**Based on IS 7051-1973 (2012) - maize sheller**

**IS: xxxxxx**

**Indian Standard**

**SPECIFICATION FOR**

**HUSKER SHELLER FOR MAIZE**

0. FOREWORD

0.1 This Indian Standard was adopted by the Bureau of Indian Standards on \_\_\_\_\_\_\_\_\_\_, after the draft finalized by the \_\_\_\_\_\_\_\_\_\_\_\_.

0.2 Maize, an important cereal crop is harvested at the maturity of the cob. The cob with a fibrous cover, called husk / sheath is destalked from the plant using knife with sharp or serrated edge. The sheath will be removed by peeling to get the cobs. The cobs with maize kernels will be dried to a moisture content of around 13% and shelled to remove the kernels from the cob. During early days, separation of maize kernels was done by manually beating the cobs with a long pole / stick. Hand operated, pedal operated and power operated shellers were introduced with advancement in technological development, to replace the inefficient, ineffective and tedious method of manual shelling. The maize cobs need to be manually de-sheathed to remove the husk and shelling is performed using the shellers. This also lead to manual operation of de-sheathing, which results in drudgery to the workers, less out turn, higher cost of shelling, *etc.* Husker sheller an improved device, which removes the sheath / husk and separates the kernels from maize cobs. The husker sheller for maize is being extensively used at farm level and also under custom hiring. Development of standards to maintain the quality of the construction, operation, maintenance, safety of operation, *etc.* for the husker sheller for maize, will ensure advantages to the farmers towards additional revenue. Thus the need for preparing of an Indian Standard on this subject for the guidance of users and manufacturers and prepared.

0.3 For deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS: 2-1960\*. The number of significant places retained in the rounded off value should be the same as that of the specified value in the standard.

\*Rules for rounding off numerical values (revised).

**1. SCOPE**

**1.1** This standard specifies the material, performance and other requirements for power operated husker sheller for maize.

**2. TERMINOLOGY**

**2.0** For this standard, the definitions given in IS: 7052-1973$ shall also apply.

2.1 Clean Grain - shelled grain free from refractions [see IS: 4333 (Part I)-1967$$].

2.2 Cleaning Efficiency - clean grains (see 2.1) received at the specified grain outlet(s) with respect to total grain received at grain outlet(s) expressed as percentage by weight.

2.3 Composite Sample - the sample of the grain, husk and shelled cobs formed by combining and blending the primary samples (see 2.11).

2.4 Concave clearance - the maximum clearance between cylinder and concave.

2.5 Feed Rate - the weight of the cobs fed into the husker sheller per unit time.

2.6 Final Sample - the sample drawn from the composite sample (see 2.3) for analysis.

2.7 Input Capacity - the maximum feed rate at which the power requirement is minimum and total losses and efficiencies are within the specified limits (see 5.1, 5.2 and 5.3 of IS: 7051- 1973 - Specification for power maize shellers).

2.8 Output Capacity - the weight of the grains received at the specified grain outlet(s) when collected at input capacity (see 2.7).

2.9 Power Maize Sheller - a machine operated by a prime mover (see 2.12) to separate the maize grains / kernels from de-sheathed maize cobs and also to remove the impurities husk from grains.

2.10 Husker sheller for Maize - a machine operated by a prime mover (see 2.12) to separate the sheath / husk and maize grains / kernels from de-sheathed cobs and also to remove the impurities from grains.

2.11 Primary Sample - the weight of the grain, husk and shelled cobs taken from the outlets for a specified period of time.

2.12 Prime Mover - an electric motor or engine or tractor used for running the husker sheller.

2.13 Routine Tests - tests carried out on each sheller to check the requirements which are likely to vary during production.

2.14. Screen Pitch - inclination of screen with the horizontal plane in degrees.

2.15 Shelling Efficiency - percentage by weight of shelled grains from all outlets of the sheller with respect to total grain input.

2.16 Sieve Clearance -the maximum vertical distance between two successive sieves.

\*Rules for rounding off numerical values (revised ).

$ IS 7052-1973 (Reaffirmed 2012) - Test code for power maize shellers.

$$Methods of analysis for food grains: Part I Refractions.

2.17 Total Loss- the sum of the following losses in a husker sheller expressed in percentage.

2.17.1 *Blown Loss* - the clean grain (see 2.1) lost along with the husk with respect to total grain input, expressed as percentage by weight.

2.17.2 *Cracked and Broken Grain Loss* - cracked and broken grains from the specified grain outlet(s) with respect to total grain received at outlet(s) expressed as percentage by weight.

2.17.3 *Sieve Loss* - the clean grain (see 2.1) dropped through the sieve, left over sieve and stuck in the sheller with respect to total grain input, expressed as percentage by weight.

2.17.4 *Unshelled Loss -* unshelled grain (see 2.19) from all outlets with respect to total grain input, expressed as percentage by weight.

2.18 Type Test-Tests carried out on sheller to prove the conformity with the requirements of relevant standard. These are intended to prove the general qualities and design of a particular type of sheller.

2.19 Unshelled Grain- Grains still in the cobs after the shelling.

**~~3. TYPES~~**

**~~3.1~~** ~~On the basis of shelling unit, the shellers shall be of the following two types:~~

~~a) Disc type, and~~

~~b) Cylinder type~~

**~~3.2~~** ~~On the basis of method of feeding, the shellers shall be of the following two types:~~

~~a) Hopper fed, and~~

~~b) Conveyor fed.~~

**3. MATERIAL**

**3.1** Steel and cast iron shall be generally used for the manufacture of different components of the husker sheller. The material should conform to the relevant Indian Standards, as far as possible. For guidance some of the relevant Indian Standards are given in Appendix A.

**4. PERFORMANCE REQUIREMENTS**

**4.1** Total losses shall not exceed 8-10 percent in which cracked and broken grains shall be not more than 5 percent.

**4.2** Shelling efficiency shall be not less than 90 percent.

**4.3** Cleaning efficiency shall be not less than 95 percent.

**4.4** Input capacity per kWh shall be not less than 5 quintals of cobs.

**4.5** Corrected output capacity shall be not less than 30 percent of the input capacity.

**5. OTHER REQUIREMENTS**

**5.1** The construction shall be rigid and strong,

**5.2** The bearings, plumber blocks, keys, belts and pulleys should, as far as possible, conform to relevant Indian Standards. A list of such standards is given in Appendix B.

**5.3** Bearings shall be adequately protected against the ingress of dust.

**5.4** Arrangements for belt tightening and lubrication of moving parts shall be made.

**5.5** Shelling cylinder or disc shall be statically balanced.

**5.6** Sieves shall be capable of easy cleaning and replacement.

5.7 The unit may be provided with transporting wheels, of appropriate size, for easy transportation using pair of bullocks or tractor drawbar.

5.8 The husker sheller shall be optionally provided with screw conveyor and bucket elevator for easy collection and bagging of maize kernels after shelling.

**5.9** Concave clearance, air displacement, screen pitch and sieve clearance shall, as far as possible, be adjustable.

**5.10** Each husker sheller shall be provided with instruction manual containing full information on method of installation and operation of sheller. It shall also contain the information regarding maintenance, ordering replacement of parts and safety precautions

**6. WORKMANSHIP AND FINISH**

**6.1** The sheller shall be finished in such a manner that it shall be free from defects that may be detrimental for its use. The welding shall be satisfactory in all respects and should not be brittle or porous.

**6.2** All exposed metallic surfaces shall be free from rust and shall be painted properly.

6.3 All the moving parts, belt, pulley, chain, shaft, sprocket, *etc.* will be provided with proper covers to avoid any miss-happening.

**7. ACCESSORIES**

**7.1** The following accessories shall be supplied along with the sheller:

a) Flexible coupling or pulley

b) Belts,

c) Oil lubricator or grease cups, and

d) Set of tools.

**7.2** The following accessories may be supplied on the request of the purchaser:

a) Cylinder or disc,

b) Concave, and

c) Sieves.

**8. TESTS**

**8.1** At least one husker sheller of each type shall be tested for type testing. Once a husker sheller has undergone type tests, any major or essential alterations, which the manufacturer intends to make, shall be reported to the testing authority and further type test shall be carried out.

**8.2** Each husker sheller of a type shall be tested for routine tests.

**8.3** The method of type and routine testing shall be as given in ~~IS: 7052- 1973\*.~~

**9. MARKING AND PACKAGING**

**9.1** Each husker sheller shall be marked with the following information at a prominent place:

a) Manufacturer’s name and trade-mark, if any;

b) Model code and batch number;

c) Cylinder or disc size;

d) Recommended input capacity;

e) Direction of rotation of the shelling unit and recommended rev/min; and

f) Recommended power requirement.

**9.1.1** Each husker sheller may also be marked with the IS1 Certification Mark.

NOTE - The use of the IS1 Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made there under. The IS1 mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by IS1 and operated by the producer. ISI marked products are also continuously checked by IS1 for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the IS1 Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

**9.2 Packing** - The husker sheller and its components shall be packed as agreed to between the purchaser and the supplier, to avoid damage in transit.

**APPENDIX A**

(Clause 4.1)

**LIST OF RELEVANT INDIAN STANDARDS FOR STEEL AND CAST IRON**

|  |  |
| --- | --- |
| IS : 210-1970 | Grey iron castings (second revision) |
| IS : 226-1969 | Structural steel (standard quality) (fourth revision ) |
| IS : 277-1969 | Galvanized steel sheets (plain and corrugated ) (second revision ) |
| IS : 280-1962 | Mild steel wire for general engineering purposes (revised) |
| IS : 808-1964 | Rolled steel beam, channel and angle sections (revised) |
| IS : 1730-1961 | Dimensions for steel plate, sheet and strip for structural and general engineering purposes |
| IS : 1731-1971 | Dimensions for stee1 flats for structural and general engineering purposes (first revision ) |
| IS : 1732.1971 | Dimensions for round and square steel bars for structural and general engineering purposes (first revision ) |

**APPENDIX B**

(Clause 6.2)

**LIST OF RELEVANT INDIAN STANDARDS ON BEARING,**

**PLUMMER BLOCK, ETC**

|  |  |
| --- | --- |
| IS : 529-1959 | Solid-woven impregnated cotton belting for power transmission (revised) |
| IS : 1691-1968 | Cast iron and mild steel flat pulleys (first revision ) |
| IS : 2292-1963 | Taper keys and keyways |
| IS : 2293-1963 | Gib-head keys and keyways |
| IS : 2294-l 963 | Woodruff keys and keyslots |
| IS : 2494- 1964 | V-belts for industrial purposes |
| IS : 2513-1963 | Boundary dimensions for rolling bearings for general engineering purposes |
| IS : 3142-1965 | V-grooved pulleys for V-belts -groove sections A, B, C, D and E |
| IS : 3697-1966 | Boundary dimensions for tapered roller bearings |
| IS : 4773-1968 | Plummer blocks for rolling bearings |