

**dryflex<sup>®</sup> xl**

**TPV**



THEρμοPLASTIC VULCANISATE

## A whole range of possibilities...

Dryflex® XL are a range of thermoplastic vulcanisates compounds (TPVs) developed by The VTC TPE Group for the plastics and rubber processing industries.

The range consists of several series of high-performance compounds that contain a highly cross-linked elastomeric phase dispersed in a thermoplastic matrix. The cross-linked phase provides improved elasticity and thermal stability and the thermoplastic phase provides the melt-processability.

All Dryflex® XL TPV compounds offer superior weathering and ozone resistance characteristics; they display excellent colour and property retention after excessive exposure to UV. The combination of vulcanised rubber characteristics, such as heat and chemical resistance and low compression set, together with the processing ease and recyclability of a thermoplastic, results in lower production costs, consistent quality and greater product performance.

## Key Benefits of Dryflex® XL TPVs

- All grades are available in black, natural and specified colours on request.
  - No pre-drying of compound required (with the exception of 400 Series).
  - TPV compounds can be tailor made to specific customer requests.
- All compounds listed are examples of standard compounds, however, variants of intermediate hardness are available.
- Fully qualified and highly experienced technical support team offering practical advice from concept to application.

*Grade Reference System: First 2 digits refer to the hardness of the compound. The next three digits refer to the specific series it belongs to.*

## Tailor made for you

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 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.

We have developed endless formulations to fulfil different properties and application requirements to optimise the finished component. Use this guide as an introduction to our Dryflex® XL series and contact us to discuss your specific requirements.

## Injection Moulding Grades

### High Flow

The 100 Series are designed for long or complex flow paths, which require a material with excellent flow properties. They can also be used for general mouldings and are available as non-filled grades where easy colourability is required. The 100 series also display excellent bonding to polypropylene, EPDM and other Olefinic polymers.

#### 100 SERIES:High Flow

Material	Hardness	S.G.	Modulus 100%	Tensile Strength	Strain at Break	Tear Strength	Compression Set	
							Shore A ISO 868	g/cm <sup>3</sup> ISO 2781
XL 40100	40	0.91	1.0	2.0	400	12	17	40
XL 50100	50	0.92	1.5	2.5	380	13	19	42
XL 60100	60	0.92	2.0	4.0	400	19	23	43
XL 70100	70	0.93	2.5	5.8	480	25	29	46
XL 80100	80	0.93	3.4	6.9	540	32	32	50
XL 90100	90	0.93	4.8	7.6	400	45	37	60

### General Purpose

The 200 Series has been designed as a lower cost alternative to the 100 Series for injection moulding articles. These grades are very clean, easy to colour and also display very good bonding to polypropylene and Olefinic polymers.

#### 200 SERIES: General Purpose

Material	Hardness	S.G.	Modulus 100%	Tensile Strength	Strain at Break	Tear Strength	Compression Set	
							Shore A ISO 868	g/cm <sup>3</sup> ISO 2781
XL 50200	50	0.88	1.7	2.6	200	11	20	37
XL 60200	60	0.88	2.3	3.5	240	19	24	39
XL 70200	70	0.89	3.8	5.0	200	26	26	40
XL 80200	80	0.89	4.8	6.6	230	35	34	46
XL 90200	90	0.89	7.8	10.0	270	64	38	60

### Superior Strength

The 900 Series are the VTC TPE Group's original range of TPVs. They have good all round general properties giving a balance of compression set values against strength properties.

#### 900 SERIES:Superior Strength

Material	Hardness	S.G.	Modulus 100%	Tensile Strength	Strain at Break	Tear Strength	Compression Set	
							Shore A ISO 868	g/cm <sup>3</sup> ISO 2781
XL 45900	45	0.95	1.4	3.1	330	12	15	39
XL 55900	55	0.96	2.0	4.2	370	18	18	38
XL 63900	63	0.96	2.5	5.3	420	22	20	40
XL 68900	68	0.96	2.8	6.5	500	26	20	45
XL 73901	73	0.97	3.2	7.6	500	32	23	45
XL 80900	80	0.95	3.7	8.5	520	36	30	48
XL 87900	87	0.96	5.0	8.7	470	44	35	55

**Improved Heat and Oil Resistance Grades**

The 300 Series has been specially designed to offer improved resistance to degradation at elevated temperatures and an increased resistance to fluids such as hydrocarbons, chemicals and solvents.

**300 SERIES: Good Heat and Oil Resistance**

Material	Hardness	S.G.	Modulus 100%	Tensile Strength	Strain at Break	Tear Strength	Compression Set	
							Shore A ISO 868	g/cm <sup>3</sup> ISO 2781
XL 50300	50	0.91	1.8	2.8	260	14	16	38
XL 60300	60	0.92	2.3	3.5	280	17	19	38
XL 70300	70	0.93	3.2	5.4	380	28	25	43
XL 80300	80	0.93	4.8	7.4	380	38	27	48
XL 90300	90	0.93	6.0	8.6	380	50	36	53

Material	Change in Properties after Heat Ageing			Change in Properties after Submission in Fluid							
	7 days at 130°C			7 days in ASTM No. 1 at 125°C				7 days in IRM 903 at 125°C			
	Hardness ISO 868	Tensile ISO 37	Strain at Break ISO 37	Hardness ISO 868	Tensile ISO 37	Strain at Break ISO 37	Volume ASTM D-471	Hardness ISO 868	Tensile ISO 37	Strain at Break ISO 37	Volume ASTM D-471
XL 50300	-1	-5%	-9%	-11	-29%	-50%	35%	-35	-55%	-75%	90%
XL 60300	-2	-4%	-8%	-15	-22%	-43%	40%	-35	-50%	-68%	96%
XL 70300	-3	3%	-3%	-20	-25%	-55%	44%	-28	-48%	-73%	100%
XL 80300	-2	1%	-9%	-20	-21%	-55%	45%	-28	-40%	-71%	100%
XL 90300	0	-4%	-9%	-17	-15%	-55%	43%	-30	-37%	-70%	98%

**Overmoulding Grades**

The 400 Series are designed to offer a good chemical bond onto both glass filled and unfilled polyamide substrates (PA6 and PA6,6). Bond failure can occur by two methods; cohesive, this is where material fails before the bond and adhesive, where the bond fails and the two materials peel apart. If adhesive failure occurs then the force required to peel apart the two materials is indicated.

**400 SERIES: Overmoulding**

Adhesion to Polyamide (typical result)									Peel Force N/mm	
Material	Hardness	S.G.	Modulus 100%	Tensile Strength	Strain at Break	Tear Strength	Compression Set		ASTM D903 <sup>1)</sup>	
	Shore A ISO 868	g/cm ISO 2781	MPa ISO 37 Average	MPa ISO 37 Average	% ISO 37 Average	N/mm ISO 34 (method C) Average	% ISO 815 (type B) 24h at 23°C   24h at 100°C		90° peel angle Unfilled	30% glassfilled
XL 45400	45	0.91	1.2	2.0	260	10	19	44	Cohesive <sup>1)</sup>	Cohesive
XL 50400	50	0.91	1.4	2.2	300	11	21	46	Cohesive	Cohesive
XL 60400	60	0.92	1.8	3.0	330	15	23	47	Cohesive	Cohesive
XL 70400	70	0.92	2.6	5.1	450	26	27	50	6.8	5.0
XL 80400	80	0.94	3.5	7.6	490	33	30	55	6.8	5.2

<sup>1)</sup> Cohesive = the bonding strength is greater than the tensile strength

**Flame Retardant Grades**

The 500 Series has been designed to meet a range of UL94 flame retardancy standards and other customer specific needs. Both halogenated and halogen free grades have been developed to meet all compounding requirements.

**500 SERIES: Flame Retardant**

Material	Hardness	S.G.	Modulus 100%	Tensile Strength	Strain at Break	Tear Strength	Compression Set		Flame Retardancy		
	Shore A ISO 868	g/cm <sup>3</sup> ISO 2781	MPa ISO 37 Average	MPa ISO 37 Average	% ISO 37 Average	N/mm ISO 34 (method C) Average	% ISO 815 (type B) 24h at 23°C   24h at 100°C		UL94		
<b>Halogen Free</b>									1.5 mm	2.0 mm	3.0 mm
XL 60500	60	1.06	2.3	2.8	170	18	31	37	V1	V0	V0
XL 70500	70	1.07	2.9	3.4	175	21	33	40	V1	V0	V0
XL 80500	80	1.07	4.6	5.3	180	34	37	42	V0	V0	V0
XL 90500	90	1.08	8.0	8.8	220	51	45	50	V0	V0	V0
<b>Halogenated</b>									1.5 mm	2.0 mm	3.0 mm
XL 60510	60	1.23	1.7	1.9	180	13	40	42	V1	V0	V0
XL 70510	70	1.25	2.6	3.2	200	19	40	43	V1	V0	V0
XL 80510	80	1.31	3.7	4.7	190	28	40	41	V0	V0	V0
XL 90510	90	1.35	5.5	7.2	230	44	48	50	V0	V0	V0

**Extrusion Quality**

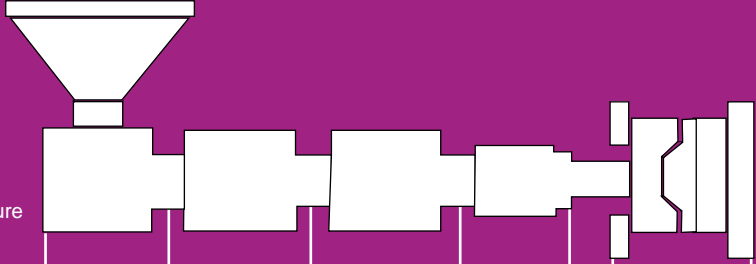
The 600 series compounds have been developed for articles that are produced using an extrusion process. They have been developed to offer a higher viscosity to allow efficient filling of the die and a smooth finish on the extruded profile. These grades are also suitable for co-extrusion with polypropylene and other olefinic polymers where a strong bond is required.

**600 SERIES: Extrusion Quality**

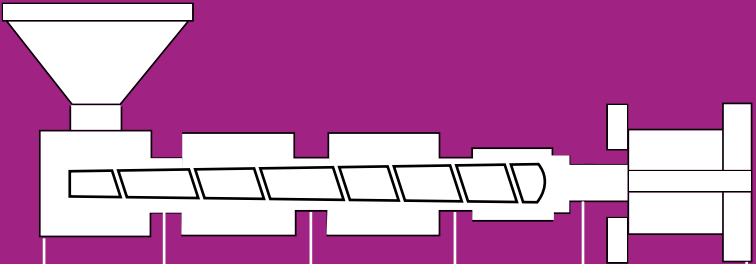
Material	Hardness	S.G.	Modulus 100%	Tensile Strength	Strain at Break	Tear Strength	Compression Set	
							MPa ISO 37 Average	MPa ISO 37 Average
XL 50600	50	0.92	1.4	3.4	450	15	21	42
XL 60600	60	0.93	2.2	4.0	480	21	24	44
XL 70600	70	0.94	3.0	6.0	450	28	24	50
XL 80600	80	0.94	3.6	6.8	480	34	32	58
XL 90600	90	0.94	5.0	8.0	450	48	36	62

All the above information about chemical and physical properties consists of values measured in tests on injection moulded test specimens. All Tensile and Tear properties are the average of both the flow and across the flow directions. UL94 testing performed at Vita Thermoplastic Polymers and not officially approved by UL. We provide written and illustrated advice in good faith. This should only be regarded as being advisory and does not absolve the customer from doing their own tests and trials to determine the suitability of the material for the intended applications. We retain the right to make changes without prior notice.

**Injection Moulding Guidelines**

Gates and Runners:	Fully round allowing easy flow						
Venting:	0.02 – 0.05 mm deep at final fill point						
Injection Speed:	Medium - Fast						
Injection Pressure:	Medium						
Back Pressure:	Low - Medium						
Holding Pressure:	Sufficient to pack the mould						
Cooling:	Parts can be demoulded once temperature drops to approx. 100°C						
Temperature °C	100 Series	160 - 180	170 - 190	180 - 200	180 - 210	20 - 60	
	200 Series	160 - 180	170 - 190	180 - 200	180 - 210	20 - 60	
	900 Series	160 - 190	170 - 200	180 - 210	200 - 220	20 - 60	
	300 Series	160 - 180	170 - 190	180 - 200	180 - 210	20 - 60	
	400 Series	180 - 200	190 - 210	200 - 220	220 - 230	20 - 60	
	(Overmoulding)						
Substrate should be moulded as hot as possible (> 100 °C) to provide best chemical bond							
	500 Series	160 - 180	170 - 190	180 - 200	190 - 210	30 - 60	

**Extrusion Guidelines**

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						
Temperature °C	600 Series						

**General Information:**

In general these grades do not require predrying. However, after periods of prolonged storage predrying may be necessary. Venting of extrusion lines may be used to prevent the build-up of volatiles during continuous processing.

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

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