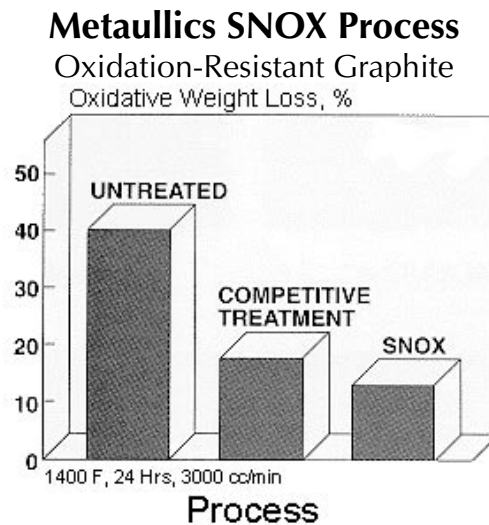


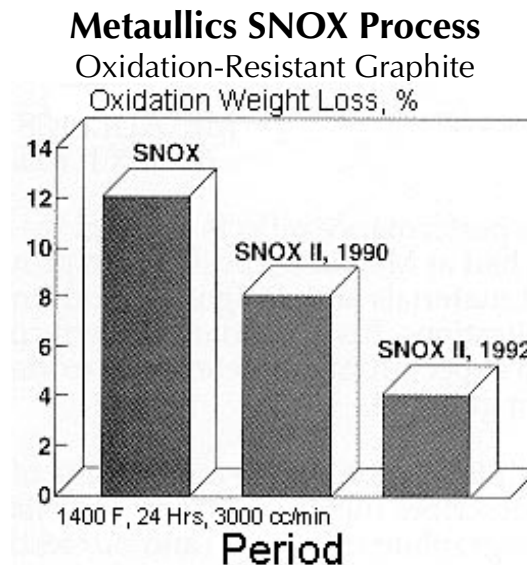
Advancements in Graphite Treatments

Metaullics Systems developed and is the major worldwide supplier of molten metal pumps made of graphite and ceramics. We also manufacture a variety of graphite products including flux tubes, scrap submergence equipment, and rotary degassing systems with graphite shafts and rotors.

In 1984 Metaullics introduced the Super NOX (SNOX) treated graphite. This was a 50% improvement over the previously standard treatment, which is similar to other treatments that most manufacturers offer even today. The figure below illustrates how the original SNOX process improved weight-loss performance.



We continued to improve the SNOX process as shown in the figure below. Our Total Quality Management (TQM) program, in place since 1991, resulted in the most recent SNOX II treatment. Weight loss averages only 4% in standardized tests compared with an average of over 16% in competitive materials.



Today an even better grade, designated "ZX" is standard in most Metaullics graphite pumps and other high-temperature structural applications. Also available are coatings to further enhance oxidation resistance as well as improve erosion resistance in dynamic applications.

Test Procedures

Metaullics Systems performs standardized, accelerated lab tests on all treated graphite lots on a continuous, everyday basis. Oxidation rates from these tests and life of graphite components in static molten aluminum applications correlate very well.

Standard tests are 24 hours at 1400° F in a purged air atmosphere. Air is fed via mass flow controllers capable of maintaining 3000 ± 3 cc/min. Test furnaces are controlled to ± 1 ° C. Standard sample shapes and sizes are maintained to eliminate surface area contributions to weight-loss results. Whenever possible, comparison samples are fired in the same furnace at the same time.

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