Fermilab is developing superconducting RF cavities of the bulk Niobium (Nb) type for a future linear collider. Several prototypes of a third-harmonic cavity and a transverse deflecting mode (CKM-type) cavity were built. The first 3-cell third harmonic model recently achieved the expected performance limit. Here we report on RRR measurements on samples cut from Nb sheets for the third harmonic and CKM prototype cavities. The RRR parameter is a measure of the purity and thermal conductivity of the bulk material. The RRR was measured upon receipt and after the chemical polishing and heat treatment steps used in the cavity fabrication. These measurements not only serve the purpose of quality control of the pre-cursor material but also as a check of the cavity processing. We also measured the RRR of the electron-beam welds using samples cut from plates produced by joining sheets by e-beam welding in the same device used for welding cavity parts. We also present our next generation RRR measurement system, currently in the design stage.

To verify if the various treatment steps applied to the Niobium blanks affect the RRR, the samples underwent a full sequence of treatment steps, including a ~100 min BCP (1:1:2) etch, a high temperature heat treatment (800°C, 5 hrs) in vacuum (<10^-6 Torr) followed by another 20 min BCP polish. The results of the RRR measurements on these samples is shown in the figure on the left, indicating that within the measurement reproducibility of ±5% there is no discernible effect of the surface treatment on the RRR. The lack of an effect of the weld on the RRR was also previously found in four weld-samples made at Sciaky with thinner material used for the first transverse deflecting cavities [SRF05 conference].

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