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PLASTICS & COMPOSITES



DISPERSANTS FOR  
PLASTICS



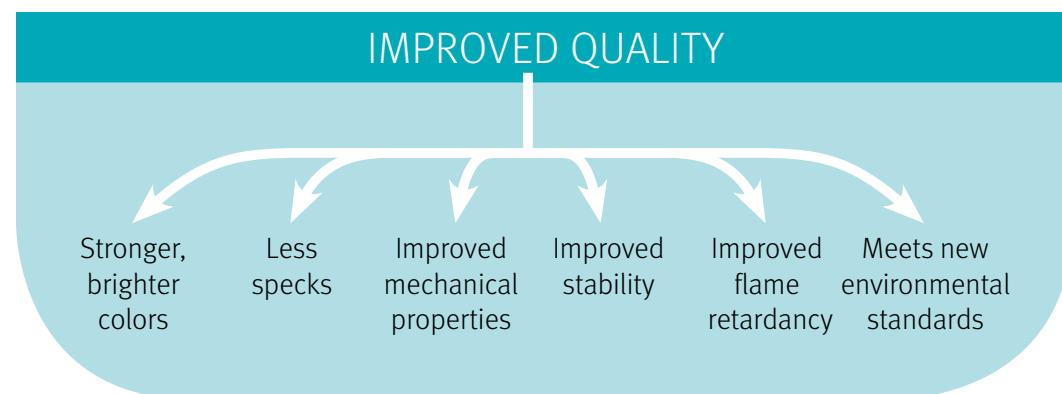
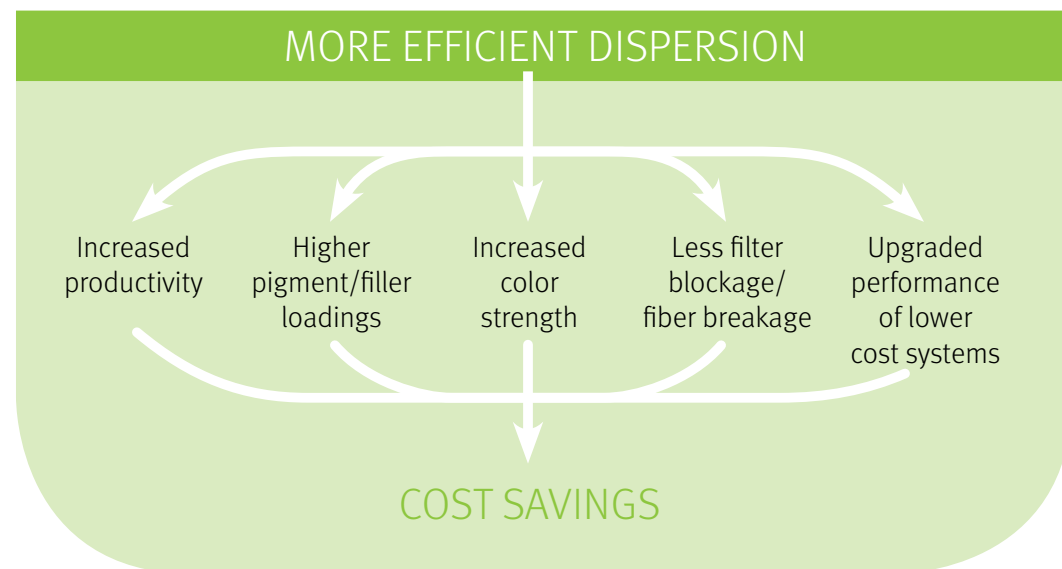
PRODUCT  
GUIDE

# HYPERDISPERSANTS AND COUPLING AGENTS FOR THERMOPLASTICS AND THERMOSETS

Solplus™ and Solsperse™ hyperdispersants and coupling agents have been developed to meet the needs of the plastic industry, for both thermoplastic and thermoset polymers, as well as polyurethanes.

## THERMOPLASTIC MASTERBATCH AND COMPOUNDING

Solplus™ DP310, Solplus™ DP320 and Solplus™ DP330 hyperdispersants are recommended for the dispersion of pigments and fillers in thermoplastic masterbatch and compound applications. They can be used in a wide variety of thermoplastic polymers including polyethylene, polystyrene, ABS, polypropylene and PVC.



## PLASTICIZER AND POLYOL DISPERSIONS

The recommended Solplus™ hyperdispersant for the production of plasticizer and polyol dispersions is dependent upon the pigment:

Solplus™ K500	Inorganic pigments and fillers
Solplus™ DP700	Inorganic pigment fillers and carbon black
Solplus™ K200	Organic pigment (phthalate free dispersions)
Solplus™ K210	Organic pigments (phthalate based dispersions)
Solplus™ R700	Organic pigments (polyether polyols)
Solplus™ R710	Organic pigments (polyether polyols)

## BENEFITS

In both phthalate and non-phthalate plasticizer systems and in polyether and polyester polyols for conversion to polyurethanes, Solplus hyperdispersants improve dispersion of:

- Organic and inorganic pigments
- Fillers
- Flame retardants
- Stabilizers
- Blowing agents

As a result, manufacturers achieve:

- Higher solids loadings/increased pigment concentration
- Reduced viscosities (more Newtonian rheology)
- Improved color strength development
- Better dispersion of color in finished polymer
- Cost reductions (increased productivity and fewer passes on the mill)



## COUPLING AGENTS IN THERMOPLASTIC COMPOUNDING AND CABLE APPLICATIONS

Solplus™ C800 hyperdispersant is the recommended agent for coupling with a variety of fillers in thermoplastic compounding and cable production. These novel coupling agents for filled polymers offer:

- Improved mechanical properties (tensile strength, elongation to break, etc.)
- More cost-effectiveness than maleinized polymers and silanes
- Effectiveness on wide range of fillers and flame retardants and for many polymer types—suitable for peroxide catalyzed processing
- Surface treatment of fillers (including calcium carbonate)—no evolution of alcohols or toxic byproducts during processing

## THERMOSET/COMPOSITE APPLICATIONS

Engineered specifically for composite fillers and resins—and based on proprietary polymer chemistry—Solplus™ additives offer major process advantages to the thermoset industry, including the combination of dispersing/wetting and anti-settling benefits in a single additive.

From being 100% active and solvent free, Solplus™ hyperdispersants also help to reduce environmental impact from the styrene content levels that characterize most unsaturated polyester based systems.

Solplus™ dispersants have been developed to improve dispersion of fillers, flame retardants and reinforcements (fibers) in thermoset systems, as well as for organic and inorganic pigments in gel coats.

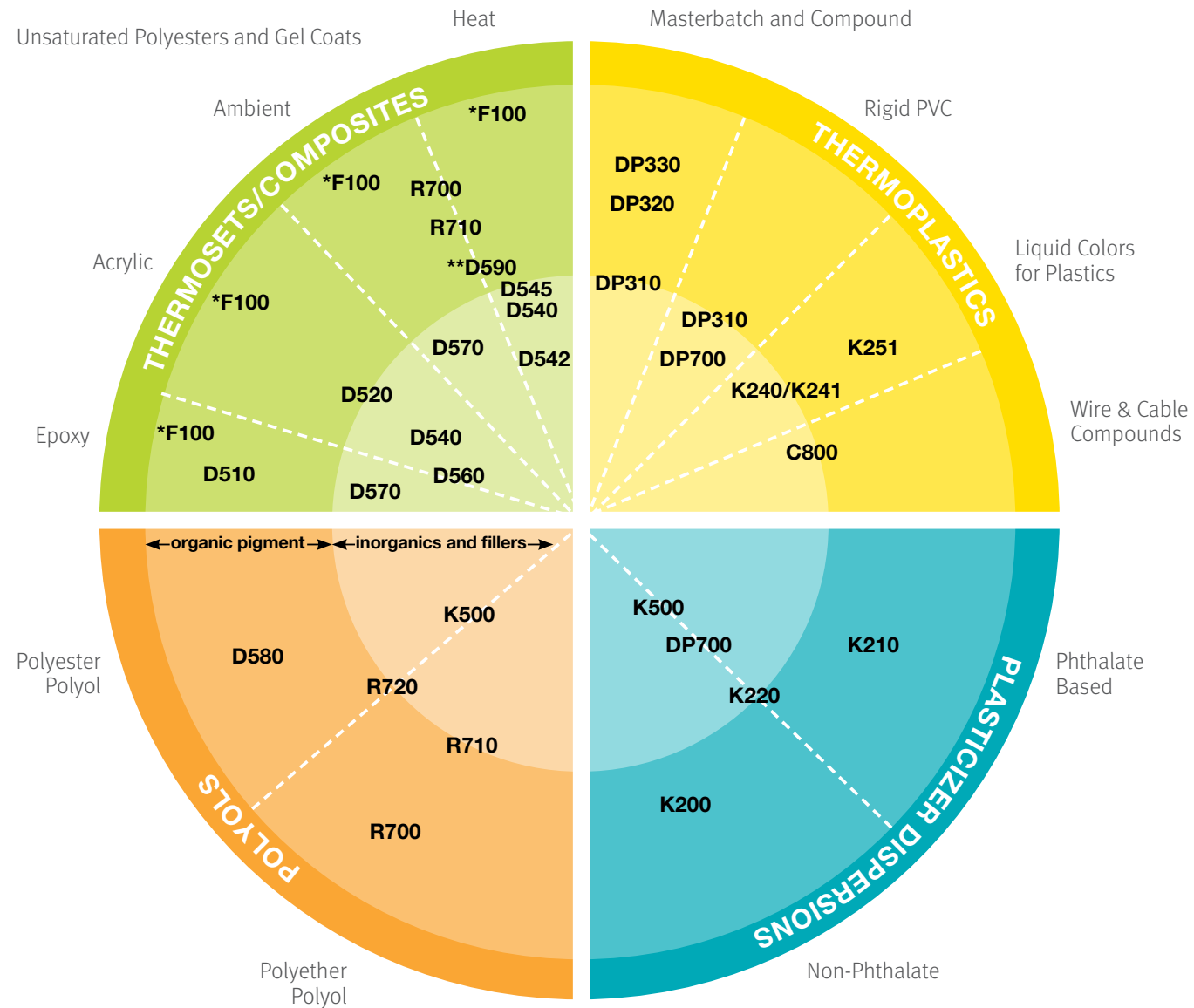
## BENEFITS

- Higher filler/flame retardant loadings
- Decreased viscosities
- Anti-settling
- Improved stability
- Improved color to white compatibility
- Improved processing

# HYPERDISPERSANTS AND COUPLING AGENTS FOR THERMOPLASTICS AND THERMOSETS

## INFLUENCE OF MEDIA COMPATIBILITY ON PRODUCT SELECTION

For a Solperse™ or Solplus™ hyperdispersant to be effective in specific applications, it must be compatible with the media in which the solid is being dispersed AND have an affinity with the surface of the material itself. These are the main criteria used in product selection. The main grades offered for a range of plastics applications are mapped out below:



\*Solplus™ F100 is an air-release agent that is designed for rapid air-release and effective wetting in thermoset systems.  
 \*\*Solplus™ D590 is a polymeric stabilizer for resin systems containing low shrinkage additives.

With certain organic pigment dispersions it may be advantageous to include the use of a Solperse™ synergist in combination with the polymeric Solplus™ or Solperse™ hyperdispersant.

# FORMULATING GUIDELINES DOSAGE – PLASTIC APPLICATIONS

## MASTERBATCH/COMPOUND

To determine the optimum dosage for masterbatch or compound applications, a “ladder series” should be carried out.

### PLASTICIZERS AND GEL COATS

For many plasticizer and polyester gel coat applications, it has been established that the theoretical dosage level of the appropriate Solplus™ or Solperse™ hyperdispersant in a pigment dispersion equates to 2 mg of Solplus™ or Solperse™ polymeric hyperdispersant/square meter of pigment surface area.

This can be expressed as % Agent On the Weight of Pigment (% AOWP).

$$\% \text{ AOWP} = \frac{\text{pigment surface area (m}^2\text{/g)}}{5}$$

## THERMOSET COMPOSITES

For thermoset composite applications, testing has confirmed a loading of between 0.5% and 2% of the appropriate Solplus™ hyperdispersant on the weight of filler is effective.

Minor adjustments may, however, be required depending on the specific grade of filler used.



## FILLER COUPLING IN THERMOPLASTIC COMPOUNDS

The recommended dosage level of Solplus™ C800 to use is calculated as follows:

$$1.2 \times \text{surface area of filler (m}^2\text{/g)} = \text{weight in grams (g) of Solplus C800 required per kg of filler}$$

Please refer to Lubrizol technical contacts for more details.

## METHOD OF USE/ORDER OF ADDITION – PLASTIC APPLICATIONS

### MASTERBATCH/COMPOUND

1. Charge polymer to pre-blending equipment.
2. Add Solplus™ or Solperse™ agent and blend thoroughly with the polymer to coat the surface of the polymer.
3. Add pigments, fillers, processing aids and other essential ingredients and continue pre-blending.
4. Process the resultant blend in normal manner (extrusion, internal mixer, 2-roll mill, etc.).

It is essential to follow this order of addition carefully since it allows for maximum distribution of the Solplus™ or Solperse™ additive and produces intimate contact between the hyperdispersant and the polymer. This intimate contact gives the best results.

### PLASTICIZERS, GEL COATS AND THERMOSET COMPOSITES

1. Dissolve the appropriate Solperse™ or Solplus™ hyperdispersant in the millbase plasticizer or resin.
2. If required, add a synergist and distribute evenly with stirring (note: the synergist is virtually insoluble).
3. Add the pigment or filler in stages and disperse in normal manner.

# HYPERDISPERSANTS AND COUPLING AGENTS FOR THERMOPLASTICS AND THERMOSETS – PRODUCT LIST

PRODUCT NAME	PHYSICAL DESCRIPTION	PACKAGE SIZE (kg)	% ACTIVE CONTENT	SOLVENT/ CARRIER	SUITABLE APPLICATION(S)
Solplus™ C800	Colorless liquid	P25/P200	100	–	Filler coupling in thermoplastic compounds
Solplus™ D510	Yellow viscous liquid	D20/D180	100	–	Thermoset composites, pigmented gel coats
Solplus™ D520	Straw colored viscous liquid	P25/P200	100	–	Thermoset composites
Solplus™ D540	Pale amber to brown viscous liquid	P20/P200	100	–	Thermoset composites
Solplus™ D541	Amber liquid	D25, D180	100	–	Thermoset composites
Solplus™ D542	Pale amber liquid	D20, D180	50	MPA: methoxy propanol	Thermoset composites
Solplus™ D545	Pale amber to brown viscous liquid	P25, P200, I1000	100	–	Thermoset composites
Solplus™ D560	Pale yellow liquid	P20/P180	100	–	Thermoset composites
Solplus™ D570	Colorless to brown viscous liquid	P25, P200	100	–	Thermoset composites
Solplus™ D590	Yellow to brown liquid	D20/D180	100	–	Compatibilizer for thermoset composites
Solplus™ DP310*	Off white powder	B825	100	–	Masterbatch/compounding
Solplus™ DP320*	White powder	Bag 25	100	–	Masterbatch/compounding especially fibers and engineering plastics (not available in Europe)
Solplus™ DP330*	White powder	P30	100	–	Masterbatch/compounding
Solplus™ DP700	Brown liquid	D20, D180, I750	100	–	Plasticizers
Solplus™ DP710	Cream powder	B25	100	–	Rigid PVC
Solplus™ ES1000	White to off white liquid	D20, D160	10	Hydrocarbon carrier	Thermoset composites (styrene suppressant)
Solplus™ F100	Pale yellow liquid	D20, D180	100	–	Thermoset composites
Solplus™ K200*	Pale yellow to brown viscous liquid	D20/D180	50	DOA (Diocyladipate)	Plasticizers and liquid colors for plastics
Solplus™ K210	Pale yellow to brown viscous liquid	D20/D180	50	DINP (Diisononyl-phthalate)	Plasticizers and liquid colors for plastics
Solplus™ K220	Amber to brown viscous liquid	D20/D180/I940	100	–	Plasticizer and liquid colors for TP and PVC
Solplus™ K240*	Pale yellow to brown viscous liquid	D20, D150	100	–	Liquid colors for plastics

PRODUCT NAME	PHYSICAL DESCRIPTION	PACKAGE SIZE (kg)	% ACTIVE CONTENT	SOLVENT/ CARRIER	SUITABLE APPLICATION(S)
Solplus™ K241*	Pale yellow to brown viscous liquid	D20, D150	50	FDA compliant natural oil	Liquid colors for plastics
Solplus™ K251*	Pale yellow to brown viscous liquid	D20, D150	50	FDA compliant natural oil	Liquid colors for plastics
Solplus™ K500	Pale yellow to brown viscous liquid	D20/D180/I900	100	–	Plasticizers
Solplus™ R700	Yellow viscous liquid	D20/D180	100	–	Polyether or polyester polyols
Solplus™ R710	Pale to dark amber liquid	D20, D180	100	–	Polyether or polyester polyols
Solplus™ R720	Amber liquid	D25/D190/I1000	100	–	Polyether or polyester polyol
Solplus™ R730	Pale yellow to amber viscous liquid	D25/D180/I1000	100	–	Polyether or polyester polyol
Solplus™ TX5	Pale yellow liquid	D25, D200	40	MPA	Thermoset composites (silica replacement)
Solsperse™ 3000*	Waxy paste/ viscous liquid	D20/D170	100	–	Plasticizers
Solsperse™ 5000S	Blue powder	B15	100	–	Synergist
Solsperse™ 11000*	Amber liquid	D20/D180	50	Mineral oil	Plasticizers and liquid colors for plastics
Solsperse™ 12000S	Blue powder	B25	100	–	Synergist
Solsperse™ 13650	Amber liquid	D20/D150	50	Diundecyl-phthalate	Plasticizers
Solsperse™ 21000*	Waxy paste/ viscous liquid	D20/D170	100	–	MBX/compound
Solsperse™ 22000	Yellow powder	B20	100	–	Synergist

KEY: Packaging: B = box, D = drum, I = IBC, P = plastic drum

\*Approved for food contact. Some limitations apply. Please consult your regional Lubrizol sales office.



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