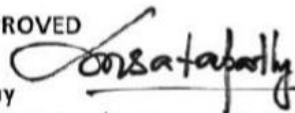
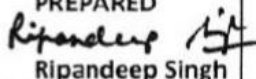


	PURCHASE SPECIFICATION FOR CALENDERING MACHINE	PS-251-606
		REV. 00

EQUIPMENT: Calendering Machine/Hot Roll Press

REVISION HISTORY SHEET

REV NO	DATE	NATURE OF CHANGE	REASON	PREPARED BY	APPROVED BY
00	9-5-18	New Issue	-	Ripandeep Singh	LN Satapathy

REVISION : 00	APPROVED  LN Satapathy		
	PREPARED  Ripandeep Singh	ISSUED ENGG	DATE 09-05-2018

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	PURCHASE SPECIFICATION FOR CALENDERING MACHINE	PS-251-606
		REV. 00

SCOPE: Design, Supply, Installation & commissioning of **Calendering Machine**

(Hot Roll Press Machine) at BHEL for Lithium Ion cell manufacturing facility.

Calendering Machine is required to hot press the dried positive & negative electrode to achieve the required compaction.

Pre-Qualification Criteria (PQC)

The supplier shall necessarily meet the following conditions.

Sl. No	Particulars	Supplier's confirmation (Yes/No)
1	The vendor shall be an Original Equipment Manufacturer (OEM) or their authorized dealers/representative. A latest valid authorization letter from OEM giving full contact details (add., email & phone no) shall be furnished along with offer (by dealer/ representative).	
2	Offer shall be for new equipment and not for any refurbished or used equipment. All the parts used in the equipment shall be new and not used / refurbished ones. A declaration to that effect to be furnished.	
3	Supplier shall supply, install and commission the equipment as per BHEL Specification.	
4	Vendor shall have an experience of supplying similar Calendering Machine to at least 3 customers (details of customers to be provided) as on date of tender opening. Certificate of satisfactory performance/ User acceptance certificate/ Successful commissioning certificate shall be furnished from at least one such customer. Out of 3 customers at least 1 shall be from a country other than the country of origin.	
5	Supplier shall agree for Annual Maintenance Contract (AMC) for a period of three (03) years after the expiration of warranty period. The vendor or their authorized service representative should be equipped to provide prompt after sales service, spares & support for the offered equipment at BHEL ESD, Bangalore, India.	

Note: 1-The Pre-Qualification Criteria are mandatory requirements and the technical bid will be considered only if all the above PQC are met.

2-All Supporting documents related to PQC shall be enclosed in techno-commercial offer.

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	PURCHASE SPECIFICATION FOR CALENDERING MACHINE	PS-251-606
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SCOPE

This document establishes the specifications for the design, supply and commissioning of Calendering Machine as per details below. It includes the hardware specifications & requirements, deliverables, documents and other general conditions. The system shall be commissioned at 1st floor, Old Production Block, Electronics Systems Division, BHEL, Electronic City, Bangalore.

Scope of supply:

The supply of Calendering Machine shall include components as mentioned below and others as per the design requirements.

SL No	ITEM DESCRIPTION
1	Calendering machine main frame
2	Unwinding mechanism with tension control
3	Two or more rollers vertical calender with gap control, heating mechanism, alignment control etc.
4	Hydraulic system for pressure/force control
5	Roll rewinding mechanism with tension control & alignment mechanism.
6	Drive & control system with HMI panel etc
11	10 sets of unwinding/ rewinding cores (bobbin)
13	Documentation for software and hardware
14	Operating manual
15	Standard spares & Accessories
16	Calibration certificates for all measurable parameters valid for 1 year
17	Service manual

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PURCHASE SPECIFICATION FOR CALENDERING MACHINE

PS-251-606

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Technical Specification

SL No	MATERIAL/PROCESS DISCRIPSON	TECHNICAL SPECIFICATION	Supplier's confirmation (Yes/No)
CALENDERING PROCESS			
1	Type/Pressing Method	2 Roll Hot Pressing	
2	Roller Diameter	- Approx. 400mm - Tolerance: maximum $\pm 2\mu\text{m}$ - Surface roughness: $\leq 0.4s$ - Mirror finish with 0 to 1 Ra or 0 to 2 Ra - Surface hardness: Over Hrc60	
3	Roller Width	Minimum 300 mm	
4	Roller Surface Material	Hardened High strength steels with chrome plating	
5	Electrode Pressing width	50mm to ≥ 250 mm	
6	Electrode thickness	Maximum 400 μm	
7	Mechanical speed	0.5 to 5 m/min or more (adjustable)	
8	Gap Between Roller	- There should be easy way to set the gap between rollers at required level (vendor to specify the method). - Manual or Automatic gap adjustment $\leq 1 \mu\text{m}$ - Provision for left/right adjustment of roller & nip adjustment. - Digital display for the gap between the rollers.	
9	Sensors/mechanism for controlling/monitoring the thickness of Calendered Electrode.	- Tolerance for thickness of calendered electrode : $\pm 5\mu\text{m}$ or better - Sensor for measuring the electrode thickness after calendering.	
10	Roller Temperature	- Electrically heated/ other method (vendor to be specify) - Controllable up to about 150 °C - Temperature setting resolution of 1 °C	

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	PURCHASE SPECIFICATION FOR CALENDERING MACHINE	PS-251-606
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11	Pressing Pressure	- Adjustable force up to 15 Ton or more - Hydraulic System for force application	
12	EPC/Wave Guide sensor	Provision for EPC sensor should be there to track the Electrode edges and for proper alignment.	

UNWINDING/REWINDING

13	Roll unwinding/rewinding mechanism.	- Automatic unwinding/rewinding mechanism should be provided. - Provision should be there to set tension for unwinder & re-winder up to 10 kgf.	
14	Roll core (bobbin) diameter	76mm (3 inch)	
15	Roll outer diameter	Minimum 250mm	
16	Roll core holding mechanism	- Pneumatic chuck for holding the core or other suitable mechanism. (Vendor to provide details). - Removable shafts with Tilt lock safety chuck. - Alloy steel construction (4130CD or equivalent) - The shaft shall be able to take a weight of at least 50 kg. - Integrated web-guide with sensors shall be provided.	

CONTROL SYSTEM

17	Control System	- PLC control system to control full Calendering machine with HMI facility. - The PLC shall be from reputed vendors like Allen Bradley, Siemens etc. - Control of complete calendering process along with necessary safety mechanisms like interlock for operator safety and better process control.	
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OTHER COMPONENTS

18	Machine frame	Extra heavy duty welded and highly torsion resistant construction	
19	Pre-heating	Provision for Preheating the electrodes before feeding to main calendering rolls.	

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20	Roll cleaning	Suitable method for cleaning the rolls like felt sliders/ PTFE or suitable scraper or other (vendor to specify). Cleaning mechanism shall not leave any marks on the cylinder.	
21	Dust collector	There shall be provision within the machine for collecting waste generated while calendering. Dust eliminating system in the upper roller and lower roller should be provided.	

General specifications:

- Only dry room of <0.5% RH & Cleanroom class 10000 compatible lubricants to be used in the machine
- The machine should automatically stop when there is a break in the web.
- The chucks, rollers and other parts should be corrosion free or having anti-corrosion protection coating.
- The equipment shall be provided with Heavy duty castor wheels for easy movement.
- BHEL shall provide 230V, single phase / 415V (+/-2.5%), 3 phase, 50 Hz (+/-2.5%) power supply for the equipment.
- BHEL shall provide Compressed air at 6 bar pressure for the equipment.
- In case of a power failure, there shall be a provision to start the machine automatically as well as manually after power is resumed.
- In case any system needs to be on UPS, vendor to clearly specify that.

PRE-DISPATCH INSPECTION (PDI):

BHEL shall carry out Pre-dispatch inspection of equipment at Vendor's work. Vendor shall demonstrate proper functioning of system and also demonstrate equipment meeting all the specifications. After satisfactory PDI, BHEL shall give a go-ahead for dispatch of equipment.

Vendor has to inform at least 1 month in advance to BHEL for PDI, so that all necessary arrangements can be made.

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Installation & Commissioning/ Training:

Vendor has to do installation of Machine at BHEL-ESD, Electronic City Phase 1, Bangalore-560100. Vendor shall depute requisite manpower at BHEL premises to complete the installation of machine.

After completion of installation, the vendor shall demonstrate the performance of system to BHEL's satisfaction as per the specifications.

Vendor shall arrange to train BHEL's personnel in operation of the Calendering Machine for required number of days at BHEL's premises free of cost.

Warranty & AMC

The vendor shall provide a warranty of the Calendering Machine for a period of 24 months from date of successful commissioning or 30 months from date of delivery at BHEL ESD whichever is earlier.

Vendor shall quote separately with this tender for AMC (Annual maintenance contract) for a period of at least 3 years after the expiry of warranty. The AMC prices shall also be considered during evaluation of vendor. The ordering of AMC shall be at the discretion of BHEL. The quote shall also contain list and price of essential spares & accessories.

General

- a. **The Vendor shall enclose a point to point compliance / deviation matrix with respect to each of the specifications as mentioned above along with the offer without which the offer will not be considered.**
- b. Vendor to ensure suitable packing of the equipment.
- c. The Vendor shall clearly indicate the power rating (kW), compressed air requirement (CFM) of the equipment.
- d. Vendor shall provide the dimensions, weight, electrical requirements and civil requirements along with offer.
- e. Vendor shall provide general arrangement drawing of the equipment along with the offer.

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