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TECHNICAL SPECIFICATION	
DESCRIPTION	CENTRE LESS GRINDER
TENDER NO.	HRPU/NFC/PT/TPT/CAP/10714

TECHNICAL CHECK LIST FOR CENTRELESS GRINDER

Note:

Bidder to write YES/ NO against	**COMPLIANCE STATEMENT / QUERY**	**BIDDER'S CONFIRMATION / ANSWER (YES/NO) ***
1.	Confirm that the scope of work shall be in compliance with the TECHNICAL SPECIFICATION document. All other equipment, materials and work not explicitly mentioned but nevertheless required for safe and satisfactory operation of equipment / package shall also be included by bidder in his offer. Please confirm.	
2.	Bidder to note that no deviations are allowed from the Technical specifications. However, if it is inevitable, clause-wise Deviation, against the Technical specifications (which includes all documents referred / attached with Technical Specification) shall be duly consolidated at one place, under Exceptions / Déviations List (format enclosed – **Annexure-I**) and shall be submitted with the bid. In case, no such list is furnished, it will be presumed that all requirements of technical specification are fully met. **Any deviations / deletions / corrections made by the Bidder elsewhere will not be taken cognisance of and all such deviations shall be deemed as null and void.** Confirm compliance.	
3.	Bidder to confirm that reference list of comparable equipment previously supplied for similar service (as per Experience Record Proforma, enclosed – **Annexure-II**) has been furnished with the bid.	
4	Confirm that Consumption rate of Utilities (such as electric power, make up water, dry compressed air, fuel oil etc.) required from the NFC have been furnished in the bid.	
5.	Confirm that all Drawings / Data required to be submitted with bid as per Tech Specification have been included in the Bidder's proposal.	
6.	Confirm that Price schedule Proforma (**with price part kept blank in the technical bid) Annexure-III** to be submitted with bid as per Technical Specification have been included in the Bidder's proposal. Confirm compliance .	

TECHNICAL SPECIFICATION	
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Bidder to write YES/ NO against	**COMPLIANCE STATEMENT / QUERY**	**BIDDER'S CONFIRMATION / ANSWER (YES/NO) ***
7.	Bidder is informed that the details of equipment furnished in the Bidder's proposal shall not be reviewed or taken cognizance of at evaluation stage. These details shall be treated as preliminary and for reference and record purpose only. Review of details submitted after award of job will be done by NFC for compliance with the technical Spec / contract requirements. NFC comments for ensuring compliance with the technical spec / contract requirement shall be binding on vendor without any price and time implication to the NFC. Confirm compliance.	
8.	Confirm that Recommended Spares and consumables for the first TWO (2) YEARS normal operation and maintenance for offered system have been quoted by the Bidder and its itemised price list included in the bid **(with price part kept blank in the technical bid**). NFC shall order these spares separately.	
9.	Confirm that Commissioning Spares, as required; have been included by the Bidder in his lump sum price.	
10.	Confirm that Special Tools and Tackles per stream / module, as required for operation and maintenance of the package, have been included by the Bidder in his lump sum price and its list included in the bid.	
11.	Confirm that in the event of order, all drawings, documents and data shall be furnished in accordance with Technical Specification	
12.	Confirm that duration of onsite training (shop floor & class room) for NFC's personnel has been indicated in the Bid.	
13	Confirm that lump sum price for the site activities (Unloading at site, transportation to store and from store to work site, storage at site, handling, assembly at site, installation, testing, pre-commissioning, painting, insulation, commissioning, performance guarantee run, handing over to client and other field works etc.) has been quoted separately.	

* In case of "No", give reasons.

Bidder' s Seal **Signature of Bidder with date**

ANNEXURE - I

EXCEPTION / DEVIATION SCHEDULE FORMAT

S. No.	Document No.	Sheet No.	Clause No.	TECHNICAL Requirement	Deviation required by the Bidder and justification of its need
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					

Bidder's Seal **Sign. of Bidder with date**

ANNEXURE – II

EXPERIENCE RECORD PROFORMA

(CENTRE LESS GRINDING MACHINE)

S No	**Client's Name/ address/ tel. No. / fax / email and name of contact person**	**Eqpt.supplied (i.e. Model No. / make Of Centreless Grinder Machine) (with fixed grinding wheel and adjustable regulating wheel)**	**Dia of Grinding wheel and regulating wheel**	**Month and year of commissioning**	**Feedback (Whether the supplied equipment has performed satisfactorily) Yes/No**	**Remarks**
1.						
2.						
3.						
4.						

Note: Additionally, the Bidder may furnish along with the bid his standard reference list for the offered equipment / package.

Bidder's Seal **Sign. of Bidder with date**

ANNEXURE – III

Price schedule Proforma

Un-priced price-bid shall be submitted with the offer as per the format given below. All the item/rows are to be filled as "Q" indicating quoted and submitted with technical offer, and the same shall be submitted as Price-bid in part-II. Item wise cost of all the items shall be clearly offered as per the price bid for cost evaluation. Bidder's offer shall be considered incomplete and shall not be considered for technical evaluation by purchaser if this duly filled-in is not submitted along with the bid.

S No	Description	Qty	Unit	Remark
•	DESIGN, ENGINEERING, FABRICATION, SUPPLY, ERECTION AND COMMISSIONING OF CENTRELESS GRINDER FOR NFC-KOTA PROJECT ALONG WITH ACCESSORIES AS PER SPECIFICATIONS DETAILED IN THE ANNEXURE	04	NOS	
•	3 D model of all accessories (except main equipment) describes in the technical specification.	01	Set	
Mandatory Spares				
•	Work rest blade holder with tungsten carbide tipped blade to suit to pellet diameters	04	Nos	
•	Diamond impregnated grinding wheel with flange	02	Set	
•	Regulating wheel with flange	02	Set	
•	Diamond dresser tool	01	Nos	
•	Cartridge type assembly (spindle and bearing) for grinding wheel head.	04	Set	
•	Bearings for regulating wheel head stock	04	Set	
•	Conveyor for i. Belt Conveyor (Inlet) ii. Belt Conveyor (Outlet I)	01	Set	

S No	Description	Qty	Unit	Remark
	iii. Belt Conveyor (Outlet II)			
•	Complete CNC unit (ready to use in all aspect) comprising of i. Panel Control Unit (PCU) ii. CNC key Board iii. Flash Card iv. MCP v. Set of cables & required terminal blocks/ converter, Terminal Strip Converter vi. PP/ IO card vii. Other required communication module and electronics cards etc	01	Set	
•	Servo Motor with connector for Regulating wheel in-feed slide movement.	01	Set	
•	Servo Motor with connector for Regulating wheel dresser	01	Set	
•	Drive modules with connector for servo motors	01	Set	
•	Power Cables and encoder feed back cables with connectors for servo motors and drives	01	Set	

Bidder's Seal **Sign. of Bidder with date**

1. SCOPE OF SUPPLY:

Design, Engineering, submission of drawings for approval, manufacturing of sub-assemblies, and assembling of complete system, testing, inspection at supplier's works, supply of all materials required for site assembly, packing, forwarding and safe delivery up to site. Reassembling of complete system and all activities at NFC-Kota, Rawatbhata - Rajasthan site leading to the complete erection, final checkup, testing, trial run, commissioning of all supplied items and performance testing for four (04) Automatic Centreless Grinding Machine along with its handling system.

2. INTRODUCTION:

Four (04) number of programmable automatic CNC Centreless grinding machine shall be heavy duty in nature and shall be suitable for through feed grinding of hard, ceramic, brittle abrasive, non-magnetic cylindrical pellets. The basic grinding machine shall be integrated with automatic pellet handling system and other sub systems. These sub systems are required for:

- Lifting of loaded trays to required height.
- Feeding of the pellets to the machine from loaded trays.
- Online/ post grinding washing of pellets with DM water spray to free them from loose particles.
- Re-circulation of used wash water.
- Automatic unloading of ground pellets in a tray.
- Sludge separation and re-circulation of coolant.

The handling system consists of tray lifter, various conveyors, linear vibrator feeder etc.

The Complete system consists of following sub systems:

(a) CNC Centreless grinder having diamond impregnated grinding wheel.
(b) Rod Tray lifting system at loading & unloading side.
(c) Loading side Tray conveyor with Pellet feeding system (By linear vibratory feeder system)
(d) Belt conveyors for loading & unloading pellets
(e) Pellet washing system
(f) Pellet Discharge system with unloading side Tray conveyor
(g) Sludge handling system
(h) Machine enclosure.
(i) Machine control system etc,

3. JOB SPECIFICATION:

3.1.	Name of the machine	Centreless Grinding Machines
3.2.	No. of machines required	4
Sintered Pellet Specifications		
3.3.	Material to be processed	Sintered UO_2 pellets
3.4.	Outer diameter, mm	12.15 to 12.30
3.5.	Length/Diameter ratio	1.05 to 1.25
3.6.	Density, gm/cc	10.6 (+/-) 0.15
3.7.	Hardness (on Mohs scale)	7
Ground Pellet Specifications		
3.8.	Material to be produced	Ground UO_2 pellets
3.9.	Outer diameter, mm	12.1158 to 12.192
3.10.	Length/Diameter ratio	1.05 to 1.25
3.11.	Stock removal (on diameter in single pass), mm	0.35 (max)
3.12.	Tolerance on ground diameter of pellet (including taper), µm	+0 to -10
3.13.	Ovality on diameter, µm	≤10
3.14.	Finish on ground surface, µm rms	≤1.6
Grinding Machine Specifications		
3.15.	Throughput of the grinding machine, pellets per hour	8000
3.16.	Machine bed slope	1:10 or better

4. Process Description

Sintered Pellets are ground in a centreless grinder machine to produce ground pellets having diameter as per the ID of the zircaloy tube into which they are loaded. When pellets are loaded into the tubes, a clearance of 50 to 125 micron (inclusive of the tolerances in tube ID)between pellet OD and tube ID is a mandatory requirement. The

centreless grinding machine uses a diamond impregnated grinding wheel and one rubber bonded regulating wheel, the pellets are supported over a work-rest blade while they are ground. During this through-feed grinding operation, pellets are fed row after row from SS Rod trays. Flow of coolant water is maintained in between the wheels to minimize heat generation and to contain the radioactive dust. The sludge is processed for uranium recovery through dissolution.

Diamond impregnated grinding wheel has a graded grit sizes of the diamond along the width direction. While the material removal is fast in the feed end, the desired accuracy and surface finish on pellet is obtained in the discharge end. The ground pellets are visually inspected and defective pellets with defects like chip, end cap, pit, crack, etc. are sent back for dissolution to the powder plant.

5. SCOPE OF SUPPLY AND SERVICES

5.1. SCOPE OF SUPPLY

The scope of supply shall include all materials and supplies as specified in this specification for Centreless Grinding Machines and other drawings/documents enclosed/referred. The vendor's scope of supply shall include but not limited to the following major items/sub-systems:

5.1.1. CNC centreless grinding machine having diamond grinding wheel

- 5.1.1.1. Machine bed
- 5.1.1.2. Grinding wheel head & grinding wheel spindle.
- 5.1.1.3. Regulating wheel head and spindle
- 5.1.1.4. Infeed slide
- 5.1.1.5. Regulating wheel dresser
- 5.1.1.6. Work rest stand

5.1.2. Lubrication system
5.1.3. Loading slide tray conveyor with pellet feeding system
5.1.4. Belt conveyor for loading & unloading side
5.1.5. Pellet washing system
5.1.6. Pellet discharge system with unloading side tray conveyor.
5.1.7. Cooling water system.
5.1.8. Sludge handling system.
5.1.9. Machine enclosure
5.1.10. Empty tray handling Unit
5.1.11. Machine control system
5.1.12. foundation bolts, nuts, washers, grouting material and other related installation materials.
5.1.13. Structural supports for all equipment, piping, cable trays etc. as applicable.
5.1.14. Operating and maintenance platforms, access ladders, etc. required to provide access to various items of unit for operation and maintenance wherever required.

5.1.15. Complete piping work, all valves, fittings and instrumentation as required for distribution of utilities within Battery Limit.

5.1.16. First fill of oils & lubricants and replenishment of any loss of these up to commissioning as required.

5.1.17. All drawings and documents as per art no 14 "Submission Of Drawing,Document And Softwares"

5.1.18. Commissioning Spares as per clause 13.3 (Price to be included in the base price / lump sum price).

5.1.19. One set of special tools and tackles for operation and maintenance, as required, separately for each machine as per clause 13.4. The list of such special tools and tackles shall be furnished along with the bid (Price to be included in the base price /lump sum price).

5.1.20. Quotation for Recommended spares for two (2) years' normal operation and maintenance of the equipment, as per clause No. 13.2 (Itemized price list to be furnished along with the bid). Owner shall order these spares separately.

5.1.21. Any additional items or feature required/ identified, during detailed engineering for the completeness and trouble-free performance of the system shall be included in the Vendor's scope without any price and time implications, as long as system performance & technical requirements within the battery limits of the system as defined under this specification / requisition are kept unchanged.

5.2. SCOPE OF SERVICES

Vendor scope of service shall include the following:

i) Design and Engineering.

ii) Procurement of equipment and material.

iii) Manufacturing and Assembly at works.

iv) Inspection and Testing of equipment at shop.

v) Painting (primer + finish coat) at shop including supply of paint.

vi) Packing and Supply.

vii) Site fabrication (if any).

viii) Storage at work site, local handling, assembly at site.

ix) Erection/ Installation, Testing, Commissioning and painting (touch up) at site. .

x) Performance Guarantee Test..

xi) “On-site” training at project site to Owner’s personnel for operation and maintenance.

6. EXCLUSION

The following are excluded from the Vendor’s scope of supply/services:

i) Building.

ii) Civil work including foundation

iii) Rod Trays

7. MACHINE DESCRIPTION:

7.1. BASIC GRINDING MACHINE:

The machine shall be suitable for continuous operation with high dynamic rigidity and high cutting speed. It shall have adjusting hydrodynamic bearings for grinding wheel spindle mechanism to protect dry running of the wheel spindle.

Grinding Wheel Requirements
Wheel diameter - 400 mm
Wheel width - 250 mm

Depth of diamond impregnation should be minimum 5 mm with 100% diamond concentration. The peripheral speed of grinding wheel shall be around 35 M/s.

The regulating wheel headstock shall he adjustable for forward/backward movement of the job to facilitate through feed grinding. This movement shall be through CNC System. The adjustment of movement shall be according to a preset value, which can be varied from 1 micron to 5mm. It shall also have provision for rapid movement of the headstock. The regulating wheel assembly shall be adjustable for achieving precise alignment of edges and parallelism between the grinding and control wheels.

Regulating wheel requirement:
Wheel diameter: 300 mm
Wheel width: 250 mm

7.2.MACHINE BED :

The machine bed shall be box type, the interior of bed shall be re-inforced with ribs to ensure rigidity and stability. The channels provided for coolant flow shall be lined with Stainless Steel sheet. Slope of the coolant path shall be 1:10 or better for better flow and to avoid dust accumulation. Coolant jets shall be provided at all

the corners of the bed. Minimum three nos. of flushing points shall be provided in the bed and pipeline shall be connected to the coolant water circuit with an isolation valve.

7.3. GRINDING WHEEL HEAD & GRINDING WHEEL SPINDLE:

For maximum rigidity of machine, grinding wheel head shall be fixed type and directly clamped on the machine bed. The grinding wheel spindle head shall be made from alloy steel, case hardened and mirror finished. It shall be supported on special tilting pad type/multipoint hydrodynamic type bearings. These bearings are pivoted on spherical surfaces so that they adjust themselves automatically according to the varying load during grinding.

A Suitable arrangement shall be provided to lifting and mounting of Grinding wheel to the spindle.

7.4. REGULATING WHEEL HEAD:

The regulating wheel head shall be mounted on in-feed slide and can be adjusted in two perpendicular directions. It can be swiveled about the vertical axis for taper grinding and can be tilted about the horizontal axis in order to achieve an axial feed of the work piece during through feed grinding. For precision angular setting of the wheel head for taper grinding, a dial indicator with least count of 0.01 mm shall be provided. Regulating wheel head shall be adjustable along the wheel axis to align the edges of both wheels. Enclosure should have the provision to accommodate the adjustment.

7.5. REGULATING WHEEL SPINDLE

The regulating wheel spindle shall be made from high grade alloy steel/hardened alloy steel, case hardened/ full hardened and mounted on High precision bearings/ hydrodynamic bearing with an outboard support. The regulating wheel spindle shall be driven by A.C. variable speed motor and drive. The speed of the regulating wheel shall be variable from 10-250 RPM. The speed of motor shall be displayed on the panel..

7.6. INFEED SLIDE

The movement of in-feed slide which carries the regulating wheel head and work rest stand shall be on preloaded antifriction needle roller guide ways/ Linear motion guide. It shall be provided with Ball screw and nut arrangement for in-feeding movement and shall be driven by directly coupled A.C. Servo motor. The slide movement shall be controlled as follows:

- Incremental feed for fine and fast setting in user selectable step of 0.001, 0.010 and 0.100 mm. The slide movement is displayed on screen.

- For faster setting, in-feed slide may be moved in job / rapid traverse mode and its speed can be varied depending upon selection of feed rate override switch.

7.7. REGULATING WHEEL DRESSER

Regulating wheel dresser shall be mounted inside the machine body towards he rear side of regulating wheel head. It shall be placed horizontally or maximum 15 deg inclined with respect to regulating wheel infeed slide. Traverse movement (along the wheel axis) shall be provided with Ball screw and nut arrangement and driven by directly coupled A.C. Servo motor. Template for dressing shall be provided as standard accessory. The top slide of the dressing unit shall be mounted on preloaded antifriction guide ways. A spring loaded stylus against template shall be provided to have clearance free contact and to achieve the high copying accuracy.

7.8. WORK REST STAND:

It shall be mounted on in-feed slide and base shall be rigidly clamped. Height of the job shall be adjustable either by changing slips below work rest blade or by levelling screw type arrangement. Work rest stand should be of carbide tipped hardened tool steel.

7.9. LUBRICATION SYSTEM

The grinding wheel spindle bearings shall be lubricated by the re-circulating oil supplied by a pump. The lubrication system of grinding wheel spindle shall be switched ON by the master switch. In case of insufficient lubrication to grinding wheel spindle, all machine functions shall be switched OFF automatically. Flow switch shall be provided to ensure oil flow in the spindle. In case of precision Bearings of regulating wheel, spindle shall be grease packed. Other sliding part of the machine shall be lubricated through metering cartridges on lost lubrication principal by a centralized lubricator pump.

The coolant outlet point shall be mounted on wheel head and the coolant flow shall be regulated with the help of regulating valve. Tank with pump and filtering equipment shall be supplied along with the machine.

7.10. TRAY LIFTING SYSTEM AT LOADING & UNLOADING SIDE:

The pellet loaded Rod trays will be transferred from the Automated Storage & Retrieval System (ASRS) (by others) to the grinding station by automated guided vehicle (AGV) (by others) at the height of 900 mm (approx.) from ground. A suitably tray lifting mechanism is required which will lift the tray to the level of indexing conveyor and transfer the loaded rod tray on to the charging side

indexing conveyor of grinding machine. This lifting system shall have pneumatic cylinder for lifting, power roller for transferring the tray on to the conveyor or vice versa and proper lifting guides. Its operation shall be independent of other subsystem of the machine. The system should transfer one (01) trays at a time. Discharging side of the equipment to be designed such a way that the level of the of the discharge conveyor should be same with the AGV's height i.e. 900 mm. So that the trays can be directly transferred to the AGV.

7.11. LOADING SIDE TRAY CONVEYOR WITH PELLET FEEDING SYSTEM :

The rod trays will be placed on this indexing conveyor, which indexes tray so that pellet feeding system can feed row of pellets, after each index. Pellet feeding system consists of a pusher mounted on a rod-less servo drive linear actuator, which pushes pellet rows one after the other, after each indexing. The indexing shall be carried out by geared AC motor having clutch and brake mechanism. This conveyor shall be able to carry at least 4 nos. of trays. Each index shall be sensed accurately. The pusher should have torque limiting features.

7.12. BELT CONVEYOR (Inlet) with LINEAR VIBRATORY FEEDER:

Pellet feeding system feeds rows of pellets, on continuous running belt conveyor. A linear vibratory feeder, works as bridge between this belt conveyor and work rest blade of grinding machine. The belt conveyor is driven by geared AC motor. The conveyor shall have features, to align it easily and quickly with the other connected sub systems. Conveyor side supports, belt bottom supports and pellet guides shall be fabricated of Stainless Steel. Belt tensioning system to be provided with the conveyor. A suitable tungsten carbide tipped bridge plate to be provided between the linear feeder and the belt conveyor.

7.13. BELT CONVEYOR (Outlet —I)

Ground pellets which carries out of grinding machine are conveyed to washing station by means of this, conveyor. Speed of this conveyor shall suitably be selected so that ground pellets shall not get accumulated on it and shall match with the capacity of washing station. The belt conveyor is driven by geared AC motor. The conveyor shall have features, to align it easily and quickly with the other connected sub systems. Conveyor side supports belt bottom support and pellet guide shall be made of SS 304.

7.14. PELLET WASHING

The ground pellets are to be washed automatically on line with de-mineralized water to remove loose particles adhering to pellets. Arrangement for pellet rotation shall be provided for total surface cleaning. The de-mineralized water used for washing shall be collected and re-circulated. No accumulation of pellets shall occur at discharge end, to avoid any disturbance to grinding and possible variation in the ground diameter. This water loop shall be separate from main coolant water loop of the grinder. Tank for washing shall be of 600 liter capacity.

For washing pellets shall pass through a twin roller feeder. These two rollers are mounted in parallel and rotated in opposite directions using a single geared AC motor. It shall have worm & worm wheel arrangement to get required movements. The rollers shall be made of SS and shall be hardened to reduce wear. All the components and mounting brackets shall be made of SS 304.

7.15. BELT CONVEYOR (Outlet —II)

After washing, ground pellets are fed to pellet discharge system by means of this conveyor. The belt conveyor is driven by geared AC motor. The speed shall be suitably selected to match with the capacity of pellet washing system and pellet discharge system. The conveyor shall have features to align it easily and quickly with the other connected sub systems. This mounting bracket of this conveyor shall be connected to pellet discharge system and unloading side tray conveyor. Conveyor side supports belt bottom support and pellet guide shall be made up of SS 304.

7.16. PELLET DISCHARGE SYSTEM:

The pellets, after washing, shall be stacked & discharged in the form of row on to the empty rod tray, automatically. The rod tray shall be placed on unloading side tray conveyor, where every row will be filled after each indexing. The indexing shall be carried out by geared AC motor having clutch and brake mechanism. Once the tray is full, it shall move out automatically and fresh tray shall be brought in the required position. This Tray conveyor shall be able to carry at least 4 nos. of rod trays. All the components and mounting brackets shall be made of SS304.

7.17. SLUDGE HANDLING SYSTEM AND COOLING WATER SYSTEM:

In this system, sludge water, after grinding operation, shall be transferred to two compartment cooling water tank of suitable capacity for localized settling of sludge. The over flow of second compartment shall be taken to 5

- stage vertical rectangular/ cylindrical shaped sludge tanks of 150 liter capacity each. Sludge water, in 5 - stage vertical rectangular/ cylindrical shaped sludge tanks, shall be first entered in the top most tank. The overflow is then transferred to the lower one. Likewise, the overflow of the bottom most tank is being used for grinding operation.

Similarly, 3 stage settling shall be for online pellet washing system.

The drawing of the sludge handling unit and other accessories will be finalized during the time of detailed engineering.

Each of these, shall have separate pumps (i.e. two pumps) having same capacity. All the tanks, piping and other components shall be made out of SS 304.

Details of the sludge tanks is as follow

Height of the sludge tank comprising of 05 no.s of tank	3000 mm
Gap between two tank	100 mm approx
Capacity of the each tank	150 litre
Tank's tapered bottom height	100 mm approx
MOC	SS 304
Valve at the tank bottom	Type - Butterfly, Size 150 NB, MOC - SS

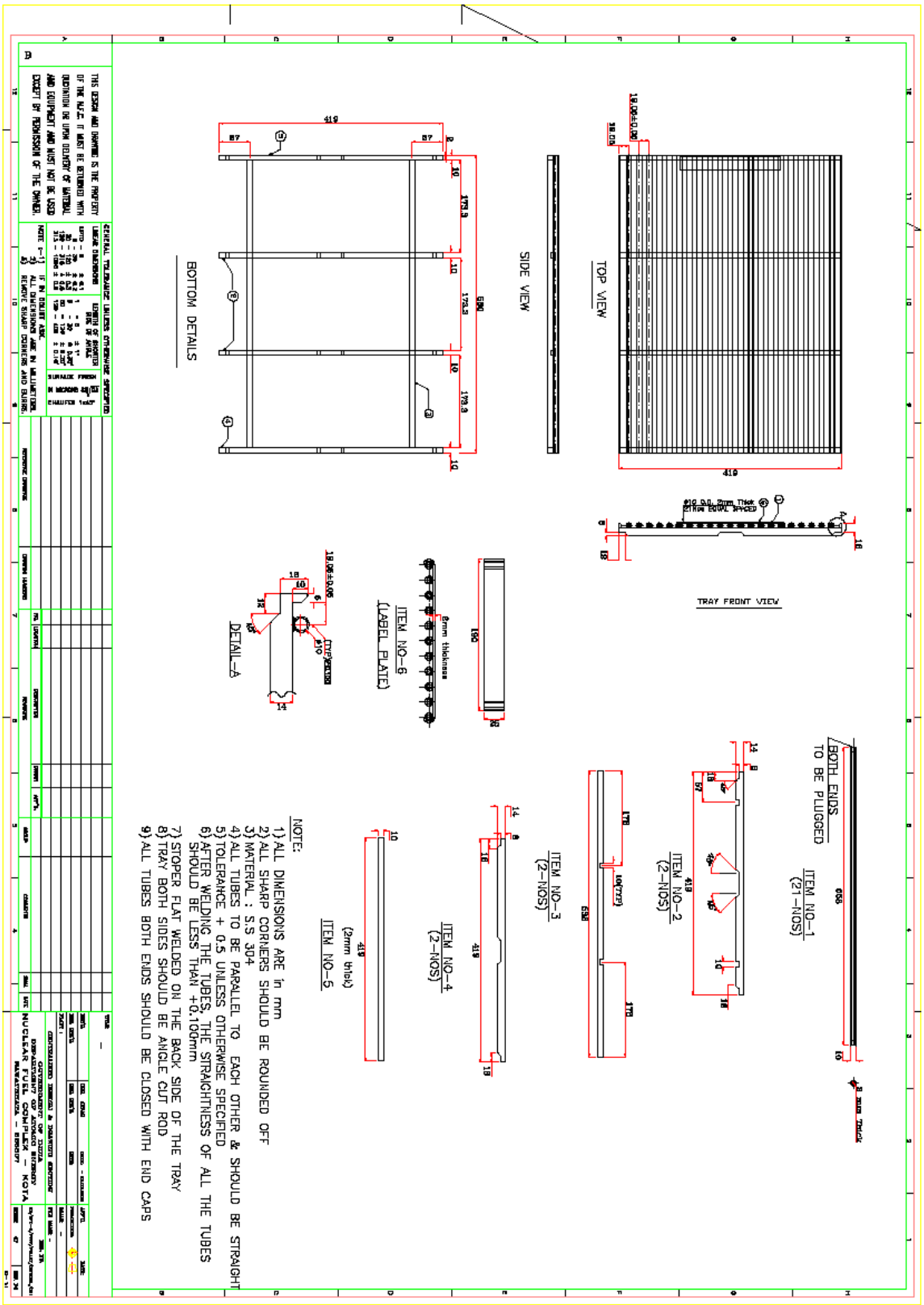
7.18. MACHINE ENCLOSURE:

The main machine shall be enclosed so that coolant, dust shall not come out. Enclosure shall be compact, leak tight and easily detachable from the main machine for major maintenance. Door / Windows shall be provided with poly carbonate panel for minor maintenance, job and machine setting job. It shall be made out of Stainless steel frames with easily detachable panels. Enclosure should have provisions to accommodate the regulation wheel linear movement.

7.19. AUTOMATIC EMPTY ROD TRAY HANDLING:

A suitable overhead Tray transfer system shall be provided for empty Rod tray handling. Generally, Rod trays, after feeding the sintered pellets to the linear vibrator in Loading side tray Conveyor, shall be transferred to the unloading side tray conveyor to use the same tray for feeding the ground pellets.

The system may be consists of ball screw for rod tray lifting & lowing purposes and suitable conveyor for conveying rod tray. The details of the handling system shall be finalized during the time of detailed engineering. The tentative drawing of the rod tray is attached as follow:


TOP VIEW
SIDE VIEW
BOTTOM DETAILS
TRAY FRONT VIEW
ITEM NO-1 (21-NOS) BOTH ENDS TO BE PLUGGED
ITEM NO-2 (2-NOS)
ITEM NO-3 (2-NOS)
ITEM NO-4 (2-NOS)
ITEM NO-5 (2mm thick)
ITEM NO-6 (LABEL PLATE)
DETAIL-A
NOTE:
1) ALL DIMENSIONS ARE in mm
2) ALL SHARP CORNERS SHOULD BE ROUNDED OFF
3) MATERIAL : S.S 304
4) ALL TUBES TO BE PARALLEL TO EACH OTHER & SHOULD BE STRAIGHT
5) TOLERANCE + 0.5 UNLESS OTHERWISE SPECIFIED
6) AFTER WELDING THE TUBES, THE STRAIGHTNESS OF ALL THE TUBES SHOULD BE LESS THAN +0.100mm
7) STOPER FLAT WELDED ON THE BACK SIDE OF THE TRAY
8) TRAY BOTH SIDES SHOULD BE ANGLE CUT ROD
9) ALL TUBES BOTH ENDS SHOULD BE CLOSED WITH END CAPS
NUCLEAR FUEL COMPLEX – KOTA

Rod tray

8. MACHINE CONTROLS:

(a) Two axes CNC

- controlled main in-feed axis to regulating wheel slide for grinding operation.
- controlled transverse movement axis (i.e along the wheel axis) of regulating wheel,

(b) Input resolution for CNC shall be 0.001 mm or better.
(c) Servo system for controlling axes should have close loop feedback system using A.C. servo motors and drives.
(d) Power transmission for in-feed axis and drive shall be through preloaded, backlash free ball screw and nut arrangement coupled to A.C. servo motor for better rigidity.
(e) Provision shall be there to maintain precise parallelism between work rest blade and regulating wheel spindle for grinding gap correction.
(f) Provision shall be there for manual size correction in forward direction during grinding by push button operation and for wheel wear compensation through CNC system.
(g) Provision shall be there for various step-less programmable feed rates for rapid approach, rough grinding and finish grinding during in-feed grinding.
(h) Regulating wheel spindle speed shall be continuously variable between 10 to 250 rpm
(i) The CNC should have provision for sufficient expansion with respect to input, output modules. System in the phase of obsolescence from the manufacturer shall not be used.
(j) It shall have feature to switchover to manual mode when machine is running in auto mode of operation.
(k) The PNP type proximity sensors shall be used. The proximity switches shall also have an LED indication to indicate the presence or absence of target.
(l) There will be provision of 20% extra digital I/O ports in machine.
(m) The Regulating wheel slide movement will be through AC servomotor with integral rotary encoder. The wheel carriage moves in pre-loaded anti-friction needle roller guide ways/ Linear Motion guide. Movement from motor will be transmitted through ball screw and nut mechanism.
(n) Pellet sensors shall be optical type.
(o) Suitable sensors shall be provided at the discharge position of both the indexing tables.
(p) Belt conveyor motor will be of minimum 0.5 Kw capacity.
(q) The power supply to the control units shall be through isolation / control transformer..

(r) The complete control systems shall be modular for ease of maintenance. Enough space shall be provided in the panels for ease of maintenance jobs.

(s) The supplier shall submit all the relevant technical catalogues along with its offer.

(t) All operations shall be in automatic/semi automatic and manual mode.

(u) The pellet feeding, washing and stacking shall be mechanized and automatically controlled. These shall be provided with local control for ease of operation and maintenance.

(v) All the operations shall be synchronized with grinding operation and necessary safety interlocks shall be provided for manual as well as automatic semiautomatic mode.

9. CONTROAL PANEL AND CABLING.

9.1. CONTROL PANEL:

9.1.1. Control panel shall have facility for required operation with proper interlocks for safe operation.

9.1.2. The Control panel shall be placed away from the equipment for safety and operational control of the equipment.

9.1.3. Power panel and control panel shall be combined in one panel with front opening door. Control panel should be with only front mounting of component and front operation.

9.1.4. Standard practices shall be followed in assembling and wiring of the panel

9.1.5. NFC-K shall approve electrical circuit layouts before assembly. The control panel shall be sheet steel enclosed and shall be dust, weather and vermin proof providing a degree of protection IP-54.

9.1.6. The control panel shall be air-conditioned.

9.1.7. Isolation/ control transformer should be provided at the mains input.

9.1.8. The control panel shall be designed for 415V ± 10%, 3 phase, 50 Hz, 4 wire system as per applicable standards.

9.1.9. All live parts shall have air clearance between phase to phase and phase to earth minimum 25 mm and 20 mm respectively.

9.1.10. The panel and equipments shall be provided with suitable earthings.

9.1.11. The panel shall be illuminated with LED lamp

9.1.12. The incoming bus bar along with MCCB shall have separate compartment. The MCCB shall be operated through Rotary Operated Mechanism (ROM) with door interlock. The incoming RYB LED indication lamps shall be provide in addition to volt meter and Ammeters.

9.1.13. There shall be separate compartment for High voltage and low voltage components. High voltage components shall be covered for safety.

9.1.14. The motor protection shall be through MPCB, if not operated through VFD.

9.1.15. All the VFDs shall be provided with Basic Operator Panel (BOP).

9.1.16. Control supply shall be through isolation/Control transformer. A separate isolation/control transformer shall be provided for feeding control supply to

the instruments. Panel should also have a separate additional isolation /control transformer with same rating.

9.1.17. Operating voltage 24VDC is to be used only for field instruments and sensors, not for power contactors. All power contactors shall operate from 220 VAC.

9.1.18. MCB is to be provided at incoming and outgoing terminals of the isolation/control transformer.

9.1.19. SMPS, used for power supply, should have MCBs at incoming and outgoing terminals.

9.1.20. Each instrument and drives shall be provided with protection at input power supply.

9.1.21. Audio & Visual alarm to be provided for alarms, faults, sequence failure etc as per process requirement.

9.1.22. Emergency switch is to be provided on main panel, operator control station and at equipment.

9.1.23. Control On switch should be provided in addition to Emergency switch at main panel and at operator station.

9.1.24. Alarms acknowledge, alarm test and alarm reset push button are to be provided on the operator station and main panel.

9.1.25. Control panel shall be provided with panel light interlocked with the panel door along with the door lock. Power supply to the panel light should be through separate MCB.

9.1.26. Individual MCB's shall be provided at input and output of each power supply.

9.1.27. Individual power supply shall be provided for CNC input and output.

9.1.28. Two Nos. of utility plug and socket for 230VAC should also be provided inside the panel with separate MCB protection.

9.1.29. Multifunction meter to be provided at the main incoming supply

9.1.30. Each junction box, console, panels and Instruments shall be provided with proper required Earthing.

9.1.31. Earthing strip should be provided inside the panel along with earthing terminals at control panel body and doors

9.1.32. System shall be earthed as per following scheme.

9.1.32.1. For this three copper strips/bus bars (G1, G2 and G3) of dimension of 25x6 mm, should be provided inside the panel.G2 and G3 bus bars should be insulated and G1 should be bare copper strip. Inside the panel safety grounding (i.e. G1) is considered separate from shield and signal ground.

9.1.32.2. Electronic signal reference in each device/instrument channel inside the panel should be connected to G3 bus bar through PVC insulated 4 Sq. mm stranded tinned copper wire.

9.1.32.3. Shields of all cables used for low voltage analogue signals, should be looped and connected to the G2 bus bar inside the panel/JB through PVC insulated 4 Sq. mm stranded tinned copper cable except for the shields which are already grounded at source/ field. Shields which are grounded at source/field, should be connected to G2 through a low

inductance capacitor of 0.1 microfarad to 0.01 microfarad using PVC insulated stranded tinned copper cable of 4 Sq. mm

9.1.32.4. G1 should be electrically connected to the sheet metal of the panel by mean of mild steel standoff posts. The safety ground connections from all different devices mounted inside the enclosure are connected to this by mean of PVC insulated 4 Sq. mm stranded tinned copper wire using crimpable lugs through shortest length.

9.1.32.5. G2 and G3 bus bar should be connected to the Grounding junction box (available at site) through two separate 16 Sq. mm insulated tinned copper cables. Approximate required cable length is 10 meter.

9.1.32.6. From G1 bus bar, two connections should be made to the nearest earth pad directly using 4 Sq. mm bare copper conductors . Approximate required length is 10 meter.

9.1.33. Eight (08) channel interposing relay card shall be used for driving field actuator. Free wheeling diode shall provided wherever inductive loads are driven. Separate MCB shall be provided for at least in a group of three relay cards.

9.1.34. All cables required for programming of CNC and servo drive and any other required for programming & operation of the equipment along with the programming software of CNC and servo-drive should be included in the supplies**.**

9.1.35. All the multi core control cables from the control panel should be terminated in junction boxes at the machine. Junction boxes should confirmed to IP-55 degree of protection. individual field instruments like a sensor, solenoid valves etc. should be connected to this junction boxes.

9.1.36. Control panel, junction boxes and push button stations shall with IP-55 protection. There shall he separate cable chamber and bus bar chamber for the control panel. All the power/control cables shall be PVC insulated, GI wire armored .

9.1.37. All the multi core control cables from the control panel shall be terminated in junction boxes at the machine. Junction boxes shall conform to IP-55 degree of protection. Individual field instrumental like sensors, solenoid valves, etc shall be connected to these junction boxes.

9.1.38. Double compression glands shall be used for termination of cables.

9.1.39. Overhead cable tray shall be used for laying the cables.

9.1.40. In control panel, component-to-component mounting distance shall be sufficient for ease of maintenance.

9.1.41. Cable exit/entry shall be from top of the panel.

9.1.42. Individual MCB'S shall be provided for instruments in the panel. Separate indicator lamp shall be provided for each operation

9.1.43. Revolving operator panel shall be provided near the machine, at a comfortable operating height. Multi core armored control cable shall be used for connecting the operator panel to the control panel. Separate indicator lamp shall be provided for each operation. Illuminated push

button shall not be used. Standard make flush type push button shall be used on the operator panel.

9.1.44. Grinding wheel operation shall be inter-locked with the spindle oil pressure switch.

9.1.45. Grinding operation shall be interlocked with coolant water pump and pellet washing pump. This will caution the operators for running the machine without coolant/wash pump.

9.1.46. The main motor shall have under current, phase unbalance, Over load, single phasing and short circuit protection

9.2. OTHER POINT

9.2.1. All motors should be 415 V, AC 3-phase, Total Enclosed Fan Cooled (TEFC), Class F insulated induction motors as per IS 325. Motor rating, RPM, mountings etc as are to be suitably selected. If VFD is used, they shall be Vector drive of suitable capacity.

9.2.2. Routing of Power, Control & signals should be routed through separate cable trays.

9.2.3. Standard engineering practice of panel illumination, ferruling, lugging, cable routing and dressing, cable terminations, etc. shall be followed. Internal panel wiring shall use minimum 0.75 for 24 Volt DC and minimum 1 sq.mm or higher for other purposes depending upon the requirement. There shall be proper ferruling, suitable PVC trays for routing of wire along with cable ties and labels of components.. Red, black and yellow green wire should be used for 230VAC phase, neutral and electrical earth respectively. Brown and blue wire should be used for 24VDC positive and 24VDC negative respectively and grey color shall be used for digital input and output.

9.2.4. Adequate status indicating devices, out-put indicators and alarm systems shall be provided to keep the operator posted of control status, unsafe conditions, malfunctions and incorrect operation of the system. The supplier shall provide list of alarms, interlocks, and indications required for safe operation in the manual mode.

9.2.5. All signal cables shall be shielded & properly earthed to eliminate the effect of noise.

9.2.6. Wherever multicore cables are used, spare cores are to be provided.

9.2.7. Any interlocks / alarm / operation envisaged during commissioning shall also be implemented and demonstrated.

9.2.8. AC drive where ever used shall be connected to motor using shielded cables. Shielded cable should be used for the analog and communication signals also.

9.2.9. All the drive shall be rated for maximum ambient temperature of 40 deg C or better and 45 deg C maximum with derating of 15 %.

9.2.10. No obsolete item from the manufacturer shall be used.

9.2.11. To ensure suitability of the instruments with the desired accuracy and performance for the application shall be responsibility of the supplier.

9.2.12. All power cables should be armored and FRLS cables.

10. MACHINE CONTROL SYSTEM:

(a) All operations shall be in automatic/semi automatic and manual mode.
(b) The pellet feeding, washing and stacking shall be mechanized and automatically controlled. These shall be provided with local control for ease of operation and maintenance.
(c) All the operations shall be synchronized with grinding operation and necessary safety interlocks shall be provided for manual as well as automatic semiautomatic mode.

11. LIST OF ACCEPTABLE MAKES:

THE LIST OF ACCEPTABLE MAKES ARE AS FOLLOWS:

S No	Type	Authorized Make
1.	CNC system	Siemens
2.	Induction motor	ABB/KIRLOSKAR/CG/BHARAT BIJLEE/SIEMENS/MARATHON/HAVELLS/REMI
3.	Servo motors	Mitsibishi/ Balder /Siemens/Schneider
4.	Gear Box	Greaves/ Elecon/ Shanti/ Bonfiglioli
5.	Variable Frequency drives	Siemens / Schneider
6.	Pneumatics components	Festo / SMC
7.	Hydraulic Components	Vickers / Rexroth / Bosch/ Parker
8.	Power Contactors	Siemens / L&T
9.	Timers /Push Button	Siemens / L &T
10.	Proximity Sensors	BCH/ PEPPREL+ FUCHS/ **Omron/ Osna**
11.	Control panels	RITTAL/ PYROTECH/ BCH/ Schieder Electric
12.	LM slide	THK/ Tsubaki/ Schneeberger
13.	Bearing	SKF/ NTN/ FAG/ TIMKEN/ THK
14.	PLC	Siemens S7 -300 series or higher end
15.	MCCB	SIEMENS / L&T/ ABB / SCHNEIDER
16.	Relay in relay card	OEN/ OMRON/ Siemens
17.	Nozzle	Spray System
18.	Ball Screw	THK/ Tsubaki/ Schneeberger

Apart from above if any other bought-out items are used; the vendor shall take the prior approval from NFC

12. STANDARD ACCESSORIES:

Following items shall be supplied as:- Standard accessories:

(a) Coolant tank including pump
(b) Series of sludge handling tanks with pump.
(c) Balancing arbor.
(d) Static wheel balancing attachment.
(e) Chain & Pulley block, Hoist for wheel change along with support structure and tooling
(f) Servo voltage stabilizer and isolation transformer.
(g) Copying template for regulating wheel.
(h) Slips of various thicknesses to adjust height of work rest blade.

13. SPARES

13.1. MANDATORY SPARE:

Vendor shall furnish the itemized price for the following mandatory spares along with the bid. The list of mandatory spares shall be reviewed for completeness during detailed engineering after the order placement. The quoted price shall remain fixed & firm during execution of project. The price of mandatory spares shall be considered for commercial evaluation. Also an un-priced copy of the list of mandatory spares shall be furnished with technical offer. Following sets of mandatory spare shall be supplied.

S No	Description	Qty	Unit	Remark
•	Work rest blade holder with tungsten carbide tipped blade to suit to pellet diameters	04	Nos	
•	Diamond impregnated grinding wheel with flange	02	Set	
•	Regulating wheel with flange	02	Set	
•	Diamond dresser tool	02	Nos	
•	Cartridge type assembly (spindle and bearing) for grinding wheel head.	04	Set	
•	Bearings for regulating wheel head stock	04	Set	
•	Conveyor for i. Belt Conveyor (Inlet) ii. Belt Conveyor (Outlet I) iii. Belt Conveyor (Outlet II)	01	Set	
•	Complete CNC unit (ready to use in all aspect) comprising of i. Panel Control Unit (PCU) ii. CNC key Board iii. Flash Card iv. MCP v. Set of cables & required terminal blocks/ converter, Terminal Strip Converter vi. PP/ IO card vii. Other required communication module	01	Set	

S No	Description	Qty	Unit	Remark
	and electronics cards etc			
•	Servo Motor with connector for Regulating wheel in-feed slide movement.	01	Set	
•	Servo Motor with connector for Regulating wheel dresser	01	Set	
•	Drive modules with connector for servo motors	01	Set	
•	Power Cables and encoder feed back cables with connectors for servo motors and drives	01	Set	
•	3 D model of all accessories (except main equipment) describes in the technical specification.	01	set	

13.2. RECOMMENDED SPARE:

Vendor shall furnish quotation separately for recommended spares (Mechanical, electrical, Instrumentation) for Two (2) years normal operation and maintenance of the equipment with itemized price list along with the bid. These shall be ordered by purchaser separately. The un-priced copy of itemized list of spares shall be attached with technical offer also. The price of these spares / consumables shall not be considered for commercial evaluation / price comparison.

13.3. COMMISSIONING SPARES

Vendor shall supply adequate quantity of commissioning spares so as to ensure that commissioning of the system is not hampered for shortage of commissioning spares. Vendor shall include the cost of the commissioning spares in the lump sum quoted price. In case, during commissioning, any spare is used from two (2) years' operation and maintenance spares or mandatory spares, the same shall be replenished by vendor without any cost implication, within a mutually agreed time.

13.4. SPECIAL TOOLS AND TACKLES

The Vendor shall provide a set of new and unused special tools and tackles for each stream, as required, for day to day operation and maintenance of the offered equipment / system. The list of such tools and tackles shall be furnished along with the bid. Vendor shall include the cost of the special tools and tackles in his lump sum quoted price.

All spares parts shall be wrapped and packaged so that they are preserved in original as-new condition, under normal conditions of storage to be anticipated in India, and shall be properly tagged and coded so that later identification for intended equipment usage will be facilitated. The two (2) years' "recommended spares", "mandatory spares" and "commissioning spares" shall be packaged separately and clearly marked as "Spare Parts", "Mandatory Spares" and "Commissioning Spares" respectively.

14. SUBMISSION OF DRAWINGS, DOCUMENTS AND SOFTWARES:

The following drawings/documents marked "✔" shall be furnished by the bidder.

S. NO.	DESCRIPTION	WITH BID	POST ORDER			REMARKS
			FOR REVIEW	FOR RECORD	WITH DATA BOOK (FINAL)	
1.	Document control index		✔			
2.	Filled in Technical Check List	✔				
3.	Specification compliance sheet against each specification	✓				
4.	GA Drawing and cross-section drawing of individual equipment showing major dimension and MOC		✓		✓	
5.	Package layout with overall and important dimensions including Battery limit details	✔	✔		✔	
6.	2D drawing for all assembly and sub assembly with respect to material handling	✓				
7.	Brief Write up with respect to automation, sludge handling and coolant water	✓				
8.	Equipment/package load data and foundation/anchor plan with pocket details		✔		✔	
9.	List of recommended spare parts and consumables for 2 years normal operation (with itemized price)	✔			✔	
10.	List of Mandatory Spares (with itemized price)	✔	✔		✔	
11.	List of Special Tools & Tackles, if any	✔			✔	
12.	List of sub-vendors of major items/components		✔		✔	
13.	Technical literature/Catalogues/Brochures of major bought out items/ component	✔		✔	✔	
14.	Utility Consumption figures	✔	✔			

S. NO.	DESCRIPTION	WITH BID	POST ORDER			REMARKS
			FOR REVIEW	FOR RECORD	WITH DATA BOOK (FINAL)	
15.	Installation, Operation & Maintenance manuals (including that of bought out items) containing electrical & electronic circuit diagram and other certified drawing and documents including prolonged storage procedure			✔		
16.	Quality Assurance Plan		✔		✔	
17.	As Built Drawings				✔	
18.	Delivery Schedule of equipments/package	✔		✔	✔	
19.	Detailed 3D Assembly drawing (in Solidworks file) showing various subsystems eg. pellet coveyors, tray handling systems, enclosures of the equipment, pellet washing systems etc		✓	✓		
20.	Load analysis of the structure		✓	✓		
21.	Write-up of system description, operation, control philosophy and Schematic Control block diagram	✔		✔	✔	
22.	Servo drive application program and all other supporting drivers/ softwares, I/O list, list of operational and safety interlocks, sequence of operation, alarms, events, faults, and all other program backup		✓	✓	✓	
23.	Programming and configuration software preloaded in programmer (latest configuration) for CNC system and other software configurable devices		✓	✓	✓	
24.	Guaranteed max. Power Consumption	✔		✔	✔	
25.	Single line diagram		✓	✔	✔	
26.	Electrical load data	✔	✓	✔	✔	
27.	Electrical Schematics, general Arrangement drawing, electrical and instrumentation wiring diagram		✔		✔	

S. NO.	DESCRIPTION	WITH BID	POST ORDER			REMARKS
			FOR REVIEW	FOR RECORD	WITH DATA BOOK (FINAL)	
28.	Cable layout		✓	✓	✓	
29.	Sizing calculation		✓	✓	✓	
30.	Electrical and instrumentation Cable schedule		✓	✓	✓	
31.	Interconnection diagram			✓	✓	
32.	Electrical interface with owner		✓		✓	
33.	GA and internal arrangement drawing for panels		✓	✓	✓	
34.	Schematic/Logic diagrams		✓	✓	✓	
35.	Interconnection/Wiring diagrams		✓	✓	✓	
36.	Equipment storage procedure at site				✓	
37.	Instrument Sizing calculations		✓	✓	✓	
38.	Instrument loop drawings		✓	✓	✓	
39.	Panel front arrangement		✓		✓	
40.	Power Supply Distribution		✓	✓	✓	
41.	Wiring diagram for panels		✓	✓	✓	
42.	I/O assignment		✓	✓	✓	
43.	Special test equipments, tool requirement for maintenance			✓		
44.	Air supply distribution drawing from instrument air header to instruments			✓		
45.	Instrument location plan, JB location, Local Panels/ gauge board locations		✓	✓	✓	
46.	Instrument Installation Drawings		✓		✓	
47.	Operation and maintenance manual, Catalog and communication manual of brought out items				✓	
48.	Electrical and electronics circuit diagram, diagnostics and troubleshooting				✓	

S. NO.	DESCRIPTION	WITH BID	POST ORDER			REMARKS
			FOR REVIEW	FOR RECORD	WITH DATA BOOK (FINAL)	
49.	Test Certificates - Material Test Certificates					*To be submitted during PDI*
50.	Test Certificates - Non destructive test reports					
51.	Test Certificates - Hydrostatic Test Certificate					
52.	Test Certificates - Mechanical Performance Test Reports					
53.	Test Certificates - Any Other Test Report					

This list indicates the minimum drawings and document requirements. However vendor shall submit a complete list of document and drawing schedule listing all drawings and documents to be submitted by them during the course of execution of the job. The schedule shall list all drawings and documents alongwith their number and expected date of submission. Any other document not listed here but felt necessary during technical evaluation, system approval and PDI shall be submitted during course of execution of the job.

Within two months from the date of acceptance of purchase order, the supplier shall submit the detailed engineering, drawings of the equipment, including design details for purchaser's approval. The drawings shall clearly indicate the material of construction of various parts with dimensions and makes & model of bought out items. The supplier shall start manufacturing of the equipment only after approval of drawings.

All as built documents should be submitted during commissioning. All the approved documents should be integral part of operation and maintenance manual

The supplier shall give 5 sets hard copy of corrected operational and maintenance manual including mechanical , electrical, instrumentation system etc and 2 sets CD (soft copy)for the furnace as well as accessories. it shall also contain all drawings make and model number of all brought out items.

15. VENDOR PRE QUALIFICATION CRITERIA:

15.1. The supplier should have supplied minimum five (05) numbers of successful operated similar capacity (as per attached Annexure III) automatic CNC grinding Machine with following features

a) Fixed Grinding Wheel
b) Adjustable regulating wheel
c) Grinding wheel dia - 400 mm or above
d) Regulating wheel dia - 250 mm or above

15.2. The firm should be Original Equipment Manufacturer (OEM)

16. PRE DISPATCH INSPECTION, TESTING AND TRAINING:

16.1. The supplier shall be responsible for supply and perform inspection tests required in accordance with these specifications included in the purchaser order. The purchaser's engineers/inspectors will carry out quality surveillance and inspection at supplier's work. The supplier shall allow reasonable facility and free access to his works/factory and records to the purchaser's engineers/inspectors for carrying out inspection/Test, and give advance intimation for arranging final inspection. All the items covered by purchase order shall be dispatched/delivered from the supplier's works only after the final inspection/test is carried out by the purchaser's Engineers/inspectors and a shipping release is obtained from him/ them.

16.2. The supplier shall arrange training to four engineers for operating and setting of Grinder at suppliers works.

16.3. The suppler shall arrange training to four engineers for assembling / disassembling changeover parts and sub system along with maintenance training at supplier’s works.

16.4. Pre-dispatch inspection shall be carried out by Owner for all the subassemblies and components at the manufacturer's premises before shipment of the equipment to the site. Vendor should give intimation 21 days in advance for pre-dispatch inspection The inspection and testing shall be carried out in accordance with the applicable codes and standards and the approved QAP. One complete set of Operation and Maintenance manuals, electrical circuit drawings with BOM, part assembly drawings & drawings of frequently wearing parts shall be supplied for arranging pre-dispatch inspection. The machine will be tested by suitable ceramic material brought by Owner’s representatives. The acceptance criteria of the machine shall be as per the machine specifications mentioned elsewhere in the documents.

16.5. QAP’s (Quality Assurance Plans) shall be drawn by main Vendor/sub-Vendor after award of order and shall be submitted for Owner’s review before taking up fabrication/assembly. QAP’s shall clearly mark the hold points to Owner. Acceptance/rejection criteria shall be clearly defined. Any or all the tests may, at the Owner’s option, be witnessed by the Owner. However, such Inspections & Testing witnessed by Owner shall be regarded as check-up and in no way absolve the main Vendor of his responsibility.

16.6. Each individual equipment shall be shop tested as per the applicable codes and standards for performance and pressure rating.

16.7. All instruments and gadgets for testing at Site shall be arranged by Vendor at his own cost. Vendor shall submit procedure for site performance test for Purchaser review after order

16.8. Inspection of control panel and power panel as per technical specification and latest applicable standard.

16.9. Inspection of all the instruments related to electrical / instrumentation (including of all bought out items) will be carried out. During inspection, functional testing of the control panel instruments and indicators will be carried out.

16.10. Test certificate and hard copy of catalogue of all the instruments and panels shall be submitted along with the pre-dispatch inspection call at least 21 days in advance.

17. ACCEPTANCE CRITERIA DURING PRE DISPATCH INSPECTION (PDI) :

During Pre-dispatch inspection, all the operations and functionalities of the grinder shall be demonstrated. Purchaser's engineers will issue the final shipping release after observing the trouble free working performance of the machine in complete automatic mode for a period of 04 hours of continuous operation at supplier's site. Vendor should provide the hydraulic oil and lubrication required for trial run. The details of oil and lubrication to be used for the grinder to be submitted to the owner after the detailed engineering. The Indian equivalent of oil and lubricant grade to be indicated to the owner. All the tooling required for this demonstration to be included in the vendor's scope of supply.

18. ACCEPTANCE CRITERIA AFTER RECIEPT OF EQUIPMENT : :

The performance of the machine will be tested at user's site after commissioning of the equipment for a trouble free operation in auto-mode continuously for a period of the 6 days (8 hours per day) for continuous hands up operation. The vendor shall demonstrate the capability of the grinder to produce pellets of acceptable quality at the guaranteed rate of output. The same shall be demonstrated continuously for the above mentioned time for each grinder. The product should meet the quality specification. All the tooling required for this demonstration to be included in the vendor's scope of supply..

The Critical parameter to be guaranteed shall be

- Average hourly output : 8000 pellet per hour
- Tolerance on the ground diameter of the pellet : 0 to -10 micron
- Ovality/ taperness on diameter : ≤10 micron.
- surface finish : ≤1.6 micron Ra

If vendor is unable to meet the performance guarantee in the first trial run, vendor must rectify the deficiency in the system with free of cost within minimum time frame to be mutually specified by the client and vendor.

19. PAINTING AND SHIPMENT

19.1. Equipment and materials supplied shall be painted after tests at shop and after installation and testing at site. Shop & field painting shall be as per Vendor's Standard painting specification suitable for normal corrosive industrial environment. Vendor shall also supply paint for touch up of any damages during transport & erection at site.

19.2. The units shall be disassembled into major components suitable for shipment and shall be properly packed to provide adequate protection during shipment. All assemblies shall be properly match marked for site erection. All machined and bearing surfaces shall be protected against rust with a thick coat of grease.

19.3. Each equipment shall have an identification plate giving salient equipment data, make, year of manufacture, equipment number etc.

20. ERECTION & COMMISSIONING:

20.1. The contractor shall carryout the erection and commissioning of the equipment covered under this Technical Specification at NUCLEAR FUEL COMPLEX - Kota, Rawatbhata Rajasthan.

20.2. As soon as the installation site at NUCLEAR FUEL COMPLEX - Kota, Rawatbhata Rajasthan is ready for erection and commissioning of the equipment, the purchaser will intimate the same to the contractor who shall depute his Engineers/Technicians to Nuclear Fuel Complex Kota, Rawatbhata Rajasthan site for the purpose of erection and commissioning of the equipment within a period of 2 weeks from the date of receipt of intimation from the purchaser.

20.3. The installation and commissioning job covered by this Technical Specification shall be completed within a period of 6 months from the date of its commencement.

20.4. Vendor should bring their manpower such as technical personnel/ engineer for erection and commissioning purpose. the supplier should provide specified output performance from the machine.

20.5. Party has to demonstrate complete functional testing of all the operation including its various modes, interlocks, alarm and faults, desire function of control and measuring inline instruments etc. Complete loading & unloading of all the softwares and corresponding licenses (i.e. for Data acquisition package with its application and supporting softwares, HMI, Drives, controller, PLC and any other software configurable device), Data backup and data cleanup procedure, List of fields on the HMI Screens along with corresponding address of PLC I/O and controllers parameters should be demonstrated through well documented procedure (with screen shots)

20.6. The design, material, construction, manufacture, inspection, testing and performance of all induction motors shall conform to IS: 325 (Three phase induction motors)

20.7. The supplier shall keep their representative to witness the operation of the Equipment for the next one week under NFC's supervision and operation.

20.8. All expenses such as to and fro fare, hotel, lodging and boarding, transportation etc., towards deputation and stay of the contractor's technicians/engineers for the purpose of erection and commissioning job at purchaser's site Rawatbhata, Rajasthan shall be borne by the contractor.

20.9. Contractor shall obtain a certificate from the Purchaser's site Engineers to the effect that the installation and commissioning job has been carried out satisfactorily.

21. INSTRUCTIONS TO THE SUPPLIER:

21.1. The firm should furnish the detailed drawing for approval to NFC before commencement of fabrication of equipment, within 3 months of getting P.O.

21.2. The firm should inform NFC at all important stages of fabrication so that stage wise inspection is carried out by NFC.

21.3. Wherever not specified, the firm should use all standard items during manufacture of equipment.

21.4. During the course of fabrication, the firm should carry out any minor modifications as suggested by NFC.

21.5. The firm should design the machine such that it is more compact and easily enclosable.

21.6. Final inspection will be carried out at manufacturers works for a hands off operation in fully automatic mode for 4 hours duration for trouble free operation.

21.7. The selection of materials for fabrication of all major parts should be in accordance with relevant IS standards and best manufacturing practices.

21.8. The enclosure are to be made in a manner that air borne dust particles are to be minimum.

21.9. The firm may suggest any improvement in the design for better performance of the machine for NFC;s consideration.

21.10. The firm should furnish all the details of bought out components, including make and model no.

21.11. The firm should furnish 3 sets of manuals containing all information regarding mechanical, electrical, electronic items, maintenance, trouble shooting, drawings (all assemblies), operational procedures, circuit diagrams, ladder diagrams, I/O listing etc.

21.12. The firm should supply essential spares as listed and furnish the list of essential spares for trouble free running of the machine.

21.13. It is not the intent of the specification to state completely herein all details of design and construction of equipment. However the equipment and all works shall confirm to all respects to high standards of engineering design and workmanship and be capable of performing of continuous commercial operations in a manner acceptable to purchaser who will interpret the meaning of the drawing and specifications and shall be reject any work in which the purchasers are not in full accordance herewith.

21.14. If it is found at any stage before final acceptance to NFC that the equipment is not meeting the requirement of the specification, any changes / rectification required shall be done at no extra cost to the purchaser.

21.15. Vendor should have experience to supply successfully operated similar capacity equipment with similar features to at least two organization. Vendor should provide the reference for the same at the time of bidding.

22. NOISE LEVEL

Noise level of the Centreless Grinder with enclosure shall not exceed 75 dB (A) at a distance of 1 meter.

23. UTILITIES:

Plant air cum instrument air shall be made available at single point within 5 m distance from the Equipment for each stream. Further distribution including supply and incorporation of conditioning devices as required, shall be done by the Vendor.

23.1. Plant air cum instrument air

Oil Content (gm/Nm^3)	:	Nil
Supply Pressure	:	6.0 kg/cm^2 (g) (Line should be design for 10 kg/cm^2)
Temperature	:	45 deg C max
Dew point	:	- 40 deg C at 1 atm

Vendor shall indicate the compressed air requirement (Nm^3/hr) for the Equipment.

23.2. DM Water :

Supply Pressure	:	1 - 2 kg/cm^2 (g)
Supply Temperature	:	Ambient

23.3. Power

3 phase 415± 6% V, 50 Hz ± 3%

Power shall be available at electrical control panel near the equipment. Incomer power supply upto the equipment control panel will be provided by NFC. However, the cable size should be communicated by the vendor during detailed engineering. All other cables required for successful operation of the equipment is in the scope of vendor.

24. GUARANTEE:

Equipment covered under this purchase order shall be guaranteed for quality, workmanship and trouble free smooth operation for a period of 12 months from the date of successful commissioning. If during the guarantee period the grinder is found not manufactured to the specification and does not conform to the standard of reliability , it shall be replaced/ rectified by the supplier at his risk and cost.

25. DELIVERY PERIOD:

Submission of technical drawings: Within 8 weeks from the date of technically and commercially confirmed purchase order.

Delivery of equipment: Within 18 months from the date of receipt of approved drawings.