

DOW CORNING® MB50-001

Masterbatch

FEATURES

- Imparts processing improvements and modified surface characteristics

BENEFITS

- Improved throughput
- Reduced energy consumption
- Enhanced scratch resistance
- Improved slip properties
- Reduced waste
- Enhanced stability vs. traditional processing aids and lubricants

COMPOSITION

- Solid pellets

Ultra-high molecular weight siloxane polymer

APPLICATION

- Additive in polypropylene-compatible systems.

TYPICAL PROPERTIES

Specifications writers: These values are not intended for use in preparing specifications. Please contact your local Dow Corning sales representative prior to writing specifications on this product.

Property	Unit	Value
Appearance		Off-white pellets
Siloxane content	%	50
Organic resin		Polypropylene, MI 12
Suggested use level (0.1 to 5% siloxane)		0.2 to 10

DESCRIPTION

DOW CORNING MB50-001 Masterbatch is a pelletized formulation containing 50% of an ultra-high molecular weight siloxane polymer dispersed in polypropylene (PP) homopolymer. It is designed to be used as an additive in polypropylene-compatible systems to impart benefits such as processing improvements and modification of surface characteristics.

Liquid siloxane plastic additives have been used for several years to improve the lubricity and flow of thermoplastics. They are effective in this role although some difficulties have been experienced in the incorporation of liquids into thermoplastic melts without the use of specialized equipment. It has also been difficult to produce masterbatches with greater than 20% liquid siloxane because of processing difficulty and bleed problems.

The DOW CORNING® MB Series Masterbatches address these problems

by supplying a high concentration of an ultra-high molecular weight siloxane as a dispersion in a dry pellet form in a variety of thermoplastics.

BENEFITS

When added to polypropylene or similar thermoplastics at 0.1% to 1.0%, improved processing and flow of the resin is expected, including better mold filling, less extruder torque, internal lubrication, mold release and faster throughput. At higher addition levels, 1% to 5% siloxane, improved surface properties are expected, including lubricity, slip, lower coefficient of friction, and greater mar and abrasion resistance. A study evaluating paintability showed no adverse effects in polypropylene with up to 5% ultra-high molecular weight siloxane added, as demonstrated in Table 2.

The DOW CORNING MB Series Masterbatches are expected to give improved benefits compared to conventional lower molecular weight siloxane additives, e.g., less screw

slippage, improved release, a lower coefficient of friction, fewer paint and printing problems, and a broader range of performance capabilities. Figure 1 shows a significant effect on coefficient of friction values.

Figure 1: Coefficient of friction vs. rotational velocity (PP)

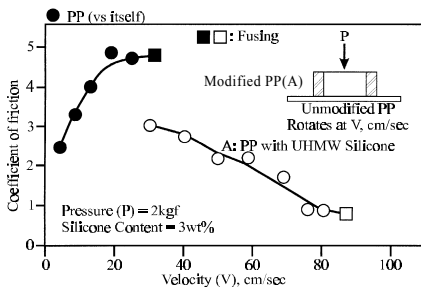
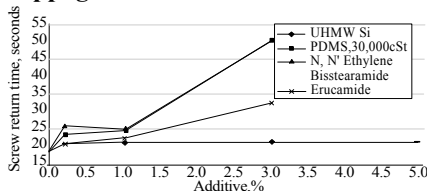


Figure 2 demonstrates the effect of UHMW siloxane, organic slip additives and low viscosity PDMS on screw slippage. Use of UHMW siloxane additive provides a constant screw return time, indicating little or no screw slippage. In comparison, the two organic slip additives and low viscosity PDMS used, show an increase in screw return time, indicating slippage caused by the additives, which can affect process cycle time.

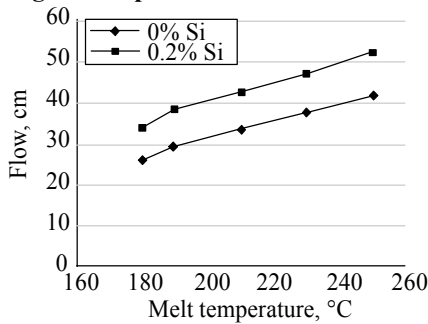
Figure 2: Injection molding screw slippage.



Note: Screw return time at 5% additive for PDMS, erucamide and N, N' Ethylene bisstearamide was >50 seconds.

In a standard injection molding spiral mold flow test, a 0.2% UHMW siloxane additive increases flow length by approximately 30% at a given temperature. Additionally, the siloxane additive will yield the same flow at approximately 50°C (122°F) lower melt temperature than without the additive. See Figure 3.

Figure 3: Spiral mold flow.



A study of homopolymer polypropylene with up to 5% UHMW siloxane shows good printability compared to a common organic (erucamide) slip additive. See Figure 4.

The scanning electron micrograph in Figure 4 shows the siloxane dispersion in a polypropylene matrix.

In a test measuring the energy to break of a double gated tensile bar containing 0.0% and 0.2% UHMW siloxane, the siloxane additive increased the weld-line strength by 27%. See Figure 5.

LIMITATIONS

This product is neither tested nor represented as suitable for medical or pharmaceutical uses.

FOOD CONTACT

DOW CORNING MB50-001 Masterbatch is suitable for use as an optional adjuvant substance in the production of basic olefin polymers or finished food-contact articles under U.S. Food and Drug Administration Regulation 21 CFR 177.1520 covering olefin polymers. It may comply with BGVV or other global regulatory agency or Kosher requirements as well. Contact your local Dow Corning representative for current compliance information.

HOW TO USE

DOW CORNING MB Series Masterbatches may be processed in the same way as the thermoplastics on which they are based. Sufficient DOW CORNING MB50-001 Masterbatch should be blended with virgin polymer pellets to give the desired siloxane level in the final

product. DOW CORNING MB50-001 Masterbatch pellets can be added during compounding in a single screw extruder or added at the feed hopper during injection molding or extrusion.

HANDLING PRECAUTIONS

PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED. BEFORE HANDLING, READ PRODUCT AND SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE SAFETY DATA SHEET IS AVAILABLE FROM YOUR LOCAL DOW CORNING SALES REPRESENTATIVE.

USABLE LIFE AND STORAGE

When stored at or below 35°C (95°F) in the original unopened containers DOW CORNING MB50-001 Masterbatch has a usable life of 48 months from the date of production.

PACKAGING

This product is available in a variety of container sizes. Contact your local Dow Corning sales representative for information about container sizes available in your area.

HEALTH, ENVIRONMENTAL AND REGULATORY INFORMATION

To support Customers in their product safety needs, Dow Corning has an extensive Product Stewardship organization and a team of Health, Environment and Regulatory Affairs specialists available in each area.

For further information, please consult your local Dow Corning representative.

LIMITED WARRANTY - PLEASE READ CAREFULLY

The information contained herein is offered in good faith based on Dow Corning's research and is believed to be accurate. However,

because conditions and methods of use of our products are beyond our control, this information shall not be used in substitution for customer's tests to ensure that Dow Corning's products are fully satisfactory for your specific applications. Dow Corning's sole warranty is that the product will meet its current sales specifications. Your exclusive remedy for breach of such warranty is limited to refund of purchase price or replacement of any product shown to be other than as warranted. DOW CORNING SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. UNLESS DOW CORNING PROVIDES YOU WITH A SPECIFIC, DULY SIGNED ENDORSEMENT OF FITNESS FOR USE, DOW CORNING DISCLAIMS LIABILITY FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES. SUGGESTIONS OF USE SHALL NOT BE TAKEN AS INDUCEMENTS TO INFRINGE ANY PATENT.

Figure 4a: Printability study-3M tape 720/as molded.

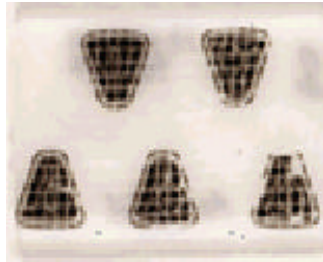
100% Amoco 3243 PP



0.2% UHMW Si



1% UHMW Si



3% UHMW Si



5% UHMW Si



0.2% Erucamide



1% Erucamide



3% Erucamide



5% Erucamide



Figure 4b: Printability study-3M tape 250 as molded.

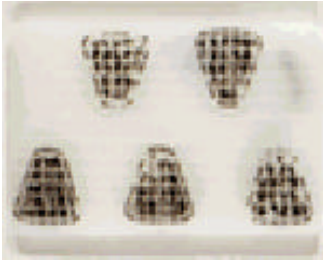
100% Amoco 3243 PP



0.2% Erucamide



0.2% UHMW Si



1% Erucamide



1% UHMW Si



3% Erucamide



3% UHMW Si



5% Erucamide



5% UHMW Si



Table 1: Physical properties of polypropylene modified with an ultra-high molecular weight Polydimethylsiloxane additive.

Property	Siloxane content %		
	0	1.0	5.0
Tensile strength, MPa	39	37	33
Elongation, %	36	70	220
Modulus, MPa	1751	1884	1646
Izod, notch, J/m	15	21	29
Melt flow, g/10 min	13.3	13.6	13.7
Vicat softening, C	157	155	153
Taber abrasion, mg loss	16.2	14.4	12.0
Coefficient of friction,			
Static	0.25	0.24	0.15
Kinetic	0.17	0.14	0.10

Table 2: Effect of siloxane on paintability.

ID	Formulation	Adhesion rating	
		Method A	Method B
1-1	100% Polypropylene (PP)	2A	3B
1-1	100% Polypropylene (PP)	2A	3B
5-10	99.5% PP/0.5% UHMW Siloxane	2A	3B
5-9	99.5% PP/0.5% UHMW Siloxane	3A	4B
6-12	97% PP/3% UHMW Siloxane	4A	4B
6-11	97% PP/3% UHMW Siloxane	4A	4B
7-13	95% PP/5% UHMW Siloxane	4A	4B
7-14	95% PP/5% UHMW Siloxane	4A	5B

Testing was performed by an outside test facility: ACT Laboratories, Inc.; top coat was Red Spot AE267 Blue (interior primerless PP lacquer) after powerwash. Relevant specifications: Ford - WSB-M15J7-A, GM - GM4350N Class C/0, Chrysler - MS PP9-6. Testing performed per ASTM D 3359.

Results will vary depending on materials, processing, post-processing, and testing conditions.

Figure 5: Scanning electron micrograph

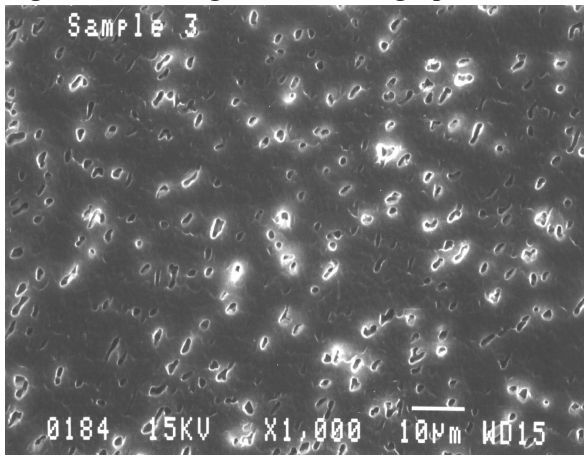
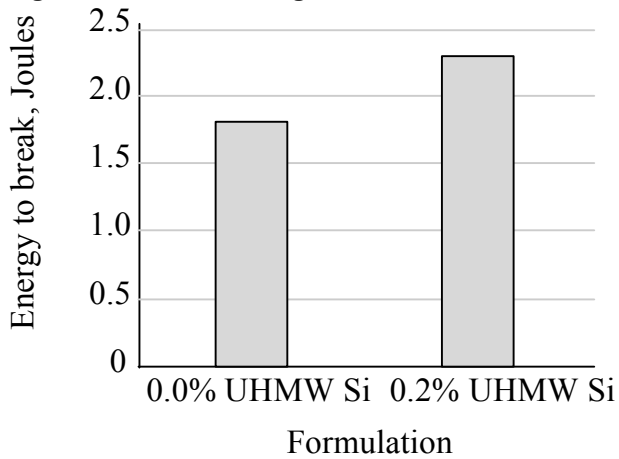


Figure 6: Weld line strength of TPO



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