

CLEARSTRENGTH® XT 151

High Performance Toughening Agent Tailored for **Epoxy Thermosetting Resins**

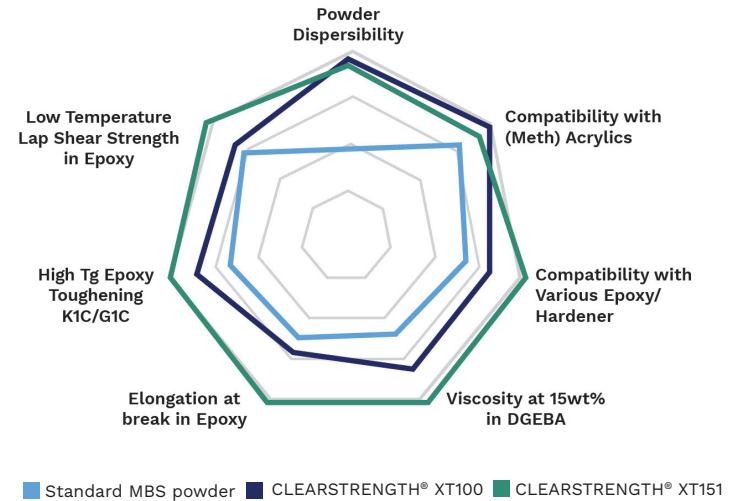
- Methylmethacrylate-Butadiene-Styrene (**MBS**) core shell
- Tailored for **epoxy thermosetting resins**
- Optimized to the **most demanding applications**
- Matching **low temperature requirements** (toughening, elongation, lapshear)

-  TOUGHENING
-  COLD TEMPERATURE
-  LOW VISCOSITY
-  EPOXY FORMULATION
-  EASY PROCESS
-  ENERGY SAVINGS

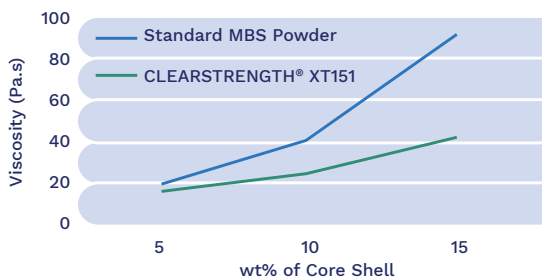
TYPICAL PHYSICAL PROPERTIES

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

OVERALL SUPERIOR PERFORMANCE IN EPOXY

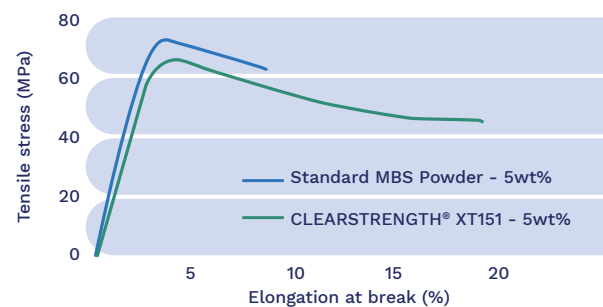


VISCOSITY INFLUENCE IN DGEBA RESIN (23°C)



Lower viscosity in epoxy at high dosage of core shell particles allows **higher additive concentration** in applications where solution viscosity could be a limitation like in composite infusion, prepreg, and coatings.

TENSILE PROPERTIES (23°C) – CURED EPOXY



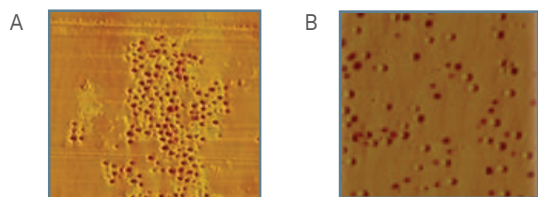
Example of higher elongation at break reached in medium Tg Epoxy system

TOUGHENING OF HIGH Tg EPOXY

| | Tg (°C) | Lap Shear (MPa) | K1C (MPa/m) | GIC (J/m ²) |
|-------------------------------|----------|-----------------|-------------|-------------------------|
| Neat | | | 0,6 | 88 |
| Standard MBS Powder (5 wt %) | No shift | 6,2 | 1,1 | 380 |
| CLEARSTRENGTH® XT151 (5 wt %) | No shift | 7,9 | 1,7 | 650 |

CLEARSTRENGTH® XT151 yields **superior toughness** and **shear adhesion strength** than Standard MBS powder in high Tg epoxy (Tg>200°C).

Comparison of the mechanical properties in high Tg epoxy system



A) Standard MBS powder B) CLEARSTRENGTH® XT151

Enhancing compatibility reaching dispersion at the individual core shell in **most high Tg and more polar epoxy systems**.

DISPERSION GUIDELINE

- CLEARSTRENGTH® XT151 powder can be dispersed in epoxy preferably with a medium shear mixer in temperature.
- Dilution of high core shell content preparation can be achieved with standard anchor blade homogenization.

EXAMPLE OF DISPERSION CONDITIONS

| | |
|--------------|-----------|
| Doseage | 15-20 wt% |
| Temperature | 80°C |
| Mixing Time | 1 h |
| Mixing Shear | Medium |

Example of dispersion conditions with dispersive blade

SUGGESTION FOR USE

- CLEARSTRENGTH® XT151 is particularly recommended to Increase the toughness of epoxy thermoset systems such as structural adhesives and composites.
- Loading levels depend on final application and associated technical performance requirements.
- CLEARSTRENGTH® XT151 can be advantageously used to replace standard core shell modifier powders but also liquid masterbatches of pre-dispersed core shell particles.



Contact Arkema's Technical Service Team:

- Discuss your application requirements
- Provide formulation guidance and laboratory testing upon request
- Discuss dispersion process optimization

Arkema France
420 rue d'Estienne d'Orves
92705 Colombes Cedex
France
T +33 (0)1 49 00 80 80

Coating Resins Headquarters
410 Gregson Dr.
Cary, NC 27511 - USA
Tel.: +1 919 469 6700
1-800-777-8227

PLADS /08.2022