

# इंटरनेट

# मानक

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IS 15561 (2005): Sugarcane crushers - Safety requirements  
[FAD 20: Agriculture and Food Processing Equipments]



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भारतीय मानक  
गन्ना दलित्र — सुरक्षा संबंधी अपेक्षाएँ

*Indian Standard*  
SUGARCANE CRUSHERS — SAFETY  
REQUIREMENTS

ICS 67.180

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**BUREAU OF INDIAN STANDARDS**  
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NEW DELHI 110002

FOREWORD

This Indian Standard was adopted by Bureau of Indian Standards, after the draft finalized by the Agricultural Produce Processing and Milling Machinery and Surface Covered Cultivation Structures Sectional Committee, had been approved by the Food and Agriculture Division Council.

Sugarcane crushers are widely used in India for crushing sugarcane. These are driven by animals, electric motors, stationary diesel engines or tractor PTO. Incidents of accidents have been reported in operation and use of cane crushers and hence felt there is a need to formulate the safety standard for cane crusher.

Figures 1 to 5 are meant only for illustration. These should not be considered as suggestive of any standard design.

The following standards may also be read along with this standard:

<i>IS No.</i>	<i>Title</i>
1973 : 1999	Sugarcane crushers — Specification ( <i>third revision</i> )
6997 : 1973	Test code for sugarcane crushers

Instructions for safe use of sugarcane crushers are given in Annex A for guidance.

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.

# Indian Standard

## SUGARCANE CRUSHERS — SAFETY REQUIREMENTS

### 1 SCOPE

This standard specifies the safety requirements of sugarcane crushers operated by animal and power.

### 2 REFERENCES

The standards given 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 indicated below:

IS No.	Title
732 : 1989	Code of practice for electrical wiring installations ( <i>third revision</i> )
900 : 1992	Code of practice for installation and maintenance of induction motors ( <i>second revision</i> )
1973 : 1999	Sugarcane crushers — Specification ( <i>third revision</i> )
2062 : 1999	Steel for general structural purposes ( <i>fifth revision</i> )
6997 : 1973	Test code for sugarcane crushers

### 3 TYPES

3.1 According to source of power, the sugarcane crushers shall be of the following types:

- a) Animal-driven, and
- b) Power-operated.

3.1.1 Animal-driven crushers shall be of vertical type (see Fig. 1), whereas power-operated crushers may be of vertical or horizontal type (see Fig. 2 and Fig. 3).

### 4 GENERAL REQUIREMENT

4.1 Provision to change the direction of rotation of feed rollers should be provided.

4.2 The crushers properly installed shall be run idle (without load) for half an hour. During and after the run, the following shall be observed:

- a) there shall not be any abnormal noise in any component,

- b) rollers and axle shall run smoothly in their respective bearings,
- c) there shall not be any marked wear or slackness and loosening of any components,
- d) bearings shall not become warm, and
- e) gears shall run smoothly.

4.3 Each crusher shall be provided with an instruction sheet containing full information on method of installation and safe operation. Some instructions are given in Annex A for the guidance of the users.

4.4 The crusher shall also be provided with a 'Operator's manual' containing instructions for installation, safety during operation, maintenance and information regarding ordering for replacement of parts.

4.5 The crusher shall be provided with necessary toolkit.

4.6 A minimum cautionary notice as given below shall be written in vernacular language legibly and prominently on a label fixed on the crusher:

- a) DO NOT OPERATE CRUSHER WITHOUT FEED PLATE/CHUTE, GUARDS AND OTHER SAFETY DEVICES;
- b) DO NOT MAKE ADJUSTMENTS WHEN CRUSHER IS IN OPERATION;
- c) DO NOT WORK UNDER THE INFLUENCE OF INTOXICANTS LIKE LIQUOR, OPIUM, ETC;
- d) DO NOT CROSS OVER THE RUNNING BELTS OR BEAM; AND
- e) DO NOT PUT OR TAKE OFF BELT WHILE PULLEY IS RUNNING.

#### NOTES

- 1 In 4.6(d) use the word belt or beam as the case may be.
- 2 In 4.6(e) should be written on crusher operated by belt-pulley power drive.

### 5 FEEDING SYSTEM

5.1 For ensuring proper and safe feeding of canes, feed plate shall be provided in vertical type crushers and a feed chute shall be provided in horizontal type crushers. A typical feed plate and a feed chute are shown in Fig. 4 and Fig. 5 respectively.

5.1.1 Mild steel sheet (see IS 2062) shall be used in the manufacture of the feeding chute. The thickness of sheet shall not be less than 1.6 mm.

5.1.2 The opening for feeding the cane in feed plate or chute in Fig. 4 and Fig. 5 shall be not more than 60 mm. The feed plate or feed chute shall be covered on the front side up to a distance of 600 mm.

5.2 The feed plate/feed chute shall be so fixed or fitted with the crushers that it is not possible to remove it easily.

## 6 GUARDS

6.1 Guards shall be provided on all moving parts of crushers to prevent accidental contact of persons or parts of clothing being caught in the transmission system, unless the system is so constructed or placed as to be safe without guards.

6.2 The guards shall be made of blind sheets of mild steel (see IS 2062) having a minimum thickness of 1.6 mm.

6.3 On animal-operated crushers, guards shall also be provided at the following places:

- a) Protecting guard between operator and feeding rollers;
- b) Safety guard between animal and operator; and
- c) Fixed guard between gear head and yoke of animals to maintain circular movement of animals and to prevent their sudden turning towards crusher or side.

6.4 All guards shall be either permanently attached or firmly secured to prevent their removal without the aid of tools. The servicing and adjustment of the crusher should be possible without complete removal of the guards.

6.5 The guards shall be so designed as not to hinder easy adjustment, servicing and operation of crushers.

## 7 WORKMANSHIP AND FINISH

7.1 Rollers and axles shall be machined properly.

7.2 The rollers axles and other components shall be free from protruding parts, blow holes, cracks seam and visual defects.

7.3 Welding of various components shall not be porous.

7.4 The exposed metallic parts shall be free from rust and shall have a protective coating which will prevent surface deterioration in transit and storage.

## 8 MARKING

8.1 Each crusher shall be marked with the following information on a metallic plate rigidly fixed at prominent place on the crusher:

- a) Manufacturer's name and trade-mark, if any;
- b) Model, code and serial number;
- c) Capacity, in kg/hour;
- d) Power requirement (for power-operated only); and
- e) Recommended revolution per minute (rpm) of king roller and its direction of rotation.

8.2 Each roller fitted with axle shall be marked clearly with the following particulars:

- a) Manufacturer's name and trade-mark, if any;
- b) Size (diameter and length);
- c) Diameter of axle; and
- d) Code or Batch number.

## 8.3 BIS Certification Marking

Each crusher may also be marked with the Standard Mark.

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

## 9 PACKING

Packing of the crusher and its components shall be done to safeguard the crusher from damage during handling and transport.

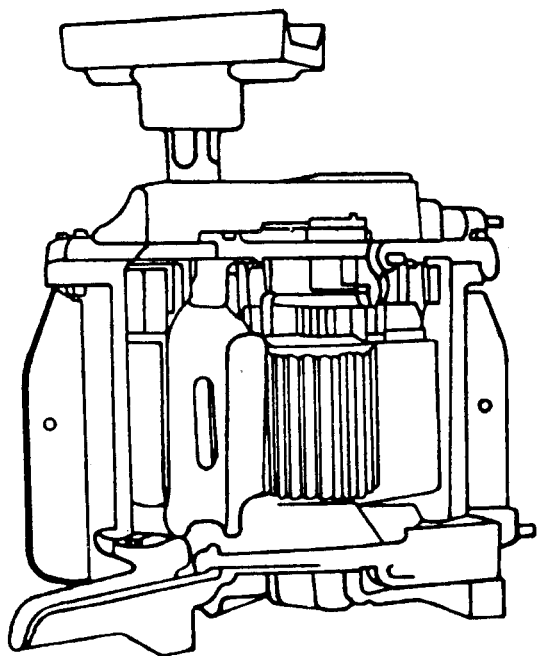


FIG. 1 ANIMAL-DRIVEN SUGARCANE CRUSHER

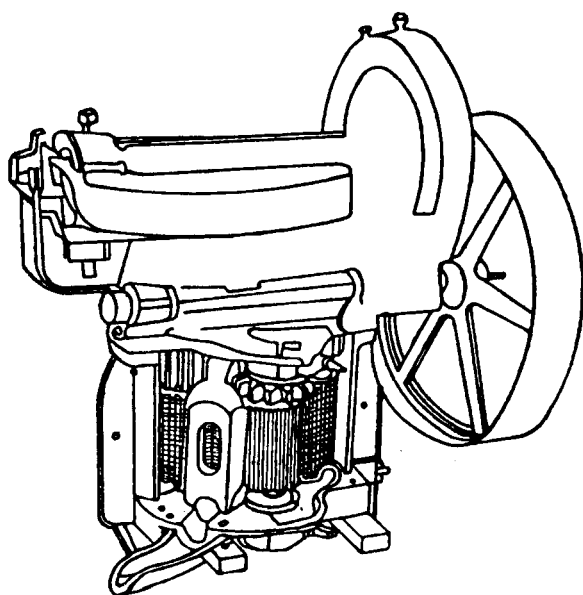


FIG. 2 POWER-OPERATED SUGARCANE CRUSHER,  
VERTICAL TYPE

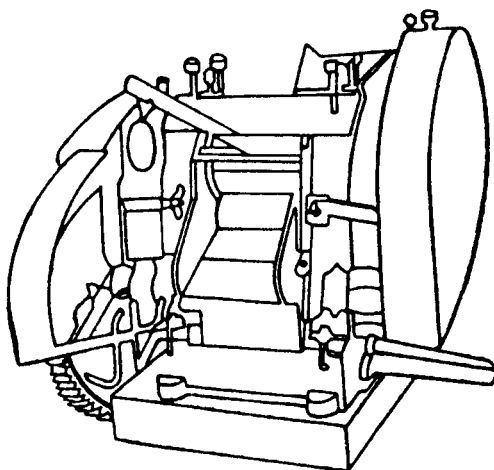


FIG. 3 POWER-OPERATED SUGARCANE CRUSHER, HORIZONTAL TYPE



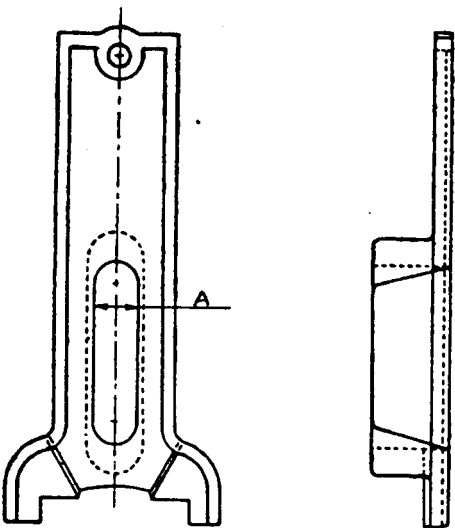


FIG. 4 A TYPICAL FEED PLATE

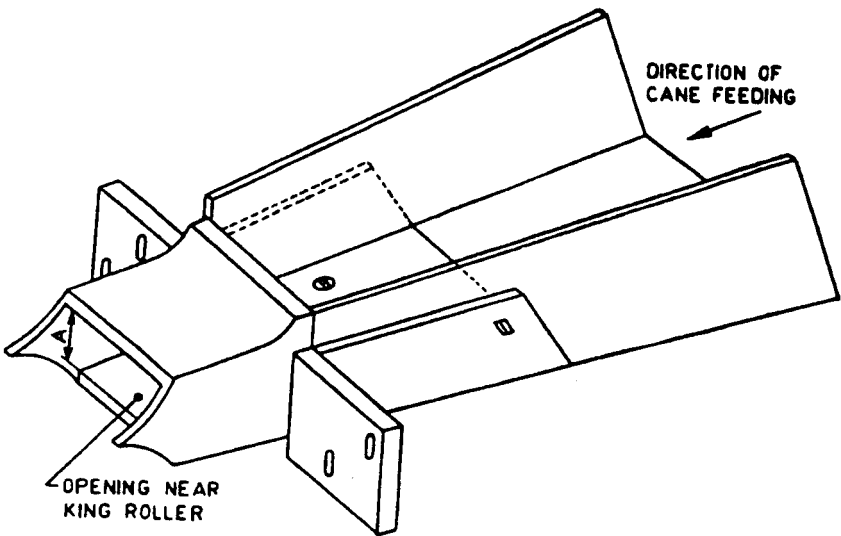


FIG. 5 A TYPICAL FEED CHUTE

**ANNEX A***(Foreword and Clause 4.3)***INSTRUCTIONS FOR SAFE USE OF SUGARCANE CRUSHERS****A-1 INSTALLATION**

- a) The crushing yard should be kept relatively free from all kinds of obstructions.
- b) The crusher should be properly anchored in the ground to ensure stability during the operation.
- c) The crusher should be set in level both longitudinally and laterally.
- d) The main drive of the crusher should be aligned with the drive of the power unit.
- e) The direction of movement of the belt should be adjusted to suit the direction of rotation of rollers.
- f) All components, including guards and other safety devices, should be intact.
- g) In case of continuing the crushing work at night, proper arrangement should be made for light. All electrical Installations shall be done in accordance with IS 732 and to the requirements of the prevailing Electricity Board rules.
- h) As far as possible, the prime mover (engine, motor, tractor or power tiller) should be kept at a safe distance from the feeding inlet.
- j) The prime mover should be set in level both longitudinally and laterally.
- k) In the case of any installation of electrical motors, the guidelines/points given under of IS 900 should be observed. The main switch of the motor should be fixed within easy reach of the operator.
- m) To avoid hitting on the head by the wooden beam of animal driven crushers, a pit should be dug near the feeding side, so that during operation, there is a clear gap of about 50 mm between the beam and the head of the operator.

**A-2 SAFETY PRECAUTIONS IN OPERATION**

- a) Do not tamper with or remove the guards or feed plate/chute.
- b) Do not wear loose clothing, hand bangles, wrist watch, etc, while feeding the cane.
- c) Never do the feeding of canes under the influence of intoxicants like liquor, opium, etc.
- d) Do not stand on the crusher.
- e) Do not operate/work on the crusher, if tired.
- f) Do not cross over the belts or beam.
- g) Do not overfeed the crusher.
- h) Avoid feeding small pieces of canes to crusher.
- j) Be always attentive while feeding the cane and avoid talking.
- k) Keep the hand at a safe distance while feeding the cane in the crusher.
- m) Except those adjustments which are required to be carried out when the crusher is in operation, other adjustments be carried out only after stopping the crusher.
- n) Invalid, infirm, minor or sick persons should not be allowed to operate the crusher.
- p) Regularly remove the heap of bagasse.
- q) Lubrication and other maintenance jobs should be done as recommended by the manufacturer.
- r) Check regularly the nuts and bolts and tighten them, if necessary.
- s) In case of bent canes, the canes should be chopped at one or two places to reduce the extent of bend.
- t) Do not encourage another person to sit near the person feeding the cane.
- u) As far as possible, ensure that all the moving parts are covered with guards.

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