

Fermilab

TS-SSC 91-211

11/1/91

R.E. Sims*

Sizes and Moduli of First all-Kapton Coils

Attached are summaries of the coil sizes and moduli of the first short coils molded at Fermilab with the glass tape replaced by Kapton coated with 3M 2290 B-stage epoxy. All coils were cured with the standard curing cycle[1] and the standard curing mold shims[2]. The specific characteristics of each coil are noted on the tables and graphs. Creep measurements were made on the coils at one measurement position using the sizing gauge.

[1] M. Wake and R.E. Sims, Molding procedure of 1.5 m dipole, TS-SSC 91-072, 4/24/91.

[2] R. Bossert, Curing mold shims on practice coils 126 and 127, TS-SSC 91-166, 8/20/91; M. Wake, Coil size and shimming of DSA series outer coil (II), TS-SSC 91-102, 5/31/91.

*Cover page "ghost written" by Jim Strait.

Chart Version # 1.0
 SHORT 50MM Inner Coil # 1M-50-128 Experimental Coil

Master Used - Inner Master #1
 Press Fixture Serial Number Used -
 Machine Serial Number Used - Not Available

Shim Size Used - No Shim Used
 Mean Arc of Master - 1.5946°

QUADRANT III POSITION 1-14				QUADRANT IV POSITION 1-14				WHOLE COIL			
	8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE
AVERAGE	0.0180	0.0148	2.03E+06	AVERAGE	0.0164	0.0131	2.13E+06	AVERAGE	0.0172	0.0139	2.08E+06
STD DEV	0.0010	0.0007	2.29E+05	STD DEV	0.0012	0.0009	1.04E+05	STD DEV	0.0014	0.0012	1.73E+05
RANGE	0.0023	0.0023	5.54E+05	RANGE	0.0026	0.0025	2.20E+05	RANGE	0.0048	0.0042	5.54E+05
MAX	0.0194	0.0160	2.28E+06	MAX	0.0172	0.0143	2.28E+06	MAX	0.0194	0.0160	2.28E+06
MIN	0.0171	0.0137	1.73E+06	MIN	0.0146	0.0118	2.06E+06	MIN	0.0146	0.0118	1.73E+06

GLASS EPOXY TAPE ON CABLE & ALL KAPTON ON WEDGES

Chart Version # 1.0
 SHORT 50MM Inner Coil # 1M-50-129 Experimental Coil

Master Used - Inner Master #1
 Press Fixture Serial Number Used -
 Machine Serial Number Used - Not Available

Shim Size Used - No Shim Used
 Mean Arc of Master - 1.5946°

QUADRANT III POSITION 1-14				QUADRANT IV POSITION 1-14				WHOLE COIL			
	8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE
AVERAGE	0.0058	-0.0015	8.86E+05	AVERAGE	0.0071	-0.0008	9.16E+05	AVERAGE	0.0064	-0.0011	9.01E+05
STD DEV	0.0010	0.0006	5.08E+04	STD DEV	0.0008	0.0012	3.20E+04	STD DEV	0.0010	0.0010	4.25E+04
RANGE	0.0021	0.0019	1.13E+05	RANGE	0.0014	0.0041	7.82E+04	RANGE	0.0030	0.0041	1.13E+05
MAX	0.0068	-0.0007	9.56E+05	MAX	0.0077	0.0014	9.56E+05	MAX	0.0077	0.0014	9.56E+05
MIN	0.0047	-0.0026	8.43E+05	MIN	0.0063	-0.0027	8.78E+05	MIN	0.0047	-0.0027	8.43E+05

(AVERAGES, STD DEV, RANGE, MIN, MAX, FOR CALCULATIONS ABOVE ARE FROM THE COIL WITH RESPECT TO THE MASTER)

ALL KAPTON (H) ON CABLE & WEDGES 50% WRAP OVER 50% WRAP

Chart Version # 1.0
 SHORT 50MM Inner Coil # 1M-50-130 Experimental

Master Used - Inner Master #1
 Press Fixture Serial Number Used -
 Machine Serial Number Used - Not Available

Shim Size Used - No Shim Used
 Mean Arc of Master - 1.5946°

QUADRANT III POSITION 1-14				QUADRANT IV POSITION 1-14				WHOLE COIL			
	8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE
AVERAGE	0.0265	0.0209	1.21E+06	AVERAGE	0.0262	0.0203	1.17E+06	AVERAGE	0.0263	0.0206	1.19E+06
STD DEV	0.0003	0.0006	3.28E+04	STD DEV	0.0012	0.0010	7.56E+04	STD DEV	0.0008	0.0009	5.72E+04
RANGE	0.0006	0.0021	6.95E+04	RANGE	0.0025	0.0037	1.76E+05	RANGE	0.0025	0.0037	1.76E+05
MAX	0.0266	0.0219	1.25E+06	MAX	0.0276	0.0219	1.28E+06	MAX	0.0276	0.0219	1.28E+06
MIN	0.0260	0.0198	1.19E+06	MIN	0.0251	0.0182	1.10E+06	MIN	0.0251	0.0182	1.10E+06

(AVERAGES, STD DEV, RANGE, MIN, MAX, FOR CALCULATIONS ABOVE ARE FROM THE COIL WITH RESPECT TO THE MASTER)

ALL KAPTON (H) ON CABLE AND WEDGES 50% WRAP OVER 66% WRAP

Chart Version # 1.0
SHORT 50MM Outer Coil # 1M-50-227

Master Used - Outer Master #1
Press Fixture Serial Number - 72195
Machine Serial Number Used - SEMI-02

Shim Size Used - No Shim Used

Mean Arc of Master - 1.4513°

QUADRANT III POSITION 1-14				QUADRANT IV POSITION 1-14				WHOLE COIL			
	8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE
AVERAGE	-0.0002	-0.0024	2.67E+06	AVERAGE	-0.0009	-0.0034	2.33E+06	AVERAGE	-0.0005	-0.0029	2.45E+06
STD DEV	0.0008	0.0009	1.88E+05	STD DEV	0.0008	0.0010	2.94E+05	STD DEV	0.0007	0.0010	2.60E+05
RANGE	0.0017	0.0032	4.42E+05	RANGE	0.0013	0.0030	7.04E+05	RANGE	0.0019	0.0038	8.29E+05
MAX	0.0004	-0.0019	2.77E+06	MAX	-0.0002	-0.0021	2.64E+06	MAX	0.0004	-0.0013	2.77E+06
MIN	-0.0013	-0.0045	2.33E+06	MIN	-0.0015	-0.0051	1.94E+06	MIN	-0.0015	-0.0051	1.94E+06

(AVERAGES, STD DEV, RANGE, MIN, MAX, FOR CALCULATIONS ABOVE ARE FROM THE COIL WITH RESPECT TO THE MASTER)

GLASS-EPOXY TAPE ON CABLE & KAPTON WEDGES

Chart Version # 1.0
SHORT 50MM Outer Coil # 1M-50-230 EXPERIMENTAL

Master Used - Outer Master #1
Press Fixture Serial Number Used -
Machine Serial Number Used - Not Available

Shim Size Used - No Shim Used

Mean Arc of Master - 1.4513°

QUADRANT III POSITION 1-14				QUADRANT IV POSITION 1-14				WHOLE COIL			
	8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE
AVERAGE	-0.0043	-0.0095	1.12E+06	AVERAGE	-0.0043	-0.0101	1.05E+06	AVERAGE	-0.0043	-0.0098	1.09E+06
STD DEV	0.0005	0.0004	6.19E+04	STD DEV	0.0004	0.0004	6.39E+04	STD DEV	0.0004	0.0005	7.06E+04
RANGE	0.0010	0.0014	1.48E+05	RANGE	0.0008	0.0014	1.44E+05	RANGE	0.0012	0.0019	2.33E+05
MAX	-0.0040	-0.0088	1.19E+06	MAX	-0.0038	-0.0093	1.10E+06	MAX	-0.0038	-0.0088	1.19E+06
MIN	-0.0050	-0.0102	1.04E+06	MIN	-0.0046	-0.0107	9.56E+05	MIN	-0.0050	-0.0107	9.56E+05

(AVERAGES, STD DEV, RANGE, MIN, MAX, FOR CALCULATIONS ABOVE ARE FROM THE COIL WITH RESPECT TO THE MASTER)

ALL KAPTON 50% WRAP OVER 50% WRAP

Chart Version # 2.0 10/19/91
SHORT 50MM Outer Coil # 1M-50-231 EXPERIMENTAL

Master Used - Outer Master #1
Press Fixture Serial Number Used -
Machine Serial Number Used - Not Available

Shim Size Used - No Shim Used

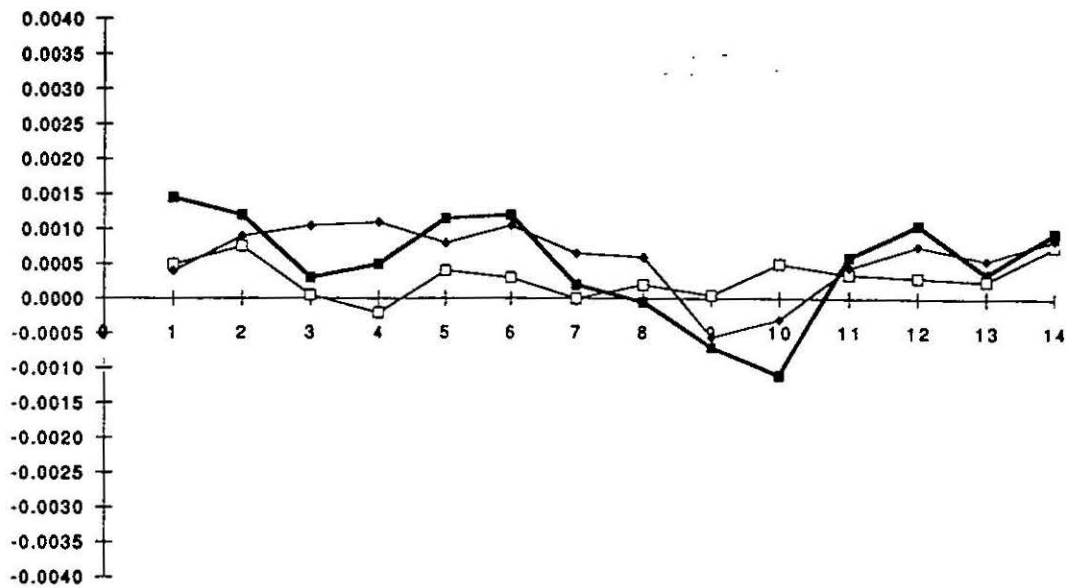
Mean Arc of Master - 1.4513°

QUADRANT III POSITION 1-14				QUADRANT IV POSITION 1-14				WHOLE COIL			
	8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE		8 kpsi	12 kpsi	MOE
AVERAGE	0.0225	0.0168	1.13E+06	AVERAGE	0.0212	0.0156	1.16E+06	AVERAGE	0.0218	0.0162	1.15E+06
STD DEV	0.0003	0.0009	1.07E+04	STD DEV	0.0016	0.0015	4.86E+04	STD DEV	0.0013	0.0014	3.73E+04
RANGE	0.0008	0.0033	2.16E+04	RANGE	0.0037	0.0045	1.10E+05	RANGE	0.0037	0.0045	1.10E+05
MAX	0.0228	0.0179	1.13E+06	MAX	0.0233	0.0183	1.20E+06	MAX	0.0233	0.0183	1.20E+06
MIN	0.0220	0.0146	1.11E+06	MIN	0.0196	0.0138	1.09E+06	MIN	0.0196	0.0138	1.09E+06

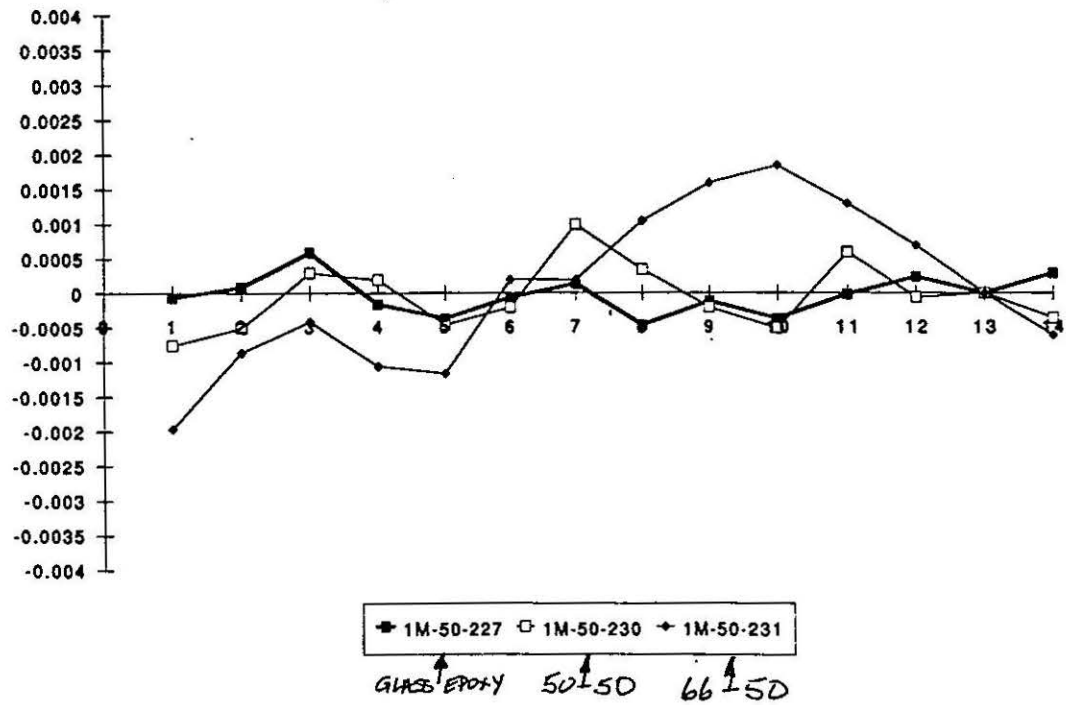
(AVERAGES, STD DEV, RANGE, MIN, MAX, FOR CALCULATIONS ABOVE ARE FROM THE COIL WITH RESPECT TO THE MASTER)

ALL KAPTON 50% WRAP OVER 66% WRAP

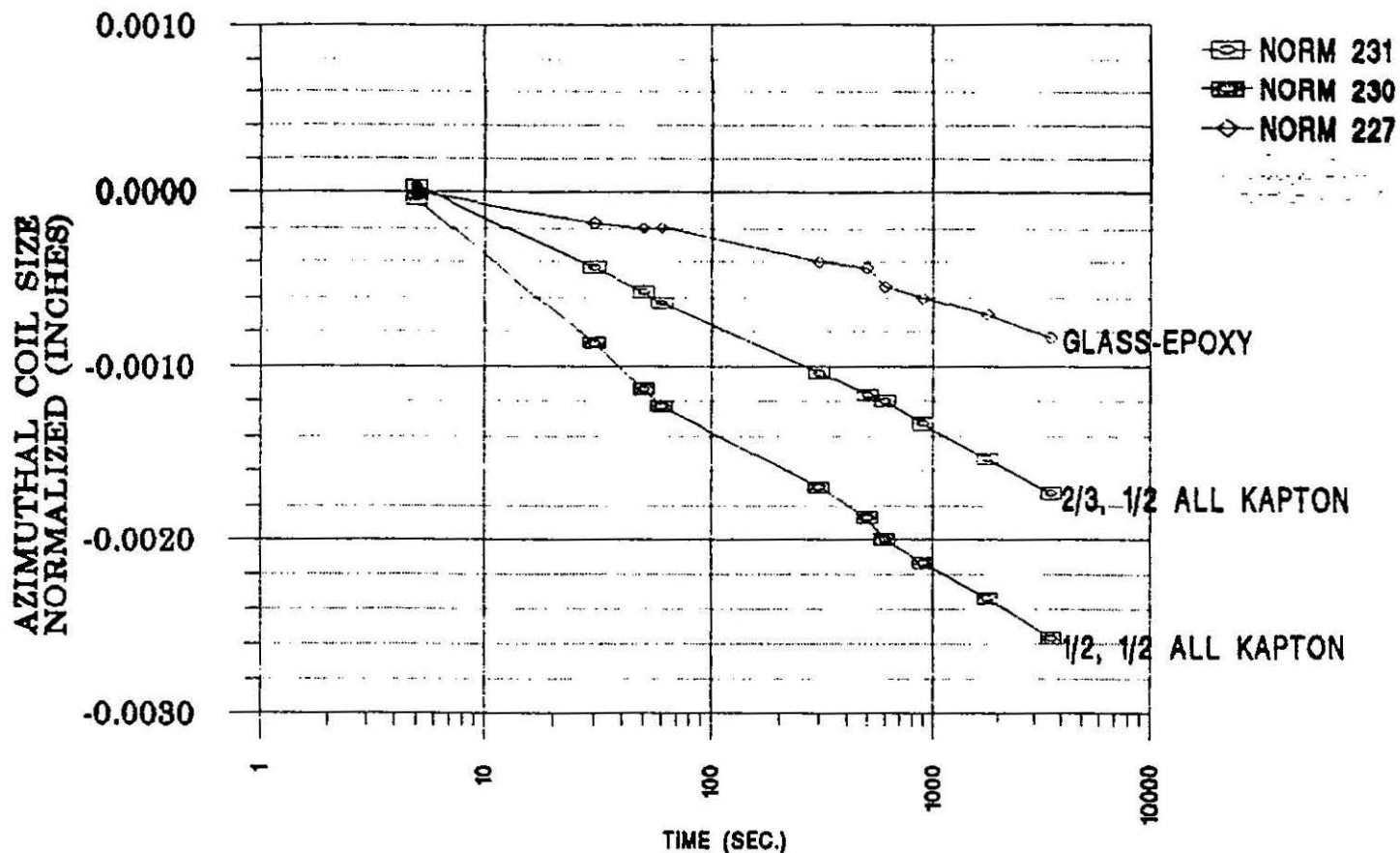
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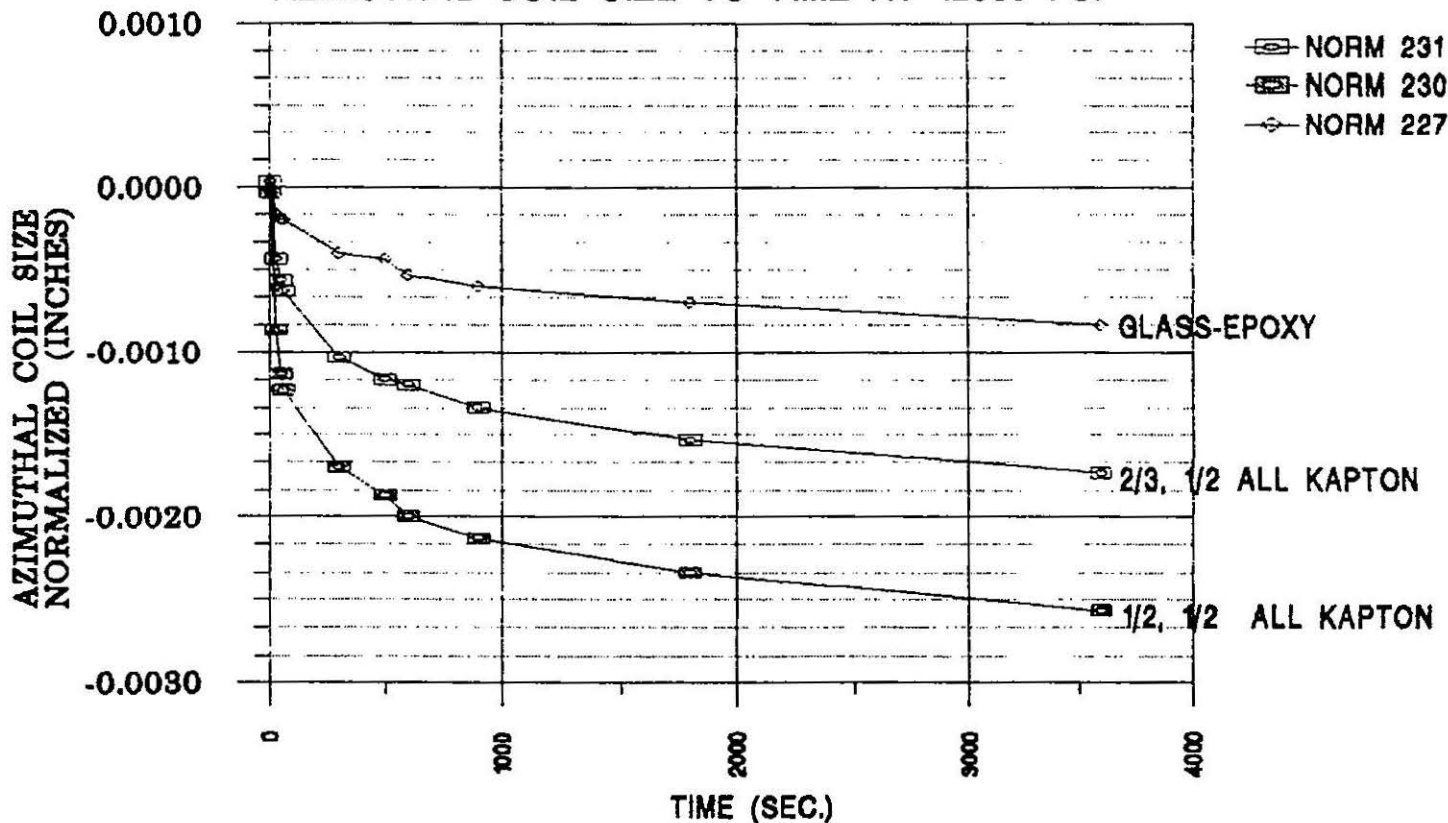
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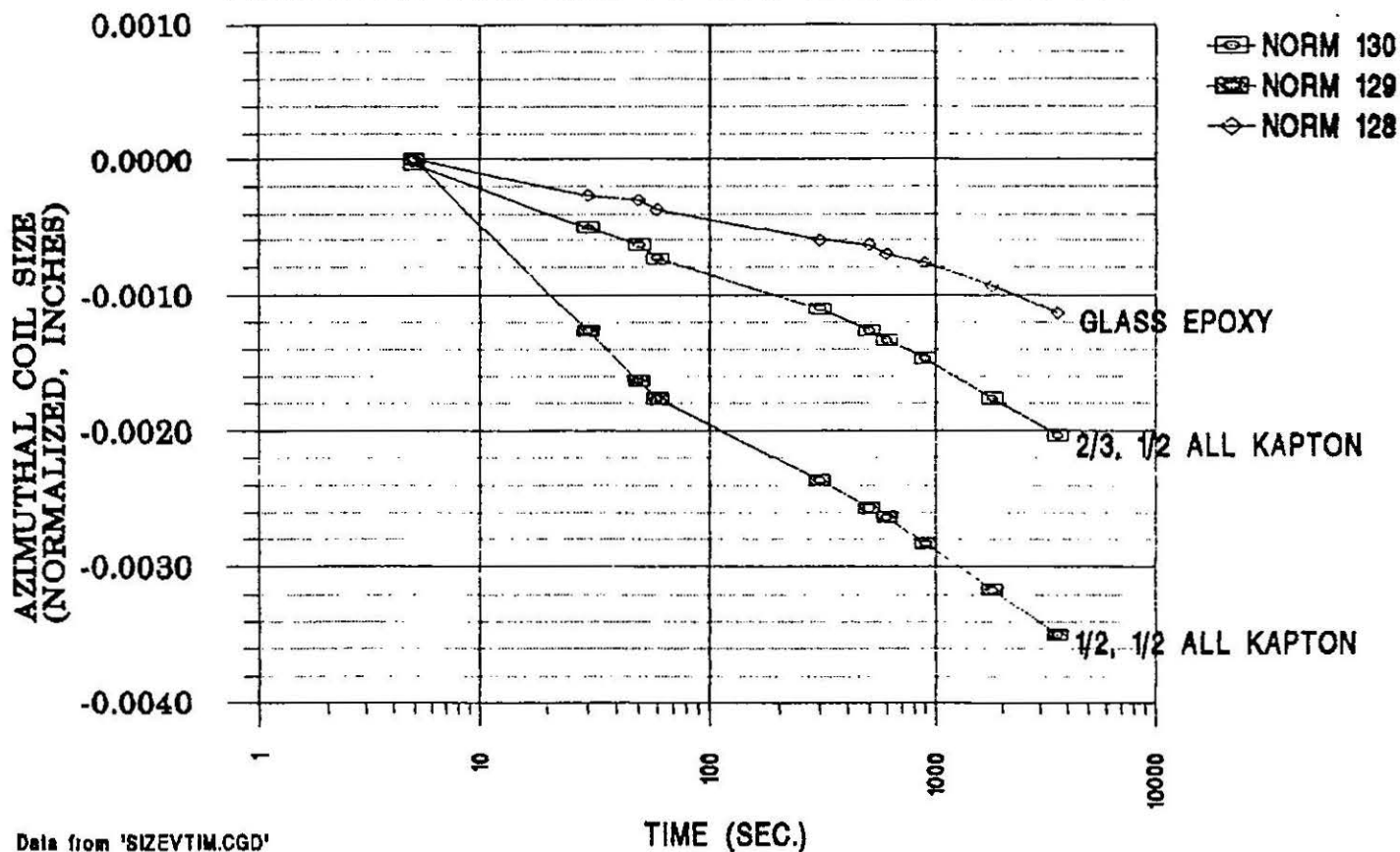
SSC 50 mm OUTER COIL AZIMUTHAL COIL SIZE VS TIME AT 12000 PSI



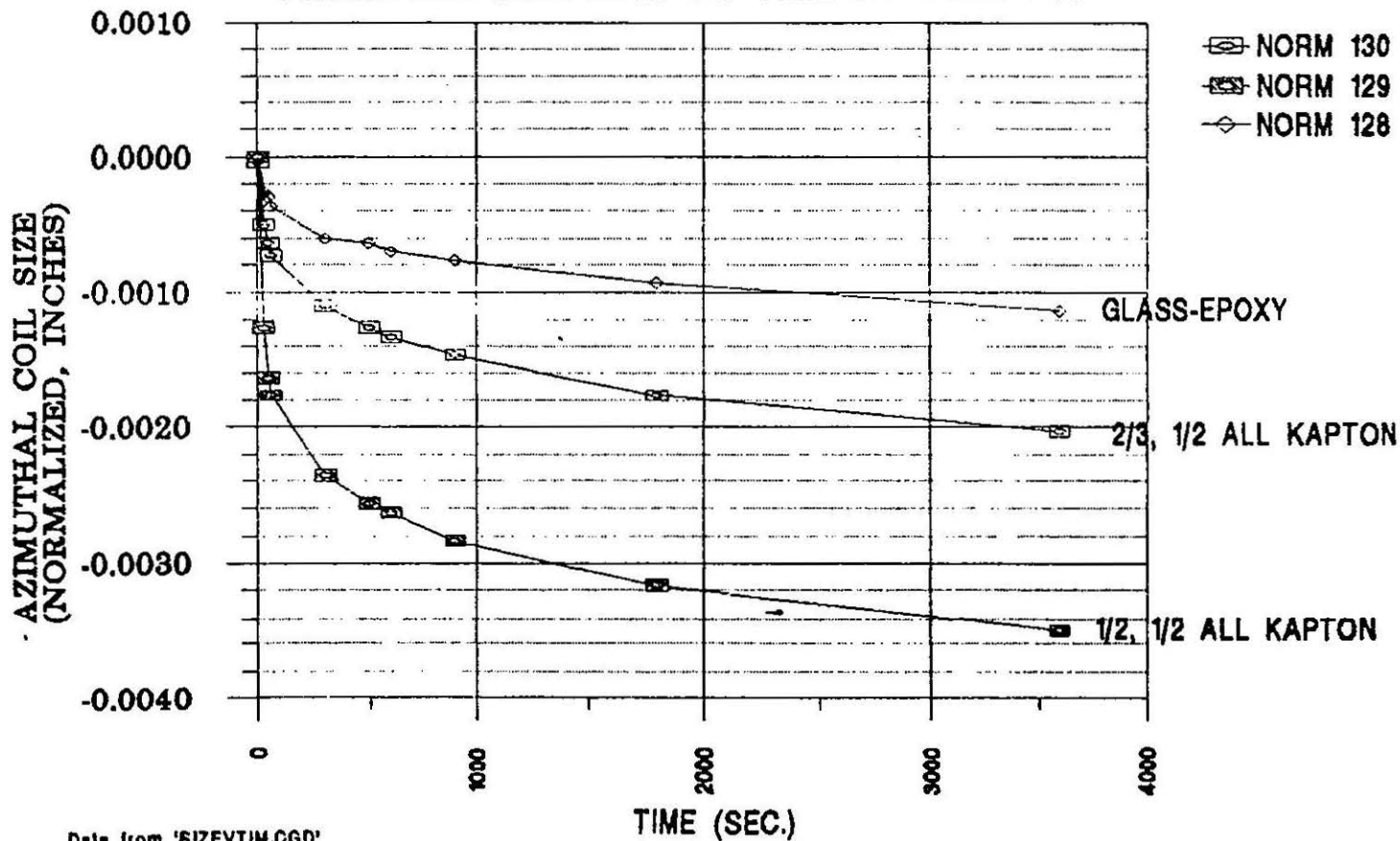
SSC 50mm OUTER COIL AZIMUTHAL COIL SIZE VS TIME AT 12000 PSI



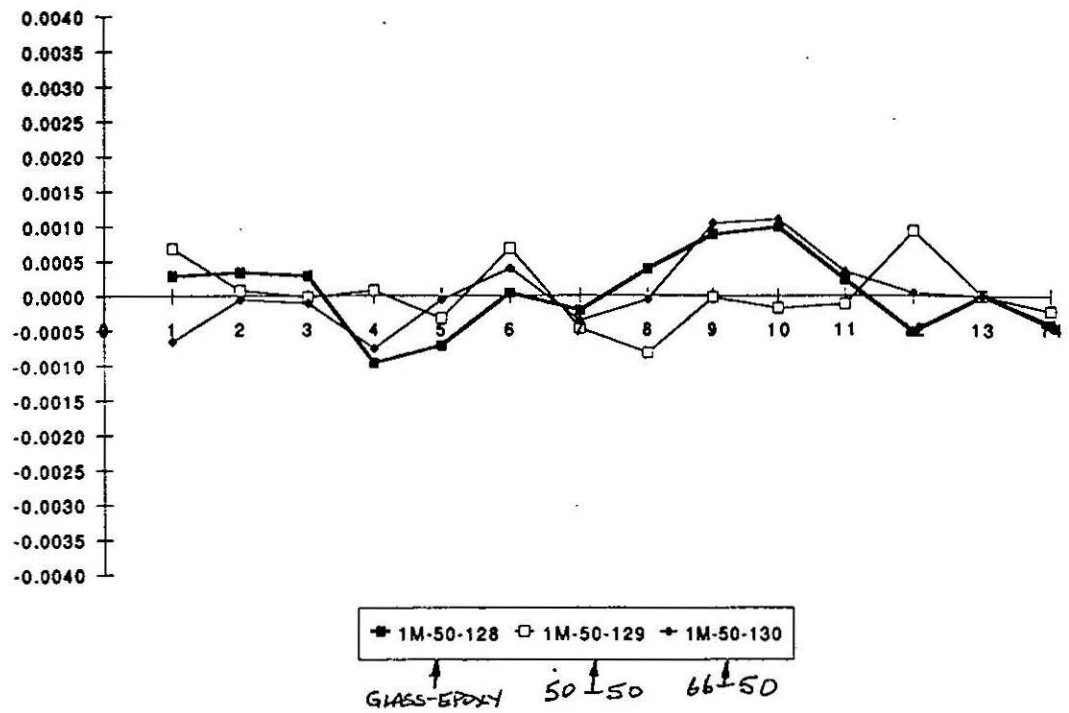
SSC 50 mm INNER COIL AZIMUTHAL COIL SIZE VS LOG TIME AT 12000 PSI



SSC 50 mm INNER COIL AZIMUTHAL COIL SIZE VS TIME AT 12000 PSI



VERTICAL ERROR (QUAD. VII + IMV / 2)



HORIZONTAL ERROR (QUAD. VII - IMV / 2)

