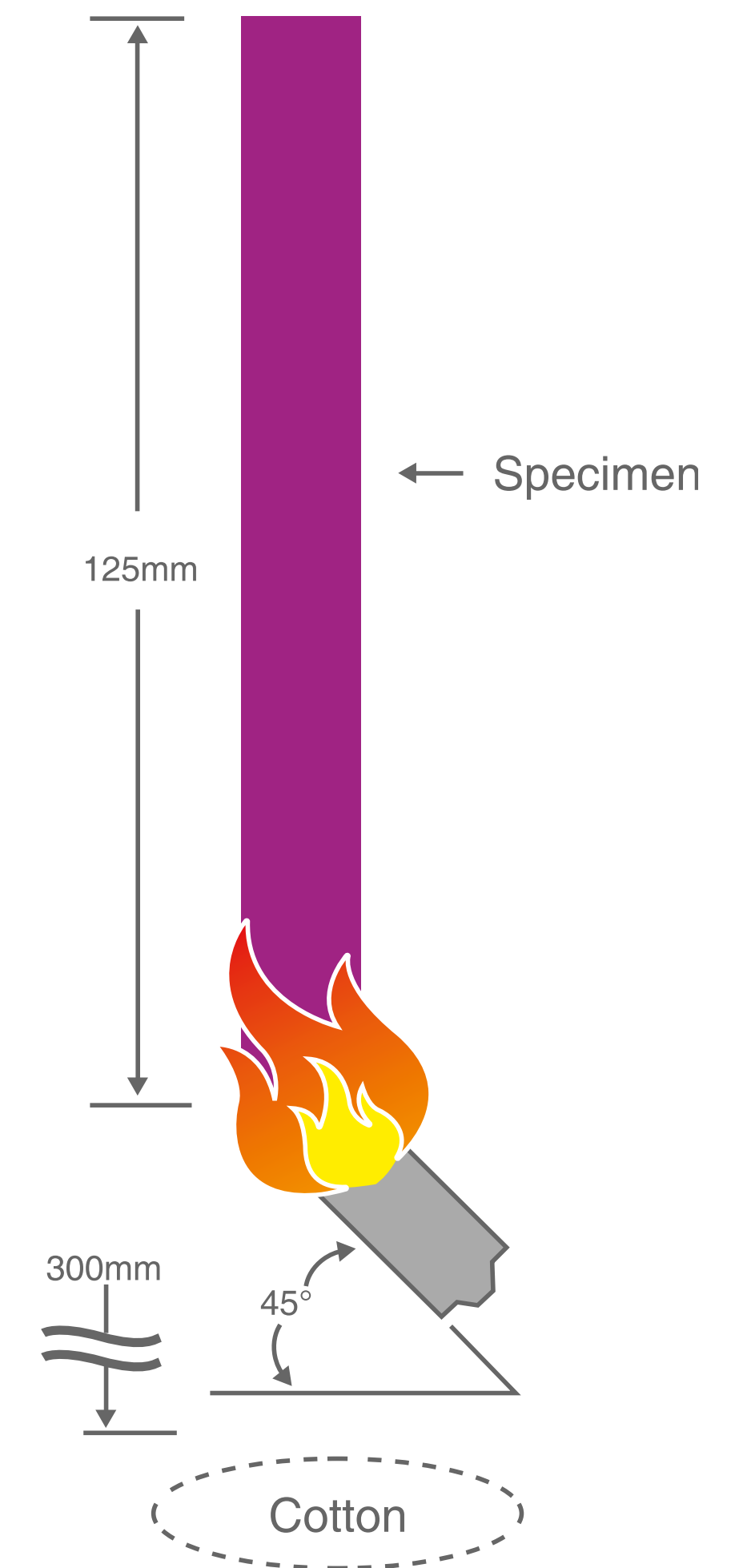
Vertical Testing (V0, V1 + V2)

The UL 94 Vertical Burn (VB) test is the most common for TPE materials for use in electrical applications. The test includes three classifications : V0, V1 and V2. V0 is the hardest to achieve.

This test would be acceptable for portable, unattended, intermittent duty household appliances (such as coffee makers). A test bar is supported at one end in a vertical position. A burner flame is applied to the free end for two ten second intervals, separated by the time it takes for flaming to cease after the first application. *See table and diagram on the next page.*

Vertical Testing (V0, V1 + V2)

Classification	V0	V1	V2
Maximum flaming combustion for each sample	≤ 10 sec	≤ 30 sec	≤ 30 sec
Maximum flaming combustion for all ten samples	≤ 50 sec	≤ 250 sec	≤ 250 sec
Cotton below ignited by flaming drips from any sample	no	no	yes
Allowable flaming and glowing combustion remaining for	≤ 30 sec	≤ 60 sec	≤ 60 sec



Glow Wire Flammability Index in Accordance with IEC 60695-2-11

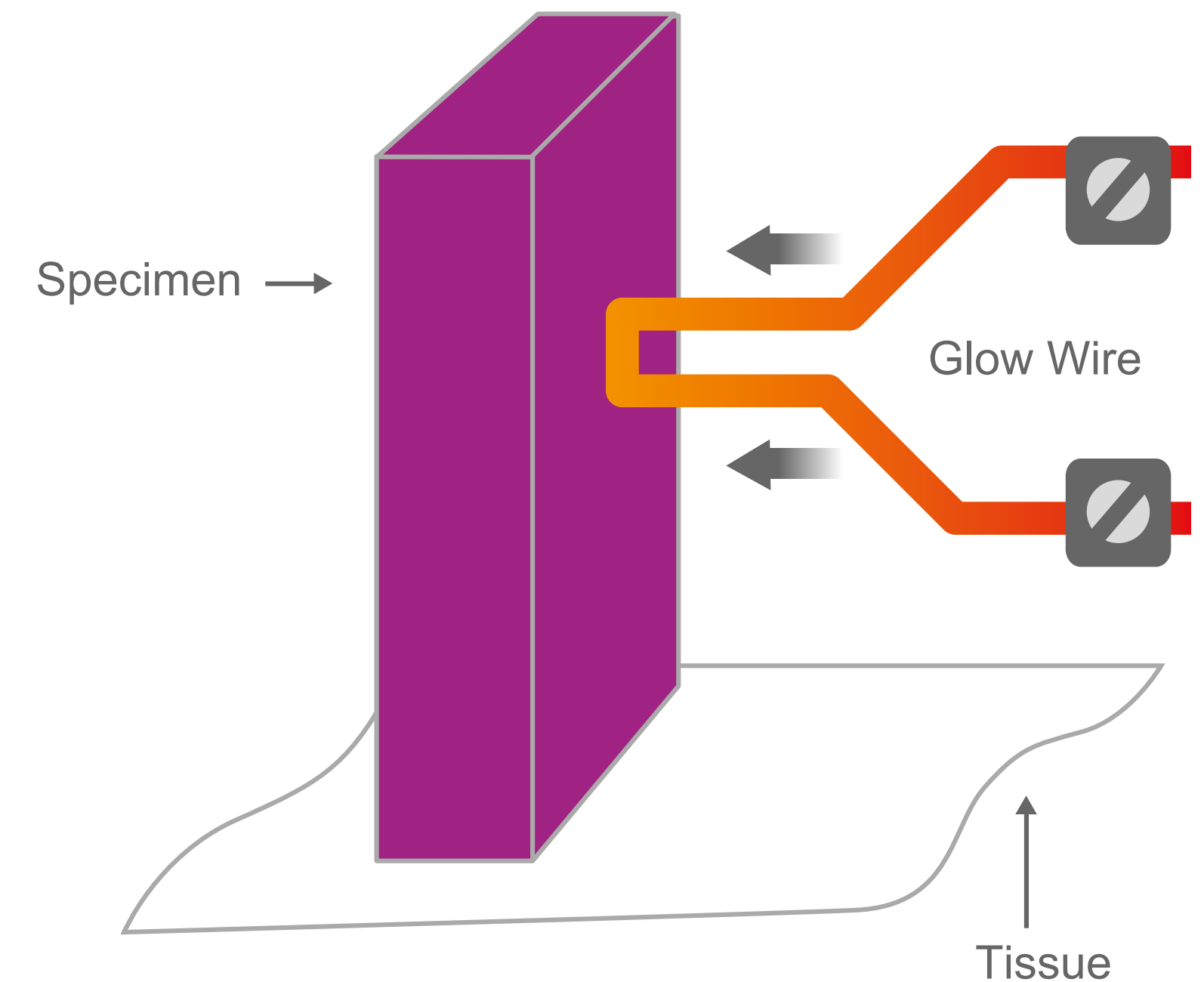
The glow wire test is used to simulate the effect of heat as may arise in malfunctioning electrical equipment.

The glow wire is heated via electrical resistance to a specified elevated temperature. A test specimen is held for 30 seconds against the tip of the glow wire with a force of 1 N. After the glow wire is removed, the time for the flames to extinguish is noted along with details of any burning drops.

Material that surrounds the test material in application or a layer of tissue paper is placed beneath the specimen during the test to determine the effects of burning drops.

The material passes the test if one of the following apply:

- There is no flame and no glowing.
- Flames or glowing of the sample extinguish within 30 seconds after removal of the glow wire, and if the cotton or the paper underlay doesn't ignite or burn.



Processing

The Flam grades can be processed using conventional thermoplastic equipment for extrusion and injection moulding.

The thermoplastic characteristics result in fast processing times and scrap recycling. These grades may require pre-drying depending on the specific compound. If poor surface finish, bubbles, voids or streaks are seen on the finished article then material should be dried for 2 to 3 hours at 80°C.

Cycle times will be governed by temperature and section thickness. Care must be taken to allow sufficient cooling of the section prior to demoulding in order to prevent permanent distortion of the article.

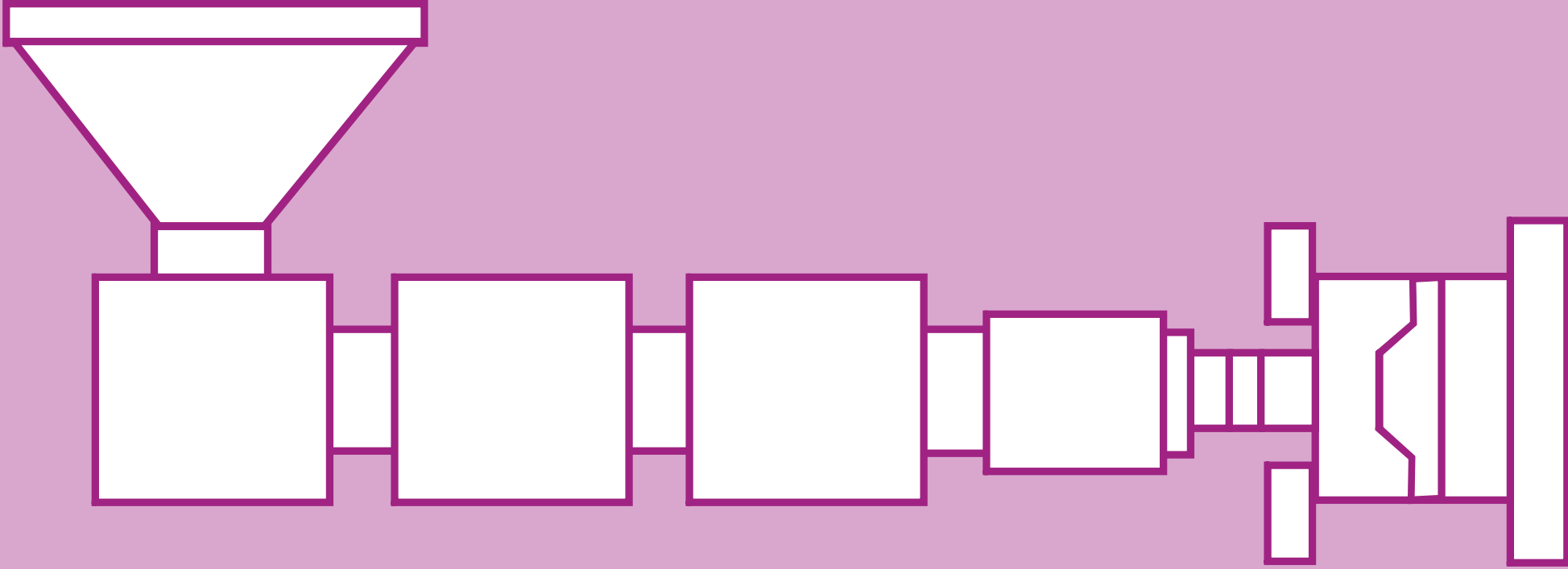
Venting of extrusion lines may be used as a method of preventing the build up of volatiles during continuous processing. Under no circumstances should these materials be taken above 230°C as this may cause the flame retardant additive to react, which may result in the release of gases or a deterioration the flame retardant properties of the material.

This processing information is intended only as a guide. The actual parameters will depend on the machine used and the moulding.

[More Processing & Problem Solving Information >](#)

Injection Moulding Guidelines

- Injection Speed:** Medium - Fast
- Injection Pressure:** Medium - Fast
- Back Pressure:** Low - Medium
- Holding Pressure:** Sufficient to pack the mould
- Cooling:** Can be demoulded when parts have cooled sufficiently

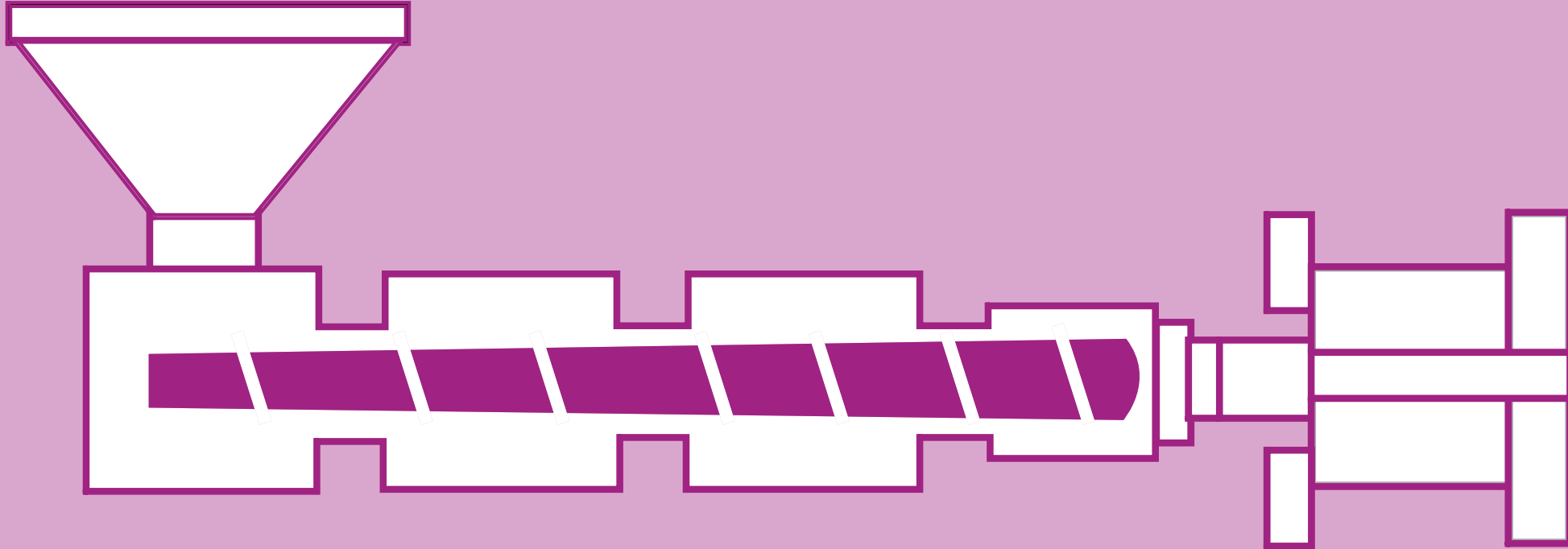


Recommended start-up temperatures °C

170 - 180 180 - 190 190 - 200 200 - 210 15 - 50

Extrusion Guidelines

L/D Ratio:	20:1 to 25:1
Compression Ratio:	2.5 to 3.0
Breaker Plate/Screen:	Both should be used
Draw Down:	5 to 10%
Cooling:	Cold water bath



Recommended start-up temperatures °C

150 - 160 160 - 170 170 - 180 180 - 190 180 - 200


More Dryflex TPE Ranges


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