CLOSER LOOK AT ZENDURA MATERIALS' EXCEPTIONAL CRACK & STAIN RESISTANCE

Our Materials' Unique Polymer Backbone

Our Zendura materials' exceptionally strong polymer backbone is a result of our using the proprietary polyurethane (TPU) resin we developed to make our materials. All other commercially available orthodontic thermoplastic materials used for aligners and retainers are made from commodity resins, mostly polyester (PETG), which accounts for why they are not nearly as hardy or durable as our Zendura materials. In fact, the PETG resin they use is very similar to the commodity resin used to make plastic Coke and Pepsi soda bottles.

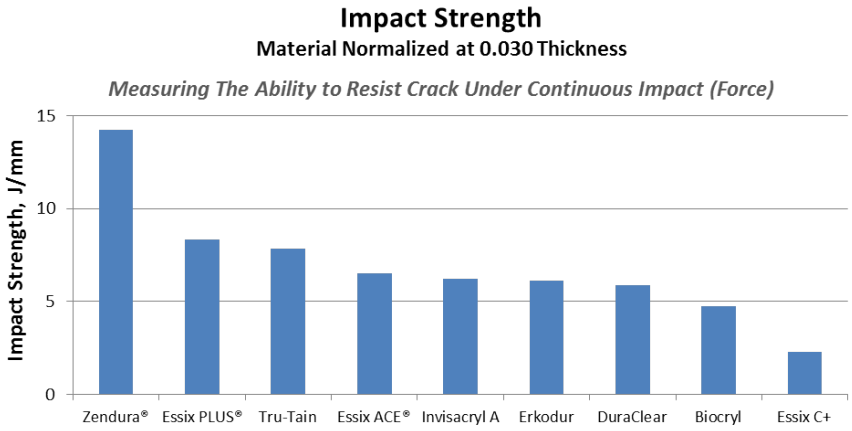
Our Zendura A materials are a monolayer material made of 100% polyurethane. Our Zendura FLX materials are a trilaminate material with a 100% polyurethane inner core encased in a hard outer shell.

Exceptional Impact Strength (Crack Resistance)

Impact Strength is defined as "the ability of a plastic to absorb mechanical energy in the process of deformation and fracture under impact loading." Or more colloquially, "how hard can I whack this thing without it fracturing, deforming or breaking?"

To scientifically measure the impact strength, we use the ASTM D 5420 (GC) test method using a Gardner Impact Tester, equipped with a 0.64 inch die and an 0.625 inch punch. Falling Weight Impact, also known as Gardner Impact, is a common method for evaluating the impact strength or toughness of a plastic. We drop a weight from a measured height and then record the impact energy required to cause failure via crack initiation and crack propagation. The higher the weight is lifted, the higher the impact energy transferred to the material under test.

Zendura was evaluated for its "impact strength" alongside with other orthodontic materials:



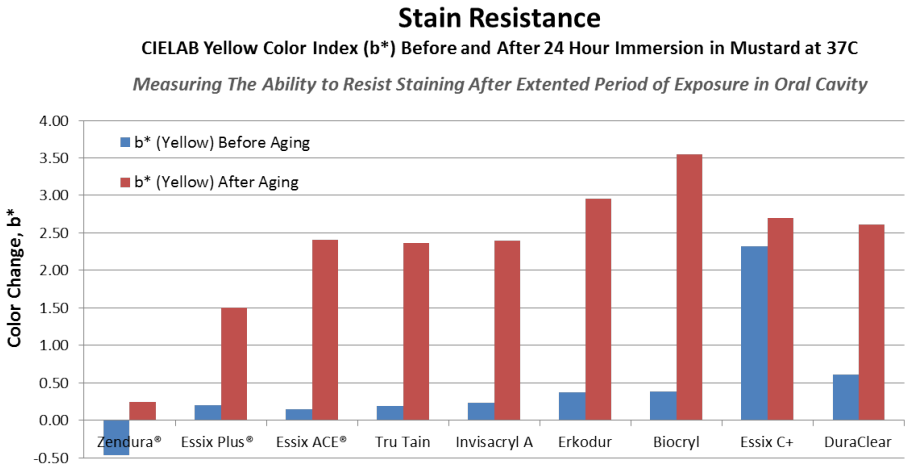
Exceptional Stain Resistance

Orthodontic appliances like clear aligners and retainers are frequently exposed to severe staining agents when worn by patients (e.g., highly staining liquids like strong coffees and teas and mouthwash), causing the plastic to yellow and even structurally deteriorate.

One test we performed to determine stain resistance was to immerse the parts in mustard (a strong staining agent) while in an oven at 37C for 24 hours. Raising the temperature during soaking accelerates almost all processes governed by molecular kinetics – in other words diffusion or staining will happen much faster at 37C than at room temperature.

To accurately measure the color of the part itself both before and after the staining procedure, we used a colorimeter. Specifically, the CIELAB Color model allowed us to accurately measure and quantify changes in "yellowness" (b*) that resulted from a 24 hour mustard soak. The color change was measured using a Byk-Gardner Color-guide and yellow index (b*) and plotted before and after the mustard immersion.

At the end of the mustard soak, Zendura showed little change in level of yellow:



Test results like these make us confident that our Zendura materials are the best available for many kinds of orthodontic appliances.

In summary, Zendura materials are much harder to break under applied stress, much more resistant to deformation, and significantly more chemically resistant to common staining agents like coffee, tea, oil, toothpaste, mustard, etc. than other staining agents.