



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)  
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### **Corrigendum: Tender for Millet Processing Line**

**Corrigendum Title: Revised Technical Specification based on PBC**

**Tender Ref: A3/74192/2020 Date: 29-05- 2020**

**Tender ID: 2020\_CSIR\_49293\_1**

The revised final specification based on the discussion in Pre Bid Conference held on 09-06-2020 @ 11.00A.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 Technical Specification based on PBC

### 1. Millet processing line:

Complete plant for processing of millets, to produce polished millets, 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 separators, Dehusker with aspirator to remove husk, Separator to separate dehusked and unhusked material and send unhusked material back to dehusker, Multi stage polishing, Bran separation and collection system, Plansifter to separate broken, and Packing system, with bucket elevators, storing tanks with structures, stair case, centralised dust collection system and all accessories.

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><b>Cleaner:</b></p> <p>Vibratory/ Reciprocating type cleaning system for cleaning different types of millets. The system should be designed for very thorough separation of 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 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</p>	1

Sl. No.	Specifications and essential features of individual machine/ system	Quantity
	<p>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, 1.4, 1.7, 2.6 and 3.0mm opening size.</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><b>Capacity: 1000 kg/h (1TPH)</b></p>	
2	<p><b>Destoner:</b></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 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><b>Capacity: 1000 kg/h (1TPH)</b></p>	1

Sl. No.	Specifications and essential features of individual machine/ system	Quantity
	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.	
3	<p><b>In – hopper magnetic separator:</b></p> <p>Magnetic grids/ grates – round (200mm <math>\Phi</math>) to catch Ferrous particle size of minimum of 30 <math>\mu</math>m and maximum of 10mm. The system should have 4 magnetic bar in extractor tube, with tube of <math>\Phi</math>25mm and bar <math>\Phi</math>23mm with 13,000 gauss (at 20°C) having a field strength (flux density) on magnetic bar (<math>\pm</math> 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>	10
4	<p><b>Rubber roll sheller with husk aspirator:</b></p> <p>Pneumatic, automatic rubber roll sheller intended to facilitate removal of husk layers from millet grains. The unit should consist of a feed hopper with pneumatic feed gate and vibratory feeder to ensure even feeding of grains across the length of the two counter – rotating rubber rolls. Parallelism of both the rolls should be ensured at all times. The system should have the feature to run the sheller on either automatic, semi-automatic or completely manual modes. It should be possible to adjust the feed rate electronically. The feed gate should close and the rubber rolls should be stopped in case there is no material in the hopper (above the machine with a holding capacity of 15 minutes of operation). The inter roll pressure should be adjusted pneumatically. Infinite adjustment of degree of shelling should be possible by appropriately adjusting the inter – roll pressure. Safety feature preventing roll to roll contact should be provided. Both the rolls should be cooled by blowing air across them. The hardness of the rubber roll should be in the range of 85 – 90 Shore number and of size 10"L x 10"<math>\Phi</math>. The scope of quotation should include supply of roll cooling blower, blower drive motor and starter and pipelines to the dehusking chamber complete, with all statutory safety features. It should be possible to adjust the gap between the two rolls both in auto and manual modes. After dehusking operation, the products should be passed through a Husk Aspirator for separation of husk, immature grains and sound grains. The system should be supplied along with dynamically balanced blower, cascading aspirator with adjustable flaps and closed circuit airflow pipelines to carry the husk outside the milling premises and should be discharged through a cyclone and rotary valve. The impeller of the blower should be made out of high wear resistant steel material of construction. Quote separately for SS vane blower option. The husk aspirator should be provided with ample inspection windows to check the functioning of the unit. The systems should separate</p>	1

Sl. No.	Specifications and essential features of individual machine/ system	Quantity
	<p>immature grains from the stock and be supplied with screw conveyor to discharge the immature grains separately. The system should be supplied complete with air compressor, pneumatic lines, safety features and all accessories for continuous working. The sheller should also have a HMI for easy access to operating parameters.</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><b>Capacity: 1000 kg/h (1TPH)</b></p>	
5	<p><b>Separator for dehusked and unhusked grains:</b></p> <p>Compartment type separator with 48 compartments arranged in 3 or 4 superimposed decks to separate dehusked and unhusked millet grains based on differences in coefficient of restitution and coefficient of friction of grains. All contact parts of the machine (feeding trough, labyrinth, bottom sheets, linings and product discharge channels should be made from stainless steel. The unit should comprise of an inlet feed box with individual feed control to ensure uniform feed to all the compartments. The separator should have provision to control feed, speed, stroke and inclination of the table to ensure complete separation while the machine is in motion. There should be a standard 3 – point stroke length adjustment system mounted on a heavy flywheel on two heavy duty bearings. The system should have a provision for fine adjustment of the table inclination. The speed regulation should be through a frequency convertor. The system should have smooth acceleration and deceleration with no jerks. The entire system should be mounted on anti – vibration mountings. The covers should be transparent to visualize the separation process unhindered.</p> <p>The compartment type separator is the preferred system. In case of proven technology/ system based on specific gravity available with the supplier, the same may be quoted separately.</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><b>Capacity: 1000 kg/h (1TPH)</b></p>	1

Sl. No.	Specifications and essential features of individual machine/system	Quantity
6	<p><b>Cone polisher:</b></p> <p>Abrasive cone polisher of 36" diameter with segmented and pre – cast abrasive segments to polish dehusked grains. The first cone polisher should have Silicon Carbide abrasive of 18/20 grit size in equal proportion. The second and third cone polishers should have Silicon Carbide abrasive grit size of 20/24 in equal proportion. The wire mesh screen cage should have an opening size of 0.8mm. One set of wire mesh screen and supporting cage to be supplied with wire mesh having an opening of 0.6mm to be used for small sized millet grains. It should be possible to move the entire cone assembly vertically to adjust the clearance in the milling chamber. The system should have 5 rubber brakes in the milling chamber. The system should automatically discharge the separated bran through a pneumatic bran collection system comprising of blower, motor, drive system, cyclone and dust collection system to transport the bran outside the milling premises. The cone polisher should have a surge hopper with adjustable feed gate to accommodate material for 15 minutes of running at rated capacity. In addition, there should be a pan type vibratory feeder below the extra hopper, with adjustable feed gate, for paddy husk which is to be fed along with the dehusked grains into the cone polisher. The hopper for husk should have a volume of 0.15m<sup>3</sup>. The polished grain outlet should also be connected with an aspiration leg of bran separation system to remove any husk particles present in the polished grain lot.</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><b>Capacity: 1000 kg/h (1TPH)</b></p>	3
7	<p><b>Plansifter:</b></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 1003µm (16 mesh BSS) and 850µm (18 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) &amp; 500µm (30 mesh).</p>	1

Sl. No.	Specifications and essential features of individual machine/system	Quantity
	<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><b>Capacity: 1000 kg/h (1TPH)</b></p>	
8	<p><b>Centralised Dust Collection &amp; Discharge System:</b></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 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><b>Capacity: To suit the entire plant</b></p>	1
9	<p><b>Bucket elevator:</b></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 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, and 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</p>	As required

Sl. No.	Specifications and essential features of individual machine/system	Quantity
	<p>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>Tentative heights of elevators are as given below:</p> <ul style="list-style-type: none"> <li>a) 23' (7.01m) - 2 Nos</li> <li>b) 32' (9.75m) - 2 Nos</li> <li>c) 36' (10.97m) - 1 No</li> </ul> <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><b>Capacity: 1000 kg/h (1TPH)</b></p>	
10	<p><b>Storage tanks with structure:</b></p> <p>Storage tank to store cleaned Millet grains. 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"> <li>a. To store cleaned and destoned grains consisting of 2 tanks each tank having a holding capacity of 2000 kg (2T)</li> <li>b. To store dehusked material prior to separator, consisting of 2 tanks, each tank having a holding capacity of 2000 kg (2T)</li> <li>c. To store dehusked material after separator prior to polishing, consisting of 2 tanks each tank having a holding capacity of 2000 kg (2T)</li> <li>d. To store polished millets prior to packing, consisting of 2 tanks each tank having a holding capacity of 2000 kg (2T)</li> </ul>	<p>As required</p> <p>1 set</p> <p>1 set</p> <p>1 set</p> <p>1 set</p>
11	<p><b>Continuous Weighing and Bag filling machine:</b></p> <p>A semi – automatic/manual continuous Auger type packing machine for granular material like millet grains with a maximum filling capacity of 50kg with provision to pack into unit packs of 5kg, 10kg and 25kg bags. The</p>	1

Sl. No.	Specifications and essential features of individual machine/ system	Quantity
	stitching type machine should be automatic/manual system with all contact parts made out of Stainless steel, with an accuracy of filling of 0.6% or better. System should run on 3 phase, 415V, and 50Hz supply. 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.	

### Physical properties of millets

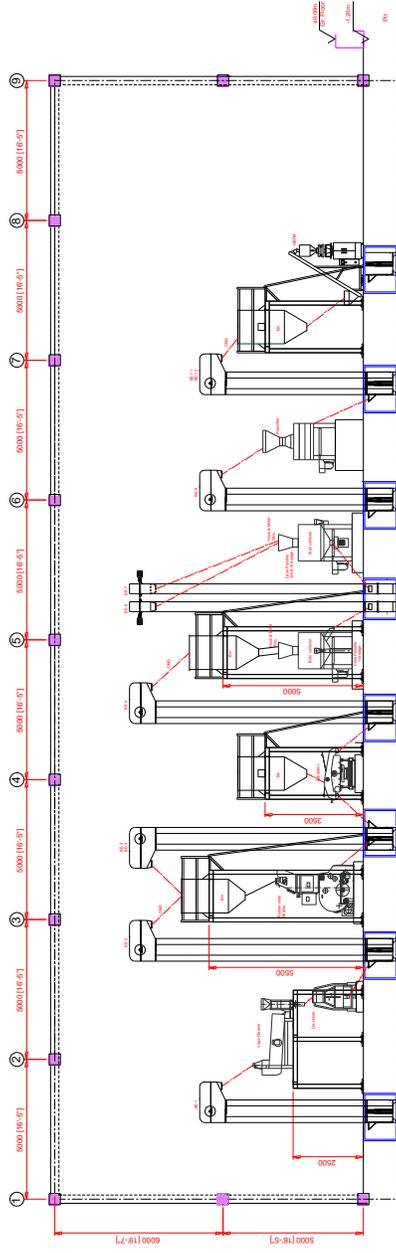
Sl. No.	Name of millet	Bulk Density (kg/m <sup>3</sup> )	Geometric Mean Diameter (mm)
1	Little Millet	785.9	1.75 ± 0.06
2	Foxtail Millet	787.5	1.67 ± 0.11
3	Proso Millet	816.2	2.15 ± 0.11
4	Kodo Millet	810.1	2.19 ± 0.12
5	Brown Top Millet	749.8	1.87 ± 0.03
Note: The above values are indicative only since it varies with variety and moisture content and is intended for use to calculate size of storage bins, hoppers and sizes of sieves in the above plant.			

## 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. 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.
17. All vibrating/ reciprocating/ gyratory machines should be supplied with individual anti – vibration mountings.
18. All civil construction requirements for erection and commissioning of the machines should be included in scope of supply.

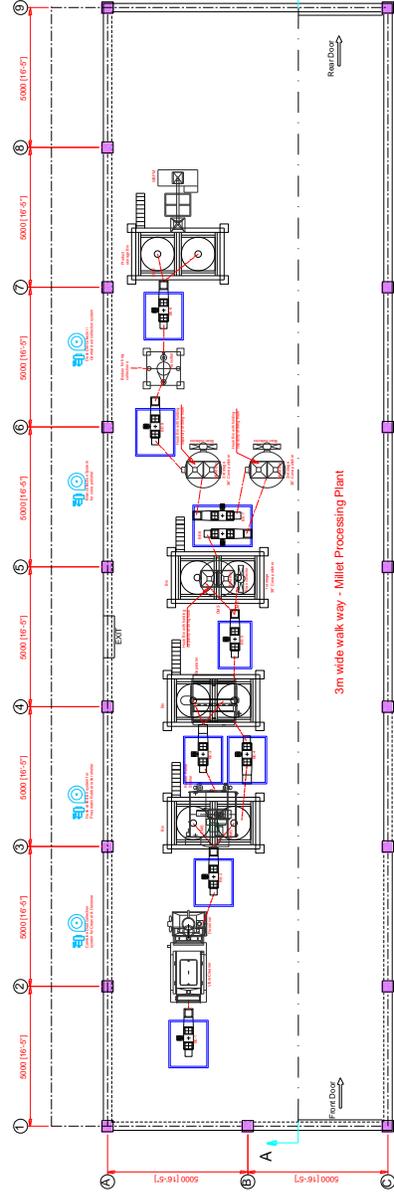
# MILLET PROCESSING PLANT



## SECTION A-A

### LEGEND:

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



## PLAN

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DATE	NAME	TITLE
DRN: 14.02.2020	Dr. Shivakumar	MILLET PROCESSING PLANT
CHD: 15.02.2020	Shivakumar	
SCALE: N.T.S.		
All Dimensions are in Millimeters		
DRAWING SHEET NO.	Ref Drawing	
REV. NO.		

Break Sharp Edges