



सीएसआईआर-केंद्रीय खाद्य प्रौद्योगिक अनुसंधान संस्थान
CSIR- CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTE
मैसूरु / MYSURU-570 020, भारत / INDIA

(Constituent Laboratory of CSIR, New Delhi (Ministry of Science & Technology)
An ISO 9001:2008, ISO 14001:2004 & ISO 17025:2005, NABL Accredited Laboratory

Corrigendum: Tender for Sorghum and Bajra Processing Line

Corrigendum Title: Revised Technical Specification based on PBC

Tender Ref: A3/74193/2020 Date: 29-05- 2020

Tender ID: 2020_CSIR_49291_1

The revised final specification based on the discussion in Pre Bid Conference held on 09-06-2020 @ 12.00P.M. at Purchase Committee Room, CSIR-CFTRI Mysuru through Video Conference enabling equal opportunity to all OEMs has been incorporated and given below as revised specification to the original tender specification. All bidders are requested to take cognizance of the revised specification and submit their bids accordingly on or before 02.00 p.m. on 07/July/2020.

The Firms who has already submitted their offer may resubmit their offer as per our revised final technical specification.

All other tender terms and conditions remain unaltered except delivery schedule date i.e. 10-12 weeks from the date of issue of P.O (instead of 6-8 weeks as mentioned in our initial tender terms & conditions).

Revised specifications based on PBC

1. Sorghum/ Bajra processing line:

Complete plant for processing of Sorghum/ Bajra at a capacity of 1 Tonne per hour consisting of the following machinery and accessories as per tentative plant layout enclosed.

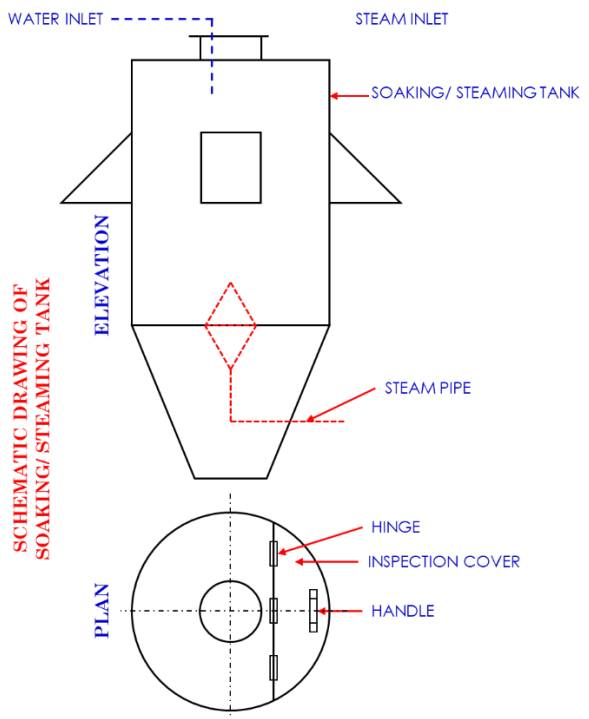
List of equipment include Cleaner, Destoner, Magnetic separator, Soaking/ Steaming tank, Continuous vibro fluidized bed dryer, Screw conveyor/ moisture conditioning unit, Horizontal abrasive polisher/ Whitener, Horizontal Emery stone grinder/ Abrasive disc grinder/ Planetary sifter, Pneumatic conveying system, Bucket elevators, Storing tanks with structures and staircase, Surge bin with structures and staircase, Central dust collection/ discharge system, Bag filling system.

The detailed specifications and essential features of each individual machine/ system is as indicated below:

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
|---------|--|----------|
| 1 | <p>Cleaner:</p> <p>Vibratory/ Reciprocating type cleaning system for cleaning Sorghum and Bajra (Pearl millet). The system should be designed for very thorough separation of impurities and material other than grain from the grain mass. Provision should be available for taking samples (when the machine is in operation) in the pipe to check the product quality. There should be two large expansion chambers (one at the inlet and the other at the outlet) to allow light particles to be discharged separately, preferably through a dust collection system/ control system with blower, motor, cyclone and gear driven rotary valve. All the sieves (minimum 4 sieves in the complete system) should be attached to sturdy metal frames and sieves should be kept clean by rubber balls which move around the sieves along with the motion of the machine or any other efficient declogging system to prevent choking of sieves. Provision to change the sieves easily and quickly through a front panel should be made. No screws have to be loosened</p> | 1 |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
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| | <p>during replacement of sieves. The system should be provided with an inlet regulator to automatically distribute the grain and product over the entire width of the machine along with a storage hopper and feed gate for 15 minutes of operation. The system should have provision to vary the deck vibration and speed. The vibrating/ reciprocating deck should be balanced dynamically. It should be possible to vary the operating parameters of the machine during operation.</p> <p>One set of additional sieves should be provided along with the machine of 0.8, 1.0, 2.0, 2.8, 3.0 and 3.8mm opening size.</p> <p>The system should be fitted with appropriate capacity TEFC induction motor of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: 1000 kg/h (1TPH)</p> | |
| 2 | <p>Destoner:</p> <p>Vibratory/ Oscillatory type vacuum destoner for continuous destoning of grains for separation of heavy particles such as stones, magnetic and nonmagnetic metals, mud balls and other foreign particles by separating impurities based on density difference by adjusting the aspirating air. The system should be supplied with closed circuit aspiration system to ensure a dust – free operating environment. The system should also have lighting system to enable easy viewing of the components of the equipment. The system should use vibro motors for trouble free, have long life and low noise operation. The system should have a separate collection of stones and dust particles. System should be provided with an adjustable system to spread the grains evenly over the mesh screen to result in even stratification and separation along with a storage hopper and feed gate for 15 minutes of operation. The cleaned grains should be discharged separately to the subsequent machine. The system should have a quality sieve cleaning device. It should also have provision to adjust the vibration intensity for efficient separation.</p> <p>The system should be fitted with appropriate capacity TEFC induction motor of continuous rating and automatic starter,</p> | |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
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| | <p>both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: 1000 kg/h (1TPH)</p> | |
| | <p>A common dust collection and discharge system for the Cleaner and Destoner could be provided to reduce the number of units and offer saving in power and space.</p> | |
| 3 | <p>In – hopper magnetic separator:</p> <p>Magnetic grids/ grates – round (200mm Φ) to catch Ferrous particle size of minimum of 30 μm and maximum of 10mm. The system should have 4 magnetic bar in extractor tube, with tube of Φ25mm and bar Φ23mm with 13,000 gauss (at 20°C) having a field strength (flux density) on magnetic bar (\pm 10%) translating to field strength of 10,000 gauss on extractor tube. The extractor tube should be made out of SS AISI304. The circular grid (with cover) should have a diameter of 200 mm and height of 50mm. This circular magnet should be placed in the plant at each unit operation of grain processing.</p> | 12 |
| 4 | <p>Soaking/ Steaming tanks with MS structure:</p> <p>Cylindrical steaming tanks with conical bottom constructed out of AISI304 SS sheet of 3mm thickness. A discharge system should be provided at the bottom of the tank with a pneumatic feed gate. The supply should include air compressor, air tank and all accessories and safety devices, for operation of the pneumatic gate manually. It should be possible to control the output of grains from the tank to the desired quantity output per hour. The tank should be water tight and should have provision to drain out only water separately. All contact parts with the grains should be made out of AISI304 SS material. The quotation should include supply and installation of steam and water line from the nearest point in the building till the process tank and should be quoted per running meter. Steam line should be clad with fibre glass material as per standard specification. The steam line should be supplied complete with all safety features and accessories like steam trap, drain line, etc. Pressure gauges to indicate pressure in the steam line should be provided at a height for convenient reading. Water line should be painted SEA GREEN as per</p> | 1 Set |

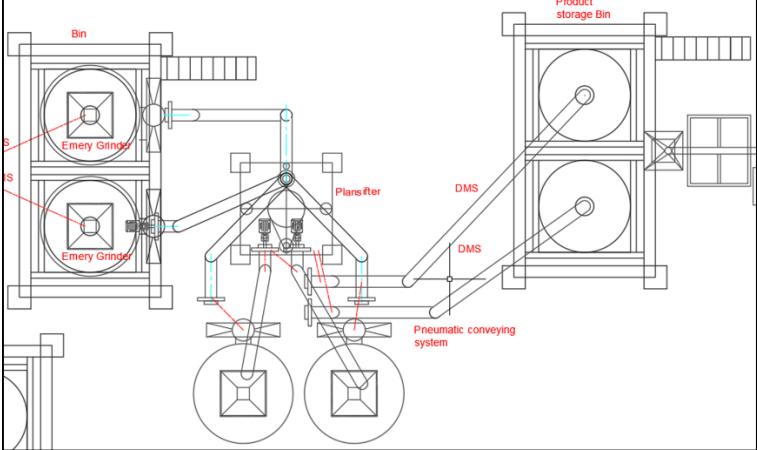
| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
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| | <p>standard specification. Water line should be provided with ball valves for control of water flow.</p> <p>A set of soaking/ steaming tank consists of two tanks each of holding capacity of 2000kg (2 T) of Sorghum/ Bajra. The outlet of these tanks should be such that there is free flow of wet material to the next machine (Elevator). Thus the angle of the pipe from the outlet of the tank to the inlet hopper of the elevator should be 60° from the horizontal.</p> <p>The support structure for the soaking/steaming tank should be made out of MS material. It should be complete with staging, grating platform, ladders, and walkways with safety railings throughout. The MS structure should be coated with enamel paint matching the scheme of the plant.</p> | |
| 4a | <p><i>Schematic drawing of soaking / steaming tank showing steam pipe configuration</i></p>  <p>The diagram consists of two views: an elevation view and a plan view. The elevation view shows a rectangular tank with a conical bottom. A dashed blue line indicates a 'WATER INLET' at the top left. A solid blue line indicates a 'STEAM INLET' at the top right. A red dashed line shows a 'STEAM PIPE' leading from the bottom of the tank. The plan view shows a circular tank with a central 'INSPECTION COVER' and a 'HANDLE' on the right side. A 'HINGE' is also indicated. The text 'SCHEMATIC DRAWING OF SOAKING/ STEAMING TANK' is written vertically on the left side of the drawing.</p> | |
| 5 | <p>Continuous Vibro Fluidized Bed Dryer:</p> <p>Continuous vibratory fluidized bed dryer required for heat treatment/ steaming/ parboiling/ drying of Sorghum/ Bajra. The material of construction in touch with the material</p> | 1 |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
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| | <p>(grains) is to be made from AISI304 SS. The hot air blowing through the grains mass should be in the range of 40° to 80°C and it should be possible to maintain the set temperature through digital systems. The vibrating deck should be mounted on springs and vibration should be delivered through vibratory motors having provision to control the degree of vibration to suit the process requirement. The following features should be in built into the system:</p> <ul style="list-style-type: none"> ● Control systems for adjusting vibration, fluidization (air flow) and residence time (thus product moisture) ● System should ensure uniform product temperature across the depth and length of fluidization ● Control system to ensure only cooling of grains (without heating) ● Explosion proof design ● CIP (Cleaning In Place) option for good sanitation ● Source of heat for hot air could be electrical, diesel, thermic fluid, LPG) ● Cyclone separators with bag filters and scrubbers to ensure zero pollution into the process area <p>The system should have all necessary options to customize the thermal processing of grains with respect to temperature and air flow through grain mass with a view to maximize efficiency of heat and mass transfer, thus assuring processing of product within the best time and temperature range for high quality output.</p> <p>The system should be fitted with all regulatory safety features. The electrical motors used in the system should have an efficiency of 80% and above. The system should be fitted with appropriate capacity motors of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: 1000 kg/h (1TPH)</p> | |
| 6 | <p>Mixing Screw Conveyor/ Moisture Conditioning/ Dozing System:</p> <p>A mixing type screw conveyor system with three nozzles to spray water in a fine mist on the grain mass. The system should ensure complete mixing of grains with sprayed water. The drive to the screw should be through a geared motor driven through a VFD system for precise control of</p> | 1 |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
|---------|---|----------|
| | <p>screw speed as desired. Provision should be made to control the amount of water being sprayed and should be supplied along with a metering unit for the same. The U trough screw conveyor system should ensure a throughput of 1000kg/h (1TPH). Owing to the size of the grain, the gap between the bottom of the trough and screw should be less than 0.5mm. Suitable hanger bearings should be used throughout the length of the screw to ensure no sagging of the screw inside the trough. The supply should be complete with water tank (PE or PP) and water line for inlet and outlet should be provided. The storage capacity of the water tank should be 500 litres. The quotation should include supply and installation of structure for water tank.</p> <p>All contact parts with grains should be made from AISI304 SS material. Quotation should include supply and installation of water line from the nearest point in the building till the process tank and should be quoted per running meter.</p> <p>The system should be fitted with all regulatory safety features. The electrical motors used in the system should have an efficiency of 80% and above. The system should be fitted with appropriate capacity motors of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: 1000 kg/h (1TPH)</p> | |
| 7 | <p>Horizontal Abrasive Polisher/ Whitener:</p> <p>Horizontal abrasive polisher for polishing of conditioned Sorghum/ Bajra grains. The system should have an inlet screw to push the feed material into the annular space between the rotating abrasive roll and stationary screen. The abrasive roll should have spiral grooves and air holes to cool the grain during polishing and also facilitate removal of bran from the milling chamber. A load system at the outlet should be provided with provision to move the loads across a lever fixed to the tail gate to adjust the milling pressure in the system. The abrasive discs should be mounted on a hollow shaft with provision to blow ambient air through the shaft and abrasive discs. The system should be supplied with the blower for air along with suitable drive arrangement. In addition, the system should be supplied with aspiration system consisting of blowers, cyclones and air locks for separation and collection of the bran removed</p> | 2 |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
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| | <p>during the process. Supply includes the drive system with motors and starters, gear drives, rotary valves and dust collection system to ensure optimum sanitation within the process area. The polisher screen should be made out of wear resistant, perforated sheet or woven wire mesh of spring steel. Three sets of screens (both perforated sheet – 1.2mm thick and wire mesh – 0.3, 0.5 & 0.8mm wire dia) with openings of 0.8, 1.0, and 1.2mm should be provided. The polisher should be supplied with a surge hopper with adjustable feed gate to store 15 minutes of material. One set of weights extra should be included in the scope of supply.</p> <p>The system should be fitted with all regulatory safety features. The electrical motors used in the system should have an efficiency of 80% and above. The system should be fitted with appropriate capacity motors of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: 1000 kg/h (1TPH)</p> | |
| 8 | <p>Horizontal Abrasive Disc Grinder for grains:</p> <p>Emery disc grinder of horizontal configuration required for size reduction of Sorghum/ Bajra grains. The system should have the following features:</p> <ul style="list-style-type: none"> ● Emery stone size = Φ 30" ● Vibrating feeder with control system to adjust the feed rate of grains being ground ● Aspiration channel and dust collection with blower, cyclone, rotary valve and bag filters complete with drive motors and starters and all regulatory safety features ● All drive systems should be concealed or provided safety guards for operators' safety <p>The system should be fitted with all regulatory safety features. The electrical motors used in the system should have an efficiency of 80% and above. The system should be fitted with appropriate capacity motors of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> | 4 |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
|---------|---|-------------|
| 9 | <p>Plansifter:</p> <p>The planetary sifter should sift and grade Sorghum/ Bajra flour into flour and semolina. The sieve should be imparted gyratory motion through a suitable motor and drive. The screen deck should be suitably balanced by counterweight. The screen should be interchangeable. The inside of the sifter box should be made out of AISI304 SS material. Hopper Outlets for discharge of stock should be through plastic chutes within a gravity spouting scope. The material of the mesh should be Nylon or Polyamide grit gauze material with an opening size of 250µm (60 mesh BSS). An additional set of screens of the following sizes is also to be included in the scope of supply: 150 (100 mesh), 180 (85 mesh), 355 (44 mesh) & 500µm (30 mesh).</p> <p>The system should be fitted with all regulatory safety features. The electrical motors used in the system should have an efficiency of 80% and above. The system should be fitted with appropriate capacity motors of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: 1000 kg/h (1TPH)</p> | 1 |
| 10 | <p>Pneumatic Conveying System:</p> <p>A pneumatic conveying system is required to transport flour from the Emery disc grinding output to the plansifter and the plus fraction of the sifter (coarse flour or semolina) to another set of grinders. The output of the second set of grinders is to be transported to the plansifter. The minus fraction (flour) from the plansifter is to be transported to the two product storage bins. The schematic drawing of the setup is as given in the drawing below.</p> | As required |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
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| |  <p style="text-align: center;"><i>Schematic diagram of pneumatic system</i></p> <p>The pneumatic conveying system should consist of pipelines from the input machines to the output system consisting of pipelines, airlocks, and clamps, connecting joints, inspection and sample collection windows, dust collection system with cyclones and accessories, necessary blowers / fans. The system should discharge clean air via rotary valves and dust collection system to ensure optimum sanitation within the process area.</p> <p>The system should be fitted with all regulatory safety features. The electrical motors used in the system should have an efficiency of 80% and above. The system should be fitted with appropriate capacity motors of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: 1000 kg/h (1TPH)</p> | |
| 11 | <p>Bucket elevator:</p> <p>Bucket elevators for vertical transport and discharge of grains from one machine's output to the inlet of the subsequent machine. The Head of the elevator should be made out of heavy – duty galvanized steel construction for clean discharge. Sectioned Head cover should be provided for easy service of internal components. The drive to the crowned pulley should be through a gear reducer with easily adjustable torque arm and should be noiseless in</p> | As required |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
|---------|---|----------|
| | <p>operation. The pulleys should be crowned and fitted with taper – lock bushings, non-slip rough top lagging for maximum traction. Sealed, high quality, high duty bearings having low maintenance and long life should be used. The belt should be made from high strength PVC belt for minimal stretch, impregnated solid carcass, pre – punched for easy bucket mounting. Buckets should be made out of high quality Polyethylene CC material with deep terminal design. Trunking should be of twin box construction made out of heavy gauge ASTM A-526 G90 galvanized steel, double seam, track welded for perfect alignment. Trunking should be provided with inspection sections for easy access to belt and buckets. The boot should be made out of heavy gauge galvanized steel having easy to adjust take – ups for the boot pulley. Clean – out doors that easily slide open to access the elevator boot floor for cleaning should be provided. The output pipe from elevator to the subsequent machine should be made out of AISI304 SS material. The standalone elevator should be supplied in accordance with the requirements of the entire plant for continuous, trouble – free operation.</p> <p>The system should be fitted with all regulatory safety features. The electrical motors used in the system should have an efficiency of 80% and above. The system should be fitted with appropriate capacity motors of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: 1000 kg/h (1TPH)</p> | |
| 13 | <p>Centralised Dust Collection & Discharge System:</p> <p>A centralised dust collection and discharge system from each individual machinery across the mill and all bucket elevators to be provided. The pneumatic lines for dust collection from each of the machine is to be taken and the discharge system should be outside the building. At the exit of the pneumatic lines, the cyclone systems, air locks, blower and drive should be housed outside the building to ensure the entire building is dust free. All pneumatic lines from the individual machines should be installed at a height of 3m (10 feet) from the ground level to facilitate easy movement of staff in the plant area.</p> <p>The system should be fitted with all regulatory safety features. The electrical motors used in the system should</p> | 1 |

| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
|---------|--|---|
| | <p>have an efficiency of 80% and above. The system should be fitted with appropriate capacity motors of continuous rating and automatic starter, both of reputed make to run on 415V, 50Hz, 3 phase AC supply.</p> <p>Capacity: To suit the entire plant</p> | |
| 14 | <p>Storage tanks with structure:</p> <p>Storage tank to store cleaned Sorghum/ Bajra. The tanks and systems in contact with grains should be made out of 3mm thick AISI304 SS material and the support structure should be made out of MS. The structure should be complete with stair case, walkways, railings and grating platform ensuring complete safety of personnel. The outlet of these tanks should be such that there is free flow of material to the next machine. Thus the angle of the pipe from the outlet of the tank to the inlet hopper of the elevator should be 60° from the horizontal or higher.</p> <p>The following storage tanks are required:</p> <ul style="list-style-type: none"> a. To temper moisture conditioned Sorghum/ Bajra after the mixing screw conveyor consisting of 2 tanks each tank having a holding capacity of 2000 kg (2T) b. To store polished Sorghum/ Bajra after the horizontal polishers (as a separate entity – to enable further processing of the grains in the flaking line – separate), consisting of 2 tanks each tank having a holding capacity of 2000 kg (2T) c. To store polished Sorghum/ Bajra after horizontal polishers above the emery disc grinders, consisting of 2 tanks each tank having a holding capacity of 2000 kg (2T) d. To store flour which has been sifted in the Plansifter prior to conveying to the packing machine consisting of 2 tanks each tank having a holding capacity of 2000 kg (2T). Since the discharge of flour is not as free flowing as grains, these storage bins should be fitted with vibro discharge hopper bottom (bin activators) along with a horizontal screw conveyor/feeder with VFD to ensure constant feed rate to the packing machine below. | <p>1 set</p> <p>1 set</p> <p>1 set</p> <p>1 set</p> |
| 15 | <p>Continuous Weighing and Bag filling machine:</p> <p>A semi – automatic continuous Auger type powder packing machine with a maximum filling capacity of 50kg with provision to pack into unit packs of 5kg, 10kg and 25kg bags. The stitching type machine should be automatic/manual system with all contact parts made out</p> | 1 |

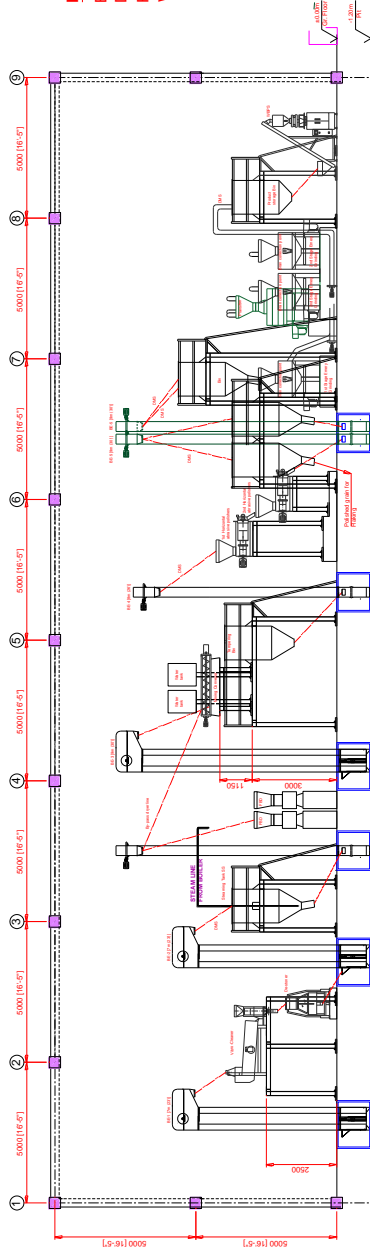
| Sl. No. | Specifications and essential features of individual machine/ system | Quantity |
|---------|--|----------|
| | <p>of Stainless steel, with an accuracy of filling of 0.6% or better. System should run on 3 phase, 415V, and 50Hz supply. The system is intended to use for packing Sorghum/ Bajra flour. The standalone system should be supplied complete with all accessories like processor based electronic weighing system with load cells, pneumatically/ electrically operated functions and operator interface (HMI). The unit should also have an in – built pouch/ bag counter. It should be able to handle a range of packing material like plastic, cloth, plastic woven sacks depending on the unit size of packing. Air compressor required for the system with all accessories has to be included in the scope of supply.</p> | |

General:

In addition to the detailed specifications of the machinery, the following points may also be added in the specifications of machinery

1. The scope of supply shall include transportation of machinery to CFTRI, installation and commissioning charges at the site as indicated by CFTRI.
2. Training on the operation and maintenance of the machinery should be provided by the supplier to the staff identified by the Institute.
3. Essential spares of machinery for smooth functioning of the plant should be supplied.
4. All tools required for maintenance of each individual machinery should be supplied.
5. All open drives should be provided with safety guards and operator safety should be ensured.
6. Pits made for installing the elevators should be covered with removable grating to ensure operator safety.
7. All machinery should be supplied with electrical motor and matching starter.
8. The electrical motors supplied with the machinery should be from reputed manufacturers and each motor should have an efficiency of 80% and above.
9. Remote control buttons for starting/ stopping the individual machine should be provided.
10. All automatic systems should be provided with a provision to run them either on automatic or manual mode.
11. All hoppers should be fitted with individual feed gate to adjust the flow rate of material.
12. Control panel for the entire plant should be provided along with all regulatory safety features, indicator lamps, voltage, current and power factor indicators should be provided.
13. The charges for wiring the individual machinery from the supplied control panel with all necessary and regulatory safety features should be included in the scope of supply.
14. The AMC for the entire plant beyond the warranty period should also be indicated.
15. The colour scheme of painting of all machines shall be uniform. Colour scheme, preferably Cream (CMYK: 0, 1, 18, 0, Hex triplet #FFFDD0 and Cerulean (CMYK: 100, 26, 0, 35, Hex triplet: #007BA7) or equivalent. Cerulean colour percentage should be about 20 - 25%.
16. Steam line: The supply should include installation of steam line (with glass wool cladding and covering) with necessary statutory steam and water traps and safety features applicable to a food processing industry. All steam lines should be mounted on the walls with suitable supports and connections to the individual machines/ system should have a minimum clear height of 3m (10 feet) from the ground level.
17. Unless mentioned otherwise, each machine should be provided with a surge hopper to hold material for 15 – 20 minutes of operation with an individual, adjustable feed gate.
18. All vibrating/ reciprocating/ gyratory machines should be supplied with individual anti – vibration mountings.
19. All civil construction requirements for erection and commissioning of the machines should be included in scope of supply.

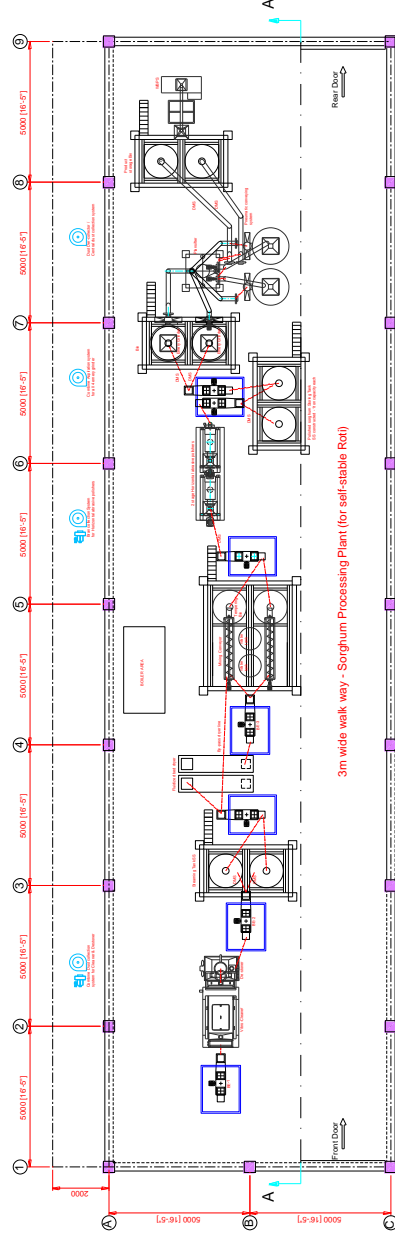
SORGHUM PROCESSING PLANT



LEGEND:

- BE - Bucket elevator
- DMS - Magnet separator (In - hopper type)
- FBD - Fluidized bed dryer
- WBPM - Weighing & packing machine

SECTION A-A



PLAN

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| DRN: 1403/2020 | MC Shree | DATE: 14/03/2020 | NAME: CENTRAL FOOD TECHNOLOGICAL |
| CHD: 1503/2020 | Shree A | SCALE: N.T.S | RESEARCH INSTITUTE, MYSURU - 570 020 |
| PROJECT TITLE: SORGHUM PROCESSING PLANT | | TITLE: SORGHUM PROCESSING PLANT | |
| ATT: Dimensions are in Metric | | DRAWING: Reference | |
| | | SHEET NO: 01 | |
| | | PAGE NO: 01 | |



Break Sharp Edges