Wire Procurement and Quality Control
for the BABAR Drift Chamber

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Field Wires

Order twice nominal length to allow for loss during stringing.

14,208 field wires, 120-µm gold-plated aluminum.

Order 300,000 ft (change diamond dies every 10,000 ft).

7,456 clearing wires, 80-µm gold-plated aluminum.

Order 150,000 ft.

Vendor: California Fine Wire.

Order placed Sept. 20, 1996.

Cost: $129.5k

See Princeton/BaBar/TNDC-96-47.
Quality Control

At least one sample from every spool will be tested as follows:

1. Wire diameter: weigh a 1-m length on a Mettler AT1005 Mass Comparator (accuracy: 0.02 mg); determine $\rho r^2$ to 1% ⇒ can determine gold-plating thickness on aluminum (but not tungsten) wire.

2. Spring constant and breaking force: measure elongation vs. force with a Mitutoyo micrometer and a Denver Instruments balance interfaced to a PC.

3. Surface appearance: use an Amray 1200B scanning electron microscope; option to perform x-ray analysis.

Occasional tests of:

1. Creep.

2. High-voltage behavior.

See Princeton/BaBar/TNDC-96-46.
Yield Measurements for Al Wire

CFW Al 5056 wire

\[ T(g) = 62.8 \times dL(mm) \]

\[ \text{d} = 0.081 \text{mm}, \ L = 587.4 \text{mm} \]

Ag coated

yield = 280 g

Au coated

yield = 390 g

KEK Al wire sample, uncoated

\[ d = 0.124 \text{mm}, \ L = 0.568 \text{m} \]

original wire, \( d = 0.124 \text{mm} \)

after stretch, \( d = 0.121 \text{mm} \)

after stretch, \( d = 0.118 \text{mm} \)

breaking here

CFW Al wire, \( d = 0.119 \text{mm} \)

\[ E = 69.6 \text{GPa} \]

\[ E = 70.8 \text{GPa} \]
Creep Tests Beginning June 1996

Legend
- 3.2mil_Al,58g
- 3.2mil_Al,90g
- 3.2mil_Al,114g
- 4.7mil_Al,92g
- 4.7mil_Al,140g
- 4.7mil_Al,177g

Legend
- CSU_4.7mil_180g
- CSU_4.7mil_146g
- CSU_3.2mil_84g
- CSU_3.2mil_109g
- kek_91g
- kek_192g
- kek_132g
- kek_230g
Recent Wire Shows Greater Creep

Legend
- $Y=0.9869-0.001X$
- $Y=0.9951-0.0013X$
- 0.08mm, date 4/17/96
- 0.12mm, date 4/17/96

CFW Al wire, lot# 10274/17967,96730/18496

Legend
- $Y=0.9571-0.004X$
- $Y=0.9586-0.0029X$
- $Y=0.9652-0.0022X$
- Spool#10
- Spool#2
- Spool#4

CFW Al wire, 0.12mm, lot# 96730/18868, date 9/5/96
Sense Wires

7104 sense wires, 20-μm gold-plated tungsten.
Wire from Thermionics Products; good stiffness.
Wire from Luma; better surface but less stiff, lower yield.
LUMA tungsten wire, \( d = 0.02 \text{mm} \)

Grade 2, no Rhenium

Yield = 76g

\( E = 354 \text{GPa} \)

LUMA tungsten wire, \( d = 0.02 \text{mm} \)

Grade 3, 3% Rhenium

Yield = 107g

\( E = 350 \text{GPa} \)