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# MEASURING THE WALL IMPEDANCE WITH THE NETWORK ANALYZER

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consisted of a glass fiber cloth cover with the heating elements sewn on. A layer of ceramic fiber thermal insulation 50 mm thick is applied over the heaters, and the outer surface is made of aluminized glass fiber cloth. The heating elements were designed to give an average power of 0.75 $kW/m^2$ with 208 volt operation. With the 300°C vacuum chamber bakeout, the temperature of the outside surface of the jacket was about 62°C.

2) Thermocouples and Power Distribution System

A total of 1200 thermocouples are welded to the outside surfaces of the vacuum chamber, the stochastic cooling tanks, the rf cavities, etc., to monitor the temperature of each component of the ring during the bake. Type E thermocouples were selected because of the large Seebeck coefficient and their non-magnetic characteristics. Each thermocouple signal is transported 50-300' to receiving electronics placed at six discrete locations within the underground tunnel. Large gauge (16 AWG), thermocouple extension cable was chosen to transport the small thermocouple voltages (1.5-22.0 mV) with minimal signal attenuation. Measurements indicated an attenuation of less than 0.4%/100', and consequently, no corrections due to attenuation losses were necessary.

An independent power system for providing current to the heating blankets is distributed throughout the Accumulator tunnel. The voltage chosen for distribution was 208 volt 3-phase system. Previous experience showed that 208 volts was the highest voltage that the heating blankets would be capable of insulating. The larger power loads (11 kW) used all three phases controlled by a contactor. The smaller loads were fed from a 6 channel solid state relay (SSR) control box. The control box was fed with 208 volts 30A and split up by using 2 SSR's per phase.

$Z_b$ can be calculated from the beam distribution and $Z_a$ can be obtained by calibration. Thus a measurement of $S_{12}$ yields a value for $Z_w$, The measurement works best, of course, if $Z_b$ and $Z_w$ are comparable in magnitude, i.e., if the beam is near the stability limit.

I propose we try to use this method to measure the wall impedance at harmonics 1, 2, 10, 84, and 100 longitudinally and 1, 10, and 100 transversely. The transverse measurements can be made with the damper; the longitudinal one can be made with the gap pickup and the broadband cavity or with the damper in the sum mode. It might be useful to have a stochastic cooling type transfer switch for calibration.