

January 24, 2019

**Re: Fine Grain Practice**

According to ASTM A941, “Standard Terminology Related to Steel, Stainless Steel, Related Alloys, and Ferroalloys”, Fine Grain Practice is a steelmaking practice for other than stainless steel that is intended to produce a killed steel that is capable of meeting the requirements specified for fine austenitic grain size. It normally involves the addition of one or more austenitic grain refining elements in amounts that have been established by the steel producer as being sufficient. Austenitic grain refining elements include, but are not limited to, aluminum, niobium (columbium), titanium, and vanadium.

Nucor-Yamato Steel uses columbium or vanadium, as grain refining elements. Periodic sampling and analysis is performed to confirm that our current practices are meeting the requirements for a fine austenitic grain size.

We trust that this information will answer your questions regarding the practice used at Nucor-Yamato Steel to achieve a fine austenitic grain size. If we can be of any further assistance, please feel free to contact us.