

# Deflection of Vinyl Sheet Piling

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## A CMI Technical White Paper

Physical properties are defined by ASTM testing standards, The Aluminum Association Design Manual, The Naval Facilities Design Manual DM 7.2, The US Army Corps of Engineers General Design Guide: PVC Sheet Pile and/or standard engineering practice. The values shown are nominal and may vary. The information found in this document is believed to be true and accurate. No warranties of any kind are made as to the suitability of any CMI product for particular applications or the results obtained there from. Crane Materials International is a Crane Building Products® company. ShoreGuard®, The ShoreGuard Seawall System™, C-Loc®, TimberGuard®, GeoGuard®, Dura Dock®, Shore-All®, GatorGates®, GatorDock Elite™, ArmorWare™, ArmorRod™, Box Profile™, UltraComposite™, Elite Wall™, Elite Panel™, Elite Fascia Panel™, Flat Panel™, XCR™, XCR Technology™, XCR Vinyl™, GatorBridge™, Gator Aluminum™, Gator Sheet Piling™, GatorDock™, I-Beam Lock™, Textured Slate™, Crane Materials International™ logo, CMI Sheet Piling Solutions™, Aqua Terra System™, Endurance™, Endurance CSP™, Polaris™, Eclipse™, GridSpine™, 21 Poly™, PileClaw™, SheerScape™, SheerScape Retaining Wall Systems™, Sheer Panel™ and CMI Waterfront Solutions™ are trademarks, service marks or trade names of Crane Materials International. United States and International Patent numbers 4,674,921; 4,690,588; 5,292,208; 5,145,287; 6,000,883; 6,033,155; 6,053,666; D420,154; 6,575,667; 7,059,807; 7,056,066; 7,025,539; 7,393,482; 5,503,503; 5,803,672; 6,231,271; 1,245,061CA; 7,914,237 and other patents pending. © 2011 Crane Materials International. All Rights Reserved.

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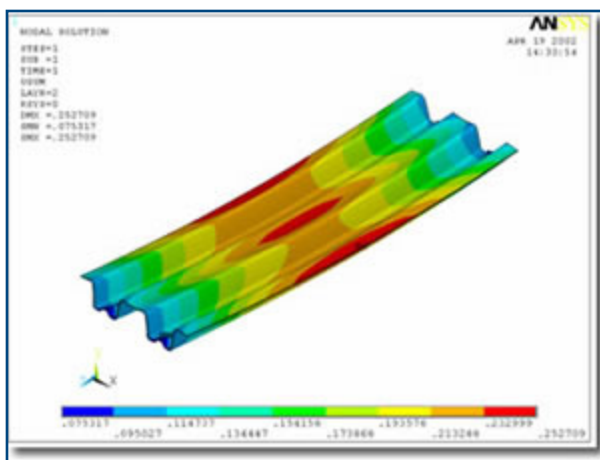
Developed specifically for long-term applications, CMI's patented sheet piling designs optimize bending and stiffness performance. In addition to Finite Element Analysis and Full Section Deflection Testing, the Geotechnical and Structures Laboratory of the US Army Corps of Engineers, Engineer Research and Development Center has verified the strength of CMI's sheet piling.

In addition, The U.S. Army Corps of Engineers, in conjunction with CMI, conducted a joint site investigation of over 300,000 square feet of installed sheet piling ranging in age from new to ten years old that confirms minimal sheet piling deflection when the products are used within their specified limits.

Vinyl sheet piling is an exceptionally ductile material that can withstand extreme amounts of strain and deflection before a loss of strength is observed. Limiting deflections in vinyl sheet piling is therefore a serviceability limit, rather than a design limit. CMI's vinyl sheet piling has been proven to perform within deflection serviceability limits when the allowable moment capacity of the product is not exceeded by site conditions and loading.

within expected deflection calculations when subjected to standard loading. However, when dealing with geotechnical wall designs and soil loadings, the situation becomes more complicated. Due to the relative flexibility of vinyl sheet piling and changes in soil loading with movement, wall loading can diminish substantially from what is predicted by traditional analysis methods.

In fact, traditional analysis methods can drastically over-predict wall deflections when compared to those actually seen in the field. The majority of the current design tools and methods available today are overly conservative when it comes to predicting deflections of vinyl sheet pile walls. Because of the relative flexibility of vinyl compared to steel and the relaxation of the soils with initial deformations, the actual wall deflections seen in the field and over years of experience are far lower than those predicted using conventional methods.



The long-term mechanical properties including strength and stiffness are a function of material capabilities and product design. The materials utilized in our sheet piling are specifically designed for exterior applications and are proven to perform