PIP-II Accelerator Systems: Vacuum Systems

Acceptance Criteria Document

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**Document Approval**

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| --- | --- |
| Signatures Required | Approval |
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Revision History

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| Revision | Date of Release | Description of Change |
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Table of Contents

[1. SCOPE 4](#_Toc166149836)

[2. ACRONYMS, TERMS, AND DEFINITIONS 4](#_Toc166149837)

[3. SYSTEM SCOPE 5](#_Toc166149838)

[4. ACCEPTANCE/HANDOFF DOCUMENTATION 5](#_Toc166149839)

[4.1. Procured Hardware 5](#_Toc166149840)

[4.2. Intersystem Handoff Documentation 5](#_Toc166149841)

[5. REFERENCED DOCUMENTS 6](#_Toc166149842)

# SCOPE

This document defines the acceptance and verification planning structure for the Vacuum Systems L3 for PIP-II. This document is intended to ensure that the integrated verification planning is systematic and well documented, including hardware to be accepted by this L3 (e.g., vendors delivery, handoffs from other L3 systems) as well as integrated hardware to be handed off to PIP-II Installation L3s (i.e., Linac Installation and BTL Installation).

Acceptance is conditional on the device meeting all Functional and Technical (performance, interface, and safety) requirements identified in the relevant associated documentation. Each requirement has a verification method, procedure summary, and relevant document references. For each handoff, detailed documentation of hardware configuration, component numbers, and all verification/QC documents are to be included with each delivery to verify acceptance. The documentation listed below details where handoff information and associated documentation is captured for this L3 System.

This document is revision controlled and subject to Teamcenter workflow approvals.

# ACRONYMS, TERMS, AND DEFINITIONS

|  |  |
| --- | --- |
| BTL | Beam Transfer Line |
| IDL | Installation Deliverables List |
| L2 | WBS Level 2 |
| L3 | WBS Level 3 |
| LEBT | Low Energy Beam Transport |
| MEBT | Medium Energy Beam Transport |
| PIP-II | Proton Improvement Plan II Project |
| QC | Quality Control |
| RFQ | Radio Frequency Quadrupole |
| UHV | Ultrahigh Vacuum |
| WBS | Work Breakdown Structure |
| WU | Warm Unit |

# SYSTEM SCOPE

The PIP-II vacuum system shall include all vacuum environments for beam that covers regions from the Ion Source through the Booster Injection Girder and shall include the regions to the Beam Absorbers. The complete PIP-II vacuum system consists of four regions: Warm Front End (Ion source-LEBT-RFQ, MEBT), Superconducting Linac, Beam Transfer Line, and Booster Injection Girder. Vacuum gate valves isolate each region when necessary for commissioning or operation. Additional valves are also installed inside the regions where it is required.

# ACCEPTANCE/HANDOFF DOCUMENTATION

## Procured Hardware

All validation and acceptance testing for Vacuum Systems procured equipment is managed by the Vacuum Systems QC Plan (PIP-II-Doc-5709).

## Intersystem Handoff Documentation

For equipment handed off from the Vacuum Systems L3 to the Installation L3s (Linac or BTL), the Project has created a formal Installation Deliverables List (IDL) which captures:

* Detailed list of equipment to be handed off including specific configurations (including documentation such as 3D models, drawings, detailed descriptions) with quantities, batches, and basic schedule including P6 milestones. Configurational information should include details such as hardware included, clean bagging, crating, and other practical details that will impact handling and storage.
* Fixed references (Teamcenter, docdb, etc.) to design documentation associated with each deliverable including: drawings, requirements, analyses, etc.
* Fixed references to as-built and acceptance documentation including: travelers, red-line drawings, etc. Expectation is that these documents will be in their final and approved forms including completed resolution of any identified non-conformances during QC.

Certain equipment will be procured/fabricated/assembled by the Beam Instrumentation team and formally handed off to the Vacuum System team for further integration before installation. This equipment is similarly listed in the Beam Instrumentation Deliverable List (ED0011271) in Section 5.3 BI Deliverables to VAC.

For IDLs, both parties to the handoffs are considered stakeholders and will be approvers on every release of the documents. The handoff milestones will be managed by the Project Technical Integration Group to ensure that requirements for handoff are met.

# REFERENCED DOCUMENTS

Intersystem Handoff Documentation:

* Vacuum Systems Linac IDL: ED0011282
* Vacuum Systems BTL IDL: ED00#####
* Beam Instrumentation IDL: ED0011271

Vacuum Systems QC Plan: PIP-II-Doc-5709