GOVERNMENT OF ANDHRA PRADESH

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Web Site : https://tender.apeprocurement.gov.in

TENDER DOCUMENT

FOR

Procurement and supply of equipment, and other items for Government Ayurvedic Pharmacy and Drug Testing Laboratory (DTL) at Sontyam, Visakhapatnam state in Andhra Pradesh in comprehensive mode (e- Procurement) (2 Years Rate Contract)

Tender Notice No. : **7.4B/APMSIDC/2025-26, Dt: 27.09.2025**

Name of the Agency and Address : ……

……

……

Implementing Agency :

ANDHRA PRADESH MEDICAL SERVICES & INFRASTRUCTURE DEVELOPMENT CORPORATION
(Formerly APHMHIDC)
(AN ENTERPRISE OF GOVT. OF A.P.)
2nd Floor, Plot No:09, survey number: 49, IT Park, Mangalagiri, Guntur District- 522503.
e-mail: aphmhidc@gmail.com, ed.apmsidc16@gmail.com

Ph No: 8978644900

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INTRODUCTION

1.1. The Andhra Pradesh Medical Services & Infrastructure Development Corporation – APMSIDC (formerly APHMHIDC) (Tender Inviting Authority) is a fully owned Government of Andhra Pradesh for providing services to the various health care institutions under the Department of Family Welfare and Health. One of the key objectives of the APMSIDC is to act as the central procurement agency for all essential drugs and equipments for all health care institutions (hereinafter referred to as user institutions) under the department. The corporation has also been entrusted with the setting up and running of all kinds of modern Medical and Paramedical or medical based ancillary facilities such as hospitals, pathological labs, diagnostic centres, x-ray/scanning facilities.

1.2. Over the last decades, several equipment have been procured and installed in the various health care institutions under the government under different schemes. One of the major problems encountered is the maintenance of the equipment. Site preparation, timely replacement of consumables, calibration of sensitive equipment, up gradation of technology, training to the doctors and paramedical staff- all poses problems. The corporation has been formed by the government to fill in these grey areas and to act as total service providers to the all the government health care institutions. Of course, this mammoth task could be achieved only with the active involvement and support of the manufacturers/dealers of the equipment.

1.3. In this tender, the lowest price is the sole criteria for selecting the equipment/supplier. The two-bid system, which is followed, has been designed to eliminate those equipment which do not match the technical specifications, or not having the proven technology and to eliminate firms that do not have the financial or technical capability to supply, install and maintain the equipment. i.e., to provide after sales support for a period of minimum 5 years from the date of installation and to ensure 98 % uptime in performance/operation of the equipment.

1.4. The payment to the successful tenders will be settled after obtaining a 'three month performance certificate' from the head of the user institution - three month period is a period of trail run- during which the performance of the equipment will be keenly observed. At the same time, it may be noted that the Corporation is not the agency finalizing the requirements of equipment and their technical specifications. These parameters are finalized by the user institutions and funding agencies and forwarded to the corporation for procurement. On our side, we ensure that the technical specifications are not biased towards a particular equipment/firm, through consultations during the pre-tender meetings with the prospective tenderers. Amendments in the terms and conditions of the tender documents may be resorted

to on the basis of expert advice to see that more than one firm qualifies for the final round. Technology specific specifications/conditions and entertaining direct purchase will be undertaken, if and only if, the user agency certifies the equipment required is of proprietary nature. Since the equipment procured are dealing with precious human life in government hospitals, depended by the poor and downtrodden of the society, it is our endeavor to ensure that most modern, but proven and durable equipment are procured and supplied. The tender documents are prepared after assessing the market to meet such objectives.

1.5. Every paisa spend by the corporation is public money and hence accountable. Therefore, after sales service and up-time guarantee on the performance of the equipment purchased by the Corporation have to be given paramount importance. Corporation will be dealing with defaulters in these fronts with a firm hand, which may lead to black listing and recovery of damages. We request our valuable suppliers to avoid such unpleasant situations.

1.6. It is also essential while dealing with public money that utmost transparency has to be maintained in the procurements of the corporation. All decisions will be published from time to time on our website www.apmsidc.ap.nic.in. The corporation will not wait for the mandatory 30 days period to provide any information under Right to Information Act and will provide the information within the minimum possible time. The Corporation will uphold the fundamental "right to be heard' enshrined under the Constitution of India and will take harsh decisions only after providing opportunity for hearing/submission of facts. Tenderers could prefer appeal to the government against all decisions of the corporation.

SECTION - I: INVITATION FOR BIDS (IFB)

GOVERNMENT OF ANDHRA PRADESH

ANDHRA PRADESH MEDICAL SERVICES & INFRASTRUCTURE DEVELOPMENT CORPORATION (APMSIDC)

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Tender Notice No. 7.4B/APMSIDC/2025-26, Dt: 27.09.2025.

1. Bids are invited on the e-procurement platform for certain medical equipment as described in the Section V- Schedule of Requirements from the eligible manufacturers/Authorized Distributors. The details of bidding conditions and other terms can be downloaded from the electronic procurement platform of Government of Andhra Pradesh i.e. https://tender.apeprocurement.gov.in.

2. Bidders would be required to register on the e-Procurement market place "www.eprocurement.gov.in" and submit their bids online. On registration with the e-Procurement market place they will be provided with a user id and password by the system through which they can submit their bids online.

3. The bidders need to scan and upload the required documents as per the Check list given in **Annexure XIV**. Such uploaded documents pertaining to technical bid need to be attached to the tender while submitting the bids on line. The attested copies of all these uploaded documents of technical bid, signed undertaking of tenderer should be submitted off line to Managing Director, APMSIDC, Mangalagiri, Guntur on or before the next day of the last date of submission of bids. The Corporation will consider only the bids submitted through on-line over the copies of the paper based bids.

4. a) The participating bidder/s will have to pay tender processing fee (non-refundable) for the amounts specified in the Schedule of Requirements (Section –V), in the form of online only.

   b) Further the bidder/s shall furnish, as part of it bid, the Bid security for the amounts specified in the Schedule of Requirements (Section –V) to be paid in the form of crossed Demand Draft drawn in favour of Managing Director, APMSIDC, Guntur along with bids. The bidders should note that the local MSME units are exempted from payment of E.M.D, subject to the production of necessary documentation to that extent by them.

   c) In place of Bid Security, the bidders (MSMEs/SSIs/EM-II units) shall furnish a bid security declaration accepting that, if the bid is withdrawn or modified during the bid validity period or if the successful bidder fails to sign the contract upon awarding or fails to submit the required Performance Security on or before the deadline date, such bidders will be suspended for a period of 3-years from doing business in the State of Andhra Pradesh or elsewhere in the country

d) This incentive is subject to production of MSME/SSI/EM-II certificate issued by the relevant competent authority. **For Traders EMD exemption is not applicable.**

e) Further all the participating bidders have to electronically pay a non-refundable transaction fee to M/s. APTS, the service provider through "Payment Gateway Service on E-Procurement platform", as per the Government Orders placed on the e-procurement website.

f) The Corporation shall not hold any risk on account of postal delay. Similarly, if any of the certificates, documents, etc., furnished by the tenderer are found to be false / fabricated / bogus, the bidder will be disqualified, **blacklisted for a period of 3 years**, action will be initiated as deemed fit and the EMD will be forfeited.

g) "Complaint/s: Any complaints/representation regarding tender will be entertained only after depositing of Rs. 25,000/- in form of Demand Draft in the name of Managing director, APMSIDC, Mangalagiri, Guntur. Subsequently necessary action will be taken by the Managing Director and decision of Managing Director will be binding upon the complainant. If the complaint turns out to the false or invalid the amount will be forfeited. The amount shall be refunded if after scrutiny the complaint is found to be true. No further complaint/representation from the same complainant for the same tender will be entertained. If the complaint or allegation made is found to be false or baseless and without any valid point, the tender inviting authority in its discretion, can prevent / blacklist / declare ineligible, such bidder from participating in its procurement process, either indefinitely or for a stated period of time."

5. **Period of Delivery: 60** Days from the date of receipt of the Notification of Award (Purchase Order) of Contract. The delivery terms include the total time given for supply, installation, testing and training of staff.

Time Limits prescribed

Sl. No	Activity	Time Limit
5.1.1.	Installation & Delivery period	60 Days from the date of receipt of the Notification of Award (Purchase Order) of Contract
5.1.2.	Comprehensive warranty period	as specified at section V schedule of requirements against each equipment.
5.1.3.	Frequency of visits to all User Institution concerned during Warranty	One visits every three months (4 visits in a year) for periodic/preventive maintenance and any time for attending repairs/break down calls.

5.1.4	Submission of Performance Security and entering into contract	15 days from the date of issuance of Supply Order
5.1.5	Payment Installments of Price of equipments and ratio	Three Installments and in the ratio 90:10
5.1.6	Time for making payments by Tender Inviting Authority	Within 60 days from the date of submission of proper documents
5.1.7.	Maximum time to attend any Repair call	*Within 48 hours*
5.1.8	Uptime in a year	*95%*

6. Bidders eligibility and qualifications: Defined at Clause 13 of Instructions to Bidders (Section II) and Qualification Criteria (Section-VI)

7. Details of Tender Process:

1.	Downloading of documents	from 27-11-2025 to 11-12-2025 up to 02.55 P.M
2.	Queries up to	01-12-2025 @ 11.00 A.M
3.	Due date for Receipt of tenders	11-12-2025 up to 03.00 P.M
4.	Time and date of opening of technical Bids	11-12-2025 @ 03.01 P.M
5.	Time and date of opening of financial bids	Will be intimated later

Note: The dates stipulated above are firm and under no circumstances they will be relaxed unless otherwise extended by an official notification or happen to be Public Holidays. For the assistance in the online submission issues, the bidder may contact the help desk of M/s Vupadhi Techno Services Pvt. Ltd. (e-procurement) at their e-mail address: eprocsupport@vupadhi.com or on the mobile nos. **8645-246370 / 71 / 72 / 73 / 74**

8. Procedure for Bid Submission

a. The Tenderers/Bidders who are desirous of participating in e-procurement shall submit their technical bids, price bids etc., in the Standard formats prescribed in the Tender documents, displayed at e-procurement market place.

b. The bidders shall sign on all the statements, documents, certificates, uploaded by them, owning responsibility for their correctness / authenticity.

c. The hard copies of all the uploaded Technical / Price bid, to be attested by a Gazetted Officer or properly notarized.

d. The Corporation shall not hold any risk on account of postal delay. Similarly, if any of the certificates, documents, etc., furnished by the tenderer are found to be false / fabricated / bogus, the bidder will be disqualified, **blacklisted for a period of 3 years**, action will be initiated as deemed fit and the EMD will be forfeited.

e. The Corporation will not hold any risk and responsibility for the loss in transit during uploading of the scanned document, for the invisibility of the scanned document online, and any other problem(s) encountered by the Tenderers while submitting his bids online.

9. Important Instructions to the Bidders:

9.1 Quality of Supplied Equipment throughout its life cycle period, timely supplies and prompt maintenance support during the warranty and CMC period without default are being given paramount importance by the Corporation. The Corporation will be dealing with the defaulters with firm hand, which may lead to blacklisting for a specified period in addition to levying penalties.

9.2 In case of complaints on the quality and poor maintenance support of the products supplied, bills will be withheld till receipt of Satisfactory reports. Further:

- If one item of any Supplier is found of 'Sub-Standard Quality' during the Contract period, then that particular item will be blacklisted for a period of (3) three years immediately succeeding the Contract year
- If two items of any Supplier are found of 'Sub-standard Quality' during the Contract period, then Supplier will be blacklisted for a period of (3) three years immediately succeeding the Contract year

9.3 The Corporation will blacklist the Supplier, who is declared as 'Undependable for two (2) items or in two (2) instances during the Contract period, for a period of one year immediately succeeding the Contract year apart from taking other penal actions under the Contract.

9.4 The decision of the Managing Director, APMSIDC, or any officer authorized by him in respect of the quality of the supplied Equipment and other goods etc., shall be final and binding.

9.5 No claims shall be allowed against the APMSIDC in respect of interest on Earnest Money Deposit or on Security Deposit or late payments.

9.6 Savings Clause: No suit, prosecution or any legal proceedings shall lie against APMSIDC or any person for anything, which is done in good faith or intended to be done in pursuance of bid.

SECTION - II : INSTRUCTIONS TO BIDDERS

TABLE OF CLAUSES

17	Format & signing of Bid Bids.	33.	Notification of award
		34	Signing of contract
		35.	Performance security.
		36.	Fraud and Corruption

A. Introduction

1. Source of funds:

The funds are made available by the State Government of Andhra Pradesh, to the Managing Director, APMSIDC Scheme wise towards the procurement processed under this tender notification.

2**. Eligible Bidder**

2.1 This invitation for Bids is open to all Manufacturers or their authorized distributors, who fulfill the eligibility criteria mentioned in the Clause 13 and who meet qualification criteria mentioned in the Section VI.

3 Eligible Goods and services

3.1 All goods and ancillary services to be supplied under the contract shall have their origin in eligible source country. The goods shall meet the requirements as specified in the Technical Specifications. And meet the eligibility criteria as given at Clause 14 of ITB.

3.2. For purpose of this clause, "origin" means the place where the goods are mined, grown, or produced or from which the ancillary services are supplied. Goods are produced, through manufacturing processing or substantial and major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.

3.3 The origin of goods and services is distinct from the nationality of the Bidder.

4. Cost of bidding.

4.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and the Managing Director, APMSIDC, Mangalagiri, Guntur here in after referred to as " the purchaser", will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

B. The Bidding Documents

5. Content of Bidding Documents

5.1 In addition to the Invitation for Bids, the bidding documents include:

(a) Instruction to Bidders;
(b) General conditions of contract;
(c) Special conditions of contract;
(d) Schedule of requirements;
(e) Technical specifications;
(f) Bid form and price schedules;
(g) Bid security form;
(h) Performance security form.
(i) Firm Registration/manufacturer license
(j) Performance statement form.
(k) Declaration Form
(l) Check List of the documents uploaded on e-platform as part of the bid

5.2 The bidder is expected to examine all instructions, forms, terms and specifications in the bidding documents. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding documents in every respect will be at the bidders risk and may result in rejection of its bid.

6. Clarification of bidding documents

6.1 A prospective Bidder requiring any clarification of the bidding documents may notify the purchaser in writing at the purchasers mailing address indicated in the Invitation for bids. The purchaser will respond in writing to any request for clarification of the Bidding documents if the same is received in the first week of the tender notice prescribed by the purchaser. Written copies of the purchaser's response (including an explanation of the query but without identifying the source or inquiry) will be sent to all prospective bidders which have received the bidding documents.

7. Amendment of bidding documents

7.1 At any time prior to the deadline for submission of bids, the purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by prospective bidder, modify the bidding documents by amendment.

7.2 The amendment will be notified online.

7.3 In order to afford prospective Bidders reasonable time in which to take the amendment into account in preparing their bid, the purchaser may, at its discretion, extend the deadline for the submission of bids.

C. Preparation of Bids

8. Language of Bid.

8.1. The Bid prepared by the Bidder and all correspondence and documents relating to the bid exchanged by the bidder and the purchaser, shall be written in the English language, provided that any printed literature furnished by the Bidder may be written in another language so long as accompanied by an English translation of its pertinent passages in which case, for purposes of interpretation of the bid, the English translation shall govern.

9. Documents comprising the bid

9.1 The bid prepared by the bidder shall comprise the following components:

1. Technical Bid:

(a) A Bid form completed in accordance with clause 10

(b) Documentary evidence established in accordance with clause 13 that the bidder is eligible to bid and is qualified to perform the contract if its bid is accepted.

(c) Documentary evidence established in accordance with clause 14 that the goods and ancillary services to be supplied by the Bidder are eligible goods and services confirm to the Bidding Documents; and

(d) Bid security furnished in accordance with clause 15.

2. The Price Bid completed in accordance with clauses 11 and 12.

10. Bid Form

10.1 The Bidder shall complete the bid form provided in the Bidding documents, indicating for the goods to be supplied, brief description of the goods, their country of origin and quantity and other declaration statements.

11. Bid prices.

11.1 The Bidder shall indicate on the appropriate price schedule, made available in the e-procurement platform and a model format is also attached to these documents, the unit prices and total bid prices of the goods it proposes to supply under the contract, for each item separately. The unit prices shall be rounded off to nearest Indian rupee. The bidder may quote one or more items for which copy of necessary documents, wherever necessary have to be produced along with the bid.

11.2. Prices indicated on the price schedule shall be entered separately in the following manner:

(i) The price of the goods, quoted ex-factory, ex-showroom, ex-warehouse, or off-the-shelf, or delivered, as applicable, including all duties and sales and other taxes including transportation, installation, commissioning at site and all incidental charges associated with the contract.

(ii) Cost of 4 years Comprehensive Maintenance Contract as defined in the Clause 18 of the Special Conditions of the Contract.

11.3 The Bidder's separation of the price components in accordance with para 11.2 above will be solely for the purpose of facilitating the comparison of bids by the purchaser and will not in any way limit the purchaser's right to contract on any of the terms offered.

11.4 Fixed Price. Price quoted by the Bidder shall be fixed during the Bidder's performance of the contract and not subject to variation except for any changes made by the Statute in respect of local taxes. A bid submitted with an adjustable price quotation will be treated as non-responsive and rejected, pursuant to clause 24.

12. Bid currencies.

12.1 Prices shall be quoted in Indian Rupees; Bids quoted other than Indian currency will be rejected.

13. Documents Establishing Bidder's Eligibility and Qualifications.

13.1 Pursuant to clause 9, the bidder shall furnish, as part of its bid, documents establishing the bidder’s eligibility to bid and its qualifications to perform the contract if its bid is accepted

13.2 The documentary evidence of the Bidder's eligibility to bid shall establish to the purchaser’s satisfaction that the bidder, at the time of submission of the bid, is an eligible bidder as defined under clause 2.

13.3 The documentary evidence of the Bidders qualifications to perform the contract if its bid is accepted, shall establish to the purchaser satisfaction;

(a) That, in the case of bidder offering to supply goods under the contract which the bidder is manufacture produce, Firm Registration/manufacturer license that the

bidder is manufacturer & also Memorandum of Articles. or otherwise produce, the bidder has been duly authorized (as per authorization form in section XII a).

(b) that, in the case of bidder offering to supply goods under the contract which the bidder did not manufacture or otherwise produce, the bidder has been duly authorized (as per authorization form in section XII b) by the goods manufacturer or producer to supply the goods in India.

(i) the legal status, place of registration and principle place of business of the company or firm or partnership etc.
(ii) Details of experience and past performance of the bidder on specified item offered in the bid within the past three years and details of current contracts in hand and other commitments (suggested proforma given in section XI);
(iii) Copy of the GST Certificate and Details of IT Returns- PAN & TIN copies
(iv) The details in compliance to the Qualification Criteria (Section VI).

13.4 The check list for the details of documents to be submitted is given at Annexure XIV

14. Documents Establishing Goods Eligibility and conformity to bidding documents.

14.1 Pursuant to clause 9 the bidder shall furnish, as part of its bid, documents establishing the eligibility and conformity to the bidding document of all goods and services which the bidder proposes to supply under the contract.

14.2 The documentary evidence of the goods and services eligibility shall consist and of statement in the price schedule on the country of origin of the goods and services offered which shall be confirmed by a certificate of origin at the time of shipment.

14.3 The documentary evidence of the goods and services conformity to the bidding documents may be in the form of literature, drawings and data, and shall furnish:

(a) A detailed description of the goods essential technical and performance characteristics of the goods.
(b) A clause by clause commentary on the purchaser technical specifications demonstrating the goods and services substantial responsiveness to those specifications or statement of deviations and exceptions of the Technical specifications.

14.4 For purpose of the commentary to be furnished pursuant to clause 14.3 above, the bidder shall note that standards for workmanship, material and goods, and references to brand names or catalogue numbers designated by the purchaser in its technical specifications are intended to be descriptive only and not restrictive. The bidder may substitute alternative standards, brand name and / or catalogue numbers in its bid, provided that it demonstrates to the purchasers satisfaction that the substitutes are substantially equivalent or superior to those designated in the Technical specifications.

15. Bid security

15.1 Pursuant to Clause 9, the Bidder shall furnish, as part of it bid, the Bid security for the amounts specified in the Invitation for Bids (Section -1)

15.2 The bid security is required to protect the purchaser against risk of bidders conduct which would warrant the security forfeiture, pursuant to clause 15.7

15.3 The bid security shall be in Indian Rupees and shall be in online only.

15.4 Any bid not secured in accordance with para 15.1 and 15.3 above will be rejected by the purchaser as non-responsive pursuant to clause 24.

15.5 Unsuccessful Bidder's bid security will be discharged/ returned as promptly as possible but not later than 30 days after the expiration of the period of bid validity prescribed by the purchaser pursuant to clause 16.

15.6 The successful Bidder's bid security will be discharged upon the Bidders executing the contract, pursuant to clause 34 and furnishing the performance security pursuant to clause 35.

15.7 The bid security may be forfeited;

(a) If a Bidder withdraws its bid during the period of bid validity specified by the Bidder on the Bid form; or

(b) In case of successful Bidder, if the Bidder fails;

(i) to sign the contract in accordance with clause 34; or

(ii) to furnish performance security in accordance with clause 35.

(c) If the Bidder does not accept the corrected amount the Bid will be rejected, and the Bid security may be forfeited.

16. Period of validity of Bids.

16.1 Bids shall remain valid for 90 days after the date of bid opening prescribed by the purchaser pursuant to Clause 19.1. A bid valid for shorter period may be rejected by the purchaser as non-responsive.

16.2 In exceptional circumstances, the Purchaser may solicit the Bidders consent to an extension of the period of validity the request and the responses thereto shall be made in writing (or by mail). The bid security provided under clause 15 shall also

be suitably extended. A bidder may refuse the request without forfeiting its bid security.

17. Format and signing of Bid.

17.1 The bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to bind the bidder to the contract. The latter authorization shall be indicated by written power-of-attorney accompanying the bid. All pages of the bid, except for unammended printed literature, shall be initialed by the person or persons signing the bid.

17.2 The bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors and made by the bidder in which case such corrections shall be initialed by the person or persons signing the bid.

D. Submission of Bids

18. Sealing and Marking of bids.

18.1 The bids shall be uploaded (submitted) electronically, as described in the Invitation for Bids (Section –I). The hard copies of the bids in sealed covers must be received by the Purchaser at the address specified above on or before the due date of submission of bids (Section –I).

18.2 The Bids shall be addressed to the purchaser at the following address:

The Managing Director, APMSIDC, 2nd Floor, Plot No:09, survey number: 49, IT Park, Mangalagiri, Guntur District- 522503**.**

18.3 The Bids shall bear the name of the invitation for bids (IFB) and Number and also the words "Do not open before 03.00 P.M Hrs **on 11-12-2025**. The envelopes shall indicate the name and address of the Bidder to enable the bid to be returned unopened in case it declared “late".

18.4 If the envelope is not sealed and marked as required by Para 18.2 and 18.3 above, the purchaser will assume no responsibility for the bids misplacement or premature opening.

19. Deadline, for submission of bids.

19.1 The Bids (both electronic and Hard copies) must be received by the purchaser, no later than the time and date specified in the Invitation for Bids (Section I). In the event of the specified date for the submission of Bids being declared a holiday for the purchaser, the Bids will be received up to the appointed time on the next working day.

19.2 The purchaser may, at its discretion, extend this deadline for submission of bids by amending the bid documents in accordance with clause 7, in which case all rights and obligations of the purchaser and bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

20. Late Bids.

20.1 Any bid received by the purchaser after the deadline for submission of bids prescribed by the purchaser, pursuant to clause 19, will be rejected and/ or returned unopened to the Bidder.

21. Modification and Withdrawal of Bids.

21.1 No bid may be modified subsequent to the deadline for submission of bids.

21.2 No bid may be withdrawn in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid form. Withdrawal of bid during this interval may result in the Bidders forfeiture of its bid security , pursuant to Clause 15.7

E. Bid Opening and Evaluation

22. Opening of Bids by Purchaser

22.1 The Purchaser/or his authorized representative will download the technical bids on **11-12-2025** at 03.01 PM.

22.2 The Financial Bids of the Technically responsive bidder would be downloaded subsequently from the e-platform, once the technical evaluation is completed.

23. Clarification of Bids.

23.1 To assist in the examination, evaluation and comparison of bids the purchaser may at his discretion, ask the Bidder for clarification of his bid. The request for clarification and the response shall be in writing and no change in price or substance of the bid shall be sought, offered or permitted.

24. Technical Evaluation (Preliminary Examination and Pre-Qualification)

24.1 The purchaser will examine the bids to determine whether they are complete, whether required securities have been furnished, whether the documents have been properly signed, and whether the bids are generally in order.

24.2 Prior to the financial evaluation, pursuant to clause 26, the purchaser will determine the responsiveness of each bid to the bidding documents. For purposes of these clauses, a responsive bid is one which conforms to all the terms and conditions of the bidding documents without material deviations. The purchaser's determination of bids responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.

24.3 Further the purchaser will determine to his satisfaction whether the Bidder is qualified to satisfactorily perform the contract. The determination will take into account the Bidder's financial, technical and production capabilities. It will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder pursuant to clause 13 as well as such other information as the purchaser deems necessary and appropriate.

24.4 An affirmative determination will be prerequisite for the opening of the financial bids. A negative determination will result in rejection of the Bidder's bid.

24.5 A bid determined as not substantially responsive will be rejected by the purchaser.

24.6 The Purchaser may waive any minor informality or non-conformity or irregularity in a bid which does not constitute a material deviation, provided such a waiver does not prejudice or affect the relative ranking of any bidder.

24.7 Purchaser and/or Authorized representative of purchaser can do inspection of manufacturing site/Assessment of manufacturing capacity.

24.8 In case of any discrepancy in documents submitted by the vendor purchase can ask to produce the original copy of the same

24.9 The Preliminary Evaluations of the bidders are kept available at APMSIDC website http://apmsidc.ap.nic.in

25. Deleted.

26. Evaluation and comparison of Bids.

26.1 The Purchaser will evaluate and compare bids previously determined to be substantially responsive, pursuant to clause 24 for each schedule separately.

26.2 The purchasers evaluation of a bid will take into account; in addition to the bid price (ex-factory/ex-warehouse/off-the-shelf price of the goods offered from within India, such price to include all costs as well as duties and taxes paid or payable on components and raw material incorporated or to be incorporated in the goods, on the finished goods and cost of incidental services required. The following costs to the extent specified:

a. cost of inland transportation, insurance and other costs within India incidental to the delivery of goods to their final destination;
b. The comprehensive annual maintenance charges (inclusive of four Preventive Maintenance visits and all distress calls in a year and costs of all spares required during the repairs) for a period mentioned against equipment at section V- (Schedule of requirements) subsequent to free guarantee maintenance period mentioned against equipment at section V- (Schedule of requirements).
c. the availability in India (Preferably in Andhra Pradesh) of spare parts and after-sales services for the equipment offered in the bid. To this extent the bidders shall give:

- An undertaking for the uninterrupted supply of adequate spares for at least a period of 7 years shall be furnished.
- An Undertaking Availability/ establishment of after sales service facility at least in (1) region of Andhra Pradesh to ensure uninterrupted after sales service during warranty period shall be confirmed. The details of service facility available / proposed to be set up shall be furnished with their bid.

27. Deleted

28. Contacting the purchaser.

28.1 Subject to clause 23, no Bidder shall contact the purchaser on any matter relating to the bid, from the time of the bid opening to the time, the contract is awarded.

28.2 Any effort by a Bidder to influence the Purchaser in the purchaser's bid evaluation, bid comparison or contract award decisions may result in rejection of the Bidders bid.

F. Award of Contract

29. Post - Qualification

Not Applicable

30. Award Criteria

30.1 Subject to clause 32, the purchaser will award the contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined as the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the contract satisfactorily.

31. Purchaser’s right to vary quantities at Time of Award

31.1 The purchaser reserves the right, at the time of award of contract to increase or decrease to any extent of the quantity of goods and services specified in the schedule of requirements without any change in price or other terms and conditions.

32. Purchaser’s right to accept any Bid and to reject any or all Bids.

32.1 The purchaser reserves the right to accept or reject any bid and to annul the bidding process and reject all bids at any time prior to award of contract, without there by incurring any liabilities to the affected Bidder or Bidders or any obligation to inform the affected Bidder or Bidders of the grounds for the Purchaser's action.

33. Notification of Award.

33.1 Prior to the expiry of the period of the bid validity, the purchaser will notify the successful Bidder in writing by registered letter or cable or telex, duly confirming that the bid has been accepted.

33.2 The notification of award will constitute the formation of the contract.

33.3 Upon the successful Bidder's furnishing of performance security, pursuant to clause 34, the purchaser will promptly notify each unsuccessful Bidder and will discharge their bid security, pursuant to clause 15.

34. Signing of contract

34.1. Within 15 days of receipt of the notification of award the successful Bidder shall sign the contract.

35. Performance security

35.1 Within 15 days of the receipt of notification of award from the purchaser, the successful Bidder shall furnish the performance security in accordance with the conditions of contract, in the performance security form provided in the Bidding documents or another form acceptable to the purchaser and signs the agreement.

35.2 Failure of the successful Bidder to comply with the requirement of clause 34 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security, in which event the purchaser may make the award to the next lowest evaluated bidder or call for new bids.

36 Fraud and corruption

36.1 It is the **purchaser'**s policy that requires that the bidders, suppliers and contractors and their subcontractor observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy, the **purchaser;**

(a) defines, for the purposes of this provision, the terms set forth below as follows:

(i) **"corrupt practice"** is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
(ii) **"fraudulent practice"** is any act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
(iii) **"collusive practice"** is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party;
(iv) **"coercive practice"** is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party;
(v) **"obstructive practice"** is

(aa) deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to materially impede a investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or
(bb) acts intended to materially impede the exercise of the purchaser's inspection and audit rights provided for under sub-clause 36.2 (d) below.

36.2 The purchaser may, without prejudice to other terms of the bidding:

(a) will reject a proposal for award if it determines that the bidder considered for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question;

(b) will cancel the contract if the purchaser determines at any time that the bidder, supplier and contractors and their sub-contractors engaged in corrupt, fraudulent, collusive, or coercive practices.

(c) will sanction a firm or individual, including declaring ineligible, either indefinitely or for a stated period of time, to be awarded a contract if it at any time determines that the firm has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing, a contract; and

(d) will have the right to inspect the accounts and records of the bidders, supplier, and contractors and their subcontractors and to have them audited by auditors appointed by the Purchaser.

SECTION - III: GENERAL CONDITIONS OF CONTRACT

TABLE OF CLAUSES

Section III: General Conditions Of Contract

1. Definitions

1.1 In this contract, the following terms shall be interpreted as indicated;

(a) "The contract" means the agreement entered into between the purchaser and the supplier, as recorded in the contract form signed by the parties, including all the attachments and appendices thereto and all documents incorporated by references therein.

(b) "The Contract Price" means the price payable to the supplier under the contract for the full and proper performance of its contractual obligations.

(c) "The Goods" means all the equipment and / or other materials which the supplier is required to supply to the purchaser under the contract.

(d) "Services" means services ancillary to the supply of the goods, such as transportation, insurance and any other incidental services, such as installation, commissioning, provision of technical assistance, training and other obligations of the supplier covered under the contract.

(e) “An undependable Supplier/s’ under contract means any Supplier who do not accept the purchase order or who delays the supply of required quantities beyond the permitted delays with liquidated damages

(f) "The Purchaser or Corporation" means the APMSIDC, the purchasing agency

(g) "The Supplier" means the individual or firm supplying the goods under this contract.

(h) “The Government” means the Government of Andhra Pradesh or its authorized representatives

(i) “The Project Site”, where applicable means the place or places named in Schedule of Requirements

(j) “The End-User” means the authorized user of the equipment/the Medical Superintendent/Head of the Department of the concerned specialty.

(k) “Day” means calendar day

(l) “Delivery period” means the period applicable up to completion of supply, Installation and testing of the equipment and the training of the staff on the equipment, by the supplier at the Project site and accepted by the Purchaser or its representative

2. Application

2.1. These General conditions shall apply to the extent that they are not superseded by provisions in other parts of the contract.

3. Country of Origin: Deleted.

4. Standards

4.1 The Goods supplied under this contract shall conform to the standards mentioned in the technical specifications and when no applicable standard is mentioned the authoritative standard appropriate to the goods country of origin shall be followed and such standard shall be the latest issued by the concerned institution.

5. Use of contract documents and Information

5.1 The supplier shall not without the purchaser's prior written consent, disclose the contract or any provision thereof or any specification, plan, drawing, pattern, sample or information furnished by or on behalf of the purchaser in connection therewith to any person other than a person employed by the supplier in performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

5.2 The supplier shall not, without the purchasers prior written consent make use of any document or information enumerated in para 5.1 except for purposes of performing the contract.

5.3 Any document other than the contract itself enumerated in para 5.1 shall remain the property of the purchaser and shall be returned (in all copies) to the purchaser on completion of the suppliers performance under the contract if so required by the purchaser.

6. Patent Rights

6.1 The supplier shall indemnify the purchaser against all third party claims of infringement of patent, trademark for industrial design rights arising from use of the goods or any part thereof in India.

7. Performance Security

7.1 Within 15 days after the supplier's receipt of notification of award of the contract, the supplier shall furnish performance security to the purchaser for the amount specified in the special conditions of contract.

7.2 The proceeds of the performance security shall be payable to the purchaser as compensation for any loss resulting from the supplier's failure to complete its obligations under the contract

7.3 The performance security shall be denominated in Indian Rupees and shall be in one of the following forms:

(a) A bank guarantee [in favour of Managing Director, APMSIDC, Guntur] issued by any scheduled commercial bank located in India acceptable to the purchaser and in the form provided in the Bidding documents or in any other form acceptable to the purchaser: or.

(b) A Banker's cheque or Demand Draft in favour of Managing Director, APMSIDC, Guntur.

7.4 Fifty percent (50%) of the performance security will be discharged by the Purchaser and returned to the supplier not later than 60 days following the date of completion of the supplier's performance obligations, including any warranty obligations. The balance 50% of the performance security will be retained towards performance security for the maintenance services to be provided for 4 years after the 3 years warranty period and this 50% will be discharged after completion of performance obligations under maintenance services after 7 years.

7.5 The supplier shall accordingly; either furnishes a fresh bank guarantee for the 50% value or an extension of bank guarantee for 50% of the value covering the 4 years maintenance period after 3 years warranty period. Only after receipt of the above, the 50% of the performance security will be discharged after the warranty period.

8. Inspections and Tests.

8.1 The purchaser or his representatives shall have the right to inspect and / or to test the Goods to confirm their conformity to the contract. The special conditions of contract and / or the Technical specifications shall specify what inspections and tests the purchaser requires and where they are to be conducted. The purchaser shall notify the supplier in writing of the identity of any representatives retained for these purposes.

8.2 The inspections and tests may be conducted in the premises of the supplier or its subcontractor(s) at point of delivery and/or at the goods final destination. Where conducted on the premises of the supplier or its subcontractor(s) all reasonable facilities and assistance including access to drawings and production data shall be furnished to the inspectors at no charge to the purchaser.

8.3 Should any inspected or tested goods fail to conform to the specifications the purchaser may reject them and the supplier shall either replace the rejected goods or make alternatives necessary to meet specifications, requirements free of cost to the purchaser.

8.4 The purchasers right to inspect test and where necessary reject the goods after the goods arrival at site and shall in no way be limited or waived by reason of the goods having previously been inspected, tested and passed by the purchaser or its representative prior to the goods shipment from the country of origin.

8.5 Nothing in clause 8 shall in any way release the supplier from any warranty or other obligations under this contract.

9. Packing

9.1 The supplier shall provide such packing of the goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit and open storage. Packing case size and weights shall take into consideration where appropriated the remoteness of the Goods final destination and the absence of heavy handling facilities at all points in transit.

9.2 The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements, as shall be provided for in the contract and subject to clause 18 and any subsequent instructions ordered by the purchaser.

10. Delivery and Documents

10.1 Delivery of the Goods shall be made by the supplier in accordance with the terms specified by the purchaser in the Notification of Award.

11. Insurance

The goods supplied under the contract shall be fully insured in Indian Rupees against the loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in the manner specified in the special conditions of contract.

12. Transportation

12.1 The supplier is required to deliver the goods to the destinations specified in the contract and the cost thereof shall be included in the contract price.

12.2 The transportation of the Goods after the delivery at the final destination shall be the responsibility of the Purchaser.

13. Incidental services.

13.1 The supplier is required to provide the following services, including additional services, if any, specified in SCC:

(a) Performance of the on-site assembly and start-up of the supplied Goods;

(b) Furnishing of tools required for assembly and maintenance of the supplied Goods;

(c) Furnishing of detailed operations and maintenance manual for each appropriate unit of supplied Goods;

(d) Performance of maintenance and repair of the supplied Goods, for a period of 7 years, provided that this service shall not relieve the Supplier of any warranty obligations under this Contract; and

(e) Training of the users and maintenance personnel, in operation, maintenance and repair of the supplied Goods.

13.2 Prices charged by the Supplier for incidental services, if not included in the contract price of the Goods, shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services.

14. Spare Parts:

14.1 As specified in the special conditions of contract, the supplier may be required to provide the following materials and notifications pertaining to spare parts manufacturer:

(a) Such of spare parts as the purchaser may select to purchase from the supplier providing that this selection shall not relieve the supplier of any warranty obligations under the contract and

(b) In the event of termination of production of the spare parts;

(i) advance notification to the purchaser of the pending terminating in sufficient time to permit the purchaser to procure needed requirements: and

(ii) Following such termination, furnishing at no cost to the purchaser, the blueprints, drawing and specifications of the spare parts, if and when requested.

15. Warranty

15.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract. The supplier further warrants that the goods supplied under this contract shall have no defect arising from design

materials or workmanship (except insofar as the design or material is required by the purchasers specifications) or from any act or omission the supplied goods in conditions obtaining in the country of final destination.

15.2 This warranty shall remain valid for as specified at section V schedule of requirements against each equipment or any portion thereof as the case may be have been delivered at the final destination indicated in the contract, unless specified otherwise in the special conditions of the contract. The warranty period starts from date of commissioning after installation by the firm.

15.3 The purchaser shall promptly notify the supplier in writing of any claims arising under this warranty.

15.4 Upon receipt of such notice, the supplier shall, with all reasonable speed, repair or replace the defective goods or parts thereof without cost to the purchaser other than, where applicable, the cost of inland delivery of the repaired or replaced goods or parts from the port of entry to the final destination.

15.5 If the supplier, having been notified, fails to remedy the defect (s) within a reasonable period, the purchaser may proceed to take such remedial action as may be necessary, at the suppliers risk and expenses and without prejudices to any other right which the purchaser may have against the supplier under the contract.

15.6 Site Visits: The successful tenderer shall visit each User Institution as part of preventive maintenance as per the frequency mentioned under clause 5.1.3 (section-I of IFB) during the warranty period. The tenderer shall attend any number of break down/repair calls as and when informed by the Tender Inviting Authority/User Institution.

15.7 During every visit, a copy of the service report/break down call report, duly signed by the custodian of the equipment/head of the health care institution and stamped shall be forwarded by email/fax/post to the APMSIDC office within 10 days from the due date.

15.8 A warranty certificate (as per format in Annexure III) duly signed and with proper stamp of the institution concerned and also signed by the authorized signatory with the stamp of the successful tenderer shall be submitted to the Tender Inviting Authority for keeping it under safe custody along with the Installation Certificate. A copy of the original warranty papers has to be given to the institution head concerned.

15.9 The tenderer shall submit the activities to be carried out during the preventive maintenance visit as per the format in Annexure IV.

16. Payment

16.1 The method and conditions of payment to be made to supplier under the contract shall be specified in the special conditions

16.2 The Suppliers request (s) for payment shall be made to the purchaser in writing accompanied by an invoice describing as appropriate the goods delivered and the services performed and by shipping document, submitted pursuant to clause 10, and upon fulfillment of other obligations stipulated in the contract.

16.3 Payments shall be made promptly by the purchaser within sixty (60) days of submission of the invoices / claims by the supplier duly furnishing the certificate specified in the bid document from the competent authority.

16.4 Payment shall be made in Indian Rupees.

17. Prices

17.1 Prices charged by the supplier for goods delivered and services performed under the contract shall not with the exception of any price adjustments authorized by the special conditions of contract, vary from the prices quoted by the supplier in its bid.

18. Change Orders

18.1 The Purchaser may at any time by written orders given to the supplier pursuant to clause 31 , make changes within the general scope of the contract in any one or more of the following;

(a) drawings, designs or specifications, where goods to be furnishing under the contract are to be specifically manufactured for the purchaser;
(b) the method of shipping or packing;
(c) the place of delivery; or
(d) the services to be provided by the supplier;

18.2 If any such changes causes an increase or decrease in the cost of or the time required for the suppliers performance of any part of the work under the contract, whether changed or not changed by the order, an equitable adjustment shall be made in the contract price or delivery schedule or both and the contract shall accordingly be amended. Any claims by the supplier for adjustment under this clause must be asserted within thirty (30) days from the date of the suppliers receipt of the purchasers change order.

19. Contract Amendments

19.1 Subject to clause 18, no variation in an modification of the terms of the contract shall be made except by written amendment signed by the parties.

20. Assignment

19.2 The supplier shall not assign in whole or in part, its obligations to perform under the contract, except with the purchasers prior written consent.

21. Sub-contracts

21.1 The supplier shall notify the purchaser in writing of all subcontracts awarded under the contract if not already specified in his bid. Such notification, in his original bid or later, shall not relieve the supplier from any liability or obligation under the contract.

22. Delays in the suppliers performance

22.1 Delivery of the goods and performance of the services shall be made by the supplier in accordance with the time schedule specified by the purchaser in its schedule of requirements.

22.2 Any unexcused delay by the supplier in the performance of its delivery obligations shall render the supplier liable for any or all of the following; i.e. forfeiture of its performance security, imposition of liquidation damages and or termination of the contract for default.

22.3 If at any time during the performance of the contract, the supplier or its subcontractor (s) should encounter performance of the services the supplier shall promptly notify the purchaser in writing of the fact of the delay its likely duration and its causes. As soon as practicable after receipt of the suppliers notice, the purchaser shall evaluate the situation and may at its discretion extend the suppliers time for performance, in which case the extension shall be ratified by the parties by amendment of the contract.

23. Liquidated Damages

23.1 Subject to clause 25, if the supplier fails to deliver any or all of the goods within the time period specified in the contract, the purchaser shall, without prejudice to its other remedies under the contract, deduct from the contract price as liquidated damages, an amount as specified in the SCC for the period of delay, until actual delivery or performance, up to a maximum deduction of **10 percent of the total contract value**. Once the maximum is reached, the purchaser may consider termination of the contract.

24. Termination for Default

24.1 The purchaser may, without prejudice to any other remedy for breach of contract by written notice of default sent to the supplier, terminate the contract in whole or part:

(a) if the supplier fails to deliver any or all of the goods within the time periods specified in the contract or any extension thereof granted by the purchaser pursuant to clause 22; or
(b) if the supplier fails to perform any other obligations under the contract.

24.2 In the event the purchaser terminates the contract in whole or in part, 24.1 the purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods similar to those undelivered, and the supplier shall be liable to the purchaser for any excess costs for such similar Goods. However, the supplier shall continue the performance of the contract to the extent not terminated.

25. Force Majeure

25.1 Notwithstanding the provisions of clauses 22,23,24, the supplier shall not be liable for forfeiture of its performance security liquidated damages or termination or default, if and to the extent that, its delay in performance or other failure to perform its obligations under the contract is the result of an event of Force Majeure.

25.2 For purposes of this clause "Force Majeure" means an event beyond the control of the supplier and not involving the suppliers fault or negligence and not foreseeable. Such events may include but are not limited to, acts of the purchaser either in its sovereign or contractual capacity, wars or revolutions, floods, epidemics, quarantine restrictions and freight embargoes.

25.3 If a force majeure situation arises, the supplier shall promptly notify the purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the purchaser in writing the supplier shall continue to perform its obligations under the contract as far as is reasonably practical and shall seek all reasonable alternative means for performance not prevented by the force majeure event.

26. Termination for Insolvency.

26.1 The purchaser may at any time terminate the contract by giving written notice to the supplier, if the supplier becomes bankrupt or otherwise insolvent, provided that such termination will not prejudice or affect any right of action or remedy which has accrued or will accrue thereafter to the purchaser.

27. Termination for convenience.

27.1 The purchaser may by written notice sent to the supplier terminate the contract, in whole or in part at any time for its convenience. The notice of termination shall specify that termination is for the purchasers convenience the extent to which

performance of work under the contract is terminated and the date upon which such termination becomes effective.

27.2 The goods that are complete and ready for shipment within 30 days after the suppliers receipt for notice of termination shall be purchased by the purchaser and the contract terms and prices. For the remaining goods the purchaser may elect.
(a) to have completed and delivered at the contract terms and prices; and / or
(b) to cancel the remainder and pay to the supplier and agreed amount for partially completed goods and for materials and parts previously procured by the supplier.

28. Resolution of Disputes

28.1 The purchaser and the supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the contract.

28.2 If after thirty (30) days from the commencement of such informal negotiations the purchaser and the supplier have been unable to resolve amicably contract dispute, either party may require that the dispute be referred for resolution to the formal mechanisms specified in the special conditions of contract. These mechanisms may include but are not limited to conciliation, mediation by third party justification in an agreed national or international forum and / or international arbitration. The mechanism shall be specified in the special conditions of contract.

29. Governing Language

29.1 The contract shall be written in English language, as specified by the purchaser in the instructions to bidders. Subject to clause 30, English language version of the contract shall govern

30. **Applicable law**

30.1 The contract shall be interpreted in accordance with the laws of the union of India and the legal jurisdiction is Hyderabad

31. Notices

31.1 Any notices given by one party to the other pursuant to the contract shall be sent in writing and confirmed in writing to the address specified for that purpose in the special conditions of the contract. A notice shall be effective when delivered or on the notices effective date, whichever is later.

32. Taxes and duties

32.1 The rates quoted by the bidder shall be deemed to be inclusive of the sales and other taxes that the bidder will have to pay for the performance of this contract, at the prevailing rates notified by the Government. The purchaser will perform such duties in regard to the deduction of such taxes at source as per applicable law.

SECTION - IV: SPECIAL CONDITIONS OF CONTRACT

TABLE OF CLAUSES

(The corresponding clause number of the General condition is in parenthesis)

Section IV: Special Conditions of the Contract

1. The following special conditions of contract shall supplement the general Conditions of contract. Whenever there is conflict, the provisions herein shall prevail over those of the general conditions of contract the corresponding clause number of the general conditions in parentheses.

2. Definitions (Clause I)

(a) The Purchaser is : The Managing Director, APMSIDC, Mangalagiri, Guntur.

(b) The Supplier is : ----------

3. Country of origin (Clause 3): All goods and related services to be supplied under the contract / agreement shall have their origin in India or any other country with which India has not banned trade relations.

4. Performance security (Clause 7)

4.1 Performance security is 5% of the contract value and shall be valid up to 60 days after the date of completion of performance obligations including warrant obligations, as applicable.

4.2 Add clause 7.5 to the GCC as the following:

In the event of any contract amendment, the supplier shall within 7 days of receipt of such amendment furnish the amendment to the performance security rendering the same valid for the duration of the contract, as amended for further period of 60 days thereafter

5. Inspection and Tests (clause 8)

The following inspection procedures and tests are required by the Purchaser:

5.1 The Supplier shall get each equipment inspected by a competent authority in manufacturer's works and also provide a guarantee/warranty certificate that the instrument conforms to all specifications contained in the contract.

5.2 The *Purchaser* or its representative may inspect and/or test any or all the equipment to confirm their conformity to the Contract specifications, prior to dispatch from the manufacturer’s premises. Such inspection and clearance will not prejudice the right of the consignee to inspect and test the equipment on receipt at destination.

5.3 However, on arrival of the equipments at destinations, the purchaser or its representative shall have the right to inspect and/or test any or all the equipments to confirm their conformity to the contract.

5.4 If the equipment or its performance is not as per specified conditions, deficiency or replace the equipment (s) to the satisfaction of the purchaser's representative.

6. Packing (Clause 9)

The Supplier will be required to mark separate packages for each consignee on three sides with proper paint/indelible ink, the following: i. Name of the contract, ii. Contract No., iii. Country of origin of Goods, iv. Supplier's Name and v. Packing of list reference number

7. Delivery and Documents (Clause 10)

(i) Three copies of the Supplier invoice showing Goods description, quantity, unit price, total amount;
(ii) Railway receipt/acknowledgement of receipt of goods from the Consignee
(iii) Manufacture's/Supplier's Warranty and Factory Test certificate;
(iv) Acceptance Certificate issued by the End-User
(v) Inspection Certificate issued by the nominated inspection agency, as applicable

8. Insurance (Clause 11)

i) **For delivery of goods at site, the insurance shall be obtained by the Supplier at his cost for an amount equal to 110% of the value of the goods from "warehouse to warehouse" on "All Risks" basis including war Risks and Strike clauses period in the name of consignee authorized by the purchaser i.e. M.D. APMSIDC. The supplier shall also provide insurance coverage against fire and theft in the name of consignee upto end of the warranty period.**

ii) To submit a copy of insurance document duly attested by the consignee to APMSIDC along with bills for making payment. Otherwise the bills may not be processed.

9. Incidental Services (Clause 13)

No additional services are required to be provided over the services already covered under clause 13 of GCC.

10. Spare parts: (Clause 14)

Add as clause 14.2 to the GCC the following:

Supplier shall carry sufficient inventories to assure ex stock supply of consumables spares such as gaskets, plugs, washers, belts etc., other spare parts and components shall be promptly as possible but, in any case, within (3) days of placement of order.

11. Warranty (Clause 15)

11.1 In partial modification of the provisions, the warranty period shall be as specified at section V schedule of requirements against each equipment, or any portion thereof, as the case may be, have been delivered at site, installed, commissioned, successfully tested and accepted by the Purchaser or its authorized representative

11.2 Substitute Clause 15.4 of the GCC with the following:

Upon receipt of such notice, the Supplier shall within 3 days, repair or replace the defective goods or parts thereof, free of cost at the ultimate destination. The Supplier shall take over the replaced parts/goods at the time of their replacement.

11.3 If the supplier has not done repair/replacement within the time specified above the purchaser will assess the cost of having the repairs/replacements done and the supplier will pay this amount.

11.4 Overall an uptime guarantees of 95% shall be maintained out of total usage period of the equipment by the end users during the warranty period

11.5 All software updates, if any required, should be provided free of cost during Warranty period.

11.6 No conditional warranty like mishandling, manufacturing defects, etc. will be acceptable.

11.7 **Warranty as well as Comprehensive Maintenance contract** will be inclusive of all accessories and Turnkey work, and it will also cover the following wherever applicable:-

- Any kind of motor.
- Plastic & Glass Parts against any manufacturing defects.
- All kind of sensors.
- All kind of coils, probes and transducers.
- Printers and imagers including laser and thermal printers with all parts.
- UPS including the replacement of batteries.
- Air-conditioners, All kinds of painting, civil, HVAC and electrical work

12 Payment (Clause 16)

12.1 Payment for goods and services shall be made in Indian Rupees as follows:

a) 60% of the contract value of the supply part after necessary deduction will be paid to the supplier on submission of copy of invoice with original Delivery Challan as proof of supply to destinations duly certified by the Head of the Institution and RTGS details

b) 30% of payment will be paid on submission of original invoice with stock entries, delivery challan and Installation Certificates (Annexure 1), warranty certificate (Annexure III), copy of insurance document duly attested by the consignee to APMSIDC, calibration, quality assurance certificate test certificate if required as per technical specification after completion of all the performance obligations.

c) The balance 10% will be paid after three months from the date of installation on submission of performance satisfactory report (Annexure-ll), obtained from the Head of the institute or concerned authorities.

d) In case any difficulty is experienced by the successful tenderer in obtaining three-month performance certificate from any of the User Institution after the installation of the equipment, the same shall be brought to the notice of the Tender Inviting Authority immediately in writing. In such event(s), if the Tender Inviting Authority is convinced, the reasons are beyond the control of the successful tenderer, the Tender Inviting Authority, in case of supply orders placed by it, shall release payments at its discretion. In such case the letter sent to the Tender Inviting Authority shall be submitted along with the invoices while claiming payment.

12.2 If there is a delay in installation of the equipment due to reasons not attributable to the supplier such as non readiness of site, 60% of the supply part of the contract value will be released against supply and a confirmation letter from the consignee / end user, on submission of original delivery challan & Invoice copy.

12.3 Cost of Comprehensive Maintenance Contract for each year will be paid, at the end of each year by the Purchaser's representatives/hospital authorities, upon submission of the service reports to the extent of the service delivered as per the contract terms.

13. Prices (Clause 17)

Prices payable to the Supplier as stated in the Contract shall not be subject to adjustment during performance of the Contract.

14 Sub-contracts (Clause 21)

Add at the end of sub-clause 21.1 of the GCC the following. "Sub-contract shall be only for bought-out items and sub-assemblies".

15 Liquidated Damages (Clause 23)

15.1 <u>For delays</u>

Substitute Clause 23.1 of the GCC by the following:

Subject to clause 25 of GCC, the Purchaser shall, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated

damages, a sum equivalent to 0.5 percent of the delivered price of the delayed Goods or unperformed Services for each week of delay or part thereof until actual delivery or performance, up to a maximum deduction of **10% of the total Contract value**. Once the maximum deduction is reached, the Purchaser may consider termination of the Contract.

15.2 For Short fall in Equipment Maintenance services

Any major repair intimated by the *Purchaser or the end-user* shall be rectified by the Supplier from the date of intimation within a period of 3 calendar days and repair the equipment to the satisfaction of the Purchaser or the End User. Failing which the Purchaser has a right to levy a penalty on the Supplier a sum of Rs.10,000/- per day of delay, until the equipment is repaired and brought to the normal working condition to the satisfaction of the Purchaser.

16 **Resolution of Disputes (Clause 28)**

Add as Clauses 28.3 and 28.4 of the GCC the following:

28.3 The dispute resolution mechanism to be applied pursuant to clause 28 of the General Conditions shall be as follows:

(a) In the case of dispute or difference arising between the Purchaser and a Domestic Supplier relating to any matter arising out of or connected with this agreement, such dispute or difference shall be referred to the award of two Arbitrators, one Arbitrator to be nominated by the Purchaser and the other to be nominated by the Supplier or in the case of the said Arbitrators not agreeing, then at the award of an Umpire to be appointed by the Arbitrators in writing before proceeding with the reference, and in case the Arbitrators cannot agree to the Umpire, he may be nominated by the Arbitration committee of the Indian Council of Arbitration, India. The award of the Arbitrators, and in the event of their not agreeing, of the Umpire appointed by them or by the Arbitration Council of India, India, shall be final and binding on the parties.

(b) The Indian Arbitration Act 1996, the rules thereunder and any statutory modification or re-enactments thereof, shall apply to the arbitration proceedings.

28.4 The venue of arbitration shall be the place from where the Contract is issued.

17 Notices (Clause 31)

For the purpose of all notices, the following shall be the address of the purchaser and supplier.

Purchaser: The Managing Director, APMSIDC, 2nd Floor, Plot No:09, survey number: 49, IT Park, Mangalagiri, Guntur District- 522503

Supplier: (To be filled in at the time of Contract Signature)

18 Comprehensive Maintenance Contract (CMC)

a) The Comprehensive Maintenance Contract includes 4 visits in a year preventive maintenance visits and all the distress calls during the year and also include the probable cost of spares required towards the repairs carried out to bring a not working equipment to its normal working condition, during the year.

b) The supplier shall under take at least one half-yearly preventive maintenance visit and attend to all the break down calls during the year. The payment for the maintenance services will be made at the end of each half-year, upon submission of necessary service reports signed by the end-users.

c) The Comprehensive Maintenance Contract agreement will be done by APMSIDC/ Hospital authority/ Any Authorized service provider nominated by Govt AP , as per rates given by the vendor in the tender.

19 Actions Against the Misconduct of the Supplier

19.1 A Supplier found being supplied similar items with similar tender conditions to any other agency in the country during the validity of the contract with the APMSIDC, at a rate lower than the rate at which they supplied under this tender, the difference amount is liable to be recovered apart from blacklisting the firm for a minimum period of 3 years. The Supplier should furnish undertaking (Annexure-XIII) that they will remit the differential cost, if they quote lower rate than the rate quoted to the APMSIDC to any other agency or department or state, during the period of contract.

19.2 Any substandard supplies without meeting the quality specifications made under the contract shall also entail blacklisting of the firm for a minimum period of three years for that particular product.

19.3 If the bidder fails to demonstrate on asked to do so, of the products quoted with their bid, without any valid or convincing reason to the satisfaction of the Purchaser, the bids for other items offered against the bid notice will not be considered and he may be debarred for a certain period as decided by the Purchaser.

20 Progress of Supply

Supplier shall intimate progress of supply, in writing, to the Purchaser as under:

- Qty offered for inspection and date;
- Qty. accepted/rejected by inspecting agency and date;
- Qty. dispatched/delivered to consignees and date;
- Qty. where incidental services have been satisfactorily completed with date;
- Quantity where rectification/repair/replacement effected/completed, on receipt of any communication from consignee/Purchaser with date; Date of completion of entire Contract including incidental services, if any; and Date of receipt of entire payments under the Contract.

21 **Country of origin:** All goods and related services to be supplied under the contract / agreement shall have their origin in India or any other country with which India has not banned trade relations.

As per the restriction under rule 144(xi) of the General Financial Rules (GFR) 2017 - "Any bidder from a country which shares a land border with India will be eligible to bid in any procurement of goods only if the bidder is registered with the competent authority i.e., Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT)".

SECTION V

SCHEDULE OF REQUIREMENTS AND TECHNICAL SPECIFICATIONS

Sl. No	Item Name	Qty	Warranty (in Years)	AMC/CMC (in Years)	EMD (in Rs.)	Average Annual turnover of the Authorized Bidder in the last three years i.e. 2022-23, 2023-24 and 2024-25
1	Ayurveda Pharmacy Equipment	1	3	4 AMC	4,80,000	4,00,00,000
2	Ayurveda DTL Equipment	1	3	4 CMC	12,50,000	10,00,00,000

Processing fee: The participating bidders will have to pay tender processing fee (non-refundable) of **Rs. 29,500/-** in the form of online only.

Note: Bidders who are having any pending court cases / legal disputes against the APMSIDC before any court of law / authority, are not eligible to participate in the tender. In this regard If any ambiguity arises, the decision of tender inviting authority (APMSIDC) is final

All tender unit price will be rounded off to next nearest whole number (if price is Rs. 100.40 it will be 100 Rs. and 100.75 then it will be Rs. 101)

1. **To allow the authorized distributors duly obtaining an agreement/ MOU from the Manufacturer for binding on Post Supply Services i.e. Warranty, CMC, AMC etc., and on agreement executed by the authorized distributor with the Corporation. Further an undertaking from Manufacturer to take responsibility in case of authorized distributor's failure in performing the Contractual Obligations also may be obtained. Proforma will be provided.**
2. EMD shall be furnished in the form of Demand Draft/BG/Online drawn in favour of Managing Director, APMSIDC, Guntur.
3. **All the bidders are requested to quote the total value of each group as a single unit (Total items X Total Quantity = Total Value)**

Note:

1. **All the bidders noted that each grouping items should be quoted individual prices in financial bid of attached document compulsory.**
2. **To allow the authorized distributors duly obtaining an agreement/ MOU from the Manufacturer for binding on Post Supply Services i.e. Warranty, CMC, AMC etc., and on agreement executed by the authorized distributor with the Corporation. Further an undertaking from Manufacturer to take responsibility in case of authorized distributor's failure in performing the Contractual Obligations also may be obtained. Proforma will be provided.**
3. **EMD shall be furnished in the form of Demand Draft/BG/Online drawn in favour of Managing Director, APMSIDC, Guntur.**
4. **2 Years rate contract and expandable up to 1 year with mutual consent.**

Technical Specifications

General Information

1. Bidders are requested to offer the equipment as per the specifications attached.

2. For each item of equipment the bidder should include all the cost associated with fixing, cables, connectors, accessories and ancillary items necessary for the satisfactory operation of that item of equipment. Bidders should make the provisions of starter packs for consumables for demonstration and three months of operation period for the supplied equipment.

3. Spare parts list, listing spare likely to be required for (7) years operations shall be attached with the Bid

4. (i) Bidders are requested to provide, referenced by given equipment code and item name, with their tender offer, the following information for all the items of equipment offered.
   - Name of the Manufacturer
   - Brand Name & Model Number
   - Country of Origin

   (ii) Catalogue, Pamphlet, descriptive literature, spare parts list and technical specifications for each unit of item must be forwarded with the offer.

5. Operating Environment:

   Electrical Supply: The Equipment supplied shall be suitable in all respect for use on the local electricity supply of 200- 270 Volts, 50 Cycles. A suitable stabilizer/CVT to be offered as an optional accessory in case of specific Voltage requirement for the supplied Equipment. Resettable over current breaker shall be fitted for protection wherever applicable.

   Humidity: The unit shall be capable of operating continuously in ambient temperature of 30^0C and relative humidity of around 80%.

7. After Sales Service:

   Bidders are requested to confirm in writing in their bid offer the after sales service they would provide, after the expiry of three-year warranty period, for four more years including an estimated cost an annual servicing contract. The maintenance capability of the bidders currently existing in Hyderabad and Andhra Pradesh should also be clearly stated.

8. All items should be of high quality, durable, and suitable for use in a Hospital. The technical specification and standards of each item delivered shall be that currently in use at the time of delivery.

a) Electrical safety conforms to standards for electrical safety IEC-60601 / IS-13450.
b) Radiation safety: Safety aspects of Radiation dosage leakage should be spelt out and all the X-ray related products should comply with AERB Guidelines for radiation leakage.

10 a) The Manufacturer, must have necessary quality certifications for both processes and products such as ISO 9001 (Quality Management System for Organization) and ISO 13485 (Quality Management System for Medical Devices).

b) Full Quality Assurance System Approval Certificate Management System Certification for Medical Devices and their equivalent International Standards certificates as BIS/Notified body CE/USFDA etc.

11. If the bidder fails to demonstrate any of the products quoted, the bid for that product would be considered as withdrawn and suitable action will be taken as per the Clause 15 of ITB. i.e., forfeiture of the Bid security and also the bidder may be debarred for a certain period as decided by the Managing Director.

Note:

1. **The bidder should submit the details of spares which are covered or not covered under warranty.**
2. **The bidder should also submit the detailed price list for all spares.**

List of items

AYURVEDA PHARMACY EQUIPMENT (Table A: Group1)

S. No.	Category of Medicine	Machinery/Equipment Recommended	Qty
1	Anjana/ Pisti	Mechanised Kalwa Yantras (5 Kalwas Unit)	1
		Kalwa Yantras (Stone)	5
		End Runner	1
		Ball Mill Sieves (L, M & S) Set	5
		Shifter	1
2	Churna/ Nasya/ Manjan/ Lepa/ Kwath / Churna	Grinder	1
		Disintegrator	1
		Pulveriser	1
		Powder Mixer	1
		Sieves (L, M & S) Set	5
		Shifter	1
3	Pills/Vati/ Gutika Matirai and tablets	Ball Mill	1
		Mass Mixer/Powder Mixer	1
		Granulator	1
		Drier	1
		Tablet Compressing Machine	1
		Pill/Vati Cutting Machine	1
		Stainless Steel Trays (L, M & S) Set	10
		Container for Storage (L, M & S) Set	10
		Container for Sugar Coating	5
		Polishing Pan (Sugar-coated Tablets)	5
		Mechanized Chattoo (For mixing Guggulu)	5
4	Kupi pakava/ Ksara/ Parpati/ Lavana Bhasma Satva/	Bhatti	5
		Kadai	5
		Stainless Steel Vessels (L, M & S)	5
		Patila Flask	1
		Multani Matti/Plaster of Paris (50 Kgs)	1

	Sindura Karpu/ Uppu / Param	Copper Rod	5
		Earthern Container	5
		Gaj Put Bhatti	1
		Muffle Furnace (Electrically operated)	1
		End/Edge Runner	1
		Exhaust Fan	1
		Wooden Spatula	5
		Stainless Steel Spatula	5
5	Kajal	Earthern Lamps (for collection of Kajal)	1
		Triple Roller Mill	1
		End runner	1
		Sieves (L, M & S) Set	5
		Stainless Steel Spatula	5
		Exhaust Fan	1
		Ultra Violet Lamps	1
6	Capsules	Air Conditioner	1
		De-humidifier	1
		Hygrometer	1
		Thermometer	1
		Capsule Filling Machine	1
		Chemical Balance	1
7	Ointment/ Marham Pasai	Tube Filling Machine	1
		Crimping Machine	1
		Ointment Mixer	1
		End Runner	1
		Stainless Steel Storage Container	5
		Stainless Steel Patila	5
8	Pak/ Avaleh/ Khand/ Modak/ Lakayam	Bhatti	1
		Iron Kadahi	1
		Stainless Steel Patila	5
		Stainless Steel Storage Container	5

9	Panak, Syrup/ Pravahi Kwath Manapaku	Tincture Press	1
		Exhaust Fan	1
		Bhatti	1
		Bottle Washing Machine	1
		Alchohol Filter Press Machine	1
		Gravity Filter	1
		Liquid Filling Machine	1
		Pilfer Proof Capping Machine	1
10	Asava/Arishta	Tincture Press	1
		Exhaust Fan	1
		Bhatti	1
		Bottle Washing Machine	1
		Gravity Filter	1
		Liquid Filling Machine	1
		Pilfer Proof Capping Machine	1
		Fermentation Tanks	1
		Containers (L)	5
		Distillation Plant	1
		Alcohol Filter Press Machine	1
11	Sura	Tincture Press	1
		Exhaust Fan	1
		Bhatti	1
		Bottle Washing Machine	1
		Gravity Filter	1
		Liquid Filling Machine	1
		Pilfer Proof Capping Machine	1
		Fermentation Tanks	1
		Containers (L)	5
		Distillation Plant	1
		Alchohol Filter Press Machine	1
		Transfer Pump	1
12		Maceration Tank	1

	Ark Tinir	Distillation Plant	1
		Liquid filling tank with tap	1
		Gravity Filter	1
		Alchohol Filter Press Machine	1
		Visual Inspection Box	1
13	Tail/Ghrit Ney	Bhatti	1
		Kadahi	1
		Stainless Steel Patila	5
		Stainless Steel Storage Containers	5
		Filtration Equipment	1
		Filter Tank with tap	1
		Liquid Filling Machine	1
14	Aschyotan/Netra Malham Panir/Karn Bindu/Nasabindu	Hot Air Oven (Electrically heated with thermostatic control)	1
		Electrical Kettle with Mixing arrangements	1
		Collation Mill	1
		Ointment Mill	1
		Tube Filling Machine	1
		Mixing & Storage Tanks (Stainless Steel)	5
		Sintered Glass Funnel	1
		Seitz Filter	1
		Liquid Filling Machine	1
		Autoclave	1

AYURVEDA DTL EQUIPMENT (Table B: Group 2))

AYURVEDA DTL EQUIPMENT INDENT LIST			
S. No.	Section	Equipment Name	Qty
1		Alcohol determination apparatus complete	1

2	Chemistry Section	Volatile oil determination apparatus	1
3		Boiling point determination apparatus	1
4		Melting point determination apparatus	1
5		Refractometer	1
6		Polarimeter	1
7		Viscineter (sowalds, Redwood viscometer)	1
8		Tablet disintegration apparatus	1
9		Moisture determination apparatus (IC filtrator)	1
10		UV Spectro-photometer	1
11		Muffle furnace	1
12		Electric balance	1
13		Hot air oven(s) different range of temperature/vacuum oven	1
14		Refrigerator	1
15		Glass/Steel distillation apparatus	1
16		Water supply demineralized exchange equipment	1
17		Air conditioner for sophisticated equipment	1
18		Gas Cylinder with burners	1
19		Electric Water bath (temperature controlled)	1
20		Heating mantle	1
21		TLC apparatus with all accessories	1
22		Sieve size 10 to 120 with sieve shaker	1
23		Centrifuge machine	1
24		De-humidifier	1
25		Bench Top pH meter	1
26		Limit test apparatus (As Pb, heavy metals)	1
27		Microphotography scope	1
28		(High Profile Thin Layer Chromatography)	1
29		(Computer controlled) with Didavvay detector	1
30		Detector	1
31		Atomic absorption Spectrophotometer	1
32		Tablet Dissolution tester	1
33		Tablet Friability tester	1
34	Pharmacognosy Section	Microscope Binocular (1) Zics.	1
35		Dissecting microscope	1
36		Rotary Microtome	1
37		Chemical balance	1
38		Micro slide cabinet	1
39		Aluminium slide trays	1
40		Hot air oven	1
41		Occular micrometer	1
42		Stage micrometer	1

43		Camera Lucida Prism type and mirror type	1
44		Hotplate (4)	1
45		Refrigerator	1
46		Cylinder with burners	1
47	Microbiology Section	Laminar Air Flow Bench	1
48		BOD Incubator	1
49		Plain Incubator	1
50		Serological Water bath	1
51		Oven	1
52		Autoclave / Sterilizer	1
53		Microscope (High power)	1
54		Colony Counter	1

Note: All the bidders are requested to quote the total value of the Group A items as a single unit (Total items X Total Quantity = Total Value)

Technical Specifications:

PHARMACY SPECIFICATIONS

I) Anjana/Pisti

1. Mechanised Kalwa Yantras (5 Kalwas Unit)
□ Kalwa Yantra Basics**: A Kalwa Yantra (also spelled Khalwa) is a traditional Ayurvedic tool, similar to a mortar and pestle. It's essential for grinding, triturating, and processing herbs and minerals to prepare Ayurvedic medicines. They are used in various processes like Shodhana (purification) and Marana**
□ Material: **Traditionally, Kalwa Yantras are made of stone (like Krishna Stone or granite) or porcelain.**
□ Size and Shape: **They come in various sizes. A standard set often includes a boat-shaped yantra and several cylindrical ones of different diameters. For example, one listing mentions a set of 4 with a 7-inch boat-shaped and 3 cylindrical ones (3, 4, and 5 inches in diameter).**
□ Mechanisation: **The term "mechanised" suggests that this unit would involve some form of automated grinding or processing, likely using electric power. This would offer benefits like increased efficiency and potentially more consistent particle size compared to manual grinding.**
□ 5 Kalwas Unit: **This likely indicates a system with five individual grinding units or bowls, allowing for processing multiple ingredients simultaneously or in sequence.**
□ Contacting Ayurvedic equipment manufacturers or suppliers directly. **They would have detailed information on their mechanised units. You**

might find some through online business directories or by searching for "Ayurvedic equipment suppliers India."
□ Searching for patents or technical papers **related to mechanised Ayurvedic processing equipment.**
□ Reaching out to Ayurvedic research institutions or pharmacies **that might use such equipment and could provide information**

2. Kalwa Yantras (Stone)
Material:
• Stone Type**: Traditionally crafted from high-quality natural stones known for their durability and non-reactive properties. Common types include:**
○ Krishna Stone**: A dense, black stone often preferred for its hardness.**
○ Granite**: Another durable option.**
○ Tamda Stone (Hansraj Stone/Kasauti Stone): **Reputed to preserve the medicinal properties of herbs and maintain an alkaline environment.**
• **Non-reactive Nature: The stone material is chosen to ensure that it does not interfere with the chemical composition or potency of the ingredients being processed.**
Shape and Size:
• Set Configuration**: Often sold as a set comprising:**
○ Boat-shaped Yantra (Khalwa**): Typically one in a set.**
○ Cylindrical Pestles (Musal): **Usually three, varying in diameter to suit different grinding needs.**
• Dimensions (Example Set of 4):
○ Boat-shaped Yantra**: Around 7 inches in length.**
○ Cylindrical Pestles**: Diameters of approximately 3 inches, 4 inches, and 5 inches.**
• Other Sizes: **Individual Kalwas and pestles can also be found in various sizes to accommodate different quantities of materials. For instance, some single Kalwas might have diameters ranging from 4 inches to 12 inches. The pestle length is usually proportionate to the mortar size for effective grinding.**
Features and Utility:
• Manual Operation**: Stone Kalwa Yantras are manually operated, allowing for precise control over the grinding process and the fineness of the powder or paste.**
• Versatility**: Used for a wide range of Ayurvedic preparations, including:**
○ **Grinding herbs into fine powders for internal and external use.**
○ **Triturating and levigating herbo-mineral formulations.**

- **Preparing essential powders and Ayurvedic formulations like Mustakadi Leha.**
- **Processing medicines during Shodhana (purification) and Marana (incineration) procedures.**
- **Making fresh spice mixes, pastes, and chutneys for daily use.**

- Durability**: Made from solid stone, these yantras are robust and designed for long-lasting use.**
- Easy to Clean**: The non-porous surface of the stone (especially polished varieties) makes them relatively easy to clean and prevents staining and odor absorption.**
- Traditional Design**: Their simple, traditional design has been used for centuries in Ayurvedic practices.**

Benefits of using Stone Kalwa Yantras:

- Preserves Potency**: The non-reactive stone helps retain the medicinal and aromatic properties of the herbs.**
- Uniform Grinding**: The shape and the weight of the pestle facilitate even and consistent grinding.**
- No Chemical Leaching**: Unlike some materials, good quality natural stone will not leach harmful chemicals into the medicines. *However, it's important to note that historically, some improperly processed Ayurvedic medicines have been found to contain heavy metals, but this is generally due to the ingredients themselves or improper processing techniques rather than leaching from a well-maintained stone Kalwa.***
- Therapeutic Touch**: The manual grinding process is sometimes considered therapeutic and aligns with the traditional approach to medicine making.**

3. End Runner

An End Runner Mill, also known as an Edge Runner Mill or Chilean Mill, is a grinding machine used to reduce materials to powder. It typically consists of two heavy rollers mounted on a shaft that rotate on a bed stone, grinding the material between them. These mills are often used in pharmaceutical and herbal industries, particularly for tough and fibrous materials.

- **Design:**

The mill features heavy rollers (steel or granite) that rotate on a bed of steel or granite.

- **Material Handling:**

The material to be ground is fed into the center of the pan and is moved outwards by the rollers.

• **Scrapers:**
Scrapers are used to keep the material in the path of the rollers.
• **Grinding Action:**
The grinding process involves both crushing due to the weight of the rollers and friction between the rollers and the bed.
• **Materials:**
Commonly made of stainless steel for the machine frame and body, and steel or granite for the rollers and bed.
• **Dimensions:**
End Runner Mills can have varying dimensions depending on their size and capacity, with some models having dimensions of 2000 x 2100 x 1800 mm (L x W x H).
• **Capacity:**
Capacities can range from 0.3 to 0.5 tons per hour, depending on the specific model and application.
• **Power:**
End Runner Mills typically require a power source, with some models using a 5500 W (or 5.5 kW) motor.
• **Application:**
Primarily used for grinding, refining, and selecting materials in various industries, including pharmaceuticals, herbal products, and others.

4. Ball Mill Sieves (L, M & S) Set
• Mesh Size: **This is the most common way to specify sieves. A higher mesh number indicates smaller openings and thus finer particles will pass through. Common ranges for ball mill applications are typically from around** 18 mesh (coarse, ~1mm) **to** 200 mesh (fine, ~74 microns)**, and even finer for specialized applications.**
• Aperture Size: **This is the actual size of each opening in the sieve, usually expressed in µm (micrometers) or mm (millimeters). This provides a more direct measure of the particle size that will be retained or passed.**

• Frame Material and Diameter: **Sieves have frames (usually stainless steel or brass) of various diameters (e.g., 100 mm, 150 mm, 200 mm, 300 mm, or 8 inches, 12 inches). The diameter needs to be compatible with your sieve shaker or testing setup.**
• Sieve Material: **The mesh itself is usually made of stainless steel wire cloth for durability and resistance to corrosion.**
• Height: **Sieves come in different heights (e.g., full height, half height).**
• Standards: **Sieves are often manufactured to comply with international standards like ISO 3310-1 or ASTM E11, ensuring accuracy and comparability.**
□ Large (L): **Would correspond to coarser sieves with a lower mesh number and larger aperture size, allowing larger particles to pass. This might be used for initial separation or when a relatively coarse final product is desired. Examples could be in the range of 18 mesh to 60 mesh (approximately 1mm to 250 microns).**
□ Medium (M): **Would represent intermediate sieves with a medium mesh number and aperture size, for achieving a medium fineness. This could be in the range of 60 mesh to 120 mesh (approximately 250 microns to 125 microns).**
□ Small (S): **Would indicate finer sieves with a higher mesh number and smaller aperture size, resulting in a very fine powder. This could be in the range of 120 mesh to 200 mesh or even higher (approximately 125 microns and below).**

5. Shifter
1. Sieve Shifter / Vibratory Sifter / Screening Machine: **This is commonly used in various industries (pharmaceutical, food, chemical, etc.) for separating materials based on particle size. If this is what you mean, here are some typical specifications:**
• Type: **Circular, rectangular, gyratory, vibratory, centrifugal, etc.**
• Number of Decks (Screens): **Single deck to multiple decks (e.g., 1 to 5 or more), allowing for multiple size separations in one pass.**
• Screen Diameter/Size: **Ranges from small laboratory units (e.g., 12 inches / 300 mm) to large industrial units (e.g., 72 inches / 1800 mm or more).**

• Mesh Size/Aperture Size: **Specified in terms of mesh number (number of openings per linear inch) or aperture size (in micrometers or millimeters). This determines the particle size separation.**
• Motor Power: **Varies depending on the size and capacity of the shifter (e.g., from fractional HP to several HP).**
• Frequency and Amplitude of Vibration: **Adjustable parameters that affect the screening efficiency and throughput.**
• Material of Construction: **Typically stainless steel (various grades like SS304, SS316L) for contact parts, with options for mild steel for the base.**
• Capacity/Throughput: **Measured in kg/hour or tons/hour, depending on the material being screened and the desired separation.**
• Inlet and Outlet Connections: **Size and type of connections for feeding material into and discharging separated fractions from the shifter.**
• Dust Containment: **Features like enclosed design, dust-tight seals, and connections for dust extraction systems.**
• Cleaning Mechanisms: **Options like ball cleaning, brush cleaning, ultrasonic cleaning to prevent screen blinding.**
• Mobility: **Some units are portable with wheels and locking mechanisms.**
• Compliance: **May need to comply with industry-specific standards (e.g., GMP for pharmaceutical, FDA for food).**
• Weight and Dimensions: **Overall size and weight of the machine.**
• Power Supply: **Voltage and frequency requirements.**
• Noise Level: **Operating noise levels.**
• Control Panel: **Features for controlling operation, adjusting parameters, and safety interlocks.**
2. Gear Shifter (for vehicles or machinery): **If you're referring to a mechanical device used to change gears in a transmission, the specifications would be very different:**

• Type: **Manual (e.g., H-pattern, sequential), automatic (e.g., torque converter, dual-clutch), semi-automatic.**
• Number of Gears: **Forward gears (e.g., 5-speed, 6-speed, 8-speed) and reverse gears.**
• Actuation Force: **The force required to move the shift lever or engage buttons.**
• Travel Distance: **The distance the shift lever or actuator moves.**
• Shift Time: **The time it takes to change gears.**
• Durability: **Number of cycles the shifter can withstand.**
• Material of Construction: **Metals and polymers used in the shifter mechanism.**
• Interface: **How it connects to the transmission (e.g., cables, linkages, electronic signals).**
• Sensor Feedback: **Sensors that provide information about the current gear position.**
• Safety Features: **Interlocks to prevent accidental gear changes.**

II) Churna/Nasya/Manjan/Lepa/Kwath Churna

6. Grinder
Churna/Nasya/Manjan/Lepa/Kwath Churna Grinder," we're likely talking about a grinder used in Ayurvedic medicine preparation for creating fine powders (Churna, Manjan, Nasya) from herbs and other ingredients. While "Lepa" (paste) and "Kwath" (decoction) are different forms, the initial stage often involves grinding ingredients into a powder.
Here are the typical specifications you might look for in such a grinder:
Key Specifications:
• Type of Grinding Mechanism:
○ Hammer Mill: **Uses rotating hammers to impact and shatter the material against a screen. Suitable for a variety of materials, from fibrous to brittle.**

○ Pin Mill: **Employs rotating pins (rotors) that pass between stationary pins (stators) to grind material through impact and attrition. Ideal for medium to fine powders.**
○ Disc Mill: **Uses rotating and stationary abrasive discs to grind material by shear and attrition. Can achieve fine to ultrafine powders.**
○ Roller Mill: **Crushes material between rotating rollers. Suitable for softer materials and can produce consistent particle sizes.**
○ Vibratory Mill: **Uses vibrations and grinding media (like balls or rods) within a chamber to pulverize the material. Can achieve very fine powders.**
• Material of Construction (Contact Parts):
○ Stainless Steel (SS304 or SS316): **Preferred for hygiene, corrosion resistance, and ease of cleaning, especially important for medicinal preparations. SS316 offers superior corrosion resistance.**
○ Food-Grade Materials: **If applicable, ensuring all contact parts are made of materials safe for processing consumables.**
• Grinding Chamber Size/Capacity: **Measured in volume (liters) or the batch size it can handle (in kg per batch). This will determine the quantity of powder you can produce at once.**
• Motor Power: **Specified in horsepower (HP) or kilowatts (kW). Higher power generally allows for faster grinding and handling of tougher materials.**
• Particle Size Output: **This is a crucial specification. The grinder should be capable of producing powders with the desired fineness for Churna (typically fine), Nasya (very fine, easily inhaled), and Manjan (fine to slightly coarse). This is often controlled by:**
○ Screen Size (for Hammer Mills): **The size of the openings in the screen determines the maximum particle size that can pass through.**
○ Rotor Speed and Clearance (for Pin and Disc Mills): **Adjustable parameters that affect the fineness of the powder.**

○ Grinding Media and Vibration Intensity (for Vibratory Mills): **Influence the final particle size.**
• Throughput/Production Rate: **Measured in kg/hour, indicating how much powder the grinder can produce in a given time. This depends on the material being ground and the desired fineness.**
• Feeding Mechanism:
○ Manual Feeding: **Operator manually feeds the material into the hopper.**
○ Automatic Feeding: **May include a hopper with a screw conveyor or vibratory feeder for consistent and controlled material input.**
• Discharge Mechanism:
○ Gravity Discharge: **Powder falls out of the grinding chamber by gravity into a collection container.**
○ Pneumatic Conveying: **Powder is conveyed using air to a collection system.**
• Dust Collection System: **Essential for safety and hygiene, especially when grinding dry powders. May include a cyclone separator, bag filter, or HEPA filter.**
• Safety Features:
○ Emergency Stop Button: **For immediate shutdown in case of issues.**
○ Overload Protection: **To prevent motor damage.**
○ Interlocks: **To ensure the machine cannot operate when access doors are open.**
• Noise Level: **Specified in decibels (dB). Lower noise levels are preferable for operator comfort.**
• Maintenance Requirements: **Ease of cleaning, accessibility of parts for maintenance, and the frequency of required maintenance.**
• Space Requirements/Dimensions: **The physical size of the grinder and any associated equipment (control panel, dust collector).**

• Power Supply: **Voltage and frequency requirements.**
• Control Panel: **May include switches for on/off, speed control (if applicable), and indicators.**
• Compliance: **Certifications like CE or other relevant safety and quality standards.**
• Optional Features:
○ Variable Speed Drive (VFD): **Allows for adjusting the grinding speed for different materials and fineness requirements.**
○ Cooling System: **To prevent overheating of the material during grinding, especially for heat-sensitive herbs.**

7. Disintegrator
• **Disintegrators are machines used to break down materials, often for processing or analysis. Specifics vary depending on the type and application, but common features include a rotating chamber with beaters or blades, a screen for sizing particles, and dust collection systems. Some disintegrators are designed for specific materials like pulp or hard materials, while others are designed for media sanitization.**
○ **Here's a more detailed look at some common disintegrator specifications:**
○ **General Features:**
• Type:
○ **Disintegrators can be crushing/grinding machines, milling machines, or part of a larger system like a pulp disintegrator or a media sanitization system.**
○ Application:
• **They are used for grinding hard materials, processing pulp suspensions, disintegrating solids and liquids, or destroying sensitive media.**
• Capacity:

- **They can handle various weights and throughputs, from small lab samples to large industrial batches.**
- Speed:
- **Many disintegrators operate at high speeds, often in the thousands of RPM, to achieve effective disintegration.**
- Construction:
    - **They may be made of mild steel, stainless steel, or other materials depending on the application and required durability.**
    - Discharge:
- **Discharge can be from the bottom, through a screen, or via other methods depending on the application and desired particle size.**
    - Dust Collection:
    - **Many disintegrators include optional dust collection systems to manage fine particles.**
- CGMP Compliance:
- **Some disintegrators are designed to meet Current Good Manufacturing Practices (CGMP) requirements.**
    - **Specific Examples:**
    - Pulp Disintegrators:
    - **These machines are designed for the standardized disintegration of pulp suspensions according to industry standards like ISO 5263-1 and TAPPI T205. They often have specific features like a motor with a digital display of revolutions and a disintegration pot.**
- Metal Arc Disintegrators:
- **These machines use a spark discharge process to remove material, often used in die-cutting or other precise applications.**
- Media Disintegrators:

These machines are designed for the destruction of sensitive media like HDDs and SSDs, often to meet security standards like DIN 66399 Class 3.
• Disintegrator/Dissolver Mixers:
• **These systems are designed to disintegrate, solubilize, or disperse solids in liquids, often used in laboratory settings or for specific industrial applications.**

8. Pulveriser
Pulverizers are machines that grind materials into powder form. Their specifications vary depending on the type and intended use, but generally include features like motor power, capacity, blade type, and material construction.
Here's a more detailed breakdown of typical pulverizer specifications:
1. Motor Power:
• **Pulverizers can range from 1 HP to 100 HP or higher, depending on the desired grinding capacity and the material being processed.**
• **Higher horsepower motors generally lead to increased production capacity.**
• **Examples: 1 HP, 2 HP, 3 HP, 7.5 HP, 10 HP, 50 HP, 60 HP, 75 HP, 100 HP.**
2. Capacity:
• **This refers to the amount of material the pulverizer can process per hour, typically measured in kilograms (kg) or tons per hour.**
• **Capacity ranges vary widely, from 12-14 kg/hour for smaller machines to 145 tons/hour for industrial-scale pulverizers.**
• **Examples: 12-14 kg/hr, 20-25 kg/hr, 30-50 kg/hr, 50 kg/hr, 9-145 tons/hr.**
3. Blade Type and Material:
• **Pulverizers use blades (or hammers) to crush and grind material.**
• **Blades can be made of stainless steel, mild steel, or aluminum, depending on the material being processed and the desired durability.**
• **Examples: SS (Stainless Steel), MS (Mild Steel), Aluminum.**
4. Chamber Size:

• **This refers to the size of the grinding chamber where the material is processed.**
• **Chamber sizes vary depending on the pulverizer's capacity and intended use.**
• **Examples: 10 x 5 inch, 10 x 4 inch.**
5. Other Important Specifications:
• Power Consumption: **Measured in units per hour (e.g., 0.8 units/hr, 1.8 units/hr) or kWh.**
• Voltage: **Typically 220 V, but can also be 380V for larger industrial machines.**
• Material: **Pulverizer bodies are often made of mild steel or stainless steel for durability.**
• Weight: **Pulverizer weights can range from 50 kg to 146 kg or more, depending on size and capacity.**
• Speed: **Motor speed (RPM) can affect grinding efficiency and particle size.**
• Phase: **Pulverizers can be single-phase or three-phase, depending on the motor and power requirements.**
• Fineness of Pulverized Material: **Some specifications may detail the percentage of material passing through a certain mesh size.**
Examples of Pulverizer Types and Their Uses:
• 2 in 1 Pulverizer: **Used for grinding spices, grains, and other dry materials.**
• MS Pulverizer: **Suitable for grinding a variety of materials, including spices, grains, and some plastics.**
• Impact Pulverizer: **Designed for grinding materials into fine powders.**
• Plastic Pulverizer: **Used for recycling plastic waste.**
• Coal Pulverizer: **Specifically designed to grind coal for combustion in power plants.**

9. Powder Mixer
"Powder Mixer" refers to a machine used to uniformly blend different powdered ingredients, which is a crucial step in creating Churna, Manjan,

and other formulations. Here are the typical specifications you'd look for in a powder mixer for this application:
Key Specifications:
• Type of Mixer:
○ Ribbon Blender: **Consists of a U-shaped trough with inner and outer helical ribbons that move materials in opposite directions, providing efficient blending. Suitable for free-flowing powders.**
○ Paddle Blender: **Uses paddles mounted on a central shaft to create a fluidizing and circulating motion of the powder bed. Good for more cohesive powders and can handle some liquid additions.**
○ V-Blender (Twin Shell Blender): **Two cylindrical or conical shells joined in a V-shape rotate, causing the powder to tumble and intermix. Gentle blending action, suitable for fragile materials.**
○ Bin Blender (IBC Blender): **Blending occurs within a portable Intermediate Bulk Container (IBC) that is rotated. Offers good containment and is suitable for batch processing.**
○ Planetary Mixer: **Uses agitators that rotate on their own axis while orbiting within the mixing bowl. Can handle a wider range of viscosities and is often used when liquid binding agents are involved.**
○ Double Cone Blender: **Similar to a V-blender but with two conical hoppers joined at their apexes. Provides good tumbling action for blending powders.**
• Material of Construction (Contact Parts):
○ Stainless Steel (SS304 or SS316): **Essential for hygiene, preventing contamination, and resisting corrosion from various herbal and mineral components. SS316 is preferred for more demanding applications.**
○ Food-Grade Materials: **Ensuring all parts in contact with the powder are safe for processing consumables.**
• Mixing Chamber Volume/Capacity: **Specified in liters or kilograms per batch, depending on the scale of production.**

• Motor Power: **Ranges from fractional HP for small lab mixers to several HP for large industrial blenders, depending on the mixer type and capacity.**
• Mixing Speed (RPM): **Adjustable speed is often desirable to optimize blending for different powder characteristics.**
• Blending Time: **The time required to achieve a homogeneous mixture, which depends on the mixer type and the properties of the powders.**
• Homogeneity/Uniformity: **The degree to which the different components are evenly distributed in the final mixture. This is a critical performance parameter.**
• Feeding and Discharge Mechanisms:
○ Top Loading with Manual or Automated Feeding: **For introducing the powders into the mixer.**
○ Bottom Discharge with Manual or Valve Operation: **For emptying the blended powder. Different valve types (e.g., butterfly, slide gate) may be used.**
• Dust Containment: **Enclosed design with tight seals and options for connecting to dust extraction systems to prevent powder loss and maintain a clean environment.**
• Safety Features: **Emergency stop buttons, safety interlocks on access doors.**
• Ease of Cleaning: **Design should allow for easy and thorough cleaning between batches to prevent cross-contamination.**
• Space Requirements/Dimensions.
• Power Supply: **Voltage and phase requirements.**
• Control Panel: **Basic on/off switches to more sophisticated controls with timers, speed adjustment (VFD), and batch control.**
• Compliance: **GMP (Good Manufacturing Practices) for pharmaceutical use is highly desirable.**
• Optional Features:

○ Jacketed Vessels: **For heating or cooling during the mixing process (less common for dry powder mixing but possible if binders are involved).**
○ Sampling Ports: **For taking samples during the blending process to check homogeneity.**
○ Load Cells: **For accurate weighing of ingredients directly into the mixer.**
○ Automation: **Integration with automated feeding and discharge systems.**
When selecting a powder mixer for Ayurvedic preparations:
• Consider the flow properties of the powders you will be mixing: **Different mixers are better suited for free-flowing versus cohesive powders.**
• Determine the required batch size and desired throughput.
• Prioritize hygiene and ease of cleaning to prevent cross-contamination.
• Ensure the material of construction is suitable for pharmaceutical or food-grade applications.
• Look for features that ensure good homogeneity of the final blend.

10. Sieves (L, M & S) Set
• Number of Sieves: **Typically a set of 3 sieves, labeled Large (L), Medium (M), and Small (S).**
• Frame Material: **Usually Stainless Steel (SS304 or SS316) for durability and corrosion resistance, especially important when working with herbal and mineral powders.**
• Diameter: **Common laboratory and small-scale production diameters include 8 inches (200 mm) or 12 inches (300 mm). The diameter should be consistent across the set.**
• Height: **Can be full height (typically around 2 inches or 50 mm) or half height (around 1 inch or 25 mm). Consistent height within the set is often preferred for stacking and analysis.**

• Compliance: **Ideally manufactured according to international standards like ISO 3310-1 or ASTM E11 to ensure accuracy and traceability.**
Individual Sieve Specifications (Likely Ranges):
Since "L, M, S" isn't standard, these are educated guesses based on potential applications in classifying powder fineness:
1. Large (L) Sieve:
• Intended Use: **To retain coarser particles and allow finer fractions to pass. This might be used for initial quality checks or to remove agglomerates.**
• Mesh Size: **Lower mesh number, indicating larger openings.**
○ Possible Range (Example 1): **20 mesh to 40 mesh**
○ Possible Range (Example 2): **Aperture size of 850 µm to 425 µm (micrometers) or 0.85 mm to 0.425 mm.**
• Common Applications: **Initial sifting of raw materials, removing large impurities, or producing a relatively coarse powder.**
2. Medium (M) Sieve:
• Intended Use: **To further refine the powder, retaining medium-sized particles. This would represent an intermediate level of fineness.**
• Mesh Size: **Intermediate mesh number.**
○ Possible Range (Example 1): **60 mesh to 100 mesh**
○ Possible Range (Example 2): **Aperture size of 250 µm to 150 µm (micrometers) or 0.25 mm to 0.15 mm.**
• Common Applications: **Achieving the typical fineness required for many Churna formulations or intermediate particle size analysis.**
3. Small (S) Sieve:
• Intended Use: **To retain finer particles, allowing only the finest fraction to pass. This would be used for achieving powders suitable for Nasya or very fine Manjan.**
• Mesh Size: **Higher mesh number, indicating smaller openings.**
○ Possible Range (Example 1): **120 mesh to 200 mesh or even finer.**

○ Possible Range (Example 2): **Aperture size of 125 µm down to 75 µm (micrometers) or 0.125 mm down to 0.075 mm.**
• Common Applications: **Producing very fine powders for nasal administration (Nasya) or fine tooth powders (Manjan), and for detailed particle size analysis to determine the fine fraction.**
Additional Specifications to Consider:
• Sieve Material: **Typically stainless steel wire cloth, but other materials like brass or synthetic fabrics might be used for specific applications.**
• Weave Type: **Plain weave is the most common for standard sieves.**
• Accuracy Grade: **Sieves are often classified by their accuracy (e.g., test sieves, inspection sieves). For critical applications, certified test sieves with documented accuracy are recommended.**
• Sieve Marking: **Each sieve should be clearly marked with its mesh size or aperture size and the standard it complies with (if any).**
• Compatibility with Sieve Shaker: **If the sieves are intended for use with a mechanical sieve shaker, ensure the diameter and height are compatible with the equipment.**

11. Shifter
1. Sieve Shifter / Vibratory Sifter / Screening Machine: **This is commonly used in various industries (pharmaceutical, food, chemical, etc.) for separating materials based on particle size. If this is what you mean, here are some typical specifications:**
• Type: **Circular, rectangular, gyratory, vibratory, centrifugal, etc.**
• Number of Decks (Screens): **Single deck to multiple decks (e.g., 1 to 5 or more), allowing for multiple size separations in one pass.**
• Screen Diameter/Size: **Ranges from small laboratory units (e.g., 12 inches / 300 mm) to large industrial units (e.g., 72 inches / 1800 mm or more).**
• Mesh Size/Aperture Size: **Specified in terms of mesh number (number of openings per linear inch) or aperture size (in micrometers or millimeters). This determines the particle size separation.**

• Motor Power: **Varies depending on the size and capacity of the shifter (e.g., from fractional HP to several HP).**
• Frequency and Amplitude of Vibration: **Adjustable parameters that affect the screening efficiency and throughput.**
• Material of Construction: **Typically stainless steel (various grades like SS304, SS316L) for contact parts, with options for mild steel for the base.**
• Capacity/Throughput: **Measured in kg/hour or tons/hour, depending on the material being screened and the desired separation.**
• Inlet and Outlet Connections: **Size and type of connections for feeding material into and discharging separated fractions from the shifter.**
• Dust Containment: **Features like enclosed design, dust-tight seals, and connections for dust extraction systems.**
• Cleaning Mechanisms: **Options like ball cleaning, brush cleaning, ultrasonic cleaning to prevent screen blinding.**
• Mobility: **Some units are portable with wheels and locking mechanisms.**
• Compliance: **May need to comply with industry-specific standards (e.g., GMP for pharmaceutical, FDA for food).**
• Weight and Dimensions: **Overall size and weight of the machine.**
• Power Supply: **Voltage and frequency requirements.**
• Noise Level: **Operating noise levels.**
• Control Panel: **Features for controlling operation, adjusting parameters, and safety interlocks.**
2. Gear Shifter (for vehicles or machinery): **If you're referring to a mechanical device used to change gears in a transmission, the specifications would be very different:**
• Type: **Manual (e.g., H-pattern, sequential), automatic (e.g., torque converter, dual-clutch), semi-automatic.**
• Number of Gears: **Forward gears (e.g., 5-speed, 6-speed, 8-speed) and reverse gears.**

• Actuation Force: **The force required to move the shift lever or engage buttons.**
• Travel Distance: **The distance the shift lever or actuator moves.**
• Shift Time: **The time it takes to change gears.**
• Durability: **Number of cycles the shifter can withstand.**
• Material of Construction: **Metals and polymers used in the shifter mechanism.**
• Interface: **How it connects to the transmission (e.g., cables, linkages, electronic signals).**
• Sensor Feedback: **Sensors that provide information about the current gear position.**
• Safety Features: **Interlocks to prevent accidental gear changes.**

III) Pills/Vati/Gutika Matirai and tablets

12. Ball Mill
• Material of Construction: **Typically steel (carbon steel, manganese steel, stainless steel) with liners made of wear-resistant materials like rubber, ceramic, or special alloys.**
• Diameter and Length: **These dimensions determine the mill's volume and capacity. Sizes range from small laboratory units to very large industrial mills (e.g., diameters from 0.3 meters to over 5 meters, and lengths can vary significantly).**
• Rotation Speed: **Measured in Revolutions Per Minute (RPM). The critical speed is an important factor in ball mill operation. Industrial ball mills often operate at 65-75% of their critical speed. Laboratory ball mills can have a wider range.**
Grinding Media:
• Material: **Steel (various alloys, carbon steel, stainless steel), ceramic (alumina, zirconia), or occasionally other materials like glass or flint. The choice depends on the material being ground and the need to avoid contamination.**
• Size and Shape: **Balls are most common, but rods (in rod mills, a variation) or other shapes can be used. The size distribution of the**

grinding media affects the grinding efficiency and final particle size. Larger balls are better for coarse grinding, while smaller balls are more effective for finer grinding.
• Loading: **The volume of the mill occupied by the grinding media (typically 30-50%).**
□ Motor Power: **Ranges from fractional horsepower for small lab mills to thousands of horsepower for large industrial mills.**
□ Capacity/Throughput: **Measured in kilograms per hour (kg/hr) or tons per hour (TPH), depending on the mill size, material being ground, and desired fineness.**
□ Feed Size: **The maximum size of the material that can be fed into the mill.**
□ Product Size (Fineness): **The desired particle size of the output material, often specified in micrometers (µm) or mesh size. Ball mills can achieve very fine powders, even nanometer-sized particles in some specialized types.**
□ Liners: **Replaceable internal linings to protect the mill shell from wear and tear caused by the grinding media and material. The design of the liners can also affect the grinding efficiency.**
□ Bearings and Support Structure: **Robust bearings to support the rotating mill and a sturdy frame to hold the entire assembly.**
□ Drive Mechanism: **Typically involves a motor connected to a gear reducer that turns the mill.**
□ Feeding and Discharge Systems: **Methods for introducing material into the mill and removing the ground product. These can be continuous or batch-wise.**
□ Optional Features:
• **Dust collection systems for dry grinding.**
• **Cooling or heating jackets for temperature control.**
• **Automated control systems.**
• **Noise reduction enclosures.**

13. Mass Mixer/Powder Mixer
A Mass Mixer, also known as a Powder Mixer, is a crucial piece of equipment in Ayurvedic medicine production for mixing herbs and other powders. These mixers are designed to ensure a homogeneous blend of ingredients, essential for maintaining the efficacy and quality of Ayurvedic preparations. They come in various sizes and configurations, with capacities ranging from a few kilograms to hundreds of kilograms per batch.
Key Features and Specifications:

• Capacity: **Ranges from a few kilograms to 100s of kilograms per batch.**
• Material: **Typically made from stainless steel for hygiene and durability.**
• Mixing Mechanism: **Includes paddle-type blades or other designs to ensure thorough mixing.**
• Motor: **Various power ratings, ranging from single-phase to three-phase, depending on the capacity and mixing requirements.**
• Control: **Can be manual, semi-automatic, or fully computerized with timers and speed controls.**
• Sealing: **Features self-adjusting seals to prevent leakage and contamination during the mixing process.**
• Charging and Discharging: **Typically involves a top-mounted hopper or lid for charging and a bottom discharge valve or slide for unloading.**
• Dust Control: **Often includes a dust cover or enclosure to prevent dust from escaping during operation.**
Types of Mass Mixers Used in Ayurveda:
• Horizontal Ribbon Mixers: **Suitable for mixing a wide range of powders, including Ayurvedic formulations.**
• Rotary Batch Mixers: **Good for mixing high-viscosity materials and ensuring even blending.**
• Planetary Mixers: **Ideal for mixing pastes, creams, and other viscous materials that are not strictly powders.**
Applications in Ayurvedic Medicine:
• Blending Herbal Powders:
Used to mix different herbs in the correct proportions for preparing Ayurvedic medicines.
• Combining Ingredients:
Ensures the uniform distribution of active ingredients and excipients in formulations.
• Mixing with Wet Additives:
Can also be used to incorporate liquids like honey or water into the powder mixture.

Benefits of Using Mass Mixers:
• Homogeneous Mixing:
Ensures a consistent and uniform blend of ingredients, which is crucial for product quality.
• Efficiency:
Reduces labor and time required for manual mixing, increasing production efficiency.
• Hygiene:
Stainless steel construction and sealing mechanisms ensure a clean and sanitary mixing environment.
• Product Quality:
Contributes to the consistent quality and efficacy of Ayurvedic medicines.

14. Granulator
Types of Granulators and Their Specifications:
There are two main granulation techniques: Wet Granulation **and** Dry Granulation**, each employing different types of granulators.**
1. Wet Granulators: **These use a liquid binder to agglomerate the powder particles.**
• High Shear Mixer Granulator (Rapid Mixer Granulator - RMG):
○ Mechanism: **Uses a high-speed impeller and a chopper to mix dry powders and then granulate them with a binder solution.**
○ Capacity (Bowl Volume): **Ranges from lab-scale (a few liters) to large production scale (hundreds to over a thousand liters).**
○ Working Capacity: **Typically 40-80% of the bowl volume.**
○ Impeller Speed: **Variable, typically from 50 to 500 RPM.**
○ Chopper Speed: **Variable, typically from 500 to 3000 RPM.**
○ Motor Power (Impeller & Chopper): **Varies with capacity, from a few kW to tens of kW.**
○ Material of Construction (Contact Parts): **Stainless Steel (SS304 or SS316L), often with GMP compliance.**

○ Discharge: **Bottom discharge valve, often pneumatically operated.**
○ Control Panel: **PLC-based with manual and automatic modes, recipe management.**
○ Optional Features: **Jacketed bowl for temperature control, spray system for binder addition, automated cleaning (CIP).**
○ Granule Size Output: **Typically 0.1 to 2.0 mm, depending on screen size and process parameters.**
○ Batch Time: **Mixing (2-5 min), Granulation (5-20 min), depending on the formulation.**
• Fluid Bed Granulator (FBG):
○ Mechanism: **Suspends powder particles in an upward stream of air while a binder solution is sprayed onto them, causing agglomeration and simultaneous drying.**
○ Capacity: **Ranges from lab-scale to large production batches (from a few kg to hundreds of kg).**
○ Airflow Rate & Temperature: **Precisely controlled for fluidization and drying.**
○ Spray System: **Nozzles (top or bottom spray) for binder application.**
○ Material of Construction (Contact Parts): **Stainless Steel (SS304 or SS316L), often with GMP compliance.**
○ Dust Collection System: **Integrated filter bags or cyclones.**
○ Control Panel: **PLC-based with recipe management, temperature and airflow control.**
○ Granule Size Output: **Typically 0.2 to 2.0 mm, producing uniform, free-flowing granules.**
○ Process Time: **Longer than high shear granulators due to the drying phase.**
• Oscillating Granulator:

○ Mechanism: **A rotor with oscillating blades pushes wet or dry powder through a screen to form granules.**
○ Capacity (Output): **Ranges from tens to hundreds of kg per hour.**
○ Rotor Speed (Oscillating Speed): **Typically around 180 oscillations per minute.**
○ Screen Size (Mesh Size): **Determines the granule size. Various mesh sizes are available.**
○ Material of Construction (Contact Parts): **Stainless Steel (SS304 or SS316).**
○ Ease of Cleaning: **Simple design allows for easy dismantling and cleaning.**
○ Suitable For: **Gentle granulation of both wet and dry materials, including heat and moisture-sensitive powders.**
2. Dry Granulators: **These agglomerate powders under high pressure without the use of a liquid binder.**
• Roller Compactor (Dry Granulator):
○ Mechanism: **Powder is fed between two counter-rotating rollers under high pressure to form a compacted sheet or ribbon, which is then milled to the desired granule size.**
○ Roller Pressure: **Adjustable to control the density of the compacted material.**
○ Roller Speed: **Variable to control throughput.**
○ Roller Material: **Typically stainless steel with specialized surfaces.**
○ Milling System: **Rotor and screen to break down the compacted sheet into granules.**
○ Screen Size (Milling): **Determines the final granule size.**
○ Capacity (Throughput): **Ranges from tens to thousands of kg per hour.**
○ Suitable For: **Moisture and heat-sensitive materials.**

Common Specifications to Consider for Any Granulator:
• Material of Construction: **As mentioned, Stainless Steel (SS304/SS316/SS316L) is crucial for pharmaceutical and food-grade applications.**
• Capacity/Throughput: **Match the granulator's output to your production needs.**
• Granule Size Range: **Ensure the granulator can produce granules within your desired size specifications.**
• Ease of Cleaning and Maintenance: **GMP compliance requires easy cleaning to prevent cross-contamination.**
• Safety Features: **Emergency stops, interlocks, and overload protection.**
• Control System: **From basic on/off to sophisticated PLC-based systems with data logging and recipe control.**
• Power Requirements: **Voltage and frequency compatibility with your local infrastructure in Challapalli, Andhra Pradesh, India.**
• Space Requirements: **Consider the footprint of the machine and any auxiliary equipment.**
• Noise Level: **Some granulators can be noisy; consider this for the working environment.**
• Compliance: **GMP, FDA, or other relevant regulatory standards.**

15. Drier
1. Tray Dryer (Cabinet Dryer):
• Mechanism: **Materials are spread in thin layers on trays placed in an insulated chamber. Heated air is circulated over the trays to remove moisture.**
• Capacity: **Batch-wise operation, with capacities ranging from a few kilograms to several hundred kilograms per batch, depending on the number and size of trays.**

• Temperature Range: **Typically adjustable from ambient to around 90-100°C (can go higher for specific applications).**
• Air Circulation: **Forced convection using fans to ensure uniform drying. Airflow rate is often adjustable.**
• Material of Construction (Contact Parts): **Stainless Steel (SS304 or SS316) is preferred for hygiene and corrosion resistance.**
• Number of Trays: **Varies based on capacity, e.g., 12 trays, 24 trays, 48 trays, etc. Tray dimensions also vary.**
• Heating Source: **Electric heaters or steam radiators.**
• Control Panel: **Temperature control, timer, and safety interlocks.**
• Moisture Removal Rate: **Depends on the material, temperature, airflow, and humidity of the inlet air.**
• Suitable For: **Drying herbs, granules, powders, and some semi-solid extracts.**
• Advantages: **Simple operation, suitable for small to medium batches, relatively low cost.**
• Disadvantages: **Longer drying times compared to other methods, potential for uneven drying if not properly loaded.**
2. Fluid Bed Dryer (FBD):
• Mechanism: **Wet material is suspended in an upward stream of hot air, facilitating rapid and uniform drying.**
• Capacity: **Batch-wise operation, ranging from a few kilograms to several hundred kilograms per batch.**
• Temperature Range: **Typically adjustable from ambient to around 80-90°C (can be higher for specific materials).**
• Airflow Rate: **Precisely controlled to ensure proper fluidization.**
• Material of Construction (Contact Parts): **Stainless Steel (SS304 or SS316) with GMP compliance.**
• Drying Time: **Significantly shorter than tray dryers (e.g., 20-60 minutes).**

• Moisture Removal Rate: **High due to efficient heat and mass transfer.**
• Suitable For: **Drying granules, powders, and some crystalline materials.**
• Advantages: **Rapid and uniform drying, good product quality, suitable for larger batches.**
• Disadvantages: **Not suitable for sticky or agglomerating materials.**
3. Vacuum Tray Dryer:
• Mechanism: **Material on trays is dried under vacuum conditions, allowing for lower drying temperatures and faster drying of heat-sensitive materials.**
• Capacity: **Batch-wise operation, similar to atmospheric tray dryers.**
• Temperature Range: **Lower than atmospheric dryers, typically 40-70°C.**
• Vacuum Level: **Maintained at a specific level (e.g., -0.8 to -0.9 bar).**
• Heating Source: **Hot water or steam circulating through heating plates beneath the trays.**
• Material of Construction (Contact Parts): **Stainless Steel (SS304 or SS316).**
• Suitable For: **Heat-sensitive herbs, extracts, and pharmaceutical formulations.**
• Advantages: **Low-temperature drying preserves heat-sensitive compounds, faster drying under vacuum.**
• Disadvantages: **Higher initial cost, batch operation.**
4. Spray Dryer:
• Mechanism: **Liquid feed (extracts, decoctions) is atomized into a spray of fine droplets into a stream of hot drying gas, resulting in a dry powder.**
• Capacity: **Continuous operation, with varying feed rates (liters per hour) and powder output (kilograms per hour).**
• Inlet Air Temperature: **Typically 150-220°C (can be adjusted based on the material).**

• Outlet Air Temperature: **Typically 70-90°C.**
• Material of Construction (Contact Parts): **Stainless Steel (SS304 or SS316) with sanitary design.**
• Particle Size of Powder: **Controlled by nozzle type, feed concentration, and operating parameters. Typically in the range of 20-300 µm.**
• Suitable For: **Drying liquid extracts, decoctions (Kwath), and other solutions into powder form.**
• Advantages: **Continuous operation, rapid drying, produces fine and uniform powder.**
• Disadvantages: **High initial cost, not suitable for solid materials.**
5. Rotary Dryer:
• Mechanism: **Wet material is tumbled inside a rotating cylindrical drum while hot air is passed through it.**
• Capacity: **Continuous operation, with varying drum sizes (diameter and length) determining the throughput (tons per hour for large industrial units, kg/hour for smaller ones).**
• Temperature Range: **Adjustable based on the material.**
• Airflow: **Co-current or counter-current flow with respect to the material movement.**
• Material of Construction (Contact Parts): **Carbon steel or stainless steel, often with internal flights to aid in material movement and heat transfer.**
• Suitable For: **Drying larger quantities of granular or free-flowing materials, some herbs.**
• Advantages: **Continuous operation, high throughput.**
• Disadvantages: **Can be less energy-efficient than other methods for smaller batches, potential for material attrition.**
Common Specifications to Consider for Any Drier:
• Material of Construction: **Stainless Steel (SS304/SS316/SS316L) for contact parts.**

• Capacity/Throughput: **Match the drier's output to your production needs.**
• Temperature Control: **Precise and uniform temperature control is crucial for product quality.**
• Drying Time: **Optimize for efficiency and product stability.**
• Energy Efficiency: **Consider the operating costs.**
• Ease of Cleaning and Maintenance: **GMP compliance requires easy cleaning.**
• Safety Features: **Over-temperature protection, emergency stops.**
• Control System: **Basic temperature controllers to advanced PLC systems.**
• Power Requirements: **Voltage and frequency compatibility in Challapalli, Andhra Pradesh, India.**
• Space Requirements: **Consider the footprint of the machine and any auxiliary equipment.**
• Compliance: **GMP, FDA, or other relevant regulatory standards.**

16. Tablet Compressing Machine
A Tablet Compressing Machine, also known as a tablet press or tableting machine, is a mechanical device that compresses powders into tablets of uniform size and weight. This is a crucial step in manufacturing pharmaceutical (including Ayurvedic), nutraceutical, and other types of tablets.
Here's a breakdown of typical specifications for a tablet compressing machine:
Key Specifications:
• Type of Tablet Press:
○ Single Punch (Eccentric) Tablet Press: **A simpler machine with a single set of upper and lower punches and a die. Suitable for small batches, R&D, and pilot production.**
○ Rotary (Multi-Station) Tablet Press: **Features multiple sets of punches and dies mounted on a rotating turret. Allows for**

continuous and high-speed production. Different sizes are available based on the number of stations.
○ High-Speed Rotary Tablet Press: **A specialized type of rotary press designed for very high output, often with advanced automation and control systems.**
○ Double Rotary Tablet Press: **Has two sets of punches and dies on a rotating turret, further increasing production capacity.**
○ Bi-Layer Tablet Press: **Designed to produce tablets with two distinct layers, often for controlled release or incompatible drug combinations.**
• Number of Stations: **For rotary presses, this indicates the number of punch and die sets the machine can accommodate, directly impacting the output per hour. Common ranges include 8, 16, 27, 35, 45, 55, 61, and more.**
• Maximum Output (Tablets per Hour): **This is a critical specification that depends on the number of stations and the turret speed (RPM). Ranges can vary from a few thousand to hundreds of thousands or even over a million tablets per hour for high-speed machines.**
• Maximum Operating Pressure (Main Compression Force): **Measured in kilonewtons (kN) or tons. This determines the machine's ability to compress powders into tablets of desired hardness and integrity. Typical ranges are from a few tons to 10 tons or more.**
• Pre-Compression Force (Optional): **Some advanced machines have a pre-compression stage to remove air from the powder bed before the main compression, which can improve tablet quality and prevent capping or lamination.**
• Maximum Tablet Diameter: **The largest diameter of the tablet the machine can produce, often specified in millimeters (mm). Common ranges are 16 mm, 20 mm, 25 mm, etc.**
• Maximum Tablet Thickness: **The maximum thickness of the tablet that can be achieved, usually in millimeters (mm).**
• Maximum Depth of Fill: **The maximum depth to which the die cavity can be filled with powder, influencing the tablet weight. Specified in millimeters (mm).**

- Turret Speed (RPM): **The rotational speed of the turret in a rotary press, directly affecting the production rate. Often adjustable.**
- Punch Type and Tooling:
    - Tooling Standard: **EU (European Union) and TSM (Tablet Specification Manual) are common standards for punch and die dimensions and shapes.**
    - Punch Shape: **Can be round, oval, capsule-shaped, or other custom shapes.**
    - Punch Material: **Typically made of hardened tool steel to withstand high compression forces.**
- Die Diameter and Height: **Dimensions of the die that determine the tablet size and shape.**
- Filling System (Feeder Type):
    - Gravity Feed: **Simple feeding of powder into the dies by gravity.**
    - Force Feeder: **Uses механические devices like paddles or screws to ensure consistent and efficient filling, especially for difficult-to-flow powders.**
- Material of Construction (Contact Parts): **Stainless Steel (SS304 or SS316L) is essential for pharmaceutical-grade machines to ensure hygiene, prevent corrosion, and meet GMP (Good Manufacturing Practices) standards.**
- Drive Motor Power: **Specified in kilowatts (kW) or horsepower (HP), depending on the machine size and compression force.**
- Control System:
    - Manual Controls: **Basic operation with manual adjustments.**
    - Semi-Automatic: **Some automated functions but with manual intervention.**
    - Fully Automatic (PLC-Based): **Programmable Logic Controller (PLC) systems with touch screen interfaces for precise control over various parameters, recipe storage, and data logging.**

• Safety Features: **Emergency stop buttons, safety interlocks on guards, overload protection mechanisms.**
• Lubrication System: **Manual or automatic systems to lubricate moving parts and reduce wear and tear.**
• Dust Extraction System: **Ports or connections for attaching dust extraction units to maintain a clean working environment and prevent cross-contamination.**
• Noise Level: **Specified in decibels (dB).**
• Space Requirements and Dimensions (L x W x H).
• Weight of the Machine (Net and Gross).
• Power Supply Requirements (Voltage, Phase, Frequency).
• Compliance: **cGMP, FDA, or other relevant regulatory standards.**
Optional Features:
• Automatic Weight Control (AWC): **Systems that automatically adjust fill depth to maintain consistent tablet weight.**
• Tablet Sampling Systems: **For automated sampling of tablets during production for quality checks.**
• Two-Layer Tablet Attachment: **For producing bi-layer tablets.**
• Force Feeding with Vacuum De-dusting: **Enhances powder flow and removes dust during filling.**
• Interchangeable Turret: **Allows for quick changeover between different tablet sizes and shapes.**

17. Pill/Vati Cutting Machine
A Pill/Vati Cutting Machine, used in pharmacy specifications, is a device that cuts and shapes pills (or "Vati," as they are known in Ayurveda) to a specific size and shape. These machines are often motorized and use rollers with grooved spaces to create pills of a desired size. They are commonly used in

Ayurvedic and herbal medicine industries, as well as in some pharmaceutical settings.
Key Features and Specifications:
• Motorization:
Most Pill/Vati Cutting Machines are motorized, using a single-phase motor and belt system to drive the rollers.
• Rollers:
The machine features sets of two rollers with grooved spaces that match the desired pill size.
• Size Range:
Common size ranges for pills range from 2mm to 12mm.
• Material:
Contact parts are often made from stainless steel (304 or 316) to ensure cleanliness and durability.
• Output:
The output can vary depending on the machine's capacity and the size of the pills being produced. A typical machine might produce 20,000 to 35,000 pills per shift.
• Uses:
Used in Ayurvedic and herbal medicine production, as well as in some pharmaceutical settings for tablet and pill preparation.
Example Specification:
• **A specific model might have a motor with 0.5 HP, a single-phase motor, and a belt drive system.**
• **It might be able to produce pills ranging from 4mm to 12mm in diameter.**
• **The unit may have one set of rollers for the desired pill size.**
• **It might be suitable for medium and small-scale Ayurvedic units with a space requirement of 2 feet x 1.5 feet.**

18. Stainless Steel Trays (L, M & S) Set

• Material: **Premium stainless steel for durability and resistance to rust and stains.**
• Size:
○ Small (S): **Typically around 36cm x 26cm.**
○ Medium (M): **Typically around 43cm x 31cm.**
○ Large (L): **Typically around 50cm x 36cm.**
• Finish: **Polished and sleek for easy cleaning and a nice appearance.**
• Thickness: **Often around 1MM.**
• Features:
○ Stackable Design: **For efficient storage.**
○ Easy to Clean: **Suitable for regular cleaning and dishwashing.**

19. Container for Storage (L, M & S) Set
1. Material:
• Glass:
High borosilicate glass (like Nestasia) is a common choice for food storage due to its heat resistance and non-porous nature.
• Plastic:
Polypropylene (like MILTON) and BPA-free plastics (like Solimo) are widely used for their lightweight and durability.
• Metal:
Stainless steel (like MARU) can be a durable option, especially for heavier items.
2. Capacity:
• **Containers are typically offered in a range of sizes, often with a small (S), medium (M), and large (L) container in a set.**
• **The exact capacity can vary widely, but common examples include:**
○ Small: **230ml, 460ml, 310ml, 520ml.**
○ Medium: **950ml, 1200ml.**
○ Large: **1650ml, 1800ml.**
3. Dimensions:

• **Container dimensions will vary depending on the shape and size.**
• **For example, a set of 6 Nestasia glass containers has dimensions of 22L x 15.7W x 6.8H centimeters.**
4. Features:
• Airtight Lids: **Many storage containers are designed with airtight lids to help maintain food freshness.**
• Stackability: **Some containers are designed to stack neatly, saving space.**
• Microwave and Dishwasher Safe: **Certain materials, like glass and some plastics, are designed for use in these appliances**

20. Container for Sugar Coating
1. Small-Scale Sugar Coating:
• Kitchen Pans:
You can coat items like tablets or small batches of confectionery using a standard stainless steel pan. The process involves spraying a syrup solution onto the items while turning or agitating them.
• Drum Coating Machines:
These machines offer gentle treatment for delicate particles, making them suitable for temperature-sensitive items. They use a drum that rotates, allowing for continuous spraying and drying of the sugar coating.
2. Large-Scale Sugar Coating (Industrial):
• Sugar Coating Pans (e.g., SQY-1000):
These specialized pans are designed for high-volume coating. They have features like adjustable inclination for optimal coating, motor and blower power for efficient operation, and a larger capacity for processing larger quantities.
• Specific Equipment:
SaintyCo provides detailed technical data for these pans, including capacity, motor power, and blower power.
3. Material Considerations:

• Stainless Steel: **This material is commonly used in both small-scale and industrial applications for its durability and suitability for food handling.**
• Glass: **Transparent glass containers are sometimes used for smaller containers to allow for easy viewing of the contents.**
• BPA-Free Materials: **Containers for storing sugar should be BPA-free to ensure safety.**
4. Key Features for Sugar Coating:
• Airtight Seal: **Containers should have airtight seals to prevent moisture from entering and affecting the sugar.**
• Removable Lids: **Lids that can be easily removed for cleaning are desirable.**
• Smooth Surfaces: **Smooth surfaces make cleaning easier and prevent sugar from sticking.**
• Stackability: **Stackable containers can help maximize storage space.**

21. Polishing Pan (Sugar-coated Tablets)
A polishing pan, used in the final stage of sugar coating for tablets, is a device that imparts a shiny, smooth finish to the tablets. It typically involves applying waxes, like carnauba or beeswax, to the tablets while they rotate in the pan.
Key aspects of a polishing pan for sugar-coated tablets:
• Purpose:
To impart a glossy, polished surface to the sugar-coated tablets, enhancing their appearance and potentially protecting the tablet's core.
• Mechanism:
The tablets are placed in the pan and rotated, and a wax or other polishing agent is applied to the surface of the tablets.
• Materials:
Common polishing agents include carnauba wax, candelila wax, beeswax, and hard paraffin.
• Pan Design:

Polishing pans are often made of stainless steel for durability and hygiene.
• Speed Control:
The speed of rotation can be adjusted to ensure even polishing.
• Tilting Angle:
Some polishing pans have a tilting mechanism to facilitate the loading and unloading of tablets and to optimize the polishing process.
• Capacity:
Polishing pans come in various sizes and capacities, ranging from small lab-scale units to large industrial machines.
• Power Supply:
Polishing pans typically require an electrical power supply to operate the motor and heating systems (if included).
• GMP Compliance:
Many polishing pans are designed to meet Good Manufacturing Practices (GMP) standards, ensuring a clean and efficient manufacturing process

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22. Mechanised Chattoo (For mixing Guggulu)
Mechanised Chattoo" for mixing Guggulu would likely refer to a motorized or automated version of a traditional churning or mixing device used to thoroughly combine Guggulu with other herbal powders and binders. Guggulu is a sticky, resinous substance, so the mixing process requires robust equipment.
Here are the typical specifications you might look for in a Mechanised Chattoo (Guggulu Mixer):
Key Specifications:
• Type of Mixer:
○ Anchor Mixer with Scrapers: **A common design for viscous materials. An anchor-shaped agitator rotates close to the vessel walls, and scrapers continuously remove material buildup, ensuring uniform mixing and heat transfer (if heating is involved).**
○ Planetary Mixer: **Features an agitator that rotates on its own axis while orbiting the mixing bowl. Can handle viscous materials**

and provides thorough mixing. Different agitator types (e.g., dough hook, paddle) might be used.
○ Sigma Blade Mixer (Double Arm Mixer): **Ideal for very viscous and sticky materials like Guggulu. Two counter-rotating sigma-shaped blades knead, shear, and fold the material.**
○ Z-Blade Mixer: **Similar to sigma blade mixers but with a different blade profile, also suitable for high viscosity.**
• Mixing Bowl/Vessel Material:
○ Stainless Steel (SS304 or SS316L): **Essential for hygiene, preventing sticking, and ease of cleaning. SS316L offers superior resistance to corrosion from various herbal components.**
○ Jacketed Bowl (Optional): **For heating the Guggulu to reduce viscosity and aid in mixing, using hot water or steam circulation. Temperature control is crucial.**
• Mixing Bowl/Vessel Capacity: **Ranges from laboratory scale (e.g., 5-10 liters) to industrial production (e.g., 100 liters or more), depending on batch size requirements.**
• Agitator/Blade Material: **Typically Stainless Steel (SS304 or SS316L), designed for effective mixing of viscous materials. Scrapers in anchor mixers are often made of food-grade Teflon or similar non-stick materials.**
• Agitator Speed: **Variable speed drive (VFD) is highly desirable to adjust the mixing intensity based on the stage of mixing and the viscosity of the Guggulu. Speed range might be, for example, 10-100 RPM.**
• Motor Power: **Sufficient power to handle the high viscosity of Guggulu, ranging from a few kW for smaller units to larger motors for industrial mixers.**
• Discharge Mechanism:
○ Tilting Bowl: **For easy manual scooping of the mixed Guggulu.**
○ Bottom Discharge Valve: **For controlled emptying, especially for larger units. The valve should be designed to handle viscous materials without clogging.**

○ Screw Conveyor (Optional): **For automated transfer of the mixed Guggulu.**
• Control Panel:
○ Basic Controls: **On/off switch, speed adjustment.**
○ Advanced Controls (PLC-Based): **With timers, temperature control (if jacketed), recipe management, and process monitoring.**
• Safety Features: **Emergency stop buttons, overload protection for the motor, safety interlocks on covers.**
• Ease of Cleaning: **Design should allow for thorough cleaning of the bowl and agitator to prevent batch-to-batch contamination. Scrapers should be easily removable for cleaning.**
• Frame and Structure Material: **Robust construction, often using mild steel with powder coating or stainless steel for durability and stability.**
• Power Supply: **Voltage and phase requirements suitable for the local power supply in Challapalli.**
• Space Requirements and Dimensions.
• Compliance: **GMP (Good Manufacturing Practices) is important for pharmaceutical-grade equipment.**
Specific Considerations for Guggulu Mixing:
• High Viscosity Handling: **The mixer must be designed to effectively move and blend the sticky Guggulu.**
• Preventing Sticking: **Material of construction (especially SS316L and non-stick scrapers) and bowl design are crucial to minimize Guggulu sticking to the surfaces.**
• Heating Capability (Optional but Recommended): **Gentle heating can significantly reduce the viscosity of Guggulu, making mixing easier and more uniform. Precise temperature control is important to avoid degradation.**
• Easy Discharge: **A discharge mechanism suitable for viscous materials is necessary.**

IV) Kupi pakava/Ksara/ Parpati/LavanaBhasma Satva/Sindura Karpu/ Uppu / Param

23. Bhatti
A "Bhatti" in an Ayurvedic pharmacy refers to a furnace or heating apparatus used in various processes, particularly those involving:
• **Paka:** Cooking or processing of herbal decoctions.
• **Bhasma preparation:** Calcination of metals or minerals.
• **Kupipakwa Rasayana:** High heat processing of minerals.
Here's a breakdown of the specifications for a Bhatti in an Ayurvedic pharmacy:
1. Types of Bhatti:
• **Traditional Bhatti:**
○ **Gogarbha Puta:** A pit-type furnace using cow dung cakes.
○ **Valuka Puta:** A furnace using sand as a heating medium.
○ **Gaja Puta:** A large pit used for high-temperature calcination.
• **Modern Bhatti:**
○ **Electric Furnace:** Uses electric heating elements.
○ **Gas Furnace:** Uses LPG or natural gas.
○ **Muffle Furnace:** Encloses the material to be heated in a chamber, allowing for precise temperature control.
2. Material of Construction:
• **Traditional:**
○ **Earthen materials:** Fire-resistant bricks, clay.
○ **Metals:** Iron, steel for support structures.
• **Modern:**
○ **Refractory bricks:** High-temperature insulating bricks.
○ **Steel casing:** To enclose and support the furnace.

○ **High-temperature alloys:** For heating elements (in electric furnaces).
3. Size and Dimensions:
• This varies greatly, ranging from small, portable Bhatti for specific procedures to large, stationary Bhatti for industrial-scale processing.
• Key dimensions include:
○ Inner chamber dimensions.
○ Overall dimensions of the Bhatti.
4. Heating Source:
• **Traditional:**
○ Cow dung cakes (for Gogarbha Puta).
○ Charcoal.
○ Wood.
• **Modern:**
○ Electricity (heating elements).
○ Gas (LPG, natural gas).
5. Temperature Range:
• Must be able to reach the required temperatures for the specific Ayurvedic processes (e.g., moderate for Paka, very high for Bhasma).
• For modern furnaces, this is a crucial specification, often with a range of several hundred to over a thousand degrees Celsius.
6. Temperature Control:
• **Traditional:** Relatively manual control, relying on fuel amount and airflow.
• **Modern:** Precise temperature control using thermostats and controllers, especially in electric and gas furnaces. Programmable controllers are used in advanced models.
7. Airflow Control:
• Proper ventilation is essential for combustion and temperature regulation.

- May involve dampers, vents, or forced air circulation.

8. Safety Features:

- **For Modern Furnaces:**
    - Over-temperature protection.
    - Automatic shut-off.
    - Insulation to prevent burns.
    - Flame sensors (for gas furnaces).
- **For all Bhatti:**
    - Proper placement and construction to prevent fire hazards.
    - Adequate ventilation in the Bhatti section of the pharmacy.

9. Flue/Chimney:

- To exhaust smoke and fumes, especially in fuel-based Bhatti.
- Proper height and design for efficient removal.

10. Insulation:

- To retain heat within the Bhatti and improve energy efficiency.
- Materials used include refractory bricks, ceramic fiber, and other high-temperature insulation.

11. Accessories:

- Tools for handling materials inside the Bhatti (tongs, crucibles, etc.).
- Temperature measurement devices (thermocouples, pyrometers).

Important Considerations for Ayurvedic Pharmacy Use:

- **GMP (Good Manufacturing Practices):** The Bhatti, especially modern ones, should be designed and constructed to meet GMP requirements, ensuring product quality and safety.
- **Safety:** Fire safety is paramount. The Bhatti section of the pharmacy should be properly designed and equipped. As mentioned, the Drugs and Cosmetics Rules 1945 mention furnaces in the context of the pharmacy layout.

• Reference to the Drugs and Cosmetics Rules, 1945, particularly Schedule T, outlines the Good Manufacturing Practices (GMP) for Ayurvedic drugs.
• **Ventilation:** Proper ventilation is critical to remove smoke and fumes and maintain a safe working environment, especially if using traditional fuel sources.
• The search results state that the "furnace/Bhatti section should covered with tin roof and proper ventilation."
• **Fuel Availability:** Consider the availability and cost of the fuel source (electricity, gas, or traditional materials) in Challapalli.

24. Kadai
Here's a consolidated view of Kadai specifications, covering both general cooking and specialized use in an Ayurvedic pharmacy:
I. Kadai Specifications for General Cooking
A Kadai, similar to a wok, is a versatile cooking vessel. Here's what to look for in a good one:
• **Material:**
○ **Stainless Steel:** Durable, easy to clean, and suitable for various cooking methods.
○ **Cast Iron:** Excellent heat retention, good for deep-frying and slow cooking, but requires seasoning.
○ **Carbon Steel:** Heats up quickly, lighter than cast iron, and often preferred by professional chefs.
○ **Aluminum (with non-stick coating):** Lightweight and affordable, but the coating can wear off over time.
• **Shape:**
○ **Round Bottom:** Promotes even heat distribution, ideal for stir-frying and deep-frying.
○ **Flat Bottom:** Suitable for use on electric or induction cooktops.
• **Size:**

○ Diameter: Varies from small (20 cm) for individual servings to large (30 cm or more) for family cooking.
○ Depth: Sufficient to hold a reasonable amount of food and oil without spillage.
• **Thickness:**
○ Ensures even heating and prevents hot spots.
○ Stainless steel: 2-3 mm is generally sufficient.
○ Cast iron/carbon steel: Should be thick and heavy-bottomed.
• **Handles:**
○ Sturdy and securely attached.
○ Heat-resistant material or design.
• **Lid:**
○ A well-fitting lid is helpful for simmering and retaining heat.
• **Surface Finish:**
○ Smooth and easy to clean.
○ Non-stick coating (if present) should be durable and food-safe.
• **Compatibility:**
○ Suitable for the intended heat source (gas, electric, induction).
II. Kadai Specifications for Ayurvedic Pharmacy Use
In an Ayurvedic pharmacy, a Kadai is used for preparing medicines, requiring stricter specifications:
• **Material:**
○ **Stainless Steel 316L:** The *preferred* material due to its superior corrosion resistance, non-reactivity, and hygienic properties.
○ **Stainless Steel 304:** Acceptable for some applications.

○ **Cast Iron/Copper:** Used traditionally for specific preparations, but requires careful consideration of reactivity and maintenance.
• **Shape:** Hemispherical is ideal.
• **Size:** Varies based on batch size.
• **Thickness:** Uniform thickness is crucial (2.5-4mm for SS).
• **Bottom:** Rounded.
• **Handles:** Sturdy, heat-resistant, and easy to handle.
• **Lid:** Recommended, made of non-reactive material.
• **Surface Finish:** Smooth, polished (for SS), well-seasoned (for cast iron).
• **GMP Compliance:** Must be pharmaceutical-grade, easy to clean, and designed to prevent contamination.
III. Key Differences and Considerations
• **Material:** General cooking Kadais offer a wider range of materials, while Ayurvedic pharmacy Kadais prioritize non-reactive materials like SS 316L.
• **Hygiene:** Pharmaceutical use demands higher hygiene standards and easier cleaning.
• **Reactivity:** Material reactivity is a critical concern in Ayurvedic pharmacy to ensure the purity and efficacy of medicines.
• **Durability:** Both applications require durable Kadais, but pharmaceutical Kadais may face more demanding conditions due to prolonged heating and contact with diverse herbal extracts.

25. Stainless Steel Vessels (L, M & S)
Key Specifications:
• Material: **Stainless steel, typically a 304 or 316 grade.**
• Capacity: **Varies greatly depending on the size (L, M, S) and type of vessel. For example, some cookware sets might have L=1.8L, M=1.4L, S=1.0L.**

• Dimensions: **Again, varies greatly. Some small containers might be 16.5cm x 16.5cm x 8.3cm, while larger vessels could be 1500mm x 2000mm.**
• Base Type: **Some vessels are designed for induction and gas stoves, while others may have a standard base.**
• Other Features: **Some may have lids, handle, or other features depending on their use.**
• Applications: **Industrial pressure vessels, cookware, food storage containers, and more.**
General Considerations:
• Corrosion Resistance:
Stainless steel is resistant to rust and corrosion, making it suitable for various applications.
• Heat Conductivity:
Stainless steel heats up and cools down relatively evenly, which is desirable in cooking applications.
• Durability:
Stainless steel is strong and durable, making it suitable for long-term use.
• Cleaning:
Most stainless steel vessels are dishwasher safe.
• Weight:
The weight of the vessel will depend on its size and thickness, but it's generally heavier than aluminum.

26. Patila Flask
A "Patila" in the context of an Ayurvedic pharmacy generally refers to a type of vessel, often used for heating, boiling, or storing liquids or semi-solid preparations. It's similar to a "Karahi" or a "Dekchi" but might have slightly different proportions or specific uses. A "Patila Flask" implies a Patila with a narrower neck or a flask-like shape.
Here's a breakdown of the specifications for a Patila Flask used in an Ayurvedic pharmacy:
I. Core Function and Intended Use

The Patila Flask in an Ayurvedic pharmacy is used for various processes, including:

- **Kashaya Preparation (Decoctions):** Boiling and reducing herbal extracts.
- **Storage of Liquids:** Holding prepared Kashayas, oils, or other liquid formulations.
- **Heating and Evaporation:** Gently heating liquids to concentrate them.
- **Specific Preparations:** May be used in certain unique Ayurvedic processes where a narrow-necked vessel is advantageous.

II. Material Specifications

The choice of material is critical to ensure the safety and efficacy of the Ayurvedic medicines.

- **Primary Material:**
    - **Stainless Steel (SS) 316L:** This is the *most preferred* material for pharmaceutical-grade applications due to its:
        - **Superior Corrosion Resistance:** Essential for handling a wide range of herbal extracts, acidic and alkaline solutions, and prolonged heating.
        - **Non-Reactivity:** Prevents leaching of metals into the medicine, ensuring purity.
        - **High Temperature Resistance:** Can withstand the temperatures used in various Ayurvedic processes.
        - **Hygiene:** Easy to clean, sterilize, and maintain.
    - **Stainless Steel (SS) 304:** Acceptable for some applications, but SS 316L offers better corrosion resistance and is preferred for long-term use.
- **Materials to Avoid (Unless Specifically Justified):**
    - **Glass:** While inert, it's fragile and can break during heating or handling, posing a safety risk. If used, it must be borosilicate glass (high heat resistance) and handled with extreme care.
    - **Copper:** Can react with certain herbal constituents. If used, it must be of very high purity and properly tinned to prevent direct contact

with the medicine. Its use should be limited to specific preparations where its properties are required.
○ **Earthenware:** Traditional, but porous and difficult to clean and sterilize to modern pharmaceutical standards. Not generally recommended for critical applications.
III. Design and Construction Specifications
• **Shape:**
○ **Body:** Cylindrical or slightly conical with a rounded bottom for even heating.
○ **Neck:** Narrower than the body, resembling a flask, to:
▪ Reduce evaporation.
▪ Minimize contamination.
▪ Facilitate controlled pouring.
○ **Base:** Stable and flat to prevent tipping.
• **Size/Capacity:**
○ Should be appropriate for the intended batch size. Common ranges:
▪ Small-scale: 500 ml to 2 liters
▪ Medium-scale: 2 liters to 5 liters
▪ Large-scale: 5 liters and above
○ Volume should be clearly marked on the flask.
• **Thickness:**
○ Sufficient thickness to withstand heating and handling without damage.
○ For SS 316L: 2 mm to 4 mm, depending on the size of the flask.
• **Opening/Mouth:**
○ Smooth, rounded rim to prevent chipping and facilitate pouring.

- Uniform diameter.

- **Lid/Stopper:**
  - A well-fitting lid or stopper is *essential* to:
    - Prevent contamination.
    - Reduce evaporation.
    - Maintain the sterility of the contents.
  - Material:
    - SS 316L
    - Ground glass (for a tight seal, if compatible with the contents)
    - Food-grade, inert silicone stopper
  - Design:
    - Secure fit to prevent leakage.
    - Easy to open and close.
    - If a stopper, it should be non-reactive with the contents.
- **Handles (If Applicable):**
  - For larger Patila Flasks, handles are necessary for safe handling.
  - Material: SS 316L
  - Design: Sturdy, securely attached, and easy to grip.
- **Pouring Spout (If Applicable):**
  - A pouring spout can facilitate controlled transfer of liquids.
  - Design: Smooth, non-drip, and easy to clean.
- **Surface Finish:**

○ **Interior:** Smooth, polished finish (Ra < 0.8 µm) to prevent material from sticking, facilitate cleaning, and minimize bacterial adhesion.
○ **Exterior:** Smooth, polished or brushed finish that is easy to clean and resistant to staining.
IV. Operational and Safety Specifications
• **Heat Resistance:** The Patila Flask must withstand the temperatures required for intended processes without deformation or damage.
• **Chemical Resistance:** The material must be resistant to the chemicals and substances used in Ayurvedic preparations.
• **Stability:** The flask must be stable and not easily tipped over.
• **Cleaning and Sterilization:** The design should allow for easy and thorough cleaning and sterilization.

27. Multani Matti/Plaster of Paris (50 Kgs)
Multani Mitti (50 kg):
• Packaging: **50 kg bag, typically HDPE (High Density Polyethylene).**
• Purity: **>99%.**
• Moisture: **8-10%.**
• Color: **Yellowish.**
• Form: **Solid, Powder.**
• Usage: **Face pack making, skin care products, industrial applications.**
• Shelf Life: **24 months.**
Plaster of Paris (50 kg):
• Packaging: **50 kg bag, typically HDPE.**
• Purity: **Typically >96%.**
• Density: **1150 kg/m3.**
• Form: **Powder.**

• Grade: **A Grade.**
• Usage: **Construction**

28. Copper Rod
1. Material and Purity:
• Oxygen-Free Copper (OFC):
OFC rods are known for their high electrical conductivity and are often specified as UNS C10200.
• Electrolytic Tough Pitch (ETP) Copper:
ETP copper is a high-conductivity grade with 99.95% copper content and low oxygen content, often used for electrical applications.
• Purity:
Copper rods can range from 99% to 99.999% purity, with higher purity grades offering better conductivity.
2. Dimensions:
• Diameter: **Rod diameters can range from 3 mm to 115 mm, with options for round, square, and rectangular shapes.**
• Length: **Copper rods are available in lengths up to 6 meters.**
3. Electrical Properties:
• Conductivity:
High-conductivity copper rods, like ETP and OFC, offer conductivity greater than 100% IACS.
• Resistivity:
The electrical resistivity of copper rods typically ranges from 0.017241 to 0.017241 mΩ.mm²/m.
• Annealing:
Annealing can affect the electrical properties of copper rods, with different annealing temperatures and times used to achieve desired properties.
4. Mechanical Properties:
• Tensile Strength:

Tensile strength can vary depending on the copper grade and temper, with values typically ranging from 250 to 280 MPa for OFC rods.
• Elongation:
Elongation, a measure of ductility, can range from 36% to 38% for OFC rods.
5. Standards:
• ASTM B49: **This is a standard specification for copper rod for electrical purposes, outlining requirements for material, dimensions, and properties.**
• ASTM B187 / ASME SB187: **These standards also specify requirements for copper rods.**
• BS: EN 1977: **This British standard specifies requirements for copper rods.**
6. Surface Condition:
• Clean, Smooth, and Bright: **Copper rods typically have a clean, smooth, and bright surface, free from defects.**

29. Earthern Container
Earthen containers, often made of unglazed natural clay, come in various sizes and shapes. They are known for their natural cooling properties and ability to improve water quality. Common uses include storing water, cooling liquids, and even cooking.
Here's a breakdown of some key specifications:
Material:
• Natural Clay: **Unglazed and often referred to as terracotta.**
• Porosity: **This allows for water to seep into the clay, cooling it down naturally.**
Common Uses:
• Water Storage:
Amazon.in mentions various capacities like 5L, 6L, 10L, 12L, 15L, 18L, and 20L, depending on the container.
• Cooling Liquids:

The porosity helps keep water and other liquids cool, especially in hot climates.

- Cooking:

Some earthen containers are designed for cooking and are often called "kadhai" or "bhojan".

Dimensions & Capacity:

- Varied Sizes:

Earthen pots come in various sizes and capacities, from small water glasses to large storage jars.

- Example Capacities:

Pot sizes range from 2.5L to 20L, and larger containers can hold up to 6000ml.

- Specific Examples:
  - Small: **A 5L pot might be 24.1cm wide and 30.5cm high, and weigh 3kg.**
  - Medium: **A 6L pot with a tap might be 20.3cm wide, 20.3cm deep, and 25.4cm high, weighing 3kg.**
  - Large: **A 10L pot might have a diameter of 6 inches and a height of 9 inches, with a lid diameter of 6 inches.**

30. Gaj Put Bhatti

A **Gaj Put Bhatti** is a traditional pit-type furnace used in Ayurvedic pharmacy, primarily for the process of *Bhasma* preparation. Bhasma is a unique class of Ayurvedic medicines where metals or minerals are calcined (incinerated) to ash form, rendering them safe and therapeutically effective. The Gaj Put Bhatti provides the high temperatures and specific conditions required for this transformation.

Here's a breakdown of its specifications:

I. General Description

- A Gaj Put Bhatti is a deep, large pit in the ground.
- It's a specialized arrangement of combustible material (typically cow dung cakes) to create a high-temperature environment.
- The size and arrangement are crucial for achieving the desired level of heat and duration of the process.

II. Construction Specifications
Since it's a traditional setup, the specifications are less about manufactured components and more about the method of construction and arrangement.
• **Pit Dimensions:**
○ Depth: Approximately 1.5 to 2 feet (0.45 to 0.6 meters) - This can vary.
○ Diameter: Approximately 2 to 3 feet (0.6 to 0.9 meters) - This can also vary based on the number of crucibles.
○ The dimensions are designed to hold a specific quantity of cow dung cakes and crucibles. The size may vary based on the scale of production and the specific Bhasma being prepared.
• **Pit Lining:**
○ The pit may be lined with:
▪ Refractory clay: To insulate and retain heat.
▪ Fire-resistant bricks: For added durability and heat retention.
• **Crucible Placement:**
○ A stable base is prepared within the pit to hold the crucibles (containing the material for Bhasma).
○ The arrangement ensures that the crucibles are surrounded by the heat source.
• **Fuel:**
○ Primarily dried cow dung cakes: These provide a consistent and high temperature.
○ The quantity and arrangement of the cakes are critical for temperature control.
• **Covering:**
○ The pit is covered with:
▪ A layer of clay: To seal the pit and retain heat.

- A lid made of fired clay or a similar refractory material: To control airflow and temperature.

III. Operational Specifications (Process)

The Gaj Put Bhatti isn't a static piece of equipment; its "specifications" are largely defined by how it's operated:

- **Fuel Preparation:**
  - Cow dung cakes should be thoroughly dried to ensure consistent burning.
  - The size and shape of the cakes may be standardized for uniformity.
- **Crucible Preparation:**
  - Crucibles made of refractory material (like clay) are used to hold the substances for calcination.
  - The crucibles must be able to withstand high temperatures.
- **Layering:**
  - The bottom of the pit is layered with cow dung cakes.
  - Crucibles are placed on this layer, ensuring they don't touch each other.
  - The crucibles are then completely surrounded and covered with more cow dung cakes.
- **Ignition:**
  - The cow dung cakes are ignited, and the pit is covered.
- **Temperature Control:**
  - Temperature is controlled by:
    - The amount of cow dung cakes used.
    - The airflow into the pit (controlled by the covering).
    - The duration of burning.
- **Duration:**

○ The burning process can last for several hours, depending on the specific Bhasma being prepared.
• **Cooling:**
○ After the burning is complete, the pit is allowed to cool completely before the crucibles are removed.
IV. Safety Considerations
• **Location:** The Bhatti should be located in a well-ventilated area, away from flammable materials.
• **Fire Safety:** Adequate fire safety measures should be in place (fire extinguishers, water).
• **Smoke Management:** Proper ventilation or a chimney may be needed to direct smoke away from the work area.
• **Handling Precautions:** Protective gear (gloves, eye protection) should be used when handling hot materials and crucibles.

31. Muffle Furnace (Electrically operated)
• **Chamber Size:**
Varies depending on the model, ranging from small (e.g., 4x4x9 inches) to larger (e.g., 12x12x18 inches) chambers.
• **Maximum Temperature:**
Typically ranges from 900°C to 1450°C, depending on the furnace's design.
• **Temperature Accuracy:**
Usually within ±2°C or ±3°C of the set temperature.
• **Heating Element:**
Can be silicon carbide rods, ceramic heating plates, or other high-temperature resistant materials.
• **Temperature Control:**
Often uses microprocessor-based PID controllers for precise temperature regulation.
• **Power Supply:**

Most commonly operates on 230V, 50Hz single-phase power, but some larger models may require 3-phase power.
• **Insulation:**
Ceramic fiberboard or other high-temperature insulating materials are used to minimize heat loss and maintain temperature uniformity.
• **Door:**
Usually a front-opening, insulated door.

32. End/Edge Runner
Edge Runner Mill:
• Driven Type: **Electric**
• Power: **1.5 to 10 HP**
• Capacity: **30 to 300 L**
• Material: **Stainless steel**
• Machine Size: **24" to 72" inch**
• Voltage: **440V**
• Gear Box: **3 to 6 inch center**
• Shell Height: **350 to 650 mm**
• Base Plate: **6 to 16 mm**
• Roller Plate: **6 to 12 mm**
• Outer Shell: **3 mm**
• Weight: **180 to 1500 kg**
• Application: **Pharmaceutical and ayurvedic industries**
• Example Models: **24" model with 30 L capacity and 1.5 HP motor, 36" model with 75 L capacity and 2 HP motor.**
End Runner Mill:
• Power: **5500 Watt (5.5 kW)**
• Capacity: **0.3-0.5 T/hr**
• Voltage: **380V**

• Dimensions: **2000 x 2100 x 1800 mm**
• Material: **Stainless steel**
• Speed: **30 RPM**
• Example: **5500 W Mild Steel End Runner Mill, 350 Mm**
• Application: **Industrial and food processing**

33. Exhaust Fan
1. Airflow (CFM/CMH):
• CFM (Cubic Feet per Minute) **or** CMH (Cubic Meters per Hour) **indicates how much air the fan can move.**
• Room Size and Purpose: **Determine the room's volume (length x width x height). Different rooms require different levels of air changes per hour (ACH).**
○ Bathrooms: **A general guideline is 1 CFM per square foot of floor space, or aim for 8 ACH. For smaller bathrooms (under 50 sq ft), a minimum of 50 CFM is recommended. Add 50 CFM for each toilet, shower, or bathtub. For a jetted tub, add 100 CFM.**
○ Kitchens: **Due to cooking fumes and odors, higher CFM is usually needed. For a medium-sized kitchen, 100-200 CFM is a common range.**
○ Large Rooms: **For rooms over 100 sq ft, consider 1 CFM per square foot or more, or multiple fans.**
• Calculating Minimum CFM: **A common formula is: Room Volume (cubic feet) x Desired ACH / 60 (minutes per hour) = Minimum CFM.**
2. Fan Size (Sweep Diameter):
• **The diameter of the fan blades, usually measured in inches or millimeters.**
• **Common sizes in India include 4 inch (100mm), 6 inch (150mm), 9 inch (225mm), and 12 inch (300mm).**
• **Larger sweep sizes generally move more air.**
• **Ensure the fan fits the available space.**
3. Noise Level (Sones/dB):
• **Measured in** sones **or** decibels (dB)**. Lower numbers indicate quieter operation.**
• Sones: **1 sone is equivalent to the sound of a quiet refrigerator.**

○ **<1 sone: Barely audible (like a soft whisper)**
○ **1-2 sones: Can be heard but relatively quiet (like a refrigerator hum or calm office)**
○ **2.5 sones: Noticeable and may be disruptive**
• **For residential use, aim for a fan with a rating of 1.0 sone or less for quiet operation.**
4. Power Consumption (Watts):
• **Indicates the electrical power the fan uses.**
• **Average exhaust fans consume around 30-40 watts. Larger fans may consume more.**
• **Look for energy-efficient models with higher star ratings. BLDC (Brushless Direct Current) motor fans are known for their energy efficiency, typically consuming around 16-40 watts.**
• **Consider the usage duration to estimate monthly electricity costs**

34. Wooden Spatula
1. Material:
• Type of Wood: **This is a primary consideration as it affects durability, heat resistance, and food safety. Common options include:**
○ Bamboo: **Sustainable, lightweight, and relatively inexpensive. It's fairly durable but can stain or absorb odors over time.**
○ Maple: **Hardwood, very durable, smooth, and resistant to staining and warping. A popular choice for quality spatulas.**
2. Dimensions:
• Length: **Typically ranges from** 8 inches (20 cm) to 14 inches (35 cm)**.**
○ Shorter (8-10 inches): **Good for stirring in small bowls or reaching into jars.**
○ Medium (11-13 inches): **The most versatile length, suitable for general cooking, sautéing, and flipping in most pans.**
○ Longer (14 inches or more): **Useful for reaching into deep pots and pans, or for grilling to keep hands away from the heat.**
• Blade Width: **Varies depending on the intended use, generally between** 2 inches (5 cm) and 4 inches (10 cm) **at the widest point.**

○ Narrower: **Good for stirring, scraping sides of bowls, or getting under delicate foods.**
○ Wider: **Ideal for flipping pancakes, burgers, or larger pieces of food.**
• Thickness: **Usually between** 0.25 inches (0.6 cm) and 0.5 inches (1.3 cm)**. A good thickness provides sturdiness and prevents bending.**
3. Design and Shape:
• Blade Shape:
○ Flat/Square: **Versatile for scraping and flipping.**
○ Rounded: **Good for stirring and scooping.**
○ Slotted: **Allows liquids and fats to drain while lifting food.**
○ Angled: **Can be helpful for reaching into corners of pans.**
• Handle Shape:
○ Straight: **Simple and functional.**
○ Curved/Ergonomic: **Designed for a comfortable grip.**
○ Hole for Hanging: **Convenient for storage.**
4. Features:
• Seamless Construction: **Spatulas made from a single piece of wood are generally more durable and easier to clean as there are no crevices for food to get trapped.**
• Heat Resistance: **Wood is naturally more heat-resistant than some plastics, but prolonged exposure to high heat can still damage it.**
• Non-Scratch: **Gentle on non-stick cookware.**
• Durability: **Depends on the type of wood and how well it's cared for. Hardwoods generally last longer.**
• Weight: **Wooden spatulas are typically lightweight and comfortable to handle.**
5. Care Instructions:

While not a specification of the spatula itself, understanding the recommended care is crucial for its longevity. This often includes:
• **Hand washing with mild soap and water.**
• **Avoiding soaking in water for extended periods.**
• **Periodically oiling with a food-safe oil to prevent drying and cracking.**

35. Stainless Steel Spatula
1. Material:
• Type of Stainless Steel: **The grade of stainless steel is crucial for quality and food safety. Common grades include:**
○ 18/8 (304 Grade): **Contains 18% chromium and 8% nickel. This is a very common and excellent grade for kitchen utensils. It's highly resistant to corrosion, rust, and staining. It's also non-reactive with food.**
○ 18/0 (430 Grade): **Contains 18% chromium but no nickel. It's still corrosion-resistant but generally less so than 18/8. It can sometimes be magnetic. Often a more budget-friendly option.**
• Finish:
○ Polished: **Shiny and easy to clean.**
○ Brushed: **Has a matte finish that can hide fingerprints and scratches better.**
2. Dimensions:
• Length: **Similar to wooden spatulas, lengths typically range from** 8 inches (20 cm) to 14 inches (35 cm)**.**
○ Shorter: **Good for smaller tasks and reaching into jars.**
○ Medium: **Most versatile for general cooking.**
○ Longer: **Ideal for grilling or reaching into deep pots.**

• Blade Width: **Usually between** 2 inches (5 cm) and 4 inches (10 cm) **at the widest point.**
o Narrower: **For stirring and getting under delicate foods.**
o Wider: **For flipping larger items like pancakes and burgers.**
• Thickness: **Typically ranges from** 1mm to 2mm**. A good thickness provides sturdiness and prevents bending, especially under the weight of food.**
3. Design and Shape:
• Blade Shape:
o Solid/Flat: **Excellent for scraping and flipping.**
o Slotted: **Allows liquids and fats to drain. The size and number of slots can vary.**
o Perforated: **Similar to slotted, but with smaller holes.**
o Offset: **The blade is angled away from the handle, providing better leverage for flipping and reaching under food. Common for fish spatulas.**
o Flexible: **Thinner blades designed to easily slide under delicate foods like fish or eggs.**
• Edge:
o Straight: **For general flipping and scraping.**
o Beveled/Tapered: **Makes it easier to slide under food.**
• Handle Shape:
o Straight: **Simple and functional.**
o Ergonomic: **Designed for a comfortable and secure grip, often with contours or finger grooves.**
o Hole for Hanging: **For convenient storage.**
4. Features:

• Seamless Construction: **Many high-quality stainless steel spatulas are made from a single piece of steel, which is very durable and hygienic as there are no seams for food and bacteria to get trapped.**
• Heat Resistance: **Stainless steel is highly heat-resistant, making it ideal for high-heat cooking like searing and grilling.**
• Durability: **Stainless steel is very strong and resistant to bending, breaking, and corrosion. A good quality stainless steel spatula can last for many years.**
• Hygienic: **Non-porous and easy to clean, making it resistant to bacterial growth.**
• Dishwasher Safe: **Generally safe to clean in the dishwasher.**
• Weight: **Can vary depending on the thickness and size. Some prefer a heavier spatula for a more substantial feel.**

V) Kajal

36. Earthern Lamps (for collection of Kajal)
1. Material:
• Type of Clay: **Typically made from unglazed earthenware or terracotta clay. The specific type of clay can vary regionally, affecting the color (ranging from reddish-brown to grey) and porosity.**
• Unglazed: **Crucially, these lamps are usually unglazed. The porous nature of the unglazed clay helps in the slow and even burning of the oil and facilitates the collection of soot. Glazed surfaces would not allow soot to adhere properly.**
2. Dimensions:
• Overall Height: **Usually small, ranging from** 2 inches (5 cm) to 4 inches (10 cm) **in total height. This compact size is practical for handling and soot collection.**
• Base Diameter: **Typically ranges from** 1.5 inches (3.8 cm) to 3 inches (7.6 cm)**, providing stability.**

- Oil Reservoir Diameter: **The diameter of the depression or bowl that holds the oil is usually around** 1 inch (2.5 cm) to 2 inches (5 cm)**.**

- Height of the Soot Collection Surface: **This is a key dimension. The design often includes a raised platform or a second, smaller inverted bowl placed above the flame, at a distance of roughly** 0.5 inches (1.3 cm) to 1.5 inches (3.8 cm) **from the wick. This distance is important for optimal soot deposition without extinguishing the flame.**

- Diameter of the Soot Collection Surface: **This inverted bowl or platform typically has a diameter of** 1.5 inches (3.8 cm) to 3 inches (7.6 cm)**, providing a surface area for soot collection.**

3. Design and Shape:

- Two-Part Structure (Common): **The most common design involves two main parts:**

    - Base/Reservoir: **A small bowl or saucer-like base to hold the oil and the wick.**

    - Soot Collector: **An inverted, smaller bowl or a flat, circular platform that sits above the flame. This is often supported by small legs or a narrow neck extending from the base.**

- Single-Piece Structure (Less Common): **Some simpler designs might have a single piece with a raised edge around the oil reservoir, and the soot is collected on the inner surface of a dome-like top that partially encloses the flame.**

- Wick Placement: **A small indentation or groove in the base to hold the cotton wick upright, partially submerged in the oil.**

- Ventilation (Minimal): **The design usually allows for minimal airflow to sustain a small, controlled flame, which is ideal for soot production.**

4. Features Specific to Kajal Collection:

- Controlled Flame: **The design aims for a small, steady flame that produces fine, dark soot.**

- Optimal Distance for Soot Deposition: **The distance between the flame and the collection surface is crucial for the quality and quantity of soot collected. Too close, and the flame might extinguish or the soot might be oily; too far, and less soot will be deposited.**

• Material Porosity: **Unglazed clay allows for slow and even oil consumption, contributing to a consistent flame.**
• Easy Soot Scraping: **The shape of the soot collection surface is usually designed to allow for easy scraping and collection of the accumulated soot.**
5. Oil Capacity:
• **Typically holds a small amount of oil, usually just enough to sustain the flame for the desired duration of soot collection (often a few hours). The capacity might range from** 0.5 to 1 fluid ounce (15 to 30 ml)**.**

37. Triple Roller Mill
• **Roller Dimensions:**
Roller diameters and lengths can range depending on the mill's size and capacity, with examples including 400mm diameter and 1300mm length.
• **Roller Surface Hardness:**
Roller surface hardness is often specified, for instance, HSD70-73, to ensure durability and resistance to wear.
• **Motor Power:**
The main motor power can range from 0.55kW to 55kW, depending on the mill's size and capacity.
• **Speed Control:**
Most mills have adjustable speed control, with examples including low, medium, and fast speeds (e.g., 32rpm, 148rpm, 400rpm).
• **Working Capacity:**
Working capacity can range from 2 to 12 kg per hour, depending on the mill's size and application.
• **Dimensions & Weight:**
The dimensions and weight of the mill vary, with examples including 750 x 600 x 600 mm (width x depth x height) and 65kg,

38. End runner
End runner mills, also known as edge runner mills, are used for crushing and grinding materials. They typically consist of two heavy rollers mounted on a shaft, which rotate on a bed of steel or granite. These mills are used in various industries like pharmaceutical and Ayurvedic medicine production.
Here's a more detailed look at their specifications:
Key Features:
• Type: **Edge Runner Mills, also called Chilean Mills or Roller Stone Mills.**
• Construction: **Two heavy rollers (usually steel or granite) mounted on a horizontal shaft.**
• Grinding Mechanism: **Rollers rotate on a bed, grinding and crushing material between them.**
• Materials: **Stainless steel or granite.**
• Applications: **Pharmaceuticals, Ayurvedic medicine, crushing tough and fibrous materials.**
Common Specifications:
• Power: **1.5 to 10 HP.**
• Capacity: **30 to 300 L.**
• Machine Size: **24" to 72" inch.**
• Weight: **180 to 1500 Kg.**
• Voltage: **440V.**
• Shell Height: **350 to 650 mm.**
• Base Plate: **6 to 16 mm.**
• Outer Shell: **3 mm.**
• Gear Box: **3 to 6 inch center.**
Important Considerations:
• Material:
The choice of material (steel or granite) depends on the specific application and the type of material being ground.
• Size and Capacity:

The size and capacity of the mill need to be appropriate for the volume of material being processed.
• Power:
The power rating of the mill needs to be sufficient to handle the grinding task.
• Safety:
Proper safety measures should be taken when operating these mills.

39. Sieves (L, M & S) Set
• Material:
○ Frame Material: **Ideally, the frames would be made of a non-reactive and easy-to-clean material. Options include:**
▪ Stainless Steel: **Durable, rust-resistant, and easy to sanitize. This is a good choice for hygiene.**
▪ Food-Grade Plastic: **Lightweight and affordable, but ensure it's sturdy and won't react with the soot or any potential binders.**
▪ Wood (with sealant): **Traditional, but can be harder to clean thoroughly and might absorb oils or moisture. If using wood, ensure it has a non-toxic, food-grade sealant.**
• Mesh Material: **The mesh itself should be made of a fine, durable material that won't easily clog or degrade. Options include:**
○ Stainless Steel Wire Mesh: **Offers durability, precise pore sizes, and is easy to clean. Different weaves (plain, twill) can affect the mesh opening.**
○ Synthetic Mesh (Nylon, Polyester): **Can offer very fine pore sizes and good resistance to chemicals, but ensure it's heat-resistant if you're working with warm soot.**
• Shape: **Typically circular, but other shapes like square or rectangular are possible. Circular sieves are common for hand-sifting.**
• Nesting Design: **For convenient storage, the sieves should ideally be designed to nest within each other.**

Specific Specifications for Each Sieve (L, M, S):
The key difference between the sieves in the set would be the mesh size (aperture), which determines the fineness of the particles that pass through. This is usually measured in:
• Mesh Number: **Indicates the number of openings per linear inch. A higher mesh number means smaller openings and finer sifting.**
• Aperture Size (Microns or Millimeters): **The actual size of each opening in the mesh.**
Here's a possible range of specifications for a set intended for refining kajal soot (assuming you want to achieve progressively finer textures):
1. Large Sieve (L):
• Diameter: **Approximately 6-8 inches (15-20 cm).**
• Mesh Size: **Relatively coarse, perhaps 40-60 mesh (aperture size around 250-400 microns). This could be used for initial sifting to remove larger debris or unburnt particles.**
2. Medium Sieve (M):
• Diameter: **Approximately 5-7 inches (12.5-17.5 cm).**
• Mesh Size: **Finer than the large sieve, perhaps 80-120 mesh (aperture size around 125-180 microns). This would further refine the soot texture.**
3. Small Sieve (S):
• Diameter: **Approximately 4-6 inches (10-15 cm).**
• Mesh Size: **The finest in the set, perhaps 150-200+ mesh (aperture size around 75-100 microns or smaller). This would be for achieving a very smooth and fine kajal powder.**

40. Stainless Steel Spatula
1. Material:
• Type of Stainless Steel: **The grade of stainless steel is crucial for quality and food safety. Common grades include:**
○ 18/8 (304 Grade): **Contains 18% chromium and 8% nickel. This is a very common and excellent grade for kitchen utensils. It's**

highly resistant to corrosion, rust, and staining. It's also non-reactive with food.
○ 18/0 (430 Grade): **Contains 18% chromium but no nickel. It's still corrosion-resistant but generally less so than 18/8. It can sometimes be magnetic. Often a more budget-friendly option.**
• Finish:
○ Polished: **Shiny and easy to clean.**
○ Brushed: **Has a matte finish that can hide fingerprints and scratches better.**
2. Dimensions:
• Length: **Similar to wooden spatulas, lengths typically range from** 8 inches (20 cm) to 14 inches (35 cm)**.**
○ Shorter: **Good for smaller tasks and reaching into jars.**
○ Medium: **Most versatile for general cooking.**
○ Longer: **Ideal for grilling or reaching into deep pots.**
• Blade Width: **Usually between** 2 inches (5 cm) and 4 inches (10 cm) **at the widest point.**
○ Narrower: **For stirring and getting under delicate foods.**
○ Wider: **For flipping larger items like pancakes and burgers.**
• Thickness: **Typically ranges from** 1mm to 2mm**. A good thickness provides sturdiness and prevents bending, especially under the weight of food.**
3. Design and Shape:
• Blade Shape:
○ Solid/Flat: **Excellent for scraping and flipping.**
○ Slotted: **Allows liquids and fats to drain. The size and number of slots can vary.**
○ Perforated: **Similar to slotted, but with smaller holes.**

○ Offset: **The blade is angled away from the handle, providing better leverage for flipping and reaching under food. Common for fish spatulas.**
○ Flexible: **Thinner blades designed to easily slide under delicate foods like fish or eggs.**
• Edge:
○ Straight: **For general flipping and scraping.**
○ Beveled/Tapered: **Makes it easier to slide under food.**
• Handle Shape:
○ Straight: **Simple and functional.**
○ Ergonomic: **Designed for a comfortable and secure grip, often with contours or finger grooves.**
○ Hole for Hanging: **For convenient storage.**
4. Features:
• Seamless Construction: **Many high-quality stainless steel spatulas are made from a single piece of steel, which is very durable and hygienic as there are no seams for food and bacteria to get trapped.**
• Heat Resistance: **Stainless steel is highly heat-resistant, making it ideal for high-heat cooking like searing and grilling.**
• Durability: **Stainless steel is very strong and resistant to bending, breaking, and corrosion. A good quality stainless steel spatula can last for many years.**
• Hygienic: **Non-porous and easy to clean, making it resistant to bacterial growth.**
• Dishwasher Safe: **Generally safe to clean in the dishwasher.**
• Weight: **Can vary depending on the thickness and size. Some prefer a heavier spatula for a more substantial feel.**

41. Exhaust Fan
1. Airflow (CFM/CMH):
• CFM (Cubic Feet per Minute) **or** CMH (Cubic Meters per Hour) **indicates how much air the fan can move.**
• Room Size and Purpose: **Determine the room's volume (length x width x height). Different rooms require different levels of air changes per hour (ACH).**
○ Bathrooms: **A general guideline is 1 CFM per square foot of floor space, or aim for 8 ACH. For smaller bathrooms (under 50 sq ft), a minimum of 50 CFM is recommended. Add 50 CFM for each toilet, shower, or bathtub. For a jetted tub, add 100 CFM.**
○ Kitchens: **Due to cooking fumes and odors, higher CFM is usually needed. For a medium-sized kitchen, 100-200 CFM is a common range.**
○ Large Rooms: **For rooms over 100 sq ft, consider 1 CFM per square foot or more, or multiple fans.**
• Calculating Minimum CFM: **A common formula is: Room Volume (cubic feet) x Desired ACH / 60 (minutes per hour) = Minimum CFM.**
2. Fan Size (Sweep Diameter):
• **The diameter of the fan blades, usually measured in inches or millimeters.**
• **Common sizes in India include 4 inch (100mm), 6 inch (150mm), 9 inch (225mm), and 12 inch (300mm).**
• **Larger sweep sizes generally move more air.**
• **Ensure the fan fits the available space.**
3. Noise Level (Sones/dB):
• **Measured in** sones **or** decibels (dB)**. Lower numbers indicate quieter operation.**
• Sones: **1 sone is equivalent to the sound of a quiet refrigerator.**
○ **<1 sone: Barely audible (like a soft whisper)**
○ **1-2 sones: Can be heard but relatively quiet (like a refrigerator hum or calm office)**
○ **2.5 sones: Noticeable and may be disruptive**
• **For residential use, aim for a fan with a rating of 1.0 sone or less for quiet operation.**
4. Power Consumption (Watts):
• **Indicates the electrical power the fan uses.**
• **Average exhaust fans consume around 30-40 watts. Larger fans may consume more.**

• **Look for energy-efficient models with higher star ratings. BLDC (Brushless Direct Current) motor fans are known for their energy efficiency, typically consuming around 16-40 watts.**
• **Consider the usage duration to estimate monthly electricity costs**

42. Ultra Violet Lamps
Types of UV Lamps:
• UV-A (Long-wave UV): **315-400 nm. Often used for black lights, curing, and some medical applications.**
• UV-B (Medium-wave UV): **280-315 nm. Used in tanning beds and some phototherapy.**
• UV-C (Short-wave UV): **100-280 nm. Known for its germicidal properties and used for disinfection.**
• UV LEDs: **Solid-state devices emitting UV light, known for their long lifespan and energy efficiency. Available in various wavelengths across the UV spectrum.**
• Fluorescent UV Lamps: **Mercury vapor lamps that produce UV light, often used for disinfection and black lights.**
• Excimer Lamps: **Emit narrow-band UV light at specific wavelengths (e.g., 222 nm, 308 nm), used for specialized applications like disinfection and medical treatments.**
General Specifications :
• Wavelength (nm): **The specific wavelength of UV light emitted is crucial as it determines the lamp's application and effectiveness. For example, UV-C around 254 nm is optimal for germicidal action.**
• UV Output Power/Intensity (mW/cm² or µW/cm²): **This indicates the amount of UV energy delivered per unit area and is critical for applications like curing and disinfection. Higher intensity generally means faster and more effective results.**
• Lamp Power (Watts): **The electrical power consumed by the lamp.**
• Voltage (V): **The operating voltage of the lamp.**
• Lamp Dimensions (Length, Diameter): **Physical size of the lamp.**

• Lamp Lifespan (Hours): **The expected operating hours of the lamp before its output significantly degrades. UV LED lamps typically have longer lifespans than traditional UV lamps.**
• Operating Temperature: **The temperature range within which the lamp operates efficiently.**
• Warm-up Time: **The time it takes for the lamp to reach its full UV output. UV LEDs typically have instant start.**
• Beam Angle/Coverage Area: **For applications like curing or disinfection, the area that the UV light effectively covers is important.**
• Safety Features: **Depending on the UV type and intensity, safety features like shielding, automatic shut-off, and indicators might be necessary to protect users from harmful UV exposure.**
• Ballast/Power Supply Requirements: **Traditional UV lamps often require a ballast to regulate the current. LEDs have specific voltage and current requirements.**
• Certifications and Standards: **Compliance with relevant safety and performance standards.**

VI) Capsules

43. Air Conditioner
1. Type of Air Conditioner:
• Window AC: **A single unit installed in a window or wall opening, suitable for cooling a single room.**
• Split AC: **Consists of two units (indoor and outdoor) connected by refrigerant pipes. The indoor unit cools the air, while the outdoor unit releases heat. Ideal for cooling one or more rooms and generally quieter than window ACs.**
• Multi-Split AC: **One outdoor unit connected to multiple indoor units, allowing independent temperature control in different rooms.**
• Central AC: **Cools an entire building through a system of ducts.**
• Portable AC: **A mobile unit that can be moved from room to room, requiring a window for ventilation.**

- Inverter AC: **Uses a variable-speed compressor, offering more precise temperature control and energy efficiency compared to non-inverter models.**

2. Cooling Capacity:

- **Measured in** Tons (TR) **or** British Thermal Units per Hour (BTU/h)**.**
- **Indicates the amount of heat the AC can remove from a room per hour.**
- 1 Ton ≈ 12,000 BTU/h.
- **The required capacity depends on the room size, insulation, number of windows, heat-generating appliances, and the number of occupants.**
    - Small rooms (up to 120 sq. ft.): **0.8 - 1.0 Ton**
    - Medium rooms (120-180 sq. ft.): **1.5 Ton**
    - Large rooms (180-240 sq. ft.): **2.0 Ton or higher**

3. Energy Efficiency:

- Star Rating (BEE in India): **A system from 1 to 5 stars, with 5 stars being the most energy-efficient. Higher star ratings mean lower electricity consumption. The Indian Seasonal Energy Efficiency Ratio (ISEER) determines these star ratings.**
    - ISEER for Split ACs:
        - **1 Star: 3.10 - 3.29**
        - **2 Star: 3.30 - 3.49**
        - **3 Star: 3.50 - 3.99**
        - **4 Star: 4.00 - 4.49**
        - **5 Star: 4.50 and above**
    - ISEER for Window ACs:
        - **1 Star: 2.50 - 2.69**
        - **2 Star: 2.70 - 2.89**

▪ **3 Star: 2.90 - 3.09**
▪ **4 Star: 3.10 - 3.29**
▪ **5 Star: 3.30 and above**
• Seasonal Energy Efficiency Ratio (SEER): **Primarily used in North America, it represents the total cooling output over a typical cooling season divided by the total electrical energy input during the same period. Higher SEER ratings indicate better energy efficiency.**
• Energy Efficiency Ratio (EER): **The ratio of the cooling capacity (in BTU/h) to the power input (in Watts) at a specific operating point. A higher EER indicates better efficiency under those conditions.**
4. Refrigerant Type:
• **The chemical used in the AC to absorb and release heat. Common refrigerants include:**
o R32: **More environmentally friendly with a lower Global Warming Potential (GWP).**
o R410A: **Previously common, but being phased out due to its higher GWP.**
o R290 (Propane): **A natural refrigerant with very low GWP, used in some newer models.**
5. Compressor Type:
• **The component that circulates the refrigerant.**
o Rotary Compressor: **Common in smaller ACs.**
o Scroll Compressor: **More efficient and quieter, often used in larger units.**
o Inverter Compressor: **Variable speed, leading to better energy efficiency and consistent cooling.**
6. Condenser Coil Material:
• **The outdoor unit's heat exchanger. Common materials:**
o Copper: **Offers excellent heat transfer and corrosion resistance. Generally considered more durable.**

○ Aluminum: **Lighter and more cost-effective but can be more susceptible to corrosion in certain environments. Often has protective coatings like "Golden Fin" or "Blue Fin."**
7. Airflow Rate:
• **Measured in** Cubic Feet per Minute (CFM) **or** Cubic Meters per Minute (m^3/min)**.**
• **Indicates the volume of air circulated by the indoor unit. Higher airflow can lead to faster cooling.**
8. Noise Level:
• **Measured in** decibels (dB)**. Lower dB ratings indicate quieter operation for both the indoor and outdoor units.**
9. Features:
• Adjustable Fan Speeds: **Allow you to control the airflow.**
• Temperature Control: **Precise adjustment of the desired room temperature.**
• Sleep Mode: **Gradually increases the temperature overnight for energy saving and comfort.**
• Timer: **Allows you to set the AC to turn on or off at specific times.**
• Auto Restart: **Automatically resumes operation after a power outage.**
• Dehumidification Mode (Dry Mode): **Removes excess moisture from the air.**
• Air Filters: **Remove dust, pollen, and other airborne particles. Some ACs have advanced filters like HEPA or activated carbon filters.**
• Swing/Oscillation: **For even air distribution. Can be horizontal, vertical, or both (4-way swing).**
• Smart Features: **Wi-Fi connectivity, smartphone app control, voice control compatibility.**
• Convertible/Adjustable Capacity: **Allows you to adjust the cooling capacity based on the number of occupants or weather conditions, saving energy.**

• Self-Clean Function: **Helps prevent the growth of mold and bacteria in the indoor unit.**
• Leakage Detection: **Some units can detect refrigerant leaks.**
• Turbo/Boost Mode: **For rapid cooling.**
• Antimicrobial/Anti-Corrosion Coatings: **On coils and other components for enhanced durability and hygiene.**

44. De-humidifier
1. Moisture Removal Capacity:
• **Measured in** liters per day (L/day) **or** pints per day**.**
• **This is the most crucial specification, indicating how much water the dehumidifier can extract from the air in a 24-hour period under specific temperature and humidity conditions (often 30°C and 80% relative humidity).**
• **Common capacities range from small units (10-20 L/day) suitable for small rooms to large units (50+ L/day) for large spaces or very damp environments.**
• Sizing is critical: **Choose a capacity appropriate for your room size and the level of humidity. Oversizing slightly is generally better than undersizing.**
2. Coverage Area:
• **Specified in** square meters (m^2) **or** cubic meters (m^3)**.**
• **Manufacturers often provide a recommended room size or volume that the dehumidifier can effectively handle.**
• **This is a guideline, and the actual effectiveness depends on factors like room layout, how sealed the room is, and the severity of the humidity problem.**
3. Water Tank Capacity:
• **Measured in** liters (L)**.**

• **This is the size of the internal container that collects the extracted water.**
• **A larger tank means less frequent emptying, but it also adds to the unit's weight and size.**
• **Many dehumidifiers have an** auto shut-off **feature that activates when the tank is full.**
• **Some models offer a** continuous drainage **option, allowing you to attach a hose to drain the water directly into a sink or floor drain, eliminating the need for manual emptying.**
4. Airflow Rate:
• **Measured in** cubic meters per hour (m³/h) **or** cubic feet per minute (CFM)**.**
• **Indicates the volume of air the dehumidifier circulates. A higher airflow rate can lead to faster dehumidification.**
5. Noise Level:
• **Measured in** decibels (dB(A))**.**
• **Lower dB ratings indicate quieter operation, which is important for bedrooms or living areas.**
6. Power Consumption:
• **Measured in** watts (W)**.**
• **Indicates the electrical power the dehumidifier uses. Consider the energy efficiency, especially if you plan to run the unit frequently. Look for models with higher energy efficiency ratings.**
7. Humidity Control:
• **Most dehumidifiers have a** humidistat **that allows you to set your desired relative humidity (RH) level. The unit will then automatically turn on and off to maintain that level.**
• **Some advanced models offer digital displays for setting and monitoring humidity levels.**
• **Some have different operating modes, such as continuous dehumidification, automatic mode, or laundry drying mode.**
8. Operating Temperature Range:

• **Dehumidifiers have an optimal temperature range for efficient operation (typically between 5°C and 35°C).**
• Condensing dehumidifiers **work best in warmer temperatures, while** desiccant dehumidifiers **are more effective in cooler environments (below 10-15°C).**
9. Refrigerant Type (for condensing dehumidifiers):
• **Common refrigerants include R134a, R290 (propane - a more environmentally friendly option), and others.**
10. Features:
• Automatic Defrost: **Prevents ice buildup on the coils in cooler temperatures, ensuring efficient operation.**
• Timer: **Allows you to set the dehumidifier to run for a specific duration.**
• Auto Restart: **Automatically turns the unit back on after a power outage.**
• Air Filter: **Some models include a filter to remove dust and other particles from the air. Some even have advanced filters like HEPA or activated carbon filters for improved air quality.**
• Portability: **Features like carry handles and wheels make it easier to move the dehumidifier between rooms.**
• Smart Features: **Some newer models offer Wi-Fi connectivity and control via smartphone apps.**
• Empty Tank Indicator/Alarm: **Alerts you when the water tank is full.**
• Laundry Mode: **Optimizes the unit for drying clothes indoors.**

45. Hygrometer
hygrometers, instruments used to measure humidity in the air or other gases:
1. Measurement Range:
• Relative Humidity (RH): **Typically expressed as a percentage (%), ranging from 0% RH (completely dry air) to 100% RH (air saturated**

with water vapor). Common ranges include 10-99% RH, 0-100% RH, or wider depending on the application.
• Temperature: **Many modern hygrometers also measure temperature, usually in Celsius (°C) and Fahrenheit (°F). The temperature range can vary widely depending on the intended use (e.g., indoor, outdoor, industrial).**
• Other Parameters (in some advanced models):
○ Dew Point: **The temperature to which air must be cooled at a constant pressure for water vapor to condense into liquid water.**
○ Wet Bulb Temperature: **The temperature a parcel of air would have if cooled to saturation by the evaporation of water into it, with all latent heat being supplied by the parcel.**
○ Absolute Humidity: **The actual amount of water vapor present in a unit volume of air (e.g., grams per cubic meter).**
○ Mixing Ratio: **The ratio of the mass of water vapor to the mass of dry air.**
2. Accuracy:
• **Expressed as a plus or minus (±) percentage for relative humidity and a plus or minus (±) degree for temperature.**
• **Accuracy varies significantly depending on the type and quality of the hygrometer.**
○ Digital Hygrometers: **Higher accuracy is common, often in the range of ±2% to ±5% RH and ±0.5°C to ±1°C. High-precision models can achieve even better accuracy (±1% RH or better).**
○ Analog Hygrometers (e.g., hair tension, metal-paper coil): **Generally less accurate, with variations of ±5% RH or more being typical. They often require calibration.**
3. Resolution:
• **The smallest increment that the hygrometer can display.**
• **For digital hygrometers, this is often 0.1% RH and 0.1°C/°F. Analog hygrometers have a resolution determined by the markings on their scale.**

4. Sensor Type:
• Capacitive: **Measures the change in electrical capacitance of a material as it absorbs moisture. Common in digital hygrometers, offering good accuracy and robustness.**
• Resistive: **Measures the change in electrical resistance of a material due to humidity. Less sensitive than capacitive types and can be more temperature-dependent.**
• Thermal: **Measures the change in thermal conductivity of air due to humidity (measures absolute humidity).**
• Hair Tension (Analog): **Uses the expansion and contraction of human or animal hair to move a needle.**
• Metal-Paper Coil (Analog): **Uses a coil made of materials that expand and contract with humidity changes.**
• Psychrometers (Wet Bulb/Dry Bulb): **Use the temperature difference between a wet and dry thermometer to determine humidity.**
• Dew Point Hygrometers: **Measure the temperature at which condensation forms on a cooled surface. These are often very accurate.**
• Optical: **Measures the absorption of light by water vapor in the air.**
5. Response Time:
• **The time it takes for the hygrometer to register a change in humidity.**
• **Digital hygrometers typically have a response time ranging from a few seconds to several minutes.**
6. Display:
• Analog: **Uses a needle and a scale to indicate humidity levels.**
• Digital: **Uses an LCD or LED screen to display readings numerically, often with additional information like temperature, time, and trends. Some have backlights for better visibility.**
7. Power Source:
• Battery-powered: **Common for portable and handheld digital hygrometers.**

• AC-powered: **Often used for fixed installations or laboratory-grade instruments.**
8. Operating Temperature Range:
• **The temperature range within which the hygrometer can accurately measure humidity. This varies depending on the model and sensor type.**
9. Calibration:
• **Indicates whether the hygrometer can be calibrated to improve accuracy. Digital hygrometers often have calibration functions. Analog hygrometers may require manual adjustment. Calibration frequency depends on the hygrometer's accuracy requirements and usage.**

46. Thermometer
Temperature Measurement Range:
• **The span of temperatures the thermometer can accurately measure. This varies greatly depending on the type.**
○ Clinical: **Typically 32°C to 43°C (90°F to 110°F).**
○ Food: **Often -50°C to 300°C (-58°F to 572°F) or wider.**
○ Industrial: **Can range from very low (cryogenic) to very high (furnace).**
○ Infrared: **Can have broad ranges, but accuracy may vary across the span.**
3. Accuracy:
• **The degree to which the thermometer's reading matches the actual temperature. Expressed as a ± value (e.g., ±0.1°C, ±0.2°F).**
• **Accuracy varies by thermometer type and quality.**
○ Digital thermometers **for clinical use often have an accuracy of ±0.1°C (±0.2°F) within a specific range (e.g., 35°C to 41°C).**

- Infrared forehead thermometers **may have a lower accuracy, around ±0.3°C (±0.5°F) for clinical use standards. Ear thermometers often have tighter requirements.**
- High-precision industrial thermometers **can achieve accuracies of ±0.05°C or better.**

- **Accuracy can be affected by calibration, environmental conditions, and proper usage.**

4. Resolution:

- **The smallest temperature increment the thermometer can display (e.g., 0.1°C, 0.01°C).**
- **A higher resolution doesn't always mean higher accuracy.**

5. Response Time:

- **The time it takes for the thermometer to reach a stable and accurate reading.**
  - Digital thermometers: **Can range from a few seconds to a minute or more.**
  - Infrared thermometers: **Very fast, often providing readings in under a second.**
  - Ear thermometers: **Also very quick.**

6. Display:

- Digital: **LCD or LED screens showing numerical readings. May include backlights.**
- Analog: **Needle moving along a calibrated scale (e.g., liquid-in-glass, bimetallic strip).**

7. Power Source:

- Battery-powered: **Common for digital and infrared thermometers. Battery life is often specified (e.g., number of measurements).**
- No power required: **Liquid-in-glass and bimetallic strip thermometers.**

47. Capsule Filling Machine

• Production Output: **Manual machines can fill up to 6,000 capsules per hour, while high-speed automatic machines can reach 150,000 capsules per hour.**
• Capsule Sizes Supported: **Most machines accommodate capsule sizes 00, 0, 1, 2, 3, 4, and 5.**
• Material: **Contact parts are typically made of stainless steel (SS 316), while non-contact parts may be SS 304.**
• Hole Configuration: **Many manual machines feature 300 holes (25 x 12) for capsule placement.**
• Power Supply: **Automatic machines may require a 3-phase, 415-volt power supply.**
• Dimensions and Weight: **Manual machines typically have dimensions of 405 mm (L) x 300 mm (W) x 455 mm (H) and a net weight of around 43 kg. Automatic machines have larger footprints and weights.**
• Loading Trays: **Some manual machines feature three loading trays.**
• Vacuum: **Semi-automatic and automatic machines may include vacuum systems for efficient capsule handling.**

48. Chemical Balance
• Capacity: **Typically ranges from 100g to 500g.**
• Readability: **0.1mg to 0.001mg.**
• Repeatability: **The ability of the balance to produce the same measurement result when weighing the same sample repeatedly.**
• Linearity: **The accuracy of the balance across its entire weighing range.**
• Draft shield: **Protects the balance from air currents.**
• Automatic calibration: **Allows for self-calibration of the balance.**
• Overload protection: **Prevents damage to the balance if it is overloaded.**
• Display: **Typically an LCD screen.**
• Power: **220 VACS, 50 Hz.**
• Optional accessories: **Standard calibration weights for external calibration.**

Types of Balances:
• Analytical Balances: **Highly sensitive balances for precise measurements.**
• Single-disk Analytical Balances: **A type of analytical balance with a single weighing pan.**
• Electro-optical Analytical Balances: **A type of analytical balance that uses light for precise measurements.**
• Electronic Analytical Balances: **A type of analytical balance that uses electronic sensors for precise measurements.**
• Chemical Balance: **A type of beam balance that measures the mass of chemicals with great precision.**

VII) Ointment/Marham Pasai

49. Tube Filling Machine
• Filling Capacity: **Machines can fill 40 to 200 tubes per minute, depending on the model.**
• Tube Material: **Suitable for various tube types like plastic, laminated, and aluminum.**
• Filling Accuracy: **Generally, filling accuracy is within +/- 1%.**
• Tube Diameter: **Can handle tubes with diameters ranging from 10 to 50mm, depending on the machine.**
• Tube Length: **Typically, tubes of 80 to 205mm in length can be filled.**
• Power Consumption: **Power consumption varies from 2.5 kW to 5 kW, depending on the model.**
• Other Specifications: **Some machines also offer options for sealing different tube materials, like PBL, ABL, and aluminum.**
• Viscosity Range: **The viscosity range for the product being filled can be from 1000 to 300000 CPS.**
Important Considerations:
• Utility Requirements: **Some machines require utilities like compressed air and cooling water for operation.**

• Machine Dimensions: **Machine dimensions can vary, but they generally range from 1900mm x 1170mm x 1780mm to 3226mm x 1384mm x 2480mm.**
• Machine Weight: **Machine weight can range from 385 kg to 1255 kg.**

50. Crimping Machine
1. Crimping Force**: This refers to the pressure applied during the crimping process, often measured in Newtons (N) or Tons. For example, some machines have a crimping force of 10,000 N.**
2. Power Source**: Crimping machines can be powered by electricity, hydraulics, or even manually.**
3. Voltage**: Electric-powered machines typically require a specific voltage, such as 230V or 415V.**
4. Dimensions**: The overall size and dimensions of the machine, including its length, width, and height, are important factors to consider.**
5. Crimping Capacity**: This refers to the number of crimps or connections that the machine can produce per hour. For example, some machines can handle 3000-4500 pieces per hour.**
6. Automation Grade**: Machines can be fully automatic, semi-automatic, or manual. Automatic machines can perform the entire crimping process without manual intervention, while semi-automatic machines require some manual input, and manual machines rely entirely on the operator for all steps.**

51. Ointment Mixer
Capacity **:- 10 Liters to 2000 Liters**
Design :- **Semi Contra Rotary**
Power Supply:- **1 H. P. to 90 H. P.**
Power Voltage:- **440 volts, 3 phase, 50 hertz**
Gearbox:- **Helical type / similar**
Stirrer Type :- **Anchor Type**
Stirrer MOC :- **Stainless Steel 304/316/316L**
Stirrer RPM :- **40 RPM adjustable through VFD**
Stirrer Mounting Orientation :- **Top Mounted**
Homogenizer MOC :- **Stainless Steel 304/316/316L**
Homogenizer RPM :- **2800 RPM**
Homogenizer Mounting Orientation:- **Bottom Mounted**

52. End Runner

End runner mills, also known as edge runner mills, are used for crushing and grinding materials. They typically consist of two heavy rollers mounted on a shaft, which rotate on a bed of steel or granite. These mills are used in various industries like pharmaceutical and Ayurvedic medicine production.

Here's a more detailed look at their specifications:

Key Features:

- Type: **Edge Runner Mills, also called Chilean Mills or Roller Stone Mills.**
- Construction: **Two heavy rollers (usually steel or granite) mounted on a horizontal shaft.**
- Grinding Mechanism: **Rollers rotate on a bed, grinding and crushing material between them.**
- Materials: **Stainless steel or granite.**
- Applications: **Pharmaceuticals, Ayurvedic medicine, crushing tough and fibrous materials.**

Common Specifications:

- Power: **1.5 to 10 HP.**
- Capacity: **30 to 300 L.**
- Machine Size: **24" to 72" inch.**
- Weight: **180 to 1500 Kg.**
- Voltage: **440V.**
- Shell Height: **350 to 650 mm.**
- Base Plate: **6 to 16 mm.**
- Outer Shell: **3 mm.**
- Gear Box: **3 to 6 inch center.**

Important Considerations:

- Material:

The choice of material (steel or granite) depends on the specific application and the type of material being ground.

- Size and Capacity:

The size and capacity of the mill need to be appropriate for the volume of material being processed.

• Power:
The power rating of the mill needs to be sufficient to handle the grinding task.
• Safety:
Proper safety measures should be taken when operating these mills.

53. Stainless Steel Storage Container
1. Material:
• Stainless Steel Grades:
Common grades are 304 and 316. Grade 316 is often preferred for food storage due to its superior chemical resistance, especially against acidic and salty substances.
• Rust Resistance:
Stainless steel is naturally rust-resistant, making it ideal for storing food and other items.
• Food Grade:
Many containers are specifically labeled as food-safe, ensuring they won't leach chemicals into stored food.
2. Capacity:
• Range:
Capacities vary widely, from small containers with a few hundred milliliters (e.g., 1000 ml) to large drums that can hold multiple liters (e.g., 10-50 L).
• Types:
You'll find containers for everything from individual portions to bulk storage.
3. Dimensions:
• Shape: **Available in various shapes like cylindrical, rectangular, and square.**
• Size: **Dimensions are usually specified in length, width, and height (e.g., 28L x 28W x 30H cm).**
• Weight: **Containers can range from lightweight to heavy depending on their size and capacity.**

4. Features:
• Airtight:
Many containers are designed to be airtight, helping to preserve food freshness and prevent moisture damage.
• Dishwasher Safe:
Many stainless steel containers are dishwasher safe, making them easy to clean.

54. Stainless Steel Patila
Material:
• Stainless Steel:
The most common material, typically 304 or 304L grade, known for its durability, corrosion resistance, and food-grade safety.
• Tri-ply Construction:
Some patilas may have three layers of stainless steel, with an aluminum core for enhanced heat distribution.
Dimensions:
• Diameter: **Can vary widely, from 14.5 cm (small sizes) to 38 inches (large sizes).**
• Height: **Typically around 19 inches for larger sizes.**
• Thickness: **Body thickness may range from 1 inch for larger sizes to 2.5mm for smaller sizes.**
• Lid Thickness: **Lid thickness may be around 1.6 inches.**
Capacity:
• **Can range from 370ml to 30 liters, depending on the size.**
Other features:
• Induction and Gas Stove Compatibility: **Many patilas are designed to work on both induction and gas stoves.**
• Dishwasher Safe: **Many stainless steel patilas are dishwasher safe.**

• Handles: **Typically made of stainless steel and designed for easy handling.**
•

VIII) Pak/Avaleh/Khand/ Modak/Lakayam

55. Bhatti
A "Bhatti" in an Ayurvedic pharmacy refers to a furnace or heating apparatus used in various processes, particularly those involving:
• **Paka:** Cooking or processing of herbal decoctions.
• **Bhasma preparation:** Calcination of metals or minerals.
• **Kupipakwa Rasayana:** High heat processing of minerals.
Here's a breakdown of the specifications for a Bhatti in an Ayurvedic pharmacy:
1. Types of Bhatti:
• **Traditional Bhatti:**
○ **Gogarbha Puta:** A pit-type furnace using cow dung cakes.
○ **Valuka Puta:** A furnace using sand as a heating medium.
○ **Gaja Puta:** A large pit used for high-temperature calcination.
• **Modern Bhatti:**
○ **Electric Furnace:** Uses electric heating elements.
○ **Gas Furnace:** Uses LPG or natural gas.
○ **Muffle Furnace:** Encloses the material to be heated in a chamber, allowing for precise temperature control.
2. Material of Construction:
• **Traditional:**
○ **Earthen materials:** Fire-resistant bricks, clay.
○ **Metals:** Iron, steel for support structures.
• **Modern:**
○ **Refractory bricks:** High-temperature insulating bricks.

○ **Steel casing:** To enclose and support the furnace.
○ **High-temperature alloys:** For heating elements (in electric furnaces).
3. Size and Dimensions:
• This varies greatly, ranging from small, portable Bhatti for specific procedures to large, stationary Bhatti for industrial-scale processing.
• Key dimensions include:
○ Inner chamber dimensions.
○ Overall dimensions of the Bhatti.
4. Heating Source:
• **Traditional:**
○ Cow dung cakes (for Gogarbha Puta).
○ Charcoal.
○ Wood.
• **Modern:**
○ Electricity (heating elements).
○ Gas (LPG, natural gas).
5. Temperature Range:
• Must be able to reach the required temperatures for the specific Ayurvedic processes (e.g., moderate for Paka, very high for Bhasma).
• For modern furnaces, this is a crucial specification, often with a range of several hundred to over a thousand degrees Celsius.
6. Temperature Control:
• **Traditional:** Relatively manual control, relying on fuel amount and airflow.
• **Modern:** Precise temperature control using thermostats and controllers, especially in electric and gas furnaces. Programmable controllers are used in advanced models.
7. Airflow Control:

- Proper ventilation is essential for combustion and temperature regulation.
- May involve dampers, vents, or forced air circulation.

8. Safety Features:

- **For Modern Furnaces:**
    - Over-temperature protection.
    - Automatic shut-off.
    - Insulation to prevent burns.
    - Flame sensors (for gas furnaces).
- **For all Bhatti:**
    - Proper placement and construction to prevent fire hazards.
    - Adequate ventilation in the Bhatti section of the pharmacy.

9. Flue/Chimney:

- To exhaust smoke and fumes, especially in fuel-based Bhatti.
- Proper height and design for efficient removal.

10. Insulation:

- To retain heat within the Bhatti and improve energy efficiency.
- Materials used include refractory bricks, ceramic fiber, and other high-temperature insulation.

11. Accessories:

- Tools for handling materials inside the Bhatti (tongs, crucibles, etc.).
- Temperature measurement devices (thermocouples, pyrometers).

Important Considerations for Ayurvedic Pharmacy Use:

- **GMP (Good Manufacturing Practices):** The Bhatti, especially modern ones, should be designed and constructed to meet GMP requirements, ensuring product quality and safety.
- **Safety:** Fire safety is paramount. The Bhatti section of the pharmacy should be properly designed and equipped. As mentioned, the Drugs and

Cosmetics Rules 1945 mention furnaces in the context of the pharmacy layout.
• Reference to the Drugs and Cosmetics Rules, 1945, particularly Schedule T, outlines the Good Manufacturing Practices (GMP) for Ayurvedic drugs.
• **Ventilation:** Proper ventilation is critical to remove smoke and fumes and maintain a safe working environment, especially if using traditional fuel sources.
• The search results state that the "furnace/Bhatti section should covered with tin roof and proper ventilation."
• **Fuel Availability:** Consider the availability and cost of the fuel source (electricity, gas, or traditional materials) in Challapalli.
56. Iron Kadahi
• Material: **Cast Iron.**
• Sizes:
○ **Small: 19-20cm diameter, 1.0-1.5kg weight.**
○ **Medium: 22-24cm diameter, 1.7-2.5kg weight.**
○ **Large: 27.5-28cm diameter, 3.0-3.5kg weight.**
• Capacity: **Varies from 1.3L to 3.3L, depending on the size.**
• Dimensions: **Typically range from 20cm to 28cm in diameter, with depths varying by size.**
• Weight: **Small kadais can weigh around 1.5kg, while larger ones can weigh over 3kg.**
• Handles: **Iron handles are common, with variations in shape and size.**
• Seasoning: **Many kadais are pre-seasoned, meaning they are ready to use out of the box.**
Example Specifications:
• Mini Kadai: **750ml capacity, 8-inch diameter, 1.6kg weight, 3-inch depth.**
• Small Kadai: **1500ml capacity, 9.5-inch diameter, 1.8kg weight, 3.5-inch depth.**
• Medium Kadai: **2500ml capacity, 10.5-inch diameter, 2.5kg weight, 4-inch depth.**

• Large Kadai: **3000ml capacity, 12-inch diameter, 3.6kg weight, 4.5-inch depth.**

57. Stainless Steel Patila
Material:
• Stainless Steel:
The most common material, typically 304 or 304L grade, known for its durability, corrosion resistance, and food-grade safety.
• Tri-ply Construction:
Some patilas may have three layers of stainless steel, with an aluminum core for enhanced heat distribution.
Dimensions:
• Diameter: **Can vary widely, from 14.5 cm (small sizes) to 38 inches (large sizes).**
• Height: **Typically around 19 inches for larger sizes.**
• Thickness: **Body thickness may range from 1 inch for larger sizes to 2.5mm for smaller sizes.**
• Lid Thickness: **Lid thickness may be around 1.6 inches.**
Capacity:
• **Can range from 370ml to 30 liters, depending on the size.**
Other features:
• Induction and Gas Stove Compatibility: **Many patilas are designed to work on both induction and gas stoves.**
• Dishwasher Safe: **Many stainless steel patilas are dishwasher safe.**
• Handles: **Typically made of stainless steel and designed for easy handling.**
•

58. Stainless Steel Storage Container
1. Material:

• Stainless Steel Grades:
Common grades are 304 and 316. Grade 316 is often preferred for food storage due to its superior chemical resistance, especially against acidic and salty substances.
• Rust Resistance:
Stainless steel is naturally rust-resistant, making it ideal for storing food and other items.
• Food Grade:
Many containers are specifically labeled as food-safe, ensuring they won't leach chemicals into stored food.
2. Capacity:
• Range:
Capacities vary widely, from small containers with a few hundred milliliters (e.g., 1000 ml) to large drums that can hold multiple liters (e.g., 10-50 L).
• Types:
You'll find containers for everything from individual portions to bulk storage.
3. Dimensions:
• Shape: **Available in various shapes like cylindrical, rectangular, and square.**
• Size: **Dimensions are usually specified in length, width, and height (e.g., 28L x 28W x 30H cm).**
• Weight: **Containers can range from lightweight to heavy depending on their size and capacity.**
4. Features:
• Airtight:
Many containers are designed to be airtight, helping to preserve food freshness and prevent moisture damage.
• Dishwasher Safe:
Many stainless steel containers are dishwasher safe, making them easy to clean.

IX) Panak, Syrup/Pravahi Kwath Manapaku

59. Tincture Press
• Material: **Typically made of food-grade stainless steel for the container and a heavy-duty base.**
• Capacity: **Varies, with common capacities ranging from 1 liter to larger volumes.**
• Pressing Mechanism: **Can be manual (screw-driven) or hydraulic.**
• Dimensions: **Typically has a base size of 8 inches x 5 inches and a height of 15 inches, with a total weight of approximately 4 kg.**
• Applications: **Used for extracting liquid from herbs, plants, and other materials for creating tinctures, which are concentrated liquid herbal extracts used as medicine.**
• Features: **Some models include features like a jali (mesh) for filtering, a spout for dispensing the extracted liquid, and a cast iron base for stability.**

60. Exhaust Fan
1. Airflow (CFM/CMH):
• CFM (Cubic Feet per Minute) **or** CMH (Cubic Meters per Hour) **indicates how much air the fan can move.**
• Room Size and Purpose: **Determine the room's volume (length x width x height). Different rooms require different levels of air changes per hour (ACH).**
○ Bathrooms: **A general guideline is 1 CFM per square foot of floor space, or aim for 8 ACH. For smaller bathrooms (under 50 sq ft), a minimum of 50 CFM is recommended. Add 50 CFM for each toilet, shower, or bathtub. For a jetted tub, add 100 CFM.**
○ Kitchens: **Due to cooking fumes and odors, higher CFM is usually needed. For a medium-sized kitchen, 100-200 CFM is a common range.**
○ Large Rooms: **For rooms over 100 sq ft, consider 1 CFM per square foot or more, or multiple fans.**
• Calculating Minimum CFM: **A common formula is: Room Volume (cubic feet) x Desired ACH / 60 (minutes per hour) = Minimum CFM.**
2. Fan Size (Sweep Diameter):
• **The diameter of the fan blades, usually measured in inches or millimeters.**

• **Common sizes in India include 4 inch (100mm), 6 inch (150mm), 9 inch (225mm), and 12 inch (300mm).**
• **Larger sweep sizes generally move more air.**
• **Ensure the fan fits the available space.**
3. Noise Level (Sones/dB):
• **Measured in** sones **or** decibels (dB)**. Lower numbers indicate quieter operation.**
• Sones: **1 sone is equivalent to the sound of a quiet refrigerator.**
○ **<1 sone: Barely audible (like a soft whisper)**
○ **1-2 sones: Can be heard but relatively quiet (like a refrigerator hum or calm office)**
○ **2.5 sones: Noticeable and may be disruptive**
• **For residential use, aim for a fan with a rating of 1.0 sone or less for quiet operation.**
4. Power Consumption (Watts):
• **Indicates the electrical power the fan uses.**
• **Average exhaust fans consume around 30-40 watts. Larger fans may consume more.**
• **Look for energy-efficient models with higher star ratings. BLDC (Brushless Direct Current) motor fans are known for their energy efficiency, typically consuming around 16-40 watts.**
• **Consider the usage duration to estimate monthly electricity costs**

61. Bhatti
A "Bhatti" in an Ayurvedic pharmacy refers to a furnace or heating apparatus used in various processes, particularly those involving:
• **Paka:** Cooking or processing of herbal decoctions.
• **Bhasma preparation:** Calcination of metals or minerals.
• **Kupipakwa Rasayana:** High heat processing of minerals.
Here's a breakdown of the specifications for a Bhatti in an Ayurvedic pharmacy:
1. Types of Bhatti:
• **Traditional Bhatti:**
○ **Gogarbha Puta:** A pit-type furnace using cow dung cakes.

○ **Valuka Puta:** A furnace using sand as a heating medium.
○ **Gaja Puta:** A large pit used for high-temperature calcination.
• **Modern Bhatti:**
○ **Electric Furnace:** Uses electric heating elements.
○ **Gas Furnace:** Uses LPG or natural gas.
○ **Muffle Furnace:** Encloses the material to be heated in a chamber, allowing for precise temperature control.
2. Material of Construction:
• **Traditional:**
○ **Earthen materials:** Fire-resistant bricks, clay.
○ **Metals:** Iron, steel for support structures.
• **Modern:**
○ **Refractory bricks:** High-temperature insulating bricks.
○ **Steel casing:** To enclose and support the furnace.
○ **High-temperature alloys:** For heating elements (in electric furnaces).
3. Size and Dimensions:
• This varies greatly, ranging from small, portable Bhatti for specific procedures to large, stationary Bhatti for industrial-scale processing.
• Key dimensions include:
○ Inner chamber dimensions.
○ Overall dimensions of the Bhatti.
4. Heating Source:
• **Traditional:**
○ Cow dung cakes (for Gogarbha Puta).
○ Charcoal.

○ Wood.
• **Modern:**
○ Electricity (heating elements).
○ Gas (LPG, natural gas).
5. Temperature Range:
• Must be able to reach the required temperatures for the specific Ayurvedic processes (e.g., moderate for Paka, very high for Bhasma).
• For modern furnaces, this is a crucial specification, often with a range of several hundred to over a thousand degrees Celsius.
6. Temperature Control:
• **Traditional:** Relatively manual control, relying on fuel amount and airflow.
• **Modern:** Precise temperature control using thermostats and controllers, especially in electric and gas furnaces. Programmable controllers are used in advanced models.
7. Airflow Control:
• Proper ventilation is essential for combustion and temperature regulation.
• May involve dampers, vents, or forced air circulation.
8. Safety Features:
• **For Modern Furnaces:**
○ Over-temperature protection.
○ Automatic shut-off.
○ Insulation to prevent burns.
○ Flame sensors (for gas furnaces).
• **For all Bhatti:**
○ Proper placement and construction to prevent fire hazards.
○ Adequate ventilation in the Bhatti section of the pharmacy.
9. Flue/Chimney:

• To exhaust smoke and fumes, especially in fuel-based Bhatti.
• Proper height and design for efficient removal.
10. Insulation:
• To retain heat within the Bhatti and improve energy efficiency.
• Materials used include refractory bricks, ceramic fiber, and other high-temperature insulation.
11. Accessories:
• Tools for handling materials inside the Bhatti (tongs, crucibles, etc.).
• Temperature measurement devices (thermocouples, pyrometers).
Important Considerations for Ayurvedic Pharmacy Use:
• **GMP (Good Manufacturing Practices):** The Bhatti, especially modern ones, should be designed and constructed to meet GMP requirements, ensuring product quality and safety.
• **Safety:** Fire safety is paramount. The Bhatti section of the pharmacy should be properly designed and equipped. As mentioned, the Drugs and Cosmetics Rules 1945 mention furnaces in the context of the pharmacy layout.
• Reference to the Drugs and Cosmetics Rules, 1945, particularly Schedule T, outlines the Good Manufacturing Practices (GMP) for Ayurvedic drugs.
• **Ventilation:** Proper ventilation is critical to remove smoke and fumes and maintain a safe working environment, especially if using traditional fuel sources.
• The search results state that the "furnace/Bhatti section should covered with tin roof and proper ventilation."
• **Fuel Availability:** Consider the availability and cost of the fuel source (electricity, gas, or traditional materials) in Challapalli.

62. Bottle Washing Machine
• Output Capacity:
This refers to the number of bottles the machine can wash per hour. Typical ranges are from 1000 to 8000 bottles per hour.

• Bottle Size:
This includes the bottle diameter and height, as well as the neck diameter. Typical ranges are 15-75mm diameter, up to 280mm height, and 20-38mm neck diameter.
• Working Height:
This is the height at which the machine operates, typically adjustable.
• Wash Cycle:
The number of wash cycles (inner and outer) the machine performs. Common configurations include 4 inner + 1 outer.
• Power Consumption:
The amount of power the machine uses, typically measured in kilowatts (KW).
• Air Consumption:
The amount of air required for operation, often specified in CFM (cubic feet per minute) or liters per hour.
• Water Consumption:
The amount of water the machine uses per bottle washed, usually in liters per hour.
Rotary Bottle Washing Machines:
• Rotary Action: **These machines use a rotating platform to move bottles through the wash cycle.**
• Number of Heads: **Some machines have multiple washing heads (e.g., 12 heads).**
• Tank Capacity: **The size of the water tank(s) used for washing, often in liters.**
Linear Bottle Washing Machines:
• Linear Conveyor: **These machines use a conveyor belt to move bottles through the wash cycle.**
• Washing Position: **Linear machines can have multiple washing positions for a more thorough clean.**
Other Important Considerations:
• Automation Grade:

Machines can be fully automatic, semi-automatic, or manual.
• Material:
Machines are typically made of stainless steel (SS 304 or SS 316) for durability and hygiene.
• Electrical Supply:
Machines typically require a three-phase power supply, often at 415 or 440 volts.
• Dimensions and Weight:
Machine dimensions and weight vary depending on the size and type of machine.

63. Alchohol Filter Press Machine
□ Filtration Capacity: **This varies widely depending on the machine model, ranging from 1-500 liters/hour to over 3000 liters/hour. Some machines specify capacity in LPH (liters per hour).**
□ Number of Plates: **Typically ranges from 6 to 50 or more, influencing the filtration area and capacity. Some common ranges are 10-20 plates or even up to 50+ in some designs.**
□ Filter Area: **Usually less than 100 square meters in many models, but can vary.**
□ Max Pressure: **Commonly around 5 KG/CM2 (kilograms per square centimeter), but some can go higher.**
□ Material: **Often constructed from stainless steel (SS 304 or SS 316/316L) for corrosion resistance and hygiene. Some may use other materials like PP (polypropylene) for certain components.**
□ Automation Grade: **Available in automatic, semi-automatic, and sometimes manual configurations.**
□ Filter Type: **Different designs exist, including plate and frame (sparkler type, zero hold-up type), cartridge filters (vertical or cylinder types).**
□ Diameter of Plates: **Can range from 8" to 33" or more, affecting the filtration area and capacity.**
□ Cake Holding Capacity: **Measured in liters and depends on the size and number of plates.**
□ Operating Temperature: **Typically around 60°C for some models.**

64. Gravity Filter
• Capacity:

Gravity filters come in various capacities, with some holding up to 20 liters of water.
• Materials:
They are commonly constructed from stainless steel or plastic.
• Filtration:
Gravity filters utilize gravity and a combination of materials like ceramic candles, activated carbon, and membranes to purify water.
• No Electricity:
A key feature of gravity filters is that they do not require electricity to operate, making them suitable for areas with limited or no power.
Filtration Details:
• Bacteria and Parasites:
Gravity filters effectively remove bacteria and parasites, with some models claiming to remove up to 99.999999% of bacteria and 99.999% of parasites.
• Contaminants:
They also remove contaminants like microplastics, silt, sand, and cloudiness.
• Mineral Retention:
Some gravity filters are designed to retain essential minerals in the water while removing impurities.
Other Features:
• Anti-bacterial Properties: **Some filters incorporate anti-bacterial formulations to inhibit microbiological growth.**
• Maintenance: **Some models claim to require minimal maintenance and no annual maintenance services.**
• Water Wastage: **Many gravity filters are designed to minimize water wastage.**

65. Liquid Filling Machine
1. Filling Range & Capacity:
• Filling Volume:

Machines can handle a wide range of fill volumes, from a few milliliters to several liters, depending on the model and the application.
• Bottles Per Minute/Hour:
Production speed is crucial, with machines offering different filling rates, from a few to hundreds of bottles per minute, or thousands per hour.
2. Automation Level:
• Semi-Automatic:
Requires some manual input, such as bottle placement and triggering the filling process.
• Automatic:
Fully automated, including bottle handling, filling, and sometimes capping.
3. Filling Method:
• Volumetric: **Uses a precise volume of liquid to fill each container.**
• Gravitational: **Employs gravity to fill containers with a consistent level.**
• Pneumatic: **Uses compressed air to fill containers.**
• Gear Pump: **Employs a gear pump to accurately transfer liquid to containers.**
4. Electrical Specifications:
• Voltage: **Typical voltages include 230V or 415V, depending on the region and machine type.**
• Frequency: **Standard frequency is 50Hz.**
• Power (HP): **Power requirements vary depending on the machine's size and complexity, ranging from 0.5 to 2 HP or more.**
5. Material Handling:
• Bottle Shapes:
Machines can handle various bottle shapes, including round, square, and rectangular.
• Bottle Sizes:
The machine's capacity to handle different bottle sizes and diameters needs to be considered.
• Filling Materials:

The machine should be compatible with the specific liquids being filled, considering viscosity and potential corrosiveness.
• Change Parts:
Many machines use change parts to accommodate different bottle sizes and filling ranges.

66. Pilfer Proof Capping Machine
• **Cap Type:**
The machine is designed for specific cap types, such as ROPP (Roll-On Pilfer Proof), which are common in food, beverage, and pharmaceutical packaging.
• **Capacity:**
Automatic machines can handle high production rates, with some models capping 1500 bottles per hour. Manual machines have lower capacities, such as 300-600 bottles per hour.
• **Bottle Size:**
Machines are designed to accommodate various bottle sizes, with some models handling bottles with diameters ranging from 35-120mm and heights from 40-250mm.
• **Torque Adjustment:**
Many machines feature adjustable torque settings to ensure the correct tightness of the cap.
• **Material:**
Machine components are typically made of mild steel, ensuring durability and resistance to wear.
• **Operation:**
Machines can be manual, semi-automatic (with manual cap placement), or fully automated (with automated cap feeding and handling).

X) Asava/Arishta

67. Tincture Press
• Material: **Typically made of food-grade stainless steel for the container and a heavy-duty base.**
• Capacity: **Varies, with common capacities ranging from 1 liter to larger volumes.**
• Pressing Mechanism: **Can be manual (screw-driven) or hydraulic.**
• Dimensions: **Typically has a base size of 8 inches x 5 inches and a height of 15 inches, with a total weight of approximately 4 kg.**
• Applications: **Used for extracting liquid from herbs, plants, and other materials for creating tinctures, which are concentrated liquid herbal extracts used as medicine.**
• Features: **Some models include features like a jali (mesh) for filtering, a spout for dispensing the extracted liquid, and a cast iron base for stability.**

68. Exhaust Fan
1. Airflow (CFM/CMH):
• CFM (Cubic Feet per Minute) **or** CMH (Cubic Meters per Hour) **indicates how much air the fan can move.**
• Room Size and Purpose: **Determine the room's volume (length x width x height). Different rooms require different levels of air changes per hour (ACH).**
○ Bathrooms: **A general guideline is 1 CFM per square foot of floor space, or aim for 8 ACH. For smaller bathrooms (under 50 sq ft), a minimum of 50 CFM is recommended. Add 50 CFM for each toilet, shower, or bathtub. For a jetted tub, add 100 CFM.**
○ Kitchens: **Due to cooking fumes and odors, higher CFM is usually needed. For a medium-sized kitchen, 100-200 CFM is a common range.**
○ Large Rooms: **For rooms over 100 sq ft, consider 1 CFM per square foot or more, or multiple fans.**
• Calculating Minimum CFM: **A common formula is: Room Volume (cubic feet) x Desired ACH / 60 (minutes per hour) = Minimum CFM.**
2. Fan Size (Sweep Diameter):

• **The diameter of the fan blades, usually measured in inches or millimeters.**
• **Common sizes in India include 4 inch (100mm), 6 inch (150mm), 9 inch (225mm), and 12 inch (300mm).**
• **Larger sweep sizes generally move more air.**
• **Ensure the fan fits the available space.**
3. Noise Level (Sones/dB):
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• **For residential use, aim for a fan with a rating of 1.0 sone or less for quiet operation.**
4. Power Consumption (Watts):
• **Indicates the electrical power the fan uses.**
• **Average exhaust fans consume around 30-40 watts. Larger fans may consume more.**
• **Look for energy-efficient models with higher star ratings. BLDC (Brushless Direct Current) motor fans are known for their energy efficiency, typically consuming around 16-40 watts.**
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○ **Steel casing:** To enclose and support the furnace.
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• This varies greatly, ranging from small, portable Bhatti for specific procedures to large, stationary Bhatti for industrial-scale processing.
• Key dimensions include:
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4. Heating Source:
• **Traditional:**
○ Cow dung cakes (for Gogarbha Puta).

○ Charcoal.
○ Wood.
• **Modern:**
○ Electricity (heating elements).
○ Gas (LPG, natural gas).
5. Temperature Range:
• Must be able to reach the required temperatures for the specific Ayurvedic processes (e.g., moderate for Paka, very high for Bhasma).
• For modern furnaces, this is a crucial specification, often with a range of several hundred to over a thousand degrees Celsius.
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• Proper ventilation is essential for combustion and temperature regulation.
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8. Safety Features:
• **For Modern Furnaces:**
○ Over-temperature protection.
○ Automatic shut-off.
○ Insulation to prevent burns.
○ Flame sensors (for gas furnaces).
• **For all Bhatti:**
○ Proper placement and construction to prevent fire hazards.
○ Adequate ventilation in the Bhatti section of the pharmacy.

9. Flue/Chimney:
• To exhaust smoke and fumes, especially in fuel-based Bhatti.
• Proper height and design for efficient removal.
10. Insulation:
• To retain heat within the Bhatti and improve energy efficiency.
• Materials used include refractory bricks, ceramic fiber, and other high-temperature insulation.
11. Accessories:
• Tools for handling materials inside the Bhatti (tongs, crucibles, etc.).
• Temperature measurement devices (thermocouples, pyrometers).
Important Considerations for Ayurvedic Pharmacy Use:
• **GMP (Good Manufacturing Practices):** The Bhatti, especially modern ones, should be designed and constructed to meet GMP requirements, ensuring product quality and safety.
• **Safety:** Fire safety is paramount. The Bhatti section of the pharmacy should be properly designed and equipped. As mentioned, the Drugs and Cosmetics Rules 1945 mention furnaces in the context of the pharmacy layout.
• Reference to the Drugs and Cosmetics Rules, 1945, particularly Schedule T, outlines the Good Manufacturing Practices (GMP) for Ayurvedic drugs.
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• The search results state that the "furnace/Bhatti section should covered with tin roof and proper ventilation."
• **Fuel Availability:** Consider the availability and cost of the fuel source (electricity, gas, or traditional materials) in Challapalli.

70. Bottle Washing Machine
• Output Capacity:
This refers to the number of bottles the machine can wash per hour. Typical ranges are from 1000 to 8000 bottles per hour.

• Bottle Size:
This includes the bottle diameter and height, as well as the neck diameter. Typical ranges are 15-75mm diameter, up to 280mm height, and 20-38mm neck diameter.
• Working Height:
This is the height at which the machine operates, typically adjustable.
• Wash Cycle:
The number of wash cycles (inner and outer) the machine performs. Common configurations include 4 inner + 1 outer.
• Power Consumption:
The amount of power the machine uses, typically measured in kilowatts (KW).
• Air Consumption:
The amount of air required for operation, often specified in CFM (cubic feet per minute) or liters per hour.
• Water Consumption:
The amount of water the machine uses per bottle washed, usually in liters per hour.
Rotary Bottle Washing Machines:
• Rotary Action: **These machines use a rotating platform to move bottles through the wash cycle.**
• Number of Heads: **Some machines have multiple washing heads (e.g., 12 heads).**
• Tank Capacity: **The size of the water tank(s) used for washing, often in liters.**
Linear Bottle Washing Machines:
• Linear Conveyor: **These machines use a conveyor belt to move bottles through the wash cycle.**
• Washing Position: **Linear machines can have multiple washing positions for a more thorough clean.**
Other Important Considerations:
• Automation Grade:

Machines can be fully automatic, semi-automatic, or manual.
• Material:
Machines are typically made of stainless steel (SS 304 or SS 316) for durability and hygiene.
• Electrical Supply:
Machines typically require a three-phase power supply, often at 415 or 440 volts.
• Dimensions and Weight:
Machine dimensions and weight vary depending on the size and type of machine.

71. Gravity Filter
• Capacity:
Gravity filters come in various capacities, with some holding up to 20 liters of water.
• Materials:
They are commonly constructed from stainless steel or plastic.
• Filtration:
Gravity filters utilize gravity and a combination of materials like ceramic candles, activated carbon, and membranes to purify water.
• No Electricity:
A key feature of gravity filters is that they do not require electricity to operate, making them suitable for areas with limited or no power.
Filtration Details:
• Bacteria and Parasites:
Gravity filters effectively remove bacteria and parasites, with some models claiming to remove up to 99.999999% of bacteria and 99.999% of parasites.
• Contaminants:

They also remove contaminants like microplastics, silt, sand, and cloudiness.
• Mineral Retention:
Some gravity filters are designed to retain essential minerals in the water while removing impurities.
Other Features:
• Anti-bacterial Properties: **Some filters incorporate anti-bacterial formulations to inhibit microbiological growth.**
• Maintenance: **Some models claim to require minimal maintenance and no annual maintenance services.**
• Water Wastage: **Many gravity filters are designed to minimize water wastage.**

72. Liquid Filling Machine
1. Filling Range & Capacity:
• Filling Volume:
Machines can handle a wide range of fill volumes, from a few milliliters to several liters, depending on the model and the application.
• Bottles Per Minute/Hour:
Production speed is crucial, with machines offering different filling rates, from a few to hundreds of bottles per minute, or thousands per hour.
2. Automation Level:
• Semi-Automatic:
Requires some manual input, such as bottle placement and triggering the filling process.
• Automatic:
Fully automated, including bottle handling, filling, and sometimes capping.
3. Filling Method:
• Volumetric: **Uses a precise volume of liquid to fill each container.**
• Gravitational: **Employs gravity to fill containers with a consistent level.**
• Pneumatic: **Uses compressed air to fill containers.**

• Gear Pump: **Employs a gear pump to accurately transfer liquid to containers.**
4. Electrical Specifications:
• Voltage: **Typical voltages include 230V or 415V, depending on the region and machine type.**
• Frequency: **Standard frequency is 50Hz.**
• Power (HP): **Power requirements vary depending on the machine's size and complexity, ranging from 0.5 to 2 HP or more.**
5. Material Handling:
• Bottle Shapes:
Machines can handle various bottle shapes, including round, square, and rectangular.
• Bottle Sizes:
The machine's capacity to handle different bottle sizes and diameters needs to be considered.
• Filling Materials:
The machine should be compatible with the specific liquids being filled, considering viscosity and potential corrosiveness.
• Change Parts:
Many machines use change parts to accommodate different bottle sizes and filling ranges.

73. Pilfer Proof Capping Machine
• **Cap Type:**
The machine is designed for specific cap types, such as ROPP (Roll-On Pilfer Proof), which are common in food, beverage, and pharmaceutical packaging.
• **Capacity:**
Automatic machines can handle high production rates, with some models capping 1500 bottles per hour. Manual machines have lower capacities, such as 300-600 bottles per hour.
• **Bottle Size:**

Machines are designed to accommodate various bottle sizes, with some models handling bottles with diameters ranging from 35-120mm and heights from 40-250mm.
• **Torque Adjustment:**
Many machines feature adjustable torque settings to ensure the correct tightness of the cap.
• **Material:**
Machine components are typically made of mild steel, ensuring durability and resistance to wear.
• **Operation:**
Machines can be manual, semi-automatic (with manual cap placement), or fully automated (with automated cap feeding and handling).

74. Fermentation Tanks
• **Capacity:**
• Ranging from small homebrew fermenters (20 liters) to large industrial tanks (5,000 liters or more).
• Units can be described in liters, barrels (bbls), or gallons.
• **Material:**
• Primarily made of food-grade stainless steel (304 or 316) for durability, hygiene, and resistance to corrosion.
• Other materials like plastic may be used in smaller tanks.
• **Shape and Bottom:**
• Commonly conical, but can also be cylindrical or flat inclined.
• Conical bottoms facilitate sediment removal and racking.
• **Temperature Control:**
• Insulation and double jackets are common to maintain consistent temperature during fermentation.
• Temperature gauges and control panels allow for monitoring and adjustment.
• **Cleaning System:**

• Built-in CIP (Cleaning In Place) systems for efficient cleaning and sanitation.
• **Accessories:**
• Airlocks, spigots, sparge arms, racking ports, and other fittings can be included depending on the application.
• **Dimensions:**
• Specific dimensions will vary depending on the capacity and manufacturer.
• Examples include 860mm diameter x 1680mm height for a 500L tank or 1900mm diameter x 3105mm height for a 5,000L tank.
• **Other Features:**
• Seamless construction for smooth interior surfaces and easy cleaning.
• Optional temperature control systems and support systems with wheels or adjustable legs.
• Compliance with standards like APEX and CE.

75. Containers (L)
• Inside Length: **5.895 meters**
• Inside Width: **2.350 meters**
• Inside Height: **2.392 meters**
• Door Width: **2.340 meters**
• Door Height: **2.292 meters**
• Capacity: **33 cubic meters**
• Tare Weight: **2230 kg**
• Max Cargo Weight: **28230 kg**

76. Distillation Plant
• Material: **304 grade stainless steel is a common choice for the main body.**
• Power Supply: **Typically 220 Volts.**
• Operating Modes: **May be automatic or have manual controls.**
Specifics of Water Distillation Units:
• Capacity: **Ranges from 4 to 10 liters per hour.**
• Distillate Temperature: **Typically between 25°C and 40°C.**
• Output Conductivity: **May have a conductivity range of 1.5-2.0 µS/cm.**
• Output pH: **Often in the range of 5.5 - 6.0.**
• Power Consumption: **Heaters can range from 1.5 kW to 3 kW.**
Optional Features:
• Safety Features: **Low water cut-off probes, mains/heating indicators.**
• Monitoring: **Optical beam sensors, audio alarms.**
• Storage: **Quartz storage vessels.**
• Condensation: **Additional bulb condensers.**
• Water Quality: **Water softeners for boiler input.**
• Control: **Solenoid valves, MCB for short circuit protection.**
Other Considerations:
• Type: **Can be single or double stage, vertical or horizontal.**
• Heaters: **May use quartz heaters.**
• Condensers: **May be made of SS 304.**
• Standards: **Units may be certified to safety standards like CE and UL**

77. Alchohol Filter Press Machine
Filtration Capacity: **This varies widely depending on the machine model, ranging from 1-500 liters/hour to over 3000 liters/hour. Some machines specify capacity in LPH (liters per hour).**

Number of Plates: **Typically ranges from 6 to 50 or more, influencing the filtration area and capacity. Some common ranges are 10-20 plates or even up to 50+ in some designs.**
Filter Area: **Usually less than 100 square meters in many models, but can vary.**
Max Pressure: **Commonly around 5 KG/CM2 (kilograms per square centimeter), but some can go higher.**
Material: **Often constructed from stainless steel (SS 304 or SS 316/316L) for corrosion resistance and hygiene. Some may use other materials like PP (polypropylene) for certain components.**
Automation Grade: **Available in automatic, semi-automatic, and sometimes manual configurations.**
Filter Type: **Different designs exist, including plate and frame (sparkler type, zero hold-up type), cartridge filters (vertical or cylinder types).**
Diameter of Plates: **Can range from 8" to 33" or more, affecting the filtration area and capacity.**
Cake Holding Capacity: **Measured in liters and depends on the size and number of plates.**
Operating Temperature: **Typically around 60°C for some models.**

XI) Sura

78. Tincture Press
• Material: **Typically made of food-grade stainless steel for the container and a heavy-duty base.**
• Capacity: **Varies, with common capacities ranging from 1 liter to larger volumes.**
• Pressing Mechanism: **Can be manual (screw-driven) or hydraulic.**
• Dimensions: **Typically has a base size of 8 inches x 5 inches and a height of 15 inches, with a total weight of approximately 4 kg.**
• Applications: **Used for extracting liquid from herbs, plants, and other materials for creating tinctures, which are concentrated liquid herbal extracts used as medicine.**
• Features: **Some models include features like a jali (mesh) for filtering, a spout for dispensing the extracted liquid, and a cast iron base for stability.**

79. Exhaust Fan
1. Airflow (CFM/CMH):
• CFM (Cubic Feet per Minute) **or** CMH (Cubic Meters per Hour) **indicates how much air the fan can move.**
• Room Size and Purpose: **Determine the room's volume (length x width x height). Different rooms require different levels of air changes per hour (ACH).**
○ Bathrooms: **A general guideline is 1 CFM per square foot of floor space, or aim for 8 ACH. For smaller bathrooms (under 50 sq ft), a minimum of 50 CFM is recommended. Add 50 CFM for each toilet, shower, or bathtub. For a jetted tub, add 100 CFM.**
○ Kitchens: **Due to cooking fumes and odors, higher CFM is usually needed. For a medium-sized kitchen, 100-200 CFM is a common range.**
○ Large Rooms: **For rooms over 100 sq ft, consider 1 CFM per square foot or more, or multiple fans.**
• Calculating Minimum CFM: **A common formula is: Room Volume (cubic feet) x Desired ACH / 60 (minutes per hour) = Minimum CFM.**
2. Fan Size (Sweep Diameter):
• **The diameter of the fan blades, usually measured in inches or millimeters.**
• **Common sizes in India include 4 inch (100mm), 6 inch (150mm), 9 inch (225mm), and 12 inch (300mm).**
• **Larger sweep sizes generally move more air.**
• **Ensure the fan fits the available space.**
3. Noise Level (Sones/dB):
• **Measured in** sones **or** decibels (dB)**. Lower numbers indicate quieter operation.**
• Sones: **1 sone is equivalent to the sound of a quiet refrigerator.**
○ **<1 sone: Barely audible (like a soft whisper)**
○ **1-2 sones: Can be heard but relatively quiet (like a refrigerator hum or calm office)**
○ **2.5 sones: Noticeable and may be disruptive**
• **For residential use, aim for a fan with a rating of 1.0 sone or less for quiet operation.**
4. Power Consumption (Watts):
• **Indicates the electrical power the fan uses.**

- **Average exhaust fans consume around 30-40 watts. Larger fans may consume more.**
- **Look for energy-efficient models with higher star ratings. BLDC (Brushless Direct Current) motor fans are known for their energy efficiency, typically consuming around 16-40 watts.**
- **Consider the usage duration to estimate monthly electricity costs**

80. Bhatti

A "Bhatti" in an Ayurvedic pharmacy refers to a furnace or heating apparatus used in various processes, particularly those involving:

- **Paka:** Cooking or processing of herbal decoctions.
- **Bhasma preparation:** Calcination of metals or minerals.
- **Kupipakwa Rasayana:** High heat processing of minerals.

Here's a breakdown of the specifications for a Bhatti in an Ayurvedic pharmacy:

1. Types of Bhatti:

- **Traditional Bhatti:**
  - **Gogarbha Puta:** A pit-type furnace using cow dung cakes.
  - **Valuka Puta:** A furnace using sand as a heating medium.
  - **Gaja Puta:** A large pit used for high-temperature calcination.
- **Modern Bhatti:**
  - **Electric Furnace:** Uses electric heating elements.
  - **Gas Furnace:** Uses LPG or natural gas.
  - **Muffle Furnace:** Encloses the material to be heated in a chamber, allowing for precise temperature control.

2. Material of Construction:

- **Traditional:**
  - **Earthen materials:** Fire-resistant bricks, clay.
  - **Metals:** Iron, steel for support structures.

- **Modern:**
    - **Refractory bricks:** High-temperature insulating bricks.
    - **Steel casing:** To enclose and support the furnace.
    - **High-temperature alloys:** For heating elements (in electric furnaces).

3. Size and Dimensions:

- This varies greatly, ranging from small, portable Bhatti for specific procedures to large, stationary Bhatti for industrial-scale processing.
- Key dimensions include:
    - Inner chamber dimensions.
    - Overall dimensions of the Bhatti.

4. Heating Source:

- **Traditional:**
    - Cow dung cakes (for Gogarbha Puta).
    - Charcoal.
    - Wood.
- **Modern:**
    - Electricity (heating elements).
    - Gas (LPG, natural gas).

5. Temperature Range:

- Must be able to reach the required temperatures for the specific Ayurvedic processes (e.g., moderate for Paka, very high for Bhasma).
- For modern furnaces, this is a crucial specification, often with a range of several hundred to over a thousand degrees Celsius.

6. Temperature Control:

- **Traditional:** Relatively manual control, relying on fuel amount and airflow.

- **Modern:** Precise temperature control using thermostats and controllers, especially in electric and gas furnaces. Programmable controllers are used in advanced models.

7. Airflow Control:

- Proper ventilation is essential for combustion and temperature regulation.
- May involve dampers, vents, or forced air circulation.

8. Safety Features:

- **For Modern Furnaces:**
    - Over-temperature protection.
    - Automatic shut-off.
    - Insulation to prevent burns.
    - Flame sensors (for gas furnaces).
- **For all Bhatti:**
    - Proper placement and construction to prevent fire hazards.
    - Adequate ventilation in the Bhatti section of the pharmacy.

9. Flue/Chimney:

- To exhaust smoke and fumes, especially in fuel-based Bhatti.
- Proper height and design for efficient removal.

10. Insulation:

- To retain heat within the Bhatti and improve energy efficiency.
- Materials used include refractory bricks, ceramic fiber, and other high-temperature insulation.

11. Accessories:

- Tools for handling materials inside the Bhatti (tongs, crucibles, etc.).
- Temperature measurement devices (thermocouples, pyrometers).

Important Considerations for Ayurvedic Pharmacy Use:

• **GMP (Good Manufacturing Practices):** The Bhatti, especially modern ones, should be designed and constructed to meet GMP requirements, ensuring product quality and safety.
• **Safety:** Fire safety is paramount. The Bhatti section of the pharmacy should be properly designed and equipped. As mentioned, the Drugs and Cosmetics Rules 1945 mention furnaces in the context of the pharmacy layout.
• Reference to the Drugs and Cosmetics Rules, 1945, particularly Schedule T, outlines the Good Manufacturing Practices (GMP) for Ayurvedic drugs.
• **Ventilation:** Proper ventilation is critical to remove smoke and fumes and maintain a safe working environment, especially if using traditional fuel sources.
• The search results state that the "furnace/Bhatti section should covered with tin roof and proper ventilation."
• **Fuel Availability:** Consider the availability and cost of the fuel source (electricity, gas, or traditional materials) in Challapalli.

81. Bottle Washing Machine
• Output Capacity:
This refers to the number of bottles the machine can wash per hour. Typical ranges are from 1000 to 8000 bottles per hour.
• Bottle Size:
This includes the bottle diameter and height, as well as the neck diameter. Typical ranges are 15-75mm diameter, up to 280mm height, and 20-38mm neck diameter.
• Working Height:
This is the height at which the machine operates, typically adjustable.
• Wash Cycle:
The number of wash cycles (inner and outer) the machine performs. Common configurations include 4 inner + 1 outer.
• Power Consumption:

The amount of power the machine uses, typically measured in kilowatts (KW).
• Air Consumption:
The amount of air required for operation, often specified in CFM (cubic feet per minute) or liters per hour.
• Water Consumption:
The amount of water the machine uses per bottle washed, usually in liters per hour.
Rotary Bottle Washing Machines:
• Rotary Action: **These machines use a rotating platform to move bottles through the wash cycle.**
• Number of Heads: **Some machines have multiple washing heads (e.g., 12 heads).**
• Tank Capacity: **The size of the water tank(s) used for washing, often in liters.**
Linear Bottle Washing Machines:
• Linear Conveyor: **These machines use a conveyor belt to move bottles through the wash cycle.**
• Washing Position: **Linear machines can have multiple washing positions for a more thorough clean.**
Other Important Considerations:
• Automation Grade:
Machines can be fully automatic, semi-automatic, or manual.
• Material:
Machines are typically made of stainless steel (SS 304 or SS 316) for durability and hygiene.
• Electrical Supply:
Machines typically require a three-phase power supply, often at 415 or 440 volts.
• Dimensions and Weight:
Machine dimensions and weight vary depending on the size and type of machine.

82. Gravity Filter
• Capacity:
Gravity filters come in various capacities, with some holding up to 20 liters of water.
• Materials:
They are commonly constructed from stainless steel or plastic.
• Filtration:
Gravity filters utilize gravity and a combination of materials like ceramic candles, activated carbon, and membranes to purify water.
• No Electricity:
A key feature of gravity filters is that they do not require electricity to operate, making them suitable for areas with limited or no power.
Filtration Details:
• Bacteria and Parasites:
Gravity filters effectively remove bacteria and parasites, with some models claiming to remove up to 99.999999% of bacteria and 99.999% of parasites.
• Contaminants:
They also remove contaminants like microplastics, silt, sand, and cloudiness.
• Mineral Retention:
Some gravity filters are designed to retain essential minerals in the water while removing impurities.
Other Features:
• Anti-bacterial Properties: **Some filters incorporate anti-bacterial formulations to inhibit microbiological growth.**
• Maintenance: **Some models claim to require minimal maintenance and no annual maintenance services.**
• Water Wastage: **Many gravity filters are designed to minimize water wastage.**

83. Liquid Filling Machine
1. Filling Range & Capacity:
• Filling Volume:
Machines can handle a wide range of fill volumes, from a few milliliters to several liters, depending on the model and the application.
• Bottles Per Minute/Hour:
Production speed is crucial, with machines offering different filling rates, from a few to hundreds of bottles per minute, or thousands per hour.
2. Automation Level:
• Semi-Automatic:
Requires some manual input, such as bottle placement and triggering the filling process.
• Automatic:
Fully automated, including bottle handling, filling, and sometimes capping.
3. Filling Method:
• Volumetric: **Uses a precise volume of liquid to fill each container.**
• Gravitational: **Employs gravity to fill containers with a consistent level.**
• Pneumatic: **Uses compressed air to fill containers.**
• Gear Pump: **Employs a gear pump to accurately transfer liquid to containers.**
4. Electrical Specifications:
• Voltage: **Typical voltages include 230V or 415V, depending on the region and machine type.**
• Frequency: **Standard frequency is 50Hz.**
• Power (HP): **Power requirements vary depending on the machine's size and complexity, ranging from 0.5 to 2 HP or more.**
5. Material Handling:
• Bottle Shapes:
Machines can handle various bottle shapes, including round, square, and rectangular.

• Bottle Sizes:
The machine's capacity to handle different bottle sizes and diameters needs to be considered.
• Filling Materials:
The machine should be compatible with the specific liquids being filled, considering viscosity and potential corrosiveness.
• Change Parts:
Many machines use change parts to accommodate different bottle sizes and filling ranges.

84. Pilfer Proof Capping Machine
• **Cap Type:**
The machine is designed for specific cap types, such as ROPP (Roll-On Pilfer Proof), which are common in food, beverage, and pharmaceutical packaging.
• **Capacity:**
Automatic machines can handle high production rates, with some models capping 1500 bottles per hour. Manual machines have lower capacities, such as 300-600 bottles per hour.
• **Bottle Size:**
Machines are designed to accommodate various bottle sizes, with some models handling bottles with diameters ranging from 35-120mm and heights from 40-250mm.
• **Torque Adjustment:**
Many machines feature adjustable torque settings to ensure the correct tightness of the cap.
• **Material:**
Machine components are typically made of mild steel, ensuring durability and resistance to wear.
• **Operation:**
Machines can be manual, semi-automatic (with manual cap placement), or fully automated (with automated cap feeding and handling).

85. Fermentation Tanks
• **Capacity:**
• Ranging from small homebrew fermenters (20 liters) to large industrial tanks (5,000 liters or more).
• Units can be described in liters, barrels (bbls), or gallons.
• **Material:**
• Primarily made of food-grade stainless steel (304 or 316) for durability, hygiene, and resistance to corrosion.
• Other materials like plastic may be used in smaller tanks.
• **Shape and Bottom:**
• Commonly conical, but can also be cylindrical or flat inclined.
• Conical bottoms facilitate sediment removal and racking.
• **Temperature Control:**
• Insulation and double jackets are common to maintain consistent temperature during fermentation.
• Temperature gauges and control panels allow for monitoring and adjustment.
• **Cleaning System:**
• Built-in CIP (Cleaning In Place) systems for efficient cleaning and sanitation.
• **Accessories:**
• Airlocks, spigots, sparge arms, racking ports, and other fittings can be included depending on the application.
• **Dimensions:**
• Specific dimensions will vary depending on the capacity and manufacturer.
• Examples include 860mm diameter x 1680mm height for a 500L tank or 1900mm diameter x 3105mm height for a 5,000L tank.
• **Other Features:**
• Seamless construction for smooth interior surfaces and easy cleaning.

• Optional temperature control systems and support systems with wheels or adjustable legs.
• Compliance with standards like APEX and CE.

86. Containers (L)
• Inside Length: **5.895 meters**
• Inside Width: **2.350 meters**
• Inside Height: **2.392 meters**
• Door Width: **2.340 meters**
• Door Height: **2.292 meters**
• Capacity: **33 cubic meters**
• Tare Weight: **2230 kg**
• Max Cargo Weight: **28230 kg**

87. Distillation Plant
• Material: **304 grade stainless steel is a common choice for the main body.**
• Power Supply: **Typically 220 Volts.**
• Operating Modes: **May be automatic or have manual controls.**
Specifics of Water Distillation Units:
• Capacity: **Ranges from 4 to 10 liters per hour.**
• Distillate Temperature: **Typically between 25°C and 40°C.**
• Output Conductivity: **May have a conductivity range of 1.5-2.0 µS/cm.**
• Output pH: **Often in the range of 5.5 - 6.0.**
• Power Consumption: **Heaters can range from 1.5 kW to 3 kW.**

Optional Features:
• Safety Features: **Low water cut-off probes, mains/heating indicators.**
• Monitoring: **Optical beam sensors, audio alarms.**
• Storage: **Quartz storage vessels.**
• Condensation: **Additional bulb condensers.**
• Water Quality: **Water softeners for boiler input.**
• Control: **Solenoid valves, MCB for short circuit protection.**
Other Considerations:
• Type: **Can be single or double stage, vertical or horizontal.**
• Heaters: **May use quartz heaters.**
• Condensers: **May be made of SS 304.**
• Standards: **Units may be certified to safety standards like CE and UL**

88. Alchohol Filter Press Machine
□ Filtration Capacity: **This varies widely depending on the machine model, ranging from 1-500 liters/hour to over 3000 liters/hour. Some machines specify capacity in LPH (liters per hour).**
□ Number of Plates: **Typically ranges from 6 to 50 or more, influencing the filtration area and capacity. Some common ranges are 10-20 plates or even up to 50+ in some designs.**
□ Filter Area: **Usually less than 100 square meters in many models, but can vary.**
□ Max Pressure: **Commonly around 5 KG/CM2 (kilograms per square centimeter), but some can go higher.**
□ Material: **Often constructed from stainless steel (SS 304 or SS 316/316L) for corrosion resistance and hygiene. Some may use other materials like PP (polypropylene) for certain components.**
□ Automation Grade: **Available in automatic, semi-automatic, and sometimes manual configurations.**
□ Filter Type: **Different designs exist, including plate and frame (sparkler type, zero hold-up type), cartridge filters (vertical or cylinder types).**
□ Diameter of Plates: **Can range from 8" to 33" or more, affecting the filtration area and capacity.**

□ Cake Holding Capacity: **Measured in liters and depends on the size and number of plates.**
□ Operating Temperature: **Typically around 60°C for some models.**

89. Transfer Pump
• Flow Rate: **The volume of liquid the pump can move per unit of time (e.g., liters per minute - LPM, gallons per minute - GPM).**
• Head (Pressure): **The pressure or vertical lift the pump can achieve (e.g., meters of head, feet of head, bar).**
• Horsepower (HP): **The amount of power the pump's motor requires to operate.**
• Motor Type: **Can be electric, hydraulic, or pneumatic.**
• Material of Construction: **Must be compatible with the liquid being transferred (e.g., stainless steel for milk transfer, plastic for some chemicals).**
• Suction Lift: **The height from which the pump can draw liquid (e.g., meters of suction lift).**
• Viscosity: **The pump's ability to handle liquids of different thicknesses (e.g., oils, thick fluids).**
• Temperature: **The maximum temperature the pump and its materials can withstand.**
• Operating Voltage and Phase: **For electric pumps, the required voltage and phase (single or three-phase).**
Examples of Specific Transfer Pump Applications and Specifications:
• Oil Transfer Pumps:
May be designed for specific oil viscosities and transfer rates, as seen in the example from SAIL.
• Fuel Transfer Pumps:
Often require self-priming and self-suction capabilities, as described by Winner Lubrication.
• Milk Transfer Pumps:

May be constructed from stainless steel and designed for sanitary applications, as shown by VED ENGINEERING.
• Chemical Transfer Pumps:
Need to be chemically resistant and may have higher head requirements.
• Water Transfer Pumps:
Can be submersible, non-submersible, or portable, with flow rates and heads tailored to different applications.

XII) Ark Tinir

90. Maceration Tank
Material**:**
• Body:
Stainless steel AISI 304 is a common choice for its corrosion resistance and hygienic properties.
• Lid:
Polycarbonate Lexan or other materials that can withstand pressure and temperature changes.
Design**:**
• Bottom: **Conical bottoms (typically 10°) are used to facilitate draining and cleaning.**
• Lid: **A secure lid with a seal to maintain temperature and prevent contamination.**
• Discharge: **Multiple discharge points (total and partial) with ball valves.**
• Hose connectors: **For connecting pipes or pumps.**
• Legs: **Stainless steel legs for stability and height adjustment.**
• Hooks: **For securing the lid.**
Finishes:
• Internal: **Mirror polished for easy cleaning and sanitation.**
• External: **Flocked with satin welded seams.**

Other features**:**
• Temperature control: **Some tanks may include cooling jackets or heating systems for precise temperature regulation during maceration.**
• Agitation/Mixing: **Agitation systems (like pumps or mixers) may be included to ensure uniform maceration and prevent separation of solids.**
• Level indicators: **To monitor the liquid level.**
• Thermometers: **To monitor and control temperature.**
• Sampling valves: **For taking samples during the process.**
• Air tubes and relief valves: **For proper fermentation and pressure release.**

91. Distillation Plant
• Material: **304 grade stainless steel is a common choice for the main body.**
• Power Supply: **Typically 220 Volts.**
• Operating Modes: **May be automatic or have manual controls.**
Specifics of Water Distillation Units:
• Capacity: **Ranges from 4 to 10 liters per hour.**
• Distillate Temperature: **Typically between 25°C and 40°C.**
• Output Conductivity: **May have a conductivity range of 1.5-2.0 µS/cm.**
• Output pH: **Often in the range of 5.5 - 6.0.**
• Power Consumption: **Heaters can range from 1.5 kW to 3 kW.**
Optional Features:
• Safety Features: **Low water cut-off probes, mains/heating indicators.**
• Monitoring: **Optical beam sensors, audio alarms.**
• Storage: **Quartz storage vessels.**

• Condensation: **Additional bulb condensers.**
• Water Quality: **Water softeners for boiler input.**
• Control: **Solenoid valves, MCB for short circuit protection.**
Other Considerations:
• Type: **Can be single or double stage, vertical or horizontal.**
• Heaters: **May use quartz heaters.**
• Condensers: **May be made of SS 304.**
• Standards: **Units may be certified to safety standards like CE and UL**

92. Liquid filling tank with tap
Material**:**
• Stainless Steel:
Often used for its durability, resistance to rust and corrosion, and food-grade safety.
• Plastic:
Commonly used for lighter-duty applications, especially for water storage or smaller containers.
Capacity**:**
• **Tanks can range from small (5-10 liters) to very large (1000 liters or more).**
• **The capacity depends on the intended use and storage needs.**
Dimensions**:**
• **Height, diameter, and width will vary depending on capacity and desired shape.**
• **Some tanks are designed for specific spaces, like vertical or horizontal orientations.**
Tap**:**
• Material: **Can be plastic, stainless steel, or brass, depending on the tank material and desired durability.**

• Type: **Can be a standard tap, a valve, or a more specialized dispenser, depending on the intended use.**
• Size: **Tap sizes are typically specified by their diameter (e.g., 15mm, 20mm).**
Other Considerations:
• Construction: **Seamless construction can minimize leaks and cleaning issues.**
• Handles: **Convenient handles can make tanks easier to lift and transport.**
• With/Without Lid: **Some tanks have lids for added safety and protection.**
• Cleaning: **Wide mouth openings can facilitate easy cleaning.**

93. Gravity Filter
• Capacity:
Gravity filters come in various capacities, with some holding up to 20 liters of water.
• Materials:
They are commonly constructed from stainless steel or plastic.
• Filtration:
Gravity filters utilize gravity and a combination of materials like ceramic candles, activated carbon, and membranes to purify water.
• No Electricity:
A key feature of gravity filters is that they do not require electricity to operate, making them suitable for areas with limited or no power.
Filtration Details:
• Bacteria and Parasites:
Gravity filters effectively remove bacteria and parasites, with some models claiming to remove up to 99.999999% of bacteria and 99.999% of parasites.
• Contaminants:

They also remove contaminants like microplastics, silt, sand, and cloudiness.
• Mineral Retention:
Some gravity filters are designed to retain essential minerals in the water while removing impurities.
Other Features:
• Anti-bacterial Properties: **Some filters incorporate anti-bacterial formulations to inhibit microbiological growth.**
• Maintenance: **Some models claim to require minimal maintenance and no annual maintenance services.**
• Water Wastage: **Many gravity filters are designed to minimize water wastage.**

94. Alchohol Filter Press Machine
□ Filtration Capacity: **This varies widely depending on the machine model, ranging from 1-500 liters/hour to over 3000 liters/hour. Some machines specify capacity in LPH (liters per hour).**
□ Number of Plates: **Typically ranges from 6 to 50 or more, influencing the filtration area and capacity. Some common ranges are 10-20 plates or even up to 50+ in some designs.**
□ Filter Area: **Usually less than 100 square meters in many models, but can vary.**
□ Max Pressure: **Commonly around 5 KG/CM2 (kilograms per square centimeter), but some can go higher.**
□ Material: **Often constructed from stainless steel (SS 304 or SS 316/316L) for corrosion resistance and hygiene. Some may use other materials like PP (polypropylene) for certain components.**
□ Automation Grade: **Available in automatic, semi-automatic, and sometimes manual configurations.**
□ Filter Type: **Different designs exist, including plate and frame (sparkler type, zero hold-up type), cartridge filters (vertical or cylinder types).**
□ Diameter of Plates: **Can range from 8" to 33" or more, affecting the filtration area and capacity.**
□ Cake Holding Capacity: **Measured in liters and depends on the size and number of plates.**
□ Operating Temperature: **Typically around 60°C for some models.**

95. Visual Inspection Box
• **Illumination:**
• **Type:** LED lighting is common, offering adjustable intensity and color.
• **Adjustability:** Height-adjustable lighting and/or intensity control are often included.
• **Inspection Surface:**
• **Material:** Often a matte, black-finished aluminum or a non-glaring background (white, gray, or black).
• **Design:** Non-glare surfaces are essential for accurate visual inspection.
• **Features:**
• **Magnifier:** Some boxes include a magnifying glass for closer inspection.
• **Timer:** A programmable timer with pacing system can help standardize inspection times.
• **Sensors:** Sensors can verify the presence of the container and/or inspector's hand in the inspection zone.
• **Alarm Buzzer:** A buzzer can indicate when the inspection time is up.
• **Construction:**
• **Materials:** Aluminum, stainless steel, or other durable materials are used.
• **Dimensions:** Vary depending on the specific model and intended use.

XIII) Tail/Ghrit Ney

96. Bhatti

A "Bhatti" in an Ayurvedic pharmacy refers to a furnace or heating apparatus used in various processes, particularly those involving:

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  - **Electric Furnace:** Uses electric heating elements.
  - **Gas Furnace:** Uses LPG or natural gas.
  - **Muffle Furnace:** Encloses the material to be heated in a chamber, allowing for precise temperature control.

2. Material of Construction:

- **Traditional:**
  - **Earthen materials:** Fire-resistant bricks, clay.
  - **Metals:** Iron, steel for support structures.
- **Modern:**
  - **Refractory bricks:** High-temperature insulating bricks.
  - **Steel casing:** To enclose and support the furnace.
  - **High-temperature alloys:** For heating elements (in electric furnaces).

3. Size and Dimensions:

• This varies greatly, ranging from small, portable Bhatti for specific procedures to large, stationary Bhatti for industrial-scale processing.
• Key dimensions include:
○ Inner chamber dimensions.
○ Overall dimensions of the Bhatti.
4. Heating Source:
• **Traditional:**
○ Cow dung cakes (for Gogarbha Puta).
○ Charcoal.
○ Wood.
• **Modern:**
○ Electricity (heating elements).
○ Gas (LPG, natural gas).
5. Temperature Range:
• Must be able to reach the required temperatures for the specific Ayurvedic processes (e.g., moderate for Paka, very high for Bhasma).
• For modern furnaces, this is a crucial specification, often with a range of several hundred to over a thousand degrees Celsius.
6. Temperature Control:
• **Traditional:** Relatively manual control, relying on fuel amount and airflow.
• **Modern:** Precise temperature control using thermostats and controllers, especially in electric and gas furnaces. Programmable controllers are used in advanced models.
7. Airflow Control:
• Proper ventilation is essential for combustion and temperature regulation.
• May involve dampers, vents, or forced air circulation.
8. Safety Features:
• **For Modern Furnaces:**

○ Over-temperature protection.
○ Automatic shut-off.
○ Insulation to prevent burns.
○ Flame sensors (for gas furnaces).
• **For all Bhatti:**
○ Proper placement and construction to prevent fire hazards.
○ Adequate ventilation in the Bhatti section of the pharmacy.
9. Flue/Chimney:
• To exhaust smoke and fumes, especially in fuel-based Bhatti.
• Proper height and design for efficient removal.
10. Insulation:
• To retain heat within the Bhatti and improve energy efficiency.
• Materials used include refractory bricks, ceramic fiber, and other high-temperature insulation.
11. Accessories:
• Tools for handling materials inside the Bhatti (tongs, crucibles, etc.).
• Temperature measurement devices (thermocouples, pyrometers).
Important Considerations for Ayurvedic Pharmacy Use:
• **GMP (Good Manufacturing Practices):** The Bhatti, especially modern ones, should be designed and constructed to meet GMP requirements, ensuring product quality and safety.
• **Safety:** Fire safety is paramount. The Bhatti section of the pharmacy should be properly designed and equipped. As mentioned, the Drugs and Cosmetics Rules 1945 mention furnaces in the context of the pharmacy layout.
• Reference to the Drugs and Cosmetics Rules, 1945, particularly Schedule T, outlines the Good Manufacturing Practices (GMP) for Ayurvedic drugs.

- **Ventilation:** Proper ventilation is critical to remove smoke and fumes and maintain a safe working environment, especially if using traditional fuel sources.

- The search results state that the "furnace/Bhatti section should covered with tin roof and proper ventilation."

- **Fuel Availability:** Consider the availability and cost of the fuel source (electricity, gas, or traditional materials) in Challapalli.

97. Kadai

Here's a consolidated view of Kadai specifications, covering both general cooking and specialized use in an Ayurvedic pharmacy:

I. Kadai Specifications for General Cooking

A Kadai, similar to a wok, is a versatile cooking vessel. Here's what to look for in a good one:

- **Material:**
    - **Stainless Steel:** Durable, easy to clean, and suitable for various cooking methods.
    - **Cast Iron:** Excellent heat retention, good for deep-frying and slow cooking, but requires seasoning.
    - **Carbon Steel:** Heats up quickly, lighter than cast iron, and often preferred by professional chefs.
    - **Aluminum (with non-stick coating):** Lightweight and affordable, but the coating can wear off over time.
- **Shape:**
    - **Round Bottom:** Promotes even heat distribution, ideal for stir-frying and deep-frying.
    - **Flat Bottom:** Suitable for use on electric or induction cooktops.
- **Size:**

○ Diameter: Varies from small (20 cm) for individual servings to large (30 cm or more) for family cooking.
○ Depth: Sufficient to hold a reasonable amount of food and oil without spillage.
• **Thickness:**
○ Ensures even heating and prevents hot spots.
○ Stainless steel: 2-3 mm is generally sufficient.
○ Cast iron/carbon steel: Should be thick and heavy-bottomed.
• **Handles:**
○ Sturdy and securely attached.
○ Heat-resistant material or design.
• **Lid:**
○ A well-fitting lid is helpful for simmering and retaining heat.
• **Surface Finish:**
○ Smooth and easy to clean.
○ Non-stick coating (if present) should be durable and food-safe.
• **Compatibility:**
○ Suitable for the intended heat source (gas, electric, induction).
II. Kadai Specifications for Ayurvedic Pharmacy Use
In an Ayurvedic pharmacy, a Kadai is used for preparing medicines, requiring stricter specifications:
• **Material:**
○ **Stainless Steel 316L:** The *preferred* material due to its superior corrosion resistance, non-reactivity, and hygienic properties.
○ **Stainless Steel 304:** Acceptable for some applications.

○ **Cast Iron/Copper:** Used traditionally for specific preparations, but requires careful consideration of reactivity and maintenance.
• **Shape:** Hemispherical is ideal.
• **Size:** Varies based on batch size.
• **Thickness:** Uniform thickness is crucial (2.5-4mm for SS).
• **Bottom:** Rounded.
• **Handles:** Sturdy, heat-resistant, and easy to handle.
• **Lid:** Recommended, made of non-reactive material.
• **Surface Finish:** Smooth, polished (for SS), well-seasoned (for cast iron).
• **GMP Compliance:** Must be pharmaceutical-grade, easy to clean, and designed to prevent contamination.
III. Key Differences and Considerations
• **Material:** General cooking Kadais offer a wider range of materials, while Ayurvedic pharmacy Kadais prioritize non-reactive materials like SS 316L.
• **Hygiene:** Pharmaceutical use demands higher hygiene standards and easier cleaning.
• **Reactivity:** Material reactivity is a critical concern in Ayurvedic pharmacy to ensure the purity and efficacy of medicines.
• **Durability:** Both applications require durable Kadais, but pharmaceutical Kadais may face more demanding conditions due to prolonged heating and contact with diverse herbal extracts.

98. Stainless Steel Patila
Material:

• Stainless Steel:
The most common material, typically 304 or 304L grade, known for its durability, corrosion resistance, and food-grade safety.
• Tri-ply Construction:
Some patilas may have three layers of stainless steel, with an aluminum core for enhanced heat distribution.
Dimensions:
• Diameter: **Can vary widely, from 14.5 cm (small sizes) to 38 inches (large sizes).**
• Height: **Typically around 19 inches for larger sizes.**
• Thickness: **Body thickness may range from 1 inch for larger sizes to 2.5mm for smaller sizes.**
• Lid Thickness: **Lid thickness may be around 1.6 inches.**
Capacity:
• **Can range from 370ml to 30 liters, depending on the size.**
Other features:
• Induction and Gas Stove Compatibility: **Many patilas are designed to work on both induction and gas stoves.**
• Dishwasher Safe: **Many stainless steel patilas are dishwasher safe.**
• Handles: **Typically made of stainless steel and designed for easy handling.**
•

99. Stainless Steel Storage Container
1. Material:
• Stainless Steel Grades:
Common grades are 304 and 316. Grade 316 is often preferred for food storage due to its superior chemical resistance, especially against acidic and salty substances.
• Rust Resistance:

Stainless steel is naturally rust-resistant, making it ideal for storing food and other items.
• Food Grade:
Many containers are specifically labeled as food-safe, ensuring they won't leach chemicals into stored food.
2. Capacity:
• Range:
Capacities vary widely, from small containers with a few hundred milliliters (e.g., 1000 ml) to large drums that can hold multiple liters (e.g., 10-50 L).
• Types:
You'll find containers for everything from individual portions to bulk storage.
3. Dimensions:
• Shape: **Available in various shapes like cylindrical, rectangular, and square.**
• Size: **Dimensions are usually specified in length, width, and height (e.g., 28L x 28W x 30H cm).**
• Weight: **Containers can range from lightweight to heavy depending on their size and capacity.**
4. Features:
• Airtight:
Many containers are designed to be airtight, helping to preserve food freshness and prevent moisture damage.
• Dishwasher Safe:
Many stainless steel containers are dishwasher safe, making them easy to clean.

100. Filtration Equipment
1. Driving Force:
• Gravity:
Uses gravity to filter liquids through a filter medium, often in gravity nutsche filters.
• Pressure:
Applies pressure to force fluid through a filter, common in pressure filtration systems.
• Vacuum:
Creates a vacuum to draw fluid through a filter, used in vacuum filtration units.
• Centrifuge:
Uses centrifugal force to separate solids from liquids, suitable for various applications.
2. Filtration Mechanism:
• Filter Medium:
This can be a membrane, bag, or other porous material that separates solids from the fluid.
• Pore Size:
The size of the pores in the filter medium, crucial for removing specific particle sizes.
• Material Compatibility:
Ensuring the filter medium is compatible with the fluid being filtered to prevent degradation or contamination.
3. Operating Cycle:
• Batch: **A process where the entire load is filtered at once.**
• Continuous: **A process where material is continuously fed into the system for filtration.**
4. Material Size:

• Particle Size: **The size of the solids being separated, influencing filter selection and operation.**
5. Process Stage:
• Pretreatment: **Removing coarse solids before the main filtration step.**
• Solids Concentration: **Increasing the concentration of solids in a slurry.**
• Solids Separation: **Removing solids from a liquid.**
6. Other Considerations:
• Flow Rate:
The volume of fluid that can be filtered per unit of time.
• Pressure Drop:
The pressure difference across the filter, which can affect filtration efficiency.
• Noise Level:
The noise generated by the equipment, especially important in industrial settings.
Examples of Filtration Equipment Specifications:
• Vacuum Filtration Unit: **Funnel volume, pore size of the filter membrane, material of the funnel and support screen.**
• Hydraulic Oil Filtration Machine: **Capacity, material of construction, motor power, number of filters.**
• Bag Filter: **Material of construction, pore size, filtration capacity.**
• Gravity Nutsche: **Material of construction, filter area, vacuum capacity.**
• 20kW Multistage Filtrations System: **Flow rate, pressure capacity, number of stages, material compatibility.**

101. Filter Tank with tap
Tank Specifications:
• Capacity: **Ranges widely, from small pitchers (1-3 liters) to large industrial tanks (hundreds or thousands of liters). Common sizes for home or small commercial use might be in the 5-50 liter range.**

• Material:
○ Plastic: **Often made from food-grade plastics like polypropylene (PP), polyethylene (PE), or Tritan. Lightweight and relatively inexpensive.**
○ Stainless Steel: **Typically SS 304 or SS 316. Durable, corrosion-resistant, and easy to clean, suitable for food and beverage applications.**
○ Glass: **Used in some smaller countertop filters. Aesthetically pleasing but more fragile.**
• Shape: **Cylindrical, rectangular, or other custom shapes.**
• Dimensions: **Will vary greatly depending on the capacity and shape.**
• Lid/Cover: **May or may not be included, often with a secure seal to prevent contamination.**
• Filter Housing/Mechanism: **The tank will incorporate a way to hold the filter media (e.g., a built-in compartment, a separate cartridge holder).**
• Mounting: **Could be freestanding, wall-mounted, or part of a larger system.**
Tap Specifications:
• Material:
○ Plastic: **Commonly used for smaller, less demanding applications.**
○ Stainless Steel: **Durable and hygienic, often preferred for food and beverage.**
○ Brass: **Can be used, but may not be ideal for all liquids due to potential leaching.**
• Type: **Simple on/off valve, lever-operated, spigot with flow control.**
• Connection Type: **Threaded connection to the tank.**
• Size/Diameter: **Varies depending on the desired flow rate.**
• Features:

○ Non-drip design: **To prevent leaks.**
○ Locking mechanism: **For safety or to prevent accidental dispensing.**
○ Swivel function: **For easier dispensing.**
Filter Media (Specifications will depend heavily on what you are filtering):
• Type: **Sediment filters (various micron ratings), activated carbon filters, ceramic filters, ion exchange resins, UV filters (may be a separate component).**
• Pore Size/Micron Rating: **Determines the size of particles removed.**
• Lifespan/Replacement Frequency: **Varies depending on the filter type and the quality of the liquid being filtered.**
• Material: **The material of the filter media itself (e.g., cellulose, polypropylene, carbon).**

102. Liquid Filling Machine
1. Filling Range & Capacity:
• Filling Volume:
Machines can handle a wide range of fill volumes, from a few milliliters to several liters, depending on the model and the application.
• Bottles Per Minute/Hour:
Production speed is crucial, with machines offering different filling rates, from a few to hundreds of bottles per minute, or thousands per hour.
2. Automation Level:
• Semi-Automatic:
Requires some manual input, such as bottle placement and triggering the filling process.
• Automatic:
Fully automated, including bottle handling, filling, and sometimes capping.
3. Filling Method:

• Volumetric: **Uses a precise volume of liquid to fill each container.**
• Gravitational: **Employs gravity to fill containers with a consistent level.**
• Pneumatic: **Uses compressed air to fill containers.**
• Gear Pump: **Employs a gear pump to accurately transfer liquid to containers.**
4. Electrical Specifications:
• Voltage: **Typical voltages include 230V or 415V, depending on the region and machine type.**
• Frequency: **Standard frequency is 50Hz.**
• Power (HP): **Power requirements vary depending on the machine's size and complexity, ranging from 0.5 to 2 HP or more.**
5. Material Handling:
• Bottle Shapes:
Machines can handle various bottle shapes, including round, square, and rectangular.
• Bottle Sizes:
The machine's capacity to handle different bottle sizes and diameters needs to be considered.
• Filling Materials:
The machine should be compatible with the specific liquids being filled, considering viscosity and potential corrosiveness.
• Change Parts:
Many machines use change parts to accommodate different bottle sizes and filling ranges.

XIV) Aschyotan/Netra Malham Panir/Karn Bindu/Nasabindu

103. Hot Air Oven (Electrically heated with thermostatic control)

• Temperature Control: **Thermostatic or PID (Proportional-Integral-Derivative) temperature controllers provide precise temperature regulation.**
• Heating: **Electrically heated with heating elements (often coils or tubes).**
• Construction: **Double-walled design with insulation to maintain temperature.**
• Chamber Material: **Often made of stainless steel (e.g., 304 grade) for the inner chamber and mild steel for the outer shell, often with a powder coating.**
• Shelves: **Adjustable shelves are common for accommodating different sample sizes.**
• Power: **Typically 220/230V AC, single-phase, 50/60 Hz.**
• Accessories: **Some models may include timers and heat-resistant gloves.**
Common Dimensions and Volumes:
• **Chamber volumes can range from 60 liters to 150 liters or more.**
• **Oven dimensions are usually around 455x455x455 mm.**
Additional Considerations:
• Sterilization: **Hot air ovens are used for sterilization by exposing materials to high temperatures for specific durations, such as 170°C for 30 minutes or 160°C for 60 minutes.**
• Applications: **They are used in various applications including drying, baking, curing, and heat-treating.**
• Safety Features: **Over-heat and over-current protection may be included.**

104. Electrical Kettle with Mixing arrangements
Capacity**:**
• Liter Capacity:

Kettles can range from small household sizes (e.g., 1-2 liters) to industrial models with capacities of hundreds or even thousands of liters.
• Weight Capacity:
Some kettles also specify the weight capacity in kilograms per hour (e.g., 200 kg/hr).
Material**:**
• Body Material:
Common materials include stainless steel (e.g., SS304, SS316) and other industrial-grade materials.
• Scraper Material:
If a scraper is included for mixing, it may be made of materials like Teflon.
Power and Voltage:
• Voltage:
Typically, kettles are designed for standard household voltages (e.g., 220v, 415v) or industrial voltages (e.g., 440v).
• Power (HP):
Industrial models may have motor power ratings in horsepower (HP), ranging from 1 HP to 5 HP or higher.
• Phasing:
Some kettles, particularly those with motors, may have single-phase or three-phase power requirements.
Mixing Arrangement:
• Tilting Arrangement: **Some kettles have electric or hydraulic tilting mechanisms to facilitate pouring or emptying.**
• Mixing Mechanism: **Mixing can be achieved through various methods, including paddles, scrapers, or even specialized stirring equipment.**
• Scraper: **Scraping mechanisms are common for removing solids from the kettle walls.**
Other Specifications:
• Usage/Application: **Kettles are used in various industries, including food processing, pharmaceuticals, and chemical applications.**

• Bowl Capacity: **Some kettles have a bowl or container inside, which can have its own capacity measurement (e.g., 225 L, 425 L).**
• Surface Treatment: **Some kettles may have a galvanized surface treatment.**

105. Collation Mill
Material of Construction (M.O.C.):
• **Collation mills are typically made from stainless steel (e.g., SS 304, SS 316, SS 316L) to ensure corrosion resistance, durability, and compliance with GMP standards.**
• **The specific type of stainless steel may vary depending on the application and the chemicals involved.**
Rotor and Stator Design:
• **The rotor and stator design is crucial for precise particle size reduction through high-shear milling.**
• **The gap between the rotor and stator can be adjusted to control the intensity of the milling process.**
Motor Speed:
• **Motor speed is typically variable, allowing for adjustments to process different materials.**
• **Speed ranges may vary depending on the model, but a typical range is 50 to 1400 RPM, often controlled by a VFD (Variable Frequency Drive).**
• **Some models offer continuously variable speed control, allowing for precise adjustments between 6,000 and 11,500 RPM.**
Rotor/Stator Gap:
• **The gap between the rotor and stator can be adjusted in steps or continuously to optimize the milling process.**
• **Common gap ranges may include 0.6 mm, 1.4 mm, and 2.2 mm.**
Capacity**:**

• **Capacity can vary significantly depending on the size and configuration of the mill.**
• **Some mills are available in different sizes, with capacities ranging from 500 to 34,000 liters per hour.**
Other Notable Specifications:
• Power:
Electric power requirements may vary depending on the model and size, with examples including 5 HP / 3.75 kW or 10 HP / 7.5 kW.
• Voltage and Frequency:
Typically, these mills operate on a 3-phase electrical system (e.g., 3 x 400 V, 50/60 Hz).
• Dimensions and Weight:
Dimensions (L x W x H) and weight will vary based on the model and size.

106. Ointment Mill
□ Type: **Typically a three-roll mill.**
□ Rollers:
• Number: **Three horizontal rollers.**
• Material: **Often made of durable, chemically inert materials like ceramic (e.g., aluminum oxide or porcelain) or stainless steel.**
• Rotation: **Rollers rotate in opposite directions and at different speeds to create shear force.**
• Adjustable Gap: **The distance between the rollers is adjustable to control the fineness of the product. The gap can often be set within a range of 10 to 250 microns or even finer in some advanced models.**
□ Motor: **Electric motor with variable speed control in some models. Power ratings can vary (e.g., 120W to 500W or more for larger units).**
□ Hopper: **For feeding the premixed product. Capacity varies depending on the mill size.**
□ Scraper System: **To remove the finished product from the front roller. May be self-adjusting for consistent performance.**

□ Safety Features: **Emergency stop button, overload protection (electrical and mechanical). Some models include a safety bar for use during cleaning.**
□ Frame/Housing Material: **Often stainless steel for hygiene and durability.**
□ Cleaning: **Designed for easy cleaning, sometimes with features like a cleaning bar that allows operation during cleaning. Some models have drip trays.**
□ Dimensions and Weight: **Vary significantly based on the capacity and type of mill. Lab-scale units are compact and lightweight (around 12-18 kg), while production units are larger and heavier.**
□ Electrical Requirements: **Typically single-phase power (e.g., 110-240V, 50/60 Hz).**
□ Throughput/Capacity: **Can range from a few liters per hour in lab models to much higher volumes in production mills (e.g., up to 8.35 L/H or more).**
□ Particle Size Reduction: **Capable of reducing particle size to a very fine and controllable distribution (e.g., down to less than 5 microns in some cases).**
□ **Control Panel:** May range from simple on/off switches to more advanced membrane control pads with digital speed displays and programmable settings.

107. Tube Filling Machine
□ Machine Type:
• Manual: **Requires significant operator involvement for each step (filling, sealing, crimping). Typically for very low production volumes or specialized applications.**
• Semi-Automatic: **Automates some steps (usually filling and/or sealing) but requires manual loading and unloading of tubes. Suitable for small to medium production volumes.**
• Fully Automatic: **Automates the entire process from tube feeding and orientation to filling, sealing, coding, and ejection. Designed for medium to high production volumes.**
□ Tube Material Compatibility: **Specifies the types of tube materials the machine can handle (e.g., plastic, laminate, aluminum). Some machines are versatile and can handle multiple materials with change parts.**
□ Filling Range: **Indicates the minimum and maximum volume of product that can be filled into each tube (e.g., 1.5 ml to 250 ml, 5 g to 200 g). This often depends on the pump type and syringe size used.**
□ Tube Size Range: **Specifies the acceptable diameter and length of the tubes that can be processed (e.g., diameter 10 mm to 50 mm, length 50 mm**

to 205 mm). Change parts (tube holders, etc.) are usually required for different tube sizes.
□ Filling Accuracy: **The precision with which the machine dispenses the product, usually expressed as a percentage of the filled volume (e.g., ±1%).**
□ Output/Speed: **The number of tubes that can be filled and sealed per minute (TPM) or per hour. This varies greatly depending on the machine type and the size of the tubes being filled (e.g., 10 TPM for manual to 120 TPM or more for high-speed automatic machines).**
□ Sealing Method:
• Plastic/Laminate Tubes: **Typically sealed using hot air or hot pincers. Some machines offer trimming of excess material after sealing.**
• Aluminum Tubes: **Sealed by folding and crimping the end of the tube (often with multiple folds for a secure seal).**
• **Some advanced machines can handle both plastic/laminate and aluminum tubes with the appropriate sealing mechanism.**
□ Coding/Dating: **Many machines include a system for printing batch numbers, manufacturing dates, or expiry dates onto the sealed tube. This can be done through embossing, inkjet printing, or other methods.**
□ Material of Construction: **Contact parts (those that come into direct contact with the product) are usually made of stainless steel (SS304 or SS316L) for hygiene and corrosion resistance. Non-contact parts are often made of stainless steel or other durable materials.**
□ Drive System: **Can be pneumatic, electric, or a combination of both. Automatic machines often use servo motors for precise control.**
□ Control System: **Ranges from simple switches for manual and semi-automatic machines to Programmable Logic Controllers (PLCs) with touch screen interfaces for fully automatic systems, allowing for parameter setting, recipe storage, and diagnostics.**
□ Safety Features: **Emergency stop buttons, safety guards, overload protection, and sometimes sensors to detect issues like jammed or incorrectly fed tubes.**
□ Power Requirements: **Specifies the voltage, phase, and frequency of the electrical supply needed.**
□ Air Requirements (if pneumatic): **Specifies the required air pressure and flow rate.**
□ Dimensions and Weight: **Physical size and weight of the machine.**
□ **Hopper Capacity:** The volume of the product hopper that feeds the filling system.

108. Mixing & Storage Tanks (Stainless Steel)
I. Material of Construction:
• Stainless Steel Grade:
○ SS304 (18/8): **The most common grade, offering good corrosion resistance for many applications, especially food and beverage.**
○ SS316/316L: **Offers superior corrosion resistance, particularly against chlorides and other aggressive substances. Often preferred in pharmaceutical and some chemical applications. The "L" designation indicates low carbon content, which minimizes carbide precipitation during welding and further enhances corrosion resistance.**
○ **Other grades (e.g., SS317, SS904L) may be used for highly corrosive environments.**
• Surface Finish:
○ Mill Finish (2B): **A standard, smooth, cold-rolled finish.**
○ Brushed Finish: **Provides a uniform, directional texture.**
○ Polished Finish (e.g., #4, #6, #8 mirror finish): **Increasingly smooth surfaces for enhanced cleanability and reduced risk of contamination, particularly important in hygienic industries. Ra (Roughness Average) values are often specified (e.g., Ra < 0.8 µm for pharmaceutical contact surfaces).**
• Welding:
○ Type: **Typically Tungsten Inert Gas (TIG) welding for smooth, hygienic welds.**
○ Finish: **Welds are often ground smooth and polished to match the surrounding surface finish to prevent crevices where bacteria can accumulate.**
II. Tank Design & Features:
• Capacity/Volume: **Ranging from small laboratory tanks (liters) to large industrial storage vessels (thousands of liters or cubic meters).**
• Shape: **Cylindrical (vertical or horizontal), rectangular, conical bottom, etc., depending on the application and space constraints.**

• Bottom Design:
○ Flat Bottom: **Simplest design, often used for storage of less viscous liquids.**
○ Conical Bottom: **Facilitates complete drainage, especially for viscous materials or processes involving sedimentation. The cone angle (e.g., 30°, 60°) can be specified.**
○ Dished Bottom (Torispherical, Elliptical, Hemispherical): **Provides better pressure resistance and easier cleaning compared to flat bottoms.**
• Top Design:
○ Flat Top: **Often with manways for access.**
○ Conical Top: **Can be used for pressure resistance or specific process requirements.**
○ Dished Top: **Offers strength and can accommodate agitator mountings.**
• Agitation/Mixing System (for Mixing Tanks):
○ Agitator Type: **Impellers (e.g., axial flow, radial flow), turbines, propellers, anchors, scrapers, etc., chosen based on the viscosity of the material and the mixing requirements.**
○ Agitator Mounting: **Top-mounted, side-mounted, or bottom-mounted.**
○ Drive Motor: **Power rating, speed (fixed or variable), and motor enclosure type (e.g., IP rating).**
○ Sealing: **Mechanical seals, gland packing, or magnetic drives to prevent leakage and maintain sterility if required.**
• Nozzles and Connections:
○ Inlet/Outlet Ports: **Size, type (e.g., threaded, flanged, tri-clamp), and location.**
○ Sight Glasses: **For visual inspection of the tank contents.**

○ Sampling Ports: **For taking product samples.**
○ Level Sensors: **Connections for various types of level monitoring devices.**
○ Temperature Sensors: **Connections for thermocouples or RTDs.**
○ Pressure Relief Valves: **For safety.**
○ CIP (Clean-in-Place) System: **Spray balls or nozzles for automated cleaning. Connections for CIP supply and return lines.**
• Support Structure: **Legs with adjustable feet, skirted base, or other mounting arrangements based on the tank size and location.**
• Manways: **Size, type (e.g., inward opening, outward opening), and sealing mechanism for access to the tank interior.**
• Lifting Lugs: **For safe transportation and installation of larger tanks.**

109. Sintered Glass Funnel
1. Material:
• **Borosilicate glass is the most common material due to its excellent chemical resistance and thermal stability.**
2. Capacity:
• **Sintered glass funnels come in a variety of capacities, ranging from a few milliliters to several liters, to suit different sample volumes. Common sizes include 35 mL, 80 mL, 100 mL, 200 mL, 500 mL, 1000 mL, and 2000 mL.**
3. Sintered Disc Diameter:
• **The diameter of the sintered glass disc varies depending on the funnel capacity and determines the filtration area. Common diameters range from 30 mm to 140 mm.**
4. Porosity Grade:
• **This is a crucial specification that determines the size of particles the funnel can retain. Sintered glass discs are available in various**

porosity grades, typically numbered from 0 to 5 (or sometimes G0 to G5), with increasing numbers indicating finer pore sizes:
○ Grade 0 (G0): **Coarse porosity (160-250 µm pore size). Used for very coarse precipitates and gas dispersion.**
○ Grade 1 (G1): **Medium-coarse porosity (100-160 µm pore size). Used for crystalline precipitates.**
○ Grade 2 (G2): **Medium porosity (40-100 µm pore size). Used for medium-sized precipitates.**
○ Grade 3 (G3): **Medium-fine porosity (16-40 µm pore size). Used for fine precipitates.**
○ Grade 4 (G4): **Fine porosity (10-16 µm pore size). Used for very fine precipitates.**
○ Grade 5 (G5): **Very fine porosity (1-1.6 µm or 1-10 µm depending on the manufacturer). Used for ultrafine filtration, bacteria filtration, and filtering biological solutions.**
5. Funnel Type and Stem:
• Buchner Funnel: **Has a cylindrical body and a flat, perforated plate above the sintered disc to support filter paper if needed for specific applications or to prevent the sintered disc from clogging with very large amounts of solid. Typically used with vacuum filtration.**
• Conical Funnel (Hirsch Funnel): **Has a conical shape and is often smaller than Buchner funnels. Also used with vacuum filtration, especially for smaller sample volumes.**
• Plain Stem Funnel: **Has a simple stem for gravity filtration.**
6. Joint Type and Size (if applicable):
• **Some sintered glass funnels come with standard ground glass joints (e.g., 19/26, 24/29) to fit filtration flasks or other apparatus.**
7. Brand and Material Quality:
• **Different manufacturers offer sintered glass funnels with varying levels of quality and precision. Reputable brands ensure the use of high-quality borosilicate glass and consistent porosity of the sintered disc.**

110. Seitz Filter
1. Filter Media:
• **Seitz filter sheets are typically composed of a matrix of materials such as:**
○ Cellulose fibers: **Provide the structural backbone of the sheet.**
○ Diatomaceous earth (Kieselguhr): **Porous material that enhances filtration efficiency.**
○ Perlite: **Another porous material used to improve filtration.**
○ Activated carbon: **Incorporated in some sheets for decolorization, deodorization, and removal of specific impurities.**
2. Retention Rating (Pore Size):
• **A crucial specification indicating the size of particles the filter can effectively remove. Seitz filter sheets are available in a wide range of retention ratings, typically expressed in microns (µm).**
○ Coarse grades (e.g., K 700, K 800, K 900): **Higher micron ratings (e.g., 5-10 µm), used for clarifying filtration and removing larger particles like yeast.**
○ Medium grades (e.g., K 100, K 150, K 200, K 250, K 300): **Intermediate micron ratings (e.g., 1-4 µm), used for polishing filtration to achieve clear liquids.**
○ Fine grades (e.g., KS 50, KS 80, EK, EK1, EKS): **Lower micron ratings (e.g., 0.25-0.8 µm), used for microbial reduction and "sterile" filtration.**
3. Flow Rate:
• **Indicates the volume of liquid that can pass through a given area of the filter sheet per unit of time at a specific pressure. Flow rates vary depending on the filter grade and the viscosity of the liquid being filtered. Typical units are liters per square meter per hour (L/m²/h) or gallons per square foot per hour (gal/ft²/h).**
4. Dimensions:
• **Seitz filter sheets are commonly available in standard sizes, such as:**

○ **40 cm x 40 cm (15.8" x 15.8")**
○ **20 cm x 20 cm**
○ **60 cm x 61.2 cm (23.6" x 24.1")**
○ **Other custom sizes may be available.**
5. Thickness:
• **The thickness of Seitz filter sheets contributes to their depth filtration capability and dirt-holding capacity.**
6. Maximum Differential Pressure:
• **This specifies the maximum pressure difference that the filter sheet can withstand without rupturing or compromising its integrity. Typical values range from 1.5 bar (21.8 psi) to 3 bar (43.5 psi).**
7. Operating Temperature:
• **Seitz filter sheets have maximum operating temperature limits, often around 80-90°C (176-194°F) for hot water sanitization. Some grades can also withstand steam sterilization at higher temperatures (e.g., 125°C/257°F) for a limited time.**
8. Materials of Construction (excluding media):
• **The filter housings and support plates used with Seitz filter sheets are typically made of materials like stainless steel or plastic, depending on the application and scale.**

111. Liquid Filling Machine
1. Filling Range & Capacity:
• Filling Volume:
Machines can handle a wide range of fill volumes, from a few milliliters to several liters, depending on the model and the application.
• Bottles Per Minute/Hour:
Production speed is crucial, with machines offering different filling rates, from a few to hundreds of bottles per minute, or thousands per hour.

2. Automation Level:
• Semi-Automatic:
Requires some manual input, such as bottle placement and triggering the filling process.
• Automatic:
Fully automated, including bottle handling, filling, and sometimes capping.
3. Filling Method:
• Volumetric: **Uses a precise volume of liquid to fill each container.**
• Gravitational: **Employs gravity to fill containers with a consistent level.**
• Pneumatic: **Uses compressed air to fill containers.**
• Gear Pump: **Employs a gear pump to accurately transfer liquid to containers.**
4. Electrical Specifications:
• Voltage: **Typical voltages include 230V or 415V, depending on the region and machine type.**
• Frequency: **Standard frequency is 50Hz.**
• Power (HP): **Power requirements vary depending on the machine's size and complexity, ranging from 0.5 to 2 HP or more.**
5. Material Handling:
• Bottle Shapes:
Machines can handle various bottle shapes, including round, square, and rectangular.
• Bottle Sizes:
The machine's capacity to handle different bottle sizes and diameters needs to be considered.
• Filling Materials:
The machine should be compatible with the specific liquids being filled, considering viscosity and potential corrosiveness.
• Change Parts:
Many machines use change parts to accommodate different bottle sizes and filling ranges.

112. Autoclave
Capacity and Volume:
• Chamber Volume:
Autoclaves are available in various sizes, from small tabletop models (5-10 liters) to larger floor-mounted units (70-90 liters or more).
• Tray Capacity:
Many autoclaves offer multiple trays for loading items, with sizes ranging from 1 to 2 or more.
Temperature and Pressure:
• Temperature Range:
Standard sterilization temperatures are typically 121°C (250°F) and 134°C (273°F). Some models offer optional temperature settings.
• Pressure Range:
Working pressures usually fall between 15 psi and 20 psi. Some models can be upgraded to higher pressures, such as 30 psi.
• Pressure Gauge:
Autoclaves typically have pressure gauges to monitor pressure during sterilization.
Material of Construction:
• Chamber Material:
Common materials include stainless steel (SUS304 or 316) for the chamber, door, and other key components.
• Insulation:

Autoclaves often have insulation to minimize heat loss and maintain temperature uniformity.
Automation and Control:
• Semi-Automatic vs. Fully Automatic:
Autoclaves can be semi-automatic, requiring some manual adjustments, or fully automatic, with pre-programmed sterilization cycles.
• Safety Features:
Most autoclaves include safety features like pressure relief valves, interlocks to prevent opening under pressure, and over-temperature protection.
• Cycle Options:
Autoclaves may offer different cycle types, such as standard sterilization, rapid sterilization, drying cycles, and vacuum drying.
• Control Panel:
Digital control panels allow for precise temperature and pressure settings, cycle selection, and monitoring of the sterilization process.
Other Considerations:
• Power Requirements:
Autoclaves can operate on single-phase or three-phase power, with power consumption ranging from 2 kW to 6 kW or more.
• Mounting Type:
Autoclaves can be mounted on a table or floor, with some models designed for pit mounting.
• Accessories:
Additional accessories may include steam traps, vacuum pumps, and drying racks.

DTL SPECIFICATIONS

I) Chemistry Section

1. Alcohol determination apparatus complete
1. Distillation and Density Measurement:
• Distillation Unit:
• Flask: **Usually a 500mL round-bottom flask for distillation.**
• Condenser: **Water-cooled condenser to condense the alcohol vapor.**
• Receiver: **A flask or graduated cylinder to collect the distilled alcohol.**
• Heating Source: **A heat source like a heating mantle or hot plate.**
• Density Measurement:
• Pycnometer: **A 50mL capacity pycnometer is used to measure the density of the distillate.**
• Hydrometer: **A short-range hydrometer (0.96 - 1.00) can also be used.**
• Thermometer: **A thermometer (0-100°C) is needed to record the temperature of the distillate, as density is temperature-dependent.**
• Other Components:
• Volumetric flask: **200mL capacity for diluting the distillate.**
• General glassware: **Beakers, pipettes, etc., as needed for sample preparation and handling.**
2. NIR Spectroscopy:
• Alcolyzer: **A bench-top NIR spectroscopy system.**
• NIR Spectroscopy: **Uses near-infrared light to analyze the alcohol content in alcoholic beverages without distillation.**
• Temperature Control: **A built-in solid-state thermostat (Peltier) is used to maintain the sample temperature (e.g., 15°C, 20°C, 25°C).**
• Alcohol Measuring Range: **Typically measures alcohol content from 0 to 100% v/v.**
• Repeatability: **The repeatability of the measurement (standard deviation) is typically around 0.01% v/v.**
3. Alcohol Meters:

• Repeatability: **Alcohol content repeatability (SD) is typically 0.05 vol%.**
• Density: **Density repeatability (SD) is typically 0.00005 g/cm3.**
• Specific Gravity: **Specific gravity repeatability (SD) is typically 0.00005.**
• Brix, Babo, Baume: **Repeatability (SD) for Brix, Babo, and Baume is also specified.**
• Resolution: **Alcohol content resolution is typically 0.01 vol%.**
• Measurement Temperature: **Measurements are often taken at 20°C / 60°F.**
• Alcohol Tables: **May include tables based on OIML (vol%/wt%), HMCE (at 20°C), G225 (at 20°C), AOAC, and NIST (at 60°F) standards.**

2.Volatile oil determination apparatus
• Components:
○ Boiling Flask: **Holds the sample and water.**
○ Condenser: **Cools the vaporized sample, converting it back to liquid.**
○ Receiver (Dean-Stark or Similar): **Collects the distillate and separates the oil from the water.**
○ Oil Separator Tube: **In some cases, a separate tube for separating oil from water.**
• Capacity: **Flasks and receivers come in various capacities, often up to 1000ml or larger.**
• Joints: **Standard joints are used to connect the components securely.**
• Material: **Typically made of borosilicate glass (Simax) for heat and chemical resistance.**
• Graduations: **The receiver or oil separator tube is graduated for accurate volume measurement of the extracted oil.**
• Stopcock: **A stopcock on the receiver allows for easy delivery of the separated oil.**

• Specifics for Oils Lighter than Water: **A different type of receiver (Dean-Stark) may be used for lighter oils, where the oil is collected on top of the water.**
• Standards: **Some apparatuses are designed to meet specific standards like IS 1797.**

3.Boiling point determination apparatus
• Heating Source: **Typically an electric heating mantle or an oil bath for controlled heating.**
• Thermometer: **Measures the temperature of the sample, with digital displays offering better accuracy and resolution.**
• Condenser: **Cools the vaporized sample to condense it back into liquid form for observation.**
• Boiling Point Tubes: **Often made of glass and designed to hold the sample.**
• Magnification Lens: **Facilitates observation of the boiling process.**
• Digital Temperature Indicator: **Provides precise temperature readings.**
• Sample Loader: **Helps in loading and unloading samples efficiently.**
• Stirrer: **Ensures even temperature distribution.**
General Specifications:
• Temperature Range: **Typically ranges from ambient to 300°C or higher, depending on the model.**
• Resolution: **The smallest temperature increment displayed, often 0.1°C or 1°C.**
• Sample Size: **Varies depending on the specific apparatus and the nature of the sample.**
• Heating Media: **Silicon oil is commonly used in oil baths for controlled heating.**
• Safety Features: **May include overheating protection and safety mechanisms to prevent accidents.**

4. Melting point determination apparatus
1. Temperature Range:

• **The apparatus should be capable of reaching temperatures suitable for the substances being analyzed. Common ranges include:**
o **Ambient to 300°C**
o **Ambient to 350°C**
o **Ambient to 400°C**
o **Some advanced models can go even higher.**
2. Heating Rate Control:
• **Precise control over the heating rate is crucial for accurate melting point determination. Specifications include:**
o Adjustable Ramp Rate: **Typically from 0.1°C/min to 20°C/min, often in increments of 0.1°C or 1°C. Some models offer pre-set or programmable ramp rates.**
o Automatic Ramp Rate: **Some advanced units can automatically adjust the heating rate near the melting point for better accuracy.**
o Rapid Pre-heating: **The ability to quickly reach a starting temperature close to the expected melting point to save time.**
3. Temperature Measurement and Display:
• **Accurate temperature sensing and clear display of the temperature are essential.**
o Temperature Sensor: **Usually a platinum resistance thermometer (PT100) or a thermocouple, known for their accuracy and stability over a wide range. Grade "A" sensors offer higher precision.**
o Temperature Resolution: **Typically 0.1°C or 1°C. Higher resolution allows for more precise readings.**
o Display: **Digital displays (LED or LCD) are standard, showing the current temperature and often the recorded melting point range. Some advanced models have touchscreen interfaces.**
4. Sample Observation:
• **The apparatus needs to allow for clear observation of the sample as it melts.**

○ Magnification: **A built-in magnifier (e.g., 2.5x to 8x) helps in observing the sample clearly. Some have adjustable focus.**
○ Illumination: **Glare-free illumination from the front and/or rear to provide optimal viewing conditions. Adjustable light intensity may be available.**
○ Viewing Channels: **Some instruments can accommodate multiple capillary tubes (typically 1 to 3, and some up to 6) for simultaneous analysis.**
○ Video Recording: **Advanced automatic systems may include a high-resolution camera and display to view and record the melting process digitally. This allows for unattended operation and post-analysis.**
5. Sample Holder/Oven:
• **The part of the apparatus that heats the sample.**
○ Heating Block: **Typically made of aluminum for good thermal conductivity and uniform heating. Some use a miniature furnace module.**
○ Oil Bath: **Older designs may use a silicon oil bath with a stirrer for uniform heating.**
○ Capillary Tube Size: **Designed to accept standard melting point capillary tubes (typically 75 mm long with an internal diameter of 0.8 to 1.8 mm and a wall thickness of 0.1 to 0.2 mm).**
6. Detection Method (for Automatic Systems):
• **Automatic melting point apparatus uses various methods to detect the melting point without manual observation:**
○ Optical Detection: **Measures the change in light transmission through the sample as it melts.**
○ Digital Image Processing: **Analyzes digital images of the sample to detect phase transitions.**
○ Thermal Imaging: **Uses thermal cameras to monitor the temperature distribution and identify melting.**
7. Data Handling and Output (for Advanced Systems):

• **Modern melting point apparatus often includes features for data management:**
o Memory: **Storage for a certain number of results with date, time, and sample information.**
o Printer Interface: **For direct printing of results.**
o Computer Interface: **USB or RS-232 ports for data transfer to a PC.**
o Software: **Optional software for data analysis, storage, and reporting, sometimes with features for GLP/GMP compliance and 21 CFR Part 11 support.**
8. Safety Features:
• **Safety is an important consideration in the design.**
o Over-temperature protection: **Prevents the apparatus from exceeding safe operating temperatures.**
o Heat shields: **To protect the user from hot surfaces.**
9. Power Requirements:
• **Specified in terms of voltage (e.g., 115V, 230V) and frequency (e.g., 50/60 Hz).**
10. Dimensions and Weight:
• **Physical dimensions and weight of the apparatus, which can be important for lab space considerations.**
11. Compliance and Standards:
• **Some instruments are designed to meet pharmacopeia requirements (e.g., USP, Ph. Eur., JP) and GLP/GMP guidelines.**

5. Refractometer
I. General Specifications :
Measurement Principle: **Based on the refraction of light as it passes from a prism into the sample. The angle of refraction is related to the refractive index of the sample.**
□ Light Source: **Often an LED with a specific wavelength (e.g., 589 nm, corresponding to the sodium D-line) or white light with a compensation system.**

□ Prism Material: **Typically made of high refractive index glass, such as synthetic sapphire or flint glass, which is resistant to scratching and chemical corrosion.**
□ Sample Volume: **Requires a small sample volume, usually just a few drops (e.g., 0.1 to 0.5 mL).**
□ Temperature Compensation: **Many refractometers feature Automatic Temperature Compensation (ATC) to correct readings for temperature variations, as refractive index is temperature-dependent. The compensation range is typically between 10°C and 40°C.**
□ Calibration: **Usually calibrated with distilled water, which has a known refractive index. Some models allow for multi-point calibration using standard solutions.**
□ Housing Material: **Often made of durable and chemical-resistant materials like ABS plastic or metal.**
□ Power Source: **Can be powered by batteries (especially handheld models) or AC power adapters (for benchtop units).**
II. Handheld/Portable Refractometers:
□ Measurement Range: **Varies depending on the specific application. Common ranges include:**
□ Brix (Sugar Content): **0-32%, 0-53%, 0-90%, or wider ranges.**
□ Salinity: **0-100 ppt (parts per thousand) or specific gravity scales.**
□ Alcohol: **0-80% volume.**
□ Glycol (Antifreeze): **Specific scales for ethylene glycol and propylene glycol freezing points.**
□ Urine Specific Gravity: **1.000 - 1.050 SG.**
□ Refractive Index (nD): **Typically 1.3330 to 1.5400.**
□ Resolution: **The smallest increment the scale or digital display can show. Examples: 0.1% Brix, 0.001 RI.**
□ Accuracy: **The degree of closeness of a measurement to the true value. Examples: ±0.2% Brix, ±0.0002 RI.**
□ Display: **Analog (with etched scales viewed through an eyepiece) or digital LCD. Digital models often provide more precise readings and additional features.**
□ Size and Weight: **Compact and lightweight for portability. Typically weigh a few hundred grams.**
□ Applications: **Field use, quick checks in production areas, incoming material inspection.**
III. Digital Benchtop Refractometers:
□ Measurement Range: **Generally wider and more precise than handheld models. Refractive Index (nD) ranges can be from 1.26 to 1.72 or even higher, with corresponding Brix ranges of 0-100%.**
□ Resolution: **Higher resolution than handhelds, e.g., 0.00001 RI, 0.01% Brix.**
□ Accuracy: **Higher accuracy, e.g., ±0.00002 RI, ±0.015% Brix.**
□ Temperature Control: **Often feature precise Peltier temperature control over a wider range (e.g., 4°C to 105°C) for accurate measurements at specific temperatures.**

Display: **Large digital displays, often with touchscreens, providing multiple parameters and user-friendly interfaces.**
Data Storage and Output: **Internal memory for storing results, with interfaces like USB, RS-232, or Ethernet for data transfer to computers or printers. Some models offer software for data management and analysis.**
User Management: **May include user accounts and password protection for data integrity.**
Compliance: **Some advanced models comply with GLP/GMP and 21 CFR Part 11 requirements for regulated industries.**
Automation: **Can be integrated with autosamplers for high-throughput analysis.**
Applications: **Laboratory analysis, quality control in manufacturing, research and development.**
IV. Abbe Refractometers:
Measurement Range: **Typically nD 1.3000 to 1.7000 and Brix 0 to 95%. Some models offer extended ranges.**
Accuracy: **Typically ±0.0002 nD and ±0.1% Brix.**
Temperature Control: **Often require connection to an external circulating water bath for precise temperature control. Some newer models have integrated digital thermometers.**
Display: **Readings are taken visually through an eyepiece with superimposed scales. Some modern Abbe refractometers have digital displays for temperature.**
Features: **Can measure both liquids and some solids (with a flat surface in contact with the prism). May include a dispersion measurement capability (nF - nC) in some models.**
Applications: **Education, general laboratory use, quality control.**

6. Polarimeter
Light Source: **LED with interference filter (589nm), Sodium lamp (589 nm), Tungsten-Halogen lamp (WI), or Mercury lamp (Hg).**
Wavelength: **589 nm is a common wavelength, but others like 436, 546, 578, and 633 nm are also used.**
Measuring Range: **Typically spans -179.95° to +180.00° for angle of rotation.**
Minimum Indication: **Often 0.05° for angle of rotation.**
Measurement Accuracy: **Accuracy is typically within ±0.10° for angle of rotation, but can be higher for some models.**
Resolution: **Some polarimeters have a resolution of 0.001° or better.**
Temperature Range: **Measurement temperature range is often 5 to 40°C.**
Dimensions and Weight: **Dimensions can vary, but a typical digital polarimeter might be around 600mm x 320mm x 240mm and weigh 30kg.**

□ Other Features: **Some polarimeters offer features like temperature control, sample cell identification, and compliance with international standards like ICUMSA and OIML.**

7. Viscineter (sowalds, Redwood viscometer)
Ostwald Viscometer:
□ Principle: **Measures the flow time of a liquid through a capillary tube.**
□ Design: **Typically a U-shaped glass tube with two bulbs and a capillary tube connecting them.**
□ Materials: **Primarily made of glass, with the capillary tube being of a small bore and uniform diameter.**
□ Operation: **The liquid is drawn into one bulb, allowed to flow through the capillary tube to the other bulb, and the time is recorded.**
□ Applications: **Suitable for measuring the viscosity of various liquids.**
Redwood Viscometer:
Principle:
Measures the flow time of a liquid through a standard jet under controlled temperature.
Design:
Consists of a cup with a stainless steel jet, a bath for temperature control, and a stirrer.
Materials:
The cup is often made of stainless steel, with the bath made of copper or stainless steel.
Operation:
The sample is filled into the cup, the temperature is maintained, and the time for a specific volume to flow through the jet is measured.
Types:
Two main types are available: Redwood No. I for liquids with flow times between 20 and 2000 seconds, and Redwood No. II for flow times exceeding 2000 seconds.
Applications:
Commonly used for measuring the viscosity of lubricating oils and other petroleum-based products.

Key Differences and Considerations:
Ostwald:
Suitable for a wider range of liquids, simpler design, and more precise measurements for fluids with similar viscosities.
Redwood:
Designed for specific applications like lubricating oils, with a more robust design and controlled temperature.
Temperature Control:
Both instruments require accurate temperature control to ensure reliable viscosity measurements.
Flow Rate:
The Redwood viscometer measures the time for a specific volume of liquid to flow, while the Ostwald viscometer measures the flow rate through a capillary tube.
Calibration:
Both instruments require proper calibration and maintenance to ensure accurate and reliable measurements.

8. Tablet disintegration apparatus
Stroke Length:
Typically, stroke lengths range from 55 mm to 55 ± 2 mm, indicating the vertical movement of the basket rack within the water bath.
Number of Baskets:
Most apparatuses feature two baskets, allowing for testing two batches of tablets simultaneously.
Timer Range:
The timer typically allows for setting and displaying disintegration times from 1 second to 9 hours, 59 minutes, and 59 seconds.
Temperature Control:
The apparatus needs to maintain a specified temperature range, commonly between ambient +5 to 50°C, or 25.0°C to 40.0°C.

Display Type:
Modern apparatuses may use LED displays, graphic LCD displays, or touch screens to show various parameters like set time, actual time, and temperature.
Other Features:
Some models include features like automatic lowering and raising of the basket rack, and compliance with specific pharmacopoeias (USP, Ph. Eur.).
Basket-Rack Assembly:
The basket rack assembly is a crucial component, typically made of stainless steel wire cloth with specific aperture and wire diameter dimensions.
Example Specifications from Search Results:
DT 1000 (Labindia Analytical):
Single drive for two baskets, 30 ± 1 strokes per minute, stroke length 5.5 ± 0.1 cm, temperature range ambient +5 to 50°C.
2901 (Electronics India):
Two baskets, 55 mm ± 2 strokes/minute, two timers, 5-digit LED display for each timer, timer range 1 second to 9 hours, 59 minutes, 59 seconds.
VTD-AV(T) (Veego):
Touch screen, 30 cycles/minute, stroke length 55 ± 2 mm, dimensions 390 x 390 x 740 mm.
901 (Electronics India):
Operating temperature range 0 – 100°C, 230V ± 10%, 50Hz.AC power, dimensions (without rods) 320 x 290 x 290mm, weight 8 Kgs (approx.).

9. Moisture determination apparatus (IC filtrator)
A Moisture determination apparatus, also known as a moisture analyzer or moisture tester, is a device that measures the moisture content of a sample by heating it and measuring the weight loss due to evaporation. Specific details about "IC filtrator" are not directly mentioned in the provided search results.
Key Features and Specifications:
Measuring Principle:

Most moisture analyzers use thermogravimetric analysis (TGA), where the sample is heated, and the weight loss is monitored as the moisture evaporates.
Heating Methods:
Various heating methods are used, including halogen lamps, infrared lamps, sheathed heaters, and microwave heaters.
Sample Types:
Moisture analyzers can be used to measure moisture content in various materials, including liquids, powders, and solids.
Measurement Range:
Typical moisture analyzers can measure moisture content from 0.01% to 100% or even lower.
Accuracy:
Moisture analyzers offer varying levels of accuracy, with some providing repeatability of ±0.05% (for small samples) or even ±0.01%.
Drying Temperature:
The drying temperature can range from 40°C to 230°C or higher, depending on the analyzer and sample type.
Switch-Off Criteria:
Many analyzers allow for automatic or user-defined switch-off criteria based on weight loss, time, or other factors.
Sample Size:
The sample size can vary, with some analyzers capable of handling very small samples (e.g., 1g) and others capable of handling larger samples.
Other Features:
Some analyzers may include features like built-in weighing systems, touch-screen displays, and data logging capabilities.
Examples of Moisture Analyzers:
Sartorius MA160: **A widely used infrared moisture analyzer with a space-saving design and user-friendly programming.**
Mettler Toledo Halogen Moisture Analyzer HX204: **Offers features like automatic switch-off criteria and customizable drying temperatures.**

□ Radwag MA 50.5Y.IC Moisture Analyzer: **A precise moisture analyzer with high repeatability and readability.**
□ Anton Paar Brabender MT-CA: **A universal moisture analyzer suitable for various applications.**
□ Cole-Parmer MB-800-210 Touch-Screen Moisture Analyzer: **A moisture balance with a touch-screen display and various drying profiles.**

10. UV Spectro-photometer
Optical System:
□ Wavelength Range: **Typically 190-1100 nm, although some instruments may have a wider or narrower range.**
□ Optical System Type: **Single or double beam, single or double monochromator.**
□ Light Sources: **Deuterium lamp (UV), tungsten lamp (visible), or a combination.**
□ Detector: **Silicon photodiode, photomultiplier tube, or other types.**
□ Grating: **Holographic grating, typically with 1200 lines/mm for high resolution.**
□ Scanning Speed: **Up to 4000 nm/min or higher, with slew speeds up to 12,000 nm/min.**
□ Stray Light: **Typically less than 0.01% T.**
Performance Characteristics:
□ Wavelength Accuracy: **+/- 0.5 nm (at specific wavelengths), +/- 0.8 nm (full range).**
□ Wavelength Reproducibility: **+/- 0.05 nm.**
□ Photometric Accuracy: **+/- 0.001 Abs at 1 Abs.**
□ Photometric Reproducibility: **+/- 0.0001 Abs at 1 Abs.**
□ Baseline Flatness: **Typically +/- 0.001 Abs across the wavelength range.**
□ Noise: **Typically less than 0.00015 Abs RMS at 0 Abs.**
□ Stability: **Typically less than 0.0005 Abs/hour at 1 Abs.**
Other Specifications:
□ Display: **5-inch color screen (480x272) or graphical LCD.**
□ Keypad: **Resistive touch screen or soft touch numeric keys.**
□ Sample Holder: **10mm 4-cell holder, optional auto cell changer.**
□ Power: **100-240 V AC, 50/60Hz, typically 75-150 W.**
□ Dimensions: **Varies depending on the model, typically around 456(W)x360(D)x185(H)mm.**
□ Weight: **Varies depending on the model, typically around 14.4 kg.**
□ Software: **Includes functions for photometric measurements, quantitation, spectrum analysis, file management, and more.**
□ Connectivity: **USB port, Ethernet port.**

11. Muffle furnace
1. Temperature Range:
□ Standard: **Many muffle furnaces operate between 900°C and 1200°C.**
□ High-Temperature: **Some models can reach temperatures up to 1400°C or even higher.**
2. Chamber Size:
□ Volume: **Chamber sizes vary, ranging from a few liters to larger volumes of 40 liters or more.**
□ Dimensions: **Typical chamber dimensions can be expressed in inches or centimeters.**
3. Power Requirements:
□ Voltage: **Most muffle furnaces operate on standard AC voltage (e.g., 230V).**
□ Power Consumption: **Power consumption can vary depending on the size and maximum temperature of the furnace.**
4. Temperature Control:
Controllers:
Muffle furnaces typically use digital or programmable temperature controllers to maintain precise temperature settings.
Accuracy:
Temperature accuracy can vary, with some models offering accuracy within ±3°C or ±5°C.
Heating Rate:
Some muffle furnaces are designed for fast heating, with the ability to reach maximum temperature in 120 minutes or less.
5. Construction Materials:
Muffle:
The muffle (or lining) is typically made of heat-resistant materials like refractory materials (e.g., siliminite, high-quality bricks) or high-strength alumina and silicon carbide.
Insulation:

High-grade ceramic fiber insulation helps minimize heat loss and maintain temperature uniformity.
Heating Elements:
Heating elements can include resistance wire (for lower temperatures) or silicon carbide rods (for higher temperatures).
Outer Casing:
The outer casing is often made of stainless steel to ensure durability and withstand high temperatures.
6. Other Features:
Ventilation:
Some muffle furnaces have built-in ventilation systems to remove gases generated during heating.
Exhaust System:
Exhaust systems can be used to vent out gases and maintain optimal conditions inside the furnace.
Safety Features:
Muffle furnaces often include safety features like overheat protection, door interlocks, and safety switches.

12. Electric balance
□ Capacity: **The maximum weight the balance can hold (e.g., 220g, 120g, 320g).**
□ Readability: **The smallest increment the balance can display (e.g., 0.0001g, 0.001g, 0.01mg).**
□ Repeatability: **The degree to which the balance provides the same reading for the same weight under similar conditions.**
□ Linearity: **The accuracy of the balance's readings across its entire weighing range.**
□ Display: **The type of display used to show the weight (e.g., LCD, OEL).**
□ Pan Size: **The diameter or dimensions of the weighing pan (e.g., 90mm, 91mm).**
□ Response Time: **The time it takes for the balance to stabilize and display the weight.**
□ Calibration: **Whether the balance has internal or external calibration options.**
□ Operating Temperature: **The temperature range in which the balance can operate (e.g., 15°C to 30°C).**

□ Units: **The different units in which the balance can display weight (e.g., g, mg, oz, lb).**
□ Overload Protection: **Whether the balance has protection against excessive weight.**
□ Draft Shield: **Whether the balance has a draft shield to minimize air currents affecting the reading.**
□ Interface: **Whether the balance has an interface for data transfer (e.g., RS232C, USB).**
□ Power Supply: **The type of power supply required (e.g., AC 220V).**
Additional Considerations:
□ Analytical balances**: are designed for high precision and accuracy, with readability often in the milligram range or lower.**
□ Precision balances**: offer a good balance between accuracy and capacity.**
□ High-capacity balances**: are designed for weighing larger objects.**
□ Moisture balances**: are used for determining the moisture content of samples.**

13. Hot air oven(s) different range of temperature/vacuum oven
Hot Air Oven Specifications:
Temperature Range:
Most hot air ovens operate in a range from 50°C to 300°C, with some models reaching higher temperatures.
Accuracy:
Temperature control accuracy is typically within ±1°C to ±2°C.
Uniformity:
Forced convection systems help to achieve a more uniform temperature distribution within the chamber.
Chamber Volume:
Available in various sizes, from small laboratory models to larger industrial ovens.
Construction:
Typically made of mild steel or stainless steel with insulated chambers to minimize heat loss.
Features:

Adjustable shelves, digital temperature control, and optional features like timers and alarms.
Vacuum Oven Specifications:
Temperature Range:
Vacuum ovens often operate in a range from 50°C to 200°C, but some models can go higher.
Vacuum Range:
Vacuum ovens can achieve various levels of vacuum, from low vacuum (e.g., 200-400 mbar) to medium vacuum (e.g., 10-100 mbar).
Vacuum Control:
Equipped with vacuum pumps, vacuum gauges, and control valves to regulate the vacuum pressure.
Construction:
Similar to hot air ovens, vacuum ovens are typically made of mild steel or stainless steel with insulated chambers.
Features:
Digital temperature control, vacuum gauge, and optional features like timers and alarms.
Key Differences:
Drying Principle:
Hot air ovens use hot air circulation, while vacuum ovens use reduced pressure to aid in drying and evaporation.
Applications:
Hot air ovens are commonly used for sterilization, drying, and heating various materials, while vacuum ovens are preferred for drying sensitive materials that may decompose at high temperatures or for applications requiring a controlled environment.
Vacuum Pressure:
Vacuum ovens operate at a reduced pressure, which helps to lower the boiling point of water and other liquids, accelerating the drying process.

14. Refrigerator
Freezer Capacity :- **60liter**
Fresh Food Capacity :- **178liter**
Current Rating :- **0.8A**
Voltage :- **220-240V**
Frequency :- **50HZ**
Refrigerant Type :- **R134a**
Defrost System :- **Auto Defrost**
Changed Mass :- **105g**
Capillary Tube Length :- **270cm**
Capillary Tube Inner Diameter :- **0.78mm**
Refrigerant Gas :- **CFC Free**
Compressor :- **Power Saver Compressor**

15. Glass/Steel distillation apparatus
Glass Distillation Apparatus Specifications
□ Material: **Borosilicate 3.3 glass is a common specification due to its low coefficient of thermal expansion and high resistance to chemical corrosion. Quartz glass is used for specialized applications requiring higher temperatures or greater chemical inertness.**
□ Joint Sizes: **Standardized ground glass joints (e.g., NS 14/23, NS 19/26, NS 24/29, NS 24/40) ensure compatibility between different components.**
□ Flask Capacity: **Ranges from small laboratory scale (e.g., 50 mL) to larger pilot plant scale (e.g., 20 L or more).**
□ Condenser Type and Size: **Specified based on the boiling points of the liquids being separated and the efficiency required. Longer condensers provide better cooling.**
□ System Configuration: **Simple distillation, fractional distillation (with a fractionating column), steam distillation (with a steam inlet), vacuum distillation (with vacuum connections).**
□ Safety Features: **Some setups may include features like splash heads to prevent bumping and contamination of the distillate.**
Steel Distillation Apparatus Specifications
□ Material: **Stainless steel (SS304, SS316, SS316L are common grades) for corrosion resistance and durability. Carbon steel may be used for less corrosive applications.**
□ Capacity: **Ranges from pilot plant scale (e.g., 50-1000 L) to large industrial scale (e.g., 1000 L to 100,000+ L).**

□ Operating Pressure: **Can range from vacuum to high pressure, depending on the process requirements.**
□ Operating Temperature: **Specified based on the boiling points of the components being separated and the heat source used. Stainless steel can withstand high temperatures.**
□ Column Dimensions (for fractional distillation): **Height, diameter, type and number of trays or packing material (e.g., structured packing, random packing).**
□ Heat Source: **Steam, electricity, or hot oil are common heating media for the distillation column and reboiler. Specified by heat transfer capacity (kW or BTU/hr).**
□ Condenser Specifications: **Heat transfer area (m^2 or ft^2), material of construction (stainless steel), cooling fluid flow rate, inlet/outlet temperatures.**
□ Control System: **Type of control (manual, semi-automatic, fully automatic), PLC brand, instrumentation specifications.**
□ Standards and Codes: **Compliance with relevant industrial standards (e.g., ASME, PED).**

16. Water supply demineralized exchange equipment
Demineralized water exchange equipment is used to remove minerals and salts from water, producing high-purity water. Key specifications include the type of ion exchange technology (e.g., resin-based), flow rate, and water quality parameters (e.g., TDS, conductivity, hardness). The equipment typically includes ion exchange columns, a regeneration system, and control systems.
Key Specifications:
Technology:
Ion exchange, using resins to remove dissolved salts (cations and anions).
Flow Rate:
Determined by the application, ranging from small residential units (e.g., 50-80 LPH) to large industrial systems (e.g., 1000 LPH).
Water Quality:
TDS (Total Dissolved Solids): **Typically <1 ppm or <1 mg/L.**
Conductivity: **<1 µS/cm or < 0.1 µS/cm.**
Hardness: **0 mg/L (as CaCO3).**
pH: **Typically between 6.5 and 7.5.**
Regeneration:

Frequency: **Determined by the flow rate and water quality of the feed water.**
Output: **The volume of water treated between regenerations.**
Materials:
Columns: **Typically made of stainless steel or FRP (Fiber Reinforced Polymer).**
Pumps: **Stainless steel or corrosion-resistant materials.**
Automation:
Can range from semi-automatic to fully automated systems with PLC (Programmable Logic Controller) or DCS (Distributed Control System) control.
Other Components:
Filters: **PP (Polypropylene) or leaf filters for pre-treatment.**
Sanitization: **UV or chlorination systems for disinfection.**
Dechlorination: **Systems to remove chlorine for specific applications.**
Pressure Gauges and Pumps: **For monitoring and managing pressure.**
17. Air conditioner for sophisticated equipment
1. Cooling Capacity:
Measured in: **BTU/hr (British Thermal Units per hour) or kW (kilowatts).**
Determination: **Calculated based on the heat load generated by the equipment, the size of the room, and the desired temperature difference. It's crucial to have an accurate heat load calculation, considering all contributing factors. Oversizing can lead to inefficient operation and humidity control issues, while undersizing will result in inadequate cooling.**
2. Temperature Control:
Set Point Accuracy: **The ability of the unit to maintain a specific temperature within a tight tolerance (e.g., ±0.5°C, ±1°C). Sophisticated equipment often has narrow operating temperature ranges.**
Temperature Stability: **How consistently the unit holds the temperature over time, without significant fluctuations or cycling.**
Temperature Range: **The range of temperatures the unit can provide to match the equipment's requirements.**
3. Humidity Control:
Relative Humidity (RH) Range: **The range of humidity levels the unit can maintain (e.g., 40% to 60% RH).**
Humidity Control Accuracy: **The precision with which the unit can maintain the desired humidity level (e.g., ±2% RH, ±5% RH).**

Dehumidification Capacity: **The unit's ability to remove moisture from the air, especially important in environments with high ambient humidity or equipment that releases moisture.**
Humidification Capability (Optional): **Some sensitive equipment may require maintaining a minimum humidity level to prevent electrostatic discharge.**
4. Airflow Management:
Airflow Rate (CFM or m^3/hr): **The volume of air the unit circulates per minute or hour. Proper airflow is essential for uniform temperature and humidity distribution and for removing heat generated by the equipment.**
Air Distribution Pattern: **How the cooled air is supplied to and returned from the room (e.g., downflow, upflow, front discharge). This needs to be compatible with the equipment layout to avoid hot spots.**
Filtration: **High-efficiency filters (e.g., HEPA, ULPA) may be required to remove dust and particulate matter that can damage sensitive equipment. The filter efficiency and MERV (Minimum Efficiency Reporting Value) rating are important specifications.**
5. Reliability and Redundancy:
Mean Time Between Failures (MTBF): **An indication of the expected lifespan and reliability of the unit.**
Redundant Components (Optional): **For mission-critical equipment, having backup compressors, fans, or even entire cooling units ensures continuous operation in case of a failure.**
Alarm Systems: **Integrated alarms to notify users of temperature or humidity deviations, filter blockages, or system malfunctions.**
6. Energy Efficiency:
EER (Energy Efficiency Ratio) or SEER (Seasonal Energy Efficiency Ratio): **Measures the cooling output per unit of energy consumed. Higher values indicate better energy efficiency, which can lead to lower operating costs.**
Inverter Technology: **Variable-speed compressors and fans can adjust their output to match the cooling demand, resulting in significant energy savings and more stable temperature control.**
7. Noise Levels:
Measured in dBA (A-weighted decibels): **Low noise operation may be crucial in certain environments, such as laboratories or control rooms.**
8. Physical Specifications:
Dimensions and Weight: **To ensure the unit fits the available space and the floor can support its weight.**
Installation Requirements: **Details on electrical connections, ductwork (if applicable), and mounting.**
Refrigerant Type: **Environmentally friendly refrigerants with low Global Warming Potential (GWP) are increasingly preferred.**
9. Control and Monitoring:
Local Controller: **User interface for setting temperature, humidity, and fan speed.**

□ Remote Monitoring and Control (Optional): **Capabilities for network connectivity (e.g., Ethernet, BACnet, Modbus) to allow remote monitoring and adjustment of settings.**
□ Data Logging: **Recording of temperature, humidity, and system status for analysis and troubleshooting.**
10. Standards and Certifications:
□ **Compliance with relevant industry standards (e.g., ISO, ASHRAE).**

18. Gas Cylinder with burners
LPG Cylinder Specifications:
□ Weight: **14.2 kg (filled).**
□ Dimensions: **715mm high and 305mm in diameter for a 14kg cylinder.**
□ Material: **Steel.**
□ Safety Standards: **Manufactured as per Indian Standard (IS): 3196 (Part-I) 2006.**
Gas Burner Specifications:
□ Type: **Domestic gas stoves with multiple burners.**
□ Material: **Metallic bodies with ceramic burners are common.**
□ Safety Standards: **Meet safety requirements as per BIS Standard IS 4246:2002.**
□ Gas Pressure: **Designed for use with LPG at 2.942 kN/m2 (30 gf/cm2) gas inlet pressure.**

19. Electric Water bath (temperature controlled)
Temperature Range:
The range of temperatures the water bath can achieve, typically from a few degrees Celsius above room temperature to 100°C or higher.
Accuracy:
The level of precision with which the water bath maintains the set temperature. Commonly, this is expressed as ±0.1°C to ±0.5°C.
Volume:
The capacity of the water bath, usually measured in liters.
Power Rating:

The amount of electrical power the water bath consumes, typically in watts or kilowatts.
Temperature Fluctuation:
A measure of how much the temperature changes over time, usually expressed as ±0.1°C to ±0.5°C.
Temperature Resolution:
The smallest temperature increment the water bath can display and control, often 0.1°C.
Timer Range:
The duration the water bath can be set to run, typically in minutes or hours.
Voltage:
The operating voltage of the water bath, commonly 230V AC.
Other Considerations:
Bath Material:
Stainless steel is a common material for water bath tanks, providing durability and resistance to corrosion.
Heating Method:
Some water baths use direct heating elements, while others circulate heated water to ensure even temperature distribution.
Safety Features:
Many water baths include safety features like over-temperature protection and low-water level alarms.

20. Heating mantle
Heating mantles are typically designed for round-bottom flasks and feature a flexible heating element that wraps around the flask, providing uniform heating for various applications. They offer temperature control, usually with analog or digital controllers, and come in various sizes and configurations, including multi-position options for heating multiple flasks simultaneously.
Here's a more detailed look at common specifications:
General Features:

Heating Element:
Glass fiber yarn knitted heating element for uniform heat distribution.
Insulation:
Typically uses glass wool or other insulating materials to minimize heat loss.
Housing:
May be made of powder-coated rolled aluminum, mild steel, or stainless steel.
Temperature Control:
Analog or digital controllers with temperature accuracy of ±0.5°C to ±1.0°C, with resolutions down to 0.1°C.
Power Supply:
Standard AC voltage (e.g., 230V, 50-60Hz).
Flask Compatibility:
Designed for round-bottom flasks, often meeting standards like DIN-12347/ISO 4797.
Multi-position Options:
Available with 3 or 6 positions for simultaneous heating of multiple flasks.
Stirrer Integration:
Some models incorporate stirrers, allowing for both heating and stirring functions.
Safety Features:
Non-slip rubber feet, built-in protection for liquid spills, and provisions for attaching accessories.
Specific Specifications (Examples):
Temperature Range: **Ambient + 5°C to 350°C or 450°C.**
Power Consumption: **Varies depending on size and model, with examples ranging from 150W to 450W.**
Flask Capacity: **Available in sizes from 50mL to 5L or 10L, and even up to 20L for larger applications.**
Dimensions: **Outer dimensions can be Ø 260 x 220 mm, with inner dimensions of Ø 150 x 77 mm.**
Weight: **Typically around 3-4 kg.**
Stirring Speed: **May offer speeds up to 1200 RPM or 800 RPM.**

Electrical Requirements: **Input voltage of 230 V AC ± 10%, 50-60 Hz.**

21. TLC apparatus with all accessories
Developing Tank:
Rectangular, with a lid to maintain a stable atmosphere for the separation process. The size can vary, but a common size for glass plates is 20 cm x 20 cm.
TLC Plates:
Material: **Glass, plastic, or aluminum.**
Adsorbent Layer: **Typically silica gel, but can also be alumina or cellulose.**
Size: **Common sizes are 20x20 cm and 20x10 cm.**
Thickness: **Around 0.1–0.25 mm for analytical purposes and 0.5–2.0 mm for preparative TLC.**
Indicators: **Some plates may have UV-detectable fluorescence indicators (like F254).**
Spotting Template:
Perspex or similar material used to create accurate spots on the TLC plate.
Spreader (Applicator):
Electroplated brass or similar material used to evenly distribute the sample on the TLC plate.
Accessories:
Micropipette: **For precise sample application.**
Scribers: **For marking lines or making scratches on the plate.**
Glass Sprayer: **For removing excess solvent or for other laboratory applications.**
Plate rack: **For storing and organizing TLC plates.**

Optional Accessories:
□ Dessicator Cabinet: **For storing TLC plates and general laboratory use.**
□ TLC Master Sheet: **For visualizing Rf values.**
□ TLC plate storage cabinet: **For storing coated plates and protecting them from humidity.**

22. Sieve size 10 to 120 with sieve shaker

Sieve Mesh Number	Approximate Opening Size (mm)	Approximate Opening Size (microns)	Application Examples
10	**2.00**	**2000**	**Coarse sands, gravel**
20	**0.850**	**850**	**Fine sands, sugar, granular materials**
40	**0.425**	**425**	**Flour, cement, pigments**
60	**0.250**	**250**	**Powdered milk, fine chemicals**
80	**0.180**	**180**	**Ground spices, pharmaceuticals**
100	**0.150**	**150**	**Fine powders, cosmetics**
120	**0.125**	**125**	**Very fine powders, some pigments and pharmaceutical powders**

As you can see, this range covers a significant spectrum of particle sizes, from relatively coarse to very fine.

Sieve Shaker Specifications to Consider:

When selecting a sieve shaker for this range, consider the following specifications:

□ Sieve Compatibility (Diameter):

□ **Most standard laboratory sieve shakers accommodate sieves with diameters of** 200 mm (8 inches) **or** 300 mm (12 inches)**. Ensure the shaker you choose is compatible with the diameter of your sieves. Some can handle both with adapters.**

□ Number of Sieves:

□ **Determine the maximum number of sieves you'll need to run simultaneously. Most shakers can handle a stack of** 6 to 10 sieves **plus a lid and pan.**

□ Shaking Motion:
□ Electromagnetic/Vibratory: **These are common for a wide range of particle sizes and offer good separation efficiency. They typically use electromagnetic forces to create a 3D shaking motion (vertical oscillation with a rotary motion).**
□ Mechanical/Motorized: **These shakers use a mechanical drive to create a shaking or tapping motion. They can be suitable but may be less efficient for very fine particles compared to electromagnetic types.**
□ Tapping Motion (with Vibration): **Some shakers combine vibration with a tapping action to help material pass through finer meshes. This can be beneficial for the higher mesh numbers in your range.**
□ Amplitude/Intensity Control:
□ **A variable amplitude or intensity setting is crucial for optimizing the sieving process for different particle sizes and densities. Finer particles often require lower amplitudes and longer sieving times.**
□ Frequency/Speed:
□ **Measured in oscillations or vibrations per minute (OPM or VPM). A variable frequency allows you to fine-tune the shaking action.**
□ Timer:
□ **A digital timer with a range from minutes to hours is essential for accurate and reproducible results. Some advanced models allow for programmed intervals or continuous shaking.**
□ Noise Level:
□ **Consider the noise generated by the shaker, especially if it will be used in a quiet laboratory environment. Some models are designed for low-noise operation.**
□ Wet Sieving Capability (Optional but useful):
□ **If you anticipate working with materials that tend to agglomerate or are in suspension, a sieve shaker with wet sieving capabilities (with appropriate sealing and liquid handling) would be beneficial.**
□ Safety Features:
□ **Look for features like safety interlocks that prevent operation when the sieve stack is not properly secured.**
□ Control and Programming:
□ **More advanced shakers offer digital interfaces with programmable settings, memory for storing test parameters, and sometimes software for data analysis.**
□ Material of Construction:
□ **The shaker should be robust and made of durable materials to withstand continuous use.**
□ Clamping Mechanism:
□ **A reliable and easy-to-use clamping mechanism is important to securely hold the sieve stack.**

23. Centrifuge machine
1. Speed & RCF:
Revolutions Per Minute (RPM):
Measures how fast the rotor spins.
Relative Centrifugal Force (RCF):
A measure of the force generated by the spinning rotor, often expressed as "g" units, and is calculated from the RPM and rotor radius.
Speed Ranges:
Centrifuges can have various speed ranges, from a few hundred RPM for general purpose separation to thousands of RPM for specialized applications like blood component separation.
Speed Control:
Many centrifuges have stepless speed regulators for precise control over the spinning speed.
Speed Accuracy:
Some centrifuges offer high speed accuracy, such as +/- 100 RPM, says Globe Scientific.
2. Capacity & Rotor:
Rotor Capacity:
Refers to the number and type of tubes the rotor can hold.
Rotor Types:
Different types of rotors include swing-out rotors (for easy sample access) and fixed-angle rotors (for higher speed centrifugation).
Tube Capacity:
Centrifuges can handle various tube sizes, from microcentrifuge tubes (1.5/2 mL) to larger tubes (15 mL, 50 mL, etc.).
Rotor Accessories:
Some centrifuges come with adapters for different tube sizes, allowing for flexibility in sample handling.
3. General Features:

□ Timer: **Allows setting the duration of centrifugation.**
□ Digital Display: **Shows speed, RCF, time, and other parameters.**
□ Motor Type: **Brushless DC motors offer better performance and longevity, while traditional motors (e.g., universal motors with carbon brushes) are also used.**
□ Safety Features: **Interlocks prevent the lid from opening during operation, while imbalance detection systems protect the centrifuge from damage due to uneven loading.**
□ Temperature Control: **Refrigerated centrifuges maintain a stable temperature during centrifugation, crucial for temperature-sensitive samples.**
4. Dimensions & Weight:
□ Size: **Centrifuges can vary in size, from compact mini centrifuges to large, high-capacity models.**
□ Weight: **The weight of a centrifuge depends on its size, capacity, and features.**
5. Other Specifications:
□ Power Input: **Most centrifuges operate on standard AC voltage (e.g., 220VAC).**
□ Usage: **Centrifuges are used in various applications, from routine laboratory work to specialized research and clinical diagnostics.**

24. De-humidifier
1. Moisture Removal Capacity:
□ Measured in: **Liters per day (L/day) or pints per day (pints/day).**
□ Determination: **This is the most crucial specification. It indicates how much moisture the dehumidifier can remove from the air in a 24-hour period under specific temperature and humidity conditions (usually around 30°C and 80% relative humidity).**
□ Sizing: **Choose the capacity based on the size of the space and the severity of the humidity problem. Consider:**

Room Size: **Larger rooms require higher capacity dehumidifiers.**
Dampness Level: **More severe humidity requires a higher capacity.**
Slightly damp: Smaller capacity.
Moderately damp: Medium capacity.
Very damp: High capacity.
Climate: **Regions with consistently high humidity will need more powerful units.**
2. Coverage Area:
Measured in: **Square meters (m²) or cubic feet (ft³).**
Guideline: **Manufacturers often provide a recommended coverage area for their dehumidifiers. This is a general guideline, and the actual effectiveness depends on factors like room layout, air circulation, and the severity of the humidity.**
3. Water Tank Capacity:
Measured in: **Liters (L) or gallons (gal).**
Importance: **A larger tank means you won't have to empty it as frequently. However, a very large tank in a low-humidity environment might take a long time to fill.**
Features: **Look for features like an automatic shut-off when the tank is full and a water level indicator.**
4. Airflow (CFM/CMH):
Measured in: **Cubic feet per minute (CFM) or cubic meters per hour (CMH).**
Significance: **Higher airflow helps the dehumidifier process more air and remove moisture faster, leading to better efficiency and faster drying.**
5. Operating Temperature Range:
Measured in: **Degrees Celsius (°C) or Fahrenheit (°F).**
Relevance: **Condensing dehumidifiers (the most common type) work best in warmer temperatures (above 15-20°C). Their efficiency decreases in cooler temperatures.**
Desiccant Dehumidifiers: **For colder environments (below 10-15°C), desiccant dehumidifiers are more effective as they don't rely on condensation.**
6. Humidity Control:
Type: **Most dehumidifiers have a humidistat that allows you to set the desired relative humidity level (usually between 30% and 80%).**
Accuracy: **Look for models with precise and reliable humidity sensors and controls.**
Modes: **Some dehumidifiers offer different modes like continuous operation, automatic mode (maintains a set humidity), or laundry drying mode.**
7. Energy Efficiency:
Energy Star Rating: **Look for models with an Energy Star label, indicating they meet specific energy efficiency guidelines.**
Integrated Energy Factor (IEF): **This measures how many liters of water a dehumidifier can remove per kilowatt-hour (kWh) of energy consumed. A higher IEF indicates better energy efficiency.**

Power Consumption (Watts): **Lower wattage generally means lower energy consumption, but consider the moisture removal capacity as well.**
8. Noise Level:
Measured in: **Decibels (dB).**
Consideration: **If the dehumidifier will be used in a bedroom or living area, a lower noise level is preferable.**
9. Features:
Automatic Defrost: **Prevents ice buildup on the coils in cooler temperatures, improving efficiency.**
Timer: **Allows you to set the dehumidifier to run for a specific duration.**
Auto Restart: **If there's a power outage, the dehumidifier will automatically resume its previous settings when power is restored.**
Air Filter: **Some models include an air filter to remove dust and allergens from the air. Washable filters are a plus.**
Drainage Options:
Manual Emptying: **Requires you to periodically empty the water tank.**
Continuous Drainage: **Allows you to connect a hose for continuous drainage into a drain or sink.**
Portability: **Features like wheels and handles make it easier to move the dehumidifier.**
Smart Features: **Some advanced models offer Wi-Fi connectivity and control via smartphone apps.**
10. Physical Specifications:
Dimensions and Weight: **Ensure the dehumidifier fits the intended space and is manageable to move if needed.**
Refrigerant Type: **Check if the unit uses an environmentally friendly refrigerant.**
11. Safety Features:
Automatic Shut-off: **When the water tank is full.**
Tip-Over Protection: **Shuts off the unit if it's accidentally knocked over.**
12. Maintenance:
Consider how easy it is to access and clean the filter and water tank.

25. Bench Top pH meter
1. pH Measurement:
pH Range: **The range of pH values the meter can accurately measure. Common ranges are -2.000 to 20.000 pH, -2.00 to 16.00 pH, or similar. The wider the range, the more versatile the meter.**
pH Resolution: **The smallest increment of pH that the meter can display. Common resolutions are 0.001 pH, 0.01 pH, or 0.1 pH. Higher resolution provides more precise readings.**

pH Accuracy: **The maximum permissible difference between the measured pH value and the true pH value. Typically expressed as ±0.001 pH, ±0.01 pH, or ±0.1 pH. Higher accuracy is crucial for critical applications.**
2. mV (Millivolt) Measurement (for Redox/ORP):
mV Range: **The range of millivolt values the meter can measure (e.g., ±2000 mV).**
mV Resolution: **The smallest increment of mV that the meter can display (e.g., 0.1 mV or 1 mV).**
mV Accuracy: **The maximum permissible difference between the measured mV value and the true mV value (e.g., ±0.1 mV or ±1 mV).**
3. Temperature Measurement:
Temperature Range: **The range of temperatures the meter can measure (e.g., -10 to 110 °C).**
Temperature Resolution: **The smallest increment of temperature that the meter can display (e.g., 0.1 °C).**
Temperature Accuracy: **The maximum permissible difference between the measured temperature value and the true temperature value (e.g., ±0.1 °C or ±1 °C).**
Temperature Compensation:
Automatic Temperature Compensation (ATC): **The meter automatically adjusts pH readings based on the measured solution temperature. This is essential for accurate pH measurements as pH values are temperature-dependent.**
Manual Temperature Compensation (MTC): **The user manually inputs the solution temperature. This is less convenient than ATC.**
4. Calibration:
Calibration Points: **The number of buffer solutions the meter can be calibrated against (e.g., 1, 2, 3, 5, or more points). More calibration points generally lead to better accuracy across the entire pH range.**
Predefined Buffer Sets: **The meter should support commonly used buffer standards (e.g., IUPAC, NIST, DIN). Automatic buffer recognition simplifies the calibration process.**
Custom Buffer Entry: **The ability to enter custom buffer values for specialized applications.**
Calibration Reminders: **Some meters offer reminders to perform regular calibrations.**
Calibration Data Storage: **The ability to store calibration data, including buffer values and calibration dates.**
5. Electrode Input:
Connector Type: **Specifies the type of connector for the pH electrode (e.g., BNC, DIN). Ensure compatibility with your electrodes.**
Separate Temperature Probe Input: **Some meters have a separate input for a temperature probe (e.g., for ATC).**
Combination Electrode Support: **Most modern meters support combination pH electrodes (with both sensing and reference elements in one body).**
6. Display:

Type: **LCD or touchscreen display.**
Size and Clarity: **Easy-to-read display with clear icons and information.**
Backlight: **For better visibility in various lighting conditions.**
Simultaneous Display: **The ability to display pH, temperature, and mV readings simultaneously.**
7. Data Logging and Output:
Data Storage Capacity: **The number of data points (readings) the meter can store internally with timestamps.**
Data Output:
USB Port: **For connecting to a computer for data transfer.**
RS-232 Port: **Another common interface for connecting to printers or computers.**
Software Compatibility: **Check if the meter comes with or is compatible with data management software.**
GLP/GMP Compliance Features: **Some advanced meters offer features for Good Laboratory Practice (GLP) or Good Manufacturing Practice (GMP), such as recording calibration data, user IDs, and sample IDs.**
8. Power:
Power Source: **AC adapter (usually included). Some portable benchtop meters may also have battery operation.**
Battery Life (if applicable): **Duration of operation on battery power.**
9. Physical Specifications:
Size and Weight: **Consider the bench space required.**
Durability: **Construction materials and protection against spills (e.g., splash-proof).**
Electrode Holder: **A stable and adjustable electrode holder is essential.**
10. Software and Advanced Features:
User Management: **Multiple user profiles with different access levels.**
Method Storage: **Ability to store measurement methods with specific parameters.**
Alarms: **For out-of-range readings or calibration due dates.**
Connectivity: **Wi-Fi or Bluetooth for wireless data transfer.**
11. Regulatory Compliance and Certifications:
Check for compliance with relevant standards (e.g., CE, ISO).

26. Limit test apparatus (As Pb, heavy metals)
For limit tests of arsenic (As), lead (Pb), and heavy metals, standard test apparatus includes Nessler cylinders, which are specifically designed tubes for colorimetric comparisons. These cylinders are made of clear, colorless glass with uniform internal diameter and a flat, transparent base, ensuring accurate color comparisons. Other apparatus often used includes Nessler cylinder stands, glass rods, and various flasks for preparing and dissolving samples.

Detailed Specifications:
Nessler Cylinders:
Material: **Clear, colorless glass.**
Capacity: **Nominal 50 ml.**
Height: **Overall height about 150 mm, external height to the 50 ml mark 110 to 124 mm.**
Wall Thickness: **1.0 to 1.5 mm.**
Base Thickness: **1.5 to 3.0 mm.**
Uniformity: **The external height to the 50 ml mark of cylinders used for a test must not vary by more than 1 mm.**
Internal Diameter: **Uniform internal diameter to ensure consistent color intensity comparisons.**
Base: **Flat and transparent base to facilitate viewing of the solution.**
Nessler Cylinder Stand:
Purpose: **To hold the Nessler cylinders securely and at the same height during comparison.**
Glass Rod:
Purpose: **To stir solutions, transfer samples, and clean the Nessler cylinders.**
Flasks:
Material: **Clear glass.**
Size: **Typically 100 ml or 250 ml, depending on the volume of sample being prepared.**
Purpose: **To dissolve samples, prepare solutions, and perform acid digestion if necessary.**

27. Microphotography scope
Microscopes used for photomicrography, or taking photos through a microscope, require specific specifications to capture high-quality images.

Key Specifications for Microphotography Microscopes:
Magnification:
Microscopes for photomicrography typically offer a wide range of magnification, allowing for capturing details at various levels of enlargement.
Single-lensed simple microscopes can magnify up to 300x, while compound microscopes can magnify up to 2,000x.
Microscope magnification can be further enhanced through the use of lenses and accessories.
Resolution:
Resolution refers to the microscope's ability to distinguish fine details.
Simple microscopes can resolve below 1 micrometer (µm), while compound microscopes can resolve down to about 0.2 µm.
Higher resolution is crucial for capturing clear and sharp images of small objects.
Illumination:
Microscopes for photomicrography require effective illumination systems.
Illumination can be provided by various sources, including ring lights, LED lights, or other specialized systems.
Proper illumination ensures that the subject is well-lit and that the resulting photomicrographs are well-exposed.
Camera Integration:
Microscopes can be integrated with various camera systems, including film cameras or digital cameras.
Digital cameras offer advantages such as real-time viewing and ease of image capture.
Some microscopes have built-in camera systems, while others require adapters or specialized connections.
Other Features:
Microscopes for photomicrography may also have features like:

Adjustable interpupillary distance (IPD) and diopter settings for eyeglass users.
Field of vision, which refers to the area visible through the microscope.

28. High Profile Thin Layer Chromatography
I. HPTLC Plates:
These are the heart of the separation process and differ significantly from conventional TLC plates.
□ Stationary Phase:
□ Material: **Typically optimized Silica gel 60 with a significantly smaller and more uniform particle size (usually** 4-10 µm**, often cited as** 5-6 µm **for premium plates) compared to TLC (10-12 µm or 5-20 µm). This leads to higher packing density and a smoother surface.**
□ Pore Size: **Usually around** 60 Å **(angstroms), which is a medium pore size suitable for a wide range of analytes.**
□ Layer Thickness: **Typically** 100 µm or 200 µm**, which is often thinner than conventional TLC plates (250 µm). Thinner layers contribute to faster development and reduced diffusion.**
□ Plate Size: **Common dimensions include** 10 x 10 cm **and** 20 x 10 cm**. Other sizes may be available for specific applications.**
□ Support Material: **Usually high-quality** glass **or** aluminum **sheets. Aluminum sheets offer flexibility and can be easily cut.**
□ Fluorescent Indicator: **Often impregnated with a fluorescent indicator (e.g.,** F_{254}**) that fluoresces under UV light (254 nm), allowing visualization of colorless compounds as dark spots against a bright background. Some plates may also have** F_{366} **indicators.**
□ Specialty Plates: **Available with modified stationary phases for specific separation needs, such as:**
□ Reversed Phase (RP): **C18, C8, etc., for separating non-polar compounds.**
□ Amino (NH_2): **For polar and charged compounds.**
□ Cyano (CN): **For moderately polar compounds.**
□ Diol: **As an alternative to silica, less sensitive to water content.**
□ Cellulose: **For hydrophilic substances.**
□ Purity: **High purity sorbents are crucial for minimizing background interference, especially in quantitative analysis. Premium purity plates are available for demanding applications.**
II. Sample Application Devices:
Automated sample application is a key aspect of HPTLC for reproducibility.
□ Applicator Type: **Automated spray-on applicators are common (e.g., CAMAG Linomat).**

Application Mode: **Can apply samples as spots or narrow bands. Band application is preferred for quantitative analysis as it leads to more uniform and compact zones after development.**
Application Volume: **Very small volumes are typically used, in the range of** 0.1 to 5 µL**, often** 0.1 to 0.5 µL **for optimal results.**
Number of Tracks: **Can apply multiple samples and standards side-by-side on a single plate (up to 36 or even 72 on larger plates).**
Application Rate and Resolution: **Precise control over the application rate and high resolution in dispensing are important for narrow, reproducible bands.**
III. Development Chambers:
Controlled and reproducible development is essential.
Chamber Type:
Twin Trough Chambers: **Commonly used to ensure vapor phase saturation, leading to more reproducible Rf values.**
Automated Developing Chamber (ADC 2): **Allows for fully automated and standardized development with precise control over chamber saturation, temperature, and development distance.**
Horizontal Development Chambers: **Can be used for specific applications.**
Mobile Phase Delivery: **Automated systems can offer controlled and reproducible mobile phase delivery.**
Migration Distance: **Typically shorter than conventional TLC, in the range of** 3 to 9 cm **or** 3 to 6 cm **for faster analysis and sharper bands.**
IV. Detection and Quantification:
Sophisticated instruments are used for detection and quantitative analysis.
TLC/HPTLC Scanner (Densitometer):
Light Sources: **Deuterium lamp (UV range), halogen-tungsten lamp (visible range), and sometimes a mercury lamp for specific wavelengths.**
Wavelength Range: **Typically** 190 to 900 nm**, allowing for UV-Vis scanning.**
Scanning Modes: **Absorbance and fluorescence in reflectance and/or transmittance.**
Slit Dimensions: **Variable slit widths (e.g., 0.4 to 10 mm) and heights (e.g., 20 µm to 2 mm) to optimize detection. Micro-optics are used for HPTLC.**
Data Step Resolution: **The distance between measurement points during scanning (e.g., 25 to 200 µm).**
Spectrum Recording Speed: **High speeds (e.g., up to 100 nm/s) for rapid spectral acquisition.**
Spectrum Library: **Some scanners have integrated libraries for compound identification by comparing spectra.**
TLC Visualizer:
Provides controlled and homogeneous illumination with white light, UV 254 nm, and UV 366 nm for visual inspection and image capture.
High-performance cameras with CMOS sensors are used for image-based evaluation.

Hyphenation with Mass Spectrometry (HPTLC-MS Interface): **Allows for direct elution of selected zones from the HPTLC plate into a mass spectrometer for structural elucidation and confirmation.**
V. Software:
Integrated software controls the HPTLC system and performs data analysis.
Instrument Control: **For automated sample application, development, and scanning.**
Data Acquisition: **For collecting absorbance or fluorescence data as a function of migration distance.**
Data Processing: **Peak integration, baseline correction, qualitative and quantitative analysis.**
Calibration: **Single and multi-level calibration with linear and non-linear regression models.**
Reporting: **Generation of comprehensive reports with chromatograms, peak tables, and quantitative results.**
GLP/GMP Compliance Features: **Audit trails, user management, and secure data storage.**
Key Advantages of HPTLC (leading to these specifications):
Higher Resolution: **Due to smaller particle sizes and optimized layers.**
Faster Analysis: **Shorter migration distances and optimized procedures.**
Greater Sensitivity: **Smaller sample volumes and focused bands.**
Improved Reproducibility: **Automation of key steps minimizes manual errors.**
Quantitative Accuracy: **Precise sample application and densitometric scanning.**
Lower Solvent Consumption: **Compared to HPLC.**
Parallel Analysis: **Ability to analyze multiple samples simultaneously.**

29. (Computer controlled) with Didavvay detector
I. System Control (Computer Controlled Aspects):
Software:
Instrument Control: **Software for controlling all modules of the system (pump, autosampler, column oven, detector).**
Data Acquisition: **Software for collecting and storing detector signals (absorbance vs. time and wavelength).**
Data Processing: **Software for peak integration, baseline correction, qualitative analysis (spectral comparison), and quantitative analysis (calibration curves).**
Reporting: **Software for generating customized reports.**

GLP/GMP Compliance Features: **Audit trails, user management, electronic signatures, etc. (depending on the software).**
Communication Interface: **Typically Ethernet, USB, or GPIB for communication between the computer and the instrument modules.**
Automation Capabilities: **Programmable methods, automated sample injection sequences, fraction collection (if applicable).**
II. Diode Array Detector (DAD) Specifications:
Light Source: **Typically a deuterium lamp for the UV range (around 190-400 nm) and a tungsten-halogen lamp for the visible range (around 400-900 nm). Some advanced detectors might use Xenon flash lamps.**
Wavelength Range: **The range of wavelengths the detector can monitor (e.g., 190-900 nm).**
Wavelength Accuracy: **The accuracy with which the detector selects the desired wavelength(s) (e.g., ±1 nm).**
Wavelength Reproducibility: **The consistency of wavelength selection over time (e.g., ±0.1 nm).**
Spectral Resolution (Bandwidth): **The ability of the detector to distinguish between closely spaced wavelengths. Specified as the spectral bandwidth (e.g., < 1 nm to 10 nm). A narrower bandwidth provides higher resolution.**
Number of Diodes: **The number of individual photodiodes in the array (e.g., 512, 1024). A higher number of diodes allows for finer spectral resolution.**
Sampling Rate: **The frequency at which the detector collects data points (e.g., up to 100 Hz or higher). A higher sampling rate is important for narrow peaks in fast chromatography.**
Flow Cell Volume: **The volume of the sample cell where light passes through the eluent. Smaller volumes are preferred for narrow peaks to minimize band broadening.**
Path Length: **The distance the light travels through the flow cell. Longer path lengths increase sensitivity (absorbance is directly proportional to path length according to Beer-Lambert Law). Common path lengths are 10 mm.**
Linearity: **The range of analyte concentrations over which the detector response is linearly proportional to the concentration (expressed in Absorbance Units - AU). A wider linear range is desirable.**
Sensitivity (Minimum Detectable Concentration - MDC): **The lowest concentration of an analyte that can be reliably detected above the noise level. This depends on the analyte, mobile phase, and system noise.**
Noise Level: **The baseline fluctuations of the detector signal (expressed in AU). Lower noise leads to better sensitivity.**
Drift: **The change in baseline signal over time (expressed in AU/hour). Low drift ensures stable baselines for long analyses.**
Absorbance Range: **The maximum absorbance the detector can accurately measure (e.g., up to 3 or 4 AU).**
Spectral Acquisition: **The ability to acquire a complete UV-Vis spectrum of the eluting compounds on-the-fly. This is a key advantage of DADs for peak identification and purity assessment.**

□ Multi-Wavelength Detection: **The ability to simultaneously monitor the absorbance at multiple discrete wavelengths. This is useful for analytes with different optimal detection wavelengths or for ratioing peaks for purity checks.**
□ Peak Purity Analysis: **Software algorithms that use the acquired spectra across a peak to determine if it represents a single compound or co-eluting substances.**
□ Spectral Library Matching: **The ability to compare acquired spectra with a library of known compound spectra for identification.**
□ Temperature Control (Optional): **Some advanced DADs may offer temperature control of the flow cell to minimize refractive index changes and improve baseline stability.**
III. Integrated System Specifications (HPLC with Computer-Controlled DAD):
Beyond the individual module specifications, consider:
□ System Pressure Limit: **The maximum pressure the entire HPLC system can withstand.**
□ Flow Rate Range: **The range of flow rates achievable by the pump.**
□ Autosampler Capacity and Precision: **The number of samples the autosampler can hold and the accuracy and reproducibility of injections.**
□ Column Oven Temperature Control: **The range and accuracy of temperature control for the column.**
□ System Suitability Tests: **Software features to automatically perform tests to ensure the system is performing within specifications.**

30. Detector
Fire Detectors:
Specifications :
Voltage: Operating voltage (e.g., 17-28 V DC).
Sensitivity: How well the detector responds to changes in smoke or heat.
Temperature Range: Operating temperature (e.g., 32° to 120° F).
Humidity: Operating humidity (e.g., 10% - 93% relative humidity).
Air Velocity: The speed of air that the detector can withstand without false alarms.
Construction: Material and dimensions (e.g., flame retardant plastic, diameter, height).

Gas Chromatograph Detectors:
Specifications :
Sensitivity: How well the detector can detect small amounts of a substance.
Linear Range: The range over which the detector's response is proportional to the concentration of the analyte.
Stability and Reproducibility: How consistent the detector's readings are over time and between measurements.
Temperature Range: The range of temperatures at which the detector can operate.
Noise: The level of unwanted signals that can interfere with the detection process.
Metal Detectors:
Specifications :
Detection Capabilities: The types of metals that the detector can detect (ferrous, non-ferrous).
Depth of Detection: The maximum depth at which buried objects can be detected.
Operating Environment: Whether the detector can work in various weather conditions (e.g., rain, arid).
Battery Life: The duration of use on a single charge.
Operating Temperature: The range of temperatures at which the detector can operate.
High Voltage Detectors:
Specifications :
Sensing Distance: The range at which the detector can detect voltage.
Probe Dimensions: Length, diameter, weight of the probe.
Insulated Stick: Length, diameter, and materials of any extension sticks used with the detector.
Voltage Range: The voltage range that the detector can detect.

31. Atomic absorption Spectrophotometer .
Wavelength Range:
Most AAS instruments cover the UV and visible range, typically from 190 to 900 nm.
This range allows for the analysis of a wide variety of elements.
Spectral Bandwidth:
The spectral bandwidth refers to the width of the spectral band passed by the monochromator.
Common bandwidth settings are 0.1, 0.2, 0.4, 1.0, and 2.0 nm.
The choice of bandwidth affects the resolution and sensitivity of the instrument.
Monochromator:
The monochromator selects the specific wavelength of light to be used for analysis.
AAS typically uses a diffraction grating monochromator with at least 1800 lines/mm.
The grating ensures that the light is dispersed into its constituent wavelengths.
Burner/Atomizer:
The burner (or atomizer in some cases, like graphite furnace AAS) is responsible for converting the sample into a gaseous state of free atoms.
Common burner materials include titanium for its resistance to corrosion and high temperature.
Air-cooled burners are also available to prevent overheating.
Other Features:
Nebulizer: **Converts the liquid sample into a fine mist for efficient atomization.**
Detector: **Detects the amount of light absorbed by the atoms.**
Baseline Stability: **A measure of the instrument's ability to maintain a consistent zero reading over time.**
Gas Control: **Automatic systems regulate the flow and pressure of gases used in the flame or furnace.**
Safety Features: **Interlocks to prevent ignition, door locks, and gas pressure sensors to ensure safe operation.**

32. Tablet Dissolution tester
Stations:
The number of independent dissolution vessels that can be tested simultaneously. Common numbers are 8, 14, or more.
Temperature Control:
The ability to maintain and adjust the temperature of the dissolution medium within a specific range, typically around 37°C.
Speed Range:
The adjustable speed at which the paddle or basket rotates, affecting the rate of dissolution.
Sampling System:
The method used to extract and collect dissolution samples, which may include peristaltic pumps or other systems.
Data Output:
Features for data logging, printing, and backup, potentially including USB, LAN, or RS232 connectivity.
Power Requirements:
Typically 110/220 V AC with 50/60 Hz frequency.
Dimensions and Weight:
The physical size and weight of the instrument, varying depending on the model.
Compliance:
Many models are designed to meet standards like USP, EP, BP, and IP.
Additional Features:
Features like audit trails, user authentication, and electronic signatures may be included in more advanced models.

33. Tablet Friability tester
Drum:
□ Material: **Typically made of transparent plastic or stainless steel for visibility and durability.**
□ Diameter: **The internal drum diameter is usually between 283 and 291 mm.**
□ Depth: **The drum depth is typically between 36 and 40 mm.**
□ Curved Projection: **Many testers have a curved projection within the drum to impact the tablets during rotation.**
□ Rotation Speed: **The drum rotates at a speed of 25 ± 1 rpm.**
Other Key Features:
□ Tablet Fall Height: **The height from which tablets fall within the drum is a critical factor, typically around 156 mm.**
□ Rotation Count: **The number of rotations the drum makes during the test, often set at 100.**
□ Power Supply: **Typically operates on 110/230 V, 50/60 Hz power.**
□ Dimensions and Weight: **Testers can vary in size and weight, with some weighing around 6 kg and others up to 22 lbs.**
□ LCD Display: **Many testers include an LCD display for viewing test parameters and data.**
□ Store Test Descriptions: **Some testers can store a number of test descriptions, potentially up to 256.**
□ Speed Accuracy: **Accuracy in drum speed is important, with some testers offering a speed-accuracy of ±1 rpm.**

II) Pharmacognosy Section

34. Microscope Binocular (1) Zics.
□ Full Model Name or Number: **There's usually a model name or number printed on the microscope body, often near the eyepieces, base, or arm.**
□ Manufacturer's Logo: **Look for any other logos or markings that might indicate the actual manufacturer.**
□ Any Documentation: **Do you have a user manual, specification sheet, or any other documentation that came with the microscope?**

Assuming the name is indeed "Zics" and I have no further information, I can provide a *general* overview of the specifications you might expect from a standard binocular compound light microscope. Keep in mind that specific features and performance will vary greatly between different models, even within a less common brand.
General Expected Specifications for a "Zics" Binocular Microscope (Assuming a Standard Compound Light Microscope):
1. Optical System:
□ Head: **Binocular head, likely with interpupillary distance adjustment (to fit the distance between your eyes) and diopter adjustment on at least one eyepiece tube for individual focusing. May be inclined for comfortable viewing.**
□ Eyepieces: **Two eyepieces, likely with a magnification of 10x (standard) or possibly 15x or 20x. May have a field number (FN) indicating the diameter of the field of view (e.g., FN 18mm, FN 20mm).**
□ Objective Lenses: **Usually a revolving nosepiece (turret) holding 4 objective lenses. Typical magnifications would be:**
□ 4x: **Scanning objective, low magnification for initial viewing. Numerical Aperture (NA) likely around 0.10.**
□ 10x: **Low power objective for more detailed viewing. NA likely around 0.25.**
□ 40x: **High dry objective for detailed cellular examination. NA likely around 0.65.**
□ 100x: **Oil immersion objective for the highest magnification and resolution, requires immersion oil. NA likely around 1.25.**
□ **The objectives will likely be achromatic (corrected for basic color aberrations) or possibly plan achromatic (corrected for color and flatness of field in the center).**
□ Total Magnification: **Ranges achievable would be:**
□ **4x objective + 10x eyepiece = 40x**
□ **10x objective + 10x eyepiece = 100x**
□ **40x objective + 10x eyepiece = 400x**
□ **100x objective + 10x eyepiece = 1000x**
2. Illumination System:
□ Light Source: **Likely an LED light source (common in modern microscopes for its longevity and cool operation) or possibly a halogen bulb.**
□ Condenser: **Usually an Abbe condenser located below the stage, used to focus light onto the specimen. It will likely have an adjustable aperture diaphragm to control contrast and resolution.**
□ Focusing: **Separate coarse and fine focus knobs for adjusting the sharpness of the image.**
3. Stage:
□ Mechanical Stage: **Likely includes a mechanical stage that allows for precise movement of the specimen slide in the X and Y directions using adjustment knobs. May have vernier scales for locating specific points on the slide.**
□ Stage Clips: **To secure the specimen slide.**

4. Stand and Mechanics:
Stable base and a supporting arm.
Possible Scenarios and How to Get More Specific Information:
Misspelling: **Could the brand name be "Zeiss"? Zeiss is a very reputable and well-known microscope manufacturer. If so, providing the Zeiss model name would allow for precise specifications.**
Regional Brand: **"Zics" might be a brand specific to a certain region or distributor. In this case, detailed specifications might be harder to find online unless you can locate the specific supplier.**
Older Model: **If it's an older microscope, finding detailed specifications might require looking through older catalogs or contacting specialized microscopy forums or communities.**

35. Dissecting microscope
1. Optical System:
Stereoscopic Head: **Contains two separate optical paths (one for each eye) with inclined eyepieces to provide a 3D view. Binocular heads (two eyepieces) are standard. Trinocular heads have an additional port for attaching a camera.**
Eyepieces: **Typically come with 10x magnification (WF10x) and a wide field of view (e.g., 20mm or more). Optional eyepieces with higher (e.g., 15x, 20x) or lower magnifications are often available. Diopter adjustment on at least one eyepiece allows for individual focusing. Interpupillary distance adjustment (usually 50-75mm) accommodates different users.**
Objective Lenses:
Fixed Magnification: **Some dissecting microscopes have fixed magnification objectives (e.g., 1x, 2x, 4x), often on a revolving turret.**
Zoom Objectives: **More common, offering a range of continuous magnification (e.g., 0.7x to 4.5x, 0.8x to 5x, or even wider ratios like 6.4:1, 7:1, 8:1, or more).**
Auxiliary Objectives: **Optional lenses that can be attached to the main objective to increase or decrease the overall magnification and working distance (e.g., 0.5x, 0.7x, 1.5x, 2x).**
Magnification Range: **The total magnification is determined by multiplying the eyepiece magnification by the objective magnification. Typical ranges with standard eyepieces and objectives are from** 5x to 50x **or higher, sometimes reaching** 200x-300x **with optional eyepieces and auxiliary lenses.**
Working Distance: **The distance between the objective lens and the specimen when in focus. Dissecting microscopes are known for their long working distances, typically ranging from** 40mm to over 100mm**, allowing for easy manipulation of specimens.**

Field of View: **The diameter of the area visible through the eyepieces. It decreases as magnification increases. Wide-field eyepieces contribute to a larger field of view.**
Numerical Aperture (NA): **Generally lower than high-power compound microscopes due to the lower magnifications. It affects resolution and depth of field.**
Optical Correction: **Objectives are typically** achromatic **or** plan achromatic **to minimize chromatic aberrations and provide a flat field of view. Some high-end models may feature** apochromatic **optics for superior color correction.**
2. Illumination System:
Dissecting microscopes typically have dual illumination systems:
Incident (Top) Illumination: **Light shines onto the specimen from above. Often adjustable and can be provided by halogen, LED, or fiber optic sources. Ring lights, gooseneck lights, and spotlights are common types.**
Transmitted (Bottom) Illumination: **Light passes through the specimen from below, useful for transparent or translucent samples. Often integrated into the base with a stage plate that can be black, white, or frosted glass.**
Both incident and transmitted light sources often have adjustable intensity. Some advanced models feature independent control of upper and lower lights.
3. Focusing Mechanism:
Coarse Focus: **Used for large adjustments to bring the specimen into focus. Often a rack and pinion system.**
Fine Focus: **Allows for precise focusing, especially at higher magnifications. Some models have coaxial coarse and fine focus knobs.**
Focusing Mount/Stand: **The head of the microscope is attached to a stand with a focusing mechanism that allows vertical movement to adjust the focus. Different stand types are available (e.g., pillar stand, boom stand for greater flexibility).**
4. Stage:
Typically a flat platform where the specimen is placed. Can have clips to secure the specimen. Some have a reversible black and white stage plate for contrast. Larger stages are available for bigger specimens.
5. Construction and Ergonomics:
Sturdy Stand: **Provides stability during observation and manipulation.**
Head Rotation: **Some heads can rotate 360 degrees for convenient viewing from different angles.**
Ergonomic Design: **Features like adjustable viewing angles and heights can reduce user fatigue during prolonged use.**
6. Optional Accessories:
Microscope Cameras: **For capturing images and videos. Trinocular heads are required for simultaneous viewing and imaging.**
Software: **For image analysis and documentation.**
Auxiliary Lenses: **To modify magnification and working distance.**
Eyepiece Reticles/Graticules: **For measurements.**
Polarizing Attachments: **For examining birefringent materials.**

Darkfield Attachments: **For enhancing contrast of unstained specimens.**
Key Specifications to Consider When Choosing a Dissecting Microscope:
Magnification Range: **Determine the required level of detail for your applications.**
Working Distance: **Crucial if you need to manipulate specimens under the microscope.**
Field of View: **Important for viewing larger areas of the specimen.**
Illumination Type: **Choose based on the opacity and characteristics of your samples.**
Optical Quality: **Consider the level of aberration correction needed for clear and accurate imaging.**
Stand Type: **Select a stand that provides the necessary stability and flexibility.**
Ergonomics: **Important for comfortable and prolonged use.**
Budget: **Prices vary widely depending on the features and quality.**

36. Rotary Microtome
A rotary microtome is a precision instrument used in histology and pathology to cut extremely thin slices (sections) of biological tissue embedded in a medium like paraffin wax or frozen tissue. These thin sections are then mounted on slides and stained for microscopic examination. Here's a breakdown of typical specifications for a rotary microtome:
1. Section Thickness Range:
This is a critical specification. Rotary microtomes typically offer a wide range of section thicknesses, usually adjustable in micrometer (µm) increments. Common ranges include:
Standard: **0.5 µm to 60 µm or 0.5 µm to 100 µm.**
Some advanced models may go down to 0.25 µm or even lower for specialized applications like electron microscopy (though ultramicrotomes are specifically designed for this).
The adjustment mechanism should be precise and reliable, often using a fine-pitch screw or a stepping motor for electronic models.
2. Specimen Advance:
Type: **Can be manual or motorized.**
Manual: **The specimen block advances a set distance with each rotation of the handwheel.**
Motorized: **An electronic motor precisely advances the specimen block, often with adjustable speed and step size. This is common in semi-automatic and fully automatic models.**
Advance Increment: **Corresponds to the selected section thickness.**

Total Advance: **The maximum distance the specimen can be advanced, which limits the size of the tissue block that can be sectioned.**
3. Specimen Holder:
Type: **Accepts various types and sizes of tissue blocks embedded in different media (e.g., paraffin, frozen). Interchangeable specimen clamps or vises are common.**
Orientation: **Many rotary microtomes allow for precise orientation of the specimen block in multiple axes (e.g., rotation around horizontal and vertical axes) to ensure the desired plane of sectioning.**
4. Knife Holder:
Type: **Designed to securely hold microtome blades, which can be disposable blades (high-profile or low-profile) or resharpenable steel knives.**
Adjustments: **Typically allows for adjustment of the blade angle (clearance angle) relative to the tissue block. Some advanced models offer lateral blade movement to utilize the entire cutting edge and extend blade life.**
5. Cutting Stroke:
The vertical movement of the specimen block past the stationary blade (or vice versa in some designs). The stroke length should be sufficient to section the size of tissue blocks commonly used.
6. Handwheel:
Large, ergonomically designed handwheel for manual sectioning. Should provide smooth and consistent rotation. Some motorized models also have a manual override handwheel.
7. Motorized Operation (if applicable):
Sectioning Speed: **Adjustable speed for automated sectioning.**
Trimming Function: **Allows for rapid removal of excess embedding medium before reaching the tissue. Often with a selectable thicker section thickness.**
Memory Functions: **Some models can store sectioning parameters for different tissue types or protocols.**
Foot Pedal Control: **May be available for hands-free operation.**
8. Safety Features:
Handwheel Lock: **To prevent accidental movement of the specimen arm.**
Blade Guard: **To protect the user from the sharp blade.**
Emergency Stop Button (for motorized models).
9. Construction Materials:
Robust and stable construction, typically using high-quality metals to minimize vibrations and ensure precise sectioning.
10. Dimensions and Weight:
Benchtop instruments, but size and weight can vary depending on the model and features.
11. Power Supply (for motorized models):
Specifies the voltage and frequency requirements.
12. Optional Accessories:
Blade holders for different types of blades.
Specimen clamps for various block sizes and shapes.
Anti-roll plates to prevent curling of thin sections.

Foot pedal.
Dust cover.
Key Considerations When Choosing a Rotary Microtome:
Volume of Work: **For high-throughput labs, motorized or fully automated models are more efficient.**
Types of Tissues: **Different tissues and embedding media may require specific section thickness ranges and blade types.**
Budget: **Prices vary significantly based on features and automation level.**
User Experience: **Ergonomics and ease of use are important for comfort and efficiency.**
Maintenance Requirements: **Consider the ease of cleaning and maintenance.**

37. Chemical balance
1. Traditional Mechanical Chemical Balance:
Capacity: **The maximum weight the balance can measure (e.g., 100g, 200g).**
Sensitivity: **The smallest change in weight that the balance can detect (e.g., 0.1 mg, 0.01 mg, or even lower). This is often indicated by the movement of a pointer across a scale for a given weight difference.**
Beam: **A calibrated beam with a central pivot point and pans suspended on either side.**
Rider: **A small wire that can be moved along a graduated beam to make fine adjustments to the weight.**
Weights: **A set of calibrated weights (usually brass) used to balance the sample.**
Leveling Screws: **To ensure the balance is level for accurate measurements.**
Draft Shield: **An enclosure to protect the weighing pans from air currents.**
Material: **Often constructed with a wooden base and glass enclosure.**
2. Modern Electronic Balances (Analytical and Precision Balances for Chemical Use):
These are the balances predominantly used in chemistry labs today. The specifications depend on whether it's an analytical or a precision balance:
a) Analytical Balances:
Capacity: **Typically ranges from around 20g to a few hundred grams (e.g., 100g, 200g, 300g).**
Readability (Precision): **Very high, typically 0.1 mg (0.0001 g) or even 0.01 mg (0.00001 g) for microbalances. This is the smallest increment the balance can display.**
Repeatability: **The ability of the balance to give the same reading when the same object is weighed multiple times under the same conditions (expressed as a standard deviation, e.g., ±0.1 mg).**

Linearity: **The ability of the balance to show the correct weight across its entire weighing range (expressed as a deviation, e.g., ±0.2 mg).**
Tare Range: **Usually the full weighing capacity of the balance (can zero out the weight of a container).**
Stabilization Time: **The time it takes for the balance to reach a stable reading after a sample is placed on the pan (typically a few seconds).**
Calibration: **Often features automatic internal calibration or external calibration using certified weights. Some have both.**
Weighing Units: **Grams (g) are standard, but many offer other units like milligrams (mg), ounces (oz), carats (ct), etc.**
Pan Size: **Relatively small, often around 80-100 mm in diameter, and enclosed within a draft shield with doors to minimize the effects of air currents.**
Display: **Digital LCD or touchscreen displays showing the weight and often other information (e.g., stability indicator, unit).**
Interface: **Often includes RS-232 or USB ports for data transfer to computers, printers, or other devices. Some may have Ethernet or wireless connectivity.**
Software Features: **May include functions like parts counting, percentage weighing, density determination, formulation, and statistical analysis.**
Power Supply: **AC adapter.**
Operating Temperature: **Specified range for accurate operation (e.g., 15-35 °C).**
Compliance: **May comply with GLP/GMP (Good Laboratory Practice/Good Manufacturing Practice) requirements.**
Construction: **Sturdy base to minimize vibrations, often with a chemical-resistant housing.**
b) Precision Balances (Used in Chemistry for less demanding accuracy):
Capacity: **Typically higher than analytical balances, ranging from hundreds of grams to several kilograms.**
Readability (Precision): **Lower than analytical balances but still high, typically 0.01 g (10 mg), 0.1 g, or 1 g.**
Repeatability and Linearity: **Specified values, but generally less stringent than analytical balances.**
Tare Range: **Usually full capacity.**
Stabilization Time: **Generally quick.**
Calibration: **Often external calibration, some models have internal calibration.**
Weighing Units: **Multiple units are common.**
Pan Size: **Larger than analytical balances.**
Display: **Digital LCD.**
Interface and Software Features: **Similar to analytical balances but may have fewer advanced functions.**

38. Micro slide cabinet
1. Capacity:

Measured by the number of standard microscope slides (typically 25mm x 75mm or 1" x 3") the cabinet can hold.
Capacities range from small desktop units holding around 100-500 slides **to larger, multi-drawer cabinets that can store** thousands of slides (e.g., 1000, 2000, 5000, or even more)**.**
Capacity is often specified per drawer and the total number of drawers.
2. Drawer Configuration:
Number of Drawers: **Varies significantly based on capacity requirements (e.g., 1 drawer, 5 drawers, 10 drawers, 20 drawers, etc.).**
Drawer Style:
Flat Drawers: **Slides lie flat in rows or compartments. This is the most common style.**
Slotted Drawers: **Slides stand vertically in individual slots, often angled for easy viewing and retrieval. This style can save space.**
Drawer Dividers/Compartments: **Drawers are often divided into rows or individual compartments to keep slides separated and organized. The number of compartments per drawer varies.**
Labeling: **Drawers usually have a space for labels on the front to indicate the contents.**
3. Material of Construction:
Metal: **Most common material, offering durability and stability. Typically made of:**
Steel: **Often powder-coated for chemical resistance and a clean finish. Gauge of steel can vary.**
Aluminum: **Lighter than steel but still durable.**
Wood: **Can offer a more traditional aesthetic but may be less resistant to moisture and chemicals. Hardwoods are generally preferred.**
Plastic: **Less common for large capacity cabinets but may be used for smaller, portable units.**
4. Dimensions:
Overall dimensions (width, depth, height) will depend on the capacity and drawer configuration.
Individual drawer dimensions (internal size) will determine the maximum number of slides per drawer and how they are arranged.
5. Weight:
Weight will vary significantly based on the material and capacity. Metal cabinets, especially large ones, can be quite heavy.
6. Locking Mechanism:
Many slide cabinets, especially those used for valuable or sensitive samples, feature a locking mechanism (e.g., key lock) to secure the contents.
7. Finish:
Powder-coated finishes on metal cabinets are common for durability and chemical resistance. Colors are typically neutral (e.g., gray, beige, white).
8. Stacking Capability:

Some modular cabinets are designed to be stackable, allowing for increased storage capacity as needed. They may have features to ensure stable stacking.
9. Special Features:
Dust Protection: **Tight-fitting drawers or doors to minimize dust accumulation on the slides.**
Humidity Control: **Some specialized cabinets may include features for controlling humidity levels, especially important for long-term storage of delicate samples.**
Index Card Holders: **Some cabinets may include holders for index cards to further organize and catalog the slides.**
Carrying Handles: **For portable units.**
Rubber Feet: **To protect surfaces and prevent slipping.**
Example Specifications (Illustrative):
Type: **Metal Microscope Slide Cabinet**
Capacity: **1000 Slides**
Number of Drawers: **10**
Drawer Style: **Flat drawers with 100 slide capacity per drawer (e.g., 10 rows of 10 slides)**
Material: **Powder-coated steel**
Dimensions (Approx.): **30 cm (W) x 40 cm (D) x 45 cm (H)**
Weight (Approx.): **15 kg**
Locking Mechanism: **Key lock on the front door**
Finish: **Beige powder coat**
Special Features: **Label holders on each drawer front**

39. Aluminium slide trays
1. Material:
Aluminium Alloy: **Typically made from lightweight and corrosion-resistant aluminium alloys (e.g., 5052, 6061). The specific alloy might not always be stated but indicates the tray's strength and resistance to chemical exposure.**
Anodized Finish: **Often anodized to provide a protective layer, enhance durability, and offer a smooth, non-reactive surface. Anodizing can also provide different color finishes (e.g., natural aluminium, black, blue).**
2. Capacity:
The number of standard microscope slides (25mm x 75mm or 1" x 3") the tray can hold. Common capacities include:
20 Slides: **Smaller, often used for staining or short-term organization.**
30 Slides: **A common standard size.**
40 Slides: **Offers slightly more capacity.**
50 Slides: **Larger capacity for batch processing or transport.**
The capacity is usually clearly stated by the manufacturer.
3. Slide Orientation:
Flat: **Slides lie flat in individual slots or channels within the tray. This is the most common orientation for transport and staining.**

□ Angled/Slotted: **Some trays have slots that hold slides at a slight angle, which can be useful for draining excess liquid after staining or for easier viewing while in the tray.**
4. Dimensions:
□ Overall Dimensions: **Length, width, and height of the tray. These will vary based on the capacity and slide orientation.**
□ Slot/Channel Width: **Designed to snugly fit standard microscope slides.**
□ Depth of Slots/Channels: **Sufficient to hold the thickness of a standard slide without it easily slipping out.**
□ Height/Thickness of Tray: **Impacts stackability and storage space.**
5. Weight:
□ **Aluminium being a lightweight material, the trays are generally easy to handle even when full. The weight will depend on the size and thickness of the aluminium used.**
6. Design and Features:
□ Flat Bottom: **Ensures stability on benchtops and staining racks.**
□ Stackable Design: **Many aluminium slide trays are designed to be stackable, often with small feet or ridges to prevent sliding when stacked. This saves space during storage or processing.**
□ Handles or Grips: **Larger capacity trays might have small handles or indented grips for easier carrying.**
□ Drainage Features: **Some staining trays might have small holes or a slightly angled design to facilitate drainage of staining solutions.**
□ Lids or Covers: **Some aluminium slide trays come with matching aluminium or transparent plastic lids to protect the slides from dust and damage during transport or storage. These might be sold separately.**
□ Color Coding: **Anodized finishes can come in different colors, which can be used for color-coding samples or experiments.**
7. Chemical Resistance:
□ **Aluminium is generally resistant to many common laboratory chemicals used in microscopy and histology. However, prolonged exposure to strongly acidic or alkaline solutions should be avoided as it can potentially corrode the aluminium. Anodized finishes enhance chemical resistance.**
8. Temperature Resistance:
□ **Aluminium can withstand a wide range of temperatures typically encountered in laboratory settings, including those used for some staining procedures or short-term storage in refrigerators. However, it's not designed for extreme heat.**
9. Cleaning and Maintenance:
□ **Aluminium slide trays are generally easy to clean with mild detergents and water. They should be dried thoroughly to prevent water spots.**
Example Specifications (Illustrative):
□ Material: **Anodized Aluminium Alloy**
□ Capacity: **30 Slides**
□ Slide Orientation: **Flat, individual channels**
□ Overall Dimensions: **24 cm (Length) x 20 cm (Width) x 1 cm (Height)**

Weight (Empty): **Approximately 150 grams**
Stackable: **Yes**
Finish: **Natural Aluminium (Silver)**
Features: **Flat bottom, slightly raised edges to prevent slides from slipping.**

40. Hot air oven
You're asking for the specifications of a hot air oven**, which is essentially a general-purpose laboratory oven used for dry heat sterilization, drying glassware, baking, and other heating applications. Here's a breakdown of typical specifications you might encounter:**
1. Temperature Range:
Typically spans from slightly above ambient temperature up to 250°C **or** 300°C**.**
Some high-temperature models can reach 400°C **or even higher for specialized applications.**
The control system should allow for precise temperature setting and maintenance within this range.
2. Temperature Accuracy:
The degree to which the oven maintains the set temperature. Typically specified as ±0.5°C to ±2°C**.**
3. Temperature Uniformity:
How evenly the temperature is distributed throughout the oven chamber. Specified as ±1°C to ±5°C**, depending on the size and air circulation method.**
Forced air ovens **generally offer better temperature uniformity compared to natural convection ovens.**
4. Capacity/Volume:
Available in a wide range of sizes, from small benchtop units (e.g., 20-50 liters**) to large floor-standing models (e.g.,** 100-1000 liters or more**).**
5. Control System:
Digital PID (Proportional-Integral-Derivative) controller: **For precise temperature setting and maintenance. Offers better accuracy and stability compared to analog controls.**
Analog Thermostat: **Found in simpler or older models. Less precise temperature control.**
6. Display:
Digital LED or LCD display: **Shows the set temperature and the actual chamber temperature.**
Analog dial: **Indicates the set temperature (less precise).**
7. Air Circulation:
Natural Convection: **Relies on the natural movement of heated air. Suitable for gentle heating and applications where strict uniformity isn't critical. Can have slower heating and recovery times.**
Forced Air (Fan-Assisted): **Uses a fan to circulate heated air throughout the chamber, providing faster heating, better temperature uniformity, and**

efficient drying. Recommended for applications requiring consistent conditions across all samples.
8. Heating Elements:
Electric heating elements strategically placed within the oven chamber for efficient heating.
9. Construction Materials:
Inner Chamber: **Typically made of corrosion-resistant** stainless steel (SS 304) **or** aluminized steel **for easy cleaning and durability.**
Outer Body: **Usually constructed of** powder-coated mild steel**.**
Insulation: **High-quality insulation (e.g.,** mineral wool**) to minimize heat loss and ensure energy efficiency.**
Door: **Insulated door with a silicone gasket for a tight seal. May include a** viewing window **made of tempered glass.**
10. Shelving:
Adjustable shelves, typically made of stainless steel wire mesh **or** perforated metal**, to accommodate different sizes and quantities of samples. The number of shelves depends on the oven's capacity.**
11. Safety Features:
Over-temperature Protection: **A secondary thermostat or electronic system that prevents the oven from exceeding a set safety limit, protecting samples and the oven itself.**
Thermal Fuse (in some models): **An additional safety measure that cuts off power if the temperature gets too high.**
Door Interlock (in some sterilization ovens): **Prevents the door from being opened during a sterilization cycle.**
12. Power Supply:
Typically 220-240 V AC, 50/60 Hz**. Power consumption varies depending on the size and heating capacity of the oven.**
13. Optional Features:
Timer: **For programmed operation and setting heating durations.**
Data Logging: **Records temperature over time for documentation and analysis.**
RS-232 or USB Interface: **For connecting to a computer for data transfer or remote monitoring.**
Interior Light: **For easy viewing of samples inside the chamber.**
Exhaust Port: **For venting fumes or moisture.**
Calibration Port: **For inserting a temperature probe for calibration and validation.**
Validation IQ/OQ/PQ Documentation: **For pharmaceutical or GMP-regulated environments.**
Key Considerations When Choosing a Hot Air Oven:
Application: **The intended use will determine the necessary temperature range, accuracy, uniformity, and features. For sterilization, specific temperature and time requirements must be met.**
Capacity: **Select a size that can accommodate your typical sample load.**

Air Circulation: **Forced air is generally preferred for consistent and efficient heating, especially for larger loads or when uniformity is critical.**
Control System: **Digital PID controllers offer more precise temperature control.**
Safety Features: **Ensure the oven has adequate safety mechanisms for your application.**
Budget: **Prices vary depending on size, features, and brand.**

41. Ocular micrometer
1. Material:
Glass Disc: **Made of high-quality, transparent optical glass to ensure clear viewing.**
Etched Scale: **The scale is precisely etched onto the glass, often using chrome for durability and visibility.**
2. Dimensions:
Diameter: **The diameter of the disc is designed to fit snugly into the eyepiece of a standard microscope. Common diameters include** 19 mm, 20 mm, and 21 mm**, but other sizes may exist to fit specific eyepieces.**
Thickness: **The thickness is usually around** 1-2 mm **to fit within the eyepiece assembly without interfering with its function.**
3. Scale Pattern:
Ocular micrometers come with various scale patterns to suit different measurement needs. Common types include:
Linear Scale: **A simple ruler with divisions of equal length. A common configuration is a** 10 mm line divided into 100 equal divisions**, meaning each division represents 0.1 mm at the plane of the eyepiece. The actual size this represents on the specimen depends on the objective lens magnification.**
Crosshair with Scale: **A crosshair with a linear scale along one or both axes, often with subdivisions.**
Grid Pattern: **A grid of squares of equal size, useful for estimating area or counting particles within a field of view.**
Concentric Circles: **A series of concentric circles with known diameter differences, useful for estimating the size of circular or oval objects.**
Angular Scales (Goniometer): **Scales marked in degrees, used for measuring angles.**
Combination Scales: **Some ocular micrometers combine different scale types (e.g., a linear scale with a grid).**
4. Scale Divisions and Units:
The number of divisions and the total length of the scale vary depending on the type. For linear scales, a common specification is 100 divisions over 10 mm**.**
The units on the ocular micrometer itself are arbitrary until calibrated with a stage micrometer. After calibration, each division corresponds to a specific real-world unit (e.g., micrometers or nanometers) for a given objective lens.
5. Accuracy:

Ocular micrometers are manufactured with high precision to ensure the accuracy of the etched scale. The accuracy is usually within a few micrometers for the entire scale length.
6. Mounting:
Designed for easy insertion and secure fitting within the designated location inside the microscope eyepiece.
7. Compatibility:
Ocular micrometers are often designed to be compatible with specific brands or types of microscopes and eyepieces. It's crucial to choose a micrometer with the correct diameter for your eyepiece.
Key Considerations:
Eyepiece Compatibility: **Ensure the diameter of the ocular micrometer matches the eyepiece's reticle holder.**
Scale Type: **Choose a scale pattern that suits your measurement needs (linear measurements, area estimation, angle measurement, etc.).**
Calibration: **Remember that an ocular micrometer must be calibrated with a stage micrometer for each objective lens used to obtain accurate measurements of the specimen. The value of each ocular division in real units will change with magnification.**

42. Stage micrometer
1. Material:
Substrate: **High-quality glass slide, typically soda-lime glass, with a thickness around 1-1.5 mm (0.04" - 0.06"). Some may be made of quartz or UV fused silica for specialized applications.**
2. Scale Length:
Common scale lengths include 1 mm, 2 mm, 5 mm, 10 mm, and 20 mm**. Some specialized micrometers can have longer scales (e.g., 25 mm or even inches).**
3. Divisions:
The scale is divided into smaller units of known length. Common division sizes include:
0.01 mm (10 µm): **Often the smallest division on standard stage micrometers.**
0.1 mm (100 µm): **Larger, more prominent divisions for easier reading.**
Some micrometers may have finer divisions (e.g., 2 µm, 5 µm) for high-precision calibration.
The number of divisions depends on the scale length and the division size (e.g., a 1 mm scale with 0.01 mm divisions will have 100 divisions).
4. Accuracy:
Stage micrometers are manufactured to high accuracy standards. The overall accuracy is often within ±1 µm to ±2 µm **over the entire scale length. High-quality, certified micrometers can have even better accuracy.**
5. Line Width:

The width of the lines on the scale is also specified and is typically very fine, often around 1-2 µm **or even less, to ensure precise measurements.**
6. Image Type:
Positive Image: **The scale lines are opaque (usually chrome) on a clear glass background. This is the most common type for transmitted light microscopy.**
Negative Image: **The scale lines are clear on an opaque background.**
7. Mounting:
The scale is usually permanently mounted on a standard microscope slide (25 mm x 75 mm or 1" x 3"). Some specialized micrometers might have different substrate sizes or shapes.
8. Numerical Labeling:
The scale often includes numerical markings at regular intervals (e.g., every 0.1 mm or 1 mm) to aid in counting divisions.
9. Calibration and Certification:
Some stage micrometers are supplied with a certificate of calibration, often traceable to national standards (e.g., NIST, UKAS). Certified micrometers offer a higher level of confidence in their accuracy.
10. Special Patterns:
Besides linear scales, some stage micrometers include additional patterns like crosshairs, grids, concentric circles, or resolution test targets for more specialized calibration tasks.
Example Specifications:
Scale Length: **1 mm**
Divisions: **100 divisions, each 0.01 mm (10 µm)**
Accuracy: **±1 µm**
Substrate: **Soda-lime glass, 25 mm x 75 mm**
Image: **Positive, chrome on clear glass**
Certification: **Optional, with a certificate traceable to a national standard.**
Key Considerations:
Application: **Choose a stage micrometer with a scale length and division size appropriate for the magnification range you need to calibrate. Finer divisions are needed for higher magnifications.**
Accuracy Requirements: **If precise measurements are critical, consider a certified stage micrometer.**
Durability: **Chrome-etched scales on glass are generally durable.**

43. Camera Lucida Prism type and mirror type
Optical Component: **Utilizes a specially designed** prism **made of high-quality optical glass (e.g., Leman optical glass). Often a** beam-splitting prism **with multiple facets.**
Image Orientation: **Typically designed to produce an image that is** not inverted or reversed**, making it easier to trace directly. Some simpler prism types might still have some inversion.**

Light Loss: **Light passes through the prism and undergoes reflections. Good quality prisms with** total internal reflection **minimize light loss, resulting in a brighter superimposed image.**
Field of View: **The design of the prism and its positioning over the eyepiece aims to provide a** sufficient field of view **of both the specimen and the drawing surface. Some designs might have limitations on the simultaneous visibility of the entire drawing area.**
Mounting: **Designed to** hang over or clamp onto the eyepiece **of a standard microscope. The fitting mechanism should be secure and allow for easy adjustment of the prism's position.**
Adjustability: **May include mechanisms for** adjusting the brightness **of the superimposed images (e.g., through filters or by changing the angle of the prism).**
Compactness: **Often designed to be** relatively compact **and not significantly obstruct the user's access to the microscope or drawing surface.**
Material: **Optical glass for the prism, with metal or plastic components for the mounting mechanism.**
Case: **Usually supplied with a** protective case**, often velvet-lined, for storage.**
Camera Lucida - Mirror Type Specifications:
Optical Component: **Employs a** beam-splitting prism **(often an Abbe prism) positioned over the eyepiece, combined with a** large-sized swinging mirror **attached to an extension arm.**
Image Orientation: **The initial reflection from a simple mirror would produce an** inverted and right-left reversed image**. However, the combination with the prism in these devices is designed to correct this, aiming for a** non-inverted and non-reversed **final superimposed image.**
Light Loss: **Involves reflection from the mirror surface, which can lead to some light loss depending on the quality of the mirror coating.**
Field of View: **The** swinging mirror **allows for adjusting the position of the drawing surface in the superimposed view, potentially offering more flexibility in seeing the entire drawing area.**
Mounting: **Designed to** clamp onto the eyepiece **of a standard microscope. The extension arm with the mirror provides adjustability.**
Adjustability: **The** swinging mirror **allows for adjusting the apparent position of the drawing surface. Some models might have additional adjustments for brightness or focus.**
Size: **The inclusion of the swinging mirror and extension arm can make the mirror type** slightly bulkier **than some prism-only designs.**
Material: **Optical glass for the prism, glass with reflective coating for the mirror, and metal for the arm and mounting mechanism.**
Case: **Typically supplied with a** protective case**, often velvet-lined, for storage.**
Key Differences and Considerations:
Complexity: **Mirror types often involve more moving parts (the swinging mirror) compared to simpler prism types.**

Adjustability: **Mirror types can offer more direct control over the positioning of the drawing surface in the field of view.**
Image Quality: **Both types, when well-designed and of good optical quality, can produce clear superimposed images. The specific quality depends on the precision of the optics.**
Ease of Use: **Some users might find one type more intuitive to set up and use than the other, depending on the specific design**

44. Hotplate (4)
1. General Laboratory Hotplates (Single Position):
Top Plate Material:
Ceramic: **Excellent chemical resistance, easy to clean, good temperature uniformity. Maximum temperature typically up to 380-500°C.**
Aluminum: **Fast and even heating, durable. Maximum temperature typically up to 350-400°C.**
Stainless Steel: **Durable, good for high temperatures (up to 300-370°C), but may have less uniform heating than ceramic or aluminum.**
Glass Ceramic: **Combines chemical resistance of ceramic with good thermal conductivity. Max temp around 450-500°C.**
Top Plate Size: **Ranges from approximately 7" x 7" (180 x 180 mm) to 12" x 12" (300 x 300 mm) or larger.**
Temperature Range: **Typically from ambient +5°C to 300-500°C, depending on the top plate material and model.**
Temperature Control:
Analog: **Knob-based control, less precise temperature setting.**
Digital: **Microprocessor-based control with LED or LCD display for set and actual temperature, offering better accuracy and stability (often with PID control). Accuracy typically ±1-5°C.**
Heating Power: **Varies with size and maximum temperature, typically from 500W to 1500W.**
Safety Features:
Over-temperature protection: **Prevents overheating.**
Hot top indicator light: **Warns when the surface is hot.**
Spill-proof design: **Protects internal components.**
Housing Material: **Powder-coated steel or chemical-resistant plastic.**
Power Supply: **Typically 220-240V AC, 50/60 Hz.**
2. Multi-Position Hotplates (e.g., 4-Position):
These hotplates have multiple independently controlled heating surfaces. Specifications for each position are generally similar to single-position hotplates, but with the following considerations:

Number of Positions: **In your case, 4 independently controlled heating areas.**
Top Plate Configuration: **Can be individual plates or one large plate with marked heating zones.**
Individual or Central Control: **Each position may have its own temperature control, or a central unit might control all zones. Independent control is more common for flexibility.**
Size: **Overall dimensions will be larger to accommodate multiple heating surfaces.**
Power: **Higher total power consumption due to multiple heating elements.**
3. Hotplate Stirrers (including multi-position):
These units combine heating with magnetic stirring capabilities. Specifications include those of a standard hotplate plus:
Stirring Speed Range: **Typically from 100 to 1500 RPM.**
Stirring Capacity: **Maximum volume of liquid that can be effectively stirred (e.g., 1-10 liters per position).**
Magnetic Strength: **Determines the size and viscosity of the sample that can be stirred.**
Control: **Separate or integrated controls for heating and stirring speed.**
External Temperature Probe: **Some models allow for direct temperature control of the liquid using an external probe.**
4. Industrial Hotplates:
These are larger, heavy-duty units designed for industrial applications and can have significantly different specifications:
Size: **Much larger heating surfaces.**
Temperature Range: **Can go up to higher temperatures depending on the application.**
Power: **Higher power ratings.**
Construction: **Robust materials for industrial environments.**
Control: **Often more sophisticated control systems.**

45. Refrigerator
Freezer Capacity :- **60liter**
Fresh Food Capacity :- **178liter**
Current Rating :- **0.8A**
Voltage :- **220-240V**
Frequency :- **50HZ**
Refrigerant Type :- **R134a**
Defrost System :- **Auto Defrost**
Changed Mass :- **105g**
Capillary Tube Length :- **270cm**

Capillary Tube Inner Diameter :- **0.78mm**
Refrigerant Gas :- **CFC Free**
Compressor :- **Power Saver Compressor**

46. Cylinder with burners
LPG Cylinder Specifications:
• Weight: **14.2 kg (filled).**
• Dimensions**: 715mm high and 305mm in diameter for a 14kg cylinder.**
• Material: **Steel.**
• Safety Standards: **Manufactured as per Indian Standard (IS): 3196 (Part-I) 2006.**
Gas Burner Specifications:
• Type: **Domestic gas stoves with multiple burners.**
• Material: **Metallic bodies with ceramic burners are common.**
• Safety Standards: **Meet safety requirements as per BIS Standard IS 4246:2002.**
• **Gas Pressure: Designed for use with LPG at 2.942 kN/m2 (30 gf/cm2) gas inlet pressure.**

III) Microbiology Section

47. Laminar Air Flow Bench:
1. Dimensions:
Standard Widths: Commonly available in sizes like 2 feet (610 mm), 3 feet (915 mm), 4 feet (1220 mm), 6 feet (1828 mm), and 8 feet (2438 mm). Custom sizes can also be available.
Depth: Typically around 2 feet (610 mm).
Height: Bench height is usually around 2-2.5 feet (600-750 mm) for the working area, with the total height depending on whether it's a benchtop model or has a support stand.
2. Airflow:
Type: Can be either Horizontal or Vertical.
Horizontal LAF: Filtered air flows horizontally from the back of the cabinet towards the operator.
Vertical LAF: Filtered air flows vertically downwards from the top of the cabinet onto the work surface.
Air Velocity: The typical air velocity across the working area ranges from 0.3 to 0.6 meters per second (60 to 120 feet per minute). Some standards specify around 0.45 m/s ± 20%.
Air Cleanliness: Most LAF benches are designed to meet ISO Class 5 (formerly Class 100 under US FED STD 209E) standards. This means the air within the work zone should have no more than 3,520 particles of 0.5 µm or larger per cubic meter.

Airflow Pattern: Laminar or unidirectional with minimal turbulence (<5% is sometimes specified).
3. Filtration System:
Pre-filter: A washable pre-filter (typically 5-10 microns) is used to capture larger particles and extend the life of the HEPA filter. It usually has an efficiency of around 95% for particles down to 5 microns. Materials include HDPE, non-woven fabric, and HDPE mesh in an aluminum frame.
HEPA Filter: The main filter with a typical efficiency of 99.99% to 99.999% for particles 0.3 microns and larger. Some high-performance units may use ULPA filters with even higher efficiency. HEPA filters are usually housed in an anodized aluminum case to prevent leaks.
4. Materials of Construction:
Cabinet Body: Options include:
Stainless Steel (SS 304 or SS 316) for the entire unit.
Inner Stainless Steel with an outer body of Mild Steel (powder-coated or GI sheet).
Stainless Steel workbench with a Mild Steel or wooden body.
Work Surface: Typically made of Stainless Steel (SS 304) for durability and ease of cleaning, often with curved edges.
Side Panels: Usually made of transparent acrylic, polycarbonate, or glass to provide visibility.
Front Sash (Door): Can be manual or motorized sliding type, made of transparent acrylic or tempered glass.
5. Blower Assembly:
A motor (typically ¼ to ½ HP) with dynamically balanced impellers (often aluminum anodized) to provide a consistent and reliable airflow. The motor speed is usually around 1400 RPM.
Noise level is often specified to be within 60-65 ±5 dB.
6. Lighting:
Fluorescent or LED lighting to provide adequate illumination (around 800 lux, glare-free) within the working area.
Some units include a UV germicidal lamp for sterilizing the work area before use (253.7 nm wavelength). An hour meter for the UV lamp may be included.
7. Standard Fittings:
Air/gas cocks.
Electrical outlets inside the working area.
Mains on/off switch.
Light on/off switch.
Blower on/off switch.
UV light on/off switch (if applicable).
8. Optional Features:
Motorized sliding door.
LCD display for air velocity, timer, and lamp status.
UV hour meter.
Magnehelic gauge to monitor pressure drop across the HEPA filter.

Extra power outlets.
Footrest.
Leveling legs or castors for mobility.
DOP/HEPA filter testing port.
Integrated particle monitoring system (IPMS).
9. Power Supply:
Typically 220-240 volts / 50 Hz, single phase.
10. Standards Compliance:
Designed to meet standards such as:
ISO 14644-1 Class 5 (or equivalent).
US Federal Standard 209E (Class 100).
BS EN ISO 14644-1:2015.
EU GMP (for pharmaceutical applications).
ANSI/IEST/ISO 14644-1:1999 Class 5.
EN 1822 (for HEPA filter classification).
CE certification.

48. BOD Incubator
1. Capacity/Volume:
Available in various sizes, ranging from small benchtop units (around 25-50 liters) to larger floor-standing models (up to several hundred liters, e.g., 200-400 liters or more). The choice depends on the number and size of samples to be incubated simultaneously.
2. Temperature Control:
Temperature Range: **Typically spans from 5°C to 60°C or even higher in some models, allowing for various incubation studies beyond just BOD. However, for BOD analysis, the crucial setpoint is 20°C.**
Temperature Accuracy: **High accuracy is critical. Specifications usually state ±0.5°C or even ±0.1°C of the set temperature.**
Temperature Uniformity: **The temperature should be consistent throughout the chamber. Uniformity is often specified as ±1°C or better. Forced air circulation via a fan and a well-designed airflow system ensures even temperature distribution.**
Temperature Stability: **The incubator should maintain the set temperature without significant fluctuations over the incubation period.**
3. Control System:
Microprocessor-based PID (Proportional-Integral-Derivative) controller: **For precise temperature control and programming.**
Digital Temperature Display: **Clear and easy-to-read LED or LCD display showing the current temperature and setpoint.**
Timer: **Some advanced models may include a built-in timer for automated operation or to track incubation periods.**
Alarms: **High/low temperature alarms to alert users of any deviations from the set temperature, ensuring sample integrity.**
4. Construction Materials:

Inner Chamber: **Typically made of corrosion-resistant stainless steel (SS 304 grade) for easy cleaning and durability. Some models might use anodized aluminum.**
Outer Body: **Usually constructed of powder-coated mild steel or stainless steel, providing a robust and easy-to-clean exterior.**
Insulation: **High-quality insulation (e.g., PUF - Polyurethane Foam) to minimize heat loss/gain and maintain stable internal temperature, contributing to energy efficiency.**
Door: **Insulated door with a magnetic gasket for a tight seal to prevent temperature fluctuations. Some models may have an inner glass door to allow sample viewing without disturbing the internal environment.**
5. Shelving:
Adjustable stainless steel wire mesh or perforated shelves to accommodate samples of different sizes. The number of shelves varies with the incubator's capacity.
6. Lighting:
Designed to provide complete darkness, as light can affect the BOD reaction. The door should be opaque or have a mechanism to block light effectively.
7. Safety Features:
Over-temperature protection to prevent damage to samples and the incubator in case of control system failure.
Door lock (optional) to secure samples.
8. Power Supply:
Typically 220-240 V AC, 50/60 Hz. Power consumption varies depending on the size and features of the incubator.
9. Optional Features:
Data logging capabilities with software for recording and analyzing temperature data.
RS-232 or USB interface for connecting to a computer.
Humidity control (less common in standard BOD incubators but available in specialized models).
CFC-free refrigerant for cooling (in models with temperature control below ambient).
Observation port with internal light (if darkness is not strictly required for all applications).
10. Standards Compliance:
May comply with relevant laboratory equipment standards and safety regulations.

49. Plain Incubator
1. Capacity/Volume:
Available in a wide range of sizes, from compact benchtop models (e.g., 20-50 liters) to larger floor-standing units (e.g., 100-800 liters or more). The choice depends on the number and size of samples or cultures to be incubated.

2. Temperature Control:
Temperature Range: **Typically spans from slightly above ambient temperature up to 70°C or even higher (e.g., 80°C). Some low-temperature incubators can go below ambient, often utilizing refrigeration.**
Temperature Accuracy: **Important for reliable results, usually specified as ±0.5°C or ±0.2°C of the set temperature.**
Temperature Uniformity: **Consistent temperature throughout the chamber is crucial. Uniformity is often specified as ±1°C or better, achieved through natural convection or forced air circulation.**
Temperature Stability: **The incubator should maintain the set temperature with minimal fluctuations over extended periods.**
Control System: **Microprocessor-based PID (Proportional-Integral-Derivative) controllers are common for precise temperature setting and maintenance.**
3. Air Circulation:
Natural Convection: **Simpler and quieter, suitable for applications where strict uniformity is not paramount. Heat rises and circulates naturally within the chamber.**
Forced Air Circulation (Fan-Assisted): **Uses a fan to distribute heated air evenly throughout the chamber, providing better temperature uniformity and faster recovery after door openings. Essential for applications requiring consistent conditions across all samples.**
4. Control Panel and Display:
Digital Temperature Display: **Clear LED or LCD screen showing the set temperature and the current chamber temperature.**
Temperature Setting: **User-friendly interface with buttons or a touchscreen for setting the desired temperature.**
Timer (Optional): **Some models may include a timer for programmed operation or incubation periods.**
Alarms (Optional): **High/low temperature alarms to alert users of temperature deviations.**
5. Construction Materials:
Inner Chamber: **Typically made of corrosion-resistant stainless steel (SS 304) or aluminum for easy cleaning and durability.**
Outer Body: **Usually constructed of powder-coated mild steel or stainless steel for a robust and easy-to-clean exterior.**
Insulation: **High-quality insulation (e.g., mineral wool or polyurethane foam) to minimize heat loss and maintain temperature stability, contributing to energy efficiency.**
Door: **Insulated door with a gasket to ensure a tight seal. Some models have an inner glass door to allow observation of samples without opening the main door and disrupting the internal environment.**
6. Shelving:
Adjustable shelves, typically made of stainless steel wire mesh or perforated metal, to accommodate different sizes and quantities of samples. The number of shelves depends on the incubator's capacity.

7. Safety Features:
Over-temperature Protection: **A secondary thermostat or electronic system that prevents the incubator from overheating in case of the primary control system failure.**
Thermal Fuse (in some models): **An additional safety measure that cuts off power if the temperature exceeds a critical limit.**
8. Power Supply:
Typically 220-240 V AC, 50/60 Hz. Power consumption varies depending on the size and heating capacity of the incubator.
9. Optional Features:
Internal Lighting: **Some models include internal lighting for easy viewing of samples.**
Observation Port: **A small window in the door to view samples without opening it.**
Humidity Control: **Specialized incubators may include humidity control for applications requiring specific humidity levels (these are often called humidity incubators).**
Data Logging: **Some advanced models offer data logging capabilities for recording temperature over time.**
RS-232 or USB Interface: **For connecting to a computer for data transfer or remote monitoring.**
Sterilization Cycle: **Some high-end incubators may have a built-in sterilization cycle using high temperatures.**
10. Standards Compliance:
May comply with relevant laboratory equipment safety standards and regulations.

50. Serological Water bath
1. Capacity/Volume:
Available in various sizes, typically ranging from around 6 liters to 30 liters or more, depending on the manufacturer and model.
2. Temperature Control:
Temperature Range: **Generally from a few degrees above ambient temperature up to 99.9°C. Some models might have a lower minimum temperature if they include a cooling mechanism, but this is less common for standard serological baths.**
Temperature Accuracy: **Typically ±0.1°C to ±1°C, with more advanced models offering better accuracy.**
Temperature Uniformity: **Usually ±0.2°C to ±1°C throughout the water bath chamber, ensured by natural convection or sometimes with the aid of a stirrer (optional in some models).**
Control System: **Often features a digital PID (Proportional-Integral-Derivative) controller for precise temperature setting and maintenance. Analog controls with a thermostat are also found in some models.**

□ Display: **Digital LED or LCD displays for showing set and actual temperatures are common. Some basic models might use a thermometer for temperature indication.**
3. Construction Materials:
□ Inner Chamber: **Typically made of corrosion-resistant stainless steel (SS 304) for durability and ease of cleaning. Some might use SS 316 for even better corrosion resistance.**
□ Outer Body: **Usually constructed from powder-coated mild steel or stainless steel.**
□ Lid: **Often made of stainless steel, sometimes with concentric rings to accommodate different sizes of glassware and minimize heat loss and evaporation. Gabled lids are also available.**
□ Insulation: **The space between the inner chamber and outer body is usually filled with insulation material like glass wool or mineral wool to minimize heat loss and improve energy efficiency.**
4. Heating System:
□ **Immersion heaters, typically made of stainless steel, are used to heat the water. The wattage of the heater varies with the size of the bath.**
5. Safety Features:
□ Over-temperature protection: **A crucial safety feature that prevents the bath from overheating if the primary control system fails. This can be a secondary thermostat or an electronic cut-off.**
□ Low water level alarm/cut-off: **Some advanced models may include this to prevent the heater from running dry and potentially causing damage or fire.**
6. Standard Fittings:
□ **On/off switch.**
□ **Heating indicator light.**
□ **Mains indicator light.**
□ **Temperature control knob or digital interface.**
□ **Sometimes includes a drain plug for easy emptying and cleaning.**
□ **May come with a set of test tube racks (number depends on the size).**
7. Optional Features:
□ **Stirrer with speed control for better temperature uniformity.**
□ **Digital timer for programmed operation.**
□ **Data logging capabilities with software.**
□ **RS-232 or USB interface for computer connectivity.**
□ **Inner glass door for sample viewing without opening the main lid.**
8. Power Supply:
□ **Typically 220-240 V AC, 50/60 Hz.**
9. Dimensions:
□ **Internal and external dimensions vary greatly depending on the capacity and model. Manufacturers usually provide these specifications.**
10. Standards Compliance:
□ **May comply with relevant laboratory equipment safety standards (e.g., CE certification)**

51. Oven
1. General Purpose Laboratory Ovens:
These are the most common type, used for routine drying, heating, and sterilization.
□ Temperature Range: **Typically from slightly above ambient temperature up to 250°C or 300°C. Some high-temperature models can reach 400°C or higher.**
□ Temperature Accuracy: **Usually ±0.5°C to ±2°C.**
□ Temperature Uniformity: **Typically ±1°C to ±5°C, depending on the size and air circulation method. Forced air ovens generally have better uniformity.**
□ Capacity/Volume: **Ranges from small benchtop units (e.g., 20-50 liters) to large floor-standing models (e.g., 200-1000 liters or more).**
□ Control System: **Often uses a digital PID (Proportional-Integral-Derivative) controller for precise temperature setting and maintenance. Analog controls are also found in some basic models.**
□ Display: **Digital LED or LCD displays for set and actual temperatures are common.**
□ Air Circulation: **Can be either** natural convection **(for gentle heating and minimal drying) or** forced air **(using a fan for faster heating, better uniformity, and efficient drying).**
□ Construction Materials:
□ Inner Chamber: **Typically stainless steel (SS 304) or aluminized steel for corrosion resistance and ease of cleaning.**
□ Outer Body: **Usually powder-coated mild steel.**
□ Insulation: **High-quality insulation (e.g., mineral wool) to minimize heat loss and ensure energy efficiency.**
□ Door: **Insulated door with a silicone gasket for a tight seal. Often includes a viewing window made of tempered glass.**
□ Shelving: **Adjustable stainless steel or chrome-plated wire shelves. The number of shelves depends on the size.**
□ Safety Features:
□ Over-temperature protection: **Prevents the oven from exceeding a set safety limit.**
□ Thermal fuse (in some models): **Provides an additional layer of safety.**
□ Power Supply: **Typically 220-240 V AC, 50/60 Hz.**
□ Optional Features:
□ **Timer for programmed operation.**
□ **Data logging capabilities.**
□ **RS-232 or USB interface for computer connectivity.**
□ **Interior light.**
□ **Exhaust port for venting fumes.**
2. Vacuum Ovens:
Used for drying heat-sensitive materials at lower temperatures by reducing the pressure.
□ Temperature Range: **Typically slightly above ambient to 200°C or higher, depending on the model.**

Temperature Accuracy: **Similar to general-purpose ovens.**
Temperature Uniformity: **Can be challenging to achieve perfect uniformity due to the absence of air convection; often relies on heat transfer through the shelves.**
Capacity/Volume: **Similar range to general-purpose ovens.**
Control System: **Digital PID controllers with vacuum gauge interfaces.**
Vacuum Level: **Expressed in units like Torr, mbar, or kPa. Typical vacuum levels can range from near atmospheric pressure down to a few Torr or millibar.**
Construction Materials: **Robust construction to withstand vacuum conditions, often with a thick-walled stainless steel chamber and a tightly sealing door with a silicone gasket.**
Shelving: **Typically aluminum to facilitate heat transfer under vacuum.**
Safety Features: **Implosion-resistant design, over-temperature protection.**
Connections: **Ports for vacuum pump connection and inert gas purging (optional).**
Optional Features: **Vacuum pump, vacuum controller, inert gas inlet.**
3. Sterilization Ovens (Hot Air Sterilizers):
Designed for dry heat sterilization of glassware and heat-stable instruments at high temperatures.
Temperature Range: **Typically 50°C to 250°C or higher, with standard sterilization temperatures around 160-180°C.**
Temperature Accuracy: **Critical for effective sterilization, often ±0.5°C to ±1°C.**
Temperature Uniformity: **Very important for consistent sterilization across the chamber, usually achieved with forced air circulation (±1°C to ±3°C).**
Capacity/Volume: **Similar range to general-purpose ovens.**
Control System: **Precise digital PID controllers with sterilization cycle programming capabilities.**
Display: **Clear digital display showing temperature and cycle status.**
Air Circulation: **Always forced air for optimal temperature uniformity and effective sterilization.**
Construction Materials: **Similar to general-purpose ovens, with a focus on materials that can withstand high temperatures.**
Shelving: **Typically stainless steel.**
Safety Features: **Over-temperature protection, door interlock (to prevent opening during a cycle).**
Cycle Programming: **Ability to set sterilization temperature and holding time.**
Validation Ports: **For inserting temperature probes to verify sterilization conditions.**
4. High-Temperature Ovens:
Designed for applications requiring very high temperatures, such as materials testing, annealing, or specialized industrial processes.
Temperature Range: **Typically 300°C up to 1000°C or even higher.**

Temperature Accuracy: **Depends on the specific application and control system.**
Temperature Uniformity: **Can be challenging at very high temperatures and depends heavily on the design and air circulation (if any).**
Construction Materials: **Specialized high-temperature alloys and insulation materials (e.g., ceramic fiber).**
Heating Elements: **High-wattage heating elements designed for extreme temperatures.**
Control System: **Advanced digital controllers with precise temperature programming and safety features.**
Safety Features: **Robust over-temperature protection, specialized insulation to minimize external surface temperature.**
When selecting a laboratory oven, consider the following factors:
Application: **The specific use of the oven will determine the required temperature range, accuracy, and features.**
Capacity: **Choose a size that can accommodate your typical sample load.**
Temperature Uniformity: **Critical for applications requiring consistent heating across all samples. Forced air ovens offer better uniformity.**
Control System: **Digital controllers offer more precise temperature control and programming capabilities.**
Safety Features: **Ensure the oven has adequate safety mechanisms.**
Budget: **Prices vary depending on size, features, and brand.**

52. Autoclave / Sterilizer
1. Type:
Gravity Displacement Autoclaves: **Rely on steam entering the chamber and displacing the heavier air downwards and out through a vent. Suitable for sterilizing liquids and porous materials.**
Pre-vacuum Autoclaves (High-Speed): **Use a vacuum pump to remove air from the chamber before steam is introduced, ensuring faster and more efficient steam penetration, especially for porous and wrapped items. Often have a post-vacuum cycle for drying.**
Benchtop Autoclaves: **Smaller, portable units suitable for limited space and smaller loads.**
Floor-Standing Autoclaves: **Larger capacity units for higher throughput.**
Vertical (Top-Loading) Autoclaves: **Steam is generated at the bottom, and sterilization occurs in a vertical chamber.**
Horizontal (Front-Loading) Autoclaves: **Similar to ovens, with a front door for loading and unloading.**
2. Capacity/Volume:
Range from small benchtop units (e.g., 5-25 liters) to large floor-standing autoclaves (e.g., 100 liters to over 1000 liters). The choice depends on the volume and size of materials to be sterilized.
3. Temperature and Pressure:

Sterilization Temperatures: **Standard cycles typically operate at 121°C (15 psi or 103 kPa) and 134°C (30 psi or 207 kPa). Some autoclaves offer adjustable temperature settings.**
Pressure Range: **Designed to withstand and operate at the required pressures for sterilization. Maximum operating pressure is a key specification.**
Temperature Accuracy: **Typically ±0.5°C to ±1°C within the sterilization chamber.**
Pressure Accuracy: **Usually within ±1 psi (±7 kPa) of the set pressure.**
4. Control System:
Manual Control: **Basic models with manual settings for temperature and time.**
Semi-Automatic Control: **May have preset cycles and automatic venting.**
Fully Automatic Control (Microprocessor-Based): **Offer programmable cycles, automatic operation (fill, heat, sterilize, exhaust, dry), and often include data logging and cycle validation features.**
5. Display:
Analog pressure gauges and thermometers (in basic models).
Digital displays (LED or LCD) showing temperature, pressure, time, and cycle status in more advanced models.
6. Construction Materials:
Chamber: **Typically made of high-grade stainless steel (SS 304 or SS 316L) to withstand high pressure and temperature and resist corrosion.**
Outer Body: **Usually stainless steel or powder-coated steel.**
Door: **Robustly constructed with safety interlocks to prevent opening when pressurized. Sealing is achieved with silicone or Teflon gaskets.**
7. Heating System:
Electrical immersion heaters are commonly used to generate steam within the chamber.
8. Safety Features:
Pressure Relief Valve: **To automatically release excess pressure.**
Door Interlock System: **Prevents the door from being opened when the chamber is pressurized.**
Over-temperature Protection: **Shuts off the heating if the temperature exceeds a safe limit.**
Low Water Level Cut-off (for models with internal steam generation): **Prevents the heating elements from burning out if the water level is too low.**
Emergency Stop Button: **For immediate shutdown in case of malfunction.**
9. Cycle Types (in advanced models):
Gravity Cycle: **For sterilizing liquids and non-porous items.**
Pre-vacuum Cycle: **For sterilizing porous and wrapped items, ensuring air removal.**
Liquid Cycle: **Gentle heating and slow exhaust to prevent boiling over of liquids.**
Instrument Cycle: **Higher temperature and pressure for sterilizing instruments.**

□ Bowie-Dick Test Cycle: **For testing the effectiveness of air removal in pre-vacuum sterilizers.**
□ Vacuum Drying Cycle (in pre-vacuum models): **Uses a vacuum to remove moisture after sterilization.**
10. Standard Features:
□ **Sterilization chamber.**
□ **Heating elements.**
□ **Pressure gauge.**
□ **Temperature sensor.**
□ **Safety valve.**
□ **Exhaust valve.**
□ **Water inlet (for models with automatic water fill).**
□ **Trays or baskets for holding items.**
11. Optional Features:
□ **Data logging and printing capabilities.**
□ **RS-232 or USB interface for computer connectivity.**
□ **Automatic water filling and draining.**
□ **Air filter on the air intake valve.**
□ **Biohazard containment features.**
□ **Validation ports for temperature probes.**
□ **Chart recorder for documenting cycles.**
12. Power Supply:
□ **Voltage and frequency requirements vary depending on the size and model (e.g., 220-240 V AC, 50/60 Hz, single or three phase for larger units).**
13. Standards Compliance:
□ **Must comply with relevant safety and performance standards (e.g., UL, CSA, CE marking, ASME Boiler and Pressure Vessel Code). Medical autoclaves often need to comply with specific medical device standards (e.g., EN 13060 for small steam sterilizers, EN 285 for large steam sterilizers).**

53. Microscope (High power)
High-power microscopes, typically referring to compound light microscopes used for detailed examination of small specimens and cellular structures, have a range of specifications that determine their performance and suitability for various applications. Here's a breakdown of common specifications:
1. Optical System:
□ Objective Lenses:
□ Magnification: **Typically include a range of objectives, such as 4x (scanning), 10x (low power), 40x (high dry), and 100x (oil immersion). Higher magnification objectives (e.g., 50x, 60x) may also be included.**
□ Numerical Aperture (NA): **A critical factor determining resolution and light-gathering ability. Higher NA objectives (e.g., 0.65 for 40x, 1.25 or higher for 100x oil) provide better resolution.**

Working Distance: **The distance between the front lens element of the objective and the specimen when in focus. High magnification objectives generally have shorter working distances.**
Field of View Number (FN): **Indicates the diameter of the field of view visible through the eyepiece. Higher FN eyepieces and objectives provide a wider viewing area.**
Correction: **Objectives are often corrected for chromatic aberration (color fringes) and spherical aberration (blurring). Common corrections include:**
Achromatic: **Corrected for two colors (red and blue).**
Plan Achromatic: **Corrected for two colors and flatness of field across the central portion.**
Apochromatic: **Corrected for three colors (red, blue, and green) and spherical aberration for one color, offering the highest image quality. Plan Apochromatic objectives also provide a flat field.**
Immersion Medium: **Higher magnification objectives (typically 40x and above) often require an immersion medium (oil, water, or glycerin) between the objective lens and the coverslip to maximize light gathering and resolution. The refractive index of the immersion medium should match that of the objective's design.**
Eyepieces (Ocular Lenses):
Magnification: **Typically 10x or 20x. Higher magnification eyepieces can increase overall magnification but may not necessarily improve resolution.**
Field Number (FN): **As mentioned above, this determines the field of view. Wide-field eyepieces have a higher FN.**
Diopter Adjustment: **Allows for individual focusing to compensate for differences in the user's eyesight.**
Eyepoint: **The distance from the eyepiece lens to the point where the eye should be positioned for comfortable viewing. High eyepoint eyepieces are beneficial for users who wear eyeglasses.**
Nosepiece: **A rotating turret that holds multiple objective lenses, allowing for easy switching between magnifications. Usually holds 4-6 objectives.**
2. Illumination System:
Light Source: **Typically LED (long-lasting, cool, and energy-efficient) or halogen (brighter but generates more heat and has a shorter lifespan).**
Condenser: **Located below the stage, it focuses the light onto the specimen. Common types include:**
Abbe Condenser: **A basic condenser with an adjustable aperture diaphragm to control contrast and resolution.**
Phase Contrast Condenser: **Contains annuli (rings) that, when used with phase contrast objectives, enhance the contrast of unstained, transparent specimens.**
Darkfield Condenser: **Blocks direct light and illuminates the specimen with oblique rays, making unstained specimens appear bright against a dark background.**
Diaphragms:

Aperture Diaphragm: **Located within the condenser, it controls the angle of the light cone illuminating the specimen, affecting resolution, contrast, and depth of field.**
Field Diaphragm: **Located in the base of the microscope, it controls the diameter of the illuminated field, reducing glare.**
Light Intensity Control: **Allows adjustment of the brightness of the light source.**
3. Focusing Mechanism:
Coarse Focus Knob: **Used for large adjustments in the stage or objective position to bring the specimen into approximate focus.**
Fine Focus Knob: **Used for precise adjustments to achieve sharp focus, especially at high magnifications.**
Stage Movement:
Mechanical Stage: **Allows for precise and controlled movement of the specimen slide in the X and Y directions using knobs.**
Stage Controls: **Knobs for adjusting the X and Y position of the stage.**
Vernier Scales: **Markings on the stage to allow for precise location of specific areas on the slide.**
4. Stand and Mechanical Components:
Stable Base: **Provides support and stability for the microscope.**
Arm: **Connects the base to the head (eyepieces and objectives) and provides a handle for carrying.**
Stage: **A platform where the specimen slide is placed. Often includes clips to hold the slide in place.**
5. Magnification:
Total Magnification: **Calculated by multiplying the magnification of the objective lens by the magnification of the eyepiece lens. For example, a 40x objective with a 10x eyepiece yields a total magnification of 400x.**
6. Resolution:
The ability to distinguish between two closely spaced objects as separate entities. Resolution is primarily determined by the numerical aperture (NA) of the objective lens and the wavelength of light. Higher NA and shorter wavelengths provide better resolution. The theoretical resolution limit of a light microscope is around 200 nanometers (0.2 micrometers).
7. Features and Accessories (May Vary):
Trinocular Head: **Has an additional port for attaching a camera for photomicrography or video microscopy.**
Phase Contrast Attachment: **Includes phase contrast objectives and a phase contrast condenser.**
Darkfield Attachment: **Includes a darkfield condenser and sometimes specialized objectives.**
Polarizing Attachment: **Includes polarizers and analyzers for examining birefringent materials.**
Fluorescence Microscopy Attachment: **Includes a high-intensity light source, excitation and emission filters, and specialized objectives for fluorescence imaging.**

Digital Camera and Software: **For capturing and analyzing images and videos.**
Key Considerations When Choosing a High-Power Microscope:
Application: **The specific use of the microscope will dictate the required magnification, resolution, illumination type, and any specialized features.**
Optical Quality: **The quality of the objective lenses is paramount for image clarity and resolution. Consider the correction level (achromatic, plan achromatic, apochromatic).**
Ergonomics: **Features like adjustable eyepieces, comfortable stage controls, and a stable design can improve user comfort during prolonged use.**
Budget: **High-power microscopes can range significantly in price depending on their features and optical quality.**

54. Colony Counter
1. Type:
Manual Colony Counters: **These are basic units with a magnifying lens, a light source for illumination, and a digital or manual counter. The user marks each colony on the plate with a pen, and the count is registered.**
Digital Colony Counters (Semi-automatic): **Similar to manual counters but often feature a pressure-sensitive counting pad. Each touch with a specialized pen registers a count on a digital display, sometimes with an audible confirmation.**
Automatic Colony Counters: **These are sophisticated systems that use a camera and image analysis software to automatically detect and count colonies. They often offer advanced features like size and color discrimination.**
2. Counting Range:
Typically from 0 to 999 for basic manual and digital counters.
Advanced digital and automatic counters can have a much wider range, up to 999,999 or more.
3. Petri Dish Size Compatibility:
Designed to accommodate standard Petri dish diameters, commonly ranging from 50 mm to 150 mm. Some can handle square Petri dishes or other formats.
4. Magnification:
Manual and digital counters often include a magnifying lens with a magnification power of 1.5x to 9x or more to aid in visualizing small colonies. Automatic counters rely on the camera's zoom capabilities.
5. Illumination:
Equipped with a light source, usually LED, to provide uniform and glare-free illumination of the Petri dish from below or above, enhancing the

visibility of colonies. Some automatic systems have sophisticated lighting options like darkfield or adjustable intensity.
6. Display:
Manual counters may have a simple mechanical counter or a basic digital LED display.
Digital and automatic counters feature digital displays (LED or LCD) showing the count and sometimes other parameters. Automatic systems display the image and analysis results on a screen.
7. Marking/Counting Mechanism:
Manual: **Handheld marker pen to mark colonies as they are counted.**
Digital: **Pressure-sensitive pad and a specialized pen; each touch registers a count.**
Automatic: **Image analysis software identifies and counts colonies without physical marking.**
8. Software (for Automatic Counters):
Image acquisition and analysis software.
Features for setting counting parameters (e.g., size, shape, color).
Ability to save and export data and images.
Options for manual editing of counts.
Some software can perform more advanced analysis like colony size measurement and distribution.
9. Data Storage and Output:
Basic manual counters may have no data storage.
Digital and automatic counters can store counts and sometimes images.
Connectivity options like USB or RS-232 for data transfer to a computer or printer.
10. Power Supply:
Typically operate on standard AC power (e.g., 220-240V, 50/60 Hz) or may use a DC adapter.
11. Dimensions and Weight:
Vary depending on the type and features, from compact benchtop units to larger, more sophisticated systems.
12. Optional Features:
Audible confirmation of counts.
Adjustable pressure sensitivity for digital counters.
Grids or reticles for manual counting.
Integration with barcode readers for sample tracking.
Compliance with GLP (Good Laboratory Practice) requirements.
Software for inhibition zone measurement (for antimicrobial testing).
Applications of Colony Counters:
Colony counters are essential tools in various microbiological applications, including:
Microbial Enumeration: **Determining the number of viable bacteria, fungi, or other microorganisms in a sample (e.g., food, water, environmental samples, pharmaceuticals).**

Quality Control: **Monitoring microbial contamination levels in manufacturing processes and finished products.**
Antibiotic Susceptibility Testing: **Assessing the effectiveness of antimicrobial agents by counting colonies in the presence of different concentrations of the agents.**
Food Safety: **Detecting and quantifying foodborne pathogens.**
Environmental Monitoring: **Assessing microbial populations in air, water, and soil.**
Clinical Microbiology: **Counting bacteria or fungi in patient samples for diagnostic purposes.**
Research: **Studying microbial growth patterns, mutations, and the effects of various treatments on microbial populations.**

SECTION – VI

PRE - QUALIFICATION CRITERIA

(Referred to in clause 13.3 of ITB)

I. Terms of Qualification for Equipment:

The Authorized Distributor or manufacturer should have supplied similar equipment as specified in the schedule of requirements to any Indian Institutions, up to the following quantity in any one of the last three financial years and completed the supplies within the stipulated delivery period. The Supplied units should be in working condition without any adverse remarks for the last two years as on the date of bid notification.

(a). at least equal of the quantity offered or 25, whichever is lowest, if the tender quantity is ≤49 (or)
(b). at least 50% of the quantity offered or 70, whichever is lowest, if the tender quantity is between 50 and 199
(c). at least 35% of the quantity offered or 125, whichever is lowest, if the tender quantity is between 200 and 499
(d). at least 25% of the quantity offered, if the tender quantity is > 500

- The bidder should furnish the information on past supplies and satisfactory performance in the proforma given under Section XI- Format B1, duly attested by the Bid signatory

- **Performance statement along with required PO copies and its corresponding end user's satisfactory performance certificate Section XI. The documentary proof will be a certificate from the consignee/end user with cross-reference of order no. and date in the certificate along with a notarized certification authenticating the correctness of the information furnished.**

- Bidders shall invariably furnish documentary evidence (End-user Certificate) in support of the satisfactory operation of the equipment as specified or a CA/Statutory auditor Certificate to that extent as per the format provided in the Section XI- Format B2

- The Bidder shall have an Avg. annual turnover in the last three financial years of not less than the amount specified against each item in the Schedule of the Requirements and also to have a positive net worth as per the latest Annual Accounts.

- Towards the above, the bidder should furnish data as per the Format (B3) given in Section- XI, to support that he has the financial capacity to perform the contract. Further the bidder as to submit the corresponding Balance Sheets and Profit and Loss Accounts for verification

a) The Manufacturer, must have necessary quality certifications for both processes and products such as ISO 9001 (Quality Management System for Organization)

b) Full Quality Assurance System Approval certificate Management System Certification for Medical Devices and their equivalent International Standards certificates as BIS/CE/USFDA etc.

II. Terms of Disqualification:

1. The Bidders who has withdrawn their bids in any of the previous tenders of APMSIDC

2. A bidder who is placed on the black-list by either APMSIDC or by any other State /Central government's department or organization for the product offered with his bid in the last 3 years

3. A bidder who is placed on the black-list by either APMSIDC or by any other State / Central government's department or organization in the last 3 years

4. A bidder who is currently blacklisted / debarred either by APMSIDC or by any State Government or Central Government Department or Organization

5. The bidder who has been declared as 'undependable supplier' for two (2) items or in two (2) instances in the last one year by the APMSIDC and

6. The bidders against whom there have been reports of substandard Equipment and/or service are liable for disqualification.

7. In past performance documents related to trading will not be considered

Note: In all the above cases, the disqualification cut-off date will be till the contract is signed

III. Not with standing anything stated above, the purchaser reserves the right to assess the Bidders capabilities and capacity to perform the contract should circumstances warrant such an assessment in the overall interest of the purchaser deciding on award.

SECTION – VII (A): BID FORM

(Name and Address of Purchaser)

Date_____

To
The Managing Director,
APMSIDC, Mangalagiri, Guntur.

Contract No._____

Gentlemen:

Having examined the Bidding Documents including Addenda No. _____ the receipt of which is hereby duly acknowledged, we, the under-signed, offer to supply and deliver _____ (Description of Goods and Services) in conformity with the said Bidding Documents for the sum as given in the Price Bid (electronically) or such other sums as may be ascertained in accordance with the schedule of prices furnished and made part of this bid.

We undertake, if our bid is accepted, to commence delivery within 60 (Number) days and to complete delivery of all the items and perform incidental services as specified in the contract within 60 (Number days calculated from the date of receipt of your Notification of Award/Letter of credit.

If our bid is accepted we will obtain the guarantee of a bank in a sum not exceeding 5% of the Contract price for the due performance of the Contract

We agree to abide by this bid for a period of 90 (Number) days from the date fixed for bid opening under Clause 22 of the Instruction to Bidders and shall remain binding upon us and may be accepted at any time before the expiration of that period.

We undertake that, in competing for (and, if the award is made to us, in executing) the above contract, we will strictly observe the laws against fraud and corruption in India like "The Prevention of Corruption Act 1988"

Until a formal contract is prepared and executed, this bid, together with your written acceptance thereof and your notification of award shall constitute a binding contract between us.

We understand that you are not bound to accept the lowest or any bid you may receive.

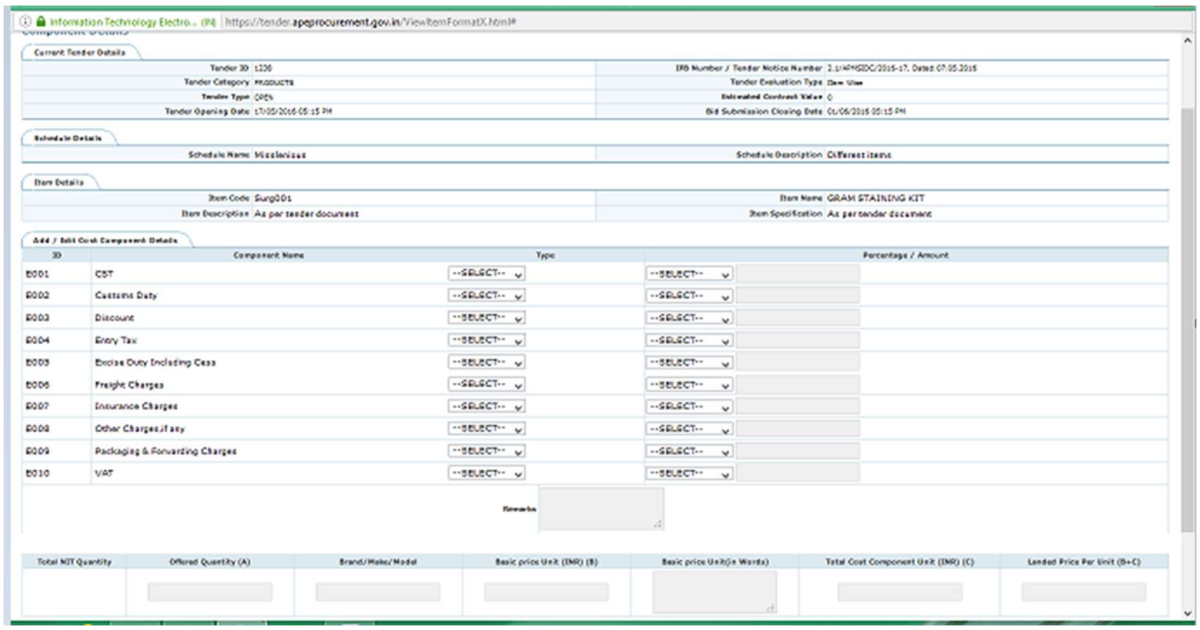
Dated this _____ day of _____

Signature: _____

(in the Capacity of) : _____

Duly Authorized to sign bid for and on behalf of

Section VII (B) - Model PRICE Schedules (available on e-procurement Platform)



SECTION – VIII
Bid Security Form

To

The Managing Director
APMSIDC, Mangalagiri, Guntur.

Whereas _____ (hereinafter called "the Bidder" has submitted its bid dated _____ for the supply of _____ (hereinafter called "the Bid")

KNOW ALL MEN by these presents that WE _____ of _____ having our registered office at _____ (hereinafter called the Bank") are bound unto _____ (hereinafter called "the purchaser") in the sum of _____ for which payment will and truly to be made to the said purchaser, the Bank binds itself, its successors and assigns by these presents. Sealed with the common Seal of the said Bank this _____ day of _____.

THE CONDITIONS of this obligation are:

If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid form; or

If the Bidder, having been notified of the acceptance of its bid by the Purchaser during the period of bid validity:

- Fails or refuses to execute the contract form if required
- Fails or refuses to furnish the performance security, in accordance with the Instruction to Bidders
- Does not accept the correction of the bid price pursuant to Clause 15.7(c).

We undertake to pay the purchaser up to the above amount upon receipt of its first written demand, without the purchaser having to substantiate its demand, provided that in its demand the purchaser will note that the amount claimed by it is due to owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including 45 days after the period of the bid validity, and any demand in respect thereof should reach the Bank not later than the above date i.e., up to _____.

…….(Signature of the Bank)

SECTION – IX : CONTRACT FORM

THIS AGREEMENT made the _____ day of _____ between _____ (Name of Purchaser) of _____ (Country of Purchaser) (hereinafter "the Purchaser") of one part and _____(Name of the Supplier) of _____ (City and Country of Supplier) (hereinafter "the Supplier") of the other part.

WHEREAS the Purchaser is desirous that certain Goods and ancillary services should be provided by the supplier, viz, _____ (Brief description of Goods and Services) and has accepted a bid by the supply of Goods and services in the sum of _____ (Contract price in Words and Figures) (hereinafter "the Contract Price").

NOW THIC AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the conditions of Contract referred to;

2. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz.:

   (a) The Technical and Price bid of the Supplier
   (b) The approved Technical Specifications,
   (c) The General Conditions of Contract,
   (d) The Special Conditions of Contract, and
   (e) The Purchaser's Notification of Award.

3. In consideration of the payments to be made by the purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Goods and Services and to remedy defects therein in conformity in all respects with the provision of the Contract.

4. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, the Contract price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

5. Brief particulars of goods and services which shall be supplied/provided by the Supplier are as under.

SL NO.	BRIEF DESCRIPTION TO GOODS & SERVICES	QUANTITY TO BE SUPPLIED	UNIT PRICE	DELIVERY TERMS

TOTAL VALUE:

DELIVERY SCHEDULE:

IN WITNESS whereof the parties here to have caused this Agreement to be executed in accordance with their respective laws the day and year first above written.

Signed, Sealed and Delivered by the

Said _____ (For the Purchaser)

in the presence of _____

Signed, sealed and Delivered by the

Said _____ (For the supplier)

In the presence of _____

SECTION- X: PERFORMANCE SECURITY FORM

To

The Managing Director
APMSIDC,
Mangalagiri, Guntur.

WHEREAS _____ (Name of the Supplier) hereinafter called "the Supplier" has undertaken, in pursuance of Contract No. _____ dated _____ to supply _____ (Description of Goods and Services) hereinafter called "the Contract".

AND WHEREAS it has been stipulated by you in the said contract that the Supplier shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with the Supplier's performance obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the Supplier a Guarantee:

THEREFORE WE hereby affirm that we are Guarantors and responsible to you, on behalf of the Supplier, up to a total of _____ (Amount of the Guarantee in Words and Figures) and we under take to pay you, upon your first written demand declaring the Supplier to be in default under the Contract and without cavil or argument, any sum or sums within the limit of _____ (Amount of Guarantee) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This guarantee is valid until the _____ day of _____.

Signature and seal of Guarantors

_____

_____

Date _____
Address_____

_____

SECTION XI

FORMAT B1: PROFORMA FOR PERFORMANCE (for a period of last three years)

(Please see Section VI: Qualification Criteria)

Bid No. _____ Date of Opening _____ Time _____ Hours

Name of the Firm _____

Order placed by _____ (Full address of Purchaser)	Order No	Date	Description of Item	Quantity of ordered Items.	Value of order	Date of completion of delivery		Remarks indicating reasons for late delivery, if any	Has the Supplier received full payment towards the supplies made
						Purchase terms	Actual		
1	2	3	4	5	6	7	8	9	10

Signature and seal of the Bid Signatory

_____

_____

_____

SECTION XI

FORMAT B2

CA (STATUTORY AUDITOR) CERTIFICATE

(Please see Section VI: Qualification Criteria)

Certificate from the Statutory Auditor

This is to certify that ..... (name of the Bidder) is a "Manufacturer/Authorized Distributor'' of the required items offered under the Bid. The Bidder had supplied the quantities shown in the past performance statement and also completed the respective supplies within the stipulated delivery period/s.

Further it is certified that the previously supplied equipment are reported to be in working condition without any adverse remarks from the respective users and some are working for more than two year as per the records as on the date of this Tender notification.

The bidder has previous experience in maintenance and repairs of equipment for _____ years and has qualified service staff working with him".

Name of Authorized Signatory:
Designation:
Name of firm:

(Signature of the Authorized Signatory)
Seal of the Firm

SECTION XI

B3- FINANCIAL CAPACITY OF THE MANUFACTURER

A. Details of Annual Turnover for Preceding 3 Years.

	Year 1 (2022-23)	Year 2 (2023-24)	Year 3 (2024-25)	Average Annual Turnover
Turn Over (In Rs. Crores)				

B. Details of Net Worth

	Year1 (Last Financial Year i.e. as on 31st March 2025)
Paid up Capital (Rs. Cr)	
(Add) Free Reserves (Rs. Cr)	
Total Net Worth (Rs. Cr)	

_____

(Signature of Bid Signatory)
Seal of the Firm

Certificate from the Statutory Auditor

This is to certify that .....(name of the Bidder) has an average annual turnover (in the last three financial years) and Net Worth (in the last financial year) as shown above

Name of Authorized Signatory:
Designation:
Name of firm:

(Signature of the Authorized Signatory)
Seal of the Firm

SECTION XI

B3-A FINANCIAL CAPACITY OF THE DISTRIBUTOR

A. Details of Annual Turnover for Preceding 3 Years.

	Year 1 (2022-23)	Year 2 (2023-24)	Year 3 (2024-25)	Average Annual Turnover
Turn Over (In Rs. Crores)				

B. Details of Net Worth

	Year1 (Last Financial Year i.e. as on 31st March 2025)
Paid up Capital (Rs. Cr)	
(Add) Free Reserves (Rs. Cr)	
Total Net Worth (Rs. Cr)	

_____

(Signature of Bid Signatory)
Seal of the Firm

Certificate from the Statutory Auditor

This is to certify that .....(name of the Bidder) has an average annual turnover (in the last three financial years) and Net Worth (in the last financial year) as shown above

Name of Authorized Signatory:
Designation:
Name of firm:

(Signature of the Authorized Signatory)
Seal of the Firm

SECTION – XII -A

(Please see Clause 13.3(a) of Instructions to Bidders)
(to be submitted by manufacturers)

MANUFACTURER'S AUTHORIZATION FORM
No._____ dated _____

To
The Managing Director
APMSIDC, Mangalagiri, Guntur.
Dear Sir,

Tender Notice No._____

We _____ who are established and reputable manufacturers of _____ having factories at _____ and _____ do hereby authorize M/s. _____ (Name and address of Agents) to bid, negotiate and conclude the contract with you against Tender Notice No._____ for the above goods manufactured by us.

No company or firm or individual other than M/s. _____ are authorized to bid, negotiate and conclude the contract in regard to this business against this specific Tender Notice.

We hereby declare that we are willing to provide guarantee/warranty and after sales service during the period of comprehensive warranty/CMC/AMC as per the above tender.

We also hereby declare that we have the capacity to manufacture and supply, install and commission the quantity of the equipments tendered within the stipulated time.

We hereby extend our full guarantee and warranty as per Clause 15 of the General Conditions of Contract and read with the Clause 10 of Special Conditions of Contract, for the Goods offered for supply against this invitation for bid by the above firm.

Yours faithfully,

(Name) for and on behalf of M/s.

_____(Name of manufacturers)

Note: This letter of authority is on the letterhead of the manufacturing concern and should be signed by a person competent and having the power of attorney to bind the manufacturer.

SECTION – XII -B

(Please see Clause 13.3(a) of Instructions to Bidders)
(to be submitted by Authorized Distributors))

MANUFACTURER'S AUTHORIZATION FORM
No._____ dated _____

To
The Managing Director
APMSIDC, Mangalagiri, Guntur.
Dear Sir,

Tender Notice No._____

We _____ who are established and reputable manufacturers of _____ having factories at _____ and _____ do hereby authorize M/s. _____ (Name and address of Agents) to bid, negotiate and conclude the contract with you against Tender Notice No._____ for the above goods manufactured by us.

No company or firm or individual other than M/s. _____ are authorized to bid, negotiate and conclude the contract in regard to this business against this specific Tender Notice.

We also hereby undertake to provide full guarantee/warrantee/CMC/AMC as agreed by the tenderer in the event the tenderer is changed as the dealers or the tenderer fails to provide satisfactory after sales and service during such period of comprehensive warranty/CMC/AMC and to supply all the spares/ reagents during the said period.

We also hereby declare that we have the capacity to manufacture and supply, install and commission the quantity of the equipments tendered within the stipulated time.

We hereby extend our full guarantee and warranty as per Clause 15 of the General Conditions of Contract and read with the Clause 10 of Special Conditions of Contract, for the Goods offered for supply against this invitation for bid by the above firm.

Yours faithfully,
(Name) for and on behalf of M/s.

_____(Name of manufacturers)

Note: This letter of authority is on the letterhead of the manufacturing concern and should be signed by a person competent and having the power of attorney to bind the manufacturer.

SECTION - XIII

DECLARATION FORM

I / We …….. having Our …….. office at ……. read and understood the terms and conditions contained in the bidding documents under this notification for bid and offer our bids unconditional, to the extent not stated at any other part of our bid.

We will not quote or supply the equipment/furniture similar to the ones offered under this bid notification to any agency or organization in the country, at the rate lower than the rate quoted in this present tender.

If we found quoting lower rate than the rate quoted to the APMSIDC, to any other agency in the country during the validity of the present contract, we will remit the differential cost to the APMSIDC, unconditionally.

Signature :

Date :

Name of the
Firm and address :

SECTION XIV

Check List of Documents to be Uploaded as part of the Bid and Notes to Bidders

I. Documents with the Technical Bid

Sl. No	Document Description	Documents to be submitted
1	Process Fee 29,500/-	online
2	EMD	Online & Offline
3	Bid Form Section VII-A	Online & Offline
4	List of items offered with Make and Model details without prices	Online & Offline
5	Manufacturers Authorization	Online & Offline
6	Past Performance Details Format B1 along with supporting documents	Online & Offline
7	End-User Certificates or CA Certificate as per Format B2	Online & Offline
8	Financial Capability Details Format B3 for Manufacturer	Online & Offline
9	Financial Capability Details Format B3-A Distributor	Online & Offline
10	Details & proof of After-Sales Service facilities	Online & Offline
11	Letter of authorization to sign the bids	Online & Offline
12	Clause-by-clause commentary on technical specifications	Online & Offline
13	Technical and Commercial deviations statements	Online & Offline
14	Copy of the GST Certificate and Details of IT Returns- PAN / TIN copies.	Online & Offline
15	The Manufacturer, must have necessary quality certifications for both processes and products such as ISO 9001 (Quality Management System for Organization) and ISO 13485 (Quality Management System for Medical Devices) wherever required	Online & Offline
16	Full Quality Assurance System Approval Certificate Management System Certification for Medical Devices and their equivalent International Standards certificates (BIS/CE/USFDA etc) wherever required	Online & Offline
17	Memorandum of Articles	Online & Offline
18	All the uploaded Technical bid, to be attested by a Gazette Officer or properly notarized or self-attested	Online & Offline
19	General information about the bidder	Online & Offline
20	Declaration Form	Online & Offline

Sl. No	Document Description	Documents to be submitted
21	DPIIT approval (If required)	Online & Offline

II. Financial (Price) Bid in the format available with the e-procurement platform

- Please note that the Bidder runs the risk of his bid being rejected if the price schedule contains any conditions.

Notes to Bidders

1. Upload the documents in ZIP format with suitable description as defined above.
2. The scanned documents shall be legible failing which they will not be considered.
3. Sign on all statements, documents, certificates uploaded owning responsibility for their correctness / authenticity.
4. All the statements copies of the certificates, documents etc., enclosed to the Technical bid shall be given page numbers on the right corner of each certificate
5. The tenderer is subjected to be blacklisted and the EMD forfeited if he is found to have mislead or furnished false information in the forms / statements / certificates submitted in proof of qualification requirements or record of performance (Please see Corrupt and Fraudulent Practices Clause)
6. All the Bidders are requested to quote with single option only, for the each item offered and please note that bids with multiple options, for any one or all of the items offered, will be rejected by the purchaser as Non-responsive.

(On Firm letter Head) **Annexure - I**

ANDHRA PRADESH MEDICAL SERVICES &

INFRASTRUCTURE DEVELOPMENT CORPORATION

(APMSIDC)

INSTALLATION CERTIFICATE

(to be fiiled jointly by the Tenderer, head of user institution & Representative of the Tender Inviting Authority individually for every equipment)

HOSP CODE/ Hospital Name:				
Equipment Details				
EQPT CODE/ Name of the equipment:		Purchase Order No:		
Make / Manufacturer		Purchase Order Date:		
Model		Purchase Amount		
Serial no.		Project Name		
Location / Department				
Installation Start Date		Completed Date.		
Comprehensive Warranty Start Date		Comprehensive Warranty End Date:		

Preventive Maintenance Schedule (Specify Year & Month)				
YEAR	Visit 1	Visit 2	Visit 3	Visit 4

Contact Details			
SUP.CODE / Name of the Supplier			
Name of Service Engineer		Mobile No.	
Service Centre Manager's name		Mobile No.	
Service center address			

Accessories supplied				
Sl. No.	Item	Qty.	Serial No.	Remarks

To be filled by Institution			
Whether the sticker affixed on all the key components of the equipment or on a conspicuous place in the installed room/storage area?			YES / NO (*tick one)*
Whether a digital Photograph of the installed equipment taken after affixing the sticker in the presence of the hospital personnel?			YES / NO
Whether the Demonstration of the equipment with accessories on the technical specification/key features was conducted to the satisfaction at the time of installation?			YES / NO
Whether training was conducted to the satisfaction at the time of installation?			YES / NO
Short supply items, if any			
Remarks of hospital authorities			
Recommend to release payment YES □ NO □		The equipment is working satisfactorily YES □ NO □	
The equipment was installed and handed over on *(Installation date to be fiiled in by the Head of the institution or by the end user)*			
Name of Service Engr.		Sign.	
Name of End User & Department Mobile No.		Sign.	
Name of Bio Medical Engr. & Organization		Sign.	
Signature of the Superintendent. Mobile No.		Sign. & Seal	
Date: Seal of supplier:		Date: Hospital Seal:	

Note: The installation report shall be submitted in a single sheet printed back to back and shall be submitted individually for each equipment installed.

Annexure - II

On Consignee letter Head

Dt:_____

ANDHRA PRADESH MEDICAL SERVICES & INFRASTRUCTURE DEVELOPMENT CORPORATION (APMSIDC)

THREE MONTHs PERFORMANCE CERTIFICATE

(to be fiiled by the head of user institution individually for every equipment)

HOSP CODE / Hospital Name:			
SUP.CODE / Name of the Supplier			
Equipment Details			
EQPT CODE /Name of the equipment:		Purchase Order No:	
Make / Manufacturer		Purchase Order Date:	
Model		Purchase Amount	
Serial no.		Project Name	
Date of Installation		Location / Department	
Whether Equipment working satisfactorily without any problem for one month?		YES □ NO □	
If No, provide details of equipment failure in the first month *(attach additional details if any in a separate sheet)*			

BREAK DOWN DETAILS				
Break down Reported Date	Attended date	Rectified date	Attended by	Details of beak down / service

Present status of the equipment	Working satisfactorily □ Not working satisfactorily □
Recommended to settle the final payment	YES □ NO □
Recommend for trial run for one more month	YES □ NO □
Performance of accessories supplied	
Further Training	Required □ Not required □
Remarks of hospital authorities	
Three month performance certificate was issued on	

(date to be filed in by the Head of the institution or by the end user)			
Name of End User & Department		Sign.	
Signature of the Superintendent.		Sign. & Seal	
Date: Seal of supplier:		Date: Hospital Seal :	

Annexure - III

ANDHRA PRADESH MEDICAL SERVICES & INFRASTRUCTURE DEVELOPMENT CORPORATION (APMSIDC)

WARRANTY CERTIFICATE

(to be fiiled jointly by the Tenderer, head of user institution & Representative of the Tender Inviting Authority individually for every equipment)

Date:

APMSIDC Supply order No: .....dated.....

The equipment ..... *(Equipment Name)* Model No..... bearing serial no ..... was installed successfully at ..... (*Institution Name*) is offered with a comprehensive warranty for a period of..... Years starting from ..... to ..... including all the following accessories;

Sl. No	Name of the accessory	Manufacturer's name	Equipment Serial No.	Qty

Name of the Supplier: Signature: Seal:	Name of the Supdt. / End User: Signature: Seal:

Annexure - IV

ANDHRA PRADESH MEDICAL SERVICES & INFRASTRUCTURE DEVELOPMENT CORPORATION (APMSIDC)

PREVENTIVE MAINTENANCE CHECK LIST

Equipment Name.

Sl. No.	Activities carried out during Preventive Maintenance visit	Visit 1	Visit 2	Visit 3	Visit 4
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					

Annexure-V

ANDHRA PRADESH MEDICAL SERVICES & INFRASTRUCTURE DEVELOPMENT CORPORATION (APMSIDC)

CALIBRATION CHECK LIST

Equipment Name

Model.

Sl. No.	Parameters to be calibrated	Frequency of calibration required
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Annexure-VI

ANDHRA PRADESH MEDICAL SERVICES & INFRASTRUCTURE DEVELOPMENT CORPORATION (APMSIDC)

List of Spare Part

Equipment Name :

Make:

Model

Sl. No.	Spare name	Cost (inclusive of all charges)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		

Signature :

Date :

Name of the
Firm and address :

Annexure-VII

ANDHRA PRADESH MEDICAL SERVICES & INFRASTRUCTURE DEVELOPMENT CORPORATION (APMSIDC)

GENERAL INFORMATION ABOUT THE TENDERER

Name of the Tenderer

Registered address of the firm

State: District

Telephone. No. Fax. No. Email.

3	Address			
	State		District	
	Telephone No.		Fax	
	Email		Website	

Type of Firm (Please □ relevant box)

4	Private Ltd.		Public Ltd.		Proprietorship	
	Partnership		Society		Others, specify	
	Registration No. & Date of Registration.					
	Nature of Bussiness (		-lease □ relevant box)			
5	Original Equipment Manufacturer		Authorized Dealer /Representative			
	Direct Importer		Others, specify.			

Annexure-VIII

SERVICE CENTRE DETAILS

TOLL FREE NUMBER, IF ANY			
Sl. No	Name and address of the service center (s)	Contact Details	
1		Telephone No:	
		Fax No:	
		Email ID.	
		Name of the Service Engr.	
		Mobile No.	
2		Telephone No:	
		Fax No:	
		Email ID.	
		Name of the Service Engr.	
		Mobile No.	
3		Telephone No:	
		Fax No:	
		Email ID.	
		Name of the Service Engr.	
		Mobile No.	