

**CLEARSTRENGTH®XT100**

# High Performance Toughening Agent for Thermosetting Resins

**PRODUCT DESCRIPTION**

Clearstrength® XT100 is a Methylmethacrylate-butadiene-styrene (MBS) core-shell toughening agent designed to meet the demanding technical requirements of thermoset applications such as structural adhesives and high performance composites.

Thanks to its unique and patented technology, and contrary to standard core/shell tougheners, Clearstrength® XT100 powder is easily dispersible in most liquid resin systems and exhibits a limited impact on their viscosity while providing an outstanding toughening effect in a wide range of service temperatures.

**TYPICAL PHYSICAL PROPERTIES**

Physical Form	White Powder
Specific Gravity	1.02
Bulk Density	0.3
Average Powder Particle Size	200 µm
Percent Volatiles	< 1wt%
Core/shell Average Particle Size	< 200 nm

**PRODUCT BENEFITS**

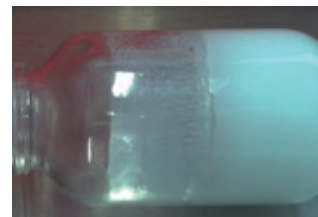
❖ **Wide versatility with monomers**

Clearstrength® XT100 has demonstrated an outstanding compatibility with various monomers. This has the advantage of using a single toughening agent reference in several systems, such as Epoxy, Methylmethacrylate (MMA), etc.

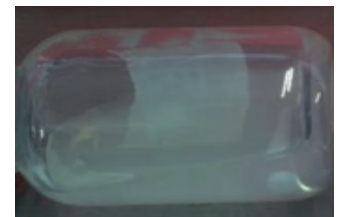
❖ **Easy dispersion**

Thanks to its unique and patented technology, Clearstrength® XT100 powder can be easily dispersed into most liquid thermosetting resins at very low shear rates, combined with lower mixing temperature or shorter mixing time. (Fig. 1 and 2).

Clearstrength® XT100 can even disperse spontaneously without shear in some liquid systems (Fig. 3).

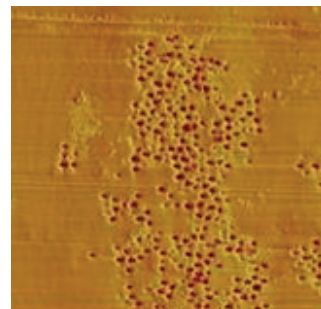


15 wt% of standard MBS into MMA monomer → strong agglomeration

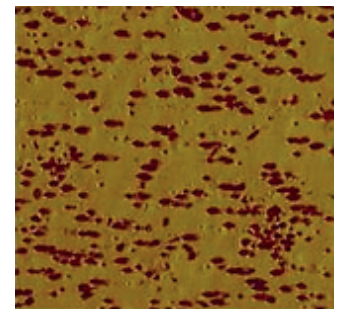


15 wt% of Clearstrength® XT100 into MMA monomer → easy dispersion

Fig. 1: Comparative dispersion into MMA monomer



Poor dispersion level of standard MBS



High dispersion level of Clearstrength® XT100

Fig. 2: Core-shell particle dispersion into high Tg system, by Atomic Force Microscopy (AFM)



Fig. 3: Clearstrength® XT100 spontaneous dispersion into MMA monomer, without shear

## Limited impact on host resin viscosity

The introduction of any rubber based toughener into a liquid resin system is well-known to significantly increase the viscosity of the host system. This effect is dramatically reduced when using Clearstrength® XT100 (Fig. 4).

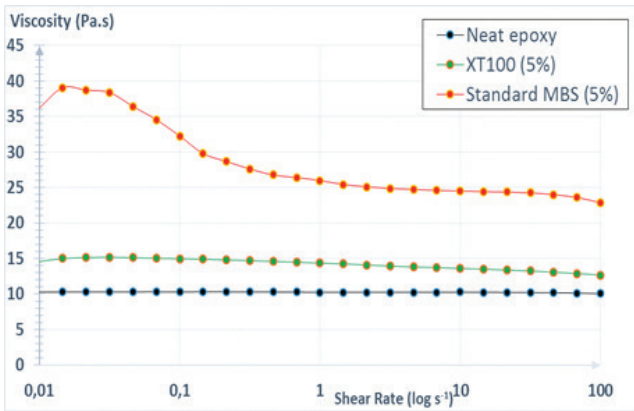


Fig. 4: Clearstrength® XT100 effect on the rheology of a high T<sub>g</sub> epoxy system

## Superior Mechanical Performances

The following graphs demonstrate the performance of Clearstrength® XT100 in a methacrylate structural adhesive formulation (Fig. 5) as well as in a high T<sub>g</sub> epoxy system (Tab. 1). Moreover, because Clearstrength® XT100 is a non-reactive toughening agent, the final glass transition temperature of the host thermoset matrix is not affected.

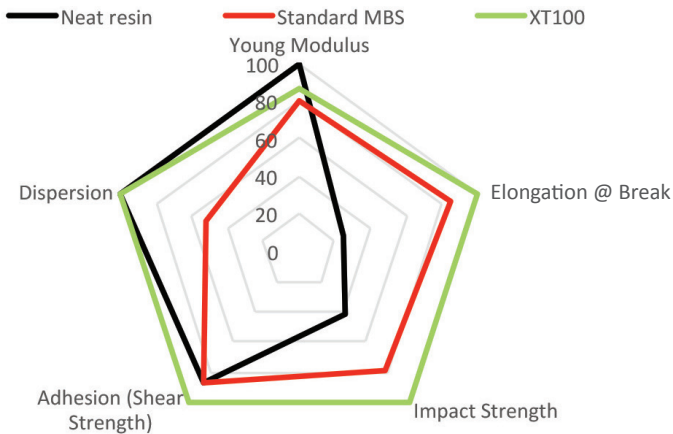


Fig. 5: Clearstrength® XT100 into a methacrylate structural adhesive formulation

	Neat epoxy	Standard MBS (5%)	XT100 (5%)
<b>K1C (MPa√m)</b>	0,6	1,1	1,4
<b>G1C (J/m<sup>2±2</sup>)</b>	88	380	490

Tab 1: Clearstrength® XT100 toughening effect in a high T<sub>g</sub> epoxy system

## SUGGESTION FOR USE

Clearstrength® XT100 is particularly recommended to increase the toughness of thermoset systems such as structural adhesives (e.g. methacrylates, epoxies, etc.) and composites. Recommended loading levels depend on final application and associated technical performance requirements. Prospective customers should evaluate Clearstrength® XT100 toughener in their own laboratories to establish optimum conditions for use in their process and applications. Arkema's Technical Service Team is available to discuss your application requirements, provide formulation guidance and laboratory testing upon request.

Clearstrength® XT100 can be advantageously used to replace standard core/shell modifier powders but also liquid masterbatches of pre-dispersed core/shell particles.

## PACKAGING

Clearstrength® XT100 toughening agent is available in 18 kg bags (450 kg per pallet), and 450 kg bulk bags (450 kg per pallet).

## ENVIRONMENTAL AND SAFETY INFORMATION

BEFORE HANDLING THIS MATERIAL, READ AND UNDERSTAND THE MSDS (MATERIAL SAFETY DATA SHEET) / SDS (SAFETY DATA SHEET) FOR ADDITIONAL INFORMATION ON SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION. The MSDS/SDS are available on our Website [www.arkema.com](http://www.arkema.com) or upon request at our Customer Service Department. Arkema believes strongly in Responsible Care® as a public commitment.

## MORE TECHNICAL INFORMATION AVAILABLE

Ask your Arkema account manager for further information on high quality Arkema additives for use in PVC, PC, PBT, ABS, PLA and other polymer systems. Arkema produces a full line of impact modifiers, processing aids and epoxidized vegetable oils. In addition, Arkema's Technical Service staff is also available to assist compounders and processors with formulation and processing advice.

## Durastrength® Impact Modifiers

Durastrength® acrylic impact modifiers deliver outstanding impact characteristics for outdoor durable applications in PVC and Engineering Resins.

## Plastistrength® Process Aids

Plastistrength® process aids offer producers a complete line of melt strengtheners and metal release agents for PVC and Engineering Resins. Plastistrength® process aids can improve fusion, surging, and aesthetics.

## Clearstrength® Impact Modifiers

Clearstrength® MBS impact modifiers are designed for extreme impact or impact/clarity combination in PVC and Engineering Resins.

## Biostrength® Additives

Biostrength® product line of impact modifiers, melt strengtheners and metal release agents are designed to improve properties and enhance processability of polylactic acid (PLA) and other biopolymers compounds.

## FOR MORE INFORMATION CONTACT

Please contact your local account manager or our headquarters:

### In Europe:

ARKEMA  
Arkema Coating Resins  
420 Rue d'Estienne d'Orves  
92705 COLOMBES Cedex, France  
Tel: +33 (0) 149 008 080  
[www.arkema.com/en/products/contact](http://www.arkema.com/en/products/contact)

### In US:

Arkema Inc.  
Arkema Coating Resins  
410 Gregson Dr  
Cary, NC 27511  
Tel: +1 (877) 331-6696  
[www.arkema.com/en/products/contact](http://www.arkema.com/en/products/contact)

### In Asia:

Arkema Pte Ltd.  
10, Science Park Road, #01-01A,  
The Alpha Singapore Science Park II,  
Singapore 117684 Tel: +65 6419 9199  
[www.arkema.com/en/products/contact](http://www.arkema.com/en/products/contact)

## VISIT US AT OUR WEBSITE

[www.additives-arkema.com](http://www.additives-arkema.com)

The statements, technical information and recommendations contained herein are believed to be accurate as of the date hereof. Since the conditions and methods of use of the product and of the information referred to PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE CONCERNING THE GOODS DESCRIBED OR THE INFORMATION PROVIDED HEREIN. The information provided herein relates only to the specific product designated and may not be applicable when such product is used in combination with other materials or in any process. The user should thoroughly test any application before commercialization. Nothing contained herein constitutes a license to practice under any patent and it should not be construed as an inducement to infringe any patent and the user is advised to take appropriate steps to be sure that any proposed use of the product will not result in patent infringement. See SDS for Health & Safety Considerations. Arkema has implemented a Medical Device Policy regarding the use of Arkema products in medical device applications that are in contact with the body or circulating bodily fluids: (<http://www.arkema.com/en/social-responsibility/responsible-product-management/medical-device-policy/index.html>). Arkema has designated Medical grades to be used for such medical device applications. Products that have not been designated as medical grades are not authorized by Arkema for use in medical device applications that are in contact with the body or circulating bodily fluids. In addition, Arkema strictly prohibits the use of any Arkema products in Medical Device applications that are implanted in the body or in contact with bodily fluids or tissues for greater than 30 days.

The Arkema trademarks and the Arkema name shall not be used in conjunction with customers' medical devices, including without limitation, permanent or temporary implantable devices, and customers shall not represent to anyone else, that Arkema allows, endorses or permits the use of Arkema products in such medical devices. It is the sole responsibility of the manufacturer of the medical device to determine the suitability (including biocompatibility) of all raw materials, products and components, including any medical grade Arkema products, in order to ensure that the final end-use product is safe for its end use; performs or functions as intended; and complies with all applicable legal and regulatory requirements (FDA or other national drug agencies) It is the sole responsibility of the manufacturer of the medical device to conduct all necessary tests and inspections and to evaluate the medical device under actual end-use requirements and to adequately advise and warn purchasers, users, and/or learned intermediaries (such as physicians) of pertinent risks and fulfill any postmarket surveillance obligations. Any decision regarding the appropriateness of a particular Arkema material in a particular medical device should be based on the judgment of the manufacturer, seller, the competent authority, and the treating physician.

Clearstrength® and Plastistrength® are registered trademarks of Arkema.  
Biostrength® and Durastrength® are registered trademarks of Arkema Inc.  
Responsible Care® is a registered trademark of the American Chemistry Council Inc.  
2017 Arkema Inc. All rights reserved.