PRESSURE RELIEF RADIAL PASSAGES FOR SSC*

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INTRODUCTION

In the 40 mm SSC cross-section design radial helium venting passages located every 6" were present. The purpose of these passages was to provide escape routes for helium from the coil cooling passage to the bypasses during a quench. The passages are introduced in the magnet by placing special yoke laminations with channels going from the bypasses to the inner radius.

The question as to whether the venting passages are still needed in the 50 mm design is addressed here. One might expect that they would be more needed here since the stored magnetic field energy increases considerably faster than the coil cooling passage cross-section, unless the width of the latter is increased.

Since the dimensions of the beam tube are not fixed at this time two cases are considered: a coil cooling passage gap of 1.3 mm and one of 5 mm.

An existing computer code developed at Brookhaven National Laboratory by R.P. Shutt and programmed by K. Jellet is applied to the present problem. The theoretical contents of the code are described in [SSC--N--266 No 59]. Pressures, helium, coil, and yoke temperatures, and mass flows are computed during a quench for one magnet with no venting occurring in the interconnect regions. Only one magnet is considered here as opposed to a string of magnets.

RESULTS

The relief passages are one lamination deep (d = 0.158 cm or 1/16 in.). However, due to limitations of the numerical method, the computer program will not run for a long enough time with this value. The conservative value d = 0.06 cm will be used instead. The case where there are no passages is simulated with d = 0.001 cm.

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1.3mm gap maximum pressure around beam tube with venting

Figure 1.

1.3mm gap maximum pressure around beam tube without venting

Figure 2.