

PPPL	PRINCETON PLASMA PHYSICS LABORATORY	PROCEDURE		No. ENG-006 Rev 7 page 1 of 5
		Subject:	Effective Date: January 31, 2018	Initiated by: Head, Engineering
Preparation, Review & Approval of Technical Specifications		Supersedes: Revision 6, dated 7/13/17 and related TCRs	Approved: Director	

Management System (Primary): 03.00 Engineering
Management System Owner: Head, Engineering
Management Process: 03.04 Engineering and Design Processes
Process Owner: Head, Engineering
Subject Matter Expert (SME): Head, Engineering; Head, Design Group; Head, Fabrication Group; Head, Power Systems Group

APPLICABILITY

This procedure defines the process to create, review, approve, use and change Technical Specifications at PPPL. It implements the PPPL QAPD graded approach requirements for developing and issuing Technical Specifications as described herein – Table 1 flows down the QAPD requirements regarding the approval authority for issuing Technical Specifications. Only approved Technical Specifications shall be used for procurements or PPPL fabrication activities.

INTRODUCTION

Technical Specifications define the technical requirements for hardware and hardware treatments (e.g. coating). They may be standalone documents or referred to in a procurement package or a Technical Procedure or a Traveler. Technical Specifications are design documents that may be required by an approved Work Planning form, per ENG-032. The Cognizant Individual ensures that requirements in applicable General Requirements Documents, Systems Requirements Documents or Requirement Documents are accurately and thoroughly included in Technical Specifications. See ENG-050, Job Requirements Documentation and Control.

Attachment 1 provides a sample template for developing a PPPL Technical Specification.

Note: Technical requirements for software projects are prepared and issued in accordance with PPPL's Software QA Program; see QAPD for further instruction.

REFERENCES

- EQP-004, Quality Assurance Program Description
- GEN-023, Records Management
- ENG-032 Work Planning Procedure
- ENG-050, Job Requirements Documentation and Control
- ENG-057, Project and Governance Roles and Responsibilities
- QA-003, Procurement Quality Assurance
- QA-005, Control of Nonconformances
- P-018, Subcontract Proposal Evaluation Board (SPEB) Policy
- P-072 Procurement Assurance
- PPPL Procurement Policies and Procedure Manual (PPPM)

PROCEDURE

A. Creation of Technical Specifications

The Cognizant Individual is responsible for preparing Technical Specifications, having them reviewed and approved as specified in Table 1, and delivering them to the Operations Center.

Responsibility

Action

Cognizant
Individual

1. Confirms the risk classification, if missing follows ENG-057 to obtain it.
2. Develops the Technical Specification in accordance with Attachment 1, including the list of all deliverables, and submits for review per Table 1.
3. Obtains a unique identification number for the Technical Specification from the Operations Center.
4. Resolves reviewer comments. Updates the Technical Specification as necessary, signs as the preparer, and collects the reviewers' and approver's signatures.
5. Provides a copy of the Technical Specification to the Operations Center and project documents control system (if one is established).

Operations
Center

6. Maintains Technical Specifications as controlled documents and issues them to users upon request.

B. Use of Technical Specifications for procurement or in-house fabrication

This procedure requires that only Technical Specifications approved and available from the Operations Center shall be used for procurement or in-house fabrication. Each component needs to be traceable to the Technical Specification used in its production.

Princeton
Technical
Representative
/ Cognizant
Individual

1. Requests a Technical Specification from the Operations Center.
2. Assures that Technical Specification is approved and provides it to the PPPL Procurement agent for issuance to the supplier (for off-site procurements) or to the Fabrication Group Head (for on-site fabrication).

C. Changes to a Technical Specification during a procurement or on-site fabrication

Technical Specifications requiring revision during production shall be promptly remedied as described herein. The Princeton Technical Representative (off-site) / Cognizant Individual (on-site) shall direct work to cease until the deficiency or issue is resolved and the Technical Specification has been updated and filed with the Operations Center.

Princeton
Technical
Representative /
Cognizant
Individual

1. Directs work to cease when deficiencies are noted or work cannot proceed in accordance with an approved Technical Specification.

Cognizant
Individual and
RE (and TA for
A2 and A1 (and
CE for A1))

2. Gather the pertinent information and confer to determine change needed to resolve the identified deficiency or condition.
3. If required, initiate a Work Planning form:

Work Planning Form IS NOT required if the change satisfies ALL of the following conditions:

- Does not involve a novel method or material or design, different from the one reviewed, and
- Does not change the original design scope or intent

Work Planning Form shall be initiated if either condition is not satisfied.

Note: Even if the above specific triggering requirements do not precipitate the use of a Work Planning Form, the RE, TA, CA can direct that a Work Planning Form to be used.

Cognizant
Individual

4. Revises the Technical Specification based on the Step 2 outcome.
5. Obtains a unique identification number for the technical specification from the Operations Center. This will have to be linked to the relevant deliverables.
6. Resolves reviewer comments. Updates the Technical Specification as necessary, signs as the preparer, and collects the reviewers' and approver's signatures.
7. Provides a copy of the Technical Specification to the Operations Center.

Ops Center

8. Releases Technical Specification to PTR/COG.

Princeton
Technical
Representative /
Cognizant
Individual

9. Assures that Technical Specification is approved and provides it to the PPPL Procurement agent for issuance to the supplier (for off-site procurements) or to the Fabrication Group Head (for on-site fabrication).
10. Releases hold on work ceased under Step 1, if applicable.

A1	A2	A3
Preparer: Cognizant Individual Reviewers: Project Manager, QA, Responsible Engineer, applicable Technical Authorities (including ESH if relevant) Approver: Chief Engineer	Preparer: Cognizant Individual Reviewers: Project Manager, QA, Responsible Engineer, applicable Technical Authorities (including ESH if relevant) Approver: main Technical Authorities	Preparer: Cognizant Individual Reviewer: QA and ESH if relevant Approver: Responsible Engineer

Table 1 – Reviewers and Approvers for graded approach application

D. TRAINING

Head, Project
Management Office

1. Provides/assures the following training.
 - A. Target Audience: Cognizant Individuals, Project Managers, Project Directors, Responsible Engineers, Technical Authorities, Chief Engineer, QA, Department Heads
 Instructor: Head, Engineering
 Training Methods:
 Briefings (major revision)
 Required Reading (major re-issue and minor revisions)
 Email distribution (minor revisions)

 Frequency: After revisions or TCR changes of this procedure.
 - B. Target Audience: All Supervisors and Laboratory Leadership Council Members
 Distributed by: Planning Office
 Training Methods:
 Required Reading (major re-issue and minor revisions)
 Email distribution (minor revisions)

 Frequency: After revisions or TCR changes of this procedure.

Head, Engineering
or Designee

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.

E. RECORDS MANAGEMENT

Records Documented	Record Custodian	Where Record Kept	Record Duration
Technical Specifications	Operations Center	Operations Center	Indefinitely if project cost >750k\$. When component is disposed off otherwise.

ATTACHMENTS

1. Sample template for Technical Specification (including documentation/deliverables list)

TECHNICAL SPECIFICATION

FOR

TITLE OF ITEM TO BE SUPPLIED*(Enter the name of the items being specified in this document)*CAT: A1 A2 A3**UNIQUE IDENTIFIER:**

Reference Work Planning #: _____

REVISION 0**DATED *Month DD, YYYY***PREPARED BY: _____
Cognizant Individual (COG)REVIEWED BY: _____
(list per Table 1, one line each)APPROVED BY: _____
(per Table 1)**PRINCETON UNIVERSITY
PLASMA PHYSICS LABORATORY
P.O. BOX 451
PRINCETON, N.J. 08543
609-243-2000**

1.0 INTRODUCTION & SCOPE

1.1.

Provide background information, as appropriate, to improve understanding of the nature of the items required. Information on the Laboratory, projects, or systems should be included, if they provide valuable context.

Describe the intended use of the items being procured briefly.

2.0 APPLICABLE DOCUMENTS

2.1.

Provide a listing of those documents that are referenced. These may include industry standards issued by nationally recognized organizations (e.g., ASME, IEEE, NFPA, ANSI, OSHA, etc.), bulletins, manuals, drawings, and DOE Orders. References should be to the specific items required by this technical specification. For example, rather than stating PPPL Engineering Standards, include the name of the standards that apply (e.g., ES-MECH-007, Hoisting and Rigging).

The listing should include the edition/revision level of each listed document or have a statement that the applicable edition/revision level is the latest in effect at the time of the award. If only part of a particular document is in effect or applicable, it should be so noted.

The source location of the referenced documents should be specified. Industry standards may be presumed to be available to all industry participants. Government and PPPL documents should be made available in hard copy form, or at a public Internet web site. Internet addresses should be included.

3.0 APPLICABLE DRAWINGS

3.1.

Provide a listing of those drawings that are part of the technical specification.

The listing should include the edition/revision level of each drawing or have a statement that the applicable edition/revision level is the latest in effect at the time of award. If only part of a particular drawing is in effect or applicable, it should be so noted.

The source location of the referenced drawings should be specified. Drawings should be made available in hard copy form, or at a public Internet web site. Internet addresses should be included.

4.0 RESPONSIBILITIES

4.1. PRINCETON PLASMA PHYSICS LABORATORY

4.1.1.

Describe what is provided by PPPL (e.g. drawings, free issue materials).

4.2. SUBCONTRACTOR

4.2.1.

Describe what is required from the supplier (e.g. deliverables, documentation, plans).

For A-1 and A-2 items and service, required submittals shall include:

- *Detailed fabrication/manufacturing plans that comprehensively describe processes that will be used to ensure that these critical components that meet technical requirements.*
- *Qualification data and information demonstrating the fidelity of complex fabrication or manufacturing processes in meeting the technical requirements.*
- *Description of in-process inspections, verifications, monitoring and other quality control methods that will be used to assure that specific technical requirements are met during their manufacture.*

4.2.2 Notification Requirements Off-Normal Events and Issues

Repairs are not to take place until they are reviewed by the Subcontractor and PPPL per QA-005, and specifically authorized by the PPPL PTR. Resumption of work that has been stopped by PPPL due to off-normal events and issues must follow the provisions of PPPL Policy P-012, STOP Work Authority.

5.0 REQUIREMENTS

5.1. PERFORMANCE REQUIREMENTS

5.1.1. PERFORMANCE CHARACTERISTICS

5.1.1.1.

Identify the functional characteristics which have been established by analysis or design including those which are not necessarily mission critical, but which must be specified to properly constrain a complete design. State requirements in quantitative terms that can be measured to determine acceptability of end-products and services.

5.1.2. OPERATING ENVIRONMENT

5.1.2.1.

Technical Specification Template

Attachment 1

State the environment that the component is to withstand such as maximum/ minimum temperature, humidity, pressure, magnetic fields, radiation, etc. Specify any constraints to eliminate an environmental impact (e.g., no PCB's, CFC's, etc.).

5.1.3. DESIGN LIFE

5.1.3.1.

Identify the required life cycle of the product in terms of cycles or hours of operation required. Include requirements for shelf-life and storage prior to usage.

5.1.4. RELIABILITY

5.1.4.1.

Identify reliability requirements by stating in quantitative terms such as mean time to failure, duration of down time, etc.

5.1.5. MAINTAINABILITY

5.1.5.1.

Include schedule of intended maintenance per storage or operating hour. Describe requirements for service such as access doors; built in tools; self test capability; test jacks; and other appropriate requirements.

5.1.6. HUMAN FACTORS

5.1.6.1.

Specify requirements related to user operation, such as color recognition, foolproof assembly, interlocks, etc.

5.1.7. SUSTAINABILITY

PPPL's prime contract requires the purchase of certain types of environmentally preferable products such as, but not limited to, EPEAT-registered electronic devices, ENERGYSTAR and FEMP-listed energy-consuming equipment, Water-Sense listed products, bio-based materials, EPA-designated recycled content products, non ozone-depleting chemicals and non-toxic or less toxic alternatives when practical. Where such products are available and meet the technical requirements of the work, they should be specified to the maximum extent practical. In addition, SOWs for architecture and facility design, construction, demolition and maintenance services should include the use of sustainable design practices, inventory, tracking and reporting of recyclables, and the specification on sustainable building materials and equipment to the maximum extent practical. Additional information on environmentally preferable products is available online at:

https://pppl.princeton.edu/PPPL_Environmentally_Preferable_Purchasing

5.2. EQUIPMENT DEFINITION

5.2.1. SPECIFICATIONS AND STANDARDS

5.2.1.1.

Identify and explain requirements, criteria, and constraints, pertinent to the component. Include requirements that apply from nationally recognized codes and standards as well as federal/military specifications and standards. Any referenced documents should also be listed in Section 2.0.

5.2.2. GENERAL DESIGN FEATURES

5.2.2.1.

Specify physical characteristics such as size, weight, shape, and individual critical dimensions. Requirements may be descriptive or expressed in quantitative terms. All requirements should be verifiable by inspection and should include appropriate tolerances.

5.2.3. MATERIALS

5.2.3.1.

List specific materials that are required and any materials that are prohibited for the various parts of the hardware. For subcontracts, identify any material/equipment that is being provided by PPPL.

5.2.4. ELECTROMAGNETIC INTERFERENCE AND SUSCEPTIBILITY

5.2.4.1.

Identify the electromagnetic radiation of fields the hardware may be subjected to (the susceptibility specification) and the maximum electromagnetic radiation permitted from the hardware (the interference specification).

5.2.5. IDENTIFICATION AND MARKING

5.2.5.1.

Include requirements for marking and coding the parts of the hardware such as wiring, plumbing, nameplates, etc. (see procedure ENG-012, Identification and Control of Items).

5.2.6. EQUIPMENT

5.2.6.1.

Subcontractors must provide their own equipment and not use government equipment. Should the use of government equipment become absolutely necessary, that use of equipment will require a liability release covering the use of PPPL equipment to be defined in the subcontract.

6.0 TEST & INSPECTION REQUIREMENTS

6.1. PERFORMANCE TESTS

6.1.1.

Identify each of the performance tests that the supplier is to perform on the hardware before shipping and the acceptance criteria that must be met. These may include destructive and

nondestructive tests. The tests should verify that the specified performance values have been met. Impose inspection and test limitations to preclude component damage or degradation.

6.2. ACCEPTANCE TESTS

6.2.1.

Identify each of the acceptance tests and inspections that PPPL is to perform. If these tests and inspections require participation by supplier personnel, their participation should be specified. Also state where and when they must be performed. Acceptance criteria must be clearly identified.

6.3. SUPPLIER HOLD POINTS

6.3.1.

Identify hold points for the supplier where inspections must be made and approved prior to continuing work. Hold points are especially critical when additional fabrication and assembly will obscure performed work and workmanship. (See procedure QA-003).

6.4. QUALITY CONTROL RECEIPT INSPECTIONS

6.4.1.

Identify QC receipt inspection of parts, equipment, or other deliverables when received by PPPL prior to acceptance. Inspection shall be performed to determine compliance with drawings and technical specifications. (See procedure QA-003).

7.0 QUALIFICATIONS

7.1.

List specific worker qualifications requirements – for example, describe if a vendor or subcontractor must provide certification or proof that personnel successfully completed manufacturer's training, or that welders are certified per a specific ANSI/ASME code section, or that equipment operators have documentation that they are qualified or certified to operate the equipment. Indicate what proof of the qualifications is required (resume, certification card, operator license, certificate of manufacturer's training, etc.)

8.0 ENVIRONMENT, SAFETY, AND HEALTH

8.1.

If relevant, the ES&H Department will provide assistance in developing this section.

9.0 QUALITY ASSURANCE REQUIREMENTS

9.1.

Provide a description of the quality assurances and controls that need to be implemented for this work. As appropriate, include a general statement such as "Work under this technical specification shall be performed under an effective Quality Assurance Program. The Subcontractor shall maintain an effective Quality Assurance Program to assure that the Subcontractor's work meets the required quality and is performed in accordance with contractual requirements. Subcontractor's quality assurance function shall be actively involved in the planning, processing oversight, problem resolution, and determination of acceptability of all work under this technical specification. The function shall be organized to have sufficient authority and independence to identify quality problems, verify conformance of supplied items or services to specified requirements and obtain satisfactory resolution of conflicts involving quality."

Select and include appropriate specific requirements from the list contained at:

<http://www-local.pppl.gov/qa/PQA/QAClauses.doc>

Consult Procurement Quality Assurance to assist in determining these requirements and agree upon general approach to supplier/subcontractor oversight.

10.0 SHIPPING STORAGE AND HANDLING

10.1.

Specify the requirements for packing (e.g., crating, pallets, accelerometers, nitrogen purge, desiccant, etc), shipping and handling of the component. Identify temperature and humidity storage requirements. Specify labeling to be placed on shipping container. Also identify requirement for receipt inspection, if necessary.

11.0 WARRANTY

11.1.

Identify if a warranty is required or desired and describe in detail.

12.0 ATTACHMENTS

12.1.

Provide a list of attachments, including each attachment referred to in the text. Attachments may include examples of documentation of similar work, done previously.

Technical Specification Template

Attachment 1

13.0 DELIVERABLES**13.1. ITEMS**

List the items required, specifying the quantity of each and their packing and shipping requirements.

13.2. DOCUMENTATION

List the required documents that must be delivered to fulfill the requirements. State "None" if there are no documents required.

A typical list includes items like:

QA Plan
Manufacturing Plan
Fabrication plan
Design and drawings for auxiliary components
First-off qualification and verification
List of subcontractor-supplied materials
Certified Material Test Reports
Manufacturing/Inspection/Test (MIT) plan, template
Procedures identified in the MIT
MIT reports
Clean Area measures
Non-conformance reports
Repair procedures
Test procedures
Special process procedures (braze, impregnate...)
Packing and shipping details
Manufacturing/Inspection/Test plan, filled out and signed off, per coil
Photographs of packed and crated items
Process history and PPPL Shipping Release Form

Define whether digital or in paper format is required, and define the file type (PDF, Excel, PowerPoint, etc.) if relevant.

If environmentally preferable materials / products are requested, the vendor has to include documentation of compliance with these requirements.