Agriculture and Food Processing Equipment Sectional Committee, FAD 20

FOREWORD

(Adoption clause will be added later)

The use of vegetable cutting machines involves various mechanical and other hazards. Their extensive use justifies the need of a standard covering both safety and the hazards to food hygiene arising from machine design.

The vegetable cutter machines are intended for cutting, shredding, dicing, chipping and grating of food products in which the product passes through the machine.

In the formulation of this standard considerable assistance was provided by Tamil Nadu Agricultural University, Coimbatore and Indian Institute of Horticultural Research, Bangalore

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*).’ The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

This standard prescribes safety and hygiene requirements for the power operated vegetable cutting machine.

2 REFERENCES

2.1 The standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below:

IS No.	Title
IS 14595 : 1998	Food hygiene – microbiological criteria - principles for establishment and application
IS *2491* : *1998*	Food hygiene – General principles - Code of practice *(second revision)*
15000 : 1998	Food hygiene - Hazard analysis and critical control point (HACCP) - System and guidelines for its application
IS 1500 : Part 1:2019/ ISO 6506-1 : 2014	Metallic materials - Brinell hardness test: Part 1 test method (Fifth Revision)
IS 732:2019/ IEC 60335	Code of practice for electrical wiring installations (Fourth Revision)
IS 16020 : 2012	Food safety management— requirements for good hygiene practices
IS 2491 : 2013	Food hygiene - General principles - Code of practice (Third Revision)
IS 2062:2011/ ISO 630-1/2/3	Hot rolled medium and high tensile structural steel - Specification (Seventh Revision)
IS 10500: 2012	Drinking Water - Specification (Second Revision)
IS 14216: 1994	Code for hygienic practice for spices and condiments processing units

3 Machine parts and its basic function

The following are the major basic parts of the Vegetable cutting machine

3.1 **Feeding chute/pipe/hopper/conveyor :** Part is useful to hold and feed vegetables and it should be large enough to accommodate all size and shape of the vegetables

3.2 **Closing lid/plunger/ pressing handle :** Device to convey and guide the vegetables inside the cutting chamber

3.3 **Cutting chamber:** It is a closed part in which rotating blades / discs are fitted to cut / slice vegetables

3.4 **Circular/ rectangular perforated blades:** Attachments to cut vegetables in the cubes of different shape and sizes

3.5 **Collecting chute/ delivery chute:** Attached to the slicing chamber to collect the cut pieces

3.6 **Motor for operation :** Prime mover to operate the slicing mechanism

3.7 **Rubber Bush/wheels for the legs :** Bushes to firmly support the machine without slipping. The wheels to move the machine conveniently

3.1 Machines covered in this standard

This standard covers the three following types of machine including combinations of them:

3.1.1 **Machines with rotating cutting devices**

Such machines contain the rotating cutting devices in a fixed chamber. Product is fed into the top of the chamber, typically through a feed hopper and assisted by a pusher or plunger device (see figure 1).

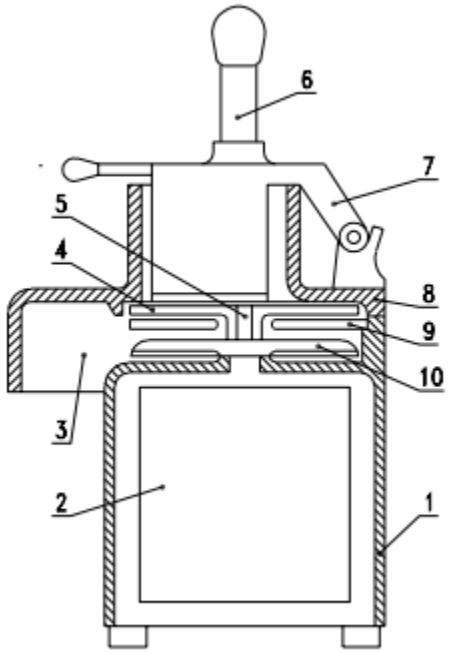

Figure 1 Machines with rotating cutting devices

Where,
1 Body

2 Electric motor
3 Delivery chute
4 Cutting device
5 Shaft
6 Plunger (removable)
7 Pusher device
8 Feed chute
9 Fixed plate
10 Ejector

3.1.2 **Machines with rotary drum**

These machines generally have a hopper method of feeding product to a rotating drum. As the product is held against the outside wall by the spinning drum so it comes into contact with a fixed cutting device (see figure 2).

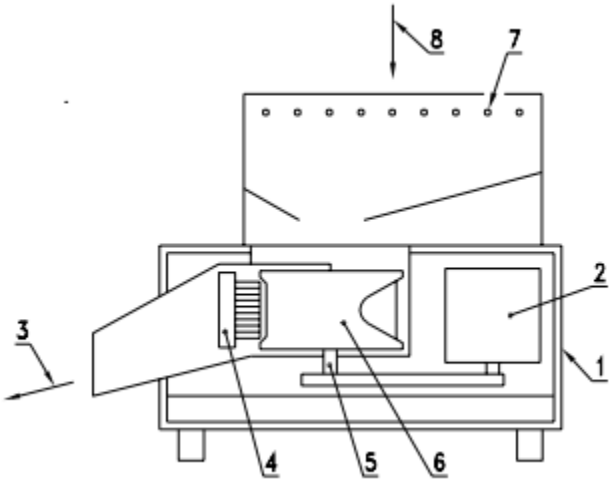

Figure 2 Machine with rotary drum

Where,

1 Body

2 Motor

3 Delivery chute

4 Cutting device

5 Shaft

6 Rotating drum

7 Fixed grid

8 Feed hopper

3.1.3 **Machines with horizontal reciprocating cutters**

These machines are used extensively for chipping potatoes. Raw potatoes are fed from a hopper into the cutting chamber containing fixed plates and reciprocating plates and cutting devices (see figure 3).

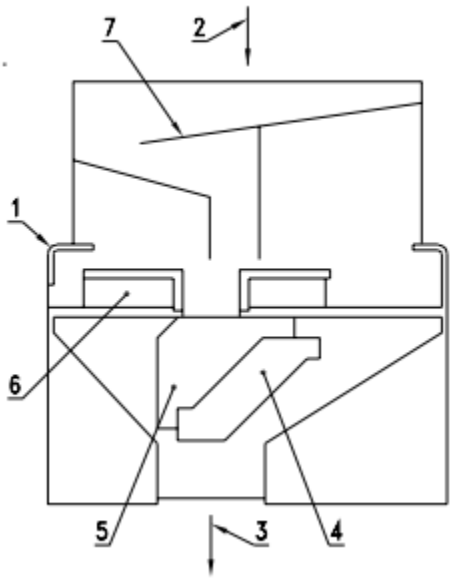

Figure 3 Machine with horizontal reciprocating cutters

Where,

1 Body

2 Feed hopper

3 Delivery chute

4 Reciprocating cutters

5 Fixed plate

6 Reciprocating plate

7 Baffles

3.2 Elements of a machine (see figures 1, 2 and 3)

All machines generally contain the following elements of design:

i) a device for feeding product into the machine;
ii) one or several tools: cutting plates or blades, hereafter called "cutting devices". A cutting plate or blade
iii) consists of one or more cutting edges fixed to a frame. Fixed cutting blades may be installed in conjunction with moving plates;
iv) an ejector;
v) a delivery chute;

vi) control devices.

3.2.1 **Devices for feeding**

Three devices for feeding product are used:

3.2.2 **Hopper feed**

The product is fed to the cutter from the hopper generally by gravity and/or by feeding devices.

3.2.3 **Pusher feed**

Here a small amount of product is fed into a feed chute and assisted to the cutters by pressure on the pusher device.

3.2.4 **Plunger feed**

Here product is manually fed to the cutting device. It is assisted with a plunger. Typically, the feeding is done through a narrow feed chute.

Note- Often machines have both pusher and plunger feed so that the operator can select the most suitable operation according to the food product being cut.

4.0 **GENERAL REQUIREMENT**

4.1 Each vegetable cutting machine shall be provided with a packing slip and instruction / operator's manual containing full information on installation, safe operation, safety during operation, maintenance and information regarding ordering for replacement of parts.
4.2 All the major components should be easily removable for inspection and cleaning. Also parts are easily cleanable.
4.3 The vegetable cutting machine should be able to run without load to identify loosely fitted parts and excess noise to ascertain smooth running.
4.4 The vegetable cutting machine shall be provided with necessary toolkit for taking up any maintenance.

4.5 A minimum cautionary notice on dangerous operation shall be written in vernacular language legibly and prominently on a label fixed on the vegetable cutting machine.
4.6 The machine parts which may pose mechanical hazard should be covered for safety of the operator.
4.7 The machine stability to be ensured through a proper balanced design of the components.
4.8 Standard spare parts and precision in manufacturing should be maintained to achieve proper assembly and fitting of the machine.
4.9 Direction of rotation of cutting blade should be indicated.
4.10 Provided with different types of knives for cutting / slicing vegetables in different patterns.
4.11 Provide with self cleaning arrangement as required for any specific operation and vegetables.
4.12 Provision to adjust the slice thickness of the cut vegetables.
4.13 The cutting chamber in the vegetable cutting machine is provided with a cleaning arrangement, may be in the form of a brush to keep the cutting blade clean.
4.14 The machine is provided with suitable doors / covers preventing entry of water into vital components, motor and electric controls.

5 Additional accessories and surrounding condition

5.1 Floor / surface on which the machine is placed should be smooth and free from pits and crevices and easily cleanable.
5.2 Installation of the cutting machine is done on a raised position, i.e. either on a table or cement slab at convenient height or on floor at least 10 cm above the ground level, depending on the size of the machine.
5.3 The place of installation is provided with good drainage facility.
5.4 The place of installation is well aerated with good lighting.
5.5 Provided with appropriate water supply to the vegetable cutting machine for use during cutting / slicing, as required.
5.6 All utensils/ containers/ crates used in handling of vegetables should be made of material (IS 14216) which does not transmit toxic substances, odour or taste, is non-absorbent, resistant to corrosion and is capable of withstanding repeated cleaning and disinfection.

6 Water quality

6.1 Adequate safe and potable water shall be made available for washing of vegetables and other vegetable cutting machine (see IS 10500: 1983).
6.2 Storage tanks for water should be kept covered with tight fitting lids, examined regularly and cleaned thoroughly at regular interval as required.
6.3 Vegetables should be washed /cleaned to remove soil and other contamination. The water so used should not be re-used unless it has been suitably treated to be maintained in a condition which will not cause health hazard.

6.4 Water shall be periodically analysed chemically and microbiologically and record of such examinations shall be maintained. If water quality is not found suitable for use in processing activities, appropriate treatment may be given.
6.5 Proper care shall be taken to prevent contamination of ground water by effluent through seepage and maintain ground water quality.
6.6 The use of wood and other materials which cannot be adequately cleaned and disinfected, should be avoided except when their use would clearly not be a source of contamination.
6.7 Vegetable cutting machine should be designed and constructed as to prevent hygienic hazards and permit easy and thorough cleaning and disinfection and, where practicable, be visible for inspection.
6.8 Sample of the cut slices have to be analysed for any microbial contamination from time to time in every batch of processing
6.9 Inedible / waste material handling containers should be leak-proof, constructed of metal or other suitable impervious material which should be easy to clean or easily disposable and be able to be closed securely.
6.10 Equipment and utensils used for inedible materials or waste should be identified/ marked and should not be used for edible products.

7 Processing hygiene

7.1 Vegetables should be washed/cleaned to remove soil and other contamination. The water so used should not be re-used unless it has been suitably treated to be maintained in a condition which will not cause health hazard.

7.2 Sample of the cut slices have to be analysed for any microbial contamination time to time in every batch of processing

7.3 Inedible/ Waste material handling containers should be leak-proof, constructed of metal or other suitable impervious material which should be easy to clean or easily disposable and be able to be closed securely.

7.4 Equipment and utensils used for inedible materials or waste should be identified/ marked and should not be used for edible products.

8 Personnel hygiene, health and safety requirements

8.1 Hygiene Training Establishments should arrange for adequate and continuing training of workers in hygienic handling of vegetables and its cut slices/ cubes and in personal hygiene so that they understand the precaution necessary to prevent contamination. Instructions should include relevant parts of this code.

8.2 Persons who come in contact with vegetables and its cut slices/ cubes in the course of their work should have a medical examination by an authorized registered medical practitioner prior to

their employment because of epidemiological considerations. Medical examination of a worker should also be carried out at other times when clinically or epidemiologically indicated.

8.3 All employees shall be inoculated against typhoid and paratyphoid 'A' on their first appointment and thereafter once in every five years, in case of epidemic. All workers shall be inoculated. A record shall be maintained.

8.4 It shall be impressed upon all the employees that they should inform the management in case of fever, vomitting, diarrhoea, typhoid, dysentery, boils, cuts, sores, ulcer or any other notifiable diseases occurring at home and in families. No worker suspected of disorders noted above shall be permitted to work in the unit. Staff/workers having frequent cough and cold should not be deputed in areas prior to packing and storage of finished products.

8.5 The management should take care to ensure that no person, while known or suspected to be suffering from, or to be a carrier of, a disease likely to be transmitted through vegetables and its cut slices/ cubes or while afflicted with infected wounds, skin infections, sores or with diarrhoea, is permitted to work in any material-handling area in any capacity in which there is any likelihood of such a person directly or indirectly contaminating material with pathogenic microorganisms.

8.6 Any person who has a cut, a wound, a boil or a sore should not continue to handle the material until the injury is completely protected by a waterproof covering which is firmly secured, and which is conspicuous in colour. Adequate first-aid facilities should be provided for this purpose.

8.7 Every person engaged in the process should maintain a high degree of personal cleanliness while on duty.

8.8 Persons engaged in handling vegetables and its cut slices/ cubes shall be provided with clean uniforms and (preferably white) and clean washable, where necessary (see IS 14216).

8.9 Separate room or place for changing the clothes shall be provided. The clothes shall not be hung in any processing rooms. The uniforms shall not be worn outside the unit but put in first before starting the work and changed when leaving.

8.10 Every person, while on duty to handle vegetables and its cut slices/ cubes, should keep his/her finger nails short and clean. He/She should wash his/her hands frequently and thoroughly with a suitable hand-cleaning preparation under running warm water. Hands should always be washed before commencing work, immediately after using the toilet, after handling contaminated material and wherever else necessary. Towels used for drying hands should be clean.

8.11 Gloves should be used and maintained in a sound, clean, sanitary and dry condition. The wearing of gloves does not exempt the operator from having thoroughly washed hands. Gloves with holes in them or that are torn should be thrown away to avoid leakage of accumulated sweat that may deposit large number of microorganisms on the cut slices.

8.12 The operators should not wear any loose cloths which can get entangled with rotating parts of the machine

8.13 The safety gloves should be used while handling the electrical components of the machine

9 Marking and packing

9.1 The vegetable cutting machine shall be marked on a suitable nonwearing part with the following particulars:

a) Manufacturers name and recognized trademark, if any;
b) Size of the machine with capacity; and
c) Batch and code number.
d) Power requirement

10 BIS Certification Marking

The vegetable cutting machine may also be marked with the Standard Mark.

10.1 The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and Rules and Regulations made thereunder. The details of the conditions under which a license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

11 Packing

Machine shall be packed for safe handling in transit and storage as specified by the purchaser.