

**REQUEST FOR BID**  
**FOR**  
**FURNISHING AND DELIVERY**  
**OF**  
**BERYLLIUM REFLECTOR and SUPPORT SKIRT**  
**FOR**  
**THE CURATORS OF THE UNIVERSITY OF MISSOURI**  
**ON BEHALF OF**  
**UNIVERSITY OF MISSOURI – COLUMBIA CAMPUS**  
**RFB# 21018**  
**DUE DATE: SEPTEMBER 24, 2020**  
**TIME: 2:00 P.M. CT**

THE CURATORS OF THE UNIVERSITY OF MISSOURI  
Prepared by:  
Wade A. Jadwin  
Strategic Sourcing Specialist  
University of Missouri Procurement  
1201 North State Street – Suite G5C  
Rolla, MO 65201

Date Issued: August 20, 2020

## NOTICE TO RESPONDENTS

The University of Missouri requests bids for the Furnishing of Delivery of **Beryllium Reflector and Support Skirt, RFB #21018**, which will be received by the undersigned at University of Missouri Procurement, until **September 24, 2020 at 2:00 P.M. CT. The University assumes no responsibility for any vendor's on-time receipt at the designated location for bid opening. Faxed or emailed responses will not be considered.**

Specifications and the conditions of Request for Bid together with the printed form on which Request for Bids must be made may be obtained by accessing the following website: <http://www.umsystem.edu/ums/fa/procurement/bids> or from the Strategic Sourcing Specialist identified within this document.

In the event a Respondent chooses to use the Word version of the RFB to aid in preparation of its response, the Respondent should only complete the response information. Any modification by the Respondent of the specifications provided will be ignored, and the original wording of the RFB shall be the prevailing document.

If you have any questions regarding the RFB, please send them to:

*Wade A. Jadwin  
University of Missouri Procurement  
1201 North State Street – Suite G5C  
Rolla, Missouri 65409  
jadwinw@mst.edu*

**All questions regarding the RFB must be received no later than 2:00 P.M. CT on September 16, 2020.**

The University reserves the right to waive any informality in Request for Bid and to reject any or all Request for Bids.

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**UNIVERSITY OF MISSOURI  
REQUEST FOR BID (RFB)  
GENERAL TERMS AND CONDITIONS  
&  
INSTRUCTIONS TO RESPONDENTS**

**A. General Terms and Conditions**

1. **Purpose:** The purpose of these specifications is to require the furnishing of the highest quality equipment, supplies, material and/or service in accordance with the specifications. These documents, and any subsequent addenda, constitute the complete set of specification requirements and bid response forms.
2. **Governing Laws and Regulations:** Any contract issued as a result of this RFB shall be construed according to the laws of the State of Missouri. Additionally, the contractor shall comply with all local, state, and federal laws and regulations related to the performance of the contract to the extent that the same may be applicable.
3. **Taxes:** The contractor shall assume and pay all taxes and contributions including, but not limited to, State, Federal and Municipal which are payable by virtue of the furnishing and delivery of item(s) specified herein. Materials and services furnished the University are not subject to either Federal Excise Taxes or Missouri Sales Tax.
4. **Sovereign Immunity:** The Curators of the University of Missouri, due to its status as a state entity and its entitlement to sovereign immunity, is unable to accept contract provisions, which require The Curators to indemnify another party (537.600, RSMo). Any indemnity language in proposed terms and conditions will be modified to conform to language that The Curators are able to accept.
5. **Preference for Missouri Firms:** In accordance with University policy, preference shall be given to Missouri products, materials, services and firms when the goods or services to be provided are equally or better suited for the intended purpose. As long as quality is equal, preference by a differential not to exceed 5% shall be given. Firms are considered "Missouri firms" if they maintain a regular place of business in the State of Missouri.
6. **Appropriation:** The Curators of the University of Missouri is a public corporation and, as such, cannot create indebtedness in any one year (the fiscal year beginning July 1 to June 30) above what they can pay out of the annual income of said year as set forth in 172.250, RSMo. Therefore, if the University determines it has not received adequate appropriations, budget allocations or income to enable it to meet the terms of this contract, the University reserves the right to cancel this contract with 30 days' notice.
7. **Equal Opportunity and Non-Discrimination:** In connection with the furnishing of equipment, supplies, and/or services under the contract, the contractor and all

subcontractors shall agree not to discriminate against any recipients of services, or employees or applicants for employment on the basis of race, color, religion, national origin, sex, age, disability, or veteran status. The contractor shall comply with federal laws, rules and regulations applicable to subcontractors of government contracts including those relating to equal employment of minorities, women, persons with disabilities, and certain veterans. Contract clauses required by the United States Government in such circumstances are incorporated herein by reference.

8. **Supplier Diversity Participation:** The University of Missouri System is committed to and supports supplier diversity as an essential part of the University's mission and core values. To qualify as a Diverse Supplier, the company must be at least 51% owned and controlled by someone in one of the recognized groups (see below). These firms can be a sole proprietorship, partnership, joint venture or corporation. Diverse suppliers should be certified from a recognized certifying agency.

The University of Missouri recognizes the following groups:

- MBE (Minority Owned Business Enterprise)
  - African American
  - Asian American
    - Pacific Asian American
    - Subcontinent Asian American
  - Hispanic American
  - Native American
- WBE (Women Owned Business Enterprise)
- DVBE (Service Disabled Veteran Owned Business Enterprise)
- VBE (Veteran Owned Business Enterprise)
- LGBT (Lesbian, Gay, Bisexual, Transgender)
- DBE (Disadvantaged Business Enterprise)

Tier 2 Diverse Supplier Spending and Reporting: The University strongly encourages Supplier Diversity participation in all of its contracts for goods and services. Tier 2 spend is spend reported by primary (non-diverse) suppliers of the University of Missouri who subcontract work to, or make purchases from a diverse supplier. Depending upon the contract, primary (non-diverse) suppliers may be asked to submit Tier 2 information with Women and Diverse Owned Companies. Suppliers have two options in reporting Tier 2 dollars depending on the terms on the contract: Direct and Indirect.

- Direct dollars – dollars directly spent with Women and Diverse Owned suppliers in the fulfillment of the contract.
- Indirect dollars – dollars based on a percentage of revenue the University represents to the supplier. An example is as follows:
  - 1) Supplier's Total Revenues: \$10,000,000

- 2) Revenues from University \$: \$4,000,000
- 3) University % of Total Revenues: 40% (#2 divided by #1)
- 4) Total MBE Dollars: \$150,000
- 5) Total WBE Dollars: \$150,000
- 6) Total University Attributable MBE \$: \$60,000 (#3 multiplied by #4)
- 7) Total University Attributable WBE \$: \$60,000 (#3 multiplied by #5)
- 8) Total University Attributable MWBE \$: \$120,000 (Sum of #6 and #7)
- 9) University % Attributable Revenue: 3% (#8 divided by #2)

Supplier Diversity Participation Form: If a respondent will be utilizing a diverse supplier as part of this contract, they must indicate their Supplier Diversity participation levels on the Supplier Diversity Participation Form included in this RFB(see Attachment A). The Respondent must describe what suppliers and/or how the Respondent will achieve the Supplier Diversity goals. Evaluation of bids shall include the proposed level of Supplier Diversity participation. Bids that do not meet the participation requirements for Supplier Diversity will not receive any of the points during bid review.

Suppliers/contractors will be responsible for reporting Tier 2 diverse supplier participation on an agreed upon timing (e.g. quarterly, annually) when business is awarded.

The University will monitor the supplier/contractor's compliance in meeting the Supplier Diversity participation levels committed to in the awarded bid. If the supplier/ contractor's payments to participating diverse suppliers are less than the amount committed to in the contract, the University reserves the right to cancel the contract, suspend and/or debar the supplier/contractor from participating in future contracts.

9. **Applicable Laws and Regulations:** The University serves from time to time as a contractor for the United States government. Accordingly, the provider of goods and/or services shall comply with federal laws, rules and regulations applicable to subcontractors of government contracts including those relating to equal employment opportunity and affirmative action in the employment of minorities (Executive Order 11246), women (Executive Order 11375), persons with disabilities (29 USC 706 and Executive Order 11758), and certain veterans (38 USC 4212 formerly [2012]) contracting with business concerns with small disadvantaged business concerns (Publication L. 95-507). Contract clauses required by the Government in such circumstances are incorporated herein by reference.
10. **Applicable Digital Accessibility Laws and Regulations:** The University affords equal opportunity to individuals with disabilities in its employment, services, programs and activities in accordance with federal and state laws, including Section 508 of the Rehabilitation Act, 36 C.F.R., Pt. 1194. This includes effective communication and access to electronic and information communication technology resources, and the University expects that all products will, to the greatest extent possible, provide equivalent ease of use for individuals with disabilities as for non-disabled individuals. The University of Missouri has adopted the Web Content Accessibility Guidelines (WCAG), as specified by the University of Missouri Digital Accessibility Policy.

Supplier shall: (1) deliver all applicable services and products in reasonable compliance with University standards (Web Content Accessibility Guidelines 2.0, Level AA or above); (2) provide the University with an Accessibility Conformance Report detailing the product's current accessibility according to WCAG standards using the latest version of the Voluntary Product Accessibility Template (VPAT); (3) if accessibility issues exist, provide a "roadmap" plan for remedying those deficiencies on a reasonable timeline to be approved by the University; (4) promptly respond to assist the University with resolving any accessibility complaints and requests for accommodation from users with disabilities resulting from supplier's failure to meet WCAG guidelines at no cost to the University; and (5) indemnify and hold the University harmless in the event of any claims arising from inaccessibility.

When installation, configuration, integration, updates, or maintenance are provided, the supplier must ensure these processes are completed in a way that does not reduce the original level of WCAG conformance. If at any point after procurement it is determined that accessibility improvements need to be made in order to comply with the WCAG standards, the supplier agrees to work with the University to remedy the non-compliance by submitting a roadmap detailing a plan for improvement on a reasonable timeline. Resolution of reported accessibility issue(s) that may arise should be addressed as high priority, and failure to make satisfactory progress towards compliance with WCAG, as agreed to in the roadmap, shall constitute a breach of contract and be grounds for termination or non-renewal of the agreement.

- 11. Applicable Health Related Laws and Regulations:** If these specifications or any resulting contract involves health care services or products, the Contractor agrees to maintain, and will further assure such compliance by its employees or subcontractors, the confidential nature of all information which may come to Contractor with regard to patients of the University. All services provided pursuant to this contract shall be provided in accordance with all applicable federal and state laws including The Health Insurance Portability and Accountability Act of 1996, Public Law 104-191, sections 261-264 (the Administrative Simplification sections) and the regulations promulgated pursuant thereto and regulations of the Joint Commission on Accreditation of Healthcare Organization and The Centers for Medicare & Medicaid Services (CMS).

Respondents understand and agree that the Curators of the University of Missouri, in the operation of MU Health Care, is regulated under federal or state laws with regard to contracting with vendors. The Contractor represents that it is not currently excluded or threatened with exclusion from participating in any federal or state funded health care program, including Medicare and Medicaid. Contractor agrees to notify the University of any imposed exclusions or sanctions covered by this representation.

The University will regularly check the "List of Excluded Individuals/Entities" (LEIE), maintained by the Office of Inspector General, United States Department of Health and Human Services ("OIG") to determine if any Respondents have been excluded from

participation in federal health care programs, as that term is defined in 42 U.S.C. §1320a-7b(f). The University reserves the sole right to reject any respondents who are excluded by the OIG, who have been debarred by the federal government, or who have otherwise committed any act that could furnish a basis for such exclusion or debarment.

12. **Inventions, Patents, and Copyrights:** The Contractor shall pay for all royalties, license fees, patent or invention rights, or copyrights and defend all suits or claims for infringements of any patent or invention right or copyrights involved in the items furnished hereunder. The Contractor shall defend, protect, and hold harmless the University its officers, agents, servants and employees against all suits of law or in equity resulting from patent and or copyright infringement concerning the contractor's performance or products produced under the terms of the contract.

Copyrights for any item developed for the University shall be the property of the University and inure to its benefit and the Contractor shall execute such documents as the University may require for the perfection thereof.

13. **Insurance:** The Contractor shall purchase and maintain such insurance as will protect the Contractor and the University against any and all claims and demands arising from the execution of the contract. Further, when stated in the Detailed Specifications and Special Conditions, the Contractor shall be required to procure and maintain the types and limits of insurance as specified.
14. **Performance Bond/Irrevocable Letter of Credit:** If a performance bond or irrevocable letter of credit is required in the Detailed Specifications and Special Conditions, the Contractor shall furnish to the University, along with their signed contract, a performance bond or unconditional irrevocable letter of credit payable to the Curators of the University of Missouri in the face amount specified in the Detailed Specifications and Special Conditions as surety for faithful performance under the terms and conditions of the contract.
15. **Vendor Gifts:** The contractor shall refrain in offering any offers of gifts to the University, and all University of Missouri employee's, in accordance with University of Missouri Policy #26301, Suppliers.

## **B. Instructions to Respondents**

1. **Request for Bid (RFB) Document:** Respondents are expected to examine the complete RFB document and all attachments including drawings, specifications, and instructions. Failure to do so is at Respondents' risk. It is the Respondents' responsibility to ask questions, request changes or clarifications, or otherwise advise the University if any language, specifications or requirements of the RFB appear to be ambiguous, contradictory, and/or arbitrary, or appear to inadvertently restrict or limit the requirements stated in the RFB to a single source.

Any and all communications from Respondents regarding specifications, requirements, competitive Request for Bid process, etc., should be directed to the University buyer of record referenced in this RFP. It is the responsibility of the person or organization communicating the request to ensure that it is received.

The RFB document and any attachments constitute the complete set of specifications and Request for Bid response forms. No verbal or written information that is obtained other than through this RFB or its addenda shall be binding on the University. No employee of the University is authorized to interpret any portion of this RFB or give information as to the requirements of the RFB in addition to that contained in or amended to this written RFB document. In case of any doubt or difference of opinion as to the true intent of the RFP, the decision of the University's Chief Procurement Officer shall be final and binding on all parties.

- 2. Preparation of Request for Bids:** All Request for Bid responses shall include three (3) copies and one (1) thumb or jump drive and must be enclosed in a sealed envelope plainly marked: **Request for Bid #21018 for Beryllium Reflector, mailed and/or delivered to University of Missouri Procurement, 1201 North State Street – Suite G5C, Rolla, MO 65409, ATTN: Wade A. Jadwin.**

To receive consideration, Request for Bids must be received, at the above address, prior to the Bid due date and time stated in this RFP. It is the respondent's full responsibility for the actual delivery of Bids during business hours at the specified address.

Unless otherwise specifically stated in the RFP, all specifications and requirements constitute minimum requirements. All Requests for Bids must meet or exceed the stated specifications or requirements. All equipment and supplies offered must be new, of current production, and available for marketing by the manufacturer unless the RFB clearly specifies that used, reconditioned, or remanufactured equipment and supplies may be offered. Unless specifically stated and allowed in the Detailed Specifications and Special Conditions, all pricing submitted in response to this RFB is firm and fixed.

Whenever the name of a manufacturer, trade name, brand name, or model and catalog numbers followed by the words "or equal" or "approved equal" are used in the specifications, it is for the purpose of item identification and to establish standards of quality, style, and features. Bids on equivalent items of the same quality are invited. However, to receive consideration, such equivalent bids must be accompanied by sufficient descriptive literature and/or specifications to clearly identify the item and provide for competitive evaluation. The University will be the sole judge of equality and suitability. Whenever the name of a manufacturer is mentioned in the specifications and the words "or equal" do not follow, it shall be deemed that the words "or equal" follow unless the context specifies "no substitution." Unless noted on the Request for Bid form, it will be deemed that the article furnished is that designated by the specifications. The University reserves the right to return, at contractor's expense, all items that are furnished which are not acceptable as equals to



items specified and contractor agrees to replace such items with satisfactory items at the original bid price.

Time will be of the essence for any orders placed as a result of this RFP. The University reserves the right to cancel any orders, or part thereof, without obligation if delivery is not made in accordance with the schedule specified by the respondents Bid and accepted by the University. Unless otherwise specified in the Detailed Specifications and Special Conditions, all bids shall include all packing, handling, and shipping charges FOB destination, freight prepaid and allowed.

- 3. Submission of Bids:** Respondent shall furnish information required by the solicitation in the form requested. The University reserves the right to reject bids with incomplete information or which are presented on a different form. All bids shall be signed, in the appropriate location, by a duly authorized representative of the Respondent's organization. Signature on the bid certifies that the Respondent has read and fully understands all RFB specifications, plans, and terms and conditions.

By submitting a bid, the Respondent agrees to provide the specified equipment, supplies and/or services in the RFP, at the prices quoted, pursuant to all requirements and specifications contained therein. Furthermore, the Respondent certifies that: (1) the bid is genuine and is not made in the interest of or on behalf of any undisclosed person, firm, or corporation, and is not submitted in conformity with any agreement or rules of any group, association, or corporation; (2) the Respondent has not directly or indirectly induced or solicited any other Respondent to submit a false or sham bid; (3) the Respondent has not solicited or induced any person, firm, or corporation to refrain from responding; (4) the Respondent has not sought by collusion or otherwise to obtain any advantage over any other Respondent or over the University.

Modifications or erasures made before bid submission must be initialed in ink by the person signing the bid. Bids, once submitted, may be modified in writing prior to the exact date and time set for the RFB closing. Any such modifications shall be prepared on company letterhead, signed by a duly authorized representative, and state the new document supersedes or modifies the prior bid. The modification must be submitted in a sealed envelope marked "Bid Modification" and clearly identifying the RFB title, RFB number and closing date and time. Bids may not be modified after the RFB closing date and time. Telephone and facsimile modifications are not permitted.

Bids may be withdrawn in writing, on company letterhead, signed by a duly authorized representative and received at the designated location prior to the date and time set for RFB closing. Bids may be withdrawn in person before the RFB closing upon presentation of proper identification. Bids may not be withdrawn for a period of sixty (60) days after the scheduled closing time for the receipt of bids.

All bids, information, and materials received by the University in connection with an RFB response shall be deemed open records pursuant to 610.021 RSMo. If a Respondent believes any of the information contained in the Respondent's response is exempt from 610.021 RSMo, the Respondent's response must specifically identify the material which is deemed to be exempt and cite the legal authority for the exemption; otherwise, the University will treat all materials received as open records. The University shall make the final determination as to what materials are or are not exempt

4. **Evaluation and Award:** Any clerical errors, apparent on its face, may be corrected by the Buyer before contract award. Upon discovering an apparent clerical error, the Buyer shall contact the Respondent and request clarification of the intended bid. The correction shall be incorporated in the notice of award. The University reserves the right to request clarification of any portion of the Respondent's response in order to verify the intent. The Respondent is cautioned, however, that its response may be subject to acceptance or rejection without further clarification.

The University reserves the right to make an award to the responsive and responsible Respondent whose product or service meets the terms, conditions, and specifications of the RFB and whose bid is considered to best serve the University's interest. In determining responsiveness and the responsibility of the Respondent, the following shall be considered when applicable: the ability, capacity, and skill of the respondent to perform as required; whether the respondent can perform promptly, or within the time specified without delay or interference; the character, integrity, reputation, judgment, experience and efficiency of the respondent; the quality of past performance by the Respondent; the previous and existing compliance by the Respondent with related laws and regulations; the sufficiency of the Respondent's financial resources; the availability, quality and adaptability of the Respondents equipment, supplies and/or services to the required use; the ability of the respondent to provide future maintenance, service and parts.

The University has established formal protest procedures. For more information about these procedures, contact the Buyer of Record.

In case of any doubt or difference of opinion as to the items and/or services to be furnished hereunder, the decision of the Assistant Vice President Management Services, UM System shall be final and binding upon all parties.

The University reserves the right to accept or reject any or all bids and to waive any technicality or informality.

5. **Contract Award and Assignment:** The successful Respondent(s) shall, within ten (10) days after the receipt of formal notice of award of the contract, enter into a contract prepared by the University. The Contract Documents shall include the Advertisement for Request for Bids, Specifications and Addenda, Exhibits, Request for Bid Form, Form of Contract, Statement of

Work, Letter of Award, University Purchase Order, and Form of Performance Bond, if required.

The contract to be awarded and any amount to be paid thereunder shall not be transferred, sublet, or assigned without the prior approval of the University.

6. **Contract Termination for Cause:** In the event the Contractor violates any provisions of the contract, the University may serve written notice upon Contractor and Surety setting forth the violations and demanding compliance with the contract. Unless within ten (10) days after serving such notice, such violations shall cease and satisfactory arrangements for correction be made, the University may terminate the contract by serving written notice upon the Contractor; but the liability of Contractor and Surety for such violation; and for any and all damages resulting there from, as well as from such termination, shall not be affected by any such termination.
7. **Contract Termination for Convenience:** The University reserves the right, in its best interest as determined by the University, to cancel the contract by given written notice to the Contractor thirty (30) days prior to the effective date of such cancellation.
8. **Warranty and Acceptance:** The Contractor expressly warrants that all equipment, supplies, and/or services provided shall: (1) conform to each and every specification, drawing, sample or other description which was furnished or adopted by the University, (2) be fit and sufficient for the purpose expressed in the RFP, (3) be merchantable, (4) be of good materials and workmanship, (5) be free from defect. Such warranty shall survive delivery and shall not be deemed waived either by reason of the University's acceptance of or payment for such equipment, supplies, and/or services.

No equipment, supplies, and/or services received by the University pursuant to a contract shall be deemed accepted until the University has had a reasonable opportunity to inspect said equipment, supplies and/or services. All equipment, supplies, and/or services which do not comply with specifications and/or requirements or which are otherwise unacceptable or defective may be rejected. In addition, all equipment, supplies, and/or services which are discovered to be defective or which do not conform to any warranty of the Contractor upon inspection (or at any later time if the defects contained were not reasonably ascertainable upon the initial inspection) may be rejected.

9. **Payment:** Preferred settlement method is through the use of Electronic Accounts Payable solutions. Payment terms associated with these forms of payment will be issued as net 30 after the date of invoice. Payment terms associated with settlement by check will be considered to be net 30 days. Cash discounts for prompt payment may be offered but they will not be considered in determination of award unless specifically stated in the Detailed Specifications and Special Conditions. The University may withhold payment or make such deductions as may be necessary to protect the University from loss or damage on account of defective work, claims, damages, or to pay for repair or correction of equipment or

supplies furnished hereunder. Payment may not be made until satisfactory delivery and acceptance by the University and receipt of correct invoice have occurred.

For consulting services and/or contract labor services performed for MU Health Care, the hourly rate and the number of hours worked must be included in the agreement and/or on the invoice submitted. Payment will not occur unless this information has been provided.

The University encourages suppliers to opt into its Single-Use Account (SUA) credit card program for payment of invoices. The SUA is an electronic, credit card-based payment solution that acts like a check. It provides a single 16-digit virtual account number for each payment. Similar to a check, the credit limit on each SUA is set to the specific payment amount. Payment terms for Suppliers who participate in the SUA program are Net 0 as opposed to the standard Net 30 terms.

10. **Accounting Practices:** The Contractor shall maintain, during the term of the contract, all books of account, reports, and records in accordance with generally accepted accounting practices and standard for records directly related to this contract. The Contractor agrees to make available to the University, during normal business hours, all book of account, reports and records relating to this contract for the duration of the contract and retain them for a minimum period of one (1) year beyond the last day of the contract term.
11. **Debarment and Suspension Certification:** The contractor certifies to the best of its knowledge and belief that it and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency in accordance with Executive Order 12549 (2/18/86).
12. **Cooperative Purchasing:** The intended coverage of this RFP, and any Agreement resulting from this solicitation, shall be for the use by all faculty, staff, students, departments, locations and affiliates of the University of Missouri, including MU Health Care.

The University of Missouri System seeks to make the terms and prices of this contract available to other higher education institutions and public entities in the State of Missouri. Extension of the terms and prices to any or all other Missouri higher education institutions and public entities is at the discretion of respondents and shall not be considered in the award of this contract. The contractor shall further understand and agree that participation by other higher education institutions and public entities is discretionary on the part of these institutions, and the University of Missouri System bears no financial responsibility for any payments due the contractor by such entities, nor will the University be responsible for contract administration for other institutions.

**UNIVERSITY OF MISSOURI**  
**DETAILED SPECIFICATIONS AND SPECIAL CONDITIONS**

**1.0 OVERVIEW**

The University of Missouri desires to purchase (1 each) beryllium reflector (material S-200-FH grade beryllium) and support skirt (material AA6061) for the University of Missouri Research Reactor (MURR®) per the following specifications and attached MURR Drawing Number 193, sheet 3 of 4 (Rev. 3) and sheet 4 of 4 (Rev. 7).

Vendor is to provide references to previous nuclear grade beryllium work that is similar to that specified in this bid request.

**2.0 SPECIFICATIONS**

References – the specifications for beryllium, Hot Isostatic Pressed (HIP) and nuclear grade will refer to the following documents:

- A. **ASTM B963-11** – “Standard Test Methods for Oil Content, Oil-Impregnation Efficiency, and Interconnected Porosity of Sintered Powder Metallurgy (PM) Products Using Archimedes’ Principle”
- B. **ASTM E8/E8M-09** – “Standard Test Methods for Tension Testing of Metallic Materials”
- C. **ASTM E55-11 (2017)** – “Standard Practice for Sampling Wrought Non-Ferrous Metals and Alloys for Determination of Chemical Composition”
- D. **ASTM E165-09** – “Standard Practice for Liquid Penetrant Examination for General Industry”
- E. **ASTM E172-90 (1999)** – “Practice for Describing and Specifying the Excitation Source in Emission Spectrochemical Analysis”
- F. **ASTM-E-1742** – “Standard Practice for Radiographic Examination”
- G. **ASTM E114-10** – “Standard Practice for Ultrasonic Pulse-Echo Straight-Beam Contact Testing”

**3.0 SCOPE**

These specifications define the manufacturing, delivery, and payment requirements for a HIP, nuclear grade beryllium reflector and aluminum support skirt.

#### 4.0 CHEMICAL COMPOSITION % (check analysis)

4.1 The materials shall conform to the requirements for chemical composition as listed below:

a) Beryllium Assay, % minimum	98.5
b) Beryllium Oxide, % maximum	1.5
c) Carbon, % maximum	0.15
d) Iron, % maximum	0.13
e) Aluminum, % maximum	0.10
f) Magnesium, % maximum	0.08
g) Silicon, % maximum	0.06
h) Nickel, % maximum	0.03
i) Calcium, % maximum	0.02
j) Chromium, % maximum	0.02
k) Copper, % maximum	0.015
l) Manganese, % maximum	0.015
m) Silver, % maximum	0.001
n) Lead, % maximum	0.002
o) Molybdenum, % maximum	0.002
p) Boron, % maximum	0.0002
q) Cadmium, % maximum	0.0002
r) Cobalt, % maximum	0.0005
s) Lithium, % maximum	0.0005
t) Uranium Impurity, ppm maximum	50.0

4.2 A check analysis shall be made and reported to the Buyer. The analysis shall be made in accordance with **ASTM E172-90** (1999), "Practice for Describing and Specifying Excitation Source in Emission Spectrochemical Analysis," where applicable. Other elements shall be analyzed as agreed upon. Sampling of material in the final form for check analysis shall be in accordance with **ASTM E55-11** (2017), "Standard Practice for Sampling Wrought Non-Ferrous Metals and Alloys for Determination of Chemical Composition."

#### 5.0 METHOD OF MANUFACTURING

Nuclear grade beryllium material supplied under this specification shall be manufactured from beryllium powder, by HIP. Finish machining shall be as specified by MURR Drawing Number 193, sheet 3 of 4 (Rev. 3) and sheet 4 of 4 (Rev.7) (see Attachment).

#### 6.0 MECHANICAL PROPERTIES

6.1 Tensile

Tensile properties shall be determined in accordance with **ASTM E8/E8M-09**, "Standard Test Methods for Tension Testing of Metallic Materials." A minimum of one (1) specimen from

each lot of material of one size and sintering parameter shall be tested at room temperature and meet the mechanical property requirements shown below:

Ultimate Tensile Strength, ksi, minimum	60.0 (414 MPa)
Yield Strength (0.2% offset), ksi, minimum	43.0 (296 MPa)
Elongation (% in 4 diameters), minimum	3.0

## 7.0 PHYSICAL PROPERTIES

### 7.1 Density

Density shall be determined in accordance with **ASTM B963-11**, "Standard Test Methods for Oil Content, Oil-Impregnation Efficiency, and Interconnected Porosity of Sintered Powder Metallurgy (PM) Products Using Archimedes' Principle." A minimum of three (3) specimens from each lot of material of one size and sintering parameter shall show a uniform density of 1.84 gram/cc minimum.

### 7.2 Grain Size

The average grain size shall not exceed 12 microns.

## 8.0 INSPECTION

### 8.1 Liquid Penetrant Examination

Liquid penetrant examination of materials and parts shall be performed in accordance with **ASTM E165-09**, "Standard Practice for Liquid Penetrant Examination for General Industry," and shall demonstrate that materials and parts have a sound surface, free of cracks, porosity and inclusions.

### 8.2 Radiographic Examination

Radiographic examination of materials and parts shall be performed over 100% of their cross section in accordance with **ASTM-E-1742** – "Standard Practice for Radiographic Examination," and shall be free of cracks and low density areas, and shall have no cavity or inclusion greater in volume than a sphere 0.050 inches in diameter in any single cubic inch of material. Radiography shall indicate a uniform density throughout the material.

### 8.3 Ultrasonic Examination

Ultrasonic examination of materials and parts shall be performed in accordance with **ASTM E114-10**, "Standard Practice for Ultrasonic Pulse-Echo Straight-Beam Contact Testing." Reference standards shall conform to the requirements for forgings, except that when testing for internal defects, the reference defect shall be the bottoms of two (2) 0.050-inch

diameter flat-bottomed holes drilled perpendicular to the surface being tested, but drilled from the opposite side. The depth of one hole shall be 1/4 the nominal thickness and the other, 3/4 the nominal thickness of the material to be tested.

## **9.0 CERTIFICATE OF TEST**

The seller shall certify in triplicate, compliance with all requirements of the specification. The certification shall include a certified report of the required tests: chemical analysis, ultimate tensile strength, yield strength, percent elongation, density, liquid penetrant, radiographic and ultrasonic. The certification shall include the purchase order number, material size and heat number.

## **10.0 RIGHT OF MANUFACTURING PROCEDURE REVIEW**

The Buyer reserves the right to review all routing and shop procedures pertaining to the manufacture of the beryllium reflector prior to start of work.

## **11.0 VENDOR EXPERIENCE**

Bidder must have successfully completed the final machining of a beryllium piece of a similar size or larger, with the same or greater degree of difficulty, and within the last two (2) years. Bidder is to provide a brief description of successful beryllium machining along with customer contact information as necessary to verify that manufacturing met the customer's specifications. Bids may be excluded should bidder not provide a brief description of experience or should previous customer indicate that beryllium manufacturing did not meet specifications.

## **12.0 DELIVERY/SCHEDULE**

Bid shall reflect all deliveries FOB Columbia, MO, MU Research Reactor. Bidder shall include proposed manufacturing and delivery schedule in bid.

## **13.0 PAYMENT**

Bidder shall provide bids for both of the following payment options:

1. Full payment, net 30 days, after delivery and receipt, and after review/inspection and final acceptance by MURR.
2. Partial payment, net 30 days, for beryllium sleeve "raw material" portion only. Final payment, net 30 days, after delivery and receipt, and after review/inspection and final acceptance by MURR. The bidder is to indicate the amount of the partial payment and the final payment.



## **INSURANCE**

Contractor agrees to maintain, on a primary basis and at its sole expense, at all times during the life of any resulting contract the following insurance coverages, limits, including endorsements described herein. The requirements contained herein, as well as the University's review or acceptance of insurance maintained by Contractor is not intended to and shall not in any manner limit or qualify the liabilities or obligations assumed by Contractor under any resulting contract. Coverage to be provided as follows by a carrier with A.M. Best minimum rating of A- VIII.

### **Commercial General Liability**

Contractor agrees to maintain Commercial General Liability at a limit of not less than \$1,000,000 Each Occurrence. Coverage shall not contain any endorsement(s) excluding nor limiting Product/Completed Operations, Contractual Liability or Cross Liability.

Contractor may satisfy the minimum liability limits required for Commercial General Liability or Business Auto Liability under an Umbrella or Excess Liability policy. There is no minimum per occurrence limit of liability under the Umbrella or Excess Liability; however, the Annual Aggregate limit shall not be less than the highest "Each Occurrence" limit for either Commercial General Liability or Business Auto Liability. Contractor agrees to endorse The Curators of the University of Missouri, its officers, employees and agents as Additional Insured on the Umbrella or Excess Liability, unless the Certificate of Insurance state the Umbrella or Excess Liability provides coverage on a "Follow-Form" basis.

### **Business Auto Liability (If required in service performance)**

Contractor agrees to maintain Business Automobile Liability at a limit not less than \$1,000,000 Each Occurrence. Coverage shall include liability for Owned, Non-Owned & Hired automobiles. In the event Contractor does not own automobiles, Contractor agrees to maintain coverage for Hired & Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Liability policy.

### **Workers' Compensation & Employers Liability (Waiver)**

Contractor agrees to maintain Workers' Compensation in accordance with Missouri State Statutes or provide evidence of monopolistic state coverage. Employers Liability with the following limits: \$500,000 each accident, disease each employee and disease policy limit. **Waiver of this requirement** - If Contractor is not required to maintain coverage by Missouri State Statute and they submit a completed UM waiver form.

**Data Breach** Refer to Risk & Insurance Management for review, but at a minimum for low risk contracts only:

If capturing, transmitting or access to PII, PHI or PCI then coverage must also include Data Breach coverage of \$1,000,000 per occurrence.

### **Contract Language**

The Curators of the University of Missouri, its officers, employees and agents are to be Additional Insured with respect to the project to which these insurance requirements pertain. A certificate of insurance evidencing all coverage required is to be provided at least 10 days prior to the inception date of the contract between the contractor and the University. Contractor/Party is required to maintain coverages as stated and required to notify the University of a Carrier Change or cancellation within 2 business days. The University reserves the right to request a copy of the policy. The University reserves the right to

require higher limits on any contract provided notice of such requirement is stated in the request for proposals for such contract.

**Indemnification**

The Contractor agrees to defend, indemnify, and save harmless The Curators of the University of Missouri, their Officers, Agents, Employees and Volunteers, from and against all loss or expense from any cause of action arising from the Contractor’s operations. The contractor agrees to investigate, handle, respond to and provide defense for and defend against any such liability, claims, and demands at the sole expense of the Contractor or at the option of the University, agrees to pay to or reimburse the University for the Defense Costs incurred by the University in connection with any such liability claims, or demands.

The parties hereto understand and agree that the University is relying on, and does not waive or intend to waive by any provision of this Contract, any monetary limitations or any other rights, immunities, and protections provided by the State of Missouri, as from time to time amended, or otherwise available to the University, or its officers, employees, agents or volunteers.

Failure to maintain the required insurance in force may be cause for contract termination. In the event the Agency/Service fails to maintain and keep in force the required insurance or to obtain coverage from its subcontractors, the University shall have the right to cancel and terminate the contract without notice.

The insurance required by the provisions of this article is required in the public interest and the University does not assume any liability for acts of the Agency/Service and/or their employees and/or their subcontractors in the performance of this contract.

**The current Certificate of Insurance shall be mailed or faxed to the following address or FAX Number: University of Missouri-Columbia, MU Procurement Services, Attention: Wade A. Jadwin, Strategic Sourcing Specialist, 1201 North State Street – Suite G5C, Rolla, MO 65409, FAX: 573-341-4822.**

BID FORM

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(Name of firm or individual bidding)

REQUEST FOR BIDS

FOR

FURNISHING AND DELIVERY

OF

BERYLLIUM REFLECTOR AND SUPPORT SKIRT

FOR

THE CURATORS OF THE UNIVERSITY OF MISSOURI

FOR

THE UNIVERSITY OF MISSOURI – COLUMBIA

RFB # 21018

OPENING DATE: SEPTEMBER 24, 2020

TIME: 2:00 PM, CT

The undersigned proposes to furnish the following items and/or services at the prices quoted and agree to perform in accordance with all requirements and specifications contained within this Request For Bid issued by the University of Missouri.

## Data Request I from Beryllium Reflector Vendor (Option 2)

### 1. Material Properties as Tested on Each Billet Used for the Production of the MURR Beryllium Reflector

#### 1.1. Fresh Material Tensile Strength Data (Based on ASTM E8 or similar)

The requested data set for S-200-FH beryllium should contain:

- a. number and geometry of tested coupons (at least three);
- b. average Young's modulus and its standard deviation;
- c. average Ultimate Tensile Strength and its standard deviation;
- d. average Yield Strength (0.2% offset) and its standard deviation;
- e. raw data (load, rate of loading or strain, displacement, and stress-strain curves) from tensile tests;
- f. type of observed failure (ductile vs. brittle) – photographs (optical microscopy and/or scanning electron microscopy (SEM));
- g. temperature, if testing was done at a temperature other than room temperature; and
- h. metrology description, metrology uncertainty with information of the uncertainty statistics and specify whether one standard deviation, 95% confidence interval, or another interval, description of the process used for making the test samples.

#### 1.2. Fresh Material Compressive Strength Data (Based on ASTM E9 or similar)

The requested data set for S-200-FH beryllium should contain:

- a. number and geometry of tested coupons (at least three);
- b. average Young's modulus and its standard deviation;
- c. average Ultimate Compressive strength and its standard deviation;
- d. average Yield Strength (0.2% offset) and its standard deviation;
- e. raw data (load, rate of loading or strain, displacement, and stress-strain curves) from compression tests;
- f. type of observed failure (ductile vs. brittle), photographs (optical microscopy and/or SEM);
- g. temperature, if testing was done at a temperature other than room temperature; and
- h. metrology description, metrology uncertainty with information of the uncertainty statistics and specify whether one standard deviation, 95% confidence interval, or another interval, description of the process used for making the test samples.

## Data Request II from Beryllium Reflector Vendor (Option 3)

### 2. Material Properties as Tested on Each Billet Used for Production of the MURR Beryllium Reflector

#### 2.1. Fresh Material Tensile Strength Data (Based on ASTM E8 or similar)

The requested data set for S-200-FH beryllium should contain:

- a. number and geometry of tested coupons (at least three);
- b. average Young's modulus and its standard deviation;
- c. average Ultimate Tensile Strength and its standard deviation;
- d. average Yield Strength (0.2% offset) and its standard deviation;
- e. raw data (load, rate of loading or strain, displacement, and stress-strain curves) from tensile tests;
- f. type of observed failure (ductile vs. brittle) – photographs (optical microscopy and/or scanning electron microscopy (SEM));
- g. temperature, if testing was done at a temperature other than room temperature; and
- h. metrology description, metrology uncertainty with information of the uncertainty statistics and specify whether one standard deviation, 95% confidence interval, or another interval, description of the process used for making the test samples.

#### 2.2. Fresh Material Compressive Strength Data (Based on ASTM E9 or similar)

The requested data set for S-200-FH beryllium should contain:

- a. number and geometry of tested coupons (at least three);
- b. average Young's modulus and its standard deviation;
- c. average Ultimate Compressive strength and its standard deviation;
- d. average Yield Strength (0.2% offset) and its standard deviation;
- e. raw data (load, rate of loading or strain, displacement, and stress-strain curves) from compression tests;
- f. type of observed failure (ductile vs. brittle), photographs (optical microscopy and/or SEM);
- g. temperature, if testing was done at a temperature other than room temperature; and
- h. metrology description, metrology uncertainty with information of the uncertainty statistics and specify whether one standard deviation, 95% confidence interval, or another interval, description of the process used for making the test samples.

#### 2.3. Fresh Material Thermal Conductivity Data (Based on ASTM E1225 or similar)

Information in literature indicates a relative insensitivity of thermal conductivity to the beryllium grade. The requested dataset for S-200-FH beryllium should contain:

- a. number of tested coupons;
- b. temperature at which the coupon was tested;

- c. average thermal conductivity and its standard deviation; and
- d. metrology description, metrology uncertainty with information of the uncertainty statistics and specify whether one standard deviation, 95% confidence interval, or another interval, description of the process used for making the test samples.

#### **2.4. Fresh Material Fracture Toughness Data (Based on ASTM E1820 or similar)**

A requested dataset for S-200-FH beryllium should contain:

- a. number of tested coupons;
- b. temperature at which the coupon was tested;
- c. average fracture toughness and its standard deviation; and
- d. metrology description, metrology uncertainty with information of the uncertainty statistics and specify whether one standard deviation, 95% confidence interval, or another interval, description of the process used for making the test samples.

#### **2.5. Data for Irradiated Material**

Any data for the above material properties (Items 2.1 through 2.4) available at irradiated conditions. This data should include the associated fluence (and appropriate neutron energy range associated with any fluence values). If available, include helium content, and displacements per atom (dpa) associated with the irradiated material data.

### **3. Material and Surface Quality Inspection of the MURR Beryllium Reflector**

#### **3.1. Penetrant Inspection (Based on ASTM E1417 or similar)**

A report is requested indicating all the findings from penetrant inspection. Cracks are not permissible. The report should list the largest indications of penetrant on the surface with dimensions, locations, and pictures if possible. A metrology description should be included in the report.

#### **3.2. Radiographic Inspection (Based on ASTM E1742 or similar)**

A report is requested that should list the largest indications (void, inclusions, and low-density areas) with dimensions and locations if possible. A metrology description should be included in the report.

#### **3.3. Grain Size (Based on ASTM E112 or similar)**

A report is requested indicating the average grain size and the distribution of grain sizes that are used to establish that the grain size does not exceed 12 microns. A metrology description should be included in the report.

#### **3.4. Description of Standard Procedures of MURR Beryllium Reflector Surface Treatment**

Information on machining, polishing, and etching should be included in the report.

#### **3.5. Surface Profilometry Measurements**

Surface profilometry measurements after the surface treatments should be completed. Of particular interest is the central ~10 cm on both the inner and outer surfaces. Metrology description should be included in the report (mechanical stylus/laser, number of sampling points, resolution).

**Option 1:** 1 ea. Beryllium Reflector and Support Skirt \$\_\_\_\_\_

**Option 2:** 1 ea. Beryllium Reflector and Support Skirt plus "Data Request I from Beryllium Reflector Vendor" \$\_\_\_\_\_

**Option 3:** 1 ea. Beryllium Reflector and Support Skirt plus "Data Request II from Beryllium Reflector Vendor" \$\_\_\_\_\_

**AUTHORIZED RESPONDENT REPRESENTATION**

Authorized Signature		Date	
Printed Name		Title	
Company Name			
Mailing Address			
City, State, Zip			
Phone No.		Federal Employer ID No.	
Fax No.		E-Mail Address	
Number of calendar days delivery after receipt of order: _____		Payment Terms: _____ Note: Net 30 is default. Early pay discounts encouraged.	
Select Payment Method:                      SUA                      ACH                      Check			
Circle one:      Individual      Partnership      Corporation			
If a corporation, incorporated under the laws of the State of _____			
Licensed to do business in the State of Missouri?    ___yes    ___no			
Maintain a regular place of business in the State of Missouri?    ___yes    ___no			

**This signature sheet must be returned with your bid.**



**ATTACHMENT A  
SUPPLIER DIVERSITY PARTICIPATION FORM**

The University of Missouri System is committed to and supports supplier diversity as an essential part of the University’s mission and core values. The University’s Supplier Diversity efforts reflect this mission.

Tier 2 Supplier Diversity Information - The University strongly encourages Supplier Diversity participation in all of its contracts for goods and services. Tier 2 Spend is spend reported by primary (non-diverse) suppliers of the University of Missouri who subcontract work to, or make purchases from a diverse supplier. Depending upon the contract, primary (non-diverse) suppliers will be asked to submit Tier 2 information with Women and Diverse Owned companies. Suppliers have two options in reporting Tier 2 dollars depending on the terms of the contract: Direct and Indirect. Awarded suppliers may be asked to utilize CVM Solutions for reporting Tier 2 spend.

- Direct dollars - those dollars directly spent with Women and Diverse Owned suppliers in the fulfillment of the contract.
  
- Indirect dollars - based on a percentage of revenue the University represents to the supplier. An example is as follows:
  - Supplier's Total Revenues: \$10,000,000
  - Revenues from University \$: \$ 4,000,000
  - University % of Total Revenues: 40% (#2 divided by #1)
  - Total MBE Dollars \$: \$ 150,000
  - Total WBE Dollars \$: \$ 150,000
  - Total University Attributable MBE \$: \$ 60,000 (#3 multiplied by #4)
  - Total University Attributable WBE \$: \$ 60,000 (#3 multiplied by #5)
  - Total University Attributable MWBE \$: \$ 120,000 (Sum of #6 and #7)
  - University % Attributable Revenue: 3% (#8 divided by #2)

1. Does your company have a Supplier Diversity Program? If so, describe efforts your company has made to increase business with Women and Diverse Owned businesses (i.e. does your company have a policy statement, participate in outreach activities, promote diverse firm subcontracting, publicize contract opportunities, provide certification assistance, etc.?) Please provide examples (use additional pages if needed): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. If you are a non-diverse owned company, what percentage of your company's total contracting and procurement spend for the prior year was with Women and Diverse Owned businesses? Are you able to provide this information specific to University of Missouri business?

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3. If you are a non-diverse owned company, complete the following table indicating the percentage your company will subcontract with certified Women and Diverse Owned businesses should your company be the successful bidder. Note: If your company does not plan to use Women and Diverse Owned businesses to fulfill your contract obligations, please explain why not.

Supplier Name	% of Contract	Specify Direct or Indirect

If there are questions regarding supplier diversity at the University, contact Teresa Vest, [vestt@umsystem.edu](mailto:vestt@umsystem.edu).

-----**THIS FORM MUST BE SUBMITTED WITH THE RESPONSE**-----

**ATTACHMENT B  
SUPPLIER REGISTRATION INFORMATION**

Completion of this section is strongly encouraged. Please review and check ALL applicable boxes.

SMALL BUSINESS CONCERN:  Yes  No

The term "small business concern" shall mean a business as defined pursuant to Section 3 of the Small Business Act and relevant regulations issued pursuant thereto. Generally, this means a small business concern organized for profit, which is independently owned and operated, is not dominant in the field of operations in which it is bidding. We would consider any firm with 500 employees or less a "small business concern".

WOMAN OWNED BUSINESS (WBE):  Yes  No

A woman owned business is defined as an organization that is 51% owned, controlled and/or managed, by a woman. The determination of WBE status depends solely on ownership and operation and is not related to employment. The firm should be certified by a recognized agency (e.g., state, local, federal, etc.). Please see Public Law 106-554 for more detail.

MINORITY BUSINESS ENTERPRISE (MBE):  Yes  No

A minority business is defined as an organization that is 51% owned, controlled and/or managed by minority group members. The determination of minority status depends solely on ownership and operation and is not related to employment. The firm should be certified by a recognized agency (e.g., state, local, federal, etc.). Please see Public Law 95-507 for more detail. Place an X by the appropriate space below.

1. Asian-Indian - A U.S. citizen whose origins are from India, Pakistan and Bangladesh  (A)
2. Asian-Pacific - A U.S. citizen whose origins are from Japan, China, Indonesia, Malaysia, Taiwan, Korea, Vietnam, Laos, Cambodia, the Philippines, Thailand, Samoa, Guam, the U.S. Trust Territories of the Pacific or the Northern Marianas.  (P)
3. Black - A U.S. citizen having origins in any of the Black racial groups of Africa.  (B)
4. Hispanic - A U.S. citizen of true-born Hispanic heritage, from any of the Spanish-speaking areas Mexico, Central America, South America and the Caribbean Basin only.  (H)
5. Native American - A person who is an American Indian, Eskimo, Aleut or Native Hawaiian, and regarded as such by the community of which the person claims to be a part.  (N)

A Veteran or Service Disabled Veteran business is defined as an organization that is 51% owned, controlled and/or managed by Veterans. The firm should be certified by a recognized agency (e.g., state, local, federal, etc.). Please see Public Law 109-461 for more detail.

VETERAN BUSINESS ENTERPRISE     Yes     No

SERVICE DISABLED VETERAN BUSINESS ENTERPRISE     Yes     No

MISSOURI FIRM:     Yes     No

A Missouri Firm is defined as an organization which has and maintains within the State of Missouri a regular place of business for the transaction of their business.

**BUSINESS TYPE:**

- Manufacturer                             (M)
- Distributor/Wholesaler             (D)
- Manufacturer’s Representative     (F)
- Service                                     (S)
- Retail                                       (R)
- Contractor                                (C)
- Other                                        (O)

SOLE PROPRIETORSHIP:     Yes     No

**SUPPLIER’S CERTIFICATION:**

The undersigned hereby certifies that the foregoing information is a true and correct statement of the facts and agrees to abide by the laws of the State of Missouri and the rules and regulations of the University of Missouri System now in effect including any subsequent revisions thereof. Supplier acknowledges that it is his/her responsibility to keep the information current by notifying the University of Missouri of any changes.

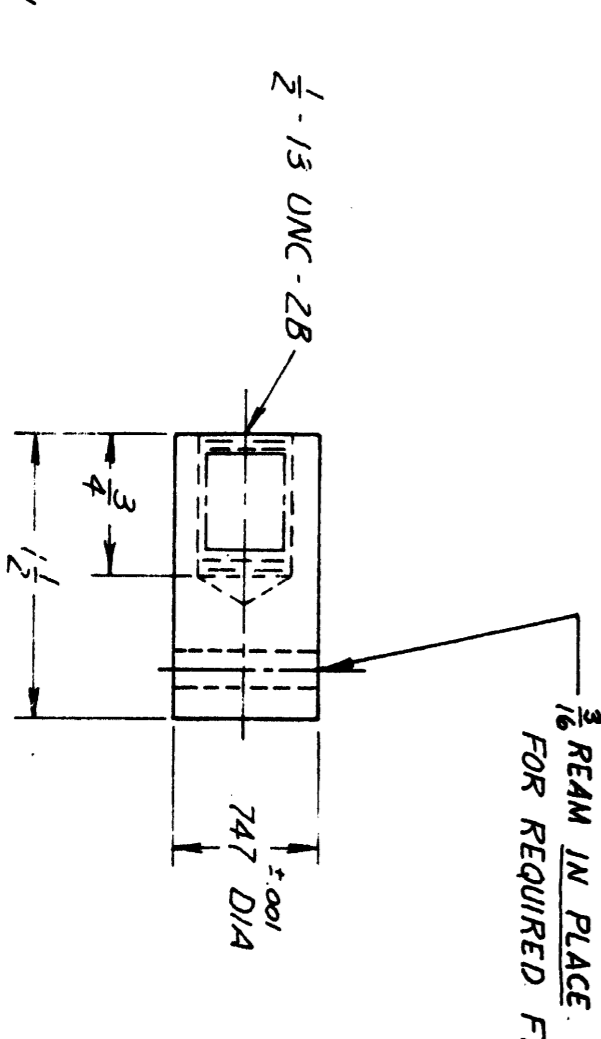
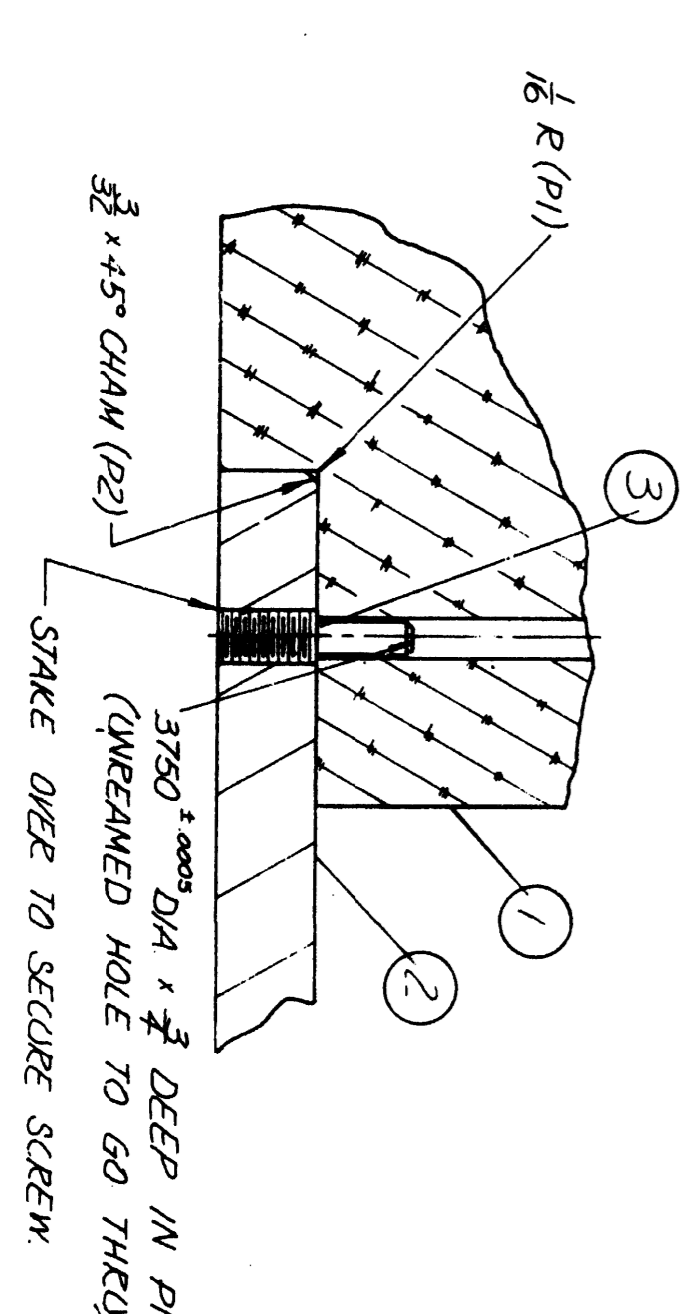
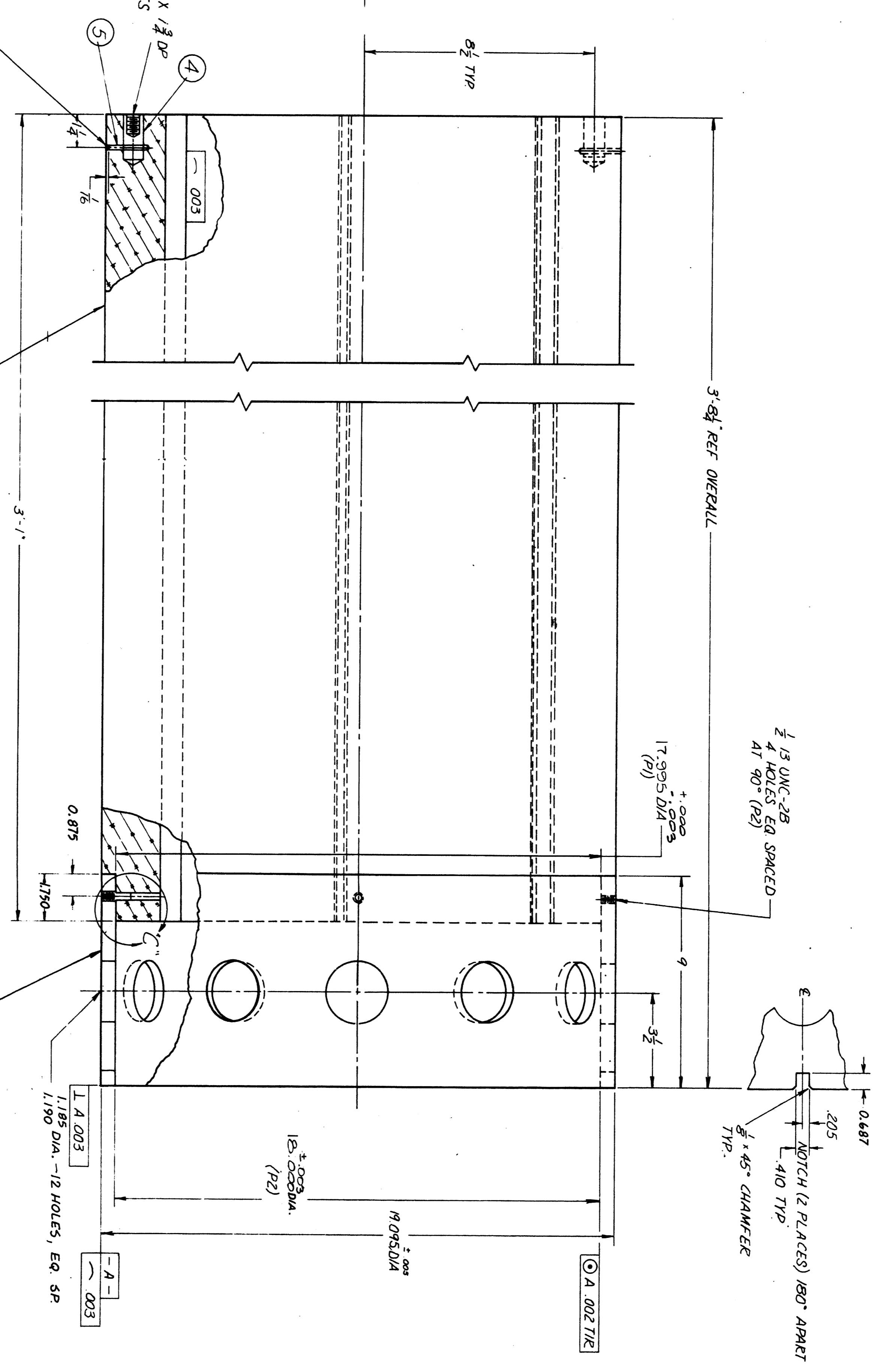
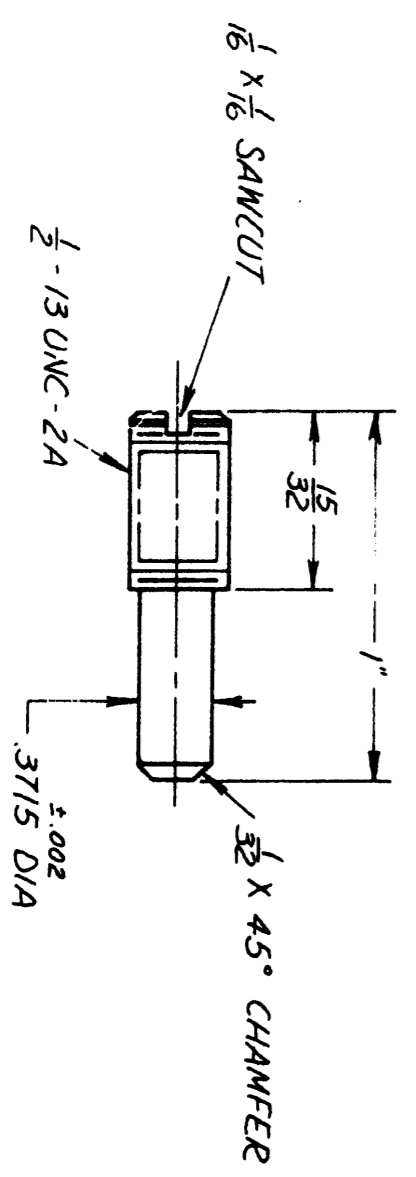
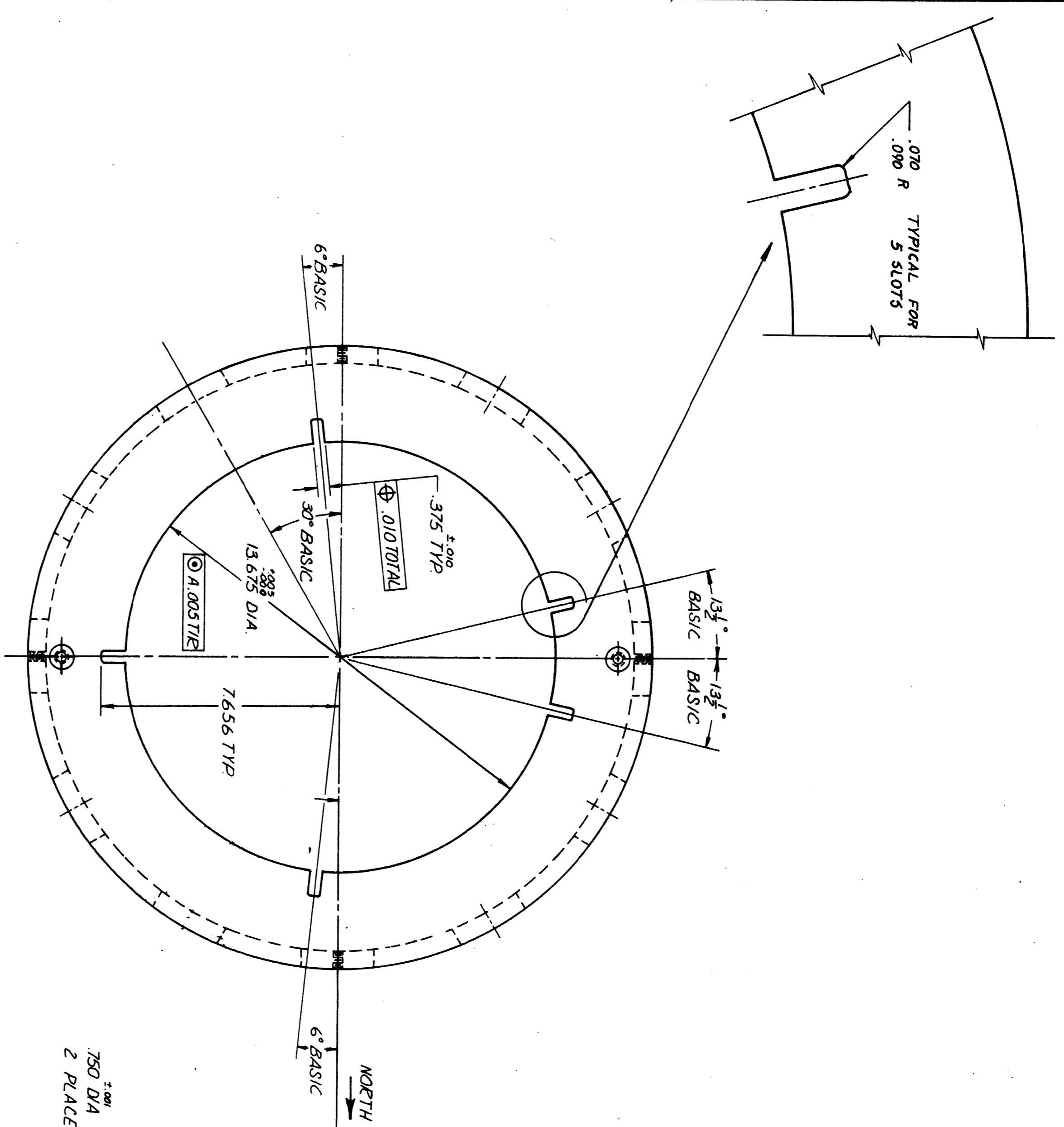
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Signature of Person Authorized to Sign this Supplier Registration Information Form

Title: \_\_\_\_\_

Date: \_\_\_\_\_





AT ASSEMBLY  
DRILL AND REAM HOLE 1/2" DEEP  
FOR SMOOTH FIT BETWEEN P4 & P5  
RE-REAM P1 (P4) TO .001 TO .0015 DIA  
TO DIM SHOWN WITH P5 INSTALL. P5  
TO DIM SHOWN

1 ALL EDGES TO BE  
ROUNDED TO 1/16 R

1/8 REAM IN PLACE  
FOR REQUIRED FIT

REV	DESCRIPTION	DATE	BY
1	PREPARED FOR BID 2021		
2	ORIFICE	1100-0	
3	INSERT	1/8 DIA x 1.437 ALUM. 6061-T6	
4	SCREEN	ALUM. 6061-T6	
5	SUPPRT SKRT	ALUM. 6061-T6	
6	REFLECTOR	B501P594 (BERYLLIUM)	

TITLE  
SPECIFICATION DRAWING  
BERYLLIUM REFLECTOR

UNLESS OTHERWISE SPECIFIED USE  
THE FOLLOWING:

SURFACES	MACHINED DIMENSIONS	ANGLES
125/	±.015	±1/2°

ENLARGED DETAIL  
TYPICAL 4 PLACES

RESEARCH REACTOR FACILITY  
UNIVERSITY OF MISSOURI

DRAWN BY J.M. McREE  
SHEET NO. 4 OF 4

APPROVED C.B. [Signature]  
ENG. NO. 183