

DURASTRENGTH® 200

PLASTIC
ADDITIVES

ACRYLIC IMPACT MODIFIER

in Siding Substrate and Topcoat Improves Compound Stability and Color Hold

Introduction

Durastrength 200 modified acrylic impact modifier has historically withstood the harsh processing conditions of vinyl siding and profile extrusion lines and come out on top in both impact resistance and processing consistency. This excellent showing in vinyl building products is due to the unsurpassed processing latitude given the fabricator who uses Durastrength 200.

In the following study, levels of Durastrength 200 were compared to three competitive impact modifiers in a typical siding substrate formulation to compare their effect on dynamic stability and color hold. The following formulation was used:

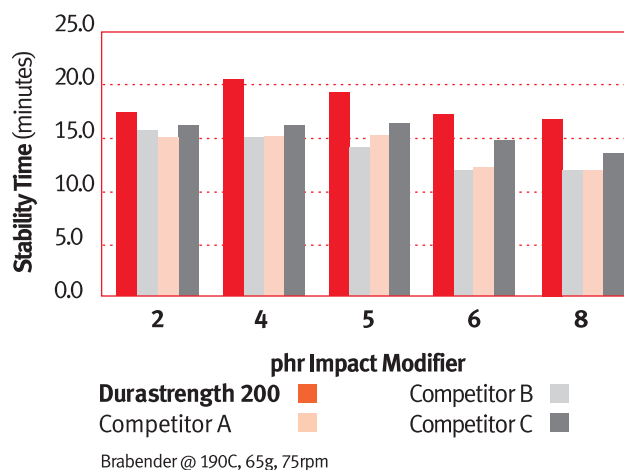
Ingredients	phr
PVC Resin (K-65)	100.00
Thermolite® 380	0.40
Paraffin Wax (165°F mp)	1.10
Calcium Stearate	1.50
Calcium Carbonate (0.8µm)	7.00
Titanium Dioxide	2.00
Plastistrength® 551	0.75
Impact Modifier	Variable

Formulations were blended in a Henschel high shear mixer and then tested on a Brabender torque rheometer for compound dynamic stability and color hold. Test conditions were 190°C, 75 rpm, using a 65 gram charge of compound. Two separate Brabender runs were made.

The first Brabender run was used to determine the dynamic stability time of the compounds. The results showed significant differences in dynamic stability between Durastrength 200 and the competitors. In all cases, the formulation containing Durastrength 200 showed significantly better dynamic stability than the formulations containing competitive impact modifiers.

Dynamic stability of the compound at all impact modifier levels was enhanced through the use of Durastrength 200. As stabilizer levels decrease and extrusion rates increase, the effect of Durastrength 200 as a “costabilizing” impact modifier will become more important to the fabricator of vinyl siding and window lineals in the processing of virgin and regrind compound.

Stability of Impact Modifiers Durastrength 200 vs. the Competition



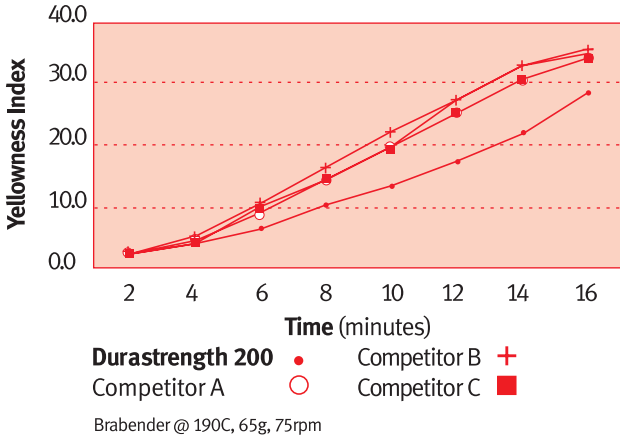
Not only is the dynamic stability of compounds containing Durastrength 200 superior, but the color hold of these compounds is also exceptional.

During the second Brabender run, color chips were pulled from the Brabender bowl at 2 minute intervals. Chips were tested for color development using a MacBeth colorimeter to read yellowness index.

The results show a significant difference between the color hold of the Durastrength 200-containing compound and the color hold of compounds containing competitive impact modifiers. In all cases, the Durastrength 200 compound showed superior color hold over the competitive compounds.

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4.0 phr: Color Hold of Impact Modifiers Durastrength 200 vs the Competition



To the processor, this improvement in dynamic stability and color hold translates into a wider processing window and the ability to utilize regrind more easily and efficiently.

Alternatively, the stability enhancing properties of Durastrength 200 also allow the producer the option of more effectively utilizing other raw materials such as heat stabilizers and pigments.

A second study evaluated the potential for a reduction in stabilizer usage in a compound containing Durastrength 200 versus compounds containing competitive acrylics.

Formulations were again high shear mixed in a Henschel mixer and then tested on a Brabender torque rheometer for compound dynamic stability. A typical siding topcoat/profile formulation was tested.

The following data were recorded:

Ingredient	A	B	C	D
PVC Resin (K-65)	100.00	100.00	100.00	100.00
Thermolite 340	1.20	1.20	1.20	0.80
Paraffin Wax (165°F mp)	1.00	1.00	1.00	1.00
Calcium Stearate	1.30	1.30	1.30	1.30
Plastistrength 501	0.75	0.75	0.75	0.75
Plastistrength 710	0.50	0.50	0.50	0.50
Durastrength 200	4.50	–	–	4.50
Competitor A	–	4.50	–	–
Competitor C	–	–	4.50	–

Brabender Data (190°C, 75 rpm, 65g)

Fusion Time (minutes)	0.6	0.5	0.5	0.6
Fusion Torque (mg)	3360	3490	3450	3330
Stability Time (minutes)	19.8	16.0	16.2	16.2
Crosslink Time (minutes)	20.5	16.5	16.7	16.8

Examination of the data shows that both compounds containing competitive acrylic modifiers (B&C) had stability times of about 16 minutes while the compound containing Durastrength 200 (A) had a much longer stability time of nearly 20 minutes.

To match the stability times of the compounds containing competitive acrylic modifier (B&C), a 33% reduction (from 1.2 phr to 0.8 phr) in the stabilizer level was possible when using Durastrength 200 as the impact modifier (D). The stability enhancing characteristic of Durastrength 200 is one of the reasons for its wide acceptance in both siding and profile applications.

Compounders currently utilizing all acrylic modifiers can benefit from a wider processing window when switching to Durastrength 200, resulting in cost savings from less downtime and scrap and higher output rates. Compounders currently using all acrylic modifiers who are satisfied with their processing window may want to switch over to Durastrength 200 and explore cost savings possible through reduced stabilizer levels.

As processing rates of vinyl siding increase, and pressure is exerted to maximize cost/performance, Durastrength 200 will lead the next generation of high output, more efficient impact modifiers for high speed siding and profile extrusion.

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Environmental and Safety Information

BEFORE HANDLING THIS MATERIAL, READ AND UNDERSTAND THE MSDS (MATERIAL SAFETY DATA SHEET) FOR ADDITIONAL INFORMATION ON PERSONAL PROTECTIVE EQUIPMENT AND FOR SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION.

For Environmental, Safety & Toxicology information, contact our Customer Service Department at (800) 446-2800 to request a Material Safety Data Sheet. Arkema believes strongly in Responsible Care as a Public Commitment.

More Technical Information Available

Ask your Arkema Account Manager for further information about other high quality Arkema additives for use in PVC resins, PVC alloys, and other polymer systems. Arkema produces a full line of heat stabilizers, impact modifiers, process aids and epoxidized vegetable oils.

Arkema offers complete technical service and assistance. Our laboratories and personnel are ready to assist you in any phase of your evaluation, from formulation development to end product testing.

Thermolite® Heat Stabilizers

Thermolite heat stabilizers are designed for use in the production of rigid, semi-rigid, foamed, and flexible PVC products. Arkema has developed PVC heat stabilizers specifically for extruded siding, profiles and pipe, injection molding, blow molded bottles, and calendered or extruded sheet. Arkema offers a full line of stabilizers that meet FDA requirements for food grade PVC packaging, and a full line of NSF approved stabilizers for PVC potable water pipe & fittings.

Clearstrength® & Durastrength® Impact Modifiers

Clearstrength and Durastrength impact modifiers are designed to meet a wide variety of processing requirements, from high clarity, crease resistant products for packaging applications to high efficiency modifiers for durable, exterior building products. Arkema's impact modifiers provide PVC processors with lot to lot consistency and cost effective performance.

Vikoflex® Epoxy Plasticizers

The Vikoflex line of epoxy plasticizers offers flexible PVC producers the highest quality, dual-function epoxidized vegetable oils available. Arkema has the ability to produce material with exacting specifications to meet varied customer requirements.

Plastistrength® Process Aids

Plastistrength process aids offer producers of rigid and flexible PVC greater product uniformity by improving compound fusion and flow during extrusion, injection molding and thermoforming. Variances in wall thickness and surging can be greatly minimized or eliminated with Plastistrength process aids.

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Note: The "Material Safety Data Sheet" on this product is available on request from the Safety and Environmental Services Department of Arkema Inc., 2000 Market Street, Philadelphia, PA 19103.



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