Statement of Work for a Water-Cooled Gate Valve for the MATERIAL PLASMA EXPOSURE EXPERIMENT (MPEX)

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For the

US DEPARTMENT OF ENERGY

under contract DE-AC05-00OR22725

Statement of Work for a Water-Cooled Gate Valve
for the
Material Plasma Exposure Experiment Project

MPEX-04-SOW-504

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Revision History

Revision	DESCRIPTION OF CHANGE	REVISION TYPE	
		Major	Minor
0	Initial Issue	☒	☐
		☐	☐
		☐	☐
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ACRONYMS

TLA	Three Letter Acronym
MPEX	Material Plasma Exposure Experiment
TPO	Technical Project Officer
ISO	International Organization for Standardization
NIST	National Institute of Standards and Technology
NQA	ASME Nuclear Quality Assurance
QAP	Quality Assurance Program
SOW	Statement of Work
STEP	Standard for the Exchange of Product Data

1 INTRODUCTION

The Material-Plasma Exposure eXperiment (MPEX), a superconducting magnet, steady-state device, is being built at Oak Ridge National Laboratory (ORNL), herein referred to as "the Company", to address the harsh conditions inside a fusion reactor. This device, as designed, will have the unique feature of being able to conduct accelerated lifetime tests of plasma-facing components, including those that have experienced neutron damage.

The primary role of the water-cooled gate valve is to provide a leak tight vacuum chamber barrier when plasma is not present and the mating vacuum chambers are separated, remove heat that is gate valve when the plasma is present and the gate valve is open, and provide inlet and outlet ports for cooling water.

2 SCOPE

This Statement of Work (SOW) applies to the detail design, fabrication, assembly, testing and delivery of two (2) water-cooled gate valves and associated components as defined in *MPEX-04-SPC-504, Product Specification for a Water Cooled Gate Valve. [1]*

3 APPLICABLE DOCUMENTS

Document	*Revision*
MPEX-04-SPC-504 Product Specification for a Water Cooled Gate Valve[1]	0
MPEX-04-DES-00-P007MPEX VACUUM SYSTEMS PUMPING P&ID [2]	0
MPEX-00-ENG-002 Vacuum Handbook [3]	0
MPEX Knife Edge Appendix VH A2[4]	0
ASTM Knife Edge Standard[5]	0
Quality Assurance Plan for the MATERIAL PLASMA EXPOSURE EXPERIMENT [6]	0

4 PERFORMANCE REQUIREMENTS

The Seller shall provide all necessary facilities, personnel, management, and other resources to carry out the tasks specified in this document.

The Seller shall deliver a Water Cooled Gate Valve and associated components as specified in *MPEX-04-SPC-504 Product Specification for a Water Cooled Gate Valve* [1].

5 QUALITY ASSURANCE

5.1 QUALITY PROGRAM

The Seller shall have a Quality Assurance Program (QAP) that, at a minimum, is ISO 9001 certified, but preferably compliant with NQA-1 2008/2009a or equivalent. The Seller shall be able to demonstrate that it can fulfill the quality assurance requirements in this statement of work. 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 described above.

The quality program shall be based on existing proven work routines and practices described in written Seller documents reflecting a planned and systematic approach to achieving and maintaining quality.

5.2 ACCESS FOR SOURCE SURVEILLANCE INSPECTION

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

The Company shall have the right to schedule all critical operations (to be determined by the Company) for the convenience to supervise and witness these operations.

5.3 TEST AND INSPECTION

Testing and inspection requirements are addressed in *MPEX-04-SPC-504, Product Specification for a Water-Cooled Gate Valve* [1]. The Company has the right to witness all tests and inspections.

5.4 TEST REPORTS

At a minimum, each test report entry must include the drawing number, the Seller ID for the measuring or test equipment used, allowable values, test parameters, recorded results, and whether the article meets or fails the referenced requirement.

5.5 SELLER REQUESTED DEVIATIONS

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

5.6 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.

5.7 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 and shipped according to *MPEX Vacuum Handbook* [3], section 3.10, and in a manner that protects the equipment from damage, indicates exposure to shock during handling, and facilitates movement, loading, and unloading by fork truck or crane. Any special lifting fixtures or related hardware that are required to move, load, or unload the equipment shall be considered part of the equipment. Delivered at Place (DAP) (ORNL Facility – Oak Ridge TN).

7 DELIVERABLES

The Seller shall deliver:

- The Seller shall provide the following deliverables in accordance with *MPEX-04-SPC-504 Product Specification for a Water Cooled Gate Valve* [1].
    - Deliverable 1: Quality Plan (QP) – Within 2 weeks after subcontract award.
    - Deliverable 2: Design Package – Within 24 weeks after QP approval.
    - Deliverable 3: Update of QP – Within 2 weeks after authorization to proceed with Part 2.
    - Deliverable 4: Cleaning Procedure and Clean Work Plan - Within 4 weeks after Company approval of updated QP.

  - Deliverable 5: Test Procedures - Within 4 weeks after Company approval of the updated QP.
- QTY (2) of the Water Cooled Gate Valve and associated components described in *Product Specification for a Water Cooled Gate Valve*.
- As-built 3D CAD model(s) of the Water Cooled Gate Valve. CREO is the preferred format, but STEP is acceptable.
- Thermomechanical Design Analysis Calculation
- Maintenance procedures and/or maintenance schedules
- 1 set consumable maintenance components
- Calibration records for measurement and test equipment
- Welder qualification documents
- Inspector qualification documents
- Test Reports
  - At a minimum, each test report entry must include the drawing number, the Seller ID for the measuring or test equipment used, allowable values, test parameters, recorded results, and whether the article meets or fails the referenced requirement.
- Functional Test Report
  - This report of subsystems and systems, as installed, indicates the functional operability of such systems to design requirements. Such reports shall contain the signature and title of the authorized representative of the organization performing the tests and shall be sent to the Company for review and acceptance.
- Material Mill Test Report
  - Material Certification such as those stipulated through ASME, ASTM, SAE, etc., and Material Test Reports shall be submitted identifying the specification to which the material conforms. Specific test data obtained from the original mill source is required and shall include physical and chemical properties and other specified properties and testing. Certification shall include the signature of the Seller. All reports shall be subject to review by the Company.
- Hydrostatic Leak Test
  - After assembly, the Seller shall leak test all cooling lines in accordance with the code for design and construction, requirements in ASTM E1003 - Hydrostatic Leak Check report to 330 psi for cooling channels. The Seller shall record test results and shall provide a test report to the Company.
- Cleaning Certification
  - The Seller shall prepare a Cleaning Procedure in accordance with the requirements of MPEX *Vacuum Handbook* [3] and shall submit the procedure to the Company for approval. The Seller shall also prepare a Clean Work Plan that specifies how cleanliness will be maintained throughout the manufacturing process, states when specific cleaning procedures will be applied, and identifies controls that will be in place to maintain cleanliness. The Clean Work Plan shall include cleaning techniques, materials, and shall identify chemicals that will be used. The Cleaning Procedure and Clean Work Plan shall be submitted to the

Company's TPO for review and approval …The procedures shall include evidence that all requirements of are clearly satisfied.

- Certificates of Compliance for all purchased components and materials
- List of recommended spare parts
- Final report documenting any non-conformances.
    - The Company expects to receive equipment items, components, materials, and documentation that conform to all codes, standards, specifications, and procedures in the subcontract. The Seller may use its own nonconformance program to identify, report, and recommend disposition of all non-conformances, but dispositions that would leave any remaining nonconformity must be submitted to the Company for approval. The request should identify the affected item(s) by name and serial number, citing the drawing and/or specification number and revision number containing the specific requirement that has not been met. The request should state the number of nonconforming items being reported. The request should include a description of the nonconformity, identifying requirement(s) not met. The supplier may attach a description of the cause, and a corrective action plan and schedule if pertinent. The issuance and acceptance of such a request in no way limits or affects the warranty provision or other rights or remedies of this agreement. Such a request shall not establish a precedent or obligation to accept existing or future items not conforming to all provisions of the subcontract.
- Process Certification
    - Each shipment shall be represented by certification for processes covered by specifications such as (but not limited to) heat treating, welding, magnetic particle inspection, penetrant inspection, ultrasonic inspection, surface preparation treatment, etc., stating that processing was performed to specification requirements. Certification shall list applicable specifications to which the processes conform and the name of the organization that performed them (if other than the Seller), date, and authorized signature of a responsible representative of the Seller. When parts are serialized, serial numbers shall appear on the certification.
- Welding/Brazing Process
    - The Seller shall provide detailed procedures for each type of welding process and each characteristically different welding joint to be used in the performance of this Agreement. Welding procedures are subject to audit and the acceptance of the Company. The Seller shall qualify both manual welders and equipment to the specification requirements of the Agreement. Qualification tests shall be performed following the detailed welding procedure and shall be documented by the Seller prior to actual fabrication of the subcontract item.
- Packaging and Shipping
    - The Seller is responsible for all packing and shipping provisions to ensure that the system arrives at the Company's site in an undamaged, working condition. The

Seller shall inform the Company of shipping plans two weeks before actual shipment.

- Certification of Compliance
  - A written statement attesting and supporting documentation that confirms the materials are in accordance with the specified requirements. When required, supporting documentation shall include documentation that the material provided meets the specified Code and has current testing laboratory certification (Underwriters Laboratory [UL], American Society for Testing and Materials [ASTM], Nationally Recognized Testing Laboratory [NRTL}, National Science Foundation [NSF], Factory Mutual [FM], etc.).
- Operating/Maintenance Manual
  - Documents shall be submitted that contain the operational procedures, instructions, maintenance, spare parts list, and handling precautions.

8 REFERENCES

[1] *MPEX-04-SPC-504 Product Specification for a Water Cooled Gate Valve*
[2] *MPEX-04-DES-00-P007MPEX VACUUM SYSTEMS PUMPING P&ID*
[3] *MPEX-00-ENG-002 Vacuum Handbook*
[4] *MPEX-00-ENG-002 Vacuum Handbook Knife Edge Definition*
[5] *ASTM Knife Edge Standard*
[6] *Quality Assurance Plan for the MATERIAL PLASMA EXPOSURE EXPERIMENT*