

Install Neutron Shielding - NSTX-U Test Cell

Statement of Work: NSTXU_1-8-1-5_SOW_100

REVISION 0

July 30, 2019

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**JOB ORDER STATEMENT OF WORK
FOR
BASIC ORDERING AGREEMENT (BOA)**

Title: Install Neutron Shielding – NSTX-U Test Cell

CAT: A1

Requisition No.: 420927

PREPARED BY: Mark Cropper

APPROVED BY: Tim Stevenson, Responsible Engineer

APPROVED BY: ES&H

APPROVED BY: Quality Assurance

APPROVED BY: Tom Jernigan, Cost Center Approver

APPROVED BY: Les Hill, Project Manager

**PRINCETON PLASMA PHYSICS LABORATORY
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1.0 SCOPE OF WORK

- 1.1 The Subcontractor shall provide all materials, labor, supervision, equipment, and expertise required to install neutron shielding in accordance with the Requirements provided herein. The following Work shall be completed:
 - 1.1.1 Install scaffolding as necessary as needed to provide safe access to the work areas.
 - 1.1.2 Remove existing penetration cover plates where required.
 - 1.1.3 Install neutron shielding and penetration cover plates where identified.
 - 1.1.4 Clean work areas and dispose of all trash and debris.

2.0 ATTACHMENT(S)

- Attachment 1 - Deliverables List
- Attachment 2 – Technical Requirements
- Attachment 3 – NSTX-U Test Cell Penetration Cross-Reference
- Attachment 4 – PPPL-Provided Materials

Note:

Referenced drawings will be provided to the Subcontractor under separate cover at time of site visit.

3.0 REFERENCE(S)

- 3.1 C/D-SOW-FAC-313 dated February 11, 2019, Rev. 0
- 3.2 PPPL Drawing E-FA1064, Test Cell East Wall Penetrations – Shielding Diagram
- 3.3 PPPL Drawing E-FA1065, Test Cell Northeast Wall Penetrations – Shielding Diagram
- 3.4 PPPL Drawing E-FA1066, Test Cell North Wall Penetrations – Shielding Diagram

4.0 GENERAL REQUIREMENTS:

Upon receipt of an appropriate BOA Job Order, Subcontractor agrees to perform the Work required by this Job Order Statement of Work, and any other documents included or referenced therein or elsewhere in this Job Order Statement of Work.

5.0 SPECIAL REQUIREMENTS:

- 5.1 Prior to submitting price quotation for this work, the Subcontractor shall visit the work site to ensure he/she understands the full scope of work and site conditions.
- 5.2 Use of scaffolding shall require inspection from a Competent Person.
- 5.3 Refer to Attachment 2 for additional Technical Requirements.

Attachment 1 - Deliverables List

#	Physical Deliverables Required	When Deliverable Is Required	Deliverable Received (✓)
1	Erect scaffolding as required	Work execution	
2	Install neutron shielding in 26 NSTX-U Test Cell wall penetrations	Work execution	
3	Install PPPL penetration cover plates	Work execution	
Exceptions: None			

#	Document Deliverables Required	When Deliverable Is Required	Deliverable format (paper, electronic etc.)	Storage Location for Deliverable	Deliverable Received (✓)
1	Job-specific Job Hazard Analysis (JHA)	Before start of work	Electronic or paper	Ops Center	
2	Product data on non-shrink grout	Verification before Work is started	Electronic or paper	Ops Center	
3	Product data on Tapcon® concrete fasteners and stainless steel deck screws	Verification before Work is started	Electronic or paper	Ops Center	
Exceptions: None					

Princeton Technical Representative: _____

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

Attachment 2 – Technical Requirements Install Neutron Shielding

Notes:

1. A total of 26 penetrations require installation of neutron shielding.
2. Refer to Attachment 4 for list of PPPL-provided materials.
3. The subcontractor shall provide scaffolding as required to access penetrations at upper wall elevations.

1. There are two (2) methods for installing neutron shielding, which are:
 - a. Non-shrink grout, and
 - b. Borated polyethylene discs.
2. Non-shrink grout shall be Sika SikaGrout® 328. No substitutes permitted without prior PPPL approval.
3. Attachment 3 provides a cross-reference to the penetration unique ID number, PPPL reference drawing location, and shielding method.
4. Attachment 4 identifies the materials which will be provided by PPPL. The subcontractor shall provide all other materials and equipment to execute the work.
5. Install neutron shielding as prescribed in the applicable PPPL drawing noting that Hold Points are identified in step 6 below.
6. HOLD POINTS: PPPL shall inspect and verify the following at the identified work step:
 - a. Equipment and view window grouted penetrations:
 - Configuration of existing penetration after removal of existing cover plate, if present
 - Cleaning of penetration interior surfaces
 - Installation of PPPL-provided cover plate with grouting connections with full bead of caulk at mating surface of shield wall
 - Grout mix
 - Penetration completely filled with grout as indicated by grout at vent fitting
 - b. 12", 11", and 10" Round penetrations:
 - Cleaning of penetration interior surfaces
 - Installation of each of the five (5) PPPL-provided borated polyethylene discs in each penetration
 - Installation of PPPL-provided Hilti® composite cover

Attachment 3 – NSTX-U Test Cell Penetration Cross-Reference

Penetration ID No.	Wall	Applicable PPPL Drawing	Shielding Method
6494	N	E-FA1066	Grout
6500	N	E-FA1066	Grout
6501	N	E-FA1066	Grout
1587	N	E-FA1066	Poly Disc
1588	N	E-FA1066	Poly Disc
1589	N	E-FA1066	Poly Disc
1590	N	E-FA1066	Poly Disc
6495	N	E-FA1066	Grout
6502	NE	E-FA1065	Grout
1616	NE	E-FA1065	Poly Disc
1617	NE	E-FA1065	Poly Disc
6434	NE	E-FA1065	Poly Disc
6496	NE	E-FA1065	Grout
6498	East	E-FA1064	Grout
6503	East	E-FA1064	Grout
6504	East	E-FA1064	Grout
6505	East	E-FA1064	Grout
1618	East	E-FA1064	Poly Disc
1619	East	E-FA1064	Poly Disc
1620	East	E-FA1064	Poly Disc
1621	East	E-FA1064	Poly Disc
1627	East	E-FA1064	Poly Disc
1628	East	E-FA1064	Poly Disc
1629	East	E-FA1064	Poly Disc
6497	East	E-FA1064	Grout
6499	East	E-FA1064	Grout

Attachment 4 – PPPL-Provided Materials

Material	PPPL Drawing/Item No.	
¼" thk. Closure Plate	E-FA1064	1
¼" thk. Closure Plate	E-FA1064	2
11.5" dia. x 2" thk. Borated Polyethylene Disc	E-FA1064	7
9.5" dia. x 2" thk. Borated Polyethylene Disc	E-FA1064	8
18" sq, Hilti® Composite Penetration Cover	E-FA1064	9
16" sq, Hilti® Composite Penetration Cover	E-FA1064	10
¼" thk. Closure Plate	E-FA1065	1
¼" thk. Closure Plate	E-FA1065	2
11.5" dia. x 2" thk. Borated Polyethylene Disc	E-FA1065	8
10.5" dia. x 2" thk. Borated Polyethylene Disc	E-FA1065	9
18" sq, Hilti® Composite Penetration Cover	E-FA1065	10
¼" thk. Closure Plate	E-FA1066	1
11.5" dia. x 2" thk. Borated Polyethylene Disc	E-FA1066	5
18" sq, Hilti® Composite Penetration Cover	E-FA1066	6