

**STATEMENT OF WORK FOR A TRANSMISSION LINE
VACUUM BARRIER WINDOW
MATERIAL PLASMA EXPOSURE EXPERIMENT
(MPEX)**

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**Statement of Work for a Transmission Line Vacuum Barrier Window
for the
Material Plasma Exposure Experiment Project
MPEX-03-SOW-003**

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ACRONYMS

DAP	Delivered at Place
FAT	Factory Acceptance Test
MPEX	Material Plasma Exposure Experiment Project
NIST	National Institute of Standards and Technology
ORNL	Oak Ridge National Laboratory
POC	Point of Contact
PO	Procurement Officer
QAP	Quality Assurance Program
TPO	Technical Project Officer
SOW	Statement of Work

1. INTRODUCTION

The Material-Plasma Exposure eXperiment (MPEX), a superconducting magnet, steady-state device, is being constructed at Oak Ridge National Laboratory (ORNL), going forward referred to as “the Company,” to address the harsh conditions inside a fusion reactor. This device, as designed, will have the unique feature of conducting accelerated lifetime tests of plasma-facing components, including those that have experienced neutron damage. MPEX will utilize a new high-intensity plasma source concept based on RF technology. This source concept will allow coverage of all expected plasma conditions in the divertor of a future fusion reactor, including very high densities. It will be able to study erosion and redeposition in correct geometries with relevant electric and magnetic fields in front of the target.

The Electron Cyclotron Heating (ECH) system is one of three plasma production and heating systems on MPEX. It consists of microwave source, transmission line, and a launcher that injects the microwaves into the plasma. The ECH system is the primary system to heat electrons in the plasma. The transmission is used to transmit the microwaves between the source and launcher, and since it requires its own private vacuum, a barrier window is required.

2. SCOPE

This Statement of Work (SOW) applies to the two-phase procurement of a transmission line vacuum barrier window (hereafter, the barrier window). The first phase of the procurement will be for the design and analysis of the window. The second phase will be for the manufacture, assembly, inspection, factory acceptance testing, packaging, and shipment of the barrier window to ORNL.

The Seller is expected to demonstrate that the barrier window will meet the technical requirements through the design package presented at a final design review.

3. APPLICABLE DOCUMENTS

- [1] *Performance Specifications for a Transmission Line Vacuum Barrier Window, MPEX-03-SPC-006 R0*

4. PERFORMANCE REQUIREMENTS

4.1 TASK 1: QUALITY PLAN AND PROJECT SCHEDULE

Prepare a quality plan and a project schedule for the design, manufacture, test and delivery of a barrier window. The quality plan shall address how the Seller's Quality Program will be applied to the work in this SOW, and identify procedures and other documentation for all special processes, measurements, etc. The quality plan shall also identify the planned work to be outsourced, list the planned or expected subcontractors and Suppliers, and address how the quality requirements of this SOW will be flowed down to these subcontractors and Suppliers.

The project schedule shall contain sufficient detail so that the Company's Technical Project Officer (TPO) may track design, procurement, fabrication, assembly, testing and shipping activities. The

Seller shall propose milestones for tracking progress and payments including at a minimum those listed in Section 4.4.3.2.

4.2 TASK 2: DESIGN

After completion of Task 1 and with approval of the TPO, the Seller shall prepare a design of the barrier window that meets the specifications given in [1]. The Seller shall prepare a final design report. The expectation is that the Seller shall be ready for manufacturing upon approval of the final design report. Completion of the final design report and closure of all action items shall constitute a project milestone.

The final design report shall:

- Demonstrate compliance and/or the method of compliance with all technical specifications.
- Include the design mechanical analysis
- Include the design microwave analysis
- Include the final interface definitions
- Present a Factory Acceptance Test plan

4.3 TASK 3: DELIVER VACUUM BARRIER WINDOWS

Upon successful completion of Task 2 and with authorization of the TPO, the Seller shall fabricate, assemble, test, and deliver two (2) barrier windows in accordance with the approved final design from Task 2 meeting the specifications in [1].

Final acceptance of the barrier windows will occur upon successful completion of the inspections and site acceptance tests at the Company's facility.

4.4 PROJECT MANAGEMENT

4.4.1 Language

All communications and documentation shall be in English.

4.4.2 Communications Protocol

The Seller shall designate an official single POC to interface with the Company's TPO. Only the Company's Procurement Officer (PO) can authorize changes to the price or work scope. SOW or Technical Specification updates can only be issued to the Seller by the Company's PO.

Problems encountered or anticipated shall be communicated as soon as practical.

4.4.3 Reporting

4.4.3.1 Kickoff Meeting

The kickoff meeting will be scheduled at a mutually agreed time as soon as practical after award of the subcontract. The Seller is responsible for recording meeting minutes and submitting them to the TPO within 3 working days after the meeting.

The primary purpose for the kickoff meeting is to confirm that the project participants understand the terms and conditions of the subcontract, SOW, specifications, and work activities.

The following topics will be discussed:

1. Flow down of requirements.
2. Work activities, schedules, and deliverables
3. Expectations for satisfying quality standards and documentation

4.4.3.2 Schedule and Milestones

At a minimum, the schedule shall include the following activities or milestones:

- Design report complete
- Receipt of diamond disks
- Completion of assembly
- Factory Acceptance Tests
- Prepare for shipment
- Complete final documentation

4.4.3.3 Monthly Reports

Monthly reports shall be submitted by the third calendar day of each month or on the Seller's usual reporting schedule as mutually agreed between the TPO and the Seller's designated POC.

Monthly report data shall include actual schedule progress, milestones reached, corrective actions needed, display of the present critical path for the Seller's work, and a brief narrative describing the status of work, significant accomplishments, actual and potential problems and risk mitigations or corrective actions.

4.4.3.4 Variance Reporting

The Seller shall notify the TPO and the PO immediately in writing when it is determined the actual cost may exceed the Agreement price. In no case shall the Seller continue work without authorized funding if it is determined that actual cost may exceed the Agreement price.

4.4.3.5 Periodic Communications

The Seller shall participate in a bi-weekly phone conference to be held with the Company's TPO to discuss any technical issues and schedule, personnel, and any other items pertinent to the work activities. The bi-weekly phone conference will serve as a mechanism to get early visibility of potential problems and issues arising during the performance of this subcontract. The Seller shall prepare written meeting minutes and submit these to the TPO within 3 working days after the meeting.

5. QUALITY ASSURANCE

5.1 QUALITY PROGRAM

The Seller shall have a Quality Assurance Program (QAP). The Seller shall be able to demonstrate that it can fulfill the quality assurance requirements in this SOW and in [1]. At a minimum, the prospective supplier shall have an established, documented, and effectively implemented quality assurance program describing controls for: work processes (controlled by instructions/procedures), personnel training and qualification, document and records control, design, procurement, inspection and testing; including the use of measuring and test equipment when used, corrective action, and assessments (audits).

Prior to subcontract award, the seller's QAP shall be evaluated to determine the degree of effective implementation of the quality program. Deficiencies, if any, identified during the evaluation shall be addressed and corrected to the satisfaction of the Company and shall occur prior to award.

All suppliers/sub-suppliers, subcontractors and fabricators (as applicable) shall have a Quality Assurance Program that meets or exceeds the requirements listed above.

5.2 ACCESS FOR SOURCE SURVEILLANCE INSPECTIONS

As part of the Company's quality assurance program, the Company reserves the right to perform source surveillance activities and may be conducted at the Seller's facility or any sub-tier seller facility that the Company determines necessary to ensure that quality objectives are met.

5.3 SELLER REQUESTED DEVIATIONS

The Seller shall propose any deviations to the specifications, drawings, or other technical requirements prior to award and obtain the Company's approval prior to invoking the deviation. Any Deviation Requests arising during the design or fabrication phase shall adhere to the Seller's Quality Program procedure and must be approved by the TPO.

5.4 NON-CONFORMANCES

When a nonconformance is identified, the Seller shall notify the Company TPO to determine what actions are required and document the nonconformance following the Seller's Quality Program

procedure. All nonconformances shall be summarized in the Final Report. Items that do not conform to specified requirements shall be controlled to prevent inadvertent installation or use. Controls shall provide for identification, documentation, evaluation, segregation when practical, disposition of the nonconforming items, and for notification to the Company.

5.5 MEASUREMENT AND TEST EQUIPMENT

Tools, gages, instruments, and other measurement and test equipment used for activities affecting quality shall be controlled, calibrated at specified periods, adjusted, and maintained to required accuracy limits.

Measurement and test equipment used by the Seller to perform work under this Statement of Work must be calibrated and traceable to NIST standards. Calibrations must be current. Calibration records must be provided to the Company.

6. TRANSPORTATION

The equipment shall be packaged in a manner that protects the equipment from damage. Incoterms: Delivered at Place (DAP) (ORNL Facility – Oak Ridge TN).

7. DELIVERABLES

The Seller shall supply the following:

Deliverable 1 – Within 2 weeks of subcontract award, provide to the TPO the Seller's Quality Assurance Program documentation, a project specific Quality Plan, and project schedule.

Deliverable 2 – Final design report shall be held no more than 2 months after subcontract award and shall include the following information called for in Section 4.2:

Deliverable 3 – Barrier windows shall be delivered to the Company site no more than 12 months after contract award and shall include:

- Dimensional inspection reports
- Test data for all components
- Completed factory acceptance test reports