

# Dryflex<sup>®</sup> FLAM

Halogen-Free Flame Retardant TPEs



# CONTENTS

BRAND NAMES & NOMENCLATURE →

INTRODUCTION →

KEY PROPERTIES →

FLAM 600 SERIES →

FLAM 700 SERIES →

TYPICAL APPLICATIONS →

EXPLANATION OF FLAMMABILITY TESTS →

PROCESSING →

CONTACTS →



# BRAND NAMES

In 2017 we restructured our TPE product brands to create a more cohesive portfolio. For new developments and projects we consolidated the [Dryflex](#) and [Lifoflex](#) grades under the Dryflex name.

For our flame retardant grades, this means that new developments and newly customised grades are called [Dryflex FLAM](#), however a number of our existing formulations have UL, automotive, railroad and other certifications and listings, these grades are sold under the Lifoflex FLAM reference.

In this eGuide we give an overview of the typical properties of our flame retardant grades, however, this does not list all available properties and materials. Please use this guide as an introduction and [contact us](#) to discuss your specific requirements.

# INTRODUCTION

Dryflex FLAM are 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 FLAM compounds 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).

# 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 <sup>1</sup> DIN 53505 (A) Shore A	Density ISO 1183-1 (A) g/cm <sup>3</sup>	Tensile Strength <sup>2</sup> DIN 53504 MPa	Elongation at Break <sup>2</sup> DIN 53504 %	CS 23°C / 72h ISO 815-1 Type B %	CS 70°C / 22h ISO 815-1 Type B %	Flame Retardant Rating <sup>3</sup> 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 <sup>4</sup>	60	1.06	5.5	835	21	49	V0	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

<sup>1</sup> 3 seconds

<sup>2</sup> Across the flow direction

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



<sup>4</sup> 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 <sup>1</sup> DIN 53505 (A) Shore A	Density ISO 1183-1 (A) g/cm <sup>3</sup>	Tensile Strength <sup>2</sup> DIN 53504 MPa	Elongation at Break <sup>2</sup> DIN 53504 %	CS 23°C / 72h ISO 815-1 Type B %	CS 70°C / 22h ISO 815-1 Type B %	Flame Retardant Rating <sup>3</sup> 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 <sup>4</sup>	60	1.07	3.6	700	16	36	V0	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

<sup>1</sup> 3 seconds

<sup>2</sup> Across the flow direction

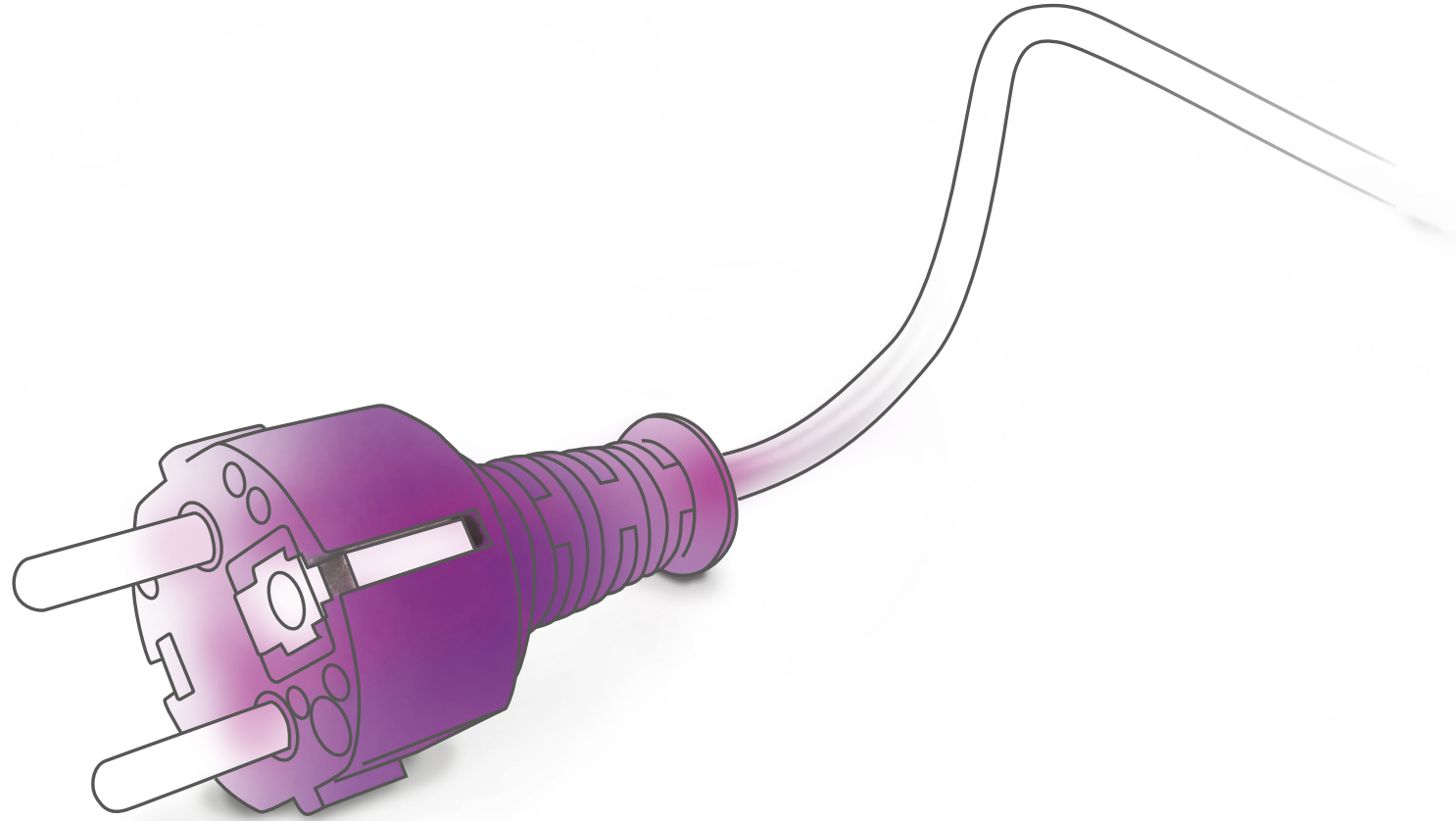
<sup>3</sup> Internal tests show materials to be compliant with UL requirements. Materials are not UL listed



<sup>4</sup> 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

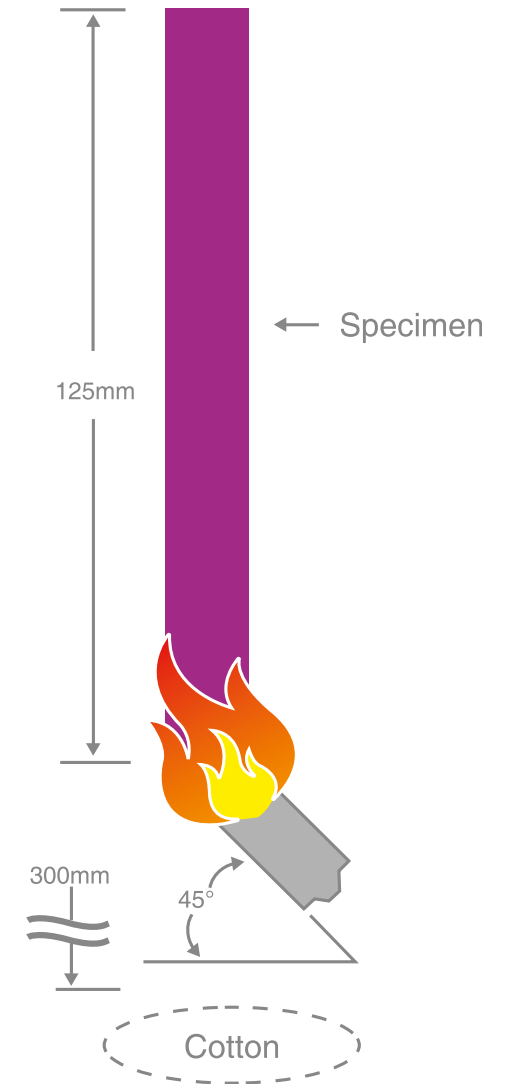
“The Standard for Flammability of Plastic Materials for Parts in Devices and Appliances”, as described by Underwriters Laboratories (UL) is one of the most widely accepted flammability performance standards for plastic materials. This standard determines a materials ability to propagate or extinguish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

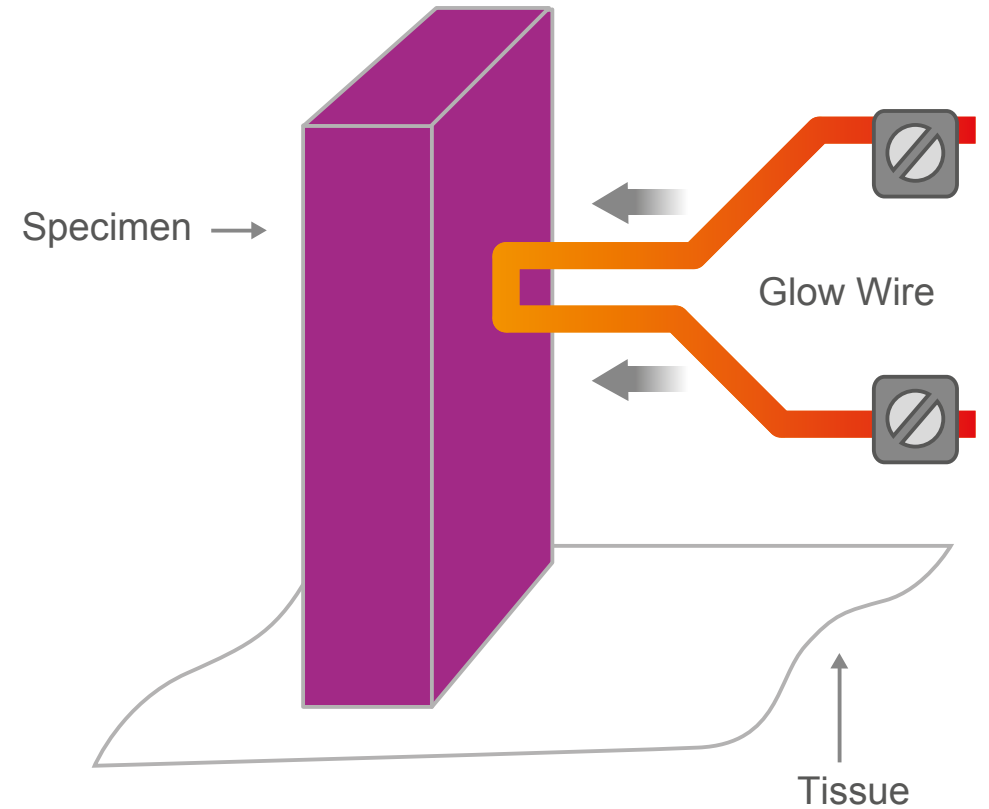


# GLOW WIRE FLAMMABILITY INDEX IN ACCORDANCE WITH IEC 60695-2-11

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

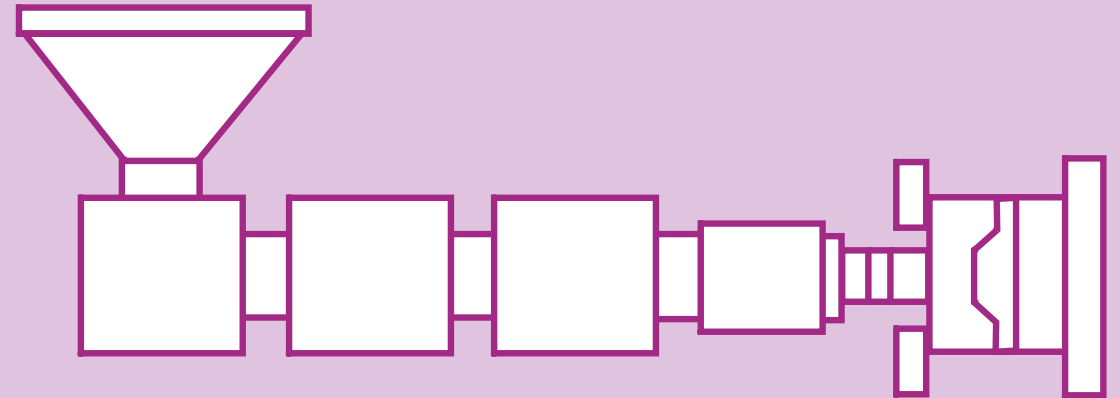
The FLAM grades can easily be processed using conventional thermoplastic equipment for extrusion and injection moulding. The thermoplastic characteristics result in fast processing times and complete scrap recycling. These grades may require pre-drying depending on the specific compound. If poor surface 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 being produced. [Further TPE processing & problem solving information is available to download from our website →](#)

# INJECTION MOULDING

Injection Speed:	Medium - Fast
Back 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

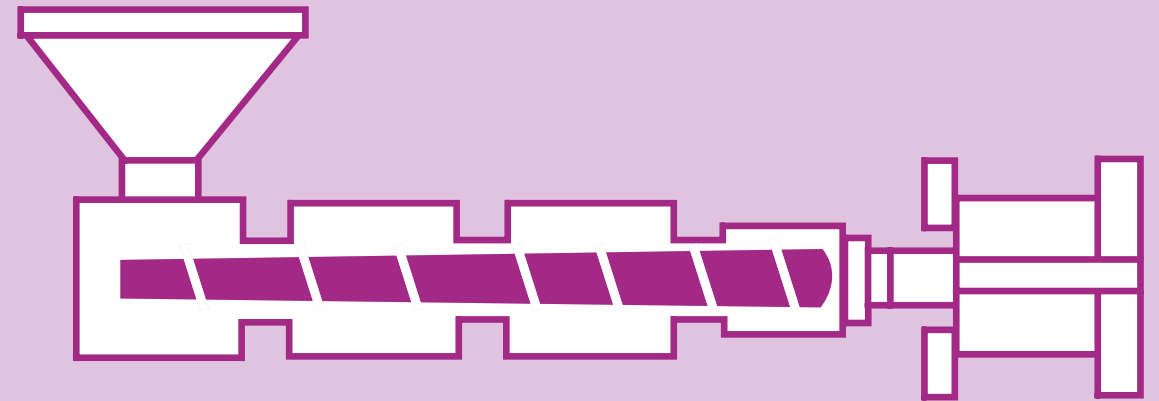
190 - 200

200 - 210

15 - 50

# EXTRUSION

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



Recommended start-up temperatures °C

150 - 160

160 - 170

170 - 180

180 - 190

180 - 200

# CONTACT US

If you can't see what you're looking for or have any questions, please get in touch. Click the button to find your local contact from our global network of plants, offices and distribution partners.

Or, simply send us an email to [info@hexpolTPE.com](mailto:info@hexpolTPE.com)

# ABOUT HEXPOL TPE

HEXPOL TPE is a global compounding group specialising in Thermoplastic Elastomers (TPE) for key industries such as consumer, medical, packaging, automotive and construction. We have a core belief in being the easiest company to do business with. That's why we invest in our operations, teams and technologies to offer our customers the most reliable, relevant and cost-effective TPE compounds, backed by highly responsive support, technical know-how and application expertise. Our teams work together, across boundaries, applying the knowledge, experience and talents we have all around the world to meet the needs of our customers.

All the information about chemical and physical properties consists of values measured in tests on injection moulded test specimens. We provide written and illustrated advice in good faith. This should only be regarded as being advisory and does not absolve the customers from doing their own full-scale tests to determine the suitability of the material for the intended applications. You assume all risk and liability arising from your use of the information and/or use or handling of any product. Figures are indicative and can vary depending on the specific grade selected and the production site. HEXPOL TPE makes no representations, guarantees, or warranties of any kind with respect to the information contained in this document about its accuracy, suitability for particular applications, or the results obtained or obtainable using the information. Some of the information arises from laboratory work with small-scale equipment which may not provide a reliable indication of performance or properties obtained or obtainable on larger-scale equipment. We retain the right to make changes without prior notice. HEXPOL TPE makes no warranties or guarantees, express or implied, respecting suitability of either HEXPOL TPE's products or the information for your process or end-use application. Dryflex® is a registered trademark, property of the HEXPOL TPE group of companies.

