

ARKEMA PLASTIC ADDITIVES FOR VINYL FLOORING SOLUTIONS

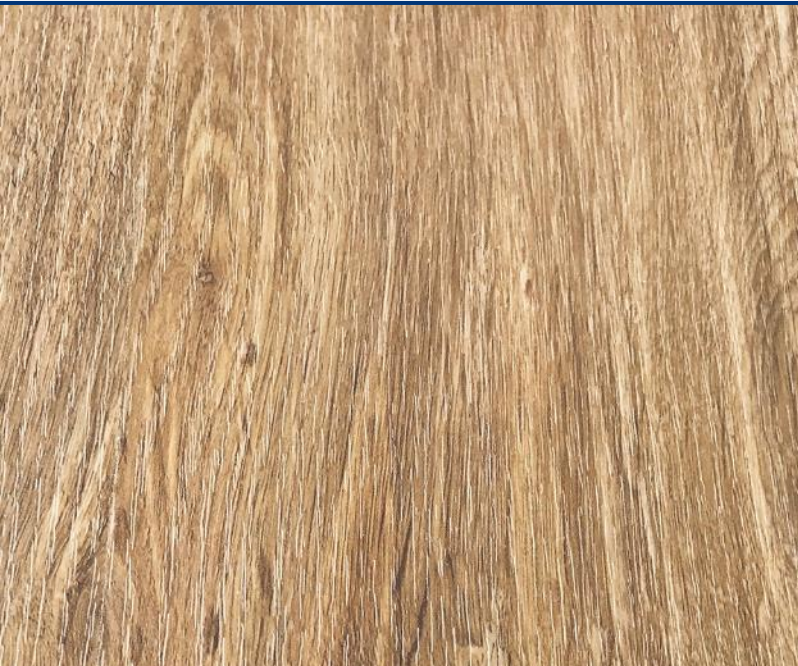
INNOVATION THROUGH IMPACT
MODIFIER AND PROCESS AID
TECHNOLOGY

coatingresins-arkema.com



**GOOD THINGS
HAPPEN WHEN
CHEMISTRY GETS
PERSONAL™**

**PLASTIC
ADDITIVES**



**DIVERSE PVC ADDITIVE
PRODUCT PORTFOLIO
FOR ALL FORMULATIONS**

**IMPROVED MELT STRENGTH
AND RELIABLE RIGID and
SEMI-RIGID PVC
PROCESSING**

**PROVEN WEATHERABILITY
VIA ACRYLIC COPOLYMERS
FOR PVC BUILDING AND
CONSTRUCTION PRODUCTS**



Arkema
**Durastrength® and
Clearstrength®**

impact modifiers and

Plastistrength®

process aids lead to
high performance

**luxury vinyl tile
products**

ARKEMA PLASTIC ADDITIVES SOLUTIONS FOR VINYL FLOORING (LVT, SPC, ETC)

❖ Clear vinyl wear layer:

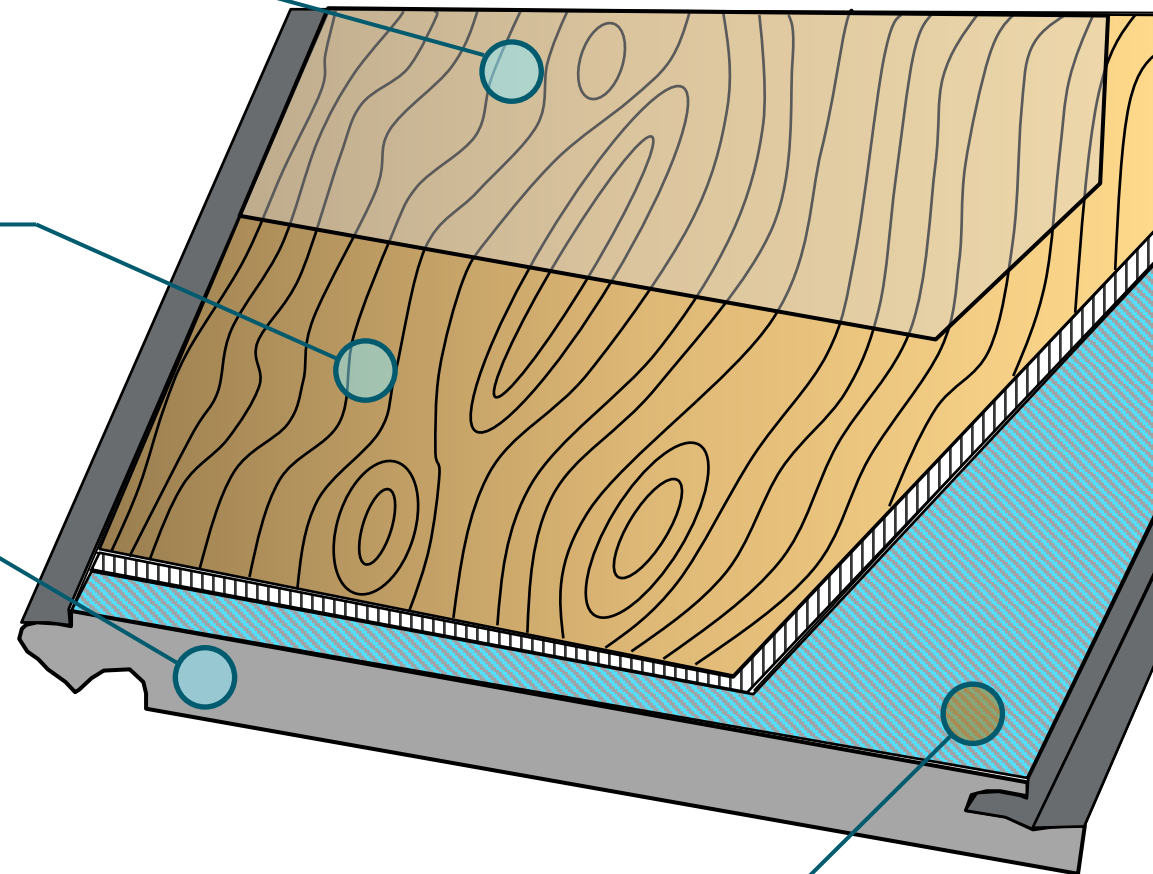
- Clear vinyl layer can be modified with specialty Arkema Clearstrength® impact modifiers and Plastistrength® process aids to maintain weatherability, durability, and transparency

❖ Patterned vinyl aesthetic layer:

- Weatherable vinyl print layer modified with Arkema Durastrength® impact modifiers and Plastistrength® process aids will provide mechanical integrity and UV protection helping aesthetics endure

❖ Reinforced vinyl backlayer:

- Specialty Plastistrength® process aids help to incorporate high filler levels and provide consistent PVC melt processing while Durastrength® impact modifiers can add mechanical integrity to tongue and groove assemblies



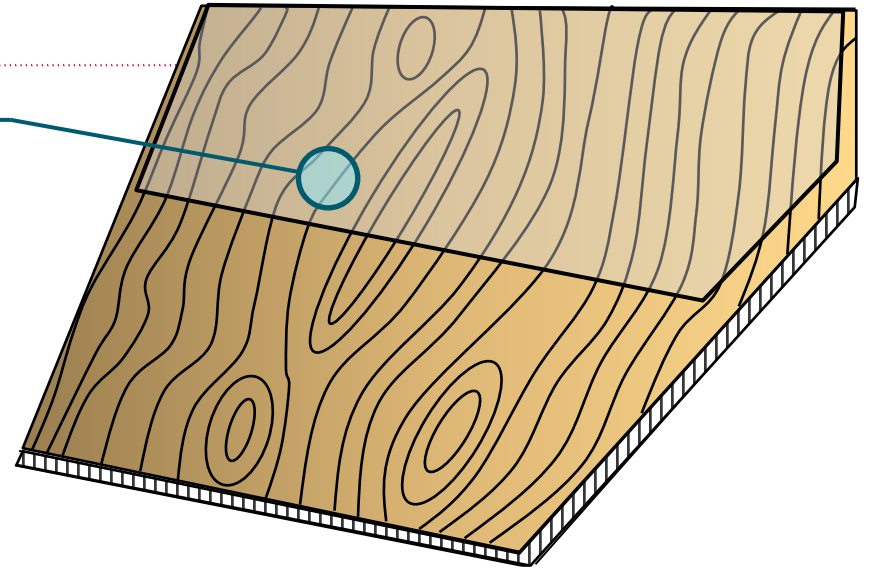
❖ Reinforced mid / inner layer:

- Typically a fiber-reinforced layer providing support in the overall LVT construction (can be calendered vinyl film)

CLEAR VINYL WEAR LAYER

❖ Durability and transparency:

- **Transparency:** Clearstrength® W300 impact modifier offers transparency and durability paired with Plastistrength® process aids
- **Durability:** Clearstrength® impact modifier technology improves drop dart impact resistance and mechanical integrity
- **UV Protective / Weatherable:** Arkema acrylic technology offers weatherability through specialty MBS chemistry in Clearstrength® W300 and Plastistrength® process aids
- **Processability:** Plastistrength® process aids offer balanced melt processing, fusion promotion and metal release as needed for the transparent protective layer

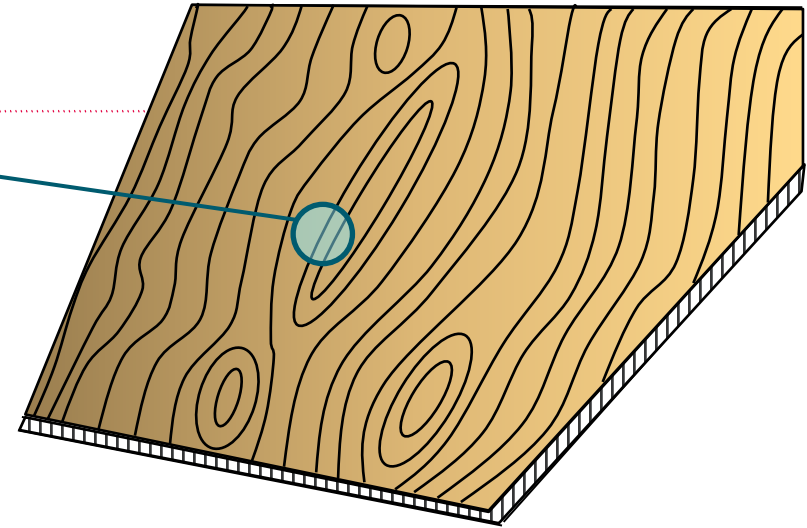


Component	phr
PVC resin (0.81 – 0.91 IV)	100
Ca / Zn stabilizer	2.5
Stearic acid	0.5
Vikoplast® 100 or plasticizer	20 - 30
Clearstrength® W300	10
Plastistrength® 550	1.5
Plastistrength® 770	0.5
UV Stabilizer	0 - 2

PATTERNED VINYL AESTHETIC LAYER

❖ Vinyl aesthetic performance:

- **Weatherable:** Durastrength® acrylic impact modifiers and Plastistrength® process aids offer proven weatherability for B&C product lines
- **Durability:** Durastrength® impact modifier chemistry offers high efficiency technology providing mechanical integrity and a wide PVC melt processing window
- **Processability:** Plastistrength® process aids offer balanced melt processing, fusion promotion and metal release as needed for the transparent protective layer

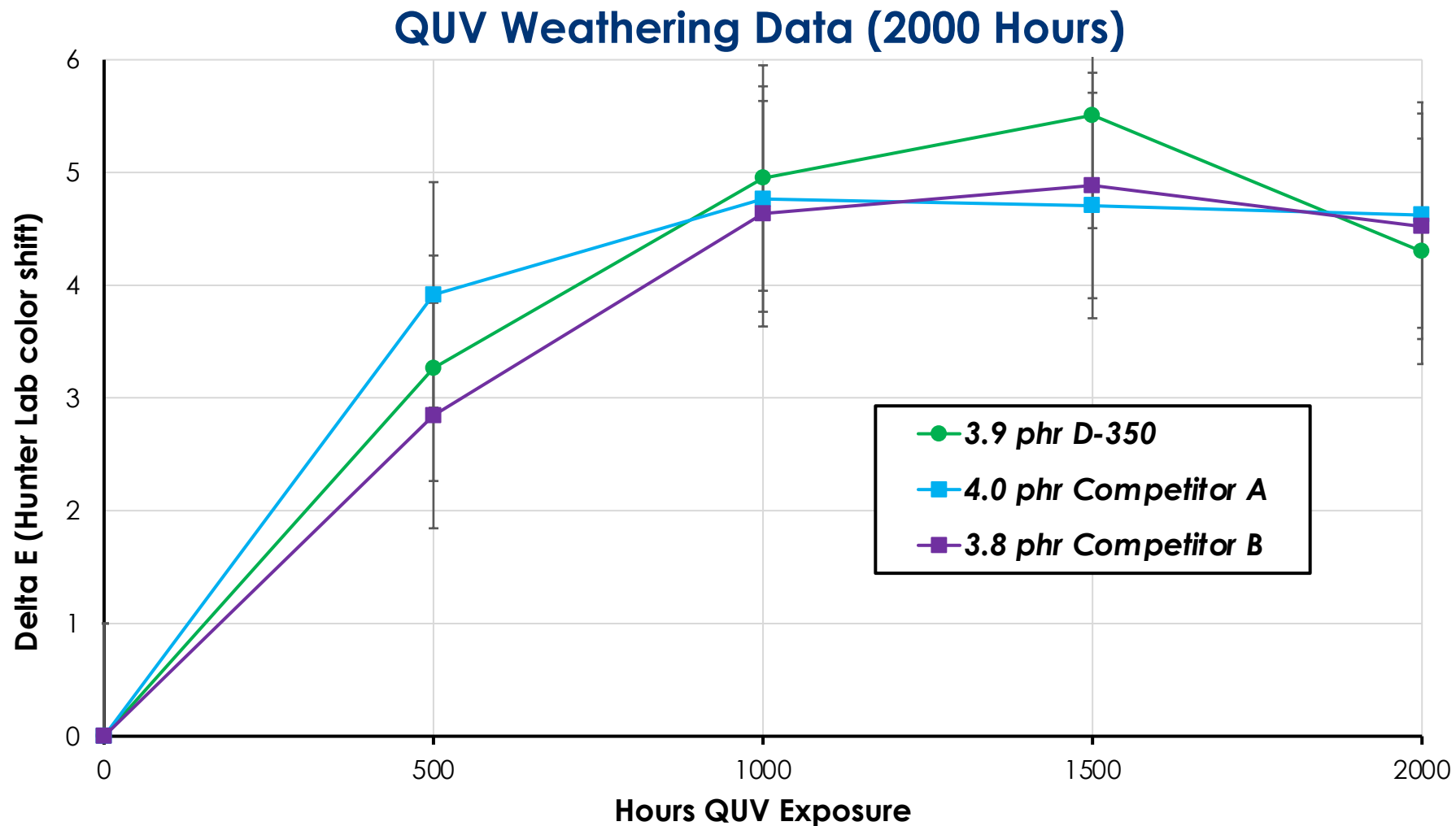


Component	phr
PVC resin (0.81 – 0.91 IV)	100
Ca / Zn stabilizer	2
Lubricants (ester-based)	0.5 – 1.5
Vikoplast® 100 or plasticizer	8 - 10
Vikoflex® 7170 or ESBO	2 - 3
Durastrength® 350	10
Plastistrength® 562NA	1.5
Plastistrength® 770	0.5
Titanium dioxide / pigment	10

DURASTRENGTH® IMPACT MODIFIER WEATHERABILITY

❖ QUV weathering results:

- Durastrength® impact modifier weathering performance trusted in PVC B&C applications
- Durastrength® 350 impact modifier offers highest rubber content
- Arkema impact modifier performance meets industry requirements
- Error bars show a Delta E ± 1 unit (normal error for QUV weathering)

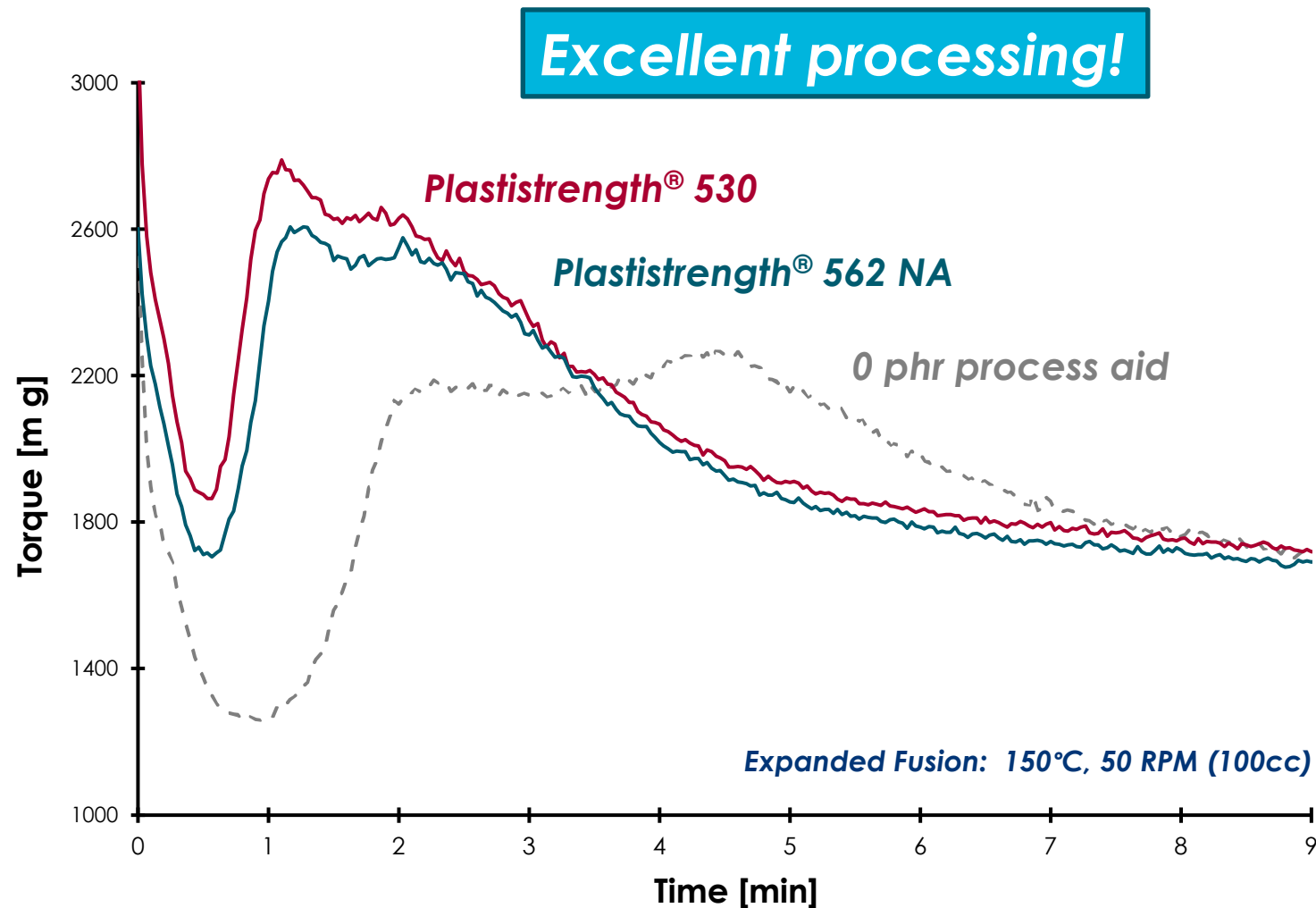


PLASTISTRENGTH® 562 NA PROCESS AID IN FLEXIBLE AND SEMI-RIGID FORMULATIONS

Continuing new technology developments for flexible vinyl:

- **Plastistrength® 562 NA process aid** offers excellent processing for opaque, semi-rigid and flexible PVC formulations
- Cost-effective solution for calendered or extruded PVC film applications
- Allows tailored rheology and use level versus traditional acrylic technology

Component	phr
PVC resin (0.91 IV)	100
Ca / Zn stabilizer	2
Vikoflex® 7170 (ESO)	2
Plasticizer (DOTP)	20
Plastistrength® Process Aid	0 or 1.5

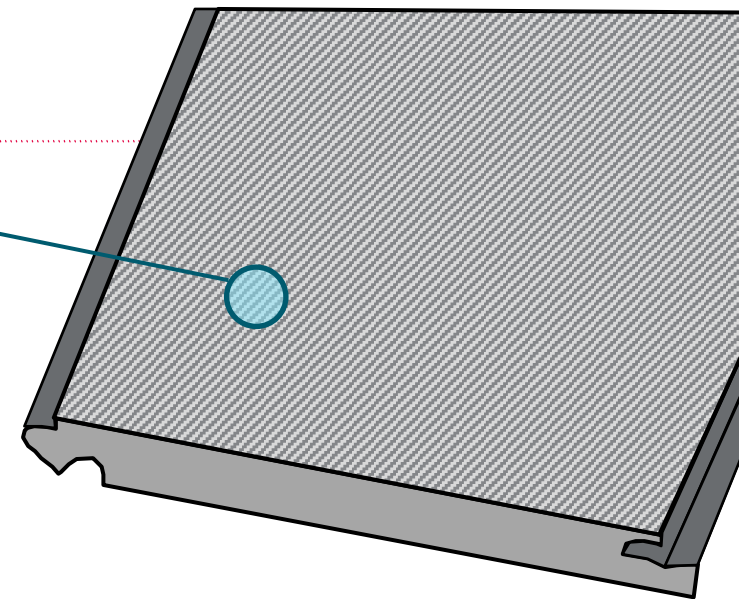


REINFORCED VINYL BACKLAYER

❖ Backlayer performance:

- **Durability:** Durastrength® acrylic impact modifier boosts tongue and groove integrity
- **Processability:** Plastistrength® process aids incorporate high filler content allowing consistent processing and reliable backlayer performance
- **Innovation:** Plastistrength® process aids for foam PVC boost new generations of rigid LVT lowering density and building consistent cellular structure
- **Cost-efficiency:** Patented Arkema Durastrength® impact modifier and Plastistrength® process aid technology links high performance PVC additives to cost-efficiency for LVT formulators

**** Plastistrength® 580 process aid (6 – 10 phr) recommended for foam LVT backlayer formulations**



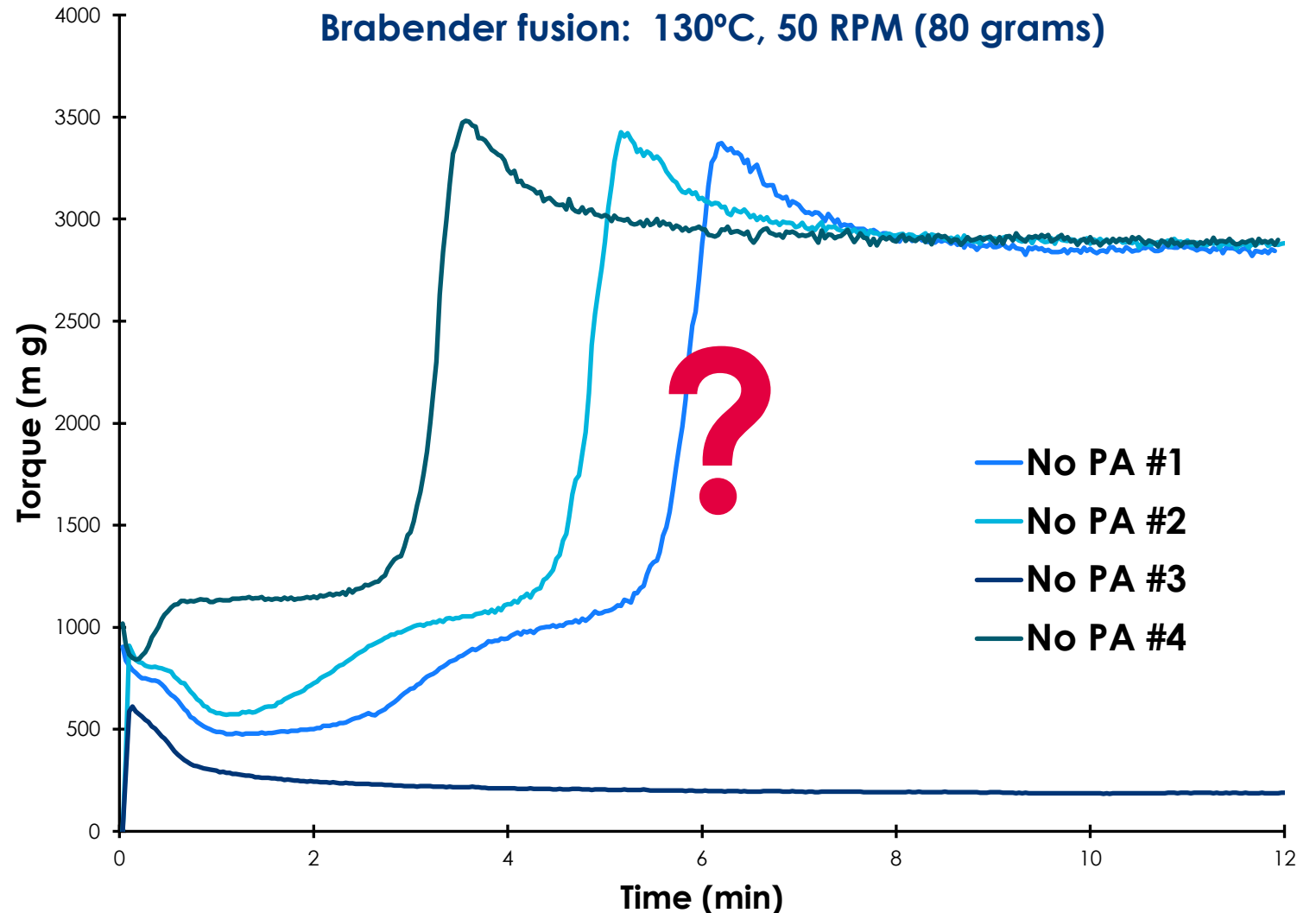
Component	phr
PVC resin (0.81 – 0.91 IV)	100
Ca / Zn stabilizer	2 - 3
Lubricants (varied)	0.5 – 2
Vikoplast® 100 or plasticizer	20 - 30
Vikoflex® 7170 or ESBO	2 - 5
Durastrength® 4000	0 - 10
Plastistrength® 562NA**	2 - 4
Calcium Carbonate (3 – 20 µm)	100 - 300
Titanium dioxide / pigment	2.5

CONSISTENT PROCESSING PARAMOUNT WITH ELEVATED FILLER CONTENT

❖ Challenging production with higher filler incorporation continues:

- At ultra-high filler loading levels, LVT backlayer is ~ 65% CaCO₃
- Filler necessary for product performance with consumers, but difficult to incorporate into a continuous melt

Component	phr
PVC Resin (0.82 IV)	100
Plasticizer (DOTP)	20
Vikoflex® 7170 (ESBO)	10
CaZn stabilizer	2.5
Stearic acid	0.2
Process Aid	0
Calcium carbonate (3 μm)	250
Titanium dioxide	2.5

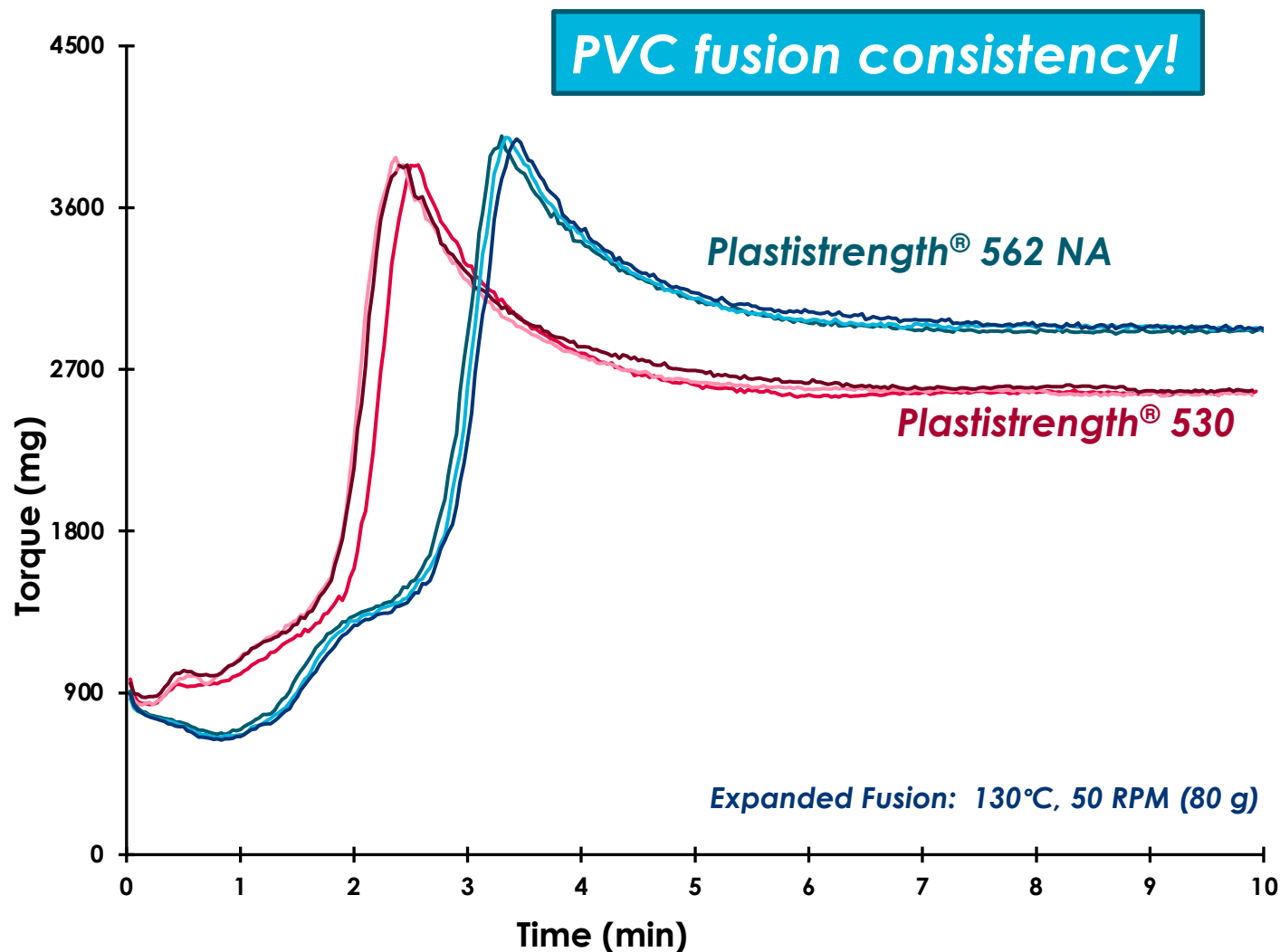


PLASTISTRENGTH® 562 NA PROCESS AID IN HIGHLY FILLED FORMULATIONS

Excels in highly filled PVC formulations:

- **Plastistrength® 562 NA process aid** provides processing consistency and promotes fusion
- Ideal for rigid and semi-rigid LVT backlayer and vinyl substrate formulations

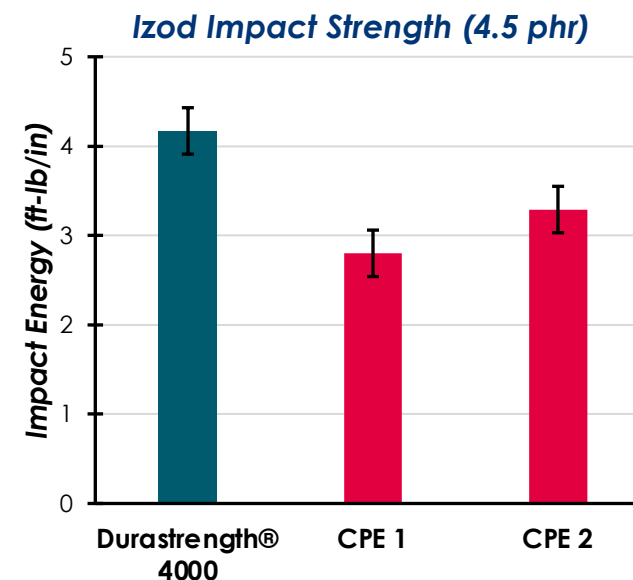
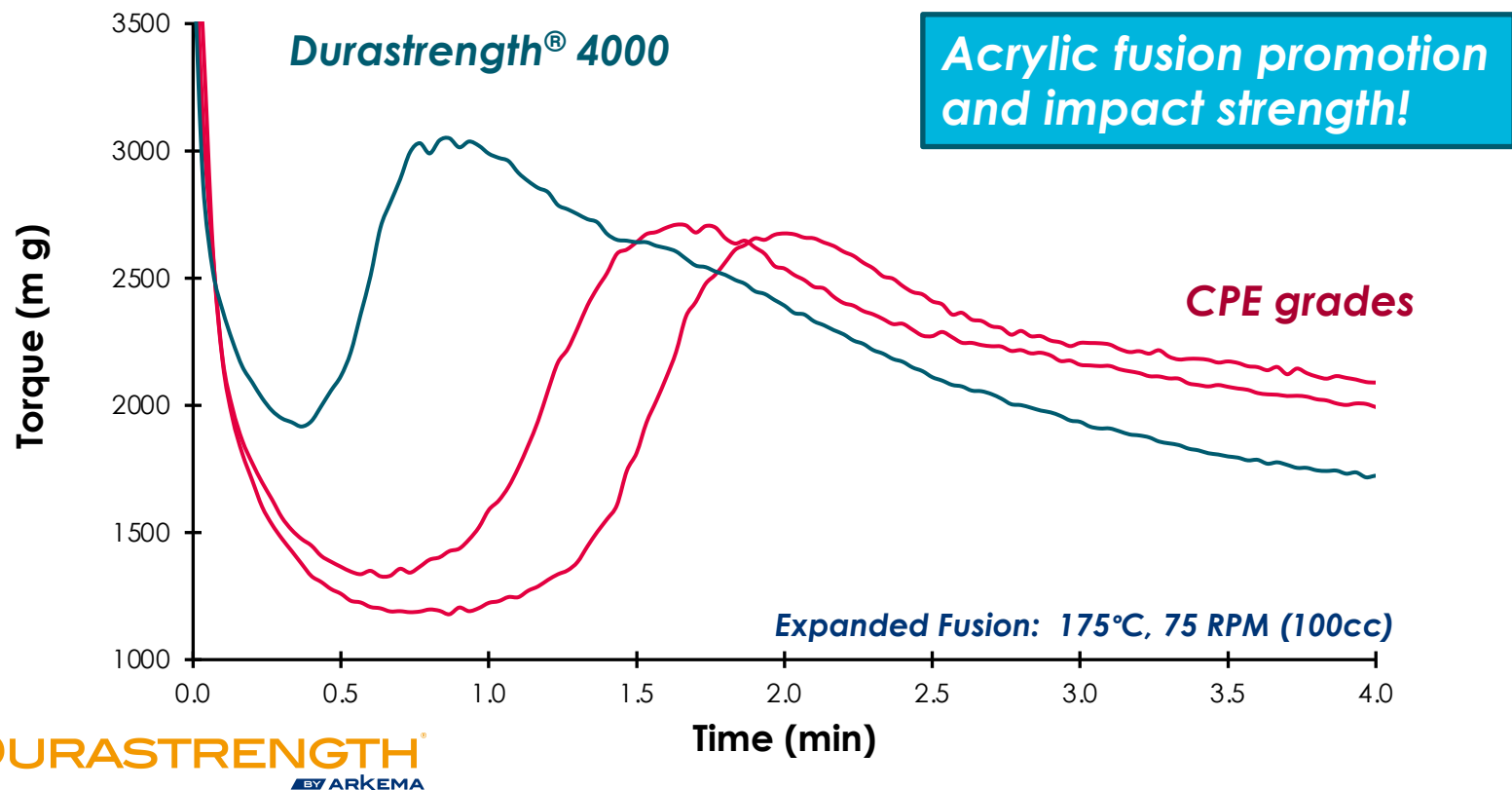
Component	phr
PVC resin (0.82 IV)	100
Ca / Zn stabilizer	2.5
Stearic acid	0.2
Vikoflex® 7170 (ESO)	10
Plasticizer (DOTP)	20
Plastistrength® Process Aid	3
Calcium carbonate (3µm)	250
Titanium dioxide	2.5



DURASTRENGTH® 4000 IMPACT MODIFIER FOR HIGHLY FILLED SUBSTRATE

Excels in highly filled PVC formulations:

- **Durastrength® 4000 impact modifier** provides expected impact performance while delivering benefits of acrylic fusion promotion
- Best suited for rigid LVT backlayer and vinyl substrate formulations
- Added mechanical integrity to tongue and groove assemblies

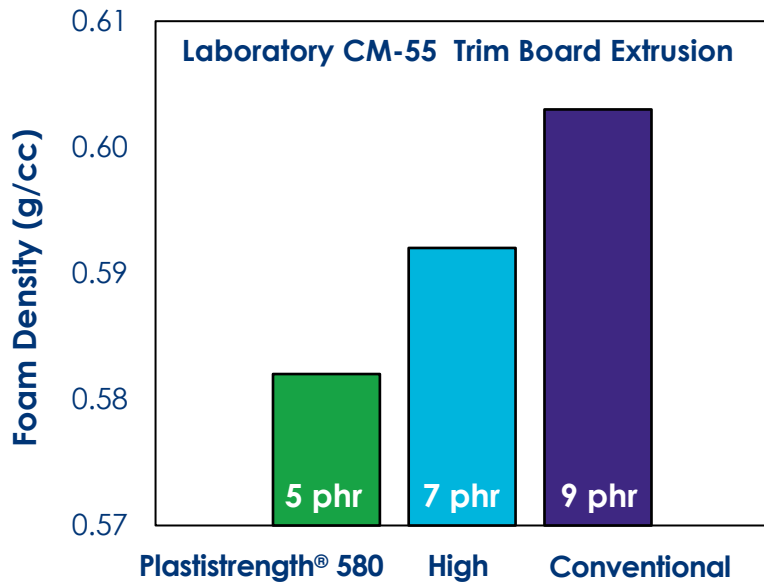


Component	phr
PVC resin (0.91 IV)	100
Reverse ester Sn stabilizer (8% Sn)	2.5
Calcium stearate	0.2
Paraffin wax	10
Oxidized PE	20
Impact modifier	4.5
Calcium carbonate (0.7 µm)	20
Titanium dioxide	0.5

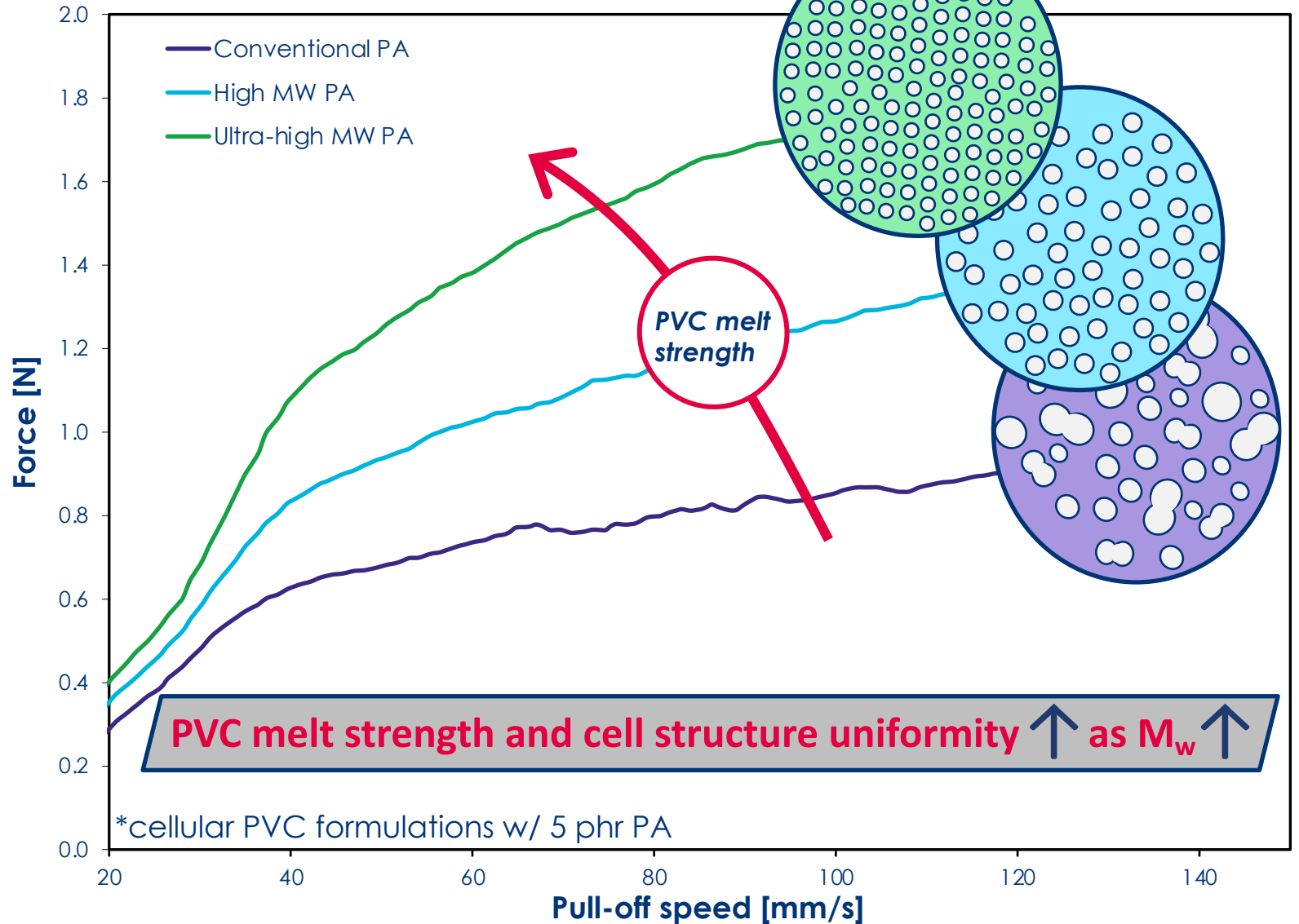
OPTIMIZING CELL STRUCTURE DENSITY REDUCTION

Plastistrength® 580 process aid offers ultra-high weight technology for efficient foaming performance:

- Generally, increasing molecular weight is desirable for improved efficiency and final performance
- Balancing loading level vs. melt strength allows for dialed-in cellular structure and density in final PVC foam article



PLASTISTRENGTH
by ARKEMA



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✦ Please visit our website for more information about Arkema and our newest technology:

- ARKEMA Plastic Additives: <https://www.arkema.com/en/products/product-families/plastic-additives/>
- ARKEMA technology: [Arkema.com](https://www.arkema.com)

Boost your *performance* with

DURASTRENGTH[®] *impact modifiers*
BY ARKEMA

and

PLASTISTRENGTH[®] *process aids!*
BY ARKEMA

Thank you for your attention!



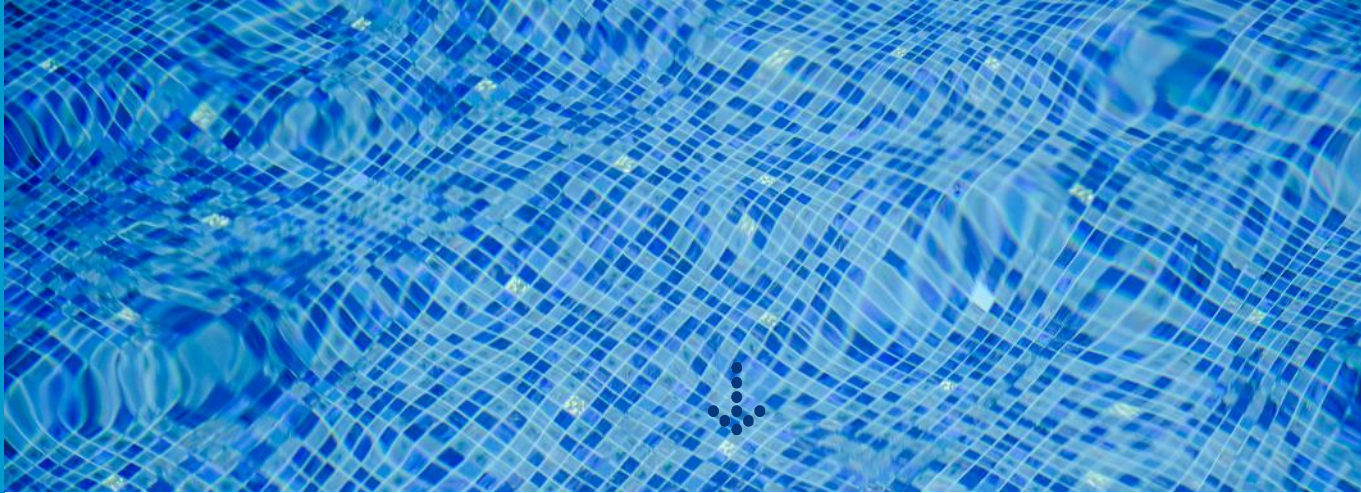
PLASTIC ADDITIVES PORTFOLIO FOR B&C NEEDS

ACRYLIC PROCESS AID AND IMPACT MODIFIER SOLUTIONS

**COATING
RESINS**
ARKEMA GROUP

ARKEMA
INNOVATIVE CHEMISTRY

Printable Vinyl Sheet



Vinyl Roofing



Opaque **semi-rigid and flexible PVC** formulating made easier through **enhanced melt strength** and **improved fusion promotion** with new **ARKEMA** technology



Calendered Vinyl Film Applications





PVC Window Profile



Reliable **ARKEMA Plastic Additives** technology offers **tunable performance** and **cost-efficiency** for **Rigid PVC formulations** in profile and substrate applications



Vinyl Siding Capstock and Substrate



Fence Capstock and Substrate

ARKEMA PLASTIC ADDITIVES

DURASTRENGTH® Acrylic Impact Modifiers

DURASTRENGTH®
BY ARKEMA

PRODUCT	TYPICAL APPLICATION	PRODUCT	TYPICAL APPLICATION
200	Industry standard general purpose / PVC	510	Multifunctional, faster fusion, high gloss / PVC
350	Highest efficiency / PVC	535	Multifunctional, high efficiency, metal release / PVC
4000	Multifunctional acrylic composite / PVC	527	Multifunctional, highest efficiency, weatherability / PVC
440	Superior colorability and cold temperature impact in PC based resins	731	Multifunctional, low gloss, weatherability / PVC
506	Multifunctional for injection molding / PVC		

PLASTISTRENGTH® Processing Aids

PLASTISTRENGTH®
BY ARKEMA

PRODUCT	TYPICAL APPLICATION	PRODUCT	TYPICAL APPLICATION
530	General purpose foam application, high melt strength / PVC	552	Improved melt strength and processing / PC all resin types
550	General extrusion, semi-rigid and rigid processing / PVC	576	Faster fusion, increased filler potential / PVC
551	General extrusion and calendaring / PVC	770	Metal release for profile extrusion, calendaring, and foam sheet / all resin types
566	Foam core pipe, fence, deck and rail / PVC	L1000	All-acrylic lubricant and metal release / all resin types
580	Thick foam sheet and low density applications / PVC	562	Fusion promotion / cost-efficiency for semi-rigid and highly filled PVC
379	Multifunctional process aid for foam applications / PVC		

ARKEMA PLASTIC ADDITIVES

CLEARSTRENGTH® MBS Impact Modifiers

CLEARSTRENGTH
BY ARKEMA

PRODUCT	TYPICAL APPLICATION	PRODUCT	TYPICAL APPLICATION
140	Highest transparency, low crease-whitening / PVC	859	Ultra high impact for opaque pipes and fittings, technical films / PVC
223	Very high impact for opaque pipes and fittings, technical films /PVC	E-920	General purpose / PC and PC ABS
303H	High impact, high transparency / PVC	E-950	High impact, low temperature applications / PC and PC polyester blends
320	General purpose transparent films, sheets and bottles easy fusion / PVC	W-300	Specialty acrylic, transparent and UV resistant profiles / PVC
350	High impact and low temperature use, good transparency for bottles / PVC		

BIOSTRENGTH® Impact Modifiers for Biopolymers

BIOSTRENGTH
BY ARKEMA

PRODUCT	TYPICAL APPLICATION	PRODUCT	TYPICAL APPLICATION
150	High rubber impact modifier for opaque thermoformed sheets and injection / PLA and biopolymers	280	Transparent impact modifier / PLA and biopolymers

CLEARSTRENGTH® MBS Toughener

CLEARSTRENGTH
BY ARKEMA

PRODUCT	TYPICAL APPLICATION
XT-100	Toughener for composite materials and structural adhesives in readily dispersible powder form. Offers formulation versatility with limited impact on host resin viscosity

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