Individual Quality Control Plan for WBS 6.10.04.03 (Proximity Focusing Ring Imaging Cherenkov)

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Individual Quality Control Plan for WBS 6.10.04.03			**Revision:** 0

REVISION HISTORY

Revision #	Effective Date	Additional Reviewers	Summary of Change
00			Initial release.

TABLE OF CONTENTS

LIST OF ACRONYMS

BNL	Brookhaven National Laboratory
EIC	Electron-Ion Collider
FRD	Functional Requirements Document
GRD	General Requirements Document
JLAB	Thomas Jefferson National Accelerator Facility
MIP	Manufacturing Inspection Plan
PRD	Performance Requirements Document
QC	Quality Control

Individual Quality Control Plan for WBS 6.10.04.03 (Proximity Focusing Ring Imaging Cherenkov)

1. BACKGROUND & PURPOSE

Individual product Quality Control Plans are an extension of the overall Detector Systems Product Quality Control Plan and provide detailed descriptions of the quality control factors that are relevant to a specific product. Like all Quality Control Plans, they are required by the EIC Requirements Management Plan and are used to ensure that a system or deliverable will satisfy all pertinent requirements and specifications.

The plan should be developed in accordance with the requirements of the EIC Project Plans and Documents referenced in Table 1.

Table 1. EIC Project Plans and Documents

Document Name	Document Number
Integrated Safety Management Plan (ISMP)	add document number
Global Requirements Document (GLRD)	add document number
Requirements Management Plan (RMP)	
Interface Management Plan (IMP)	add document number
EIC Codes of Record	EIC-ORG-RSI-026
Configuration Management Plan	add document number
EIC Quality Assurance Plan	EIC-QAG-PLN-002
Detector Systems Product Quality Control Plan	

1.1. Responsibilities

Per the Quality Assurance Plan, L3 Managers are responsible for developing Quality Control (QC) Plans for their areas of responsibility and are to ensure that:

- the plans are available and controlled,
- teams are working in accordance with the plans, and
- plans are review at an adequate frequency to identify need for change, or to support advance planning of acquisitions and procurements (whether tangible or services, like designs) from other providers (Vendors, In-Kind Contributors, Partners)

1.2. Categories of Producers

In general, all sub-systems and components in the Detector System will be obtained from one of three possible sources: vendor contract, institutional partner, or in-house construction. These sources are described in detail in the Detector Systems Product Quality Control Plan.

2. SCOPE OF QUALITY CONTROL PLAN

This Individual Quality Control Plan addresses the components within WBS 6.10.04.03 (Proximity Focusing Ring Imaging Cherenkov) that require supplemental documentation beyond what is provided in the Detector Systems Product Quality Control Plan. This section will identify the pertinent components or assemblies within the WBS that are covered by this plan, and will identify the category of provider (vendor contract, institutional partner, or in-house construction), and the approach for quality assurance that will be used for that product.

2.1. Aerogel

This component is composed of multiple sub-components, each of which has their own quality assurance requirements which are detailed in this document. These include:

- Material Purchase
- Material Tests

The following quality control measures are required:

- In-Process Inspection and Test — Section 4/5
- Incoming Inspection and Acceptance Test — Section 6
- Travelers, Procedures, and Checklists — Section 7
- Verification Plans, Methods, and Activities — Section 8
- Deliverable Documentation and Records — Section 9
- Control of Nonconformances — Section 14
- Packaging/Transportation/Shipping — Section 15

2.2. Mirrors

This component is composed of multiple sub-components, each of which has their own quality assurance requirements which are detailed in this document. These include:

- Material Purchase
- Mirror Assembly & Tests

The following quality control measures are required:

- In-Process Inspection and Test — Section 4/5
- Incoming Inspection and Acceptance Test — Section 6
- Travelers, Procedures, and Checklists — Section 7
- Verification Plans, Methods, and Activities — Section 8
- Deliverable Documentation and Records — Section 9
- Associated Equipment — Section 10
- Calibration Plans — Section 11
- Control of Nonconformances — Section 14
- Packaging/Transportation/Shipping — Section 15

2.3. Photosensors (HRPPDs)

This component is composed of multiple sub-components, each of which has their own quality assurance requirements which are detailed in this document. These include:

- Material Purchase
- Material Tests & Assembly
- Material Tests

The following quality control measures are required:

- In-Process Inspection and Test — Section 4/5
- Incoming Inspection and Acceptance Test — Section 6
- Travelers, Procedures, and Checklists — Section 7
- Verification Plans, Methods, and Activities — Section 8
- Deliverable Documentation and Records — Section 9
- Calibration Plans — Section 11
- Serialization and Material Traceability Requirements — Section 12
- Control of Nonconformances — Section 14
- Packaging/Transportation/Shipping — Section 15

2.4. Vessel

This component is composed of multiple sub-components, each of which has their own quality assurance requirements which are detailed in this document. These include:

- Material Purchase

The following quality control measures are required:

- In-Process Inspection and Test — Section 4/5
- Incoming Inspection and Acceptance Test — Section 6
- Verification Plans, Methods, and Activities — Section 8
- Deliverable Documentation and Records — Section 9
- Serialization and Material Traceability Requirements — Section 12
- Planned Partner and Vendor Communication & Visits — Section 13
- Control of Nonconformances — Section 14
- Packaging/Transportation/Shipping — Section 15

2.5. Laser Monitoring System

This component is composed of multiple sub-components, each of which has their own quality assurance requirements which are detailed in this document. These include:

- Material Purchase
- Assembly & Tests
- Laser
- Support Stand
- Control System

The following quality control measures are required:

3. REQUIREMENTS TRACEABILITY

Requirement traceability will be accomplished as described in Section 3 of Detector Systems Product Quality Control Plan.

SPECIFIC QUALITY CONTROL MEASURES

4. IN-PROCESS INSPECTION AND TEST

In-process inspections and tests for components **built in-house** provide a mechanism for detecting non-conformances in materials, components, or assemblies during fabrication and assembly. This allows problems to be identified and corrected as early as possible, minimizing the impact of manufacturing deficiencies.

Test plans, technical reports, test results, and other documentation resulting from these inspections and tests will be compiled into a report and placed in the central data repository. The document will be referenced through the document index on the EIC Systems Engineering portal.

4.1. Laser Monitoring System

This component is composed of multiple sub-components/activities which have independent quality control parameters.

4.1.1. Support Stand

- In Process Inspections

  This component will be constructed in-house and is subject to in process inspections. Details are provided in the reference: Laser Monitoring System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

- In Process Testing

  This component will be constructed in-house and is subject to in process testing. Details are provided in the reference: Laser Monitoring System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

- Documentation Deliverables

  Test plans, technical reports, test results and other documentation will be produced from the inspections and tests, and must be provided to the project. Details are provided in the reference: Laser Monitoring System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

5. OUTSOURCING: VENDOR/PARTNER/CONTRIBUTORS IN-PROCESS

In-process inspections and tests for outsourced components will be addressed differently for each category of providers. In all cases that tests and inspections are required, a test plan will be developed and approved by the project.

Test plans, technical reports, test results, and other documentation resulting from these inspections and tests will be compiled into a report and provided to the project as part of the deliverable. This report will be reviewed, validated, and then placed in the central data repository. The document will be referenced through the document index on the EIC Systems Engineering portal.

5.1. Aerogel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

5.1.1. Material Purchase

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

5.1.2. Material Tests

This component will be produced by an industry partner using in-kind labor and the inspections and tests are identified in the Work Agreement. Additional information is provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

5.2. Mirrors

This component is composed of multiple sub-components/activities which have independent quality control parameters.

5.2.1. Material Purchase

This component will be produced by an industry partner as a service agreement and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

5.2.2. Mirror Assembly & Tests

This component will be produced by an industry partner using in-kind labor and the inspections and tests are identified in the Work Agreement. Additional information is provided in the reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

5.3. Photosensors (HRPPDs)

This component is composed of multiple sub-components/activities which have independent quality control parameters.

5.3.1. Material Purchase

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

5.3.2. Material Tests & Assembly

This component will be produced by an industry partner as a service agreement and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

5.3.3. Material Tests

This component will be produced by an industry partner using in-kind labor and the inspections and tests are identified in the Work Agreement. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

5.4. Vessel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

5.4.1. Material Purchase

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: pfRICH Vessel, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Vessel/

5.5. Laser Monitoring System

This component is composed of multiple sub-components/activities which have independent quality control parameters.

5.5.1. Material Purchase

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: Laser Monitoring System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

5.5.2. Control System

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work.

6. INCOMING INSPECTION AND ACCEPTANCE TESTS

Incoming inspections and acceptance tests are used to confirm that materials or products provided by a vendor or partner institution have been produced in accordance with the plans and specifications, and meet all system requirements. These plans should be developed in conjunction with the transportation and shipping plans to account for potential impacts of moving items between locations.

Incoming inspections and acceptance tests will be addressed differently for each category of providers. These documents identify the schedule and frequency of such tests, how the results will be reported, and which material and documentation should be supplied to the project with the deliverable.

Test plans, technical reports, test results, and other documentation resulting from these inspections and tests will be compiled into a report and placed in the central data repository. The document will be referenced through the document index on the EIC Systems Engineering portal.

6.1. Aerogel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

6.1.1. Material Purchase

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

6.1.2. Material Tests

This component will be produced by an industry partner using in-kind labor and the inspections and tests are identified in the Work Agreement. Additional information is provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

6.2. Mirrors

This component will be produced by an industry partner as a service agreement and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

6.2.1. Mirror Assembly & Tests

This component will be produced by an industry partner using in-kind labor and the inspections and tests are identified in the Work Agreement. Additional information is provided in the reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

6.3. Photosensors (HRPPDs)

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

6.3.1. Material Tests & Assembly

This component will be produced by an industry partner as a service agreement and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

6.3.2. Material Tests

This component will be produced by an industry partner using in-kind labor and the inspections and tests are identified in the Work Agreement. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

6.4. Vessel

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: pfRICH Vessel, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Vessel/

6.5. Laser Monitoring System

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work. Additional information is provided in the reference: Laser Monitoring System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

6.5.1. Control System

This component will be produced as part of a vendor contract and the inspections and tests are identified in the Statement of Work.

7. TRAVELERS, PROCEDURES, AND CHECKLISTS

For every item that is manufactured, the manufacturer will be responsible for maintaining records (travelers) of all raw material that are used in the fabrication process, and document the processes and procedures that were used for production. The resultant documentation will be compiled into a report and will be provided to the project as part of the deliverable. This report will be reviewed, validated, and then placed in the central data repository. The document will be referenced through the document index on the EIC Systems Engineering portal.

7.1. Aerogel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

7.1.1. Material Purchase

- In Process Inspections

  The project will require records of how the materials were acquired, transported, maintained, or disposed. Details are provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

- Production/Fabrication Process Records

  The project will require records for the production, fabrication, or manufacturing process. Details are provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

- In Process Inspections

  The project will require other travelers, procedures, or checklists that are not covered in the preceding sections. Details are provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

7.1.2. Material Tests

- In Process Inspections

  The project will require records of how the materials were acquired, transported, maintained, or disposed. Details are provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

- Production/Fabrication Process Records

  The project will require records for the production, fabrication, or manufacturing process. Details are provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

- In Process Inspections

  The project will require other travelers, procedures, or checklists that are not covered in the preceding sections. Details are provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

7.2. Mirrors

- Production/Fabrication Process Records

  The project will require records for the production, fabrication, or manufacturing process. Details are provided in the reference: Mirror System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

- In Process Inspections

  The project will require other travelers, procedures, or checklists that are not covered in the preceding sections. Details are provided in the reference: Mirror System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

7.2.1. Mirror Assembly & Tests

- Production/Fabrication Process Records

  The project will require records for the production, fabrication, or manufacturing process. Details are provided in the reference: Mirror System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

- In Process Inspections

  The project will require other travelers, procedures, or checklists that are not covered in the preceding sections. Details are provided in the reference: Mirror System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

7.3. Photosensors (HRPPDs)

- In Process Inspections

  The project will require other travelers, procedures, or checklists that are not covered in the preceding sections. Details are provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

7.3.1. Material Tests & Assembly

- In Process Inspections

  The project will require other travelers, procedures, or checklists that are not covered in the preceding sections. Details are provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

7.3.2. Material Tests

- In Process Inspections

  The project will require other travelers, procedures, or checklists that are not covered in the preceding sections. Details are provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

7.4. Laser Monitoring System

- In Process Inspections

  The project will require records of how the materials were acquired, transported, maintained, or disposed. Details are provided in the reference: Laser Monitoring System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

- Production/Fabrication Process Records

  The project will require records for the production, fabrication, or manufacturing process. Details are provided in the reference: Laser Monitoring System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

8. VERIFICATION PLANS: METHODS AND ACTIVITIES

Verification plans are used to coordinate the orderly scheduling of events by providing equipment specifications and organizational requirements, the test methodology to be employed, a list of the test materials to be delivered, and a schedule for user (tester) orientation and participation. Finally, it provides a written record of the required inputs, execution instructions, and expected results of the system test.

The resultant documentation will be compiled into a report and will be provided to the project as part of the deliverable. This report will be reviewed, validated, and then placed in the central data repository. The document will be referenced through the document index on the EIC Systems Engineering portal.

8.1. Aerogel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

8.1.1. Material Purchase

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

- External Verification

  This component will be produced as part of a vendor contract and the verification plans are identified in the Statement of Work. Additional information is provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

8.1.2. Material Tests

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

- External Verification

  This component will be produced by an industry partner using in-kind labor and the verification plans are identified in the Work Agreement. Additional information is provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

8.2. Mirrors

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: Mirror System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

- External Verification

  This component will be produced by an industry partner as a service agreement and the verification plans are identified in the Statement of Work. Additional information is provided in the reference: Mirror System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

8.2.1. Mirror Assembly & Tests

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: Mirror System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

- External Verification

  This component will be produced by an industry partner using in-kind labor and the verification plans are identified in the Work Agreement. Additional information is provided in the reference: Mirror System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

8.3. Photosensors (HRPPDs)

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

- External Verification

  This component will be produced as part of a vendor contract and the verification plans are identified in the Statement of Work. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

8.3.1. Material Tests & Assembly

- Verification as Part of Assembly

This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

- External Verification

  This component will be produced by an industry partner as a service agreement and the verification plans are identified in the Statement of Work. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

8.3.2. Material Tests

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

- External Verification

  This component will be produced by an industry partner using in-kind labor and the verification plans are identified in the Work Agreement. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

8.4. Vessel

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: pfRICH Vessel, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Vessel/

- External Verification

  This component will be produced as part of a vendor contract and the verification plans are identified in the Statement of Work. Additional information is provided in the reference: pfRICH Vessel, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Vessel/

8.5. Laser Monitoring System

- In-House Verification

  If the component will be produced in-house and will be subject to internal verification, then provide details and references here.

8.5.1. Laser

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: Laser Monitoring System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

- In-House Verification

  If the component will be produced in-house and will be subject to internal verification, then provide details and references here.

8.5.2. Support Stand

- In-House Verification

  This component will be produced in-house and will be subject to an internal verification. Details are provided in the reference: Laser Monitoring System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

8.5.3. Control System

- Verification as Part of Assembly

  This component is part of a larger system that will be tested as a complete assembly. Details are provided in the reference: Laser Monitoring System, which is available from the link below:

  https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

- External Verification

  This component will be produced as part of a vendor contract and the verification plans are identified in the Statement of Work.

9. DELIVERABLE DOCUMENTATION AND RECORDS

Documentation and records that must be provided to the project is specified in the Statement of Work, Project Planning Document, work agreement, or work planning documents identified in the preceding sections. All testing and inspection data that is collected as part of the validation, verification and testing plan will be provided to the project as part of the final report.

10. ASSOCIATED EQUIPMENT

Associated equipment describes tools, parts, materials, components, fixtures and assemblies that are independent of the final product. Any associated equipment that must be delivered to the project is identified in the Statement of Work, Project Planning Document, work agreement, or work planning documents identified in the preceding sections. Conditions of acceptance of this material will be described in the validation, verification and testing plan.

Associated equipment that is required for in-house testing is as follows:

10.1. Aerogel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

10.1.1. Material Purchase

If additional equipment must be provided to perform in-house testing, identify and describe the equipment here.

10.1.2. Material Tests

If additional equipment must be provided to perform in-house testing, identify and describe the equipment here.

10.2. Mirrors

A list of the equipment associated with this component is available from reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

10.2.1. Mirror Assembly & Tests

A list of the equipment associated with this component is available from reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

10.3. Photosensors (HRPPDs)

If additional equipment must be provided to perform in-house testing, identify and describe the equipment here.

10.3.1. Material Tests & Assembly

If additional equipment must be provided to perform in-house testing, identify and describe the equipment here.

10.3.2. Material Tests

If additional equipment must be provided to perform in-house testing, identify and describe the equipment here.

10.4. Vessel

If additional equipment must be provided to perform in-house testing, identify and describe the equipment here.

10.5. Laser Monitoring System

A list of the equipment associated with this component is available from reference: Laser Monitoring System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

10.5.1. Control System

If additional equipment must be provided to perform in-house testing, identify and describe the equipment here.

11. CALIBRATION PLANS

Vendors, partners, and employees shall calibrate any measuring and test equipment used in production or testing against certified standards that are traceable to national standards such as the National Institute of Standards and Technology (NIST), or an international standard, or a physical constant. Specific requirements for calibration plans are described in the Detector Systems Product Quality Control Plan.

11.1. Aerogel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

11.1.1. Material Purchase

If a calibration plan is required for this component, provide a reference or describe the procedure here.

11.1.2. Material Tests

If a calibration plan is required for this component, provide a reference or describe the procedure here.

11.2. Mirrors

According to the Statement of Work, a calibration plan is required for this component. Details are available from reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

11.2.1. Mirror Assembly & Tests

According to the Statement of Work, a calibration plan is required for this component. Details are available from reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

11.3. Photosensors (HRPPDs)

According to the Formal Agreement, a calibration plan is required for this component. Details are available from reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

11.3.1. Material Tests & Assembly

According to the Formal Agreement, a calibration plan is required for this component. Details are available from reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

11.3.2. Material Tests

According to the Formal Agreement, a calibration plan is required for this component. Details are available from reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

11.4. Vessel

If a calibration plan is required for this component, provide a reference or describe the procedure here.

11.5. Laser Monitoring System

If a calibration plan is required for this component, provide a reference or describe the procedure here.

11.5.1. Control System

If a calibration plan is required for this component, provide a reference or describe the procedure here.

12. SERIALIZATION AND MATERIAL TRACEABILITY REQUIREMENTS

Requirements for serialization of parts and materials are as described below.

12.1. Aerogel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

12.1.1. Material Purchase

This component cannot be serialized because it would degrade overall detector performance. No serialization will be performed.

12.1.2. Material Tests

This component cannot be serialized because it would degrade overall detector performance. No serialization will be performed.

12.2. Mirrors

Serialization is not required for this component.

12.2.1. Mirror Assembly & Tests

Serialization is not required for this component.

12.3. Photosensors (HRPPDs)

Serialization of this component is required by Formal Agreement. Documentation can be obtained from the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

12.3.1. Material Tests & Assembly

Serialization of this component is required by Formal Agreement. Documentation can be obtained from the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

12.3.2. Material Tests

Serialization of this component is required by Formal Agreement. Documentation can be obtained from the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

12.4. Vessel

This part cannot be serialized because it would degrade overall detector performance, therefore an alternative method will be used to track this part during its lifecycle. Documentation can be obtained from the reference: pfRICH Vessel, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Vessel/

12.5. Laser Monitoring System

This part cannot be serialized because it would degrade overall detector performance, therefore an alternative method will be used to track this part during its lifecycle. Documentation can be obtained from the reference: Laser Monitoring System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

12.5.1. Assembly & Tests

This part cannot be serialized because it would degrade overall detector performance, therefore an alternative method will be used to track this part during its lifecycle. Documentation can be obtained from the reference: Laser Monitoring System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

12.5.2. Laser

Serialization of this component is required by Statement of Work. Documentation can be obtained from the reference: Laser Monitoring System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/

12.5.3. Support Stand

Serialization is not required for this component.

12.5.4. Control System

This component cannot be serialized because it would degrade overall detector performance. No serialization will be performed.

13. PLANNED PARTNER AND VENDOR COMMUNICATION & VISITS

Periodic program technical and progress telecommunications and/or meetings between the vendors/partners and project leaders will be conducted to discuss work progress, technical and contractual questions, presentations of analysis or testing results, troubleshooting, material status, tooling status, resources, and manufacturing issues. The schedule and frequency of these communications is described below.

In addition to the information provided here, technical updates and progress reports may also be provided at the regularly scheduled detector collaboration meetings. The schedule is available at https://indico.bnl.gov/category/402/calendar.

13.1. Vessel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

13.1.1. Material Purchase

The communication schedule for this component is provided in the Statement of Work. Additional information is provided in the reference: pfRICH Vessel, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Vessel/

13.2. Laser Monitoring System

If a communication plan is required for this component, provide a reference or describe the procedure here.

14. CONTROL OF NONCONFORMANCES

Vendors, partners, and in-house providers are responsible to provide items which conform to the requirements of the contract or work agreement, regardless of any assessments, surveillances, inspections and/or tests that are conducted as part of the validation and verification process. Non-conformances, significant variations in quality, recalls, and alerts will be reported to the project.

15. PACKAGING/TRANSPORTATION/SHIPPING

In preparation for shipping, a packaging plan will be developed that will be reviewed and approved by the project prior to shipment. Preservation, packaging, and packing for shipment or mailing of all work deliverables shall be in accordance with standard commercial practice and adequate to insure acceptance by common carrier and safe transportation at the most economical rates.

Packaging plans must comply with the standards established in the Detector Systems Product Quality Plan.

15.1. Aerogel

This component is composed of multiple sub-components/activities which have independent quality control parameters.

15.1.1. Material Purchase

The packaging plan for this component is included in the Formal Agreement. Additional information is provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

15.1.2. Material Tests

The packaging plan for this component is included in the Formal Agreement. Additional information is provided in the reference: Aerogel Test Stand QA Procedures, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Aerogel/Aerogel_Test_Stand_Q_A_Prodedures.pdf

15.2. Mirrors

The packaging plan for this component is included in the Statement of Work. Additional information is provided in the reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

15.2.1. Mirror Assembly & Tests

The packaging plan for this component is included in the Statement of Work. Additional information is provided in the reference: Mirror System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Mirror/

15.3. Photosensors (HRPPDs)

The packaging plan for this component is included in the Formal Agreement. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

15.3.1. Material Tests & Assembly

The packaging plan for this component is included in the Formal Agreement. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

15.3.2. Material Tests

The packaging plan for this component is included in the Formal Agreement. Additional information is provided in the reference: High Rate Picosecond Photodetector, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/HRPPD/

15.4. Vessel

The packaging plan for this component is included in the Formal Agreement. Additional information is provided in the reference: pfRICH Vessel, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Vessel/

15.5. Laser Monitoring System

The packaging plan for this component is included in the Statement of Work. Additional information is provided in the reference: Laser Monitoring System, which is available from the link below:

https://eic.jlab.org/Documents/DET/PID/pfRICH/Laser/