End Clamps for 50 mm Aperture SSC Dipoles

I. What have we learned from the 40 mm aperture program?

II. What have we learned from, and how should we proceed for the 50 mm aperture program?

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MAGNET NAME	END CLAMP DESIGN	MEASUREMENTS TAKEN
DS0308	ss, azim. G10	m
DS0309	ss, azim. G10	m
DS0310	ss, azim. G10	m, sg
DS0311	ss, azim. and trans. G10	m, sg
DS0313	ss, azim. G10	m, sg, pi
DS0314	alum., Stycast	m, sg, pi
DS0315	alum., Stycast	m, sg, pi
DC0304	ss, azim. G10	m, pi
DC0306	ss, trans. G10	m, pi
DSA321	ss, azim. G10	m, pi
DSA323	ss, azim. G10	m, sg, pi

m = micrometer deflection

sg = strain gages on end can

pi = "pi-tape"

The 50 mm Aperture Program so Far

1) The thicker end clamp can used for the 50 mm aperture magnets shows little measureable deflection on installation.

2) We are therefore attempting to arrive at procedures for

a- inspection of an end clamp assembly consisting of 4 insulators and an end can

b- determination based on a- of correct shimming of the coil end prior to end clamp installation

c- installation of the end clamp using a hydraulic fixture, including a go-nogo value for the pump pressure required to install the end clamp.

3) Data so far on pump psi required for installation:

	Lead End	Non-Lead End	
DSA321	7,000	5,000	(This magnet worked well)
DSA323	10,000	5,200	

Current 50 mm Aperture Initiatives

1) Bringing Drawings up to date for the "standard design" (aluminum / G10)

2) Improving Inspection Procedures

3) Standardization of Installation Schedule and pre/post Installation Measurements including collet clamp "squeezer test"

4) Bringing ANSYS finite element analysis calculations up to date in terms of materials and dimensions

5) Pursuing molded end clamp insulators (EM-7302 and other materials)

Conclusions of 40 mm Program:

1) Easily visible deflections of the stainless steel and aluminum end cans (micrometer measurements and pi-tape) seemed to indicate a method of establishing a GO - NOGO criterion for end clamp installation.

ANSYS finite element analysis calculations seemed to agree fairly well with experimental data.

2) However, our quantitative knowledge of the pole stress caused by the end clamp has remained poor, because the strain gage readings cannot be simply related to azimuthal strain in the end can, which in principle could be related to radial pressure using simple "thin-walled pressure vessel" formulae.

3) The loading brought about by the Stycast / Aluminum end clamps, at least at room temperature, seems to be small. However, the behavior of DS0315 at low temperatures would indicate that this clamp is adequate; in fact, the high ramp rate quench behavior shows that this end clamp may be superior to the G10/stainless steel design.

(1) CURRENT LONG 50MM APERTURE DIPOLE END CLAMP INSTALLATION SCHEDULE:

JUN 14

JUN 28

JULY 5

JULY 12

JULY 24

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(2) STATUS OF END CLAMP PARTS DELIVERED

2 LEAD END SETS DELIVERED FRIDAY

3 RETURN END SETS " "

CANS, CAPS ON ORDER

(3) STATUS OF MOLDED END CLAMP INSULATORS

MOLDED PARTS FROM MOLDING HOUSE NEXT WEEK AT BEST