

IS : 6151 (Part III) - 1976

Indian Standard

STORAGE MANAGEMENT CODE

PART III SPECIFIC CARE IN HANDLING AND STORAGE
OF AGRICULTURAL PRODUCE AND INPUTS

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STORAGE MANAGEMENT CODE

PART III SPECIFIC CARE IN HANDLING AND STORAGE
OF AGRICULTURAL PRODUCE AND INPUTS

0. FOREWORD

0.1 This Indian Standard (Part III) was adopted by the Indian Standards Institution on 29 October 1976, after the draft finalized by the Storage Structures and Storage Management Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Scientific storage of agricultural produce and inputs demands proper care of different commodities, construction of appropriate type of storage structures suitable for different commodities; hygienic transport, receipt, distribution and delivery of these commodities; maintenance of warehouse inspection records; etc. The standardized norms of storage management would help in overcoming every day problems of recurring nature like general and specific care of agricultural commodities; calculation of storage space for various commodities, occupancy of storage structures; and calculation of cost of storage and construction. Such a code would, therefore, lead to overall improvement in storage at farmers', trade and government level and ultimately to overall economy in the storage of various agricultural commodities.

0.3 In India, there is a huge avoidable loss of agricultural produce and inputs during handling and storage. The loss is due to faulty handling or due to infestation by insects, micro-organisms or rodents; seepage of ground and rain-water and development of temperature gradient in storage structures.

0.3.1 The loss may, therefore, be avoided by scientific handling and storage. Besides the general norms of handling and storage of some agricultural produce and inputs, a number of them demand specific care and management. The agricultural produce and inputs which require specific care and management include fertilizers, pesticides, seeds, chillies, jaggery and cotton.

0.4 With a view to providing information on causes of loss in handling and storage of such agricultural produce and inputs which demand specific care, and guidelines on norms of scientific handling and storage which would lead to better storage awareness and conditions in the country, this standard has been formulated.

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0.5 The chemicals proposed to be used shall be sprayed in such a way that the pesticidal residues should not exceed the limits laid down in the Prevention of Food Adulteration Rules, 1955.

0.6 This code is being formulated in three parts. Other two parts are as follows :

Part I Terminology

Part II General care in handling and storage of agricultural produce and inputs.

0.7 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, 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 this standard.

1. SCOPE

1.1 This standard (Part III) prescribes specific care in handling and storage of agricultural produce and inputs.

1.1.1 This standard does not deal with such commodities which require cold storage.

2. TERMINOLOGY

2.1 For the purpose of this standard, the definitions of terms given in IS : 6151 (Part I)-1971† and abbreviations given in IS : 6151 (Part II)-1971‡ shall apply.

3. CARE IN HANDLING

3.1 Pesticides

3.1.1 Pesticides, being toxic chemicals, should be handled with extreme care and by those operators who are fully conversant with the nature of pesticides and their handling and storage work.

3.1.2 While loading and unloading pesticides for storage, hooks should not be used as it may result in spillage of the pesticides and contamination of the clothes and skin of the workers.

3.1.3 Pesticides should be handled in leak- and moisture-proof bags properly stitched and prepared with ears for facilitating lifting or in drums properly sealed.

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

†Storage management code: Part I Terminology.

‡Storage management code: Part II General care in handling and storage of agricultural produce and inputs.

3.1.4 While handling pesticides no foodgrains should be handled simultaneously since there is a risk of the contamination of the foodgrains.

3.1.5 The operators should wear eye-shield and respirators.

3.1.6 Care should be taken that there is least amount of oil or grease on the head and body of the operator.

3.1.7 Eating, smoking or drinking should not be allowed in the course of handling of the pesticides.

3.1.8 The bags used for pesticides shall be lined with suitable material to make them leak- and moisture-proof.

3.1.9 Vehicles in which hazardous chemicals or pesticides have been transported should not be used for any foodgrains unless the vehicle has been cleaned properly. Prior to the use of the vehicle for transport of foodgrains sound, clean and dry sheets of suitable size shall be spread on the floor.

3.1.10 All stocks of the pesticides should be clearly marked with the word 'Poison'.

3.1.11 The stocks should always be kept under lock and key in the custody of a responsible person.

3.1.12 Proper licence for storage of these chemicals should be obtained from the concerned authority.

3.1.13 The godown where pesticides are stored should not be used for the storage of edible commodities.

3.1.14 It is recommended that the godown incharge should be supplied with the detailed chemical and physical properties of the pesticides at the time of their storage.

3.1.15 Immediately after handling the pesticides, the personnel should thoroughly wash their hand with soap and water.

3.2 Fertilizers — The care in handling of fertilizers shall be as given in IS : 5985-1971*.

3.3 Chillies

3.3.1 The whole or ground chillies should be handled in B-twill gunny bags.

3.3.2 The vehicles in which chillies are transported should not be damp. Before loading the bags in a vehicle, suitable polyethylene sheets or tarpaulin should be spread on the floor to avoid ingress of moisture.

3.3.3 Chillies should not be transported along with other agricultural produce.

3.3.4 Filling should be loose so as to avoid damage to the chillies.

3.3.5 The size of the bags should be as specified in IS : 2566-1965†.

*Code for handling and storage of bagged fertilizers.

†Specification for B-twill jute bags (revised).

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3.3.6 The chillies when overdry become brittle; these should, therefore, be transported in covered vehicles to avoid overdrying during transportation.

3.4 Jaggery

3.4.1 Jaggery should preferably be handled in lumps. However, in case of chips, these should be handled in bags.

3.4.2 Before loading the bags in a vehicle, suitable polythene sheets or tarpaulins should be spread on the floor of the vehicle to avoid ingress of moisture in the lumps or the chips. In case the lumps are transported, the vehicles should be covered to keep the lumps safe from sun and dust.

3.5 Seeds — The care in handling of seeds shall be as given in 'Indian Standard code of practice for handling and storage of seeds (*under preparation*)'.

3.6 Coffee Beans — The care in handling of coffee beans shall be as given in IS : 6399-1971*.

3.7 Cotton

3.7.1 In handling the cotton in pressed bales, care should be taken to maintain absolute dry conditions of loading and unloading.

3.7.2 As the colour of cotton changes due to moist weather, its transport in damp vehicles or during damp weather should be avoided.

3.8 Other norms of the general care in handling of the above commodities during transport, receipt, issue and prior to storage shall be as given in IS : 6151 (Part II) - 1971†.

4. CARE PRIOR TO STORAGE

4.1 Prior to storage of the commodities given in **3.1** to **3.7**, the bags shall be examined for any damage and the damaged bags shall be segregated as given in **6.2** of IS : 6151 (Part II) - 1971†.

4.2 In case the moisture content of any of the commodities exceeds the safe level given in Table 2 of IS : 6151 (Part II) - 1971†, these shall be dried to the safe moisture level.

4.3 In case of the heated commodities especially cotton, it shall be suitably serated under dry conditions in shade.

4.4 Preparation of BGSS — Before storage of the commodities, disinfestation of vacant BGSS shall be done as suggested in **13** of IS : 609-1955‡.

4.5 Capacity of BGSS — In order to avoid overloading of storage space, the capacity of a BGSS shall be approximately estimated as given in **6.6.1** of IS : 6151 (Part II) - 1971†.

*Code of practice for construction of coffee seed storage structure.

†Storage management code: Part II General care in handling and storage of agricultural produce and inputs.

‡Code of practice for improvement of existing structures used or intended to be used for foodgrain storage.

4.5.1 While estimating the height of the stacks, care shall be taken to see that a minimum of 2 m space is left between the top surface of the stack and the under surface of the roof (or ceiling).

4.6 Stack Height — The maximum height to which the bags of the commodities or lumps may be placed in a stack depends upon the load bearing capacity of the floor or racks, nature of commodity, strength of container, etc. However, for practical purpose, the height of stacks for the different commodities shall not exceed the limits given below:

<i>Commodity</i>	<i>Stack Height (Bags)</i>	<i>Approximate Height in Metres</i>
Coffee seeds and other seeds	16	4
Chillies	14	3.5
Pesticides	12	3 to 4
Jaggery chips in bags	6	1.5
Jaggery lumps	—	1 to 1.5
Cotton bales :		
Manual handling	14	3.5
Mechanical handling	22	5.5
Fertilizers :		
Hygroscopic	12	3
Non-hygroscopic	18	4.5

4.6.1 Stack Space — Depending upon the capacity of the BGSS, and size of fumigation cover available, the floor area shall be marked into a number of rectangular or square stack spaces. Care shall be taken to leave alleyways of 75 cm minimum width between the stacks and walls and also in between the stacks. The width of the alleyways in front of door opening should be 150 cm. The length and breadth of a stack shall be not more than 9 m and 6 m respectively.

4.7 Dunnage

4.7.1 Pesticides and Fertilizers — Wooden crate with a layer of matting over it to keep the stocks 10 to 15 cm above the floor and to allow free circulation of air. Alternatively, a layer of polyethylene sheet sandwiched between two layers of bamboo or similar matting should be provided.

4.7.2 Chillies and Seeds — Wooden crates or polyethylene sheet sandwiched between two layers of matting should be provided.

4.7.3 Jaggery and Cotton — For jaggery chips, wooden crates with minimum two layers of matting or three layers of matting or a layer of polyethylene sheet sandwiched between two layers of matting should be provided.

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4.7.4 After laying the dunnage, the floor space between them as well as the dunnage itself should be sprayed with 0.5 percent malathion emulsion by the method prescribed in Appendix B of IS : 6151 (Part II) - 1971*.

4.8 Stacking of Bags — The care in building stacks shall be as described in 6.8 of IS : 6151 (Part II) - 1971*.

5. CARE DURING STORAGE

5.1 General care during bag storage of fertilizers shall be as given in 7 of IS : 6151 (Part II) - 1971*.

5.2 Fertilizers and Pesticides

5.2.1 The specific care in storage of fertilizers shall be as given in IS : 5985-1971†.

5.2.2 The pesticides shall not be stored with any agricultural commodity as it may result in serious contamination of the commodity.

5.2.3 The pesticides shall be properly stacked in a cuboid shape, having all bags in one plane, with no face of the stack bulging outward or onward at any point.

5.2.4 Pesticides should be stored in godowns capable of protecting them from atmospheric deterioration. The warehouses should be well ventilated and away from places of fire hazards.

5.2.5 Hazardous pesticides, that is, pesticides capable of explosion and fire should be either stored in a separate godown away from other pesticides or to store them reasonably away from any combustible material.

5.2.6 In places where pesticides are stored or handled, smoking and the use of fire and naked flames shall be forbidden. In places where pesticides are stored, appropriate label (for example 'poison') may be displayed.

5.2.7 During periods of high humidity, the ventilators and doors of the godown shall be kept closed. The stacks of hygroscopic pesticides may also be covered with polyethylene sheets or tarpaulins or gunny sheets during such periods. But when the humidity of the atmosphere is not high, the doors and ventilators should be kept open and free aeration of the godown should be allowed.

5.3 Chillies

5.3.1 Chillies should be stored in well-ventilated and damp-proof godowns. The godowns should preferably have reinforced cement concrete roof.

5.3.1.1 Godowns having tin roofs should not be used for storage of chillies as the pods may break into small pieces due to overheating.

5.3.2 Chillies should be stored separately from other agricultural commodities.

*Storage management code: Part II General care in handling and storage of agricultural produce and inputs.

†Code of practice for handling and storage of bagged fertilizers.

5.3.3 The bags of chillies received for storage should be dusted with pyrethrum dust containing 0.2 percent pyrethrins. The dusting should be repeated at intervals of three weeks.

5.3.3.1 In case of infestation of chillies by insects, the stock should be fumigated with EDCT mixture or with methyl bromide or with aluminium phosphide. The method of fumigation and care involved in the fumigation operation shall be as given in Appendix B of IS : 6151 (Part II) - 1971*.

5.3.3.2 The godowns should be rodent-proof.

5.4 Jaggery

5.4.1 The jaggery lumps shall be stored on special racks provided on the walls in a 2- or 3-tier system. Alternatively, they may be stored in floor of the godown with suitable dunnage as given in **4.7.3**. The chips in bags shall be stored with suitable dunnage as given in **4.7.3**.

5.4.2 The godown for storage of jaggery should have a high plinth and preferably a flat reinforced cement concrete roof.

5.4.3 The godown shall be rodent-proof.

5.4.4 The jaggery being a hygroscopic commodity, should preferably be stored in a godown provided with shutter-type doors, and windows to make it airtight.

5.4.5 Pests like ants, house flies, bees, wasps may be warded off by maintaining suitable hygienic conditions. All spillages and sweepings should be collected immediately.

5.4.6 In case of infestation by rats, the poison-baiting of rats shall be carried out by the method given in Appendix D of IS : 6151 (Part II) - 1971*.

5.5 Seeds — The care in storage of seeds shall be as given in 'Indian Standard code of practice for handling and storage of seeds (*under preparation*)'.

5.6 Cotton

5.6.1 Cotton bales being susceptible to fire hazards require separate storage.

5.6.2 Care should be taken that no open light is allowed in the godown.

5.6.3 As the colour of cotton changes due to moisture, the commodity should not be exposed to humid weather.

5.6.4 During storage, cotton may develop heating and therefore, first in, first out rule may be followed at the time of delivery of the commodity.

5.6.5 It is essential that each consignment should be stored separately bearing the date of arrival, etc, on stack cards.

5.6.6 In rainy season, all windows and ventilators should be closed. Ventilation should be given on clear days.

*Storage management code: Part II General care in handling and storage of agricultural produce and inputs.

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5.6.7 The godown shall be rodent-proof.

5.6.8 Automatic fire hydrants should be provided in the godowns where cotton bales are to be stored as it is very difficult to carry the other fire fighting equipment inside the godown when fire takes place and bales start breaking due to heat expansion.

6. PERIODICAL INSPECTION

6.1 Details of periodical inspection of bags, classification of infestation, and treatment shall be as given in **7.3** of IS : 6151 (Part II) - 1971*.

7. ISSUE OF COMMODITIES

7.1 The care during issue of the commodities shall be as given in **10** of IS : 6151 (Part II) - 1971*.

8. SAFETY PRECAUTIONS

8.1 Suitable provisions of first-aid supplies and equipment shall be made to safeguard against any accidental exposure to pesticides.

*Stores management code: Part II General care in handling and storage of agricultural produce and inputs.

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ON

STORAGE STRUCTURES AND STORAGE MANAGEMENT

IS:

- 600-1955 Code of practice for construction of *BUKHARI* type rural foodgrain storage structure
- 601-1955 Code of practice for construction of *KOTHAR* type rural foodgrain storage structure
- 602-1955 Code of practice for construction of *MORAI* type rural foodgrain storage structure
- 603-1960 Code of practice for construction of underground rural foodgrain storage structures
- 607-1971 Code of practice for construction of bagged foodgrain storage structures (*second revision*)
- 609-1955 Code of practice for improvement of existing structures used or intended to be used for foodgrain storage
- 631-1961 Aluminium foodgrain storage bins
- 3453-1966 Code of practice for construction of hexagonal type concrete-cum-masonry bins for bulk storage of foodgrains
- 5503 General requirements for silos for grain storage
- 5503 (Part I)-1969 Constructional requirements
- 5503 (Part II)-1969 Grain handling equipment and accessories
- 5606-1970 Steel bins for grain storage
- 5826-1970 Constructional requirements for flat storage structures for grain (capacity above 200 tonnes)
- 6151 Storage management code
- 6151 (Part I)-1971 Terminology
- 6151 (Part II)-1971 General care in handling and storage of agricultural produce and inputs
- 6151 (Part III)-1976 Specific care in handling and storage of agricultural produce and inputs
- 6201-1971 Constructional requirements for flat storage structures for grains 100-200 tonnes capacity
- 6663-1972 Method for determination of angle of repose of grains
- 7147 (Part I)-1973 Steel bins for domestic storage: Part I *GHARELU KOTHI*
- 7247 Code of practice for fumigation of agricultural produce
- 7247 (Part I)-1973 Methyl bromide
- 7247 (Part II)-1973 Ethylene dibromide
- 7247 (Part III)-1973 Aluminium phosphide
- 7247 (Part IV)-1975 EDCT mixture
- 7715-1975 Methods for testing suitability of bins for safe storage of foodgrains
- 7716-1975 Methods for testing efficacy of fumigation for disinfestation of grains in domestic bins

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