

Expression of Interest

Title	Expression of Interest for Formed Inconel Bellows Vacuum Chambers
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ABSTRACT

This expression of interest document seeks from potential Sellers budgetary estimate for the design, fabrication, standard quality provisions, packaging, and delivery of Inconel bellows vacuum chambers for Oak Ridge National Laboratory’s Second Target Station project. It summarizes the technical and quality requirements of the design and the main statement of work milestones and activities.

REVISIONS

Revision	Date	Description
0	15 JUNE 2022	Initial Release

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1. ACRONYMS & DEFINITIONS

Company	Oak Ridge National Laboratory (ORNL).
Pulsed dipole	Magnet that is periodically ramped to field and back to zero, with a ramp time on the order of msec and a repetition rate on the order of Hz.
Seller	The supplier interested or under contract to produce a service and or units for the Company.
STS	Second Target Station. An Oak Ridge National Laboratory's Spallation Neutron Source (SNS) project.
TBD	To be determined by the Seller.
unit	A single complete product or package set produced by the Seller.

2. INTRODUCTION

The Company is pursuing a design concept using a thin walled, formed Inconel bellows with stainless steel flanges (Figure 1 & Figure 2).

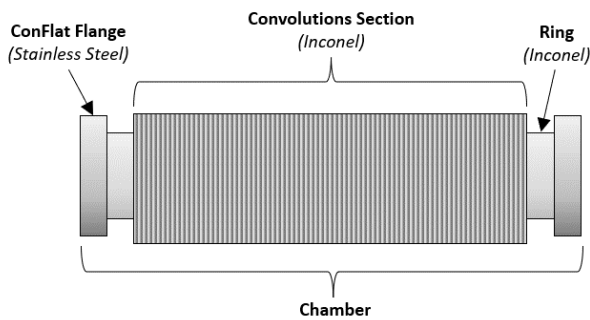


Figure 1 – Chamber Illustration and Components.

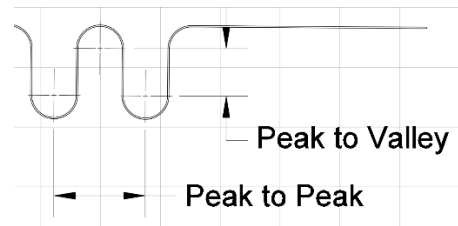


Figure 2 – Convolution Features

The Company is requesting a budgetary estimate from the Seller for a two phased project: 1) development and fabrication of a prototype unit, and 2) a run of production units. The Seller is to provide total cost and approximate duration for each phase.

Technical requirements for the prototype are provided in the summary of technical requirements section. Production unit requirements will be finalized in phase 2. Key milestones and activities for each phase are provided in the summary of work section.

The Seller may propose alternate solutions or exceptions. The Seller may subcontract work but must 1) continue to follow ORNL guidelines for maintaining quality assurance, and 2) provide a detailed description of the subcontracted work.

3. SUMMARY OF TECHNICAL SPECIFICATION

3.1 Technical Requirements

The Seller's design proposal shall adhere to the features' dimensional envelopes listed in **Table 1**.

Table 1 – Critical Feature Dimensions, Tolerance, & Envelopes. All units in mm.

Component	Description of Feature Dimension	Dimension & Tolerance	
Chamber	Total Length (Flange to Flange Sealing Faces) ^a	830	±5
Convolutions	OD	241.3	MAX
	ID	205.2	MIN
	Wall Thickness	0.3	TBD
	Peak to Peak ^a	TBD	TBD
	Peak to Valley ^a	TBD	TBD
	Total Length of Convolution Section ^a	700	TBD
Ring	OD ^b	TBD	TBD
	Wall Thickness	0.3	TBD

a. Applies to free length.

b. Considerations include the nominal bore of the flange and the convolution OD maximum.

All welds and filler materials are to follow AWS standards.

The Seller shall identify and propose values for any features not listed in **Table 1** or in this section that are also part of the chamber’s design. Design documentation for the prototype and production units shall include models and design drawings.

Component materials include Inconel 625 (ASTM B443, grade 1 minimum) for the convolutions and rings and type 304L or 316L Stainless Steel (ASTM 240) for the DN200 (ISO 3669) flanges.

Only aqueous based machining lubricants are to be used as this should simplify the cleaning process.

Cleaning, testing, and storage shall utilize a clean area that is separated from sources of potential oil or dirt contamination. All units to receive bakeout of 200°C for 48 hours.

Each unit shall be uniquely labeled per SAE AS478.

3.2 Quality Assurance Provisions

- Records of instruments used in acceptance tests, including calibration dates and product description.
- Each unit to be pumped down to $\leq 1.3 \times 10^{-6}$ Pa (1×10^{-8} Torr) with helium leak rate not exceeding 1.3×10^{-7} Pa-L/s ($\sim 1 \times 10^{-9}$ Torr-L/s) for all units.
- Each unit to have critical dimensions measured.
- First article inspections shall include all standard acceptance testing and inspections with the addition of measurements for the features designed by the Seller as well as all dimensions specified by the requirements.

3.3 Packaging & Shipping

- Each unit must be backfilled with dry nitrogen gas and blanked off. Then packaged using nitrogen-filled plastic wrapping.

4. SUMMARY OF WORK

4.1 Phase 1 – Prototype Unit

The milestones and activities for this phase are summarized into Table 2.

Table 2 - Phase 1 Milestones & Activities

Milestones	Activities
Prototype Design Review	Seller to review technical documentation and propose prototype design.
Fabrication Plan	Seller to propose fabrication plan including cleaning solutions and methods and recommend labelling method.
Quality Assurance Test Results Review	Seller to provide Company with quality assurance testing results.
Packaging Design and Shipping Plan Review	Seller to propose a packaging design for shipping and storage as well as a shipping plan.
Delivery	Company to receive and accept prototype.

4.2 Phase 2 – Production Units

The milestones and activities for this phase are summarized into Table 3.

Table 3 - Phase 2 Milestones & Activities

Milestones	Activities
Kick-off Meeting	Company to hold review of Prototype.
Production Design Review	Seller to review technical documentation and propose final design.
Quality Assurance Test Results Review	Seller to provide Company with quality assurance testing results.
Delivery	Company to receive and accept units.

Summary of unit quantities can be found in Table 4.

Table 4 - Summary of Unit Quantities

Phase	Bellows Chamber Unit Type	Quantity
1	Prototype	1
2	Production	8