

PPPL	PRINCETON PLASMA PHYSICS LABORATORY	PROCEDURE	No. ENG-062 Rev 0 page 1 of 4
Subject: Planning and Performing Tests	Effective Date: 8/1/18	Initiated by: Head, Engineering Department	
	Supersedes: NEW	Approved: Director	

Management System (Primary): 03.00 ENGINEERING (ENG)
Management System Owner: Engineering Department Head
Management Process: 03.06 Technical Project Management
Process Owner: Engineering Department Head
Sub-Process: 03.06.12 Scope Management, Planning, Definition, Verification, and Scope Change Control
Sub-Process Owner: Engineering Department Head
Subject Matter Expert: Engineering Department Head; Chief Engineer; Fabrication Group Head

Applicability

This procedure implements the PPPL Graded Approach as described in the Quality Assurance Program Description. This procedure is applicable to the planning, performing and testing of items with a risk classification of A1 and A2, it may be waived for A3 items when deemed unnecessary by the Responsible Engineer and the Project Manager.

Introduction

This procedure describes the development and use of Test Plans to plan, define, sequence, and document tests of A1 and A2 items.

Testing of components and/or systems is the process of verifying performance against requirements and specifications and/or expected behavior predicted by calculations per standard engineering practice.

Test Plans document how testing is to be done.

Test Procedures provide detailed, step-by-step instructions for conducting tests and recording test data. Standard test methods from national standards organizations should be used when available. Test Procedures should be sufficiently detailed to allow qualified individuals to duplicate the test with the same results. For complex tests, Test Reports may be used to analyze and evaluate the test results. Test results may include findings, issues, and conclusions (pass/fail, performance range, characterization, etc.).

Listed below are the primary steps used to validate a component or system.

- Devise a strategy
- Develop a Test Plan
- Prepare a Test Procedure

- Conduct the tests
- Analyze the test results and compare them to expected results

Test Plans/Procedures should include the following elements as applicable:

- Scope of equipment to be tested
- Purpose of testing
- Configuration and conditions to be in effect at the start of testing
- Potential safety, environmental, and/or equipment hazards and mitigation techniques
- List of equipment, instruments and data acquisition required
- Operating state and support required from interfacing components and system
- Sequence of test steps
- Measurements, expected results and acceptance criteria during each test step
- Method of data analysis and storage
- Plans for post-test analysis and Test Report

When performing tests, the requirements for personnel safety interlock systems as specified in ESHD 5008 Section 2 Chapter 5 (Subchapter 5.8.4) must be satisfied.

Test Reports shall be written upon completion of testing in accordance with the Test Plan. The purposes of the Test Report are to evaluate/analyze the test data and compare to expected results, to document the findings including any issues discovered during the testing, and to summarize the findings (pass/fail, performance range or characterization of the system, etc.).

REFERENCES

QAPD	Quality Assurance Program Description
QA-004	QA/QC Site Inspection and Over-sight
QA-005	Control of Nonconformities
ENG-030	Technical Procedures
ENG-033	Design Verification
ESHD 5008	PPPL Environment, Safety, and Health Directives "Safety Manual"

Procedure

This procedure defines PPPL's process for planning, performing and reporting tests, as part of the design validation process.

Cognizant Individual	1. Based on the requirements of the item develops the Test Plan following the guidelines herein.
Responsible Engineer	2. Reviews and approves the Test Plan.
Chief Engineer	3. For A1 items, reviews and approves the Test Plan, and returns it to the Responsible Engineer.

- | | |
|----------------------|--|
| Responsible Engineer | 4. Files the approved Test Plan, and incorporates in design review documentation as required by the Design Review Plan. |
| Cognizant Individual | 5. Updates the Test Plan when changes in requirements or unavailability of test process as specified, and obtains approval through the same approval chain as the original plan. |
| Cognizant Individual | 6. Develops and gets approval of Test Procedures per ENG-030. |
| | 7. Conducts the tests and files the run copies of the Test Procedures. |
| | 8. Prepares the Test Report following the guidelines herein. |
| | 9. For specific equipment issues discovered during testing, initiates NCRs as applicable following QA-005. |
| Responsible Engineer | 10. Reviews and approves the Test Report. |

TRAINING

- | | |
|------------------------------|---|
| Head, Engineering Department | 1. Ensures the appropriate training methods and means (below) are provided and obtains concurrence of the Management System Owner and the Management Process Owner. |
|------------------------------|---|

Target Audience: Responsible Engineers, Cognizant Individuals

Instructor: Head, Engineering Department

Training Method:

- X Briefings (major re-issue, new positions)
- X Required Reading (major re-issue and minor revisions)
- X Email distribution (minor revisions)

- | | |
|------------------------------|--|
| Head, Engineering Department | 2. Notifies the Human Resources Training Office of the training so that they will be aware of the training requirements and be able to provide assistance and guidance in the course development, implementation, tracking, and maintenance if needed. |
|------------------------------|--|

Records Requirements specific to this procedure

Records Custodians must assure records are maintained as follows:

Record Title	Record Custodian	Location	Retention Time
Test Plan	Operations Center	Ops Center	See record Schedule for specific Project Type <i>Reference Admin 17, Cartographic, Aerial Photography,</i>

			<i>Architectural & Engineering Records (30.c)</i>
Test Procedure	Per ENG-030		
Test Report	Operations Center	Ops Center	See record Schedule for specific Project Type <i>Reference Admin 17, Cartographic, Aerial Photography, Architectural & Engineering Records (30.c)</i>

ATTACHMENTS:

1. Test Plan – worked example
2. Test Report – worked example

PPPL	PRINCETON PLASMA PHYSICS LABORATORY	PROCEDURE	No. ENG-062 Rev 0 Page 1 of 2
Test Plan – Worked Example			Attachment 1

Test Plan

<Subsystem>

CAT. A-#
Revision <#>
<Date>

Prepared By: Cognizant Individual

A-3 and A-2 Approved By / A-1 Reviewed By: Responsible Engineer

A-1 Approved By: Chief Engineer

PPPL	PRINCETON PLASMA PHYSICS LABORATORY	PROCEDURE	No. ENG-062 Rev 0 Page 2 of 2
Test Plan – Worked Example			Attachment 1

References

[1] <Reference 1>

1. Purpose

2. Scope

3. Safety issues

4. Hazards to equipment due to the performance of the test

5. Safety and Hazard mitigation plan

6.

7. Responsibilities

8. Test Plan

8.1 Factory Acceptance Tests

8.1.1 Dimensional inspection

8.1.2 DC resistance [example]

8.1.3 AC impedance [example]

8.1.4 Insulation resistance [example]

8.1.5 Etc

8.1.6 Hydrostatic test [example]

8.1.7 Water flow test [example]

8.1.8 Etc

8.2 Tests after preparation for installation

8.2.1 Dimensional inspection

8.2.2 Etc

8.3 Stand-alone tests

8.3.1 Stand-alone Function 1 test [example]

8.3.2 Etc

8.4 Pre-operational tests

PPPL	PRINCETON PLASMA PHYSICS LABORATORY	PROCEDURE	No. ENG-062 Rev 0 Page 1 of 2
Test Report – Worked Example			Attachment 2

Test Report

<Subsystem>

CAT. A-#
Revision <#>
<Date>

Prepared By: Cognizant Individual

Reviewed By: Responsible Engineer

1. Test Purpose

PPPL	PRINCETON PLASMA PHYSICS LABORATORY	PROCEDURE	No. ENG-062 Rev 0 Page 2 of 2
Test Report – Worked Example			Attachment 2

2. Test Condition

2.1 Test Date

2.2 Test Equipment

2.3 Test Sample

2.4 Test Preparation

2.5 Specific setup 1

2.6 Specific setup 2

2.7 Etc

3. Test Procedure

3.1 Specific step 1

3.2 Specific step 2

3.3 Etc

4. Test Results

5. Summary and Conclusions