Bayer MaterialScience

Attention: John Penglase
Guardian Tactile Systems Pty Ltd
Unit 11/88 Erindale Road
Balcatta WA 6021

Re: Tactile Material Recommendation – Bayer Desmopan

Dear John,

Thermoplastic Polyurethanes such as **Desmopan DP 9659DU** are successfully used in outdoor applications.

Common TPU applications include:

- animal ear tags
- tubes and hoses
- engineering parts
- sport and leisure applications such as sport shoes and ski boot shells
- mining applications such as bearings and screens

All of the above applications need to resist UV attack.

Thermoplastic Polyurethanes possess many physical properties not seen in other engineering plastics such as:

- very high wear and abrasion resistance
- flexibility over a wide temperature range
- high tensile strength
- excellent resistance against grease, oil and many solvents
- excellent resistance against UV light and weathering.

Desmopan DP 9659DU is one of the grades we would recommend for tactile applications. As seen above our materials have excellent abrasion, UV and chemical resistance in many applications. Length of time for these properties will vary pending the different applications, moulding parameters and exposure/environment.

Extended weathering testing on Desmopan DP 9659DU is currently not available. However, we can provide extended weathering testing for **Desmopan DP 9662DU** (this is a similar product but has a shore hardness of 62D). This was run at a constant temperature of 65 degrees C for 28 days.

Please find attached Material Safety Data Sheet, Specification Sheet and our Restriction on Hazardous Substances (ROHS) Certificate.

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Best Regards,

Joe Severino
Account Manager, Plastics

This information and our technical advice whether verbal, in writing or by way of trials are given in good faith but without warranty, and this also applies where proprietary rights of third parties are involved. Our advice does not release you from the obligation to verify the information currently provided especially that contained in our safety data and technical information sheets and to test our products as to their suitability for the intended processes and uses. The application, use and processing of our products and the products manufactured by you on the basis of our technical advice are beyond our control and, therefore, entirely your own responsibility. Our products are sold in accordance with the current version of our General Conditions of Sale and Delivery.

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Desmopan DP 9659DU

900 grade series, ether / Shore hardness D 55 - 59

Extrusion- and injection molding grade; with special UV stabilizers; transparent up to 6 mm wall thickness; very good hydrolysis and microbial resistance; Application; Ski boot shells; Hoses, non-reinforced

ISO Shortname

	Property	Test Condition	Unit	Standard	Value dried	Value annealed	Value according to specifications
Mechanical properties (23 °C/50 % r. h.)							
C	shore hardness, method A		-	ISO 868		97	
C	shore hardness, method D		-	ISO 868		59	
C	Ultimate tensile strength	200 mm/min	MPa	acc. ISO 527-1,-3		60	
C	Elongation at break	200 mm/min	%	acc. ISO 527-1,-3		370	
C	Stress at 100 % strain	200 mm/min	MPa	acc. ISO 527-1,-3		24	
C	Stress at 300 % strain	200 mm/min	MPa	acc. ISO 527-1,-3		46	
C	Compression set	24 h; 70 °C	%	ISO 815		52	
C	Compression set	72 h; 23 °C	%	ISO 815		37	
C	Abrasion resistance		mm³	ISO 4649		30	
	Impact resilience		%	ISO 4662		29	
	Tear propagation resistance	500 mm/min	kN/m	ISO 34-1		89	
Thermal properties							
	Torsional storage modulus	-20 °C	MPa	ISO 6721-2		1370	
	Torsional storage modulus	23 °C	MPa	ISO 6721-2		267	
	Torsional storage modulus	70 °C	MPa	ISO 6721-2		75	
Other properties (23 °C)							
C	Density		kg/m³	ISO 1183			1160
Molding conditions							
	Injection molding-Melt temperature		°C	-	220 - 235		
	Injection molding-Mold temperature		°C	-			40 - 60
	Extrusion-Melt temperature		°C	-	205 -235		

C These property characteristics are taken from the CAMPUS plastics data bank and are based on the international catalogue of basic data for plastics according to ISO 10350.

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Desmopan DP 9659DU

Disclaimer

Disclaimer for Developmental products

" This is a developmental product. Further information, including amended or supplementary data on hazards associated with its use, may be compiled in the future. For this reason no assurances are given as to type conformity, processability, long-term performance characteristics or other production or application parameters. Therefore, the purchaser/user uses the product entirely at his own risk without having been given any warranty or guarantee and agrees that the supplier shall not be liable for any damages, of whatever nature, arising out of such use. Commercialization and continued supply of this material are not assured. Its supply may be discontinued at any time.

Test values

Unless specified to the contrary, the values given have been established on standardised test specimens at room temperature. The figures should be regarded as guide values only and not as binding minimum values. Kindly note that, under certain conditions, the properties can be affected to a considerable extent by the design of the mould/die, the processing conditions and the colouring.

Processing note

Under the recommended processing conditions small quantities of decomposition product may be given off during processing.To preclude any risk to the health and well-being of the machine operatives, tolerance limits for the work environment must be ensured by the provision of efficient exhaust ventilation and fresh air at the workplace in accordance with the Safety Data Sheet. In order to prevent the partial decomposition of the polymer and the generation of volatile decomposition products, the prescribed processing temperatures should not be substantially exceeded.Since excessively high temperatures are generally the result of operator error or defects in the heating system, special care and controls are essential in these areas.

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To whom it may concern

Certification of Compliance with
2000/53/EC, 2002/95/EC, 2002/96/EC, 2003/11/EC
and SJ/T11363-2006:

March 1st, 2007

Bayer MaterialScience AG

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In response to your request, Bayer MaterialScience's **Makrolon, Bayblend, Desmopan, Makroblend, Apec, Texin, Makrofol and Bayfol** grades comply with the requirements of:

- EU Directive **2002/95/EC** on the restriction of the use of certain hazardous substances in electrical and electronic equipment (called RoHS Directive) and its amendments (**2005/618/EC** and others)

- EU Directive **2002/96/EC** on waste electrical and electronic equipment (called WEEE Directive) and its amendments

  (A few of our Makrolon, Makroblend, Makrofol and Apec types contain a non-regulated brominated flame retardant. We would like to make you aware of the parts identification requirement for these grades to allow the selective treatment according to Annex II)

- EU Directive **2003/11/EC** , amending for the 24th time Council Directive 76/769/EEC, relating to restrictions on the marketing and use of certain dangerous substances and preparations (pentabromodiphenyl ether, octabromodiphenyl ether)

- EU Directive **2000/53/EC** (End-of-Life Vehicles Regulation) and its amendments (**2002/525/EC** and others)

- Chinese SJ/T11363-2006 (called China-RoHS)

Compounds of cadmium, lead, mercury and hexavalent chromium, flame retardants PBB and PBDE including pentabromodiphenyl ether (CAS-No. 32534-81-9) and octabromodiphenyl ether (CAS-No. 32536-52-0), have not been intentionally added for the production of all **Makrolon, Bayblend, Desmopan, Makroblend, Apec, Texin, Makrofol and Bayfol** grades. Their content in these plastics materials is below the specific limits for these substances as defined in the legislations mentioned above.

Lead – 1,000 ppm
Mercury – 1,000 ppm
Cadmium – 100 ppm
Hexavalent Chromium – 1,000 ppm
Polybrominated biphenyls (PBB) – 1,000 ppm
Polybrominated diphenyl ether (PBDE) – 1,000 ppm

The presence of analytically detectable traces of the above mentioned heavy metals or heavy metal compounds, which occur widely and have possibly been introduced into our product via the raw materials, auxiliaries and additives, can not be excluded. Although these products have not been analysed for these metals, we would not expect the total of these metals to exceed 100 ppm.

We hope you will find this information useful. If we may be of any further assistance, please feel free to contact us.

Bayer MaterialScience AG

i.V.

Bernd Getzie
Regulatory Affairs and Product Support