A Clean Pumping and Venting System for SRF Cavities and Cryomodules

S.M. Gerbick, M.P. Kelly
Argonne National Laboratory, Argonne, IL 60439, USA

ABSTRACT

A system based on a pair of mass flow controllers has been used to evacuate and vent a clean cavity rf space. The mass-flow system is used in both single cavity testing and with the ATLAS upgrade cryomodule at Argonne. It is similar schematically to that already in use at DESY, however, it is very compact and maintains the capability to precisely control both the pump out and venting rates. Initial tests of the system with both the ATLAS single cavity test cryostat and the ATLAS upgrade cryomodule show that pump down and venting cycles may be performed without introducing substantial particulates into the cavity rf space. The system, together with the ANL top loading cryomodule design with easy access to individual cavities, will allow an individual cavity to be removed and replaced in a cryomodule string without the need to re-clean the entire string. This capability would also remove the need to test every cavity individually before installation into the string, constituting a major savings for large projects.

Figure 1: Assembled “up-to-air” system.

Figure 2: Pall ChamberKleen 1100 Series diffuser welded into a 2.75” double-sided Conflat flange.

Figure 3: Required electronics to operate the mass flow controllers and loadlock transducer: mass flow controller rate indicator (left) and loadlock transducer vacuum controller (right).

Figure 4: Plot showing Q-curve data from a single cavity test before and after the clean cavity space was vented and evacuated using the “up-to-air” system.

Figure 5: “Up-to-air” system schematic.

Figure 6: Omega Model #FMA-772A-V mass flow controller.