DISC STACK CENTRIFUGE

USER REQUIREMENT SPECIFICATIONS

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U.S. DEPARTMENT OF COMMERCE Economic Development Administration (EDA) Award Number: 05-79-06192

Revision No.: 0

APPROVED

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2 SCOPE

The project will include a new Disc Stack Centrifuge. This document defines the requirements and deliverables for this system. It describes overall requirements that must be met to produce the specific equipment requested. This document covers the procurement and delivery of the systems, with no required installation.

This URS is the input document for the:

- Equipment procurement purposes
- Equipment sizing
- Functional and technical specifications

3 BACKGROUND

The Dakota Bioproducts Innovation Institute is a research facility for the development of high-quality bioproducts. A Disc Stack Centrifuge skid has been identified as one of the separation technologies that will be available for customer use.

4 PROCESS DESCRIPTION

The Disc Stack Centrifuge skid will be used to separate a variety of streams. Several easily interchanged bowl types will be required, including clarifier, separator, and nozzle bowls. Bowl speed will be variable and easily adjusted for different process requirements via a frequency converter. A centripetal pump will be used for foam-free removal of clarified liquid under pressure. A hydraulically operated self-ejecting bowl will be supplied for solids discharge. The unit will be CIP cleanable without dismantling.

5 BASIS OF DESIGN

5.1 Capacities

Based on typical fermentation broth, the expected feed flow rate is four to ten GPM at a solids concentration between 0.1 and 30% solids w/w.

5.2 Skidded Construction

The disc stack centrifuge and accessories shall be mounted on a skid, work as a stand-alone unit, and be supported by plant utilities. Requirements for the centrifuge skid and its component parts will be defined by the skid supplier, in a pre-purchase detailed proposal and drawings.

5.3 Health, Safety and Environment (HSE)

The centrifuge skid will satisfy appropriate conformity assessment procedures and the controls shall carry the UL marking. Selected unit shall be constructed per the current ASME BPE standard. The unit will be designed to protect users from hot surfaces. Pressure relief safety valves or rupture disks shall be vented to a safe location.

5.4 Operation, personnel and automation

The disc stack centrifuge skid will be fully automated as a standalone unit such that operations personnel will not need to attend to the skid once the unit is started and operating. An Ethernet connection for SCADA interface for batch reporting shall be provided.

5.5 Materials of Construction

All materials of construction must be compatible with ambient and hot water for injection (WFI), and typical chemical cleanings agents such as phosphoric acid, potassium hydroxide, and sodium hydroxide up to 3%. Piping specifications, including all gasket and valve seat material must align with current ASME BPE standards, where applicable.

5.6 Reliability & maintenance

The skid will be designed to operate routinely during 24 / 7 / 365 operations. All wear parts shall be easily accessible and replaced on a regular maintenance schedule. Wear parts like gaskets shall be stock items that can be ordered and delivered in a timely manner.

6 ABBREVIATIONS, ACRONYMS & DEFINITIONS

Acronyms	Description		
	American Society of Mechanical Engineers Bio-		
ASME-BPE	Processing Equipment		
CIP	Clean In Place		
GPM	Gallons per Minute		
HMI	Human Machine Interface		
REQ	Required Attribute		
OPT	Optional Attribute		
P&ID	Piping & Instrumentation Diagram		
PLC	Programable Logic Controller		
RPM	Revolutions per Minute		
SCADA	Supervisory Control and Data Acquisition		
UL	Underwriters Laboratories		
URS	User Requirements Specification		
WFI	Water for Injection		

7 USER REQUIREMENT SPECIFICATIONS

URS TABLE – Disc Stack Centrifuge Skid					
Designation	Description	Туре			
URS-F1	Feed rate capacity shall be capable of up to four to ten gpm for typical fermentation broths.	REQ			
URS-F2	Centrifuge hood shall be stainless steel and coolable.	REQ			
URS-F3	Liquid discharge shall be closed with a centripetal pump.	REQ			
URS-F4	A hydraulically operated self-ejecting bowl shall be used for solids discharge.	REQ			
URS-F5	The unit shall be CIP cleanable without dismantling.	REQ			
URS-F6	The drive system shall utilize a flat belt.	REQ			
URS-F7	All product contact metallic parts shall be 316L Stainless Steel or approved equal.	REQ			
URS-F8	EPDM shall be used for all gaskets except the main bowl gasket. The main bowl gasket shall be polyamide.	REQ			
URS-F9	Ra surface finish for the wetted bowl parts shall be < 2.0 μ m.	REQ			
URS-F10	Ra surface finish for the wetted hood and solids catcher surfaces shall be $< 2.0 \ \mu m$.	REQ			
URS-F11	An operating water valve block, including solenoid valve and pressure reducer, shall be included.	REQ			
URS-F12	A special set of tools for installation and maintenance of the separator shall be included.	REQ			
URS-F13	A set of spare parts for commissioning, including lubricants and certain gaskets, shall be included.	REQ			
URS-F14	Three different bowl configurations shall be supplied: clarifier, separator, and nozzle. The bowls shall be able to be easily interchanged.	REQ			
URS-F15	Bowl connections shall be tri-clamp style.	REQ			
URS-F16	Separator and clarifier bowl speeds shall be at least 9000 to 12000 RPM.	REQ			
URS-F17	Separator, clarifier, and nozzle bowl G force shall be at least 9600 to 17060 G.	REQ			
URS-F18	Separator and clarifier bowl equivalent clarification area shall be at least 5600 to 10000 m2	REQ			
URS-F19	Separator and clarifier bowl volume shall be at least2.0 L.	REQ			
URS-F20	Separator and clarifier bowl solids holding volume shall be at least 1.0 L.	REQ			
URS-F21	Nozzle bowl speed shall be at least 7000-12000 RPM	REQ			
URS-F22	Nozzle bowl equivalent clarification area shall be at least 3500 to 10000 m2.	REQ			
URS-F23	Nozzle bowl volume shall be at least 2.4 L.	REQ			
URS-F24	Nozzle bowl solids holding volume shall be at least 1.4 L.	REQ			
URS-F25	Two sets of nozzles shall be provided: 0.5 and 0.8 mm.	REQ			

URS TABLE – Disc Stack Centrifuge Skid						
Designation	Description	Туре				
URS-F26	A cyclone and tank for solids recovery shall be provided, including a level probe and spray for the cyclone.	OPT				
URS-F27	Power shall be provided to the skid via a single point 480V, 3-phase/ 60Hz connection.	REQ				
URS-F28	Vibration shall be monitored and include high and high-high alarms, as well as a 4-20 mA output for remote monitoring.	REQ				
URS-F29	A control system shall be provided and consist of a control cabinet housing, control unit w/ HMI, and motor controller with frequency converter.	REQ				
URS-F30	The control unit shall be a Compact Logix PLC from Rockwell/Allen Bradley. It will monitor speed, vibration, and feed flow, and will control the centrifuge and automatic valves.	REQ				
URS-F31	Control voltage shall be 24 VDC.	REQ				
URS-F32	Full system documentation shall be provided, including instruction and maintenance manuals, safety instructions, P&IDs, and dimensional drawings.	REQ				
URS-F33	Control system documentation shall be provided, including specifications, wiring overview, circuit diagram, arrangement drawing, terminal connection diagram,	REQ				

END OF SPECIFICATION

8 SELECTION CRITERIA

Vendors will be evaluated based on the following criteria:

Evaluation Criteria		
Description	Ranking	Weight
Mandatory Technical Requirements		
A review of your proposal to determine adherence with the REQ	1-10	30%
specifications and technical requirements.		
Proposal Pricing		
Review of your proposal in relation to the services offered in the		
proposal. Proposals will be evaluated against competing	1-10	20%
proposals for cost effectiveness. Proposals will be evaluated to		
be reasonable and appropriate.		
Technical Response		
The technical response in your proposal portrays knowledge,		
experience, and professionalism. Relevant product features	1-10	10%
and/or specifications are available with your equipment other		
than those mandatory specifications allotted above.		
Lead Time		
A review of your product's lead time to meet business	1-10	15%
objectives.		
Product Warranty		
The available warranty, in scope, duration, and value, proposed	1-10	5%
with your product.		
Experience and Demonstrated Results		
Our evaluation will include a review of your history, your		/
experience as it relates to the requirements within this RFP,	1-10	20%
evidence of past performance, quality and relevance of past		
work, references, and related items.		

9 RETURN BIDS TO

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10 OTHER PROVISIONS

Must meet 200 CFR buy America Provision• Title 49 Subtitle B Chapter VI Part 661

Federal Participation Disclosure – "This project will be partially funded with Federal funds from the United States Department of Commerce, Economic Development Administration and therefore is subject to the Federal laws and regulations associated with that program."

Must meet Federal Contract provision 200 CFR Title 2 subtitle A Chapter II Part 200

Certification Relating to Prohibited Entity

For contractors, vendors, suppliers, or subcontractors who enter into a contract with the State of South Dakota by submitting a response to this solicitation or agreeing to contract with the State, the bidder or offeror certifies and agrees that the following information is correct:

The bidder or offeror, in preparing its response or offer or in considering proposals submitted from qualified, potential vendors, suppliers, and subcontractors, or in the solicitation, selection, or commercial treatment of any vendor, supplier, or subcontractor, is not an entity, regardless of its principal place of business, that is ultimately owned or controlled, directly or indirectly, by a foreign national, a foreign parent entity, or foreign government from China, Iran, North Korea, Russia, Cuba, or Venezuela, as defined by South Dakota Executive Order 2023-02. It is understood and agreed that, if this certification is false, such false certification will constitute grounds for the State to reject the bid or response submitted by the bidder or offeror on this project and terminate any contract awarded based on the bid or response. The successful bidder or offeror further agrees to provide immediate written notice to the contracting executive branch agency if during the term of the contract it no longer complies with this certification and agrees such noncompliance may be grounds for contract termination.

RESTRICTION OF BOYCOTT OF ISRAEL

For contractors, vendors, suppliers, or subcontractors with five (5) or more employees who enter into a contract with the State of South Dakota that involves the expenditure of one hundred thousand dollars (\$100,000) or more, by submitting a response to this solicitation or agreeing to contract with the State, the bidder or offeror certifies and agrees that the following information is correct:

The bidder or offeror, in preparing its response or offer or in considering proposals submitted from qualified, potential vendors, suppliers, and subcontractors, or in the solicitation, selection, or commercial treatment of any vendor, supplier, or subcontractor, has not refused to transact business activities, has not terminated business activities, and has not taken other similar actions intended to limit its commercial relations, related to the subject matter of the bid or offer, with a person or entity on the basis of Israeli national origin, or residence or incorporation in Israel or its territories, with the specific intent to accomplish a boycott or divestment of Israel in a discriminatory manner. It is understood and agreed that, if this certification is false, such false certification will constitute grounds for the State to reject the bid or response submitted by the bidder or offeror on this project and terminate any contract awarded based on the bid or response. The successful bidder or offeror further agrees to provide immediate written notice to the contracting executive branch agency if during the term of the contract it no longer complies with this certification and agrees such noncompliance may be grounds for contract termination.