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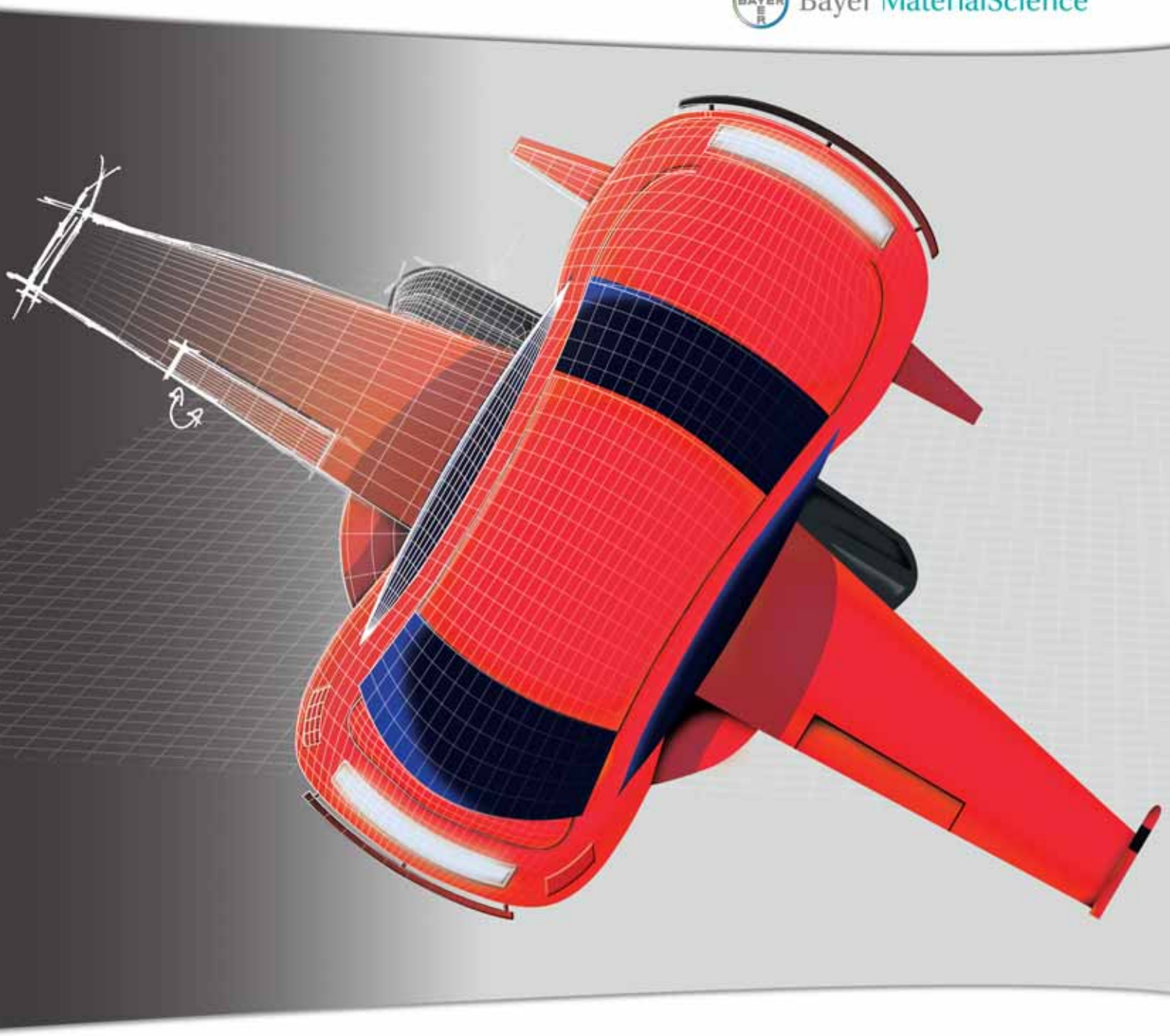

Product Range – Reference Data

desmopan®
flexible high-tech material

Desmopan® (TPU)

Product Range - Reference Data

Edition: 2006-10

Introduction

Desmopan® is Bayer MaterialScience's trade name for thermoplastic polyurethanes (TPU).

The Desmopan® range of grades has been adapted to the many special requirements imposed by Desmopan's broad range of applications. It takes in eight general-purpose lines, based on different raw material groups, and three series of special-purpose Desmopan® grades.

Overview

- Nomenclature
- Property comparison of the Desmopan® grade series (for preliminary material selection)
- Overview of grades (arranged according to Shore hardness and raw material base)
- Short description of grades and reference value tables

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In the future, visit our additional web sites at
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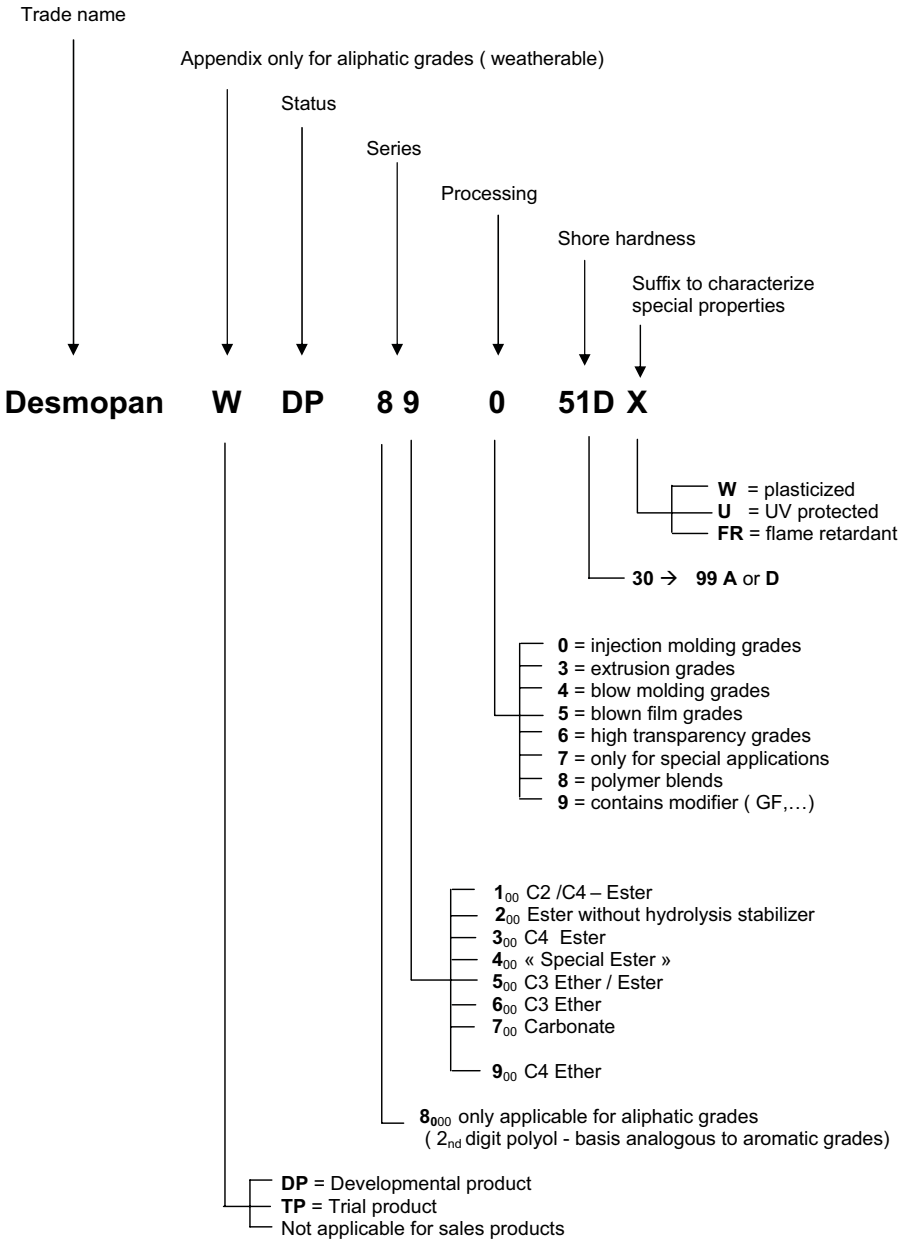
Nomenclature

Midway through 2003, we changed the nomenclature for our Desmopan® products. These changes were made in order to give the Desmopan® product range a more transparent structure. Nearly all the grades have been given a new name, with the exception of the sales products to date (three-character code), the full range of impact-modified ester grades, and a number of 300-series grades. These products can be recognized from the letters KA or KU. New developmental products have the letters DP in front of their code. The nomenclature for developmental and sales products has otherwise remained the same.

New Nomenclature



Property comparison of the Desmopan® grades

Series	Shore hardness range	Short description	Properties								
			Resistance to abrasion	Dynamic load-bearing capacity	Heat deflection	Resistance to oil and grease	Resistance to hydrolysis	Resistance to hot air	Fastness to light (yellowing)	Resistance to microbial attack	Flexibility at low temperatures
100 / Ester	60A - 50D	Injection molding and extrusion grades with high mechanical strength for articles resistant to wear	++	++	+	+	o	+	o	- x	+
200 / Ester	82A - 92A	Extrusion, injection molding and calendering grades, may be used for food contact applications	++	++	0	+	-	+	0	-	+
300 / Ester	70A - 73D	Injection molding and extrusion grades, with high mechanical strength, improved hydrolysis resistance and low-temperature flexibility	++	++	+	+	+	+	0	- x	+
400 / Ester	80A - 58D	Injection molding grades with low compression set, high heat deformation temperature and good resistance to grease and oil	++	++	++	++	+	++	0	0 x	+
500 / Ether-Ester	77A - 92A	Injection molding and extrusion grades which combine the advantages of ether and ester grades in an economical manner	0/+	0	0	+	+	-	0	+	+
600 / Ether	65A - 45D	Injection molding and extrusion grades with very good resistance to hydrolysis and microbes but reduced mechanical properties	-	-	0	+	++	-	0	++	++
700 / Carbonate	88A - 43D	Injection molding and extrusion grades, resistant to microbes and hydrolysis, with low swelling in water	+	+	0	+/++ 1)	++	0	0	+	+
W8000 / Aliphatics	85A - 56D	Modifier, injection molding and slush molding grades which do not yellow on exposure to UV light	+	0	0 / +	+	+/++ 1)	+ / - 1)	++	-/++ 1)	+/++ 1)
900 / Ether	70A - 73D	Injection molding and extrusion grades with very good resistance to microbes and hydrolysis; highly flexible at low temperatures	+	0	0	+	++	-	0	++	++
Impact-modified ester	57D - 66D	Special grades for shells and similar applications with high stiffness and good low-temperature impact strength	+	++	0	+	+	+	0	0	++

++ = very good; + = good; 0 = satisfactory; - = moderate; x = improves with increasing hardness; 1) depending on the grade

Raw material group	Esters				Ethers/ Esters	C3 ethers	Carbonates	Aliphatics	Ethers	Impact-modified esters	R - TPU
Series	100	200	300	400	500	600	700	W8000	900		
Shore hardness											
55 - 64 A	DP 1960AW		DP 3060A								
65 - 79 A	DP 1966AW DP 1970AW		DP 3070A		5377A	DP 6065A			DP 9370A DP 9370AU		
80 - 84 A	DP 1080A		DP 3380A	481	DP 5080A				DP 9380A DP 9380AU		
85 - 89 A	DP 1485A	DP 2586A DP 2586AS045 DP 2786A	385 3385A 585 3485A KU 8785A DP 8785 S043 DP 3685AU	487	588	DP 6386A	786	WDP 89085A WDP 85085A KU 88586 WDP 85786A	9385 DP 9386A DP 9585A		
90 - 94 A	192 DP 1490A	DP 2590A DP 2590AS045 DP 2792A	DP 3491A 392 DP 3690AU KU 8792A DP 8792 S043				790		DP 9392A DP 9392AU		
45 - 49 D			KU 8795A DP 8795 S043 DP 3695AU 345	445		DP 6045D	795U	WDP 89043D	DP 9395A DP 9395AU DP 9095AU		
50 - 54 D	150 DP 1350D		KU 8798A DP 8798 S043 DP 3354D	453				WDP 89051D	DP 9650DU		
55 - 59 D			DP3055D 359 DP3059D					WDP 89056D	955U DP 9659DU	KU 8715 KA 8529	
60 - 64 D			DP 3660DU DP 3364D	460					DP 9662DU	KA 8377	
65 - 69 D			365 DP3065D						DP 9665DU DP 9868D	KA 8410 KA 8417	
70 - 74 D			DP3072D DP 3075D						DP 9873D		DP 3970D

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Series 100 ester grades

Injection molding, extrusion and blow molding grades with a high mechanical strength. In extrusion applications, there is no crystallization of the melt with grades in this series even when the extruder has been in service for a long period of time. Used primarily for articles subject to wear, such as castors, shoe heels, pneumatic hoses and bellows.

Desmopan®

DP 1080A Shore hardness: 80A; injection molding grade; plasticizer-free;
Application: rigid/flexible composite systems; engineering components

DP 1485A Shore hardness: 86A / 33D; extrusion and injection molding grade; suitable for extrusion blow molding; very broad processing range;
Application: bellows; hoses, unreinforced; profiles; injection molded engineering components

DP 1490A Shore hardness: 92A / 40D; extrusion and injection molding grade; also suitable for extrusion blow molding; very broad processing range;
Application: bellows; hoses, non-reinforced; profiles; injection molded engineering components

192 Shore hardness: 94A / 42D; injection molding grade with high mechanical strength for articles subject to wear;
Application: shift lever balls; rollers; coupling elements; shoe heels

150 Shore hardness: 96A / 50D; injection molding grade with high mechanical strength for articles subject to wear

DP 1350D Shore hardness: 96A / 50D; extrusion grade; good wear resistance; high melt stability; high bursting pressure
Application: pneumatic hoses

Desmopan (TPU)				100 Series, ester grades					
Properties	**Test conditions**	**Units**	**Standards**	**DP 1080A**	**DP 1485A**	**DP 1490A**	**192**	**150**	**DP 1350D**
Mechanical properties (23 °C / 50 % r.h.)									
Shore hardness A		-	ISO 868	80	86	92	94	96	96
Shore hardness D		-	ISO 868		33	40	42	50	50
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	35	46	50	50	50	50
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	700	630	475	520	420	420
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	4	5	8,5	9	15	15
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	7,5	9	18	18	31	31
Compression set	24 h; 70 °C	%	ISO 815	39	36	47	60	50	50
Compression set	72 h; 23 °C	%	ISO 815	22	11	24	25	25	25
Abrasion loss	-	mm³	ISO 4649	35	19	35	30	30	30
Rebound resilience	-	%	ISO 4662	44	46	30	30	30	30
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	56	78	93	100	120	120
Flexural modulus	2 mm/min	MPa	ISO 178					130	130
Thermal properties									
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	171	390	1070	450	1260	2340
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	34	44	106	93	186	298
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	24	32	62	48	70	121
Other properties (23 °C)									
Density	-	kg/m³	ISO 1183	1206	1216	1220	1230	1240	1240
Glass fiber/glass bead/filler content	-	%	ISO 3451-1						
Processing conditions									
Injection molding melt temperature	-	°C	-	185 - 200	200 - 220	210 - 230	210 - 225	210 - 230	210 -230
Injection mold temperature	-	°C	-	20	20	20 - 40	20 - 40	20 - 40	20 - 40
Extrusion melt temperature	-	°C	-		180 - 200	185 - 205			210 - 230

DP = trial product (see disclaimer for trial products)

100 W Series, ester grades

The 100 W series was developed for special-purpose applications in the footwear industry. All products in this series contain plasticizer, but the plasticizer used does not belong to the phthalates group. These products offer straightforward processing and rapid cycle times. Processing of these formulations using the transfer molding process is also possible.

Desmopan (TPU)				**100 W Series, ester grades**		
Properties	**Test conditions**	**Units**	**Standards**	**DP 1960AW (8060SGN)**	**DP1966AW (8066SGN)**	**DP1970AW (8070SGN)**
Mechanical properties (23 °C / 50 % r.h.)						
Shore hardness A		-	ISO 868	61	65	70
Shore hardness D		-	ISO 868			
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	22	30	25
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	900	>800	>700
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	2,5	2,5	3
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	5	5	5
Compression set	24 h; 70 °C	%	ISO 815			
Compression set	72 h; 23 °C	%	ISO 815			
Abrasion loss	-	mm³	ISO 4649	100	46	37
Rebound resilience	-	%	ISO 4662	51	67	65
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	30	35	39
Flexural modulus	2 mm/min	MPa	ISO 178			
Thermal properties						
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2			
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2			
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2			
Other properties (23 °C)						
Density	-	kg/m³	ISO 1183	1200	1190	1120
Glass fiber/glass bead/filler content	-	%	ISO 3451-1			
Processing conditions						
Injection molding melt temperature	-	°C	-	180 - 210	180 - 210	180 - 210
Injection mold temperature	-	°C	-	20	20	20
Extrusion melt temperature	-	°C	-			

DP = trial product (see disclaimer for trial products)

200 Series, ester grades

Blown film and coating grades which can be used to manufacture consumer goods for food contact
(see page 22).

DP 2586A Extrusion and injection molding grades, specially
DP 2590A developed for the manufacture of blown films with no backing film

DP 2586A DPS 045 Modifications for textile coating with extrusion
DP 2590A DPS 045 calenders and laminating calenders .

DP 2786A These two formulations have been specially
DP 2792A developed for sinter and textile coating.

Desmopan (TPU)				200 Series, ester grades					
Properties	**Test conditions**	**Units**	**Standards**	**DP 2586A**	**DP 2590A**	**DP 2586A DPS 045**	**DP 2590A DPS 045**	**DP 2786A**	**DP 2792A**
Mechanical properties (23 °C / 50 % r.h.)									
Shore hardness A		-	ISO 868	86	94	86	94	88	93
Shore hardness D		-	ISO 868	38		38			50
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	45	45	45	45	33	43
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	500	500	500	500	590	520
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	5.6	10	5.6	10	6,4	10
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	12	30	12	30	11,2	20
Compression set	24 h; 70 °C	%	ISO 815	45	53	45	53	52	69
Compression set	72 h; 23 °C	%	ISO 815	23	24	23	24	17	26
Abrasion loss	-	mm^3	ISO 4649	32	60	32	60	86	70
Rebound resilience	-	%	ISO 4662	46	25	46	25	37	29
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	71	100	71	100	69	99
Flexural modulus	2 mm/min	MPa	ISO 178						
Thermal properties									
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	188	1710	188	1710	404	1340
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	47	130	47	130	41	95
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	34	57	34	57	23	43
Other properties (23 °C)									
Density	-	kg/m^3	ISO 1183	1190	1205	1190	1205	1205	1205
Glass fiber/glass bead/filler content	-	%	ISO 3451-1						
Processing conditions									
Injection molding melt temperature	-	°C	-	210 - 230	210 - 230	210 - 230	210 - 230	190 - 210	190 - 220
Injection mold temperature	-	°C	-	20 - 40	20	20 - 40	20	20	20 - 40
Extrusion melt temperature				195 - 215	190 - 210	195 - 215	190 - 210	180 - 200	180 - 200

DP = trial product (see disclaimer for trial products)

Series 300, ester grades (1)

Injection molding and extrusion grades offering high mechanical strength together with improved hydrolysis resistance and low-temperature flexibility. Low swelling values in oils, greases and solvents.

This is the series of grades used most frequently for extruded articles of all types, and for highly-stressed structural parts.

Desmopan®

DP 3060A Shore hardness: 62A; injection molding grade; plasticizer-free; low abrasion;
Application: sports shoe soles, rigid/flexible composite systems

DP 3070A Shore hardness: 70A; injection molding grade; plasticizer-free;
Application: injection molded engineering components; rigid/flexible composite systems

DP 3380A Shore hardness: 80A; extrusion grade; plasticizer-free;
Application: hoses, reinforced; profiles

385 E/S Shore hardness: 85A / 32D; extrusion and injection molding grade;
Application; hoses, unreinforced; screenpacks; engineering components; rigid/flexible composite systems

3385A Shore hardness: 85A / 33D; extrusion and injection molding grade; good wear resistance; short cycle times; high melt stability;
Application: rigid/flexible composite systems; hoses, non-reinforced; profiles; injection molded engineering components

Desmopan (TPU)				300 Series, ester grades (1)				
Properties	**Test conditions**	**Units**	**Standards**	**DP 3060A**	**DP 3070A**	**3380A**	**385 E**	**3385A**
Mechanical properties (23 °C / 50 % r.h.)								
Shore hardness A		-	ISO 868	62	70	80	85	85
Shore hardness D		-	ISO 868				32	33
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	28	25	44	50	50
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	800	800	590	500	500
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	2	2,5	4,5	6.0	5
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	3,5	4,6	8,3	13	15
Compression set	24 h; 70 °C	%	ISO 815	46	52	42	50	42
Compression set	72 h; 23 °C	%	ISO 815	20	24	18	25	15
Abrasion loss	-	mm³	ISO 4649	40	50	20	30	25
Rebound resilience	-	%	ISO 4662	49	47	41	42	50
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	33	36	58	70	70
Flexural modulus	2 mm/min	MPa	ISO 178					17
Thermal properties								
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	52	55	193	186	84
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	11	17	31	51	28
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	8	12	22	37	21
Other properties (23 °C)								
Density	-	kg/m³	ISO 1183	1145	1148	1160	1200	1200
Glass fiber/glass bead/filler content	-	%	ISO 3451-1					
Processing conditions								
Injection molding melt temperature	-	°C	-	185 - 215	185 - 215	185 - 200	210 - 230	190 - 210
Injection mold temperature	-	°C	-	20	20	20	20 - 40	20
Extrusion melt temperature						175 - 190	200 - 220	175 - 205

DP = trial product (see disclaimer for trial products)

Series 300, ester grades (2)

Injection molding and extrusion grades with high mechanical strength, improved hydrolysis resistance and low-temperature flexibility. Low swelling values in oils, greases and solvents.

This is the series of grades used most frequently for extruded articles of all types, as well as for highly-stressed structural parts.

Desmopan®

585 Shore hardness 85A / 32D; injection molding grade containing microbicidal agent;
Application: sports shoe soles

3485A Shore hardness: 85A / 33D; extrusion and injection molding grade; suitable for extrusion blow molding; with mold release agent; high melt stability;
Application: bellows; injection molded engineering components

DP 3491A Shore hardness: 92A / 40D; extrusion and injection molding grade; suitable for extrusion blow molding; high melt stability;
Application: blow molding; profiles; injection molded engineering components

392 Shore hardness: 92A / 40D; extrusion and injection molding grade;
Application: toothed belts; profiles; hoses, non-reinforced

Desmopan (TPU)				300 Series, ester grades (2)			
Properties	**Test conditions**	**Units**	**Standards**	**585**	**3485A**	**DP 3491A**	**392**
Mechanical properties (23 °C / 50 % r.h.)							
Shore hardness A		-	ISO 868	85	85	92	92
Shore hardness D		-	ISO 868	32	33	40	40
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	40	50	50	45
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	550	500	500	450
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	5.0	5.0	8.0	9.0
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	12	15	20	22
Compression set	24 h; 70 °C	%	ISO 815	55	42	50	41
Compression set	72 h; 23 °C	%	ISO 815	30	15	20	25
Abrasion loss	-	mm³	ISO 4649	25	25	25	25
Rebound resilience	-	%	ISO 4662	40	50	36	33
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	70	70	100	80
Flexural modulus	2 mm/min	MPa	ISO 178		17		
Thermal properties							
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	53	140	515	455
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	13	42	94	90
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	8	32	59	59
Other properties (23 °C)							
Density	-	kg/m³	ISO 1183	1200	1200	1200	1210
Glass fiber/glass bead/filler content	-	%	ISO 3451-1				
Processing conditions							
Injection molding melt temperature	-	°C	-	210 - 230	190 - 210	190 - 210	210 - 230
Injection mold temperature	-	°C	-	20 - 40	20 - 40	20 - 40	20 - 40
Extrusion melt temperature	-	°C	-		175 - 205	180 - 210	200-220

DP = trial product (see disclaimer for trial products)

*) See disclaimer for trial products

Series 300, ester grades (3)

Injection molding and extrusion grades with high mechanical strength, improved hydrolysis resistance and low-temperature flexibility. Low swelling values in oils, greases and solvents.

This is the series of grades used most frequently for extruded articles of all types, and for highly-stressed structural parts.

Desmopan®

DP 345 Shore hardness: 95A / 47D;
Injection molding grade with high mechanical strength for articles subject to wear;
Application: injection molded engineering components

DP 3354D Shore hardness: 55D; extrusion and injection molding grade; high melt stability; high bursting pressure;
Application: pneumatic hoses; engineering components

359 Shore hardness: 97A / 59D; injection molding grade with high mechanical strength for articles subject to wear;
Application: injection molded engineering components roller tires; shoe heels; ski-boot shells

DP 3364D Shore hardness: 65D; extrusion and injection molding grade; high melt stability; high bursting pressure;
Application: pneumatic hoses; engineering components

365 Shore hardness: 98A / 65D; injection molded engineering components
Application; injection molded engineering components heel patches; sports shoe soles

Desmopan (TPU)

Properties	Test conditions	Units	Standards	300 Series, ester grades (3)				
				DP 345	DP 3354D (8055D)	359	DP 3364D (8064D)	365
Mechanical properties (23 °C / 50 % r.h.)								
Shore hardness A		-	ISO 868	95		97		98
Shore hardness D		-	ISO 868	47	55	59	65	65
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	52	58	50	55	50
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	450	575	400	450	400
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	12	14	20	20	25
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	27	26	40	35	40
Compression set	24 h; 70 °C	%	ISO 815	42	48	60	47	50
Compression set	72 h; 23 °C	%	ISO 815	25	41	30	41	30
Abrasion loss	-	mm³	ISO 4649	30	34	35	37	30
Rebound resilience	-	%	ISO 4662	35	41	35	39	40
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	100	131	160	110	180
Flexural modulus	2 mm/min	MPa	ISO 178	70	95	180	165	350
Thermal properties								
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	970	418	1610	1080	2050
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	186	64	342	430	600
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	95	27	120	33	180
Other properties (23 °C)								
Density	-	kg/m³	ISO 1183	1220	1220	1230	1220	1230
Glass fiber/glass bead/filler content	-	%	ISO 3451-1					
Processing conditions								
Injection molding melt temperature	-	°C	-	210 - 235	200 - 220	220 - 240	210 - 230	220 - 245
Injection mold temperature	-	°C	-	20 - 40	20	20 - 40	20	20 - 40
Extrusion melt temperature					190 - 210		180 - 210	

DP = trial product (see disclaimer for trial products)

*) See disclaimer for trial products

300 Series, ester grades (4) (new generation)

The grades in the 300 Series summarized on this page are a further development of the proven Desmopan 355, 359 etc. grades. In addition to otherwise unchanged properties, they offer improved wear resistance and shorter cycle times during processing.

DP 3055D Shore hardness: 96A / 56D; injection molding grade with high mechanical strength for articles subject to wear; excellent abrasion resistance; good wear resistance; very short cycle times; Application: injection molded engineering components; castors and rollers

DP 3059D Shore hardness: 97A / 59D; injection molding grade with mold release agent; excellent abrasion resistance; good wear resistance; very short cycle times; Application: heel patches; castors and rollers; shoe shells; injection molded engineering components

DP 3065D Shore hardness: 9A / 65D; injection molding grade; high mechanical strength; excellent abrasion resistance; good wear resistance; very short cycle times; Application: engineering components

DP 3072D Shore hardness: 98A / 72D; injection molding grade; high mechanical strengths; excellent abrasion resistance; good wear resistance; very short cycle times; Application: engineering components

DP 3075D Shore hardness: 98A / 75D; injection molding grade; resistant to grease and oil; good wear resistance; short cycle times; Application: injection molded engineering components

Desmopan (TPU)				300 Series, ester grades (4) New generation				
Properties	**Test conditions**	**Units**	**Standards**	**DP 3055D**	**DP 3059D**	**DP 3065D**	**DP 3072D**	**DP 3075D**
Mechanical properties (23 °C / 50 % r.h.)								
Shore hardness A		-	ISO 868	96	97	98	98	98
Shore hardness D		-	ISO 868	56	59	65	72	75
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	60	50	60	60	43
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	400	400	380	350	300
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	15	21	26	34	30
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	35	42	45	52	
Compression set	24 h; 70 °C	%	ISO 815	43	46	38	49	49
Compression set	72 h; 23 °C	%	ISO 815	21	24	26	29	45
Abrasion loss	-	mm^3	ISO 4649	26	18	18	20	44
Rebound resilience	-	%	ISO 4662	35	35	50	47	38
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	136	160	180	256	164
Flexural modulus	2 mm/min	MPa	ISO 178	128	180	350	800	375
Thermal properties								
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	1200	2435	2620	3330	2160
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	256	568	948	1275	1616
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	117	181	264	385	105
Other properties (23 °C)								
Density	-	kg/m^3	ISO 1183	1220	1230	1220	1240	1240
Glass fiber/glass bead/filler content	-	%	ISO 3451-1					
Processing conditions								
Injection molding melt temperature	-	°C	-	220 - 240	220 - 240	225 - 245	225 - 245	230 - 250
Injection mold temperature	-	°C	-	20 - 40	20 - 40	20 - 40	20 - 40	20 - 40
Extrusion melt temperature	-	°C	-					

DP = trial product (see disclaimer for trial products)

*) See disclaimer for trial products

Series 300 ester grades (5) (sports shoe grades)

The 300 series grades listed below were developed for use in sports shoe soles. They have UV protection and fulfill the requirements of the leading sports shoe manufacturers. In addition to this, they are noted for their short cycle times, easy demolding and very good melt flowability when processed by injection molding. Long flow paths can thus be achieved with low wall thicknesses.

Desmopan (TPU)				300 Series, ester grades (5)			
Properties	**Test conditions**	**Units**	**Standards**	KU 2-8785 A *	KU 2-8792 A*	KU 2-8795 A*	KU 2-8798 A*
Mechanical properties (23 °C / 50 % r.h.)							
Shore hardness A		-	ISO 868	85	91	94	96
Shore hardness D		-	ISO 868	33	36	41	53
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	50	50	55	65
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	550	500	450	400
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	5	8.0	10	17
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	15	17	26	39
Compression set	24 h; 70 °C	%	ISO 815	42	50	40	45
Compression set	72 h; 23 °C	%	ISO 815	15	20	20	25
Abrasion loss	-	mm^3	ISO 4649	25	27	26	25
Rebound resilience	-	%	ISO 4662	50	43	40	36
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	70	90	90	120
Flexural modulus	2 mm/min	MPa	ISO 178				100
Thermal properties							
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	84	229	300	755
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	29	53	66	135
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	20	34	40	60
Other properties (23 °C)							
Density	-	kg/m^3	ISO 1183	1200	1200	1210	1220
Glass fiber/glass bead/filler content	-	%	ISO 3451-1				
Processing conditions							
Injection molding melt temperature	-	°C	-	200 - 220	190 - 210	190 - 210	195 - 215
Injection mold temperature	-	°C	-	20	20 - 40	20 - 40	20 - 40
Extrusion melt temperature	-	°C	-				

DP = trial product (see disclaimer for trial products)
*) See disclaimer for trial products

Series 300, ester grades (6)
(sports shoe grades, reduced-wear)

These grades with the additional designation S043 are a further development of our sports shoe series of grade. In addition to the familiar good properties, such as UV stabilization, good flowability and short cycle times, these grades are noted for their considerably improved wear properties. They are used on parts subject to high wear. For coloring, it should be noted that these grades have a slightly milky natural color.

Desmopan (TPU)				300 Series, ester grades (6)			
Properties	**Test conditions**	**Units**	**Standards**	**DP 8785A S043**	**DP 8792A S043**	**DP 8795A S043**	**DP 8798A S043**
Mechanical properties (23 °C / 50 % r.h.)							
Shore hardness A		-	ISO 868	85	91	94	98
Shore hardness D		-	ISO 868	33	40	41	59
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	45	50	50	65
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	500	500	450	400
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	5	7	10	17
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	14	17	24	39
Compression set	24 h; 70 °C	%	ISO 815	42	50	45	45
Compression set	72 h; 23 °C	%	ISO 815	15	20	21	25
Abrasion loss	-	mm³	ISO 4649	18	18	17	15
Rebound resilience	-	%	ISO 4662	50	43	40	36
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	70	80	90	120
Flexural modulus	2 mm/min	MPa	ISO 178				
Thermal properties							
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	85	169	333	560
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	29	42	67	127
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	20	28	38	62
Other properties (23 °C)							
Density	-	kg/m³	ISO 1183	1200	1200	1210	1220
Glass fiber/glass bead/filler content	-	%	ISO 3451-1				
Processing conditions							
Injection molding melt temperature	-	°C	-	190 - 210	190 - 210	190 - 220	200 - 230
Injection mold temperature	-	°C	-	20	20	20	25 - 40
Extrusion melt temperature	-	°C	-				

DP = trial product (see disclaimer for trial products)

*) See disclaimer for trial products

Series 300, ester grades (7) (transparent grades)

All the highly transparent grades listed here are hydrolysis-stabilized and have special UV protection. They can be used for clear, transparent injection moldings with a wall thickness of up to 6 mm. Hoses, flat film and profiles can be extruded from these grades.

Desmopan (TPU)				300 Series, ester grades (7)			
Properties	**Test conditions**	**Units**	**Standards**	**DP 3685AU**	**DP 3690AU**	**DP 3695AU**	**DP 3660DU**
Mechanical properties (23 °C / 50 % r.h.)							
Shore hardness A		-	ISO 868	86	93	96	98
Shore hardness D		-	ISO 868	38	40	43	56
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	50	55	59	60
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	450	430	425	400
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	5	8	12	19
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	13	24	34	40
Compression set	24 h; 70 °C	%	ISO 815	36	48	52	47
Compression set	72 h; 23 °C	%	ISO 815	13	21	22	24
Abrasion loss	-	mm³	ISO 4649	22	22	20	20
Rebound resilience	-	%	ISO 4662	32	29	25	31
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	88	95	112	170
Flexural modulus	2 mm/min	MPa	ISO 178				110
Thermal properties							
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	550	940	1670	2610
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	26	94	139	444
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	18	54	66	129
Other properties (23 °C)							
Density	-	kg/m³	ISO 1183	1197	1211	1218	1229
Glass fiber/glass bead/filler content	-	%	ISO 3451-1				
Processing conditions							
Injection molding melt temperature	-	°C	-	215 -235	215 - 235	215 - 235	215 - 235
Injection mold temperature	-	°C	-	20	20 - 40	20 - 40	20 - 40
Extrusion melt temperature	-	°C	-	180 - 200	180 - 200	190 - 210	190 - 210

DP = trial product (see disclaimer for trial products)

*) See disclaimer for trial products

Series 400, ester grades

This series offers a number of special properties thanks to the use of special raw materials and ancillary materials. Compared with the 100 and 300 series of ester grades, the individual materials display improved:

- compression set
- elasticity
- heat resistance
- hydrolysis resistance
- oil/grease resistance
- microbe resistance

These injection molding grades are used first and foremost in functional engineering components for automotive, mechanical and plant engineering.

Desmopan®

481 Shore hardness: 80A / 30D; injection molding grade; plasticizer-free; grease and oil-resistant; low compression set; high elasticity; high heat resistance; easy-release; Application: rollers; seals; membranes; automotive engineering components

487 Shore hardness: 86A / 34D; injection molding grade; grease and oil resistant; low compression set; high heat resistance; short cycle times; Application: automotive engineering components; rollers; seals; membranes; damping elements

445 Shore hardness: 93A / 44D; injection molding grade; grease and oil resistant; high heat resistance; low compression set; Application: automotive engineering components; injection molded engineering components

453 Shore hardness: 97A / 52D; injection molding grade; grease and oil resistant; low compression set; good wear resistance; Application: injection molding engineering components; automotive engineering components

460 Shore hardness: 97A / 58D; injection molding grade; grease and oil resistant; low compression set; high heat resistance; high elasticity; short cycle times; Application: automotive engineering components; engineering components

Desmopan (TPU)				400 Series, ester grades				
Properties	**Test conditions**	**Units**	**Standards**	**481**	**487**	**445**	**453**	**460**
Mechanical properties (23 °C / 50 % r.h.)								
Shore hardness A		-	ISO 868	80	86	93	97	97
Shore hardness D		-	ISO 868	30	34	44	52	58
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	30	35	38	38	35
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	600	500	500	475	350
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	5.0	6.0	8	17	21
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	9.0	14	20	29	33
Compression set	24 h; 70 °C	%	ISO 815	35	30	35	27	35
Compression set	72 h; 23 °C	%	ISO 815	22	15		15	25
Abrasion loss	-	mm³	ISO 4649	25	20	25	32	40
Rebound resilience	-	%	ISO 4662	48	45	35	30	35
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	45	70	95	180	150
Flexural modulus	2 mm/min	MPa	ISO 178					170
Thermal properties								
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	106	225	790	1780	1760
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	33	61	103	240	446
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	29	46	58	110	130
Other properties (23 °C)								
Density	-	kg/m³	ISO 1183	1200	1210	1220	1230	1220
Glass fiber/glass bead/filler content	-	%	ISO 3451-1					
Processing conditions								
Injection molding melt temperature	-	°C	-	225 - 235	230 - 240	210 - 235	220 - 240	235 - 245
Injection mold temperature	-	°C	-	20 - 40	20 - 40	20 - 40	20 - 40	20 - 40
Extrusion melt temperature								

Series 500, ether/ester grades

Ether/ester grades that combine the advantages of both classes of raw material at low cost. These are used in applications subject to mechanical stressing with a simultaneous risk of damage through micro-organisms. Fields of application include extrusion coating, seals, injection molded engineering components and watch starps.

Desmopan®

5377A Shore hardness: 77A / 28D; extrusion and injection molding grade; improved microbe resistance; improved hydrolysis resistance; Application: cable sheathings; fabric coating; watch straps

DP 5080A Shore hardness: 80A / 29D; injection molding grade; improved microbe resistance; improved hydrolysis resistance; Application: seals, membranes; rigid/flexible composite systems

588E Shore hardness: 88A / 33D; extrusion and injection molding grade; improved microbe resistance; improved hydrolysis resistance; Application: cable sheathings; hoses, unreinforced; roof linings

Series 600, ether grades

The grades in the 600 series can be used as a lower-cost solution for applications that require the hydrolysis and microbe resistance of the 900 series but not such high-level mechanical properties. Potential applications include fire extinguisher hoses, shoe soles and rigid/flexible combinations.

Desmopan®

DP 6065A Shore hardness: 66A; injection molding grade; plasticizer-free; very good hydrolysis and microbe resistance; very short cycle times; Application: rigid/flexible composite systems; shoe soles

DP 6386A Shore hardness: 85A; extrusion and injection molding grade; very good hydrolysis and microbe resistance; short cycle times; Application: fire-extinguisher hoses; injection molding engineering components; rigid/flexible composite systems

DP 6045D Shore hardness: 94A / 45D; injection molding grade; with special UV stabilizers; very good resistance to hydrolysis and microbes; very short cycle times; Application: injection molding engineering components; animal identification tags

Desmopan (TPU)				500 Series, ether / ester grades			600 Series, C3 ether grades		
Properties	**Test conditions**	**Units**	**Standards**	5377A	DP 5080A	588 E	DP 6065A	DP 6386A	DP 6045D
Mechanical properties (23 °C / 50 % r.h.)									
Shore hardness A		-	ISO 868	77	80	88	66	85	94
Shore hardness D		-	ISO 868	28	29	33			45
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	26	28	35	17	24	27
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	740	650	600	850	725	391
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	4.0	4.0	6.0	2,7	6,8	13,5
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	7.0	9.0	11	6	11	23
Compression set	24 h; 70 °C	%	ISO 815	50	50	50	36	37	56
Compression set	72 h; 23 °C	%	ISO 815	20	20	25	16	17	18
Abrasion loss	-	mm³	ISO 4649	80	70	60	150	90	90
Rebound resilience	-	%	ISO 4662	45	45	36	50	43	39
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	40	55	55	26	40	50
Flexural modulus	2 mm/min	MPa	ISO 178					18	
Thermal properties									
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	180	105	165	27	170	542
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	29	31	29	10	40	153
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	21	23	20	9	29	89
Other properties (23 °C)									
Density	-	kg/m³	ISO 1183	1140	1140	1150	1084	1117	1152
Glass fiber/glass bead/filler content	-	%	ISO 3451-1						
Processing conditions									
Injection molding melt temperature	-	°C	-	180 - 200	190 - 210	210 - 230	190 - 210	215 - 230	200 - 220
Injection mold temperature	-	°C	-	20 - 40	20 - 40	20 - 40	20 -30	20	20 - 30
Extrusion melt temperature				170 - 190		190 - 210		185 - 210	

DP = trial product (see disclaimer for trial products)

Series 700, carbonate grades

The grades in this series have been specially developed for particular applications and have been successfully used in these applications for many years. They display good resistance to microbes and hydrolysis, experience less swelling in water than ether grades and offer a level of mechanical properties comparable to ester grades.

Desmopan®

786 E Shore hardness: 88A / 33D; extrusion and injection molding grade; high mechanical strength; very good hydrolysis and microbe resistance; good low-temperature flexibility; Application: fire-extinguisher hoses; films; profiles; engineering components

790 Shore hardness: 92A / 40D; extrusion and injection molding grade; good hydrolysis and microbe resistance; high mechanical strength; good low-temperature flexibility; Application: toothed belts; profiles; injection molding engineering components

795 U Shore hardness: 94A / 43D; injection molding grade; with special UV stabilizers; good hydrolysis and microbe resistance; short cycle times; Application: animal identification tags

Desmopan (TPU)				700 Series, carbonat grades		
Properties	**Test conditions**	**Units**	**Standards**	786 E	790	795 U
Mechanical properties (23 °C / 50 % r.h.)						
Shore hardness A		-	ISO 868	88	92	94
Shore hardness D		-	ISO 868	33	40	43
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	43	55	46
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	525	450	430
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	7.0	10	14
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	14	25	34
Compression set	24 h; 70 °C	%	ISO 815	55	50	42
Compression set	72 h; 23 °C	%	ISO 815	25	25	22
Abrasion loss	-	mm³	ISO 4649	40	30	25
Rebound resilience	-	%	ISO 4662	32	32	32
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	60	85	102
Flexural modulus	2 mm/min	MPa	ISO 178			72
Thermal properties						
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	400	630	1040
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	35	100	146
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	20	53	51
Other properties (23 °C)						
Density	-	kg/m³	ISO 1183	1150	1210	1200
Glass fiber/glass bead/filler content	-	%	ISO 3451-1			
Processing conditions						
Injection molding melt temperature	-	°C	-	210 - 230	210 - 230	210 - 230
Injection mold temperature	-	°C	-	20 - 40	20 - 40	20 - 40
Extrusion melt temperature				190 - 210	200 - 220	

Series W8000, aliphatic (1)

The new Desmopan® product line based on an aliphatic isocyanate. In addition to possessing the familiar properties of TPUs, these products do not yellow on exposure to UV light. They additionally offer a particularly high resilience and "snappiness".

This is why these grades are particularly suitable for colored applications in automotive engineering and the sports and leisure sectors.

Desmopan®

W DP85085A Shore hardness: 85A; injection molding grade; improved microbe resistance; good low-temperature flexibility; improved hydrolysis resistance; Application: automotive interior applications

W DP 85786A Shore hardness: 90A; calender-coating grade; good low-temperature flexibility; high compression set; improved microbe resistance; improved hydrolysis resistance; Application: fabric coating

W DP 89085A Shore hardness: 86A; injection molding grade; very good hydrolysis and microbe resistance; good low-temperature flexibility; high compression set; low wear; for colored applications in the automotive, sports and leisure sectors

KU 2-88586* Shore hardness: 89A; special grade for slush processes; good low-temperature flexibility; high compression set; improved microbe resistance; improved hydrolysis resistance

Desmopan (TPU)				800 Series, aliphatics (1)			
Properties	**Test conditions**	**Units**	**Standards**	**W DP85085A**	**W DP85786A**	**KU 2-88586***	**W DP 89085A**
Mechanical properties (23 °C / 50 % r.h.)							
Shore hardness A		-	ISO 868	85	90	89	86
Shore hardness D		-	ISO 868				
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	32	26	25	33
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	880	850	890	750
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	6.0	6,3	6.3	7
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	9.5	9,5	9.5	10
Compression set	24 h; 70 °C	%	ISO 815	42	43	43	44
Compression set	72 h; 23 °C	%	ISO 815	18	12	12	18
Abrasion loss	-	mm^3	ISO 4649	28	30	30	31
Rebound resilience	-	%	ISO 4662	63	62	62	64
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	75	74	74	42
Flexural modulus	2 mm/min	MPa	ISO 178				33
Thermal properties							
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	207	220	224	260
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	86	83	90	65
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	55	56	58	50
Other properties (23 °C)							
Density	-	kg/m^3	ISO 1183	1130	1130	1130	1080
Glass fiber/glass bead/filler content	-	%	ISO 3451-1				
Processing conditions							
Injection molding melt temperature	-	°C	-	180-210	170 - 190	170 - 190	200 - 220
Injection mold temperature	-	°C	-	20 - 40	20	20 -40	20 -40
Extrusion melt temperature					170 - 190		

DP = trial product (see disclaimer for trial products)

*) See disclaimer for trial products

Series W8000, aliphatic (2)

The new Desmopan® product line based on an aliphatic isocyanate. In addition to possessing the familiar properties of TPUs, these products do not yellow on exposure to UV light. The products in the following table also have very good hydrolysis and microbe resistance, good low-level flexibility and low wear values. They additionally offer a particularly high resilience and "snappiness".

This is why these grades are particularly suitable for colored applications in automotive engineering and the sports and leisure sectors.

Desmopan (TPU)				**800 Series, aliphatics (2)**		
Properties	**Test conditions**	**Units**	**Standards**	**W DP89043D**	**W DP89051D**	**W DP89056D**
Mechanical properties (23 °C / 50 % r.h.)						
Shore hardness A		-	ISO 868	95	96	95
Shore hardness D		-	ISO 868	43	51	56
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	39	48	43
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	717	550	320
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	12	17	20
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	18	23	43
Compression set	24 h; 70 °C	%	ISO 815	41	46	46
Compression set	72 h; 23 °C	%	ISO 815			
Abrasion loss	-	mm³	ISO 4649	11	17	22
Rebound resilience	-	%	ISO 4662	56	52	51
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	96	142	
Flexural modulus	2 mm/min	MPa	ISO 178	80	170	250
Thermal properties						
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	230	560	708
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	143	302	308
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	101	214	216
Other properties (23 °C)						
Density	-	kg/m³	ISO 1183	1080	1080	1110
Glass fiber/glass bead/filler content	-	%	ISO 3451-1			
Processing conditions						
Injection molding melt temperature	-	°C	-	210 - 230	230 - 250	240 - 260
Injection mold temperature	-	°C	-	40 - 60	40 - 60	40 - 60
Extrusion melt temperature						

DP = trial product (see disclaimer for trial products)

Series 900, ether grades (1)

Products offering very good hydrolysis and microbe resistance. Their excellent low-temperature flexibility constitutes a further characteristic feature. The 900 series is used for example in applications where good flexibility or impact strength is required at very low temperatures.

Desmopan®

DP 9370A Shore hardness: 70A; extrusion and injection molding grade; good low-temperature flexibility; plasticizer-free; high moisture vapor transmission rate;
Application: roof linings; selas; membranes; films; rigid/flexible composite systems; sports shoe soles

DP 9370AU As for DP 9370A but with special UV stabilizers

DP 9380A Shore hardness: 82A / 31D; extrusion and injection molding grade; good low-temperature flexibility; complies with DIN VDE 0282-10;
Application: cable sheathings; hoses, unreinforced

DP 9380AU As for DP 9380A, but with UV stabilizers

9385 Shore hardness: 86A / 35D; extrusion and injection molding grade; good low-temperature flexibility; complies with DIN VDE 0282-10;
Application: cable sheathings; hoses, unreinforced

DP 9386A Shore hardness: 85A; extrusion and injection molding grade; very good hydrolysis and microbe resistance; good low-temperature flexibility; meets DIN VDE 0282-10; very broad processing range;
Application: cable sheathings; hoses, non-reinforced; profiles

DP 9585A Shore hardness: 85A / 34D; extrusion and injection molding grade; good low-temperature flexibility;
Application: blown films; films; fabric coating; profiles; engineering components

DP 9392A Shore hardness: 92A / 42D; extrusion and injection molding grade;
good low-temperature flexibility;
Application: hoses, unreinforced; cable sheathings; profiles; engineering components

DP 9392AU As for DP 9392A, but with special UV stabilizers

DP 9395A Shore hardness: 95A / 46D; extrusion and injection molding grade; good low-temperature flexibility;
Application: pneumatic hoses; cable sheathings; profiles; injection molded engineering components

DP 9395AU As for DP 9395A, but with special UV stabilizers

Desmopan (TPU)				900 Series, C4 ether grades (1)						
Properties	**Test conditions**	**Units**	**Standards**	**DP 9370A / AU**	**DP 9380A/ AU**	**9385**	**DP 9386A**	**DP 9585A**	**DP 9392A / AU**	**DP 9395A / AU**
Mechanical properties (23 °C / 50 % r.h.)										
Shore hardness A		-	ISO 868	70	82	86	87	85	92	95
Shore hardness D		-	ISO 868		31	35	34	34	42	46
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	25	40	48	42	40	50	50
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	800	500	600	600	630	500	450
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	2.4	5.0	6.0	6,3	6.0	8,5	13
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	4.3	9.0	13	11	10	17	27
Compression set	24 h; 70 °C	%	ISO 815	49	42	43	36	36	40	40
Compression set	72 h; 23 °C	%	ISO 815	22	25	25	28	28	20	22
Abrasion loss	-	mm³	ISO 4649	69	20	25	84	84	20	30
Rebound resilience	-	%	ISO 4662	63	50	40	45	45	32	
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	39	50	65	60	60	85	100
Flexural modulus	2 mm/min	MPa	ISO 178							55
Thermal properties										
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	125	73	118	152	152	700	440
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	11	37	32	48	48	132	104
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	9	30	23	35	35	71	55
Other properties (23 °C)										
Density	-	kg/m³	ISO 1183	1060	1110	1120	1110	1110	1150	1150
Glass fiber/glass bead/filler content	-	%	ISO 3451-1							
Processing conditions										
Injection molding melt temperature	-	°C	-	190 - 210	205 - 225	205 - 225	205 - 225	205 - 225	210 - 230	210 -230
Injection mold temperature	-	°C	-	20 - 40	20 - 40	20 - 40	20 - 40	20 - 40	20 - 40	20 - 40
Extrusion melt temperature				175 - 215	195 - 215	195 - 215	180 - 210	180 - 210	195 - 215	200 - 220

DP = trial product (see disclaimer for trial products)

Series 900, ether grades (2)

Products offering very good hydrolysis and microbe resistance. Their excellent low-temperature flexibility constitutes a further characteristic feature. The 900 series is used for example in applications where good flexibility or impact strength is required at very low temperatures.

Desmopan®

DP 9095AU Shore hardness: 95A / 43D; injection molding grade with UV stabilizers, good wear resistance, low tendency to warp short cycle times;
Application: animal identification tags

955 U Shore hardness: 97A / 55D; injection molding grade with special UV stabilizers; very good low-temperature impact strength;
Application: ski-boot shells; hoses, unreinforced; injection molding engineering components

DP 9868D Shore hardness: 98A / 66D; injection molding grade; very good low-temperature impact strength;
Application: shoe soles; engineering components

DP 9873D Shore hardness: 98A / 73D; injection molding grade; very good low-temperature impact strength;
Application: shoe soles; injection molding engineering components

Desmopan (TPU)				900 Series, C4 ether grades (2)			
Properties	**Test conditions**	**Units**	**Standards**	**DP 9095AU**	**955 U**	**DP 9868D**	**DP 9873D**
Mechanical properties (23 °C / 50 % r.h.)							
Shore hardness A		-	ISO 868	95	97	98	98
Shore hardness D		-	ISO 868	43	55	66	73
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	65	55	55	55
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	370	400	325	310
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	18	20	29	35
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	30	35	45	50
Compression set	24 h; 70 °C	%	ISO 815	77	56	82	92
Compression set	72 h; 23 °C	%	ISO 815	30	38	73	80
Abrasion loss	-	mm³	ISO 4649	18	40	30	55?
Rebound resilience	-	%	ISO 4662	33	38	47	45
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	129	140	150	200
Flexural modulus	2 mm/min	MPa	ISO 178		170	550	910
Thermal properties							
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	790	1080	1410	1800
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	161	371	870	1285
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	82	48	330	616
Other properties (23 °C)							
Density	-	kg/m³	ISO 1183	1149	1160	1170	1190
Glass fiber/glass bead/filler content	-	%	ISO 3451-1				
Processing conditions							
Injection molding melt temperature	-	°C	-	200 - 220	215 - 235	225 - 235	225 - 235
Injection mold temperature	-	°C	-	20	20 - 40	40 - 60	40 - 60
Extrusion melt temperature					205 - 235		

DP = trial product (see disclaimer for trial products)
*) See disclaimer for trial products

900 Series, ether grades (3) (transparent ethers)

The highly transparent ether grades described here have special UV protection. Clear, highly transparent injection molded parts with a wall thickness of up to 6 mm can be produced with short cycle times using these products. Flat films, hoses and profiles can also be extruded with these formulations.

Desmopan (TPU)				900 Series, C4 ether grades (3)			
Properties	**Test conditions**	**Units**	**Standards**	**DP 9650DU**	**DP 9659DU**	**DP 9662DU**	**DP 9665DU**
Mechanical properties (23 °C / 50 % r.h.)							
Shore hardness A		-	ISO 868	96	97	97	98
Shore hardness D		-	ISO 868	53	59	62	65
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	60	60	56	64
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	385	370	350	380
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	19	24	27	29
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	41	46	48	45
Compression set	24 h; 70 °C	%	ISO 815	45	82	87	53
Compression set	72 h; 23 °C	%	ISO 815	23	37	59	39
Abrasion loss	-	mm³	ISO 4649	25	20	20	19
Rebound resilience	-	%	ISO 4662	27	29	31	40
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	140	89	98	208
Flexural modulus	2 mm/min	MPa	ISO 178	85	160	200	310
Thermal properties							
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	1940	2000	2530	2550
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	363	502	643	816
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	130	128	187	215
Other properties (23 °C)							
Density	-	kg/m³	ISO 1183	1161	1160	1176	1175
Glass fiber/glass bead/filler content	-	%	ISO 3451-1				
Processing conditions							
Injection molding melt temperature	-	°C	-	215 - 235	220 - 235	220 - 235	220 - 235
Injection mold temperature	-	°C	-	40 - 60	40 - 60	40 - 60	40 - 60
Extrusion melt temperature				200 - 235	205 - 235	205 - 235	205 - 235

DP = trial product (see disclaimer for trial products)

*) See disclaimer for trial products

Impact-modified ester grades

This series of grades was developed primarily for shoe shells and similar applications. Shoe shells or ski boots produced in these grades are lightweight and offer high rigidity and elasticity with very good low-temperature impact strength. The modified Desmopan® grades additionally display high scratch and wear resistance.

Glass fiber reinforced grades

Injection moldings in glass fiber reinforced Desmopan® are characterized by low shrinkage and a low coefficient of expansion. The coefficient of expansion in the direction of the glass fibers is of the same order of magnitude as for aluminum.

Field of application: exterior automotive parts.

Parts in R-TPU display a high heat resistance, good low-temperature impact strength and sound insulation, good flowability and accurate reproduction of detail.

Molded parts can be printed and painted.

Desmopan (TPU)				Impact-modified ester grades					Glass fiber reinforced grades
Properties	**Test conditions**	**Units**	**Standards**	**KU 2-8715***	**KA 8529***	**KA 8377***	**KA 8410***	**KA 8417***	**DP 3970D**
Mechanical properties (23 °C / 50 % r.h.)									
Shore hardness A		-	ISO 868	96	97	97	98	98	99
Shore hardness D		-	ISO 868	58	60	63	65	68	70
Tear strength	200 mm/min	MPa	Based on ISO 527-1, -3	63	64	62	64	67	64
Elongation at break	200 mm/min	%	Based on ISO 527-1, -3	460	440	420	410	405	25
100 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	20	23	26	29	31	
300 % modulus	200 mm/min	MPa	Based on ISO 527-1, -3	38	41	43	45	48	
Compression set	24 h; 70 °C	%	ISO 815		60				
Compression set	72 h; 23 °C	%	ISO 815		30				
Abrasion loss	-	mm³	ISO 4649	25	30	30	30	30	
Rebound resilience	-	%	ISO 4662	36	38	38			
Tear propagation resistance	500 mm/min	kN/m	ISO 34-1	130	140	160	150	190	
Flexural modulus	2 mm/min	MPa	ISO 178	210	260	360	475	600	1700
Thermal properties									
Tensile storage modulus (from DMA)	-20 °C	MPa	ISO 6721-2	2100	1150	2400	1680	1980	2870
Tensile storage modulus (from DMA)	20°C	MPa	ISO 6721-2	536	330	705	615	825	1519
Tensile storage modulus (from DMA)	60°C	MPa	ISO 6721-2	185	122	236	183	218	877
Other properties (23 °C)									
Density	-	kg/m³	ISO 1183	1170	1200	1200	1200	1180	1376
Glass fiber/glass bead/filler content	-	%	ISO 3451-1						21
Processing conditions									
Injection molding melt temperature	-	°C	-	225 - 240	225 - 240	225 - 240	225 - 240	225 - 240	220 - 245
Injection mold temperature	-	°C	-	40 - 60	40 - 60	40 - 60	40 - 60	40 - 60	40 - 80
Extrusion melt temperature									

DP = trial product (see disclaimer for trial products)

*) See disclaimer for trial products

Pretreatment of the granules

TPU absorbs moisture from the air. The extent and rate at which this happens depends on the raw material type, hardness and climate. To ensure trouble-free processing and avoid any loss of quality, we recommend drying to a moisture content of ≤ 0.05 %. If the granules are too moist, blisters or streaks can occur on the surface of the finished components. The extrudate is no longer smooth and glossy but foamy and gassy.

A frequent cause of defects is also the use of undried functional concentrates. These batches should be separately pre-dried and have a moisture content of ≤ 0.05 %. Such levels can be reliably reached in conventional dry air and circulating air dryers.

Depending on the hardness, the recommended drying temperatures are between 80 and 110 °C, with drying times of 1 to 3 hours. Better drying can be achieved in a shorter time with dry air dryers.

Dried, hot granules should not be left to cool down in the open air. They must be stored in dry containers that can be re-sealed. The machine hopper must be kept covered.

Coloring

Apart from a few exceptions, Desmopan® is supplied solely in its natural color. This will be somewhere between transparent yellow and opaque white, depending on the grade in question.

Processors can easily color Desmopan® themselves. A simple and reliable means of doing this is by using pigment masterbatch with Desmopan® as the carrier material.

Pigment masterbatch based on polystyrene or SAN resin is suitable to a limited extent, while masterbatch based on polyethylene, polypropylene or PVC is not suitable. Desmopan® can similarly be colored with pigments and pastes. The standard quantities employed (depending on wall thickness and color density):

Pigment masterbatch	1.0 - 4 %
Coloring pastes	0.5 - 1 %
Pigments	0.2 - 0.5 %

Particular care should be taken to ensure that the coloring agents employed are dry. Even the addition of just 1 % moist pigment masterbatch can affect the surface and impair demolding behavior.

Food contact

Since there are different provisions governing food contact in a large number of countries, no general statement can be made here.

If you have any questions on this subject please contact:

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Occupational hygiene and environmental advice

Air extraction

Desmopan® can be machined and processed over a wide temperature range but, as with all natural and synthetic organic materials, it descomposes as from a certain temperature. The development of smoke signifies that decomposition is taking place.

Slow decomposition commences at approximately 240 °C, depending on the grade of Desmopan® involved. Further information can be found in our Safety Data Sheets.

We recommend efficient air extraction in all cases. This is particularly important for extrusion and welding since, in the latter case in particular, it is impossible to achieve a controlled temperature profile.

Waste disposal

Providing that it is not contaminated with other substances, Desmopan® can essentially be disposed of in municipal landfills. It does not constitute a hazard to water. If the material can no longer be recycled, then it is feasible and, indeed makes sense, for it to be incinerated in a waste incineration plant on account of its high calorific value.

Recycling

Molded parts made of Desmopan® must be marked in accordance with DIN/ISO 11469 and ISO 11469 (see TI KU21159).

>TPU<

All Desmopan® grades can be remelted in a stable manner and can thus be reprocessed in the course of recycling (they should be pre-dried as a matter of principle).

Injection molding

Sprue and runner waste and other clean waste can be granulated and re-processed. The quantity of regrind added to virgin material should always be selected on the basis of the requirement profile specified for the parts. This will also show whether it is possible to use 100 % regrind. Unless the injection moldings are being used for inferior-quality applications, they must be tested to check that they meet the specified requirements.

Extrusion

Either process separately or add to injection molding grades.

We're there for you - with expertise and commitment all over the world:

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www.bayermaterialsciencenafta.com

In the future, visit our additional web site at

www.desmopan.com und **www.texin.com**

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