

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website

Relativistic Heavy Ion Collider
Magnet Division Procedure

Proc. No.: RHIC-MAG-M-7422

Issue Date: June 2, 1993

Rev. No.: F

Rev. Date: July 29, 1996

Class: Ancillary Specification

Title: The CQS Magnet Multi-Layer Insulation Fabrication

- Prepared by: Signature on File
- Cognizant Engineer/Scientist: Signature on File
- Head, Magnet Production Group: Signature on File
- Q. A. Approval: Signature on File
- ES&H Review: Signature on File

REVISION RECORD

| Rev. No. | Date | Page | Subject | Approval | QA | ES&H |
|----------|---------|------|--------------------------|----------|----|------|
| A | 6/2/93 | | Initial Release. | | | |
| B | 1/13/94 | | Changes per ECN MG00571. | | | |
| C | 5/2/94 | | Changes per ECN MG00697. | | | |
| D | 8/5/94 | | Changes per ECN MG00731. | | | |
| E | 10/6/94 | | Changes per ECN MG00781. | | | |
| F | 7/29/96 | | Changes per ECN MG00942. | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

1 Scope:

This procedure establishes the requirements for the fabrication of the insulation blankets for the drawings as given below.

2 Applicable Documents:

The following documents form a part of this procedures.

Drawings

| | |
|-------------|---|
| 12100005 | Blanket, Insulation Multilayer - Heat Shield, Outer |
| 12105050 | Blanket, Insulation Multilayer - Magnet, Inner |
| 12105051 | Blanket, Insulation Multilayer - Magnet, Outer, No. 1 |
| 12105052 | Blanket, Insulation Multilayer - Heat Shield, Inner |
| 12050123 | Blanket, Insulation Multilayer - Cradle |
| 12100043 | Spacer Material |
| 12065041-01 | Blanket, Insulation Multilayer - Post, Cylinder |
| 12065042-02 | |
| 12065067-1 | Blanket, Insulation Multilayer - Baffle |
| 12065067-2 | Blanket, Insulation Multilayer - Baffle |
| 12065068 | Rod - Baffle |
| 12065070 | Baffle Assembly |
| 12065071 | Nut - Push on |
| 12065072 | Washer, Nylon |
| 12065080 | Hat, Insulation, Multilayer - Baffle |
| 12105070 | Blanket, Insulation Multilayer - Magnet, Outer, No. 2 |
| 12120047 | CQ8 Inner Blanket |
| 12120048 | CQ8 Outer #1 Blanket |
| 12120049 | CQ8 Outer #2 Blanket |
| 12120050 | CQ8 Heat Shield Blanket |
| 12120080 | CQ8 Heat Shield Outer Blanket |
| 12120028 | CQ7 Inner Blanket |
| 12120029 | CQ7 Outer #1 Blanket |
| 12120030 | CQ7 Outer #2 Blanket |
| 12120031 | CQ7 Heat Shield Blanket |
| 12120081 | CQ7 Heat Shield Outer Blanket |
| 12120009 | CQT4 Inner Blanket |
| 12120010 | CQT4 Outer #1 Blanket |
| 12120011 | CQT4 Outer #2 Blanket |
| 12120012 | CQT4 Heat Shield Blanket |
| 12120082 | CQT4 Heat Shield Outer Blanket |
| 01025063 | DU4 Heat Shield Outer Blanket |
| 01025062 | DU4 Heat Shield Inner Blanket |
| 01025055 | DU6/9 Heat Shield Outer Blanket |
| 01025054 | DU6/9 Heat Shield Inner Blanket |
| 01025065 | DU7 Heat Shield Outer Blanket |
| 01025064 | DU7 Heat Shield Inner Blanket |

3 Requirements:

3.1 Process Material - The following process materials are referenced for use in this procedure and shall be controlled for procurement, use, storage, and handling by the requirements listed below. Substitutions require prior BNL approval in writing.

| <u>Procedure Reference</u> | <u>Technical Reference</u> | <u>Source/Control</u> |
|--|--|--|
| Reemay spunbonded Polyester | 2006 5 Mils thick | Reemay Corp. Old Hickory, TN |
| Dacron Polyester Fiber Greensboro, NC | Nexus Style 100-10 | Precision Fabric Group Inc., |
| Mylar, Aluminum coated (aluminized) both sides, non crinkled | 1/4 Mil thick 1 Mil thick 7 Mils thick | Scharr Industries, Inc. Bloomfield, CT Metallized Engineering, Inc. Waterbury, CT Dunmore Corporation Newtown, PA Madico, Inc. Woburn, MA |
| Ultrasonic Welding gun | 1/32 inch tip | Branson Sonic Power Company Danbury, CT or approved source |

3.2 Insulation Blanket Fabrication Procedures

3.2.1 Blanket, Insulation, Multilayer - Magnet, Inner

Drawing 12105050 12120047 12120028 12120009

3.2.1.1 Make the blanket from two layers of the non-crinkled, both sides coated 380Å, aluminized Mylar 1 mil thick, 15 layers of the non-crinkled, both sides coated 380Å, aluminized Mylar 1/4 mil thick and 32 layers of the spunbonded polyester 5 mils thick. All layers are 40 inches wide and 117 inches long. Alternate layers of the spunbonded polyester and the aluminized Mylar so the two outside layers of the finished blanket are 1 mil thick aluminized Mylar. Stack layers squarely.

3.2.1.2 Attach twenty eight (28) strips of 1 inch wide x 2 inches long, Dacron Polyester Fiber, 10 mils thick (Dwg. 12100043) to the blanket under each weld.

3.2.1.3 Cut slots in the blanket at locations shown on the drawing.

3.2.1.4 Mark the blanket: 12105050 and revision letter.

3.2.2 Blanket, Insulation, Multilayer - Magnet, Outer

Drawing 12105051 12120048 12120029 12120010

3.2.2.1 Make the blanket from one layer of the non-crinkled, both side coated 380Å, aluminized Mylar 1 mil thick, 22 layers of the non-crinkled, both sides coated 380Å, aluminized Mylar 1/4 mil thick and 23 layers of the spunbonded polyester 5 mils thick. All layers are 65 inches wide and 108 inches long. Alternate layers of the spunbonded polyester and the aluminized Mylar so the two outside layers of the finished blanket are polyester and 1 mil thick aluminized Mylar. Stack layers squarely.

3.2.2.2 Attach twelve (12) strips of 1 inch wide x 2 inches long, Dacron Polyester Fiber, 10 mils thick (Dwg. 12100043) to the blanket under each weld.

3.2.2.3 Cut holes in the blanket at locations shown on the drawing.

3.2.2.4 Mark the blanket: 12105051 and revision letter.

Drawing 12105070 12120049 12120030 12120011

3.2.2.5 Make the blanket from one layer of the non-crinkled, both side coated 380Å, aluminized Mylar 1 mil thick, 14 layers of the non-crinkled, both sides coated 380Å, aluminized Mylar 1/4 mil thick and 30 layers of the spunbonded polyester 5 mils thick. All layers are 65 inches wide and 112 inches long. Alternate layers of the spunbonded polyester and the aluminized Mylar so the two outside layers of the finished blanket are polyester and 1 mil thick aluminized Mylar. Stack layers squarely.

3.2.2.6 Attach fifteen (15) strips of 1 inch wide, 2 inches long, Dacron Polyester Fiber, 10 mils thick (Dwg. 12100043) to the blanket under each weld.

3.2.2.7 Cut holes in the blanket at locations shown on the drawing.

3.2.2.8 Mark the blanket: 12105070 and revision letter.

3.2.3 Blanket, Insulation, Multilayer - Heat Shield

| | | |
|---------|----------|----------|
| Drawing | 12105052 | 12100005 |
| | 12120050 | 01025063 |
| | 12120080 | 01025062 |
| | 12120031 | 01025055 |
| | 12120081 | 01025054 |
| | 12120012 | 01025065 |
| | 12120082 | 01025064 |

3.2.3.1 Make the blanket from one layer of the non-crinkled, both sides coated 380Å , aluminized Mylar 1 mil thick, 30 layers of the non-crinkled, both sides coated 380Å , aluminized Mylar 1/4 mil thick and 31 layers of the spunbonded polyester 5 mils thick. All layers are 76 inches wide and P/N 12105052 is 108 inches long and P/N 12100005 is 104 inches long. Alternate layers of the spunbonded polyester and the aluminized Mylar so the two outside layers of the finished blanket are polyester and 1 mil thick aluminized Mylar. Stack layers squarely. (Two blankets will be required.)

3.2.3.2 Attach twelve (12) strips of 1 inch wide x 2 inches long, Dacron Polyester Fiber, 10 mils thick (Dwg. 12100043) to the blanket under each weld.

3.2.3.3 Cut holes in the blanket at locations shown on the drawing.

3.2.3.4 Mark the blanket: 12105052 or 12100005 and revision letter.

3.2.4 Blanket, Insulation, Multilayer - Post, Cylinder

Drawing 12065041-01 & -02

3.2.4.1 Make the blanket from 4 layers of the non-crinkled both sides coated 380Å, aluminized Mylar 1/4 mil thick and 5 layers of the spunbonded polyester 5 mils thick. All layers are 4.5 inches wide and P/N 12065041-01 is 29.0 inches long and P/N 12065041-02 is 58.0 inches long. Alternate layers of the spunbonded polyester and the aluminized Mylar so the two outside layers of the finished blanket are polyesters. Stack layers squarely.

3.2.4.2 Attach the blanket as called out in the drawing.

3.2.4.3 Mark the blanket: 121065041 and revision letter.

3.2.5 Blanket, Insulation, Multilayer - Baffle

Drawing 12065067-1

3.2.5.1 Make the blanket from two (2) layers of the non-crinkled, both sides coated 380Å, aluminized Mylar, 7 mils thick, 6 inches in diameter, thirteen (13) layers of the spunbonded polyester 5 mils thick, and twelve (12) layers of the non-crinkled, both sides coated, aluminized Mylar, 1/4 mil thick. All layers are 9 inches in diameter (except 7 mils thick Mylar). Alternate layers of the aluminized Mylar and the spunbonded polyester so the two outside layers of the finished blanket are 7 mils thick aluminized Mylar.

3.2.5.2 Use the ultrasonic welding gun to weld the blanket as called out in drawing.

3.2.5.3 Mark the blanket: 12065067-1 and revision letter.

3.2.6 Blanket, Insulation, Multilayer - Baffle

Drawing 12065067-2

3.2.6.1 Make the blanket from two (2) layers of the non-crinkled, both sides coated 380Å, aluminized Mylar, 7 mils thick, 6 inches in diameter, thirteen (13) layers of the spunbonded polyester 5 mils thick, and twelve (12) layers of the non-crinkled, both sides coated, aluminized Mylar, 1/4 mil thick. All layers are 8-1/4 inches in diameter (except 7 mils thick Mylar). Alternate layers of the aluminized Mylar and the spunbonded polyester so the two outside layers of the finished blanket are 7 mils thick aluminized Mylar.

3.2.6.2 Use the ultrasonic welding gun to weld the blanket as called out in the drawing.

3.2.6.3 Mark the blanket: 12065067-2 and revision letter.

3.2.7 Hat, Insulation, Multilayer - Baffle

Drawing 12065080

3.2.7.1 Make the blanket from two (2) layers of the non-crinkled, both sides coated 380Å, aluminized Mylar 7 mils thick, twelve (12) layers of the non-crinkled, both sides coated, 1/4 mil thick aluminized Mylar, and thirteen (13) layers of the spunbonded polyester 5 mils thick. All layers are 6 inches in diameter, except the 7 mils thick Mylar (see Item 3 on drawing). Alternate layers of aluminized Mylar and the spunbonded polyester layers so the outside layers are 7 mils thick aluminized Mylar.

3.2.7.2 Make the blanket from four (4) layers of the non-crinkled, both sides coated 380Å, 1/4 mil thick aluminized Mylar and five (5) layers of the spunbonded polyester 5 mils thick. All layers are 20 inches long and 2-1/2 inches wide. Alternate all layers so the two outside layers are polyesters. Stack layers squarely.

3.2.7.3 Use the ultrasonic welding gun to weld the blanket as called out in the drawing.

3.2.7.4 Mark the blanket: 12065080 and revision letter.

The only official copy of this file is the one on-line on the Superconducting Magnet Division website. Before using a printed copy, verify that it is the most current version by checking the document issue date on the website.

RHIC-MAG-M-7422F

Page 7 of 7

3.2.8 Magnet - Blanket, Insulation, Multilayer - Cradle

Drawing 12050123

3.2.8.1 Make the blanket from 5 layers of non-crinkled, both sides coated 380Å, aluminized Mylar 1/4 mil thick and 6 layers of the spunbonded polyester 5 mils thick. All layers are 14 inches wide and 36 inches long. Alternate layers of the spunbonded polyester and the aluminized Mylar so the two outside layers of the finished blanket are polyesters. Stack layers squarely.

3.2.8.2 Use the ultrasonic welding gun to weld blanket as called out in the drawing.

3.2.8.3 Mark the blanket: 12050123 and revision letter.

4 Quality Assurance Provisions:

4.1 The Quality Assurance Provisions of this specification require compliance with all procedural instruction contained herein.

5 Preparation for Delivery:

N/A