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INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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Indian Standard

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PART I TERMINOLOGY

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(*Continued on page 2*)

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(*Continued on page* 9)

Indian Standard

STORAGE MANAGEMENT CODE

PART I TERMINOLOGY

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 15 June 1971, after the draft finalized by the Storage and Marketing Structures for Agricultural Commodities Sectional Committee had been approved by the Agricultural and Food Products Division Council.

0.2 Scientific storage of agricultural commodities 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. Standardization of the requirements and procedures for storage management would help in overcoming problems of recurring nature like general and specific care of agricultural commodities, calculation of storage space for various commodities, occupancy or storage structures and calculation of cost of storage and construction. Such a code would, therefore, lead to overall improvement in storage at farmer's, trade and government level and ultimately to overall economy in the storage of various agricultural commodities.

0.3 Various terms relating to storage are being frequently used by various agencies concerned with storage in the country. In order to have a uniform terminology and to give an authoritative definition of these terms the Storage and Marketing Structures for Agricultural Commodities Sectional Committee decided to formulate this standard.

0.4 This code is being formulated in three parts. The other two parts will be as follows:

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

Part III Specific care in handling and storage of agricultural produce and inputs.

0.5 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*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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

1. SCOPE

1.1 This code (Part I) prescribes the definitions for various terms most frequently used in storage management.

2. DEFINITIONS

2.1 Aeration — The process of forced ventilation of AGPI* for making conditions less conducive for development of pests. The quantity of air may vary with the type and condition of AGPI. The quantity of air required for aeration is roughly calculated on the basis of 75 ml/litre/minute (*see* **2.12** and **2.51**).

2.2 Agricultural Produce — Produce such as cereals, pulses, milled products, oilseeds, sugar, etc.

2.3 Agricultural Inputs — Farm equipment, seeds, fertilizers and pesticides put in for production and protection of agricultural crops and produce.

2.4 Airtight Storage — Storage in a structure which is impermeable to air.

2.5 Alley Way — Free space left around the stacks of bags for operational purposes.

2.6 Ancillary Structures — Structures such as office room, store room for keeping equipment; rooms for watch and ward purposes, built for effective control over the storage premises.

2.7 Angle of Repose (Angle of Internal Friction) — An angle formed with the horizontal plane at which the loose grain when piled will retain its position. The angle varies with commodities and variable factors such as moisture content, particle size, degree of packing, etc.

2.8 Bag Storage Structure — Structure in which AGPI are stored in bags made of cotton, polythene, jute, etc.

2.9 Bulk Storage Structure — Structure in which AGPI are stored in loose form.

2.10 Bin — A receptacle made of cement concrete or metal or other material in which AGPI are stored in loose form.

2.11 Bulk Weight — Weight of AGPI in kilograms per cubic metre.

2.12 Degasing — Process of freeing a receptacle or structure of pesticidal vapours.

2.13 Delivery — Issue of AGPI from a receptacle or structure.

*Agricultural produce and inputs.

2.14 Disinfestation — Process by which the pests of stored agricultural produce are eliminated or reduced to minimum safe level.

2.15 Drying — Process by which moisture content of AGPI is reduced to a safe level for storage.

2.16 Dunnage — Barriers like wooden crates, polythene sheets or matting provided under AGPI for preventing damage due to seepage of moisture.

2.17 Dusting — Process of application of pesticidal dusts with a dusting machine on walls, bags and floor for disinfestation or prevention of infestation.

2.18 Dust Mask — Covering for face for protection against pesticidal dust.

2.19 Flat Storage Structure — Bulk storage structure which has its height smaller than other dimensions like width or diameter.

2.20 Fumigation — Process of employment of fumigants for disinfestation.

2.21 Fumigation Covers — Covers made of plastic or rubberized cloth used for covering stacks of AGPI for fumigation.

2.22 Gas Mask — Covering for face for protection against vapours of fumigants.

2.23 Godown (Ware House) — A structure used for storage of AGPI either in bags or in bulk.

2.24 Hazardous AGPI — AGPI like pesticides and fertilizers which by their inherent nature, are either inflammable or are liable to pose a risk of contaminating foodgrains and require special care in storage.

2.25 Infestation — Presence of harmful insect pests, that is adults of *Sitophilus oryzae*, *Rhizopertha dominica*, *Bruchids*, *Sitotroga cerealella*, larvae of *cadra cautella*, *Corcyra cephalonica;* and larvae and adults of *Trogoderma granarium.*

2.25.1 *Heavy Infestation* — Degree of infestation when, number of major insect pests above 3 and/or minor pests above 9 for every 500 g of sample are present.

2.25.2 *Moderate Infestation* — Degree of infestation when major insect pests up to 3 and/or minor insect pests from 4 to 8 for every 500 g of sample are present. This degree of infestation calls for immediate control measures like fumigation to prevent heavy infestation.

2.25.3 *Negligible Infestation* — Degree of infestation when no major pests but minor pests up to 3 for every 500 g of sample are present.

2.26 Loading Point — The place from where stocks of AGPI are lifted, for being loaded in a conveyance.

2.27 Long Term Storage — Storage for such long periods required by large scale trade stockists and government agencies desiring to keep buffer stocks or to maintain food banks. Duration of such storage is more than one year.

2.28 Loss in Storage — Quantitative and qualitative loss of AGPI in storage due to damage by pests, moisture or heat.

2.29 Major Insect Pests — Principal storage pests like *Sitophilus oryzae*, *Sitotroga cerealella*, *Rhizopertha dominica*, *Trogoderma granarium*, *Cadra cautella*, and *Bruchids* which cause significant damage to a grain. However, they may vary from grain to grain that is *Tribolium castaneum* in milled products.

2.30 Minor Insect Pests — Minor storage pests like *Plodia* spp., *Tribolium castaneum*, *Laetheticus oryzae*, *Oryzaephilus surinamensis* and *Laemophloeus minutus*, which only casually take a serious form to cause significant damage.

2.31 Non-hazardous AGPI — Commodities like foodgrains, which are neither inflammable nor pose risk of contaminating other commodities.

2.32 Occupancy — Utilization of the capacity of a storage structure expressed in terms of percentage of the total effective storage capacity and reckoned as the average for 12 calendar months.

2.33 Overall — Uniform worn by the workers for disinfestation work.

2.34 Net-plinth Area — Net plinth area of a structure actually available for storage of AGPI. The area is utilized for calculation of rated capacity of the structure (*see* **2.37**).

2.35 Receipt — Receipt of agricultural produce through trucks, carts, wagons or steamer for storage.

2.36 Rural Storage — Short term storage at farmer's level normally handling up to average 15 tonnes of AGPI or approximately volume of 20 m^3.

2.36.1 *Indoors Storage* — Storage of agricultural commodities inside a house.

2.36.2 *Outdoors Storage* — Storage of agricultural commodities outside a house.

2.37 Rated Capacity — Net storage capacity of a structure in tonnes deducting alleyways and top space from the total covered plinth area. The capacity varies with height of stack and may be computed by the formula:

$$\frac{(\text{Net plinth area in sq. metres} - 20 \text{ percent})}{0{\cdot}65} \times \text{stack height in bags}$$

2.38 Safe Moisture Level — The moisture level which will not encourage development of micro-organisms and mites.

2.39 Short Term Storage — Storage of AGPI as generally practised by cultivators, for a period less than one year.

2.40 Silo — A unit consisting of several tall bins having height greater than their diameter used for storage and handling of AGPI in bulk and fitted with necessary mechanical equipment and accessories.

2.40.1 *Storage Block* — A portion of the silo used for the storage of AGPI.

2.40.2 *Head House* — A portion of the silo which houses elevator and other accessories such as weighing and cleaning machines for AGPI.

2.40.3 *Distribution Gallery* — The structure on top of bins of a silo for housing system for distribution of AGPI into bins.

2.40.4 *Marine Tower* — A structure located on the quay side for either loading or unloading of AGPI into and from ships. This may be stationary or portable.

2.40.5 *Collection Gallery* — A portion of the silo at or below ground level for housing collection equipment.

2.40.6 *Garner* — An intermediate hopper for storage of AGPI to ensure desired flow for further handling of AGPI.

2.40.7 *Truck or Wagon Dump* — A structure consisting of a series of receiving hoppers where the AGPI are dumped by trucks or wagons.

2.41 Stack — A regularly stacked pile of filled up bags or other containers.

2.42 Stack Height — Height of a stack in terms of number of bags from floor. It varies with AGPI and conditions.

2.43 Smoking — Process of disinfestation by creating smokes of pesticides.

2.44 Spraying — Process of application of pesticidal sprays for disinfestation or prevention of infestation.

2.45 Stored Grain Pests — Pests like insects, mites, rodents, birds, micro-organisms, etc, infesting stored AGPI.

2.46 Sweepings — Sweepings containing dirt, dust, refractions, etc, and also sound grain collected as a result of either sweeping and round about a storage structure or rail heads or ship boards.

2.47 Temperature Sensing Devices — Devices like thermocouples or electrical resistance thermometers used for measuring temperature of AGPI inside a structure.

2.48 Temperature Gradient — Temperature difference between different portions of stored AGPI (specially middle and periphery) or different surfaces of a structure (especially metallic) resulting in moisture condensation in cooler regions.

2.49 Transit Storage — Storage for a short term in which a commodity is practically on the move. The transit storage is mainly done at seaports or godowns of retailers.

2.50 Unloading Point — The place where AGPI are unloaded from a conveyance.

2.51 Ventilation — Process of letting off foul air from a storage structure and letting in fresh air.

2.52 Waterproofing — Process of making a structure waterproof by means of waterproof compounds or by any other means to guard against deterioration of grain due to seepage of ground or rain water inside a structure.

(*Continued from page* 2)

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SHRI J. P. MITAL (*Alternate*)	
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SHRI S. K. MAJUMDER	Central Food Technological Research Institute (CSIR), Mysore
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SHRI P. RAMDAS	Central Warehousing Corporation, New Delhi
SHRI ADUSUMILLI SUBBA RAO	Andhra Pradesh Rice Millers' Association, Vijayawada
SHRI S. S. VIRDI	National Seeds Corporation Limited, New Delhi
SHRI R. KURMANAIKULU (*Alternate*)	

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

Quantity	*Unit*	*Symbol*
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

Quantity	*Unit*	*Symbol*
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

Quantity	*Unit*	*Symbol*	*Conversion*
Force	newton	N	1 N = 1 kg.1 m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

INDIAN STANDARDS INSTITUTION

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephone : 27 01 31 (20 lines) **Telegrams : Manaksanstha**

Regional Offices:

			Telephone
Western :	Novelty Chambers, Grant Road	BOMBAY 400007	37 97 29
Eastern :	5 Chowringhee Approach	CALCUTTA 700072	23-08 02
Southern :	C.I.T. Campus, Adyar	MADRAS 600020	41 24 42

Branch Offices:

'Pushpak', Nurmohamed Shaikh Marg, Khanpur	AHMADABAD 380001	2 03 91
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Ahimsa Bldg, SCO 82-83, Sector 17C	CHANDIGARH 160017	2 83 20
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117/418 B Sarvodaya Nagar	KANPUR 208005	82 72
B.C.I. Bldg (3rd Floor), Gandhi Maidan East	PATNA 800004	5 36 55
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27