



ENG-060 - SOW - STATEMENT OF WORK

NSTX-U Plasma Current Rogowski Coil Winding Assembly Statement of Work

NSTXU_1-4-1-2-1_SOW_100

Work Planning #: **3063**
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NSTX-U Plasma Current Rogowski Coil Winding Assembly Statement of Work

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Reference Work Planning#: 3063

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1.0 **Introduction & Scope**

This document establishes the manufacturing and acceptance requirements for the Four (4) Plasma Current Rogowski Coils that will be used within the National Spherical Torus eXperiment Upgrade (NSTX-U) device as per DWG# B-9D1001. NSTX-U is an innovative magnetic fusion device that was constructed by PPPL in collaboration with the Oak Ridge National Laboratory, Columbia University, and the University of Washington at Seattle. Note that the terms Rogowski coil and Rogowski loop are used interchangeably within the drawings and documentation.

2.0 **Applicable Documents**

- 2.1 ASME Y14.5-2018, Dimensioning and Tolerancing
- 2.2 PPPL Attachment I – “Product Quality Certification & Shipping Release”
- 2.3 PPPL Attachment II – “PPPL Dimensional Inspection Form”

3.0 **Applicable Drawings**

- 3.1 Drawing No: A-9D1009 - “NSTX Rogowski Loop Winding Assembly – Splicing”
- 3.2 Drawing No: B-9D1001 - “NSTX Rogowski Loop Winding Assembly”
- 3.3 Drawing No: C-9D1614 – “Rogowski Coil Repair Teflon Mandrel”

4.0 **Responsibilities**

4.1 **Princeton Plasma Physics Laboratory**

4.1.1 **PPPL Contacts**

PPPL shall designate a technical contact referred to as the Princeton Technical Representative (PTR), a Quality Assurance (QA) contact, as well as back-up contacts for each.

4.2 **Subcontractor**

4.2.1 **Subcontractor Contacts**

- 4.2.1.1 The Subcontractor shall designate and provide contact information for a primary technical contact, a Quality Assurance contact, and a back-up contact for each.
- 4.2.1.2 The Subcontractor shall ensure their appointed contacts are available to attend regularly scheduled status update meetings (biweekly at a minimum). Dates and times for these meetings will be established with the PTR prior to starting work. Additional status update meetings may be requested by PPPL or by the Subcontractor as needed based on project progress and/or identified issues.

4.2.2 **Subcontractor Conformance**

- 4.2.2.1 The Subcontractor shall conform to all requirements of this document and process the Rogowski Coil windings in full conformance with this Statement of Work (SOW).

- 4.2.2.2 The Subcontractor shall accommodate PPPL representatives during any potential on-site visits (per Section 9.1), including the provision of any requisite safety related training and PPE (per Section 8.0)
- 4.2.2.3 The Subcontractor shall promptly document and report any non-conformances to PPPL (per Section 9.8)
- 4.2.2.4 The Subcontractor shall submit their Manufacturing, Inspection, and Testing (MIT) plan within 10 working days of the award of contract, subject to PPPL approval (per Section 9.11).
- 4.2.2.5 The Subcontractor shall address any questions or concerns regarding the requirements of this Statement of Work to any of the designated PPPL representatives (per Section 4.1.1).

5.0 Requirements

5.1 Performance Requirements

5.1.1 Performance Characteristics

- 5.1.1.1 All coils fabricated shall conform to the dimensions and tolerancing shown on the applicable fabrication drawing. All inspection requirements within Section 6.0 shall be followed to ensure dimensional and quality conformance of Subcontractor produced coils.
- 5.1.1.2 Splicing shall be avoided unless absolutely necessary for fabrication. PPPL is furnishing two (2) spools of wire for winding the four (4) mandrels.

5.1.2 Operating Environment

Not Applicable.

5.1.3 Design Life

Not Applicable.

5.1.4 Reliability

Not Applicable.

5.1.5 Maintainability

Not Applicable.

5.1.6 Human Factors

Not Applicable.

5.1.7 Sustainability

Not Applicable.

5.2 Equipment Definitions

5.2.1 Specifications and Standards

- 5.2.1.1 The dimensions and tolerances indicated on the applicable drawings are to be interpreted by the Subcontractor in accordance with ASME Y14.5-2018, Dimensioning and Tolerancing.

5.2.2 General Design Features

- 5.2.2.1 The Design of the Rogowski Coil Windings is per the attached PPPL Drawing No. B-9D1001.
- 5.2.2.2 The Subcontractor shall, if possible with the provided materials, wind each Rogowski Coil Winding from a continuous length of wire. Splices should be avoided if possible. However, should splicing be necessary to complete a winding, the instructions for wire splicing are provided in the attached PPPL Drawing No. A-9D1009.

5.2.3 Materials & Traceability

- 5.2.3.1 PPPL shall furnish the following materials for usage at the Subcontractor's facility for winding of the Rogowski coils:
- a) Four (4) Teflon mandrels, machined per DWG# C-9D1614 Rev 1. Included are the embedded serpentine return wires, Kapton sheeting (without adhesive) covering the return wires, and the first layer of Kapton tape to keep the Kapton sheet in place.
 - b) Two (2) 10 lb. rolls of round copper magnet wire (AWG #30), ~60,000ft, thermal class 200, polyester with polyamide-imide heavy enamel overcoat.
 - c) Ten rolls (360ft) of 1" wide Kapton tape 0.0025" Thick.
- 5.2.3.2 The Subcontractor shall maintain material traceability through all stages of manufacturing to ensure conformance with material grade requirements.
- 5.2.3.3 Material identification shall be maintained throughout processing and be traceable to the records. Status of acceptability shall be readily discernible through the Subcontractor's use of tags, stamps, serial numbers or other positive means.
- 5.2.3.4 Subcontractor shall return any unused PPPL provided materials at the conclusion of the work defined herein. Identification of returned excess materials shall be preserved.

5.2.4 Electromagnetic Interference and Susceptibility

Not Applicable.

5.2.5 Identification & Marking

For each assembly, the Subcontractor shall positively identify and document the number and approximate location of any and all winding splices. The Subcontractor's methods of identification and documentation shall be submitted within the Subcontractor's Manufacturing/Inspection/Test (MIT) Plan and subject to PPPL approval prior to implementation.

5.2.6 Workmanship Requirements

Not Applicable.

6.0 Test & Inspection Requirements

6.1 Performance Tests

The Subcontractor shall verify the dimensional conformance of manufactured coils to their respective drawing and specification requirements and shall provide objective evidence of such verifications to PPPL.

All produced coils shall be inspected and tested per Section 6.2 and 6.3 requirements unless an alternate plan is agreed upon with PPPL in writing.

6.2 Acceptance and Inspection Tests

The Subcontractor will be provided a standard "PPPL Dimensional Inspection Form" (Attachment II) to be used for reporting all dimensional inspection results. The Subcontractor shall use this provided form for recording and reporting dimensional inspection results in accordance with the following procedure:

- 6.2.1 The Subcontractor is responsible for conducting the dimensional inspection and providing the completed "PPPL Dimensional Inspection Form" once complete; also provided shall be the Subcontractor's Electrical inspection results in the Subcontractor's preferred format. The inspection results shall be submitted to the PPPL QA contact for review.
- 6.2.2 PPPL will review the documentation and indicate acceptance by signing and returning the Dimensional Inspection Form and Electrical Inspection Form.
- 6.2.3 Following acceptance of the Dimensional and Electrical Inspection Forms by PPPL, the Subcontractor may continue the Release for Shipment process (per Section 9.10).

The Subcontractor is required to verify the dimensional and electrical conformance of the completed Rogowski Coils and providing PPPL objective evidence of such verification using the above process. Dimensional and Electrical Inspection approval is a Hold Point (per Section 6.4.3).

6.3 PPPL Inspection Requirements for Subcontractor Conformance:

- 6.3.1 The Subcontractor shall perform a continuity check on the "Main" winding and the "Return" winding.
- 6.3.2 In six (6) approximately equally spaced locations, the Subcontractor shall measure and record the linear distance of twenty (20) turns of the "Main" winding. The nominal winding pitch shall be 77 turns +/- one turn per inch.
- 6.3.3 After Kapton wrapping the exterior of the Winding Assembly, the Subcontractor shall measure and record the loop thickness at three (3) locations approximately 10 feet from each end and at center.
- 6.3.4 After Kapton wrapping the exterior of the Winding Assembly, the Subcontractor shall perform a 200-volt metered check between an end-to-end shorted "Main" and the "Return"

windings and the insulation. The insulation resistance shall be greater than or equal to 1000 Megohms.

- 6.3.5 After Kapton wrapping the exterior of the Winding Assembly, the Subcontractor shall perform a 1,000-volt metered check between the entire exterior Kapton installation length and the "Main"/"Return" windings. The "Main" and "Return" windings shall be connected to each other at each end thereby "shorting" the entire loop. Again, the insulation resistance shall be greater than or equal to 1000 Megohms.

Note: The testing methods and method of forming the ground plane shall be proposed by the Subcontractor in their MIT plan and approved by PPPL prior to implementation.

6.4 Supplier Hold Points

- 6.4.1 Approval of MIT Plan (per Section 9.11) – The initial MIT Plan, as well as revisions to any previously approved MIT Plan(s), shall be approved prior to implementation. Approval will be provided by the PPPL Responsible Engineer (RE) and communicated to Subcontractor by the PTR or QA Representative.
- 6.4.2 Approval of Nonconformance Disposition and Corrective Action (as applicable, per Section 9.8) – Subcontractor shall submit Non-conformance Reports for PPPL review and approval of Disposition and Corrective Action for any non-conforming items. Approval shall be provided prior to manufacturing subsequent components. Approval will be provided by the PTR.
- 6.4.3 Approval of “PPPL Dimensional Inspection Form” and Electrical Inspection Results (per Section 6.2) – The Subcontractor shall submit all Electrical Inspection Forms and “PPPL Dimensional Inspection Forms” for the completed assembly demonstrating conformance with drawing and Section 6.3 requirements. Approval of Inspection forms will be provided by the PTR.
- 6.4.4 Approval of Process History documentation (per Section 9.12) – The Subcontractor shall submit their Process History documentation for approval prior to shipment of the product along with the “Product Quality Certification & Shipping Release Form”. Approval will be provided by the PPPL QA representative via the signed form (per Section 9.10).

7.0 Qualifications

The Subcontractor’s personnel performing work to this specification are required to have been trained in the operation of any equipment being used. Training records shall be maintained on file and shall be available for review upon PPPL request.

8.0 Environment, Safety, and Health

The Subcontractor's safety record may be considered in proposal/bid evaluations; PPPL may request information deemed necessary to evaluate Subcontractor safety record at any time. The Subcontractor shall comply with all OSHA regulations to ensure the safety of any potential PPPL visitors to the Subcontractor’s facility.

9.0 Quality Assurance Requirements

9.1 Inspection/Surveillance/Audit by PPPL

Authorized representatives of PPPL and the U. S. Government shall have the right at all reasonable times to visit the Subcontractor's premises and those of Subcontractor's suppliers during the performance of the procurement for the purposes of inspection, surveillance, audit and/or obtaining any required information as may be necessary to assure that items or services are being furnished in accordance with specified requirements.

Such visits shall be coordinated with the Subcontractor's personnel to minimize interference with the normal operations of said premises. The Subcontractor shall make available records and documentation necessary for this function and shall provide all reasonable facilities and assistance for the safety and convenience of PPPL and/or U. S. Government representatives in the performance of their duties.

PPPL and the U. S. Government recognize the Subcontractor's right to withhold information concerning proprietary processes. The Subcontractor agrees to insert the paragraph above in each lower tier procurement issued hereunder.

9.2 Subcontractor's Responsibility for Conformance

Neither PPPL's review and/or approval of the Subcontractor's documents nor PPPL's inspection of Subcontractor's items or services shall relieve the Subcontractor of responsibility for full compliance with the requirements of the purchase order/contract. If any portion of this work is planned to be performed by sub-tier contractors, such plans shall be communicated to PPPL with the contractor's quotation proposal and shall be approved by PPPL prior to execution of work. The Subcontractor is responsible for ensuring that all requirements and restrictions within this specification are imposed on any sub-tier suppliers.

9.3 Subcontractor's Quality Assurance Program

The Subcontractor shall establish and maintain an effective Quality Assurance Program to assure that the Subcontractor's work meets the required level of quality and is performed in accordance with contractual requirements.

- 9.3.1 The Subcontractor's quality assurance function shall be actively involved in the planning, processing, oversight, problem resolution, and determination of the acceptability of all work covered under this sow.
- 9.3.2 The Subcontractor's quality assurance 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.
- 9.3.3 The Subcontractor shall perform planned, periodic audits of the various aspects of its QA program by persons not directly responsible for the area being audited. Written reports of these audits shall be made available to PPPL upon request.
- 9.3.4 The Subcontractor shall submit with the proposal, a copy of its Quality Assurance Program Manual or equivalent documentation that describes the subcontractor's quality

capability and general approach to quality assurance. The QA Manual or equivalent documentation shall be subject to PPPL's review and acceptance prior to contract award.

9.4 Acceptance Inspections and Tests

Inspections and tests shall be performed in accordance with written procedures referencing criteria for acceptance or rejection. PPPL internal inspections may include dimensional verification, material property verification, or verification of any other applicable conformance requirements. Adequate records shall be maintained by the Subcontractor and made available for PPPL's review upon request in to ensure the conformance of delivered coils.

9.5 Document Traceability & Records

The Subcontractor shall maintain a system of documentation whereby objective evidence of required operations, examinations, and tests is systematically compiled, indexed and stored. Such objective evidence may include "travelers", certifications, examinations, and discrepancy reports, which shall be complete, legible, and validated by responsible personnel and shall be traceable to the subject items. This documentation shall be made available to PPPL upon request.

9.6 Acceptability of Purchased Items and Services

The Subcontractor shall verify conformance of purchased and PPPL furnished items or services to drawing and specification requirements and shall provide objective evidence of such verifications to PPPL upon request.

9.7 Document Review, Approval, and Control

The Subcontractor shall implement a system for review and approval of design documents (drawings, specifications, etc.), prior to issuance for use, and for approval and incorporation of changes in a formal and orderly manner. The system shall control obsolete documents to prevent inadvertent use. The system shall also control PPPL-furnished design documents to ensure that models are in sync with the applicable drawings, and that obsolete information is not used.

Note: Revisions or changes by the Subcontractor to documents approved by PPPL shall be reviewed and approved by PPPL prior to use.

9.8 Non-Conformances & Corrective Actions

The Subcontractor shall promptly identify and control nonconforming items or services. Nonconforming items or services shall be positively identified, and segregated where possible, to prevent use. The Subcontractor shall document each non-conformance on a Non-Conformance Report "NCR".

Non-Conformance Reports (NCRs) shall be provided to PPPL within 5 working days of the discovery of the Non-Conformance and shall, at a minimum, contain the following information:

- 9.8.1 A description of the non-conformance.
- 9.8.2 A determination of the cause of the non-conformance.
- 9.8.3 A proposed resolution/disposition of the non-conformance.
- 9.8.4 A corrective action plan to preclude recurrence.

(Note: The determination of cause and corrective action plan may be waived by PPPL).

Upon the discovery of any non-conforming coils, the Subcontractor shall halt manufacturing and shall not resume until an NCR has been processed and a corrective action plan has been established and approved by PPPL.

PPPL may approve continued manufacturing activities on items or services which are not affected by identified Non-Conformances. This approval will be provided in writing by the PTR.

9.9 Calibration of Test and Measuring Equipment

- 9.9.1 Inspections and tests shall be performed using properly calibrated measuring and test equipment. Calibration standards shall be traceable to the National Institute for Standards and Technology (NIST) or equivalent.
- 9.9.2 The Subcontractor shall, along with the MIT, submit to PPPL calibration records of all Measurement & Test Equipment designated to be used in the completion of the work defined herein.

9.10 Submittal of Product Quality Certification & Shipping Release

The Subcontractor shall not ship without a "Product Quality Certification and Shipping Release" (Attachment I) form signed by PPPL's Representative. The Subcontractor shall complete and sign the certification section, fax or email the form to PPPL's Quality Assurance (QA) Representative, and hold shipment until PPPL signs and returns the form, authorizing shipment. A copy of the fully executed form shall accompany each full or partial shipment.

Note: The shipping release process runs tandem with the Process History as per Section 9.12.

9.11 Submittal of Manufacturing/Inspection/Test (MIT) Plan

The Subcontractor shall submit a Manufacturing/Inspection/Test Plan within 10 working days after receipt of order for PPPL approval prior to start of manufacture. The plan shall identify coils; show their integrated flow into end items; identify critical manufacturing operations; and show inspections and the characteristics/dimensions to be inspected.

The Plan may include flow chart(s), Process Sheets, Shop Travelers, and inspection sheets, etc. PPPL may designate selected operations as mandatory "witness" points based on the MIT Plan. Subcontractor shall provide PPPL with notice five working days in advance of such witness points. Revisions or changes to the approved MIT plan shall be reviewed and approved by PPPL prior to use.

9.12 Process History

The Subcontractor shall provide PPPL, along with the completed "Product Quality Certification and Shipping Release" (per Section 9.10), a digital copy of the Process History. The Process

History is a compilation of documents, detailing the objective evidence of the acceptability of the work performed, and shall include as a minimum the following:

9.12.1 Certificate of Conformance

Subcontractor's Certificate of Conformance, signed by the Subcontractor's Quality Manager (or equally authorized Subcontractor Representative), stating that the work performed conforms in every respect to PPPL requirements.

9.12.2 Inspection Reports

The Subcontractor shall submit all required Dimensional and Electrical inspection reports (per Section 6.0).

9.12.3 Non-Conformance Reports

The Subcontractor shall submit copies of all processed NCRs (per Section 9.8).

9.13 PPPL Receiving Inspection

PPPL will perform Receiving Inspection on items or services supplied by Subcontractor, using either a sampling plan or 100% inspection. Discrepant items or services may be rejected and returned to Subcontractor for rework or replacement.

10.0 Shipping, Storage, and Packaging

The Subcontractor shall control items during shipping, handling, and storage. Release from storage shall be controlled to prevent accidental or inadvertent use of incorrect or unacceptable items. The Subcontractor shall, at minimum, conform to the following shipping and packaging requirements:

10.1 The Subcontractor shall serialize and separately package each mandrel assembly.

10.2 The Subcontractor shall package the completed mandrel assemblies to ensure adequate protection from damage or deterioration.

Note: The Subcontractor's planned shipping method and packaging shall be detailed within their MIT Plan submitted to PPPL for approval.

11.0 Warranty

Not Applicable.

12.0 Attachments

12.1 Attachment I – "Product Quality Certification and Shipping Release"

12.2 Attachment II – "PPPL Dimensional Inspection Form"

13.0 Documentation and Deliverables

#	Document Deliverables Required	When Deliverable Is Required	Deliverable format (paper, electronic etc.)	Storage Location	Deliverable Received (✓)
1	Quality Assurance Program Manual (Section 9.3.4)	With Proposal	Electronic	Ops	
2	Manufacturing, Inspection, and Testing plan (MIT) (Section 9.11)	Within 10 days of Contract Award	Electronic	Ops	
3	Calibration of Test and Measuring Equipment (Section 9.9)	With MIT	Electronic	Ops	
4	Electrical Inspection Reports & PPPL Dimensional Inspection Reports (Sections 6.2 & 6.3)	Upon completion of MFG prior to Shipment	Electronic	Ops	
5	Non-Conformance Reports (Section 9.8)	Within 5 days of Discovery	Electronic	Ops	
6	Shipping Release Form (Section 9.10)	Prior to Shipment(s)	Electronic	Ops	
7	Process History (Section 9.12)	Prior to and included with Shipment(s)	Electronic	Ops	
Exceptions (Add justification for any missing document deliverables that will not be received):					

Princeton Technical Representative or COG:

(Sign-off and provide to the Operations Center when the job is complete, and deliverables are dispositioned and placed/filed in Operations Center (or other Project, Department or Division designated file center)

#	Physical Deliverables Required	When Deliverable Is Required	Storage Location	Deliverable Received (✓)
1	Four (4) Serialized Rogowski Winding Assemblies per DWG# B-9D1001.	End of Contract	Receiving	
2	Unused remainder of any PPPL supplied materials.	End of Contract	Receiving	

Princeton Technical Representative or COG:

(Sign-off and provide to the Operations Center when the job is complete, and deliverables are dispositioned and placed/filed in Operations Center (or other Project, Department or Division designated file center)



PRINCETON PLASMA PHYSICS LABORATORY—PPPL PRODUCT QUALITY CERTIFICATION & SHIPPING RELEASE

To be completed by supplier and submitted to PPPL with the Documentation package.
Shipment (full or partial) is not authorized until PPPL returns this form signed.

Completed by Supplier	PPPL SUBCONTRACT/ ORDER #	ITEM #(s)	QUANTITY SHIPPED
	ITEM DESCRIPTION	SUPPLIER REFERENCE #	SHIPMENT #
	SUPPLIER'S CERTIFICATION This is to certify that the products and services identified herein have been produced under a controlled quality assurance program and are in conformance with the procurement requirements including applicable codes, standards and specifications as identified in the above-referenced documents unless noted below. Any supporting documentation will be retained in accordance with the procurement requirements.		
	SIGNED: _____ DATE: _____ TITLE: _____ COMPANY: _____		

Completed, signed, and returned by PPPL before shipment	PPPL (AUTHORIZED REPRESENTATIVE) SHIPPING RELEASE This is to certify that evidence supporting the above Supplier's Certification statement has been reviewed and no product/service nonconformances from procurement requirements have been identified unless noted below. This product/service is hereby released for shipment. This section serves as the Quality Assurance release for the above described product for shipment. It does not constitute an acceptance thereof and does not relieve the Supplier, Manufacturer or Contractor of any and all responsibility or obligation imposed by the purchase contract. It does not waive any rights the Purchaser may have under the purchase contract, including the Purchaser's right to reject the above described material upon discovery of any deviations from requirements of the purchase contract, drawings and specifications.	
	NONCONFORMANCES FROM PROCUREMENT QUALITY REQUIREMENTS:	
	REMARKS/PRODUCT SERIAL NUMBERS:	
	BY PPPL QA REPRESENTATIVE (OR DESIGNEE)	DATE

Rev. 1 November 15, 2010

The PPPL Dimensional Inspection form is used to document results of inspections and any applicable nonconformances. The following are instructions for the completion of each field. Fields marked **(R)** are required. Fields marked **(CR)** are conditionally required, with the fields' instructions providing guidance regarding the applicability of the requirement. Fields marked **(O)** are optional.

1. **(R)** **Subcontractor/Company:** Name of the organization performing the inspection.
2. **(R)** **Purchase Order#:** Customer purchase order number.
3. **(R)** **Line Item:** Purchase order line item of the component being inspected.
4. **(R)** **Drawing# & Rev.:** Drawing number (including revision) of the drawing identifying the dimensions and tolerances of the component being inspected.
5. **(R)** **Part Name:** Part name/description as identified on the drawing's title block, part list, or purchase order line item.
6. **(R)** **FAI/In-Process:** Identification of type of dimensional inspection being reported. Only one option may be selected to indicate whether the inspection is an FAI or In-Process inspection.
7. **(R)** **Sheet#:** Multiple sheets may be used as necessary to document all applicable requirements. Each sheet is marked to indicate its sheet number and the total number of sheets comprising the report.
8. **(R)** **Feature Number:** Unique number assigned to each design characteristic. This number shall match the corresponding number assigned to the feature on the accompanying bubbled drawing.
9. **(CR)** **Reference Location:** Location of the feature on the drawing (sheet number and zone). This field is optional in cases where features are identified via a bubbled drawing. In the event that, with PPPL approval, a bubbled drawing is not included, this field is required.
10. **(R)** **Requirement:** Specified requirement for the design characteristic (e.g. drawing dimensional characteristic with associated nominal dimension and tolerances, drawing notes, specification requirements).
11. **(R)** **Results:** A listing of the measurement(s) obtained for the design characteristics.
 - In the event that a single Feature Number covers multiple features, the results may either be reported individually or as a range identifying the minimum and maximum measured values. Any features that are found to be nonconforming shall be listed separately.
 - When pin gages are used to verify hole diameters, the largest "go" pin and smallest "no-go" pin diameters shall be reported.
 - When qualified tooling (e.g. radius gage) is used as a go/no-go gage, the results are identified on an attribute basis (e.g. pass/fail).
12. **(R)** **M&TE Identification:** The unique identification assigned to the tooling used to take the reported measurements.
13. **(CR)** **Nonconformance Number:** As applicable, reference number of any nonconformance document.
14. **(O)** **Comments:** This field is used to document any noteworthy observations or comments.
15. **(R)** **Inspected and Documented by:** Printed name and signature of the person who prepared and approved the form. The signature may be in electronic format only if the signature is uniquely, positively, and securely associated with the approving individual.
16. **(CR)** **Date:** The date when field 15 was signed. If an electronic signature with a date stamp was used in field 15, this field is optional.
17. **(CR)** **Reviewed and Approved by:** Printed name and signature or electronic signature (as defined for field 15) of the PPPL representative who reviewed and approved the form. When First Article Inspection is indicated in field 6, this field is required.
18. **(CR)** **Date:** The date when field 17 was signed. If an electronic signature with a date stamp was used in field 17, this field is optional.