Delrin®
ONLY BY DUPONT

acetal resin

New Resin Profile

DELRIN® 100AL and DELRIN® 500AL

DELRIN® 100AL – DELRIN® 500AL

Acetal resins with advanced lubrication

If grease, squeaking, wear, or friction are a problem, then DELRIN® with Advanced Lubrication can provide the solution

"Best compromise between cost and performance"

DELRIN® 100AL and 500AL are new high and medium viscosity grades of acetal resin, containing an advanced system of lubrication. They are designed for applications requiring **low wear** and/or **low coefficient of friction** against steel, DELRIN® itself or other plastics. They are also effective for applications requiring **no noise** (squeak) or that need to be **grease** free.

All these phenomena are related. Following are some examples of applications.

Grease/Maintenance free

Some applications need to be grease free. DELRIN® AL can be used because of its outstanding performance which makes it possible to eliminate external lubricants. As a consequence aftermarket maintenance can be avoided.

Application: Printer gear mechanism made of DELRIN® 500AL. Why? Grease free application to avoid paper/toner contamination.

Wear and friction

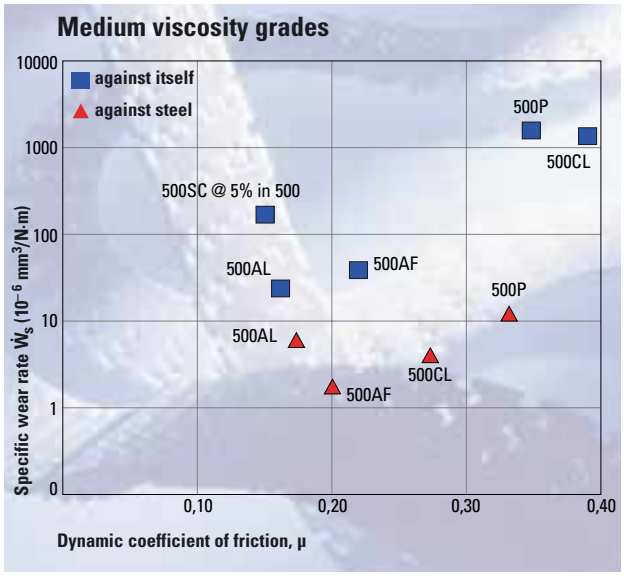
Advanced lubricated DELRIN® outperforms standard grades in terms of wear and friction, while maintaining similar levels of mechanical properties. The dynamic **coefficient of friction μ** against itself is reduced by almost 50% and the **specific wear rate $\dot{W}_s$** by a factor of almost 100. Against steel, similar improvement is achieved for friction. In terms of wear, performance is improved by more than 50%.

Note the test specimen photos after the wear test.

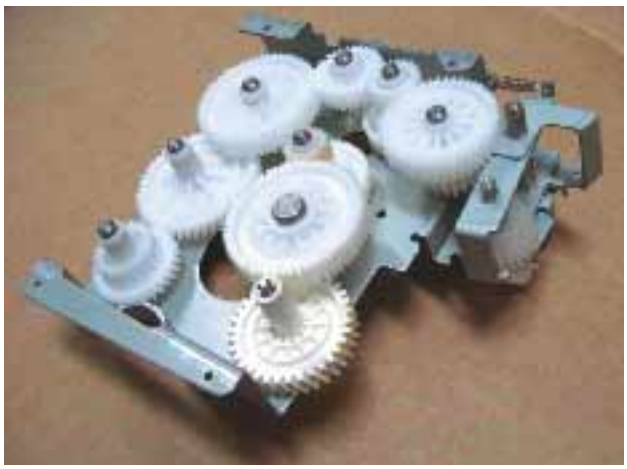
Wear track comparison between DELRIN® 500P and 500AL against itself.

DELRIN® 500P

DELRIN® 500AL

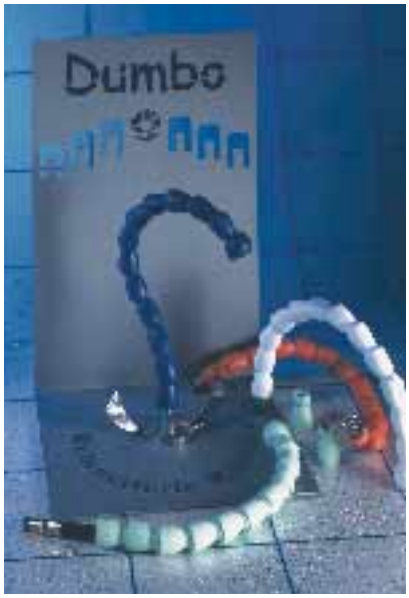


Specific wear rate and dynamic coefficient of friction against itself and steel ("thust washer" method). (See footnotes 2 and 3 on Property table, page 3).



Application: Printer gear train. Why? Low wear and friction against metal, itself and standard DELRIN®.

Application: Perfume cap. Why? Low coefficient of friction improves opening/gliding operation.



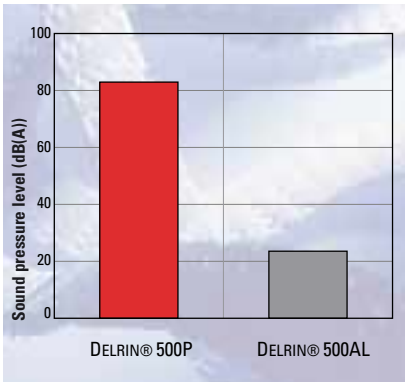
Application:
Dumbo water tap. Why? Moulding the parts with 500AL instead of 500P eliminates squeak effect.

Noise

The **noise** at high frequency (squeak), which is emitted when two plastic parts rub against each other, can be drastically reduced by using DELRIN® 500AL. The sound pressure level is reduced from 83 dB(A) for the DELRIN® 500P to 24 dB(A) by replacing only one part with DELRIN® 500AL (see graph). This corresponds to **a factor of 60 in noise reduction** as perceived by the human ear.

Note that a sound pressure level below 60 dB(A) is considered as **not squeaking.**

Reduction of noise (squeak) for DELRIN® 500AL against DELRIN® 500P.
The sound pressure level (SPL) is measured at 16 kHz at a distance of 40 mm from the sliding parts. The test conditions are the same as for the specific wear rate.



Processing guidelines

		100AL	500AL
Max. moisture content*	%	0,2	0,2
Drying conditions, if needed*		2 h at 80° C	2 h at 80° C
Melt temperature range	°C	210-220	210-220
Mould temperature range	°C	80-100	80-100
Hold pressure range	MPa	90-110	80-100

* Resins are shipped ready to be moulded; drying may be needed if open containers/bags were exposed to high humidity for a prolonged time.

Comparing properties of standard and advanced lubricated acetal resins

	Properties	Test Method	Units	DELRIN® 100P	DELRIN® 100AL	DELRIN® 500P	DELRIN® 500AL
MECHANICAL	Yield stress	ISO 527-1/-2	MPa	70	70	71	63
	Yield strain	ISO 527-1/-2	%	22	18	14	11
	Nominal strain at break	ISO 527-1/-2	%	45	47	30	24
	Tensile modulus	ISO 527-1/-2	MPa	3000	2700	3200	3100
	Charpy impact strength (notched)	ISO 179/1eA	kJ/m^2	15	9	9	7
WEAR & FRICTION	Specific wear rate against itself[2]		(10^{-6} $mm^3/N{\cdot}m$)	1500	41	1500	22
	Coefficient of friction against itself[2]			0,4	0,23	0,35	0,16
	Noise (squeak) against itself[2]			Yes	No	Yes	No
	Specific wear rate against steel[3]		(10^{-6} $mm^3/N{\cdot}m$)	14	2	12	6
	Coefficient of friction against steel[3]			0,3	0,19	0,33	0,18
OTHERS	Melt mass-flow rate (190° C, 2,16 kg)	ISO 1133	g/10 min	2,4	2,2	15	14
	Density	ISO 1183	kg/m^3	1420	1400	1420	1390
	Shrinkage:[1] Parallel (flow direction)	ISO 294-4	%	1,9	1,8	2,0	1,9
	Normal (transverse)	ISO 294-4	%	2,1	2,0	2,1	1,9

1) Sample: plaque 60 mm × 60 mm × 2 mm.

2) Surface and countersurface are moulded with the same DELRIN®. The specific wear rate is measured at low speed (0,084 m/s) with a contact pressure of 0,624 MPa using a repetitive motion (total sliding distance 1,52 km). The coefficient of friction is also measured at low speed (0,08 m/s) with a contact pressure of 0,196 MPa – also using a reciprocating motion.

3) The surface roughness Ra (µm): 0,10 and hardness 93 H.R. The specific wear rate is measured at low speed (0,084 m/s) with contact a pressure of 0,624 MPa using a reciprocating motion (total sliding distance 4,25 km). The coefficient of friction is measured at high speed (0,5 m/s) using a load of 10 N under sliding motion.

We've got solutions...
...and we're ready to help.
Contact us today for assistance in part development and additional information about DELRIN® acetal resins or any of the other eight engineering polymers made by DuPont.
Just call the number listed at the right or visit our Web site.
Contact information for other countries is available on the Web site.

More information
http://plastics.dupont.com

For DELRIN® acetal resin
DuPont (U.K.) Limited
Maylands Avenue
GB-Hemel Hempstead
Herts. HP2 7DP
Tel.: 01442/34 65 00
Fax: 01442/21 86 46

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