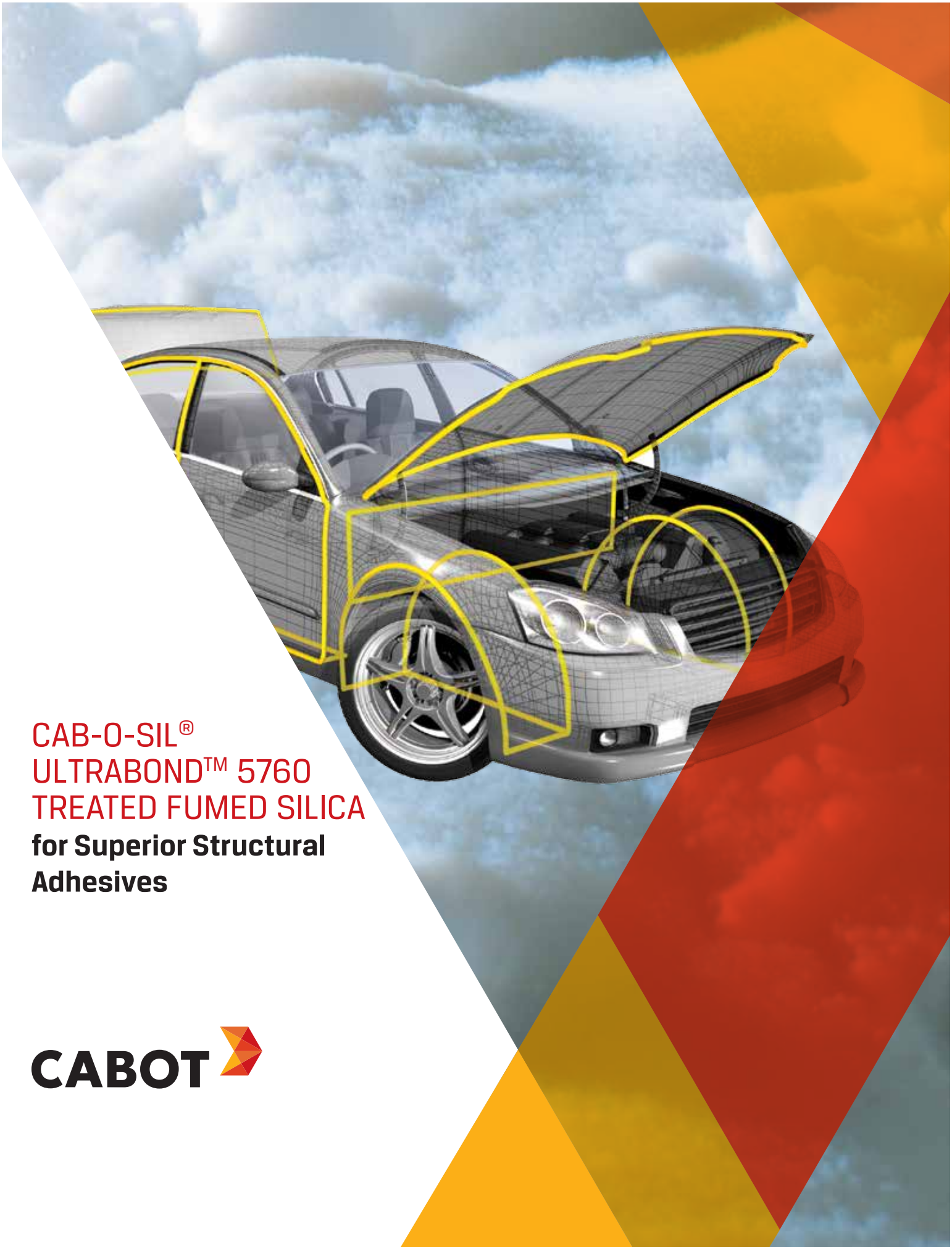


CAB-O-SIL® ULTRABOND™ 5760 TREATED FUMED SILICA

for Superior Structural Adhesives

CABOT

CAB-O-SIL® ULTRABOND™ 5760
TREATED FUMED SILICA FOR SUPERIOR STRUCTURAL ADHESIVES

CAB-O-SIL® ULTRABOND™ 5760 surface treated fumed silica delivers benefits to both adhesive manufacturers and end-users. The silica is designed to provide superior rheology control for adhesives requiring very high sag resistance and stable bond lines for structural adhesives. Compared to other polydimethylsiloxane (PDMS) treated silicas, this silica benefits adhesives systems by reducing the viscosity in the application without compromising sag resistance.

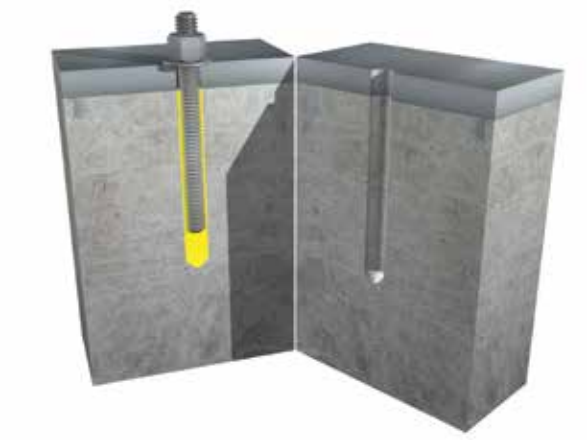
When adhesive producers use CAB-O-SIL ULTRABOND 5760 fumed silica in their formulations, they achieve significant time and energy savings during the adhesive manufacturing process. Because this silica provides higher sag resistance, adhesives producers can reduce their silica loading by approximately 10 to 15 percent, resulting in a lower viscosity adhesive. The lower loading and lower viscosity allows adhesive producers to save time, energy, and money in their manufacturing processes. In addition, higher sag resistant adhesives can be formulated for demanding applications without compromising pumping and dispensing.

Applications

CAB-O-SIL ULTRABOND 5760 fumed silica improves adhesive performance, particularly in epoxy formulations, and can be used in adhesives for use in a wide range of industries including automotive, aerospace, construction, electronics and flooring.

One of the strongest industry demands in the transportation industry is for structural adhesives to replace traditional welding or riveting to bond two vehicle parts together. The use of structural adhesives in transportation manufacturing has steadily increased over the years as it offers advantages over classic bonding techniques, including the ability to use lightweight design components with improved mechanical strength. These lightweight components will help the transportation industry achieve more aggressive weight-reduction goals and improve fuel efficiency.

For a variety of manufacturing and construction end users, the dynamic viscosity profile of adhesives using CAB-O-SIL ULTRABOND 5760 fumed silica enables a faster application of the material, regardless of the choice of dispensing device. The silica delivers higher sag resistance, creating stable bond lines because the viscosity of the adhesive made with CAB-O-SIL ULTRABOND 5760 fumed silica snaps back to a higher level once the shear forces of application have been removed. CAB-O-SIL ULTRABOND 5760 fumed silica enables a faster viscosity recovery rate when compared to competitive silica grades.



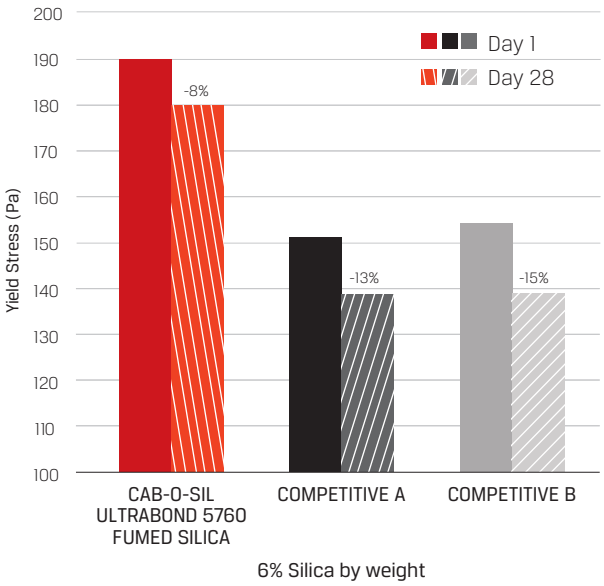
Adhesive anchor in construction

Sag Resistance and Stability

In epoxy resin, CAB-O-SIL ULTRABOND 5760 fumed silica provides superior sag resistance and stability compared to competitive PDMS treated silicas. Figure 1 shows the sag resistance, as assessed by a Yield Stress measurement in epoxy resin, and the loss of sag resistance (Yield Stress) after 28 days of accelerated aging at 60 °C.

- CAB-O-SIL ULTRABOND 5760 fumed silica provides the highest Yield Stress both initially and after aging than competitive PDMS-treated silicas.
- The epoxy formulation with CAB-O-SIL ULTRABOND 5760 fumed silica is more stable (has the smallest change in Yield Stress over time) than formulations with competitive products.

Figure 1: Change in Yield Stress of Fumed Silicas in Epoxy Resin



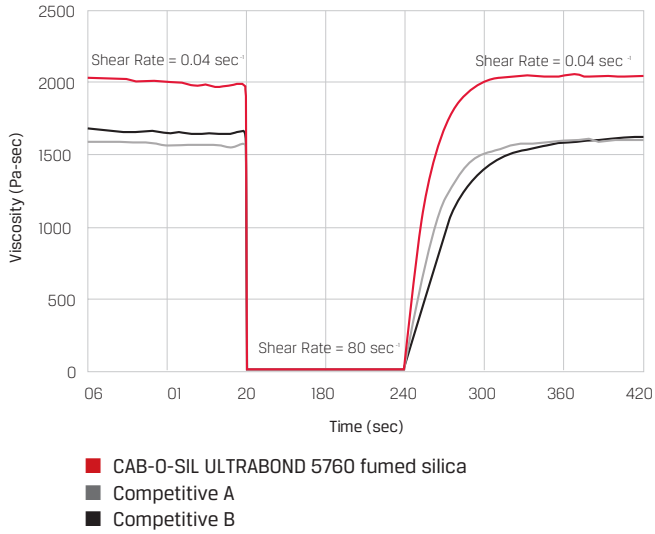
Shear Thinning and Recovery Rate

The thixotropic (shear thinning) behavior imparted by PDMS-treated silica in an epoxy system is important to the adhesive formulator and user. At high shear rates equivalent to those imparted during mixing or bead application, the viscosity of a model epoxy formulation decreases (Figure 2), facilitating processing, pumping and dispensing of adhesive.

Afterward, viscosity recovers quickly to the same level exhibited by the formulation prior to high shear, preventing an adhesive bead from slumping or sagging and fillers from settling.

CAB-O-SIL ULTRABOND 5760 fumed silica imparts higher viscosity than competitive PDMS-treated silicas yet is equally shear thinning and provides a faster rate of viscosity recovery.

Figure 2: Viscosity in Epoxy Resin - 4% silica by weight

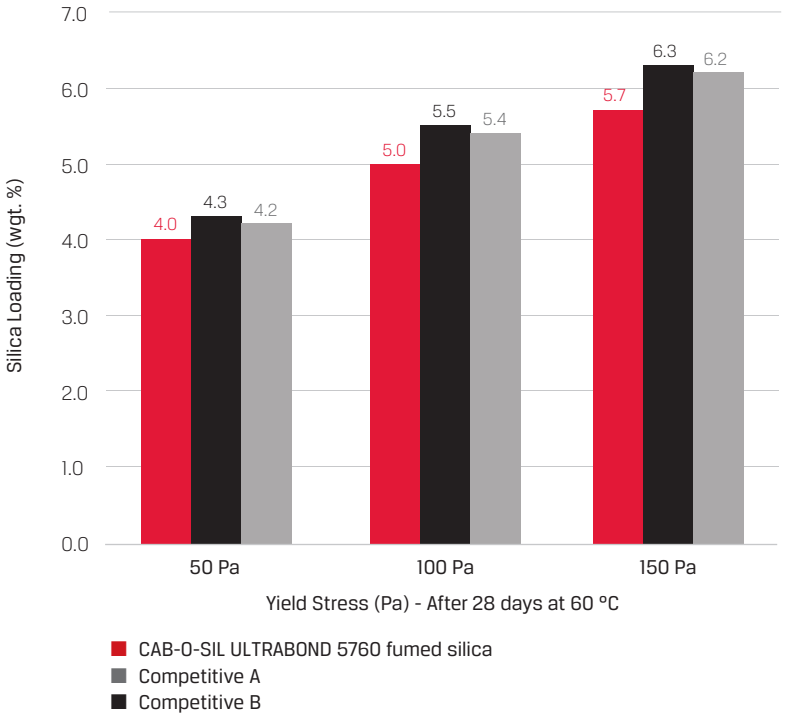


Efficiency

Formulators frequently "over-design" the structural adhesives to provide improved rheology by adding additional silica in anticipation of the loss of sag resistance and viscosity that can occur during shipping and storage. The superior rheological performance stability of CAB-O-SIL ULTRABOND 5760 fumed silica allows the formulator to forgo the additional silica resulting in overall lower silica loadings and formulation cost without compromising the rheology performance or shelf-life of the adhesive.

A formulator must factor rheology stability or loss of sag resistance over time into a formulation so that the adhesive has adequate sag resistance at the end of its shelf life. Figure 3 compares Yield Stress (correlated with sag resistance) results after aging at 60 °C.

Figure 3: Performance in Epoxy Resin



Because CAB-O-SIL ULTRABOND 5760 fumed silica provides very high Yield Stress initially and has the least loss of Yield Stress over time, less silica is needed to achieve the same performance as with competitive PDMS-treated silicas.

Why Choose CAB-O-SIL ULTRABOND 5760 fumed silica?

CAB-O-SIL ULTRABOND 5760 fumed silica performs exceptionally well in epoxy resins compared to other PDMS-treated fumed silicas and provides a variety of performance advantages in structural adhesives including:

- High sag resistance
- Rheology stability over time – low loss of sag resistance
- Anti-settling of pigments and fillers
- Shear-thinning rheological behavior

Cabot in the world

With manufacturing sites in 20 countries and five sites solely dedicated to fumed metal oxides, Cabot focuses on developing new products, technologies and solutions for its customers.

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- Billerica, MA - USA
- Rheinfelden - Germany
- Shanghai - China

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