

**Warehouse Manual**  
**For**  
**Operationalizing of**  
**Warehousing (Development & Regulation) Act, 2007 (37-**  
**2007)**

**Warehousing Development and Regulatory Authority**  
**Warehousing Bhawan, 5<sup>th</sup> Floor,**  
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## **FOREWORD**

Warehousing plays a very vital role in promoting rural banking and financing. With a view for overall growth and development of warehousing sector and to promote efficiency in conduct of warehousing business, the Government of India has introduced a negotiable warehouse receipt system in the country. Parliament has enacted the Warehousing (Development and Regulation) Act, 2007 (37 of 2007). The Government of India had notified the Warehousing (Development and Regulation) Act, 2007 in the Gazette of India, Extraordinary, Part – II- Section 1 dated 20<sup>th</sup> September, 2007. The Provisions of the Act have also become effective from 25<sup>th</sup> October, 2010. As per the provisions of the Act, a Warehousing Development and Regulatory Authority (WDRA) comprising of one Chairman and two full time members has been setup by the Government of India from 26<sup>th</sup> October, 2010 for implementing the provisions of the Act. The negotiable warehouse receipt system has been formally launched by Prof. K. V. Thomas, Hon'ble Minister (Independent Charge), Consumer Affairs, Food and Public Distribution on 26.04.2011.

The main objectives of the Warehousing (Development and Regulation) Act, 2007 are to make provisions for the development and regulation of warehouses, to promote professional organisations connected with the warehousing business, negotiability of warehouse receipts, establishment of a Warehousing Development and Regulatory Authority (WDRA) and related matters. The Negotiable Warehouse Receipts (NWRs) issued by the warehouses registered under this Act would help farmers to seek loans from banks against NWR to avoid distress sale of their agricultural produce. It will also be beneficial for a number of other stakeholders such as banks, financial institutions, insurance companies, trade, commodities exchanges as well as the consumers.

For the operationalization of the provisions of the Warehousing (Development and Regulation) Act, 2007, Warehousing Rules and Regulations, a Warehouse Manual has been prepared by the Warehousing Development and Regulatory Authority (WDRA). The manual defines the various terms and definitions used in the Warehousing (Development and Regulation) Act, 2007, the Rules and Regulations framed there under, detailed information about procedure of registration of accreditation agencies, accreditation of warehouses, registration of warehouses,

training programme for the officials of accreditation agencies and warehousemen, course content for the training of warehousemen, warehouse management system, specifications of warehouses, equipment required for warehouses, physical analysis laboratory, insect/pest management, inspection of warehouses by inspection agency and other operations carried out in the warehouses.

I hope that the Warehouse Manual would be useful for the warehousemen, officials of the accreditation agencies and all other stakeholders.

(Dinesh Rai)  
Chairman, WDRA

Dated: 29.11.2011  
New Delhi

## CHAPTER I

### Terms & Definitions used in the Warehouse Manual:

1. In this manual, unless the context otherwise required: –
  - (i) “Act” means the Warehousing (Development and Regulation) Act, 2007 (37 of 2007).
  - (ii) “Authority” means the Warehousing Development and Regulatory Authority established under sub-section (1) of section 24 of the Act.
  - (iii) “Accreditation agency” means an agency, whatever be its constitution, registered with the Authority under section 5 of the Act for accreditation of warehouses.
  - (iv) “Appeal” means an appeal made to the Appellate Authority under sub-sections (1 and 2) of section 42 of the Act;
  - (v) “Applicant” means the person submitting an application for grant of a certificate of registration to an accreditation agency, or for registration of warehouses to the Authority as the case may be, under the Act, rules and regulations thereunder.
  - (vi) “Approved laboratories” laboratories/ test houses approved to carryout quality testing of agricultural and non-agricultural commodities/goods.
  - (vii) “Calibration laboratories” means laboratories/agencies calibrating the various equipment used in the warehouses and laboratories.
  - (viii) “Inspection” means the process of inspection undertaken by an accreditation agency for accreditation of warehouses or by some other inspection agency approved by the WDRA for ensuring the compliance of various guideline/procedures prescribed by the Authority for safe and scientific storage of agricultural and non-agricultural commodities. Inspection will also include any inspection conducted by an accreditation agency or an inspection agency pursuant to directions from the Authority.
  - (ix) “Inspection report” means the report made by the accreditation agency or inspection agency recording their findings about the warehouse during the course of inspection.
  - (x) “Certificate of Accreditation” means the certificate of accreditation in the form specified in Schedule-A of the Warehousing Development and Regulatory Authority (Warehouse Accreditation) Regulations 2011, that will be issued by an accreditation agency in relation to a warehouse in accordance with the Act, the rules and the regulations.
  - (xi) “Controlled documents” means documents under authorization, distribution and amendment control to ensure that current copies of documentation are available with the warehouse.

- (xii) "Depositor" means a person who delivers the goods to the warehouseman for storage;
- (xiii) "Endorsee" means the person to whom the negotiable warehouse receipt is negotiated/endorsed ;
- (xiv) "Endorsement" means signing on the back of the negotiable warehouse receipt by the depositor or holder of the negotiable warehouse receipt for the purpose of its negotiation;
- (xv) "Electronic form", with reference to information, means any information generated, sent, received or stored in media, magnetic, optical, computer memory, microfilm, computer generated micro fiche or similar device;
- (xvi) "Examiner" means the person appointed by the accreditation agency to conduct inspection of the warehouse under the Act, the rules and the regulations.
- (xvii) "Electronic Warehouse Receipt" means a warehouse receipt in an electronic form.
- (xviii) "Fungible goods" means any goods of which any unit is, by nature or usage of trade, the equivalent of any other like unit and are received by a warehouseman as fungible goods;
- (xix) "Goods" means all tangible movable goods (other than actionable claims, money and securities), whether fungible or not;
- (xx) "Grade" means the quality standard of any goods as notified as grade designation by the Central Government under the Agricultural Produce (Grading and Marking) Act, 1937 or any other law for the time being in force;
- (xxi) "Holder" means,-
  - (i) In relation to a negotiable warehouse receipt, a person who is in possession of such receipt and has a right to goods endorsed on it; and
  - (ii) In relation to a non-negotiable warehouse receipt, a person named in it as the person to whom the goods are to be delivered or the assignee of that person;
- (xxii) "Issuer" means the person issuing a warehouse receipt in paper or in electronic form.
- (xxiii) "Legal practitioner" shall have the same meaning as is assigned to it in the Advocate Act, 1961 (25 of 1961);
- (xxiv) "Negotiable Warehouse Receipt (NWR)" means a warehouse receipt under which the goods represented therein are deliverable to the depositor or order, the endorsement of which has the effect of transfer of goods represented thereby and the endorsee for which takes a good title;

- (xxv) "Non-Negotiable Warehouse Receipt (NNWR)" means a warehouse receipt other than a negotiable warehouse receipt;
- (xxvi) "Participant" means a warehouseman whose one or more warehouses are empanelled by a Spot Exchange for issuing and trading in electronic warehouse receipts through the relevant Spot Exchange;
- (xxvii) "Person" includes a firm, co-operative society or any association or body of persons, whether incorporated or not;
- (xxviii) "Prescribed" means prescribed by the rules and the regulations made thereunder.
- (xxix) "Registration" means registration granted under the Act, the rules and the regulations;
- (xxx) "Registered depositor" an individual / organization registered with the warehouse for keeping their goods;
- (xxxi) "Regulation" means a regulation made under the Act;
- (xxxii) "Rules" means the rules made under the Act;
- (xxxiii) "Sponsor" means any person or persons who, acting alone or in combination with another person submit an application for registration of a spot exchange and undertakes to perform the obligations of a sponsor;
- (xxxiv) "Spot Exchanges" means a company formed and registered under the Companies Act, 1956 and which undertakes the business of a spot exchange in any commodity irrespective of whether it may or may not have been granted a certificate of commencement of business by the Authority;
- (xxxv) "Warehouse" means any premises (including any protected place) conforming to all the requirements including manpower specified by the Authority by regulations wherein the warehouseman takes custody of the goods deposited by the depositor and includes a place of storage of goods under controlled conditions of temperature and humidity;
- (xxxvi) "Warehousing business" means the business of maintaining warehouses in storage of goods and issuing negotiable warehouse receipts;
- (xxxvii) "Warehouse receipt" means an acknowledgement in writing or in electronic form issued by a warehouseman or his duly authorised representative (including depository by whatever name called) of the receipt for storage of goods not owned by the warehouseman;
- (xxxviii) "Warehouse Manual" means the manual which contains the detailed procedure of accreditation of warehouses, registration of warehouses, insect pest management procedures, inspection procedure and other operations being carried out in the warehouses.

2. All other words and expressions used in this manual, but not defined, and defined in the Act, the rules and the regulations shall have the same meaning respectively assigned to them in the Act, the rules and the regulations, as the case may be.



## CHAPTER II

### PROCEDURE FOR REGISTRATION OF ACCREDITATION AGENCY

1. **Registration of accreditation agency:** The Authority may register such entities for the purpose of acting as an accreditation agency under the Act, the rules and the regulations that have sufficient experience in the field of research, development, training, inspection or accreditation of warehouses.
2. **Qualifications and other requirements for functioning as an accreditation agency:** Every person desirous of functioning as an accreditation agency should be:
  - (i) A body corporate either public or private and incorporated under the companies Act, 1956 or any other law in force.
  - (ii) Government body or Government affiliated body;
  - (iii) Such persons should possess necessary infrastructure including adequate office space, equipment, trained and experienced staff as well as expertise in the field of warehousing.
  - (iv) The body / organisation should have financial capability and credibility to the satisfaction of the Authority.
  - (v) The body / organisation should not be directly engaged in the business of warehousing.
3. **Application for seeking registration of accreditation agency:**
  - (i) Any person possessing qualifications and other requirements as specified in Para 2 above and desires of taking up the job of an accreditation agency may apply to the Authority in prescribed Form- A in duplicate.
  - (ii) Every application shall be accompanied by: -
    - (a) Proof of identity as legal entity including certificate of incorporation, Memorandum of Association and Article of Association.
    - (b) List of key management personnel and technical experts, their qualifications, experience in different fields related to warehousing, scientific storage, preservation, finance, engineering etc. engaged/to be engaged by the accreditation agency for accreditation purpose;
    - (c) Statement of financial credibility inform of audited reports or budget statements with supporting documents;
    - (d) Declaration that the applicant shall not accredit any warehouse in which it may have a direct conflict of interest;
    - (e) Declaration that the accreditation agency complies with the detailed requirements and norms on the basis of which an accreditation certificate is to be issued to the warehouses.
4. **Fee** -Every application for registration of accreditation agency or renewal thereof shall be accompanied with a non-refundable fee of Rs.25, 000/- (Rupees twenty five thousand only) by bank draft/banker's cheque of any nationalized bank in favour of Drawing and Disbursing Officer (DDO), of the Warehousing Development and Regulatory Authority (WDRA) payable at New Delhi.

5. **Security Deposit.** - Every accreditation agency shall, at the time of registration, furnish to the Authority a security deposit of Rs.1, 00,000/- (Rupees. One lakh only) (refundable) by bank draft/banker's cheque of any nationalized bank in favour of Drawing and Disbursing Officer, of the Warehousing Development and Regulatory Authority payable at New Delhi.
6. The Government controlled institutions or bodies are exempted from payment of the registration fee and security deposit by the Authority.
7. **Power to make enquiry and call for information at the time of registration or renewal.**- (1) Before granting registration to an accreditation agency under the Act, the rules and the regulations made thereunder, the Authority may make such inquiry and require such further information, as it deems necessary, other than the information furnished by the accreditation agency in its application in Form –A.
- (2) Authority may call for any information at any time and the same is to be furnished to the Authority by the applicant within the time stipulated by the Authority.
8. **Certificate of Registration:** - (i). The Authority after scrutiny of the application and being satisfied that the applicant is eligible, shall grant the certificate of registration in Form –B to the applicant within a period of one month from the date of receipt of application.
- (ii) The registration shall be for a period of three years and the same may be specified in the registration certificate;
- (iii) The Authority may suspend or cancel the registration at any time if the work of accreditation agency is not found satisfactory. An opportunity of being heard shall be given to accreditation agency before cancellation of its registration;
- (iv) The accreditation agency shall comply with such conditions as are or may be specified or imposed by the Authority under the provisions of the Act and the rules and the regulations made thereunder from time to time.
9. **Refusal of Registration.** – The Authority may, for sufficient reasons to be recorded in writing, refuse to grant the registration to any applicant and shall furnish him with a copy of the order so passed. Before rejecting any such application, the applicant shall be given a personal hearing by the Authority.
10. **Renewal of Registration.** – (1)The Authority may, on an application (in Form – A) for renewal made to it in duplicate, shall renew the registration of the accreditation agency.
11. **Issue of Duplicate Registration Certificate.** - (1) The duplicate registration certificate shall be issued on receipt of request in Form–D against the original certificate, if it is lost or damaged or mutilated.
- (2) A registration certificate, which is torn or defaced shall be surrendered by the accreditation agency to the Authority on issue of the duplicate certificate.
- (3) The application for issue of a duplicate registration certificate shall be accompanied with the fee of Rs.5000/- by bank draft/banker's cheque of any

nationalized bank in favour of Drawing and Disbursing Officer of the Warehousing Development and Regulatory Authority payable in New Delhi

**12. Publication of grant, suspension and revocation of registrations and list of accreditation agencies and their warehouses: –**

- (1) The names and addresses of registered accreditation agencies under the Act shall be notified from time to time and would also be provided on the website of the Authority.
- (2) Subsequent suspension or revocation of the registration shall also be notified and the information thereof, would also be provided separately on the website of the Authority.

**13. Procedure for Suspension, Cancellation or Revocation of Registration.**

- (1) Every registration that has been granted under section 5 of the Act, shall be liable to be suspended or cancelled or revoked by the Authority after due diligence as per the procedure laid down in the Warehousing Development and Regulatory Authority (Registration of Accreditation Agency) Regulations, 2011, for reasons recorded in writing and in particular for the following cases:
  - (i) The accreditation agency has made an application to be declared an insolvent;
  - (ii) The accreditation agency has failed to carry out any order issued by the Authority;
  - (iii) The accreditation agency has committed a fraudulent act;
  - (iv) The accreditation agency has in any other manner become incompetent to conduct accreditation of warehouses as required under the Act, the rules and the regulations.
  - (v) The accreditation agency has failed to comply with any of the conditions of registration or any provision of the Act or the rules and the regulations made thereunder.
- (2) The Authority may modify, from time to time, suitable regulations governing the suspension, cancellation and revocation of registration of a warehouse.

**14. Voluntary Surrender of Certificate of Registration**

No accreditation agency shall be allowed to voluntarily surrender its certificate of registration till the pendency of his request for such cancellation with the Authority.

**15. Return of Certification of Registration.**

When the certification of registration expires or is suspended or cancelled or revoked, the accreditation agency shall cease to operate and function as an accreditation agency under the Act, the rules and the regulations and shall return the registration certificate forthwith and not later than seven days of such suspension, cancellation or revocation. This shall not prevent the accreditation agency from being bound to satisfy its obligations to the Authority in relation to any accreditation activity pending inter alia, furnishing of reports, submission of documents etc.

**16. No Compensation for Suspension, Cancellation or Revocation of Registration.**

Where registration of any accreditation agency is suspended, cancelled or revoked under the provisions of the Warehousing Development and Regulatory Authority (Registration of Accreditation Agency) Regulations, 2011, the Authority shall not be liable for any compensation, or refund of fee paid by the accreditation agency.

**17. Appeals**

Any person aggrieved by an order of the Authority made under this Act, the rules or the regulations made thereunder may prefer an appeal to the Appellate Authority within sixty days from the date of such order. An appeal may also be admitted after the expiry of the said period of sixty days but not beyond a total period of ninety days if the appellant satisfies the Appellate Authority that he had sufficient cause for not preferring the appeal within the said period.

**APPLICATION FOR GRANT OF REGISTRATION/RENEWAL OF REGISTRATION  
OF AN ACCREDITATION AGENCY**

To,

The Warehousing Development and Regulatory Authority,  
Warehousing Bhawan,  
5<sup>th</sup> Floor, 4/1 Siri Institutional Area,  
August KrantiMarg,  
New Delhi-110016.

Photo of the  
applicant

Dear Sir,

I/We .....having our main/registered office in India  
at ..... District ..... State ..... with branch offices at  
..... Telephone No.....E-mail  
..... request for grant of registration/renewal of registration for  
functioning as an Accreditation Agency from.....to.....

1. Status of the agency (Individual/firm/company/Govt. organization/others. Please specify.....)

2. No. of offices/ branches in India .....

3. Average turnover during the last three financial years.....

4. Networth as on the last day of last financial year .....

5. Detailed information in separate sheet indicating

(i) Organizational structure, details of experts with credentials, and nature of activities carried out

ii) Other details as may be required by Authority from time to time

6. A non-refundable registration fee submitted in the form of bank draft / banker's cheque of .....(nationalized bank/ branch address)  
No.....dated..... in favour of Drawing and Disbursing Officer (DDO), of the Warehousing Development and Regulatory Authority (WDRA) payable at New Delhi for Rupees twenty five thousand only.

7. Security deposit submitted in the form of bank draft / banker's cheque of ..... (nationalized bank/ branch address)  
No.....dated..... in favour of Drawing and Disbursing Officer (DDO), of the Warehousing Development and Regulatory Authority (WDRA) for Rupees one lakh only payable at New Delhi.

8. Existing or previous Registration Number.....dated.....valid from  
..... to.....

## **Declaration**

1. I/We declare to be authorized representatives of organization to apply for registration of accreditation agency,
2. I/We do not have any direct conflict of interest with warehouses to be accredited,
3. I/We are providing all the details required under Rule 8 of the Warehousing (Development and Regulation) Registration of Accreditation Agencies Rules, 2010 in the report appended to this application,
4. I/We agree to abide by the terms and conditions of the Registration,
5. I/We hereby solemnly declare that all information herein given is true to the best of my/our knowledge and that in case it proves to be untrue, we undertake to indemnify person or persons concerned in this business against any loss arising out of such false or untrue information.

Signature .....

Name in full .....

Address.....

## **Documents to be enclosed along with the Application:**

1. Proof of identity as a legal entity including certificate of incorporation and Memorandum of Association and Articles of Association;
2. List of names of owners, shareholders, proprietor and authorized signatory of applicant;
3. List of key management personnel and technical experts engaged by the applicant and their qualifications and experience in various fields relating to warehousing;
4. Statement of financial credibility in the form of audited reports or budget statement with supporting documents;
5. Declaration that the applicant shall not accredit any warehouse in which it may have a direct conflict of interest;
6. Declaration that the applicant shall comply with the terms and conditions of certificate of registration; and
7. A non-refundable registration fee of Rupees twenty-five thousand through bank draft/banker's cheque of any nationalized bank in favour of Drawing and Disbursing Officer, Warehousing Development and Regulatory Authority payable at New Delhi; and
8. A security deposit of Rupees one lakh through bank draft/banker's cheque of any nationalized bank in favour of Drawing and Disbursing Officer, Warehousing Development and Regulatory Authority payable at New Delhi.

## FORM D

### APPLICATION FOR ISSUE OF DUPLICATE REGISTRATION CERTIFICATE

To

The Warehousing Development and Regulatory Authority,  
Warehousing Bhawan,  
5<sup>th</sup> Floor, 4/1 Siri Institutional Area,  
August KrantiMarg,  
New Delhi-110016.

Photo of  
the applicant/au  
thorized officer  
who signs the  
application  
form.

Dear Sir,

I/We .....residing at ..... District  
.....State ..... request that my/our original  
registration No. .... granted on ..... for the period  
from.....to..... has been stolen/ lost/destroyed/mutilated in the  
following circumstances :

(a)

(b)

(Enclose a copy of FIR and indemnity bond in case of stolen/lost/destroyed  
certificate and original certificate if it is mutilated)

2. I/We therefore, request you to grant me/us a duplicate registration on the same  
terms and conditions on which the aforesaid registration was granted.
3. I/We have enclosed fee of Rs. 5000/- (Rupees five thousand only) by bank draft /  
banker's cheque of ..... (nationalized bank/  
branch address) No. ....dated..... in favour of Drawing and Disbursing  
Officer (DDO), of the Warehousing Development and Regulatory Authority (WDRA)  
payable at New Delhi for issuance of duplicate certificate of registration.
4. I/We hereby solemnly declare that the information herein given is true to the best  
of my/our knowledge.

Date .....

Signature of Applicant(s)

Witness1. ....

Witness 2 .....

### **CHAPTER III**

#### **ACCREDITATION OF WAREHOUSES**

#### **1. PROCEDURE FOR GRANT OF CERTIFICATE OF ACCREDITATION BY THE ACCREDITATION AGENCY**

- (1) No warehouse shall be granted registration under the Act unless it has obtained a certificate of accreditation from an accreditation agency approved by the Authority, in addition to fulfilling other eligibility criteria under section 3 of the Act, the rules and the regulations made thereunder.
- (2) An applicant (warehouse) seeking grant of certificate of accreditation shall apply in prescribed application form (Annexure-I) alongwith the prescribed accreditation fee to an approved accreditation agency by the WDRA.
- (3) The applicant shall provide to the accreditation agency the following information:
  - (i) To ascertain adequate positive networth of the warehouse, a certificate from a Chartered Accountant or creditworthiness from a scheduled bank of the individual warehouse or its organisation will suffice;
  - (ii) Proof of ownership or registered lease deed/rent receipt vesting the right with the warehouseman to use the relevant warehouse for the purposes of operating a warehouse;
  - (iii) No Objection Certificate/Warehouse License from the Municipal Corporation or local body/or other authority for carrying out the business of warehousing within the premises of the relevant warehouse;
  - (iv) The list of the agricultural and non-agricultural commodities/goods for which the accreditation is being sought;
  - (v) List of the trained graders, weighers and samplers used in the warehouse;
  - (vi) Statement including all documents, records and information about the storage worthiness of the warehouse for the specified goods including the insect/pest management, handling, sampling, grading, security, fire fighting systems etc;
  - (vii) List of equipment which are necessary for the scientific storage of goods stored / to be stored in the warehouse;
  - (viii) Insurance policies of the warehouse for fire/floods/theft/burglary/riots;
  - (ix) Insurance policies for the goods stored;
  - (x) Audited statement, if any in relation to warehouse;
  - (xi) List of personnel together with their qualifications and experience who are in-charge of managing the concerned warehouse;
  - (xii) Statement on methodology adopted for valuation of goods which may be as per APMC, Spot / Future Exchanges and News Papers;



- (xiii) Statement to support tie-ups, if any, with grading and testing laboratories;
  - (xiv) Any other document and information that is required under the Act, the rules and the regulations made thereunder or is notified by the Authority or as specified in the Warehouse Manual;
2. A certificate of accreditation shall be granted by an accreditation agency only when a warehouse complies with the:
- (i) The construction standards of warehouse(s) as per BIS standards/CWC/FCI specifications;
  - (ii) Adequately positive networth with documentary evidence;
  - (iii) Storage and handling requirements as specified in the Warehouse Manual;
  - (iv) The availability of trained manpower ;
  - (v) Insurance policies of the warehouse and the goods stored in the warehouses ;
  - (vi) Proper maintenance of records in the warehouses and timely reporting thereof, and

Any other requirement for conduct of the warehousing business under the Act, the rules and the regulations;

3. An accreditation agency shall make and provide the applicant a certificate of accreditation if found suitable/fit. In the event, the accreditation agency does not find it suitable for grant of an accreditation certificate for the warehouse, it shall clearly state the reasons for the same in its inspection report.

**4. INSPECTION BY ACCREDITATION AGENCY FOR THE GRANT OF CERTIFICATE OF ACCREDITATION.**

**(1) Accreditation standards for warehouses and training for the officials of the accreditation agencies.**

- (i) All accreditation agencies shall be bound to follow the warehouse specific accreditation standards and warehouse specific accreditation procedures as may be prescribed by the Authority. A check list of minimum basic requirement for warehouses to be checked and filled by the examiners of the accreditation agency is given in Annexure-II.
- (ii) Authority, if required may arrange training for the officials of the approved accreditation agencies for apprising them about the procedure and methodology adopted for accreditation of warehouses.

**(2) Inspection of Warehouses by Accreditation Agency.**

- (i) Before the grant of certificate of accreditation, an accreditation agency shall appoint one or more persons as examiners to undertake an inspection of the warehouse to ensure that all the conditions prescribed under para (4) above of the manual and mentioned in the Warehousing Regulatory Authority (Warehouse Accreditation) Regulations, 2011 are fulfilled;

- (ii) The fee for accreditation of a warehouse shall be borne by the relevant warehouseman.

**(3) Procedure for Inspection**

- (i) The accreditation agency shall give one week notice before conducting initial inspection of the warehouse.
- (ii) In case the accreditation agency is satisfied that in the interest of the depositors, or in public interest, no such notice should be given, it may conduct an inspection of the warehouse without such notice.
- (iii) In case some of the conditions are not fulfilled, the accreditation agency shall give a notice to the warehouseman to rectify the same within a period of thirty days from the date of receipt of such notice to the warehouseman.
- (iv) On the expiry of the period provided in sub-Para 3 above, there shall be another inspection conducted by the examiner on the direction of the accreditation agency to verify the compliance of the conditions as identified in sub Para (3) above.
- (v) On the complete satisfaction of all the conditions prescribed under the Act, the rules and the regulations and any other condition notified by the Authority, the accreditation agency shall grant a certificate of accreditation in the form and manner as prescribed in Schedule - A of the manual valid for three years, to the warehouseman for the goods, specified in such certificate.

- (4) Time frame:** The entire process of accreditation of warehouse may be completed by the accreditation agency within 30 days from the receipt of application of the warehouse.

- (5) Inspection of Warehouse after Accreditation**(i) Each accreditation agency may appoint one or more persons as examiners to undertake an inspection of the condition of the registered warehouse, books of accounts, other records and documents of the warehouseman once every year after the grant of accreditation certificate.

- (ii) The purpose of inspection referred to in sub para (i) above shall be:
  - (a) To ensure that the records and documents are being maintained in the manner required under the Act, the rules and the regulations made thereunder;
  - (b) That the provisions of the Act, the rules and the regulations are being complied with; and
  - (c) The fee for such inspection as prescribed by the Authority will be borne by the concerned warehousemen.

**(6) Duties of Warehouseman towards the Accreditation Agency.**

- (i) It shall be the duty of the warehouseman and his employees/staff to produce to the accreditation agency (or any examiners appointed by it) such books, accounts, records, reports and other documents in his custody, control or possession and furnish the statements and information relating to a warehouse within such time as the examiner may require.
- (ii) The warehouseman shall allow accreditation agency (or any examiners appointed by it) to have access, at least during the day, to the premises occupied by such warehouseman or by any other person, on his behalf and also extend reasonable facility for examining any books, records, report, documents in the custody, control or possession of the warehouseman or any such other person on his behalf and also provide copies of documents or other material which in the opinion of the accreditation agency (or any examiners appointed by it) are relevant for the purposes of the inspection.
- (iii) It shall be the duty of every warehouseman and his employees to give to the accreditation agency, its personnel or any examiners appointed by it, all assistance in connection with the inspection which the warehouseman may reasonably be expected to give.

**(7) Submission of Monthly Report by the Accreditation Agency to the Authority**

The accreditation agency shall submit a monthly report about details of warehouses accredited and inspections made by it to the Authority.

**Annexure-II****Check list to be filled up by the examiners of the accreditation agency****Name and complete postal address of warehouse:**\_\_\_\_\_

<b>Sl.No.</b>	<b>Parameters</b>	<b>Comments/Findings of Examiners</b>
1.	<b>Structural Requirements:</b> (i) Whether the warehouse(s) are constructed as per BIS/ CWC/ FCI Standards? if so give details. (ii) No. of sheds/godowns, for which registration is required. (iii) Size (Length x Breadth) of the shed (s) (in Meters) of such sheds and compartments for which registration is required. (iv) Total capacity of warehouse (in metric tonnes) for which registration is required. (v) Name of commodities stored/ to be stored in the warehouse(s). (vi) Observations about storage worthiness of the warehouse(s) with details. (vii) Observations about cleanliness and hygienic condition of warehouse. (viii) Whether owned warehouse/godown or hired? (ix) Proof of ownership or registered lease deed or rent agreement/receipt of the warehouse(s). (x) Whether 'No Objection Certificate (NOC)/Warehouse License' has been obtained from the local body/other authority for operating a warehouse? (If so, enclose a photocopy of the same). (xi) Connectivity of the warehouse with State/National Highways and nearest railhead. (Give distance in Kilometre from nearest railhead).	
2.	<b>Commodities:</b> (List of Commodities for which warehouse(s) is to accredited)	
3.	<b>Steps taken for scientific storage and preservation of stored commodities/goods:</b> (i) Whether proper stack plan has been prepared? (Give stack size and total number of stacks in the shed). (ii) Whether code of storage practices for scientific storage of goods and other items stored in the warehouse are followed: (iii) Give frequency of: (a) Inspection. (b) Prophylactic treatment (spraying of insecticide). (c) Curative treatment (fumigation). (d) Rodent control measures. (iv) Whether stacking is proper and space for inspection, chemical treatment and warehousing operation (alleyways and hallways) is available.	

	(v) Whether stack cards with proper entries about date of receipt/issue, quality/grade, quantity of stored goods and chemical treatments are available?	
4.	<b>Net worth of the warehouse</b> (To ascertain adequate positive net worth of the warehouse, a certificate from a Chartered Accountant (CA) or creditworthiness from a scheduled bank of the individual warehouse or its organisation will suffice).	
5.	<b>Security Arrangements:</b> (i) Whether the warehouse has well- protected pucca boundary walls/barbed wire fencing etc. (ii) No. of gates with locking arrangements. (iii) No. of entry points. (iv) No. of exit points (v) Whether the entry and exit points are manned by trained security guards? (vi) Name of the nearest Police Station or Check Post and distance from the warehouse. (vii) Whether there is proper security cabin or not? (viii) Whether there are proper night lighting for the security purpose? (ix) Whether Gate-Pass is issued for the goods passing out from the warehouse? (x) Whether entries for all incoming and outgoing vehicles are properly maintained in a Register or Computer?	
6.	<b>Fire-fighting arrangements:</b> (i) Whether fire-fighting arrangements are there in the warehouse? (ii) If so, details of arrangements including number and type of fire extinguishers, sand buckets, etc. to be given. (iii) Name of the nearest Fire Brigade Station and distance. (iv) Whether telephone numbers of nearest Fire Station are displayed at different prominent places in the warehouse or not?	
7.	<b>Details of warehouseman:</b> (i) Name of the warehouseman alongwith the education. (ii) Whether the warehouseman have been trained in in some institutions, viz. Indian Grain Storage Management and Research Institute (IGMRI), CWC, NIAM, FCI or any other institutions? Type and duration of training obtained. (Give photocopies of training certificates).	
8.	<b>Details of other technical and godown staff engaged in storage and preservation of commodities/goods:</b> (i) Name and Number of technical assistants/ officers /godown staff responsible for storage and preservation of the commodities in the warehouse(s). (ii) Their qualifications and experience in preservation of stored goods.	

	(iii) Whether they have been trained in some institutions, like IGMRI, CFTRI, FCI CWC, SWCs or other recognized Institutions? Give details	
9.	<b>Equipment, items and chemicals for preservation of stored goods:</b> (i) Whether all the equipment's, such as, sprayers/foggers, gas mask, canisters, gloves, gum boots, goggles, aprons, etc. are available? Give list of each item in Annexure. (ii) Whether adequate number of fumigation covers, nylon nets, plastic ropes and sands snakes are available for fumigation of foodgrains and other items? (iii) Whether sufficient quantity of pesticides (insecticides for prophylactic treatment, fumigants for fumigation and rodenticides for rodent control) are available in the warehouse? (Give details from respective pesticide stock register). (iv) Whether adequate number of dunnage material, such as, wooden crates, poly pallets, polythene sheets, patera mats, etc. are available in the warehouse? (Give details). (v) A list of minimum equipment required for preservation of foodgrains and setting up a physical analysis laboratory in a warehouse is given in Annexure - .	
10.	<b>Arrangements for weighment of goods:</b> (i) Whether the warehouse has its own weigh-bridge? (ii) If so, the details with capacity and date of last calibration. (iii) No. of beam balances, platform balances with their details. (iv) Whether the weights/platform balance used in the warehouse are timely calibrated and duly stamped by concerned weights & measures Department.	
11.	<b>Office facilities:</b> (i) Total number of staff in the warehouse including warehousemen, technical and non-technical staff. (ii) Whether sufficient office equipment, viz. telephone, computers, photocopiers, fax and furniture (table, chairs, almirah, etc.) are available in the office(s) of the warehouse? Enclose a separate sheet.	
12.	<b>Laboratory facilities:</b> (i) Whether testing facilities of goods to be stored in the warehouse, in form of a small laboratory, are available? (ii) If so, give details of the equipment's, such as, samplers, moisture meter, physical analysis kits, weighing balances, hectolitre weight apparatus, sieve sets, magnifying glass, measuring cylinder, vernier calliper, sample bags, enamel plates etc. (Give list of these equipment's).	

	(iii) List of laboratories for chemical analysis of the samples (wherever necessary) with whom the warehouse has tied up.	
13.	<b>Insurance &amp; Banking:</b> (i) Whether the warehouse as well as the goods stored in the warehouse(s) are insured? (ii) If so, the name of the insurance company and risks covered. (iii) List of banks operating within approachable distance from the warehouse. (iv) Any tie up of the warehouse with any of these banks.	
14.	(i) Financing tie up, if any. (ii) Marketing tie up.	

## **CHAPTER IV**

### **SUSPENSION OR CANCELLATION OF CERTIFICATE OF ACCREDITATION**

#### **1. Process of Suspension or Cancellation of a Certificate of Accreditation**

- (1) In the event the accreditation agency upon undertaking a periodic inspection determines that the warehouse or the warehouseman is defaulting in complying with requirements for grant of a certificate of accreditation or is not complying with any of the provisions of the Act, the rules and regulations made there under, it shall record the same in its periodic inspection report and may determine that the nature of defaults by the warehouseman or warehouse, as the case may be, the certificate of accreditation that it had earlier granted in respect of the relevant warehouse is suspended or cancelled.

The same shall be communicated to the relevant warehouseman in writing together with the copy of the periodic inspection report as soon as possible but not later than three working days from the date of such decision.

- (2) The accreditation agency shall submit a copy of its inspection report as well as its decision to suspend or cancel the certificate of accreditation in respect of a warehouse to the Authority, as soon as possible but not later than three working days from the date of such decision.
- (3) In the event the Authority suspends or cancels the registration of a warehouse in accordance with the procedure specified in the Act read with the rules and regulations made thereunder; the certificate of accreditation issued by an accreditation agency in respect of such warehouse shall stand automatically suspended or cancelled, as the case may be, with effect from the date of such order of the Authority.
- (4) In the event the Authority withdraws its order of suspension of registration of a warehouse in accordance with the Warehousing (Development and Regulation) Registration of Warehouses Rules, 2010, the certificate of accreditation issued by an accreditation agency in respect of such warehouse for revoking the suspension of registration will stand reinstated, unless the Authority specifically directs that a new certificate of accreditation be issued by an accreditation agency in respect of such warehouse.

#### **2. Effect of the Suspension or Cancellation of a Certificate of Accreditation.**

Once the certificate of accreditation is suspended or cancelled, the Authority will determine either to: (i) suspend or cancel the registration of the relevant warehouse; and or (ii) order another accreditation agency to undertake an inspection of the warehouse and based on the findings of inspection report determine whether to suspend or cancel the registration of the relevant warehouse under the Act.

*Provided that* this shall not prevent the warehouseman from being bound to satisfy its obligations to holders of negotiable warehouse receipts that had been issued in relation to such warehouse.



### **3. Renewal of Certificate of Accreditation and Payment of Fees**

#### **(1) Process of Renewal of Certificate of Accreditation.**

A warehouseman shall require a fresh certificate of accreditation, in accordance with the procedure specified above in these regulations, once the initial period of three years of the certificate of accreditation has expired.

#### **(2) Payment of Fees.**

Every warehouseman eligible for grant or renewal of a certificate of accreditation shall pay fees to the accreditation agency in such manner and within the period as specified by the Authority. The fee structure is as follows: -

##### **(A) Warehouse with capacity up to 10,000MT:**

1. Atleast 2 visits in 1<sup>st</sup> year Rs. 15,000/-
2. Follow up visit in 2<sup>nd</sup> year Rs. 7,500/-
3. Follow up visit in 3<sup>rd</sup> year Rs. 7,500/-

##### **(B) Warehouse with capacity over 10,000 MT:**

1. Atleast 2 visits in 1<sup>st</sup> year Rs. 21,000/-
2. Follow up visit in 2<sup>nd</sup> year Rs.10,500/-
3. Follow up visit in 3<sup>rd</sup> year Rs. 10,500/-

The accreditation fee to be charged by the accrediting agencies is subject to revision by the Authority.

### **4. Duties of Accreditation Agency**

Each accreditation agency shall ensure that:

- (i) The examiners are competent to undertake inspection / accreditation of warehouses.
- (ii) The examiners have conducted the inspection in a fair and transparent manner;
- (iii) Records of inspection undertaken for warehouses are maintained properly.
- (iv) There is no conflict of interest whatsoever in the grant of certificate of accreditation or any inspection conducted under these regulations;
- (v) No examiner shall conduct the inspection of the same warehouse consecutively; and.
- (vi) Comply with the reporting requirements to the Authority under the Act, the rules and the regulations made thereunder.

### **5. Dispute resolution and power of the authority for inspection of warehouses**

**Dispute:** Any person aggrieved by a decision in relation to the (i) refusal of grant of certificate of accreditation by the accreditation agency; or (ii) suspension or cancellation of the certificate of accreditation by the accreditation agency may file a representation with the Authority for resolution of the dispute in accordance with the Warehousing Development and Regulatory Authority (Disputes) Regulations, 2011.

## **6. Appeal**

Any person aggrieved by a decision of an Authority under para 17 above may submit an appeal to the Appellate Authority in accordance with the Warehousing (Development and Regulation) Appellate Authority Procedure Rules, 2010. Notwithstanding anything contained in provisions above, the Authority has an overriding power to conduct any number of inspections of the warehouses and any matter connected with the warehousing business.

**ANNEXURE - I**

**Application for grant of Accreditation Certificate from an Accreditation  
Agency under the Warehousing (Development and Regulation) Act, 2007  
(37 of 2007).**

To,  
(Name of the Accreditation Agency)

.....

.....

Dear Sir /Madam,

Photo of the  
authorized officer  
of the applicant,  
who signs the  
application form

I/We.....(name) working in.....(Name of the organization) as.....(Designation) having registered office at .....Telephone No./Mobile No.....and E-mail..... request for grant of Accreditation Certificate for a period of three years in respect of our Warehouse mentioned below for carrying on the business of warehousing of following goods :-

i. ....

ii. ....

iii. ....

(Enclose list of goods to this application)

**1. Detailed description of warehouse(s) for which accreditation is applied.**

Name of warehouse..... Location of warehouse .....  
.....Village / .....  
.....Taluka.....District.....State.....  
.....Telephone No/Mobile No..... E-mail .....

**2. Details of technical staff including Warehouseman**

S.No.	Name	Designation	Educational qualifications	Details of experience	Details of training

3.Storage capacity in MTs for which accreditation is applied

.....

4. Area of the warehouse .....

5. Equipment and other facilities in the field of warehousing available:

(a).....

(b).....

(c).....

(Please enclose a list.)

6. A non-refundable accreditation fee submitted, in the form of bank draft/banker's cheque of ..... (nationalized bank/branch address) No.....dated .....is enclosed with this application.

**DECLARATION:**

1. I/We declare to be authorized representatives of the organization to apply for accreditation of Warehouse.
2. I/We hereby solemnly declare that all applicable laws and statutory requirements in relation to the warehouse for which the application is being submitted, are complied with.
3. I/We agree to abide by the terms and conditions of the accreditation.
4. I/We declare that the warehouse specified above is suitable for carrying on the business of warehouse for the commodities mentioned above and that it is in good condition and having all the requirements for safe storage of commodities.
5. I/We hereby solemnly declare that all information herein given is true to the best of my /our knowledge and that in case it proves to be untrue; I/We undertake to indemnify person or persons concerned in this business against any loss arising out of such false or untrue information and cancellation of registration.

Signature (s).....

Name in full.....

Address.....

.....

.....

[As per section 6(5) of the Warehousing Development and Regulatory Authority (Warehouse Accreditation) Regulations, 2011].

***CERTIFICATE OF ACCREDITATION***

*for carrying on the business of warehousing*

***Accreditation No. ....***

***Date:.....***

Certificate of Accreditation is hereby granted to .....  
Warehouse located at ..... District ..... State  
.....owned/operated by .....which has been  
inspected as complying with requirements of the Warehousing (Development and  
Regulation) Act, 2007 (37 of 2007) and on the following conditions, namely: -

1. This accreditation shall be valid from..... to..... for the warehouse mention above.
2. The Accreditation Certificate has been granted to the Warehouse for the storage of following commodities/goods:
  - (i).....
  - (ii).....
  - (iii).....
3. The accreditation shall be liable to be cancelled or suspended in accordance with the provisions of the regulation 11(1) of the Warehousing Development & Regulatory Authority (Warehouse Accreditation) Regulation, 2011.
4. Upon the receipt of the Certificate of the Accreditation the warehouse shall display such certificate, in a conspicuous place in the principal place of its business.
5. The warehouse shall allow and assist the accreditation agency (or any examiners appointed by it) to inspect its office, books, records, papers, accounts etc. at any time.
6. The warehouse shall not transfer the certificate of accreditation granted to it to any other warehouse.

.....  
Signature and seal of the competent authority  
of the accreditation agency.

## CHAPTER -V

### REGISTRATION OF WAREHOUSES

1. **Application for registration.** – (1) Any person desirous of commencing the business of maintaining a warehouse, issuing a negotiable warehouse receipt (NWR) may make an application to the Authority for registration of such warehouse in Form A1.
  - (2) A person desirous of carrying on the business of a warehouse in more than one warehouse shall submit a separate application for registration in respect of each warehouse.
  - (3) A person who is a warehouseman under this Act shall not store his own goods in the warehouse registered by the said person.
  - (4) The Authority shall, from time to time, notify the type of goods that may be the subject matter of a negotiable warehouse receipt. Initially, a list of 40 cereals, pulses, spices and oil seeds having Agmark quality standards had been notified by the Authority for issuing NWR. Further, 75 more agricultural commodities have been notified by the Authority. The list is given in Annexure – III.
  - (5) An applicant shall specify the overall limit of the total value of negotiable warehouse receipts that it may issue or intend to issue.
2. **Documents to be filed with the application form** – Every application for registration of a warehouse shall be accompanied with the following documents, namely:-
  - (a) Identity proof of the applicant such as certificate of incorporation or Memorandum and Articles of Association for companies or copy of partnership deed for partnerships or such other documents as may be specified by the Authority;
  - (b) Proof of ownership or registered lease deed or rent agreement and receipt of the warehouse;
  - (c) No objection certificate from the Municipal Corporation or local authority, for carrying out the business of warehousing;
  - (d) Accreditation certificate issued by an accreditation agency registered with the Authority under section 5 of the Act.
  - (e) Statement of financial credibility in the form of audit reports/budget statement with supporting documents; and
  - (f) Such other documents as may be specified by the Authority.
3. **Fee.** – Every application for registration of warehouse or renewal thereof shall be accompanied with fee by way of bank draft or bankers cheque of any nationalized bank in favour of the Drawing and Disbursing Officer, the Warehousing Development and Regulatory Authority payable at New Delhi at the rate as indicated below:-

Registration/renewal of registration of warehouse:-

  - (i) State Capital cities -----Rs.2.50 per MT
  - (ii) District Headquarters -----Rs.1.50 per MT
  - (iii) For rural and other areas-----Re.1.00 per MT

Subject to a minimum amount of Rs.7500 for each warehouse.

4. **Security Deposit.-** Every applicant, at the time of registration of each warehouse, shall furnish to the Authority, security deposit by bank draft or bankers cheque of any nationalised bank in favour of Drawing and Disbursing Officer, the Warehousing Development and Regulatory Authority payable in New Delhi at the rate as indicated below:-
- (i) State Capital cities -----Rs.2.50 per MT
  - (ii) District Headquarters -----Rs.1.50 per MT
  - (iv) For rural and other areas -----Re.1.00 per MT
- Subject to a minimum amount of Rs.7500 for each warehouse.
5. **Power to make inquiry and call for information at the time of registration or renewal-** (1) Before granting registration to a warehouse under sub-sections (2) and (3) of section 4 of the Act, the Authority may make such inquiry and require such further information, as it deems necessary, other than the information furnished by the warehouse owner in its application in Form A.
- (2) The Authority may call for any information at any time and same shall be furnished to the Authority by the applicant within the time stipulated by the Authority.
6. **Requirement for Registration of a warehouse** – No registration certificate shall be issued unless,-
- (i) Proof of ownership or registered lease deed or rent agreement and receipt of the warehouse has been provided in accordance with the requirements of these rules and as may be determined by the Authority from time to time;
  - (ii) The warehouse is storage worthy for specified goods to be stored for which registration has been obtained;
  - (iii) The warehouse is constructed as per the Bureau of Indian Standards /FCI/CWC specification or as specified and notified by the Authority;
  - (iv) The warehouse is equipped with all necessary equipment's and apparatus for weighing, handling, sampling, grading, fire fighting and insect pest management. A list of equipment and items required for a warehouse and for setting a physical analysis laboratory is given in Annexure – III;
  - (v) The warehouse has adequate trained staff with expertise and knowledge for the scientific storage of goods to be stored in the warehouse; and
  - (vi) Warehouse should have adequate security arrangements;
  - (vi) The warehouse is adequately insured as per the requirement of the Authority.
7. **Form of Registration Certificate - (1)** The registration granted by Authority to a warehouse shall be subjected to the following terms and conditions, namely: –
- (a) The registration shall be for a maximum period of three years and the same may be specified in the registration certificate; and
  - (b) The Authority may suspend or cancel the registration duly notified at any time if the work of warehouse is not found satisfactory;
  - (c) An opportunity of being heard shall be given to warehouseman by the Authority before cancellation of the warehouse registration certificate.

**8. Grant of Registration Certificate** – The Authority may, after being satisfied that the applicant is eligible, shall grant the registration certificate in Form-A 3 to the applicant within a period of three months from the date of receipt of the completed application and clarifications sought, if any.

**9. Terms of registration** - (i) Immediately upon receipt of its registration certificate, the warehouseman shall display the same and keep it pasted until suspended or revoked, in a conspicuous place in the principal place of its business.

(ii) The certificate of registration shall not be transferable.

(iii) The Authority or its authorised representative may inspect or examine the warehouse registered under the Act at any time or without giving prior notice, the books, records, papers and accounts etc. relating thereto.

**10. Refusal of Registration.-**

The Authority may, for sufficient reasons to be recorded in writing, refuse to grant the registration to any applicant and shall furnish him with a copy of the order so passed. Before rejecting any such application, the applicant shall be given a personal hearing by the Authority.

**11. Renewal of Registration. –** (1) The Authority may renew the registration on an application for renewal made to it in duplicate.

(2) Every such application for renewal shall be in Form A1.

(3) Any registered warehouse owner desirous of renewal of registration, may make an application in duplicate to the Authority in Form A1 within three months before the expiry of the period of registration.

(4) The sections 3, 4 and 5 of the Warehousing (Development & Regulation) Registration of Warehouses Rules, 2010 shall apply in relation to renewal of registration as they apply in relation to grant of registration.

**12. Issue of duplicate Registration Certificate-** (1) The duplicate registration certificate shall be issued on receipt of request in Form A2 against the original certificate, if it is lost or damaged or mutilated.

(2) A registration certificate, which is torn or defaced, shall be surrendered by the warehouseman to the Authority on issue of duplicate certificate.

(3) The application for issue of a duplicate registration certificate shall be accompanied with the fee along with an indemnity bond as specified by the Authority by way of bank draft or bankers cheque of any nationalised bank in favour of the Drawing and Disbursing Officer, the Warehousing Development and Regulatory Authority, payable at New Delhi at the rate as indicated below:-

- (a) State Capitals Rs.1000.
- (b) District Headquarters Rs.750
- (c) Other areas Rs.500



**13. Withdrawal or voluntary surrender of Certificate of Registration-**

No warehouseman by whom the negotiable warehousing receipts have been issued shall be allowed to voluntarily surrender its certificate of registration till such time that any of the negotiable warehouse receipts issued by it are still valid and in circulation.

**14. Suspension and Cancellation of Registration-** (1) Every registration that has been granted under section 4 of the Act shall be liable to be suspended or cancelled or revoked temporarily or permanently by the Authority under following conditions:

- (i) The warehouseman files an application to declare him an insolvent;
- (ii) The warehouseman has lost control of the warehouse or has ceased to conduct the business of warehousing;
- (iii) The warehouseman has assigned the registration of the warehouse to any third party;
- (iv) The warehouseman commits any fraudulent act;
- (v) The warehouseman has in any other manner becomes incompetent to conduct the business of warehousing;
- (vi) The warehouseman has not permitted regular audit and unannounced inspection by the Authority or any of its agencies; and
- (iii) The warehouseman fails to comply with any of the conditions of registration or any provision of the Act or the rules and the regulations made thereunder.

(2) Before passing an order of suspension or cancellation or revocation of registration, the Authority shall issue a show-cause notice to warehouseman on which it is proposed to suspend, cancel or revoke the registration and call upon him to show cause as to why the proposed action should not be taken.

(3) The warehouseman shall respond to the suspension notice issued in writing to the Authority, within 15 days of receipt of the notice, failing which the matter will be decided based on the available material.

(4) After considering the submissions made by the warehouseman, if any, the Authority shall pass such orders as it may deem fit.

**15. Return of certificate of registration-(1)** When the certificate of registration expires or is suspended or cancelled or revoked, the warehouseman shall cease to issue negotiable warehousing receipts in respect of the relevant warehouse; and shall return the registration certificate within seven days of such expiration, suspension, cancellation or revocation:

(2) A warehouseman who has issued negotiable warehouse receipts shall continue to be liable in relation to the negotiable warehouse receipts issued by him till the expiry of all the negotiable warehouse receipts issued by him.

- 16. Publication of granting of licences, suspension and revocation of registrations and list of warehousemen and their warehouses-** The names and addresses of warehousemen registered under the Act will be published/notified from time to time, in the manner as decided by the Authority. Subsequent suspension or revocation of the registration shall also be publicised in the manner as decided by the Authority.
- 17. Appeals – (1)** Any person aggrieved by an order of the Authority made under this Act, or any the rules or the regulations made thereunder may prefer an appeal to such person or authority appointed by the Central Government (hereafter referred to as the Appellate Authority) within sixty days from the date of such order.
- (2)** An Appeal may also be admitted after the expiry of the said period of sixty days but not beyond a total period of ninety days if the appellant satisfies the Appellate Authority that he had sufficient cause or reasons for not preferring the Appeal within the said period.

## FORM A1

(See clauses- 3 & 13 of Warehousing (Development and Regulation) Registration of Warehousing Rules, 2010)

### Application for the Registration/Renewal of Registration of Warehouse

To  
The Warehouse Development and Regulatory Authority  
.....  
.....  
New Delhi.

Photo of  
authorized officer  
of the applicant,  
who signs the  
application form

Dear Sir /Madam,

I/We .....(name).....  
.....in.....designation..... (Name of the  
organization) having registered office at .....Telephone  
No.....and E-mail..... request for grant of  
registration/renewal of registration\* for carrying on the business of warehouse at  
.....from .....to..... for storage of following goods :-

1.....

2.....

3.....

(Enclose list of goods to this Application)

1. Detailed description of warehouse for which registration is applied.

Name of warehouse..... Location of warehouse.....

Village/ Taluka.....District..... State.....Telephone

No..... E-mail .....

2. (i)Details of technical staff

Name and Designation	Educational qualifications	Details of Experience		

(ii) Capacity of storage and area of warehouse .....

(iii)Equipment and other facilities in the field of warehousing available as per rule 8, are:

(a).....

(b).....

(c).....

(Please enclose a list.)

3. Existing or Previous Registration Number ..... and a copy of the existing/earlier certificate of registration enclosed.\*\*

#### DECLARATION:

1. I/We declare to be authorized representatives of the organization to apply for registration of Warehouse.

2. I/We hereby solemnly declare that all applicable laws and statutory requirements in relation to the warehouse for which the application is being submitted, are complied with.

3. I/We agree to abide by the terms and conditions of the registration.

4. I/We declare that the warehouse specified above is suitable for carrying on the business of warehouse and that it is in good condition and having all the requirements as per rule 8.
5. I/We hereby solemnly declare that all information herein given is true to the best of my /our knowledge and that in case it proves to be untrue , I/We undertake to indemnify person or persons concerned in this business against any loss arising out of such false or untrue information and cancellation of registration.

Signature (s).....  
Name in full.....  
Address.....  
.....  
.....

Attested documents to be enclosed along with the Application::

1. Board Resolution / Power of attorney authorizing the applicant to apply on behalf of the organization.
2. Proof of identity.
3. Title deeds or Lease agreement or franchise agreement with its validity.
4. Registration fees in the form and manner as prescribed.
5. Certificate of Compliance from Accreditation agency with detailed report of the Accreditation agency.
6. Security deposit in the form and manner as prescribed.
7. Statements of financial credibility
8. NOC from local authorities for operating the warehouse.
9. Layout plan of the Warehouse.

\*Strike off whichever not applicable.

\*\* Strike off if not applicable.

**FORM A3**

(See clause - 9 of Warehousing (Development and Regulation) Registration of Warehousing Rules, 2010)

**Warehouse Registration Certificate**

*(Under Warehousing (Development and Regulation) Act, 2007)*

**Registration No.....**  
**Valid from.....to.....**

Registration is hereby granted to..... (Name of warehouseman) located at ..... for the purpose of issuance of Negotiable Warehouse Receipt in respect of following commodities:

(a).....

(b).....

(c) .....

for a period of three years from ..... to..... subject to the provisions of the Warehousing (Development and Regulation) Act, 2007 and on the following conditions namely:-

1. This registration shall be valid upto and inclusive of the from .....to.....

2. The licensee shall not carry on the business of a warehouse at any place other than the said warehouse.

3. The licensee shall carry on the aforesaid business for the storage of the following goods in the warehouse(s):

(i)

(ii)

(iii)

(List of goods).

4. The registration shall not be transferable.

5. This registration shall be liable to be revoked or suspended in accordance with the provisions of (a) of sub-section (2) of section 35 of the Warehouse (Development and Regulation) Act, 2007.

6. In the event of cancellation or suspension of this registration, the authorized representative of the registered warehouse shall surrender the registration certificate to the Authority along with all the unused negotiable warehouse receipts etc.

Signature  
Seal of the Authority

Date .....

Place .....

**FORM A2**

(See clause - 14 of Warehousing (Development and Regulation) Registration of Warehousing Rules, 2010)  
**Application for issue of duplicate registration certificate**

To  
The Warehousing Development and Regulatory Authority  
.....  
.....  
New Delhi.

**Photo**

Dear Sir,

I/We ..... having a registered warehouse located at..... request that my/our original certificate of registration bearing No. .... granted on ..... for the storage of ..... from .....to..... has been lost/destroyed/lost/stolen/mutilated in the following circumstances:

(a)

(b)

(attach copy of FIR in case original certificate has been destroyed/lost/stolen.)

(2) I/We therefore, request you to grant me/us a duplicate registration on the same terms and conditions on which the aforesaid registration was granted.

(2) I/We have enclosed bank draft No ..... in respect of payment of specified fee of Rs..... vide ..... for issuance of duplicate registration certificate.

(3) I/We hereby solemnly affirm that the information given herein is true to the best of my/our knowledge.

Signature of Applicants

Date .....

Witness 1. ....

Witness 2 .....

**Document to be attached:**

1. Attested copy of the destroyed /lost/stolen/mutilated registration certificate.  
2. Notarised Affidavit providing the above details and background of the destruction/lost/stolen/mutilation of the registration certificate.

3. Copy of FIR.

4. Bank draft for duplicate Registration Certificate.

5. Indemnity bond.

## **CHAPTER – VI**

### **SUPPORT PROCESSES**

#### **1. Infrastructure of Warehouse and Manpower Requirement**

##### **(1) Requirement for a warehouse:**

- (i) The warehouse should be constructed as per Bureau of Indian Standards (BIS) FCI/CWC specifications. The BIS standards for code of practice for construction of foodgrains storage structures are being finalized by BIS in consultation with all stakeholders and would be published soon. The draft document is given in Annexure –III.
- (ii) Warehouse shall have necessary approval from State Licensing Authorities.
- (iii) The warehouse shall have necessary clearances from local authorities as per local laws.
- (iv) The warehouse should be accessible by an all-weather motor able road.
- (v) The warehouse should have facilities for sampling and grading of the commodities for which registration is being sought either in the warehouse or it should have tie up with some approved laboratory.
- (vi) The warehouse should have necessary equipment and other items required for operating a warehouse as well for physical analysis laboratory. A list of such equipment and items is given in Annexure-IV.
- (vii) The equipment and items requiring calibration should be got calibrated timely from some approved calibrating laboratories/ institutions and a certificate to this effect should be obtained by the warehouse from the calibrating laboratories/ institutions. A separate calibration register for the equipment which requires calibration should be maintained.
- (viii) Warehouse shall have adequate number of Fire Fighting Extinguishers of appropriate type, fire buckets with sand and water as defined in para 3 of Chapter XII
- (ix) All the electrical connections and fittings should be got checked and tested regularly to ensure that no electrical line/fitting is defective. In case some defects are observed, these should be immediately got repaired.
- (x) Warehouse shall ensure that addresses and telephone numbers of Fire Station, Police Station and warehouseman shall be displayed at conspicuous places so that in case of emergency, the concerned authorities may be contacted without any delay.
- (xi) Warehouse official shall ensure that all the walls, pillars, partitions, ceilings, staircases inside the warehouse are white washed at defined intervals (once in 3 years).

#### **2. Role, Responsibilities and Competence of Manpower-**

The warehouseman shall maintain a record of manpower in the warehouse for effective management of the same. Manpower requirement is to be decided based on commercial transactions and technical considerations. However, minimum requirement of manpower based on the capacity of the warehouse are given below:

**Table Showing the Minimum Manpower Requirements**

<b>Storage Capacity of Warehouse (in MTs)</b>	<b>Upto 5000</b>	<b>5001-10,000</b>	<b>10001-25000</b>	<b>Above 25000</b>
Warehouse Head	1	1	1	1
QC Inspector (Technical Asst.)/ Jr. QC Inspector (Jr. Technical Asst.)	1	1	2	3
Warehouse Asst.	1	2	4	5
Security Guards	4	4	6	8

It shall be ensured that personnel are competent to handle responsibilities assigned to them. The warehousemen and other technical personnel should have adequate knowledge and expertise in the scientific storage of goods/agricultural commodities to be stored in the warehouse and should be trained from some institution like Indian Grain Storage Management and Research Institute (IGMRI), Department Food and PD, Government of India, NIAM, Jaipur, FCI, CWC, SWCs, WDRA or other Government institution/Department.

**3. List of service providers:** Each warehouse shall maintain a list of service providers to the warehouse in the field of handling, transportation, weighing, insect/pest control, analysis of commodities, security and other services. The evaluation of performance of service providers would be based on documentary evidence for the following:

- a) Capability of the service provider with reference to his possession of required operational equipment, trained manpower and financial capability
- b) In case the services of some outside weighbridges are utilised, these should be duly stamped and licensed by the State Weights and Measures Department.

The warehouseman shall evaluate the service provider at least once in a year depending upon the nature of services availed keeping in view the following parameters:

- a) Availability of suitable handling and transportation equipment.
- b) Performance during period under review for timely completion of jobs.
- c) Instances of payments of demurrage / wharfage.
- d) Instances of labour problem.
- e) Continued availability of trained manpower.
- f) Regular compliance with applicable legal requirements.
- g) Instances of shortages during transit, as applicable.

The warehouseman shall maintain records of periodic evaluation and depending upon the results of evaluations will decide necessary corrective actions to ensure that the services are rendered efficiently.

**3. Maintenance and calibration of equipment and items used in the warehouse:**

The warehouseman shall maintain a list of equipment which require calibration. These equipment would be calibrated at least once in a year by the approved calibration laboratories/institutions. A separate registrar for such



equipment with details of calibrations would be maintained in the warehouses. A certificate of calibration for a particular equipment indicating the name of the calibrating agency, date of calibration, validity of calibration etc. should be maintained in the file for records. In case of in house calibration, details of calibration procedure, error between standard procedure of calibration and equipment reading should be maintained.

The equipment which are out of order or not functioning should be kept separately with clearly marked as **“Out of Services”** until these are repaired and become functional.

## **1. TRAINING FOR OFFICIALS OF ACCREDITATION AGENCIES**

- 1.1. **Objective:** For appraising the officials/examiners of accreditation agencies about the detailed procedure and methodology of inspection of warehouses for the grant of certificate of accreditation, short duration training programme/workshop may be organised by the Warehousing Development and Regulatory Authority.

During the training/workshop, the detailed process of grant of accreditation, basic requirements to be fulfilled by the warehouses for accreditation, procedure of inspection and process of suspension or cancellation a certificate of accreditation will be explained to the participant officials of the accreditation agencies. These trainings/workshops would be of one day duration and may be organised at New Delhi and other locations. Field visit to some warehouse to see the actual warehousing operations is also proposed during the training/workshop.

### **1.2. Course contents of training/workshop on process of accreditation of warehouses.**

- Aims, objectives and salient features of Warehousing (Development and Regulation) Act, 2007.
- The Warehousing Development and Regulatory Authority, its powers and functions.
- Purpose of accreditation of warehouses; Role of accreditation agencies.
- Process for grant of certificate of accreditation, procedure for inspection of warehouses for grant of accreditation certificate.
- Check list of various basic requirements and parameters of warehouses for accreditation purposes; List of agricultural commodities notified for issuance of negotiable warehouse receipt.
- Duties of accreditation agency, suspension or cancelations of a certificate of accreditation, dispute resolutions and payment of fee.

**1.3. Eligibility Qualification:** Officials of the accreditation agencies registered with the Warehousing Development and Regulatory Authority who would be engaged for inspection of warehouses for the purpose of grant of certificate of accreditation agencies are eligible for training/workshop. The officials should have adequate knowledge and experience in the field of warehousing, scientific storage of agricultural and other commodities, accounts, finance, structural designs of warehouses, quality control of agricultural and other commodities etc.

- 1.4. **Travelling Expenses:** The travelling expenses of the officials participating in the training/workshop would be borne by the concerned accreditation agencies.

## **2. TRAINING FOR WAREHOUSEMEN**

- 2.1. **Objective:** With a view to promote efficiency in the conduct of warehouse business and for efficient implementation of provisions of the Warehousing (Development and Regulation) Act, 2007, training for warehousemen may be arranged by the Warehousing Development and Regulatory Authority. These training programmes may be organised through some expert training institutions.

- 2.2. **Duration of training programme:** The training programmes may be of 5days duration.

- 2.3. **Course Contents:**

### **Course Content for 5-day training programme for warehousemen.**

1. **Warehousing (Development and Regulation) Act, 2007.**
  - ✓ Aims, objectives and salient features.
  - ✓ Negotiable Warehouse Receipts, (NWR) salient features and benefits for farmers.
  - ✓ Format of NWR, its distribution by WDRA and maintenance of records of NWR.
  - **Accreditation of Warehouses.**
    - ✓ Role of accreditation agencies. Process for grant of accreditation certificate.
    - ✓ Construction standards as per BIS, CWC and NABARD specifications.
    - ✓ Purpose of accreditation of warehouses;
    - ✓ Various basic requirements and parameters of warehouses for accreditation purposes;
    - ✓ Agricultural commodities notified for issuance of negotiable warehouse receipt.
  - **Warehousing Development and Regulatory Authority (WDRA).**
    - ✓ Its powers and functions.
    - ✓ Grant of certificate of registration by the WDRA.
2. **Scientific Storage of Agricultural Commodities and Grading/Sampling.**
  - ✓ Role of Moisture, Temperature and Humidity during storage.
  - ✓ Important stored products/ insect/pests, their biology, life cycle and mode of damage and Insect Pest Management.
  - ✓ Rodents, their different species and Rodent Pest Management during storage in warehouses.
  - ✓ Sampling proceeding for bags and bulk storage.
3. **National Grade Specifications of Agmark for agricultural commodities**
4. **Warehouse Management.**
  - ✓ Records Management.
  - ✓ Finance and Account Procedures in Warehouses.
5. **Financing by Banks against NWRs.**
  - ✓ Modality of finance by banks against warehouse receipts.
  - ✓ Advantages to banks from NWRs.
  - ✓ Pledge of NWRs.

6. **Insurance of warehouses and goods stored in warehouses.**
  - ✓ Insurance products and procedure.
  - ✓ Settlement of claims.
7. **Spot Exchanges.**
  - ✓ Their role in marketing of agricultural commodities.
  - ✓ Linkage of warehouses with spot exchanges, APMC and banks.
8. **Statutory framework for agricultural produce:**  
PFA Act, Insecticides Act, Consumer Protection Act, APMC Act, Essential Commodities Act, etc.  
**Modality of Training**
  - ✓ Lectures.
  - ✓ Power Point Presentations.
  - ✓ Group discussions.
  - ✓ Field visit to warehouses.
  - ✓ Study materials on each subject.

- 2.4. **Eligibility Qualification:** The warehousemen of registered warehouses by the Authority are eligible for training. The officials should have adequate knowledge and experience in the field of warehousing, scientific storage of agricultural and other commodities, accounts, banking, finance, structural designs of warehouses, quality control of agricultural and other commodities etc.
- 2.5. **Award of a Certificate:** A certificate on successfully completion of the training will be awarded to the participants by the training institution.
- 2.6. **Travelling Expenses:** The travelling expenses of the officials participating in the training programme would be borne by the concerned agencies. However, boarding and lodging would be provided by the Authority.

## CHAPTER-VII

### 1. TERMINOLOGY OF VARIOUS REFRACTIONS OF FOODGRAINS

The Bureau of Indian Standard (IS: 2813;1995) prescribes the terminology for foodgrains and other refractions which are found in foodgrains. This terminology of refractions is generally used in the procurement, storage and distribution of foodgrains. The definitions of important refractions used in the grain trade are given below:

Grading of agricultural commodities:- It is a method of sorting out of agricultural produce into lots each of which is substantially homogeneous.

1. Foodgrains: Foodgrains shall include edible cereals, millets and pulses.
2. Cereals: Foodgrains of monocotyledonous origin but bigger in size shall be termed as cereals, e.g. wheat, rice, barley, maize etc.
3. Millets: Foodgrains of monocotyledonous origin, roundest in shape and smaller in size shall be termed as millets, e.g. Jowar, bajra etc.
4. Pulses: Foodgrains obtained from leguminous crops shall be called pulses e.g. moong, arhar, matar, masur etc.
5. Dal or Dhal: Split halves of pulses with or without husk..
6. Paddy: Rice from which husk is not removed or hulled out.
7. Sound grains: This means not over ripe, not soft, not wetted, free from disease and free from excessive brushing or physical injuries affecting the keeping quality of the grain.
8. **Refractions:** All components in foodgrains which differ from sound grains viz:
  - (i). Foreign Matter: Organic or inorganic matter other than the grains. The inorganic matter shall include sand, gravel, dirt, pebbles, stones, glass & metallic pieces, lumps of earth, clay and mud. Organic matter shall include husk, chaff, straw, weed seeds and other inedible grains. Paddy shall be considered as foreign matter in commodities other than paddy.
  - (ii). Varietal Admixture: The presence of a variety of the same grain other than the variety in consideration.
  - (iii). Other Foodgrains: Foodgrains other than the grain under consideration.
  - (iv). Immature grains: Kernels or pieces of grain kernels that are not fully developed.
  - (v). Full or Head Grain: Complete and unbroken kernels of rice.
  - (vi). Whole grains: Rice kernels more than  $\frac{3}{4}$ <sup>th</sup> of their average size or over.
  - (vii). Broken: In case of foodgrains, other than rice, pieces of sound kernels that are less than three-fourths of the size of the full kernels are treated as broken grains. In case of rice, pieces of sound kernels that are equal or less than three-fourths of the size of the full kernels and up to  $\frac{1}{8}$ <sup>th</sup> size of full kernel are treated as broken grains. In the case of dals, pieces that are less than size of three-fourths of the split pulses shall be considered as broken.

- (viii). Big broken: Those pieces of rice kernel which are equal to or smaller than three-fourths but bigger than  $1/4^{\text{th}}$  of the average length of the unbroken kernel.
- (ix). Small broken: Those pieces of rice kernel which do not exceed one-quarter (equal to  $1/4^{\text{th}}$ ) and up to  $1/8^{\text{th}}$  size of the average length of the unbroken kernel, retained on 1.10 mm IS sieve.
- (x). Splits: These are those kernels which are broken into two halves lengthwise.
- (xi). Damaged grains: Kernels or pieces of kernels that are sprouted or internally damaged as a result of heat, moisture, weather or microbes.
- (xii). Discoloured grains: Kernels or pieces of kernels that have changed the colour as a result of deteriorative changes.
- (xiii). Insect damaged: Kernels that are partially or wholly bored by insects injurious to grain.
- (xiv). Weevilled grains: Weevilled grains are grain kernels that are partially or wholly bored by insects, but do not include touched and germ-eater grains and egg-spotted grains.
- (xv). Touched or slightly damaged: Kernels or pieces of kernels that are damaged or slightly damaged, superficially so as not to affect the quality of the material.
- (xvi). Chalky grains: Kernels or pieces of kernels of which at least half the portion is opaque, milky white in colour and brittle in nature.
- (xvii). Dehusked grains : Kernels, whole or broken which have more than one-fourth of the surface area of the kernel covered with bran.
- (xix). Red grains: Kernels or pieces of kernels having more than one-fourth of the surface covered with red cuticle.
- (xx). Degree of milling: Extent to which bran exclusive of germ portion is removed.
- (xxi). Fragments: Pieces of kernels that are less than one-eighth of the size of the full kernels.
- (xxii). Moisture: The loss in mass caused as a result of heating for two hours at 130 to 133 degree C. under specified conditions and expressed as percentage.

## **2. METHOD OF PHYSICAL ANALYSIS OF FOODGRAINS**

### **(1) Equipment required for physical analysis of foodgrains.**

The following equipment are required for carrying out the physical analysis of foodgrains:

Sl. No.	Name of the equipment
1.	Physical balance of 5mg sensitivity/Goldsmith balance with weight box
2.	Boerner sample divider
3.	Enamel plates of 30 cms diameter with raised rims
4.	Sieves.A set of four brass sieves with mesh sizes 4.00 mm, 3.35mm, 1.70mm and 1.00 mm. (IS 460(Part I) 1985)

5.	Scoops of different sizes
6.	Forceps
7.	Magnifying glass- 7.5 cms diameter and magnification of 10X

## **(2) Preparation of Test Sample**

The composite sample shall be reduced to 500 gm by using a sample divider. In case sample divider is not available, empty the container/ sample bag containing the composite sample on a flat smooth surface and mix it thoroughly. Spread the composite sample in a circular layer of about 12 to 25 mm thickness. Scoop about 500 gm sample from center, sides and different points taking care that no foreign matter is left from the grain which has been scooped. This sample of 500 gm would be used as a test sample.

**(3) Procedure of analysis:** Take 500 gm sample for analysis of foreign matter for Foodgrains other than rice and millets. For rice and millets take 250 gm sample. Sieve the sample thoroughly in the sieve set and collect the foreign matter.

For finding out refractions other than foreign matter, take the required quantity of sample as mentioned below in the table in an enamel plate, separate the refractions and find out their weight and calculate the percentage of each refraction. For the refractions other than foreign matter in rice, carry out analysis in duplicate and find out their average.

## **(4) Quantity required for physical analysis:**

<b>Foodgrains</b>	<b>Quantity required for physical analysis (in gms)</b>
Wheat	50
Maize	50
Paddy	20
Barley	50
Gram	50
Rice	20
Millets	20
Other pulses	20

## **(5) Determination of insect damaged (Weevilled grains):**

From out of the sieved sample, measure 20 ml of representative sample in a measuring cylinder. Take the sample in an enamel plate and count the total number of grains in the sample as well as total number of weevilled grains. Find out the percentage of insect damaged grains (weevilled grains) by count as follows:

$$\text{Insect damaged grains (by count)} = \frac{\text{weevilled grains in 20 ml}}{\text{Total number of grains in 20 ml}} \times 100$$

## CHAPTER VIII

### 1. SAMPLING OF FOODGRAINS & ITS PROCEDURE FOR BAG & BULK STORAGE

Drawing of representative samples is an important and essential part of grain analysis. If the sample obtained is not representative, no amount of care in analysis will establish the true quality of grain.

#### **A - General Principles:**

1. Samples should be taken jointly by representatives of the buyer and seller or by a sampling superintendent appointed jointly.
2. Samples shall be as representative as possible of the lots from which they are taken. As the composition of a lot is seldom uniform, therefore, a sufficient number of increments shall be taken and carefully mixed, thus giving a bulk sample from which the laboratory samples are obtained by successive divisions or otherwise. This may be done manually or by using a Boerner sample divider in the laboratory.
3. Grain which is sea damaged or otherwise damaged in transit, or is out of condition, is kept separate from the sound grain and is sampled separately. Samples of unsound material shall not be mixed with samples of sound material and shall be identified and quantified.
4. Special care is necessary to ensure that all sampling apparatus is clean, dry and free from foreign odours.
5. Sampling shall be carried out in such a manner as to protect the samples, sampling instruments and the containers in which the samples are placed, from contamination, from rain, dust, etc. If walking on grain cannot be avoided, precautions in the form of protective clothing should be worn to prevent contamination of the grain.

#### **B - Method of taking samples:**

1. Unless otherwise specified in the contract, consignments shall be considered in lots of a maximum of 500 tonnes or such part thereof as constitutes a single consignment.

2. **Sampling from bags:** Unless otherwise specified in the contract or unless the practice at the port or elsewhere requires otherwise, increments shall be taken from different parts of a bag (for example top, middle and bottom) by means of a sack/bag spear from the number of bags specified in Table given below:

**Number of bags to be sampled**

<b>Number of bags in consignment</b>	<b>Number of bags to be sampled.</b>
10 to 100	10, taken at random
More than 100	Square root (approx.) of total number, taken according to a suitable sampling scheme.

Pre-packed units are usually transported in outer cases or cartons containing a convenient number of units. The procedure applicable to bags shall be used to determine the appropriate number of outer cases or cartons to be sampled. If the total number of outer cases or cartons in the consignments does not exceed 1000, only one pre-packed unit shall be taken from each of the outer cases taken for sampling. Care shall be taken to ensure that a pre-packed unit is taken in a random manner from the entire contents of the outer case or carton for sampling.

The selection of pre-packed units occupying the same corresponding position in a number of outer cases or cartons shall be avoided. The pre-packed units taken in this manner shall be considered as increments.

### **Sampling from rail or road wagons, lorries, barges or ships**

Unless otherwise specified in the contract, each laden wagon, lorry, barge or ship shall be sampled. Increments shall be taken throughout the whole depth of the lot as per patterns given below.

- (a) Upto 15 Mts – 5 sampling points, (b) From 15 to 30 Mts. - 8 sampling points (c) From 30 to 500 Mts. – minimum of 11 sampling points, (d) More than 500 Mts. – Take the square root, divide by 2 and round upto next whole number.

If the type of wagon, vessel or commodity does not allow samples to be taken in this manner, or if there is a separate agreement between the buyer and seller, the grains shall be sampled during discharge of the wagon/vessel.

### **Sampling from silos, bins or bulk warehouses:**

1. Increments shall be taken throughout the whole depth of the lot. A suitable instrument must be used to achieve this requirement.
2. The number of increments to be taken shall be determined as follows:  
Take the square root of the tonnage in the static bulk. Divide by two and round up to the next whole number. This is the minimum number of increments that is to be obtained. For example more than 1000, 2000, 4000, 6000, 8000 & 10,000 Mt., the number of increments would be 16, 23, 32, 39, 45 and 50 respectively.

### **Bulk Sample:**

The bulk sample shall be formed by combining the increments and mixing them thoroughly.

### **Laboratory sample:**

- **Division of bulk sample.**

Divide the bulk sample to obtain the required number of laboratory samples by coning and quartering or by using the sample divider.

- **Number of samples:**

The number of laboratory samples to be taken for analysis and arbitration shall be specified in the contract or otherwise agreed between the parties concerned.

- **Size of sample:**

The size of the laboratory samples will be determined by the type and requirements of the tests to be undertaken. Generally it is minimum of 1 kg (3 kg for milled products).

### **Packaging and labeling of samples:**

- **Packaging of samples:** The laboratory samples shall be packed in containers/polythene bags suitable for the purpose, bearing in mind the tests to be undertaken. The containers /polythene bags shall be completely filled and the closures shall be sealed to prevent loosening or tampering.
- **Labels for samples:** If paper labels (Sample Slip) are used for the samples, they shall be of a suitably high quality for the purpose. If there are eyelet holes on the labels, these shall be reinforced. If the grain has high moisture content, then special moisture-resistant labels shall be used. A duplicate label may be included in the sample container provided that the sample is not intended for the determination of moisture content or the content of some other ingredients. The information written on the labels or directly on the bags, shall be indelibly marked, using a marker which will not cause any odour in the sample. The information shall include the following:



- a) Origin of the product.
- b) Identification number of ship, wagon or lorry.
- c) Point of departure.
- d) Date and point of receiving (if applicable).
- e) Destination.
- f) Date of arrival at the destination.
- g) Quantity of consignment.
- h) Bulk, or bagged (including number of bags).
- i) Type of goods.
- j) Lot number.
- k) Name of seller.
- l) Name of buyer.
- m) Contract number and date.
- n) Date of sampling.
- o) Date of final discharge.
- p) Place and point of sampling.
- q) Name of person who carried out sampling.
- r) Reason for sampling.
- s) Number of duplicate samples taken.

**Despatch of samples:**

Laboratory samples shall be dispatched as soon as possible, or at time to be fixed in the contract. Whenever possible, samples should be kept and transported at a temperature below 15 degree Celsius, out of direct sunlight and in a non-humid location.

**Sampling report:**

If a sampling report is prepared, besides giving the usual information it shall make reference to the condition of the grain sampled, including signs of insect, mite or rodent infestation visible at the time of sampling in the warehouse or silo, or during work carried out on the vessel or other carrier during sampling.

**Terms and Definitions:**

**Consignment:** - Physical quantity of grain on offer, dispatched or received at one time and covered by a particular contract or shopping document; it may be composed of one or more lots . It should be considered in lots not exceeding 500 Mt.

**Lot:** - Stated portion of the consignment whose quality is to be assessed.

**Increment:** - Small equal quantity of grain taken from each individual sampling point in the lot, throughout the full depth of the lot.

**Laden:** - term to describe a partly or completely full state, as for wagon, lorry, barge or ship.

**Bulk Sample:** - quantity of grain obtained by combining and mixing the increments taken from specific lot.

**Laboratory sample:** - quantity of grain removed from the bulk sample and intended for analysis or other examination.

## **2 ROLE OF MOISTURE DURING PROCUREMENT AND STORAGE OF FOODGRAINS**

Two types of water are present in the foodgrains. One type of water is bound water and is part of grain constituents and another type of water is free water. This free water can move from grain to atmosphere and from atmosphere to grain depending upon the moisture content of grain & relative humidity of atmosphere and is known as grain moisture. This is expressed in percentage.

Moisture plays a very important role in safe storage of all the foodgrains. High moisture deteriorates the foodgrains rapidly during storage. Discolouration of foodgrains particularly in rice during storage is due to the presence of high moisture. Besides, the high moisture attracts the stored grain insect pests and mould (Storage fungi) which further damage the foodgrains.

On the other hand, low or safe moisture increases the storability of foodgrains and checks the growth of insects and moulds during storage. Grain moisture is the most important critical grain management factor that regulates the storability of grain. Therefore, measurement of correct moisture of the foodgrains before and during storage is very important. Grain moisture is determined by heating the pulverized grains for two hours at 130±5 degree centigrade in a hot air oven in the laboratory. Electronic portable moisture meters are available for the measurement of correct moisture content of foodgrains. Moisture is also very important in rice milling. Paddy should have optimum moisture content (about 14.5%) at the time of milling. High moisture paddy or very low moisture paddy results in high percentage of broken rice grains. Mechanical dryers are used for drying of paddy in the modern rice mills. Sun drying of paddy also results in excessive broken grains during rice milling. Therefore, the paddy should be dried under shed with continuous turning by foot or other methods.

The safe moisture of some foodgrains is given below:-

**Table showing the safe moisture upper limit of various commodities**

<b>S.No.</b>	<b>Commodity</b>	<b>Equilibrium moisture content at 70% RH (temp. 27 degree Celsius)</b>
1.	Paddy	15
2.	Rice	13
3.	Cowpeas/Beans	15
4.	Wheat, Sorghum and Maize	13.5
5.	Ground nut (shelled)	7
6.	Mustard seeds	5-6

From the table, it is known that paddy and rice can be safely stored at 15% and 13% moisture content respectively. Wheat, sorghum and maize may be stored safely at about 13.5% moisture content at about 27 degree Celsius temperature.

The traditional moisture migration theory states that if the grain is warmer than outside air, the interstitial air near the wall sinks towards the bottom of the silo, circulates in the grain mass along the floor, warms up, and rises through the centre portion of silo or bin. As the air approaches the headspace, the air drops its moisture in the grain mass at the top surface of the silo, then continues to circulate below the grain surface back to the wall.

Grain is a poor conductor of heat like most other stored products. Therefore, heat does not escape easily or quickly in some portions of the bulk grain. Non-uniformity of temperature keeps warm spots warm and if high temperature differences exist in the bin as induced by solar radiation, air convection currents are generated causing moisture migration. In this phenomenon, the convection air current picks up moisture from warmer grain and transfers this moisture to the cooler grain where condensation of moisture would take place. This results in grain damage which is attributed to caking, rotting and sprouting.

This is critical in areas where large seasonal changes in temperature exist. The respiration of insects, moulds and the grain itself also creates localized heating in the grain bulk which could also raise the temperature of the region they occupied. This centre of insect activity is known as the "hot spot". The hotspot expands in size because insects migrate because of its high temperature and create identical conditions alongside through further respiration. The water produced by respiration tends to rise in the warm air of the hot spot and condenses in the cold grain. Both phenomena can cause damage and loss due to mould infestation.

Some of the benefits of the proper aeration are as follows:

1. Aeration removes the bad smell from grain after the fumigation.
2. Equalizes the grain moisture in bulk storage.
3. Newly harvested grain can be stored for short periods without appreciable damage using aeration to provide cooling and dissipating heat caused by respiration.
4. It reduces the grain temperature.

At the time of procurement of foodgrains viz Wheat, paddy, rice maize and bajra etc, it should be ensured that moisture of these grains is within laid down/prescribed limits. Under no circumstance, foodgrains beyond specifications should be procured.

#### **Determination of Moisture content of Foodgrains by Hot Air Oven Method (BIS Method IS:4333 (Part-II) 1967)**

**Principle:** Loss in mass of the ground test portion as determined by drying at 130 - 133 degree centigrade in a hot air oven for 2 hours.

**Equipment required:** The following equipment are required:

Sl. No.	Name of the equipment required
1.	Grinding Mill or a hand operated grinder
2.	Hot Air Oven (50 degree to 250 degree centigrade temperature range and thermostatically controlled)
3.	Physical balance upto 5 mg sensitivity
4.	Metal dish with tight fitting lid
5.	Desiccator containing anhydrous calcium sulphate or any other effective desiccant.

**Procedure:** Grind the sample so that it may pass through a sieve of 1.00 mesh. Weigh 5 gm sample and take it in the metal dish. Adjust the oven temperature at  $130 \pm 3$  degree centigrade. Heat/ Dry the sample in the oven for 2 hours. After drying the sample for 2 hours, take it out of the oven and keep it in the desiccator for 30-45 minutes for cooling up to room temperature. Take the weight of the dried sample and calculate the moisture content as follows:

$$\text{Moisture content (in \%)} = \frac{M1-M2}{M1} \times 100$$

Where M1 is the initial weight of sample and M2 is the weight after drying.

## CHAPTER IX

### 1. INSECT/PEST MANAGEMENT SYSTEM

During storage of foodgrains and other agricultural commodities, considerable quantitative and qualitative losses are caused by the stored grain insect pests. At high moisture, their growth and multiplication is very fast. The optimum conditions of temperature and relative humidity for the rapid growth and multiplication of stored grain insect pests range from 25 to 35 degree celsius and 60 to 65% respectively.

### 2. CONTAMINATION OF FOODGRAINS BY INSECTPESTS:

The stored grain insect pests also contaminate the foodgrains with harmful and unhygienic material like uric acid which causes rheumatic pain in human beings. With a view to safeguard the health of consumers from excessive uric acid, a maximum limit of 100 mg uric acid per 100 grams sample of foodgrains have been prescribed under the Prevention of Food Adulteration Act (PFA), 1954 and rules, 1955 framed under the Act.

### 3. LIFE HISTORY, BIOLOGY AND MODE OF DAMAGE OF SOME OF STOREDGRAIN INSECTPESTS.

All the warehouses/premises should be free from insect pests and rodents. For the control of stored grain insectpests, prophylactic and curative treatments should be carried out at regular intervals. Some of the stored grain insect pests, rodents and their management during storage of foodgrains in warehouses and godowns is given below:

### 4. STORED GRAIN INSECT PESTS:

#### (i) Sitophilus oryzae (Linn)

<b>Order</b>	<b>Coleoptera</b>
<b>Family</b>	<b>Curculionidae</b>
<b>Species</b>	<b>Sitophilus oryzae (Linn)</b>
<b>Common name</b>	<b>Rice weevil</b>
<b>Hindi name</b>	<b>Sund wali Sursuri</b>



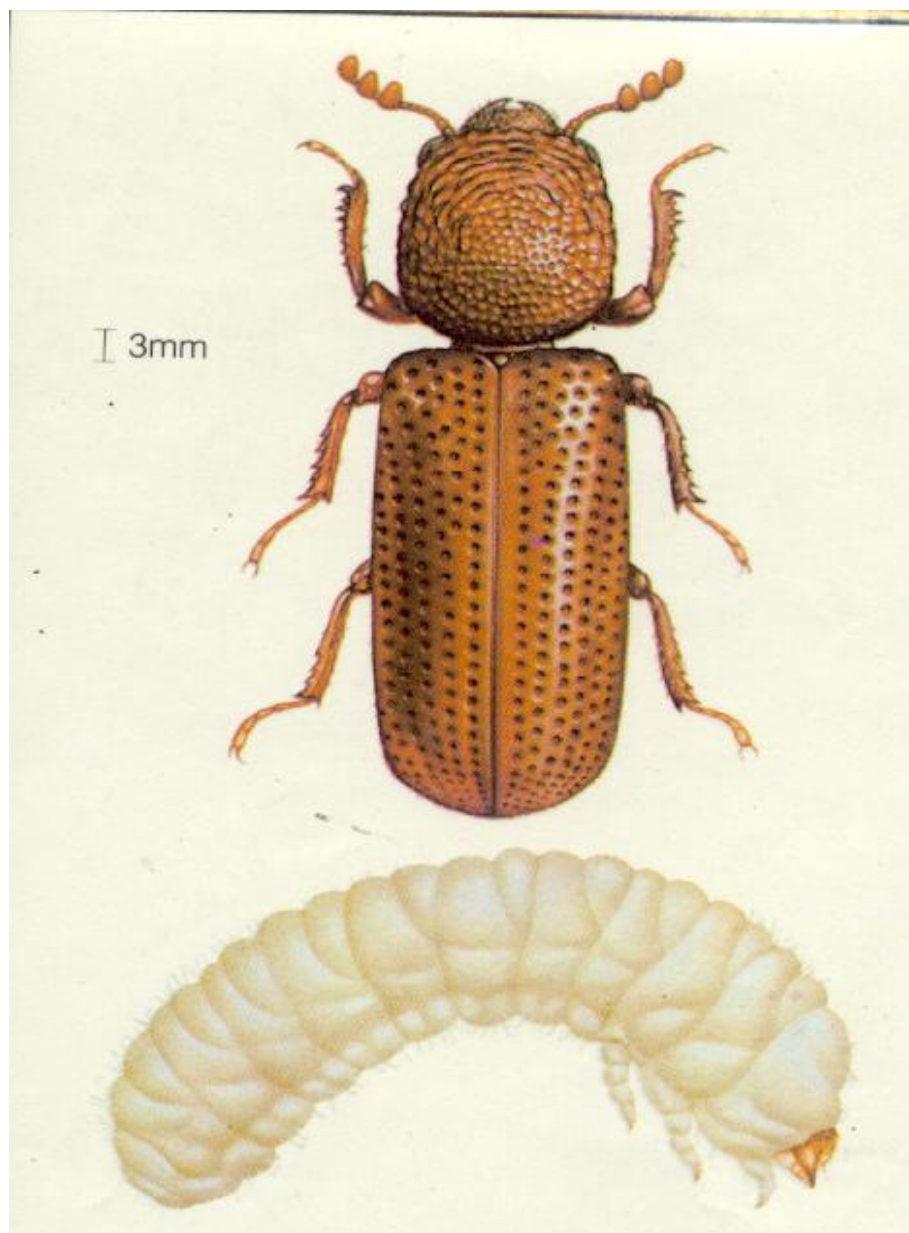
**Identification:-** The adult weevil is reddish brown in colour, 2.5 to 4.55 mm long and having a well-defined snout. Antenna is elbowed and clubbed. There are 4 light reddish marks on elytra and round punctures on pro-thorax.

**Commodity damaged:** – It is a major pest of all cereals like wheat, paddy, rice, maize, jowar and barley.

**Habits and life History:** – Under optimum condition of temperature (30 degree c) and relative humidity (70%), about 100-150 eggs are laid singly in a prepared hole and covered with waxy plug by a single female weevil. The eggs hatch inside the grain and the tiny larvae (immobile) begin to feed the grain by remaining inside the grain kernels. The life cycle is completed inside the grain kernel and the adult weevil comes outside the grain by making a round hole. Such type of grain kernels are known as weevilled grains. Both, larvae and adults feed the grain. Minimum life cycle is 25-30 days at 30 degree centigrade and 70% r.h. Adults are long lived and can fly. Infestation can cause considerable grain heating. Temperature range is 14-35 degree centigrade and r.h 40%.

**(ii) Rhizopertha dominica (Fab)**

<b>Order</b>	<b>Coleoptera</b>
<b>Family</b>	<b>Bostrychidae</b>
<b>Species</b>	<b>Rhizopertha dominica (Fab)</b>
<b>Common name</b>	<b>Lesser grain borer</b>
<b>Hindi name</b>	<b>Ghun</b>





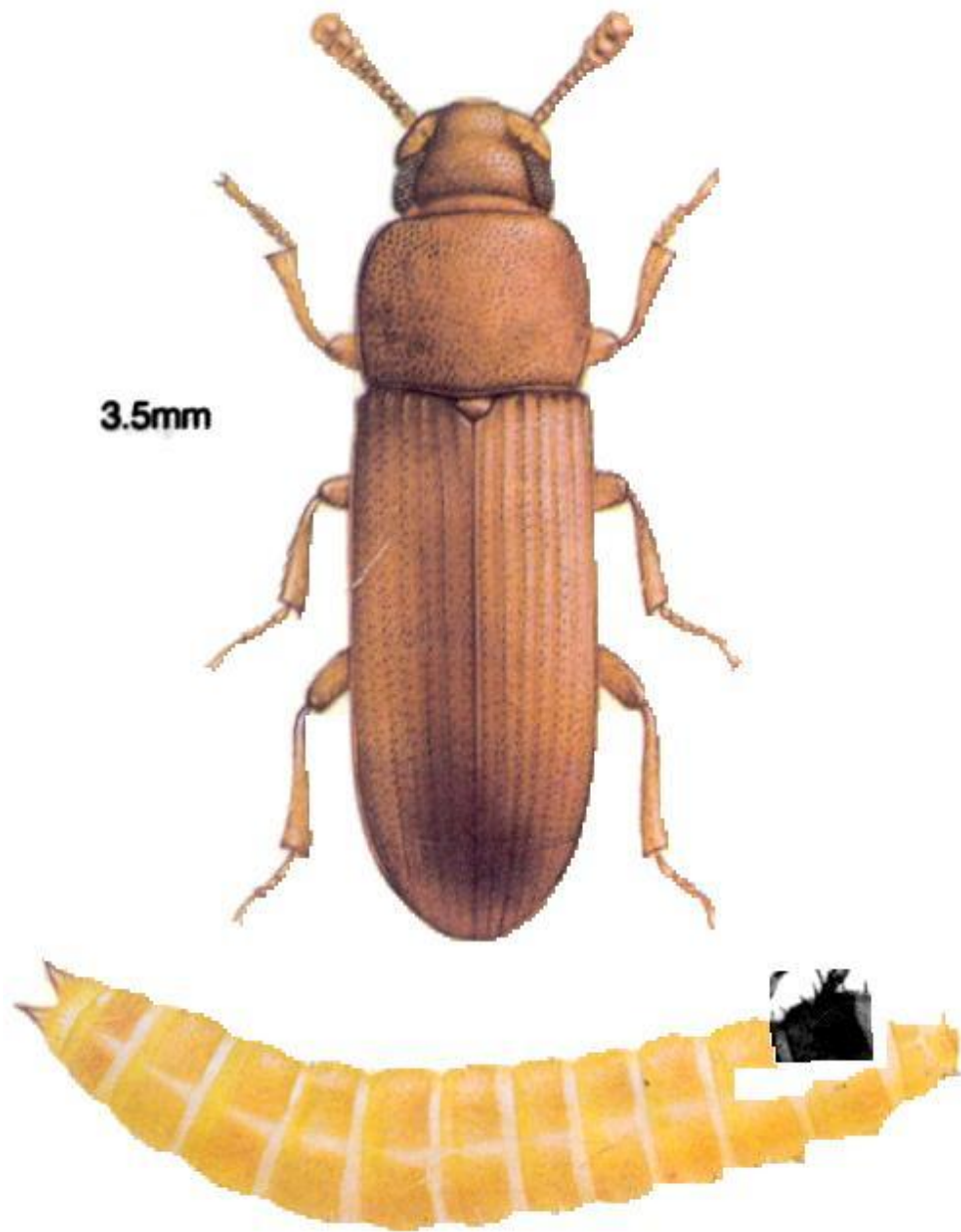
**Identification:-** This is one of the smallest of the grain-infesting beetles, but one of the most important. Adult beetle is cylindrical in shape and polished dark brown or black in colour. Its head is deflected downward and invisible when viewed from above. The average length is 3 mm and antenna is 3 segmented club.

**Commodity damaged:-** It is a serious pest of all cereals like wheat, paddy, rice, maize, jowar and barley. Both, larva and adult feed on the grain. Atta formation is the main symptom by which its infestation in the godown/warehouse can be easily detected. It is most serious in hot and dry conditions.

**Habits and life History :-** The adults are long lived, feed and 300 to 500 eggs may be laid by a single female singly or in cluster on the grain bags or on the surface of grain kernels. The thread like larva enters the grain kernel where it feeds the endosperm portion of the grain and completes its life cycle. Larvae are mobile while young but become immobile when older. It is a good flyer The adult insect comes out of the grain by making a hole. It is responsible for hidden infestation. Minimum life cycle is 25 days at 34 degree centigrade and 70% relative humidity. Temperature range is 20-38 degree centigrade and minimum 30 % r.h.

**(iii) Tribolium castaneum (Herbst)**

<b>Order</b>	<b>Coleoptera</b>
<b>Family</b>	<b>Dermestidae</b>
<b>Species</b>	<b>Tribolium castaneum (Herbst)</b>
<b>Common name</b>	<b>Red flour beetle</b>
<b>Hindi name</b>	<b>Aate Ka keet.</b>



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*Tribolium castaneum*

(Red flour beetle)

**Identification:** - The red flour beetle is reddish-brown in colour and its antennae end in a three-segmented club. The head of the red flour beetle is visible from above, does not have a beak and the thorax has slightly curved sides. Adult beetle is very active, flattened, moves fast and light reddish brown in colour. Length is about 3-4 mm. Antennae are with distinct 3 segmented club. The eggs are white, microscopic and often have bits of flour stuck to their surface. The slender larvae are creamy yellow to light brown in colour. They have two dark pointed projections on the last body segment.

**Commodity damaged:** - It is commonly found in broken cereals and their milled products like atta, maida and suji. It is also found in groundnut, oilseeds and feed mills.

**Habits and History:** - About 450 eggs are laid at random by a female over a period of many months. The larvae are creamy whitish in colour and cylindrical in shape. The egg to adult development is completed within 20 days. Damage is caused both by adult and larva. Life cycle is 57 days at 24 -30 degree centigrade and 66-92 % r.h. Temperature range is 15-32 degree centigrade and 40% r.h. Adults are long lived, can fly and feed.

**(iv) Trogoderma granarium (Everest)**

<b>Order</b>	<b>Coleoptera</b>
<b>Family</b>	<b>Dermestidae</b>
<b>Species</b>	<b>Trogoderma granarium (Everst)</b>
<b>Common name</b>	<b>Khapra beetle</b>
<b>Hindi name</b>	<b>Pai</b>



**Identification:-** Adult beetle is grey in colour, oval shape , small in size i.e 1.5 to 3.0 mm and brown in colour with irregular pale markings. Adult is short lived, flies, harmless and does not consume grain. The larva is wheat straw coloured and has dense hairs on its body. Khapra beetle is native of India.

**Commodity damaged:-** The larva damages mainly wheat grain .

**Habits and History:-** Being a primary pest, it starts damage from germ portion of the wheat grain. Larvae cast skins. It reduces the grain into the frass and excessive moulting creates contamination and loss of merchantability of the grain. Crowding of larvae create unhygienic conditions in the grain stores. Under unfavourable conditions can enter into diapause stage and can survive for several years. Minimum life cycle is 25 days at 32 degree centigrade and 70% r.h. and 4 years in diapause stage.

**(v) Oryzaephilus surinamensis(Linnaeus)**

<b>Order</b>	<b>Coleoptera</b>
<b>Family</b>	<b>Silvanidae</b>
<b>Species</b>	<b>Oryzaephilus surinamensis(Linnaeus)</b>
<b>Common name</b>	<b>Saw toothed grain beetle</b>
<b>Hindi name</b>	<b>Chawal ki sursuri</b>

**Identification:-** Adult beetle is a slender dark brown to grey colour beetle and 2.0 to 3.0 mm in size with characteristic teeth running down the pro-thorax ( six tooth like projections on each side of thorax).

**Commodity damaged:-** The larva and adult damage cereals mainly broken grains and other stored products/foods. Both make the grain surface rough.

**Habits and History:-** Being a minor pest, larvae feed on grain and germ. The saw toothed grain beetle lays its egg loosely (at random) on grain @ 6-10 eggs per day with total 370 eggs per female. Larvae are mobile and not concealed. Total life cycle may be completed in 20 -80 days at 33 degree centigrade and 80% r.h. Temperature range is 18-38 degree c and r.h. 10-90%. Adults are long lived, feed, can fly and walk long distance rapidly. It can enter into packaged food.

**(vi) Ephestia( Cadra)cautella (Walker)**

<b>Order</b>	<b>Lepidoptera</b>
<b>Family</b>	<b>Pyralidae</b>
<b>Species</b>	<b>Ephestia cautella (Walker)</b>
<b>Common name</b>	<b>Almond moth, Warehouse moth</b>
<b>Hindi name</b>	<b>Godam ka patanga</b>

**Identification:-** When fresh, wings are grey with vague darker markings. Larvae are light pink coloured with a small black spot at the base of each hair.

**Commodity damaged:-** It is a serious pest of cereals and cereal products and also infests the dried nuts/ fruits.

**Habits and History:-** Up to 300 eggs are laid at random by the female in 3-4 days. The life cycle is completed in 28 days at optimum temperature of 30 degree centigrade and 75 % r.h. Temperature range is 17-37 degree centigrade. Larvae are mobile and produce large quantities of silk webbings. Adults are short lived, do not feed and are active flier at dusk and dawn.

**(vii) Callosobruchus maculatus (Fabricius)**

<b>Order</b>	<b>Coleoptera</b>
<b>Family</b>	<b>Bruchidae</b>
<b>Species</b>	<b><u>Callosobruchus maculatus</u></b>
<b>Common name</b>	<b>Pulse beetle, Cowpea beetle</b>
<b>Hindi name</b>	<b>Dhora</b>

**Identification:** Adults weevils are about 3mm long, reddish brown slightly elongate beetles. Although weevil like but these are not true weevils. Wing covers (elytra) are marked with black and gray and there are two black spots near the middle. Eggs laid by female beetle hatch in 5 to 20 days.

**Commodity damaged:-** Pest of dried cowpeas, moong beans, soybeans, lentil and gram.

**Habits and History:-** Eggs are stuck out side of beans and pulses. Larvae on hatching bore in to seed and feed inside the whole pulse, taking 2 weeks to 6 months to develop before pupating there. Six or seven generations may occur per year. Adults may also attack the crop in the fields. Larvae chew near the surface and leave a thin covering uneaten which appears as a window. Later the adult emerges from the window. Adult is short lived and does not feed seed, runs quickly and flies very well. Life cycle is completed in 21 days at optimum temperature of 32 degree centigrade and 90% relative humidity. Range : Temperature 18-37 degree centigrade and 20-90% r.h.

**(viii) Latheticus oryzae (Waterh)**

<b>Order</b>	<b>Coleoptera</b>
<b>Family</b>	<b>Tenebrionidae</b>
<b>Species</b>	<b><u>Latheticus oryzae</u> (Waterh)</b>
<b>Common name</b>	<b>Long headed flour beetle</b>
<b>Hindi name</b>	<b>Aatekichhotisusri</b>

**Identification:-** It is a small yellowish brown beetle with flat slender body with parallel sides. The antennae are short with a five segment club on the end. Length is 2.5mm to 3mm. Larvae are elongate; light brown in colour and similar to Tribolium.

**Commodity damaged:-** It is a minor pest of cereal and their products especially in hot and damp climate. Under optimum conditions of temperature at 35 degree c and 85% r.h., the life cycle is completed in 22 days.

**Habits and History :-**The female lays about 300 eggs in her life at random. The eggs are sticky and adhere to flour or grain particles. The larvae are cylindrical and white and develop through 6 or 7 instars. The larva is mobile and pupates amongst the food source in a white pupa. Adults may live up to six months. They feed and can fly.

**(ix) Sitotrogacerealella (Olivier)**

<b>Order</b>	<b>Lepidoptera</b>
<b>Family</b>	<b>Gelechiidae</b>
<b>Species</b>	<b><u>Latheticusoryzae</u> (Olivier)</b>
<b>Common name</b>	<b>Angoumois grain moth</b>
<b>Hindi name</b>	<b>Anajkapatanga</b>

**Identification:-** The wings of this moth are pale grayish brown with black spot towards tip. It is smaller than other storage moths. Size is about 8-10 mm.

**Commodity damaged:-** It is a serious pest of whole cereals viz maize, paddy and sorghum and attacks grain even before harvest.

**Habits and History :-** The female lays about 100 eggs on grain surface. The larvae penetrate into the whole grain and feed the grain from inside. Larvae are immobile. Damage is caused by larvae only and adult moth is short lived and does not feed. It is a good flier. Minimum life cycle is 4 weeks at 30 degree C and 76% r.h.

5. **Grain Psocids:-** Grain Psocids are small in size, pale, long hair like antennae, belong to Liposcelis spp. Some are wingless other are having wings. These are scavenger and common pest found in grain stores. Most common in slightly damp stores/materials. Life cycle is 21 days at 30 degree centigrade and 70% r.h. Temperature range is 18-36 degree centigrade and minimum r.h. requirement is 60%. Eggs are laid at random. Nymphs are similar in appearance to adults but smaller and paler in colour. Adults are long lived, feed, runs rapidly in jerky manner.

6. **Control of stored grain insect pests:**

**A. Prophylactic control measures:**

Under prophylactic control measures, the crawling insect infestation in the warehouses/godowns is controlled by spraying effective prophylactic chemicals such as Malathion 50% EC and Deltamethrin 2.5% WP at recommended doses on walls, floor, alleyways and surface of grain bags. Malathion 50% EC is diluted with water in the ratio of 1: 100 and 3 liters emulsion is sprayed on 100 sq. mtr. surface area after 15 days interval. Similarly, 40 gms. of deltamethrin 2.5% WP is dissolved in 1 liter of water and 3 liters emulsion is sprayed on 100 sq. mtr. surface area after 90 days.

**B. Curative control measures:**

Under curative control measures, the insects are eliminated by using fumigants like Methyl bromide and Aluminum phosphide (phosphine) at recommended doses in a closed air tight storage system or under gas proof fumigation covers.

Aluminum phosphide at the dose of 9 gms. per tonne (for shed fumigation 63 gm per 28 cubic meter) is used under cover fumigation for the fumigation of foodgrains in FCI, CWC and SWCs godowns. The exposure period is generally 5 to 7 days. Proper sealing of covers is necessary to ensure that there is no leakage of phosphine gas. After exposure period, the stocks should be aerated for some time before issue/dispatch. The foodgrains should be properly aerated after fumigation and brushing of grain bags should be carried out to remove the residue of aluminum hydroxide.

Methyl Bromide is gas at room temperature and filled in steel cylinders in liquid form under pressure. Methyl bromide gas is odorless. Therefore, 2% Chloropicrin gas is mixed with Methyl bromide as warning agent. Methyl bromide at the dosage of 22gm per cubic meter is used under cover fumigation and exposure period is 48 hours. It should be used with proper gas mask and canister by trained persons only.

## **7. Rodent Pest Management:**

Rodents are serious pests of agriculture and stored food, deteriorogens of human and animal environment and transmit many diseases to humans and livestock. Globally, there are 1750 species of rodents which represent about 40% of total mammalian species. About 150 species occur in India and of these 18 species are pests. Rodents are vertebrate pests which belong to class Mammalia and have an external covering of hairs. Its Order Rodentia includes a large number of animals ranging in size from the smallest mice to as large as porcupine, squirrels and beavers etc. Rodents are easily distinguished from other mammals by the characteristics arrangement and form of their teeth. They have only one pair of chisel shaped incisor teeth in both the lower and upper jaws and no canines. The rodent incisors grow continuously throughout the animal's life @ 12.5 cms./year. According to Panse Committee's report, about 2.5% losses are caused due to rodents in storage annually. Rodents not only feed on grains but also contaminate 5 times more than what they consume with their droppings, urine, hair and even some times with their own dead bodies.

Some of the important rodents species, found in storage areas under:

### **House Rat**

Scientific Name	:	<b>Rattusrattus (Linn.)</b>
Common Name	:	House Rat, Roof Rat, Black Rat (Hindi : Chuha)

### **Nature of Damage**

It eats up all food materials and can damage wood, plastic, rubber and even soft metals also. It is responsible for plague.

### **Identification**

The important characteristics of black rat are as follows:

1. Soft grey to black coloured. Dorsal colour rufus; hairs on belly rough with rusty tinge.
2. It has small eyes, large sparsely hairy ears.
3. Snout is pointed.
4. Tail is thin uniformly dark coloured and is equal to the size of the body plus head.
5. Adult weighs from 150 to 200 gms.
6. Generally the droppings are found scattered and banana shaped.
7. Female has 10 mammae

## **8. Life History and Habits**

It breeds around the year with 5-7 litters per year, each having 6-14 young ones after a gestation period of about 25 days. Being nocturnal in habit, it can be seen rarely during day time. It is a good swimmer and good climber also. Life span is for 2 years in laboratory conditions, probably in field conditions for one year. It prefers to stay in dusty places. It is rarely found in sewers also. It rarely moves out of houses or crosses the big lanes. It can climb high to enter through roofs.



## House Mouse

Scientific Name	:	<b>Mus musculus</b> (Linn.)
Common Name	:	House mouse
		(Hindi : Chuhi or Chuhiya)

### 9. Nature of Damage

Their infestation imparts a typical smell to store rooms and stocks. They feed on cereals, cereal products, vegetables, meat, fats, carbohydrates etc. and can damage wooden furniture, paper, clothes, rubber, plastic and leather goods etc. They are responsible for contamination of food with hairs, urine, excreta, and also spreading Salmonella organisms responsible for food poisoning. They may cause virus infection not only by faecal infection but also by walking over the foodgrains etc. They are responsible for disease like ringworm.

### Identification

1. Colour is dark brown to sandy brown with smooth short hairs and under parts whitish to light grey.
2. Average weight is from 23 to 35 gms.
3. Tail is usually longer than head and body.
4. Rounded ears can be stretched upto eyes.
5. Female has eight mammae.
6. The droppings are scattered and spindle shaped.

### 10. Life History and Habits

Mating starts after 30-45 days of birth. Breeding is round the year with litters upto 8 per year and gestation period of approximately 19 days. Each litter size may be on an average 5.6. A female may become pregnant only two days after it has given birth. Freshly born young ones are naked and blind and are weaned for 3-4 weeks. It prefers to stay in holes in floors or under the boxes or any other dark place suitable for hiding. It is active during night but can be seen in day time also. Movements are almost like darting. Feeding is confined normally upto 10 meters.

It can penetrate into buildings easily even through holes less than 1.2 cm. size. A mouse consumes 3-4 gms. per day (approx. 22% of the body weight). It can jump upto a height of 25 cms.

## Norway Rat

Scientific Name	:	<b>Rattus norvegicus</b> (Birker)
Common Name	:	Brown rat, Sewer rat, Ship rat
		(Hindi : Videshi Chuha)

### Nature of Damage

Feeds on grain. It damages containers i.e. bags/cartons and pollutes grain with excreta, droppings and hairs. It spreads various diseases.

### Identification

1. Soft skinned brownish grey with whitish belly.
2. Its weight ranges from 200 to 300 gms.
3. Snout is wide and blunt.
4. Tail not uniformly tapered and shorter than head and body.

5. Ears are small, thick, furred, opaque and do not reach upto eyes when stretched.
6. It has 12 mammae.
7. Droppings are found in groups and spindle shaped.

## 11. Life History and Habits

It breeds round the year with 6-14 litters per year with a litter size of 5-7 young ones and a gestation period of 4 weeks. In one year 22 litters have been recorded in ideal conditions.

It is habituated of making burrows outside grain stored but often lives in sewers. The burrows are only on surface with two to five openings. Normally it stays within a radius of 25 to 30 meters. It can jump upto 60 cm. and is a good swimmer. Life span is for one year. So far it is confined to port towns mainly in sewers.

## 12. The Lesser Bandicoot Rat

Scientific Name      Bandicotabengalensis Gray and Hardwicke, 1833  
Hindi Name            Chhoti Ghoose

The lesser bandicoot rat is a large robustly built rat having a coarse dark olive- brown body. The body weight of adult rats range from 110 gms to 350 gms in females and 150 to 500 gms in males. It is found in damp fields as well as in godowns. They invade the agriculture crops and establish their burrows in the crop fields. They also make burrows in godowns near foundations. They hoard the grains in the burrows.

## 13. Rodenticides:

Compounds which kill the rats by their chemical action are known as rodenticides. These poisonous rodenticides can be divided into two groups:-

## 14. Single dose poison:

Zinc phosphide, Barium carbonate, Red squill and ANTU (Alpha naphthylthio urea) are some of the compounds which have been/ are being used as rat poisons. These are also called acute poisons as these are highly toxic in nature i.e. they show immediate fatal results. The defect of acute poisons is that these create poison shyness and bait aversion in rodents. Rodents are very suspicious to new objects (new object reaction) as well as to the new foods. Before the rats are given poisoned bait, plain baits i.e. eatable with some edible oil without poison is fed to rodents, for two days. This makes the rats habituated to feeding on that particular food. This process is known as pre-baiting. Next day the poisoned bait is placed in similar manner and on same locations instead of plain baits. Thus, a good kill is obtained.

### Preparation of bait:

$\frac{3}{4}$ Tea cup wheat flour/crushed foodgrains	-	96 gm.
$\frac{1}{2}$ Tea spoone any edible oil	-	2 gm.
$\frac{1}{2}$ Tea spoon Zinc phosphide	-	2 gm.
		<b>Total <u>100 gm.</u></b>

About 20 gms of the poisoned bait is kept in a paper plate or earthen pot at 4-5 places in a room or godown. Rats consume the poison bait and die immediately. The

dead rats should be collected and buried into the earth. Barium carbonate in 10-20% and RH 787 ( Vacor) in 0.5- 1.0% in bait form may also be used for rat control.

#### **15. Multiple dose (chronic poisons) or Anticoagulant:**

These rodenticides which are anticoagulant in nature (cause bleeding) are fed to rats in bait material continuously for 5-6 days. The rats are killed due to internal and external haemorrhage. The death occurs so slowly that the remaining population does not develop poison shyness. Among second generation anti-coagulants, Brodifacoum and Bromadiolone are used at 0.005% concentration for the control of rats with 1-2 days feeding period. Anti-coagulant baits are prepared as under:

##### **Bait material:-**

Sl. No.	Name of the item	Quantity required
1.	Anticoagulant (Warfarin, Fumarin in 0.025%)	25 gms (5 teaspoon full)
2.	Flour (cereal / millet)	450 gms (4 teacups full)
3.	Sugar or jaggery in powder	15 gms (3 teaspoon full)
4.	Any edible oil	10 gms (2 teaspoon full)

The four constituents are mixed thoroughly in a container. There is no need of mixing water. Prepared bait material (approx. 100 gms) is kept in 4 shallow vessels to facilitate rat feeding on rat runs, dark places where rats can consume bait without disturbance even during day time. Consumed baits should be replaced daily. Rats do not die immediately. They start dying after a period 6- 7 days. Dead rats should be buried. The baiting should continue for 21 days to get an effective kill.

Ready to use baits of second generation anti-coagulants are also available. These dry baits are coated with paraffin for use particularly in moist climate.

#### **16. Single dose anti-coagulants**

Single dose anti-coagulants such as Bromadiolone and Brodifacoum in 0.005% concentration in bait form can also be used for rat control. These are available in ready to use bait material (in cake forms) and are also used for the control of rats in houses and warehouses. Mix 20 gms of bromadiolone (0.25% a.i.) in 1 Kg of flour/cracked wheat, rice, millet or sorghum or their mixture containing sugar powdered and vegetable oil (96:2:2).

#### **17. Phosphine gas fumigation:**

Rodents in depots, fields and CAP complexes may be controlled by fumigating their burrows with aluminium phosphide. On the first day, all the burrows in the depot/ CAP premises should be closed. On the second day, live burrows would be found open. Aluminium phosphide pellets of 0.6 gms. are utilized for carrying out burrow fumigation. A simple rod like hollow bamboo or metal applicator is thrust deep into the burrows and two pellets (or half tablet of 3.0 gm) are put in each burrow. The burrows are sealed with mud. The liberated phosphine gas kills the rats in the burrows. This process may be repeated every month.

**18. Zinc phosphide poisoning symptoms:-** Zinc phosphide poisoning causes nausea vomiting, diarrhea, severe abdominal pain. This is followed by symptom free period of 8 hrs or longer. Symptoms of systemic toxic absorption then begin. There is again nausea and protracted vomiting, diarrhea, in the skin.

**Antidotes**

1. Gastric lavage using 1:5000 Potassium permanganate solutions.
2. Copper sulphate (0.2%) solution may act as emetic agent.
3. Beaten whites of 3 eggs may be given.
4. Fat or oil should be avoided by the victim.

**19. Anti-coagulants poisoning symptoms:** Inhibits clotting of blood which causes internal and external haemorrhage due to depressed formation of prothrombin and other components of the clotting mechanism such as factor VII.

**Antidotes:** Vitamin K is given orally or intravenous which is available in the market under trade mark Kaplin .

## **20. STORAGE FUNGI, THEIR SIGNIFICANCE AND CONTROL DURING STORAGE**

**Microorganisms associated with foodgrains:-**

Bacteria- Minute unicellular organisms, may enter through wounds or natural openings. Requires about 100% Relative Humidity (RH), e.g. *Clostridium bacillus* etc.

**Actinomycetes:-** Unicellular filamentous radiating colony, similar to Bacteria, usually saprophyte, grow where heating has taken place, inhalation of spores may cause lung disease. eg. *Thermoactinomyces vulgaris*, *Streptomyces* spp.

**Fungi:-** Most predominant group in stored grains which plays crucial role during storage

**Association:** Somatic body thread like hyphae constituting mycelium reproduce generally by spores more when wet weather coincides with harvesting. More than 150 species are associated. A group of living organisms devoid of chlorophyll – Saprophyte or parasite.

**Fungi can be classified:-**

**Field Fungi** - Infect seeds before harvest; require moisture content in equilibrium with RH of 90-100%. It may survive in dry grains for years, example *Alternaria*, *Cladosporium*, *Helminthosporium* and *Fusarium* etc.

**Storage Fungi** - Infect generally after harvest and during storage. It requires 70-90% RH, dormant spores on surface of seeds or mycelium below pericarp eg. *Aspergillus*, *Penicillium*, *Mucor*, *Rhizopus*, etc.

**Factors influencing development of Micro flora**

1. Moisture content and relative humidity (RH)
2. Temperature
3. Oxygen
4. Insect pests and Mites infestation
5. Foreign matter

**Moisture content-** Moisture content and relative humidity are directly related with the growth and development of micro flora. It determines the type of micro flora & rate of growth in the stored grains.

**Minimum requirement of Storage Fungi (at about 26-30°C)**

Fungus	Minimum RH%	MC in wheat, corn etc. %
<b>Aspergillus halophilicus</b>	68	12.5-13.5
A. restrictus	70	13.5-14.5
A. candidus	80	15.5-16.5
A. flavus	85	18.0-18.5

**Temperature** – Microorganisms can be classified into Psychrophilic, Mesophilic & Thermophilic, according to temperature requirement.

**Approximate temperature limits of common storage fungi.**

Fungus	Temperature in °C for growth		
	Minimum	Optimum	Maximum
<b>Aspergillus restructus</b>	5-10	30-35	40-45
A. glaucus	0-5	30-35	40-45
A. candidus	10-15	45-50	50-55
A. flavus	10-15	40-45	45-50
A. penicillium	-5-0	20-25	35-40

**Oxygen-** Fungi are strictly aerobic, fail to sporulate or spores fail to germinate when oxygen is less. At 60 or 90% CO<sub>2</sub> level, the production of Penicillic acid and Aflatoxin is inhibited.

**Insect-Pests and Mites Infestation** – Insects and mites may act as carrier or make conducive environment for fungal invasion. In an experiment, grain with 12.1% moisture content and 75% R.H. when un-infested, the M.C. rose to 14.6-14.8% after 3 months. Whereas, in similar conditions when the grain was infested with *S. granarius*, the moisture content rose to 17.6 % to 23.0% after three months storage.

**Foreign Matter** - Broken grains, grain dust, weed seeds, plant fragments, insect debris and soil etc. may differ in water activity and are good source for microbial development.

**Role in deterioration of food grains:** The harmful effects of storage and field fungi are:

- Discolouration
- Viability/germination loss
- Heating and mustiness
- Biochemical changes and quality loss
- Loss of dry matter
- Toxin production

**Discolouration** – It can be caused by both, storage and field fungi. Whole grains or germ and embryo portion may be affected. It may be superficial or internal infection like black tip and Karnal bunt. Development of “sick wheat” during storage is also associated with storage fungi like *A. restrictus*, *A. repens*, *A. candidus*, *A. flavus*, etc.

**Viability Loss** – It may be due to damage of embryo. In an experiment, stored peas lost germination capacity when invaded by **Aspergillus spp.** after 6 months whereas uninfected seeds retained 95% germination after 6 months period under similar conditions.

**Heating-** Temperature may increase locally in bulk grain due to seed and microbial respiration. Heating due to storage fungi may raise the temperature up to 70-75 degree Celsius. This may lead to ultimately bin burnt state resulting into charred grains.

**Biochemical changes and quality loss:** Enzymes secreted by associated fungi break down complex structures of protein (proteolytic changes) into polypeptides, simpler peptides and amino acids. Fat is broken down (lipolytic changes) into fatty acids and carbohydrates (saccharolytic changes) into glucose, thus, deteriorating the quality of the grains during storage.

#### **Toxin production:**

Toxins produced by fungi are called mycotoxins. Some of the mycotoxins are carcinogenic in nature i.e. produce cancer in human beings and animals. Production of mycotoxins depends upon species or strain and on ecological conditions especially food source, temperature & humidity. Storage fungi may produce toxins such as Aflatoxin, Ochratoxin and Citrinin etc. and field fungi may produce alimentary toxic aleukia (ATA)

Trichothecene (T-2) toxin, Vomitoxin etc. Maize, groundnut, copra etc. are more susceptible to Aflatoxin contamination. Maximum permissible limit under PFA Act in wheat and rice for Aflatoxin is 30 ppb and for DON toxin is 1000 ppb.

#### **The major fungi and mycotoxins:**

<b>Fungi species</b>	<b>Mycotoxins produced</b>
Aspergillus parasiticus	Aflatoxins B1, B2, G1, G2
A. flavus	Aflatoxins B1, B2
Fusarium sporotrichioides	T-2 toxin
F. graminearum	Deoxynivalenol (vomitoxin) zearalenone

#### **21. Control Measures:**

**Preventive Measures:** By creating non-congenial conditions for the development of fungi, their infection may be prevented. Mechanical damage, contamination before store should be avoided. The food grains should be cleaned, dried to safe moisture level and cooled before storage. Insect infestation should be controlled during storage. Moisture content should be less than in equilibrium with 70% R.H.

#### **Moisture content Equilibrium Value (at 27 °C and 70% r.h.)**

<b>Food grains</b>	<b>M.C.%</b>
Wheat, maize, sorghum	13.5
Paddy	15
Rice	13
Groundnut shelled	7.0
Cotton seed	10.0

**Temperature** - Lowering of grain temperature below optimum reduces the growth of fungi. With 15-16% moisture content at 12-15 °C, the storage fungi grow very slowly and at 5-8 °C, their growth is almost ceased.

**Physical Measures-** Microwave radiation and gamma irradiation are used for microbial control. Many countries have legalized the irradiation of food grains for feed and food.

## **Chemicals:**

- Several chemical preservatives have been tested. Propionic acid and combination of propionic acid and acetic acid are effective preservatives for high moisture grain and feed.
- Use of fungicides in the control of microbes in stored grains has number of limitations. Due a number of reasons such as toxicity to animals, excessive cost, difficulty in application, undesirable effect on processing quality, lack of adequate toxicity to storage fungi, fungicides cannot be mixed with foodgrains. Some fungicides have been tested successfully in seeds. Fumigants like ethylene oxide, methyl bromide, sulphur dioxide have been reported to inhibit proliferation and subsequent toxin production.

## **22. Cleanliness and hygiene in the warehouses:**

During storage, the foodgrains, and other agricultural commodities are deteriorated by physical and biological factors. These factors include moisture, temperature, insects, rodents, birds and storage fungi. Losses by these factors may be reduced to minimum level by maintaining cleanliness and hygiene in the warehouses. The following steps should be taken to ensure cleanliness and hygiene in the godowns/warehouses:

1. The floor space in the godowns/warehouses should be cleaned daily.
2. The stacks (foodgrains bags) should be brushed at weekly intervals and after every fumigation.
3. Cleanliness should be maintained in entire warehousing complex.
4. The sweepings including dead insects after spraying of insecticides and Fumigation should not be left in godowns/warehouses and should be immediately removed.
5. The waste material and dead stock items including used old gunny bags, wooden crates, polythene sheets etc. should not be stored in warehouse. These should be stored in separate rooms.
6. Spilled grain should be immediately collected, sieved and filled in grain bags (palla bags).
7. Timely prophylactic and curative treatments (spraying of chemicals and fumigation for insect pest control) should be carried out in the warehouses. Similarly, rodent control operations in and around warehouses should also be carried out as and when required and dead rats should be collected and buried in the earth.
8. Measures to check birds' entry in the warehouses should be carried out and these should not be allowed to contaminate the grain and other commodities with their excreta and dead birds.
9. Warehouses can be made bird proof by fixing wire meshes (size 0.6cm) on windows, ventilators and other possible entries. Polythene strips or nylon curtains may be used on doors of godowns / warehouses to check the entry of birds.
10. Proper and timely aeration which reduces the grain temperature and moisture and also eliminates the psocids infestation should be carried.
11. Warehouse official shall insure that vegetative growth, if any, is removed at periodical intervals to keep the premises free from birds, reptiles, rat burrows etc.
12. Warehouse shall insure that there are adequate light arrangements in the warehouse.

13. Warehouseman shall insure that all the drinking water coolers, drinking water taps are clean and hygienic and clean drinking water is available for its staff.
14. Warehouseman shall insure that all the pipes entering the warehouse are fixed with wire mesh properly to check the entry of rats.
15. All the roofs of the warehouses should be painted with waterproof material and should be leak proof.

During periodic inspection of goods/warehouses, official shall ensure that proper hygiene and cleanliness is maintained. Cracks and crevices should be got repaired. A location wise register about the cleanliness and hygiene in the warehouse should be maintained.



## CHAPTER – X

### 1. Food Safety and Standard Act, 2006 (Act No. 34 of 2006)

With a view to safeguard the health of consumers, to provide healthy and wholesome food items, to consolidate the laws relating to food and to establish the Food Safety and Standards Authority of India for laying down science based standards for articles of food and to regulate their manufacture, storage distribution, sale and import, to ensure availability of safe and wholesome food for human consumption and for matters connected therewith or incidental thereto the Government of India introduced the Food Safety and Standards Bill in the Parliament in 2006. The main aim was to frame an Act to make provisions for the prevention of adulteration in food items. *(As per clause 100 (a) of the Food Safety and Standard Act, 2006, the Prevention of the Food Adulteration Act, 1954" shall be substituted by reference to "the Food Safety and Standards Act, 2006". The Central Government by notification dated 04.08.2011 has repealed the PF Act, 1954).*

The Act is extended to whole of the country. Under the Act, the maximum limits of various refracton and adulterants in different food items have been fixed and a person may be prosecuted under the Act who is producing, storing or marketing adulterated food items. Under the Act, any material which is or could be employed for the purpose of adulteration is known as adulterant.

### 2. Foodgrains:

Foodgrains meant for human consumption shall be whole and broken kernels of cereals, millets and pulses. In addition to the under mentioned standards to which foodgrains shall conform, they shall be free from *Argemonemexicana* and Khesari in any form. They shall be free from added colouring matter. The foodgrains shall not contain any insecticide residues more than limits prescribed in the PFA.

#### (i) Wheat:

Wheat shall be the dried mature grains of *Triticumaestivium*Linn Or *Triticumvulgare*vill. *Triticum durum* Desf. *Triticumsphaerococcum*perc. *Triticumdicoccum*schubl, *Triticumcompactum* Host. It shall be sweet, clean and wholesome. It shall also conform to the following standards namely:-

(i)	Moisture	Not more than 14 percent by weight (obtained by heating the pulverized grains at 130 to 133 degree C for two hours)
(ii)	Foreign matter (Extraneous matter)	Not more than 1 percent by weight of which not more than 0.25% by weight shall be mineral matter and not more than 0.10 per cent by weight shall be impurities of animal origin.
(iii)	Other edible grains	Not more than 6 per cent by weight.
(iv)	Damaged grains	Not more than 6.0 per cent by weight including Karnal bunt affected grains and ergot affected grains shall not exceed 3.0 per cent and 0.05 per cent by weight, respectively.
(v)	Weevilled grains	Not more than 10 per cent by count.
(vi)	Uric Acid	Not more than 100 mg. per kg.
(vii)	Aflatoxin	Not more than 30 micrograms per kg(ppb).
(viii)	De-oxynivalenol (DON)	Not more than 1000 micrograms per kg(ppb).
Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 12 per cent by weight		

**(ii) Rice**

Rice shall be the mature kernels or pieces of kernels of *Oryza sativa* Linn. obtained from paddy as raw or parboiled. It shall be dry, sweet, clean, wholesome and free from unwholesome poisonous substance. It shall also conform to the following standards namely:

<b>(i)</b>	<b>Moisture</b>	Not more than 16.0 per cent by weight (obtained by heating the pulverized grains at 130 to 133 degree C for two hours).
<b>(ii)</b>	<b>Foreign matter (Extraneous matter)</b>	Not more than 1 per cent by weight of which not more than 0.25 per cent by weight shall be mineral matter and not more than 0.10 per cent by weight shall be impurities of animal origin.
<b>(iii)</b>	<b>Damaged grains</b>	Not more than 5 per cent by weight
<b>(iv)</b>	<b>Weevilled Grains</b>	Not more than 10 per cent by count.
<b>(v)</b>	<b>Uric Acid</b>	Not more than 100 mg. per kg.
<b>(vi)</b>	<b>Aflatoxin</b>	Not more than 30 micrograms per kg.
<b><i>Provided that the total of foreign matter, other edible grains and damaged grains shall not exceed 6 per cent by weight.</i></b>		

**Explanation:**

- (a) Foreign matter means any extraneous matter other than foodgrains comprising of;
- (i) " **Inorganic matter**" consisting of metallic pieces, sand, gravel, dirt, pebbles, stones, lumps of earth, clay and mud, animal filth and in case of rice kernels or pieces of kernels having mud sticking on the surface of rice and;
- (ii) " **Organic matter**" consisting of husk, straws, weed seeds and other inedible grains and also paddy in case of rice;
- (b) " **Poisonous, toxic and harmful seeds**" means any seeds which if present in quantities above the prescribed limit may have damaging or dangerous effect on health, organoleptic properties or ecological performance such as *Datura Fastuosa* Linn and *Stramonium* Linn, corn cockle and Akra (*Vicia* species);
- (c) " **Damaged grains**" means kernels or pieces of kernels that are sprouted or internally damaged as a result of heat, microbes, moisture or weather viz ergot affected grains and Karnal bunt affected grains.
- (d) " **Weevilled grains**" means kernels that are partially or wholly bored by insects injurious to rains but does not include germ eaten grains and egg spotted grains.

**(iii) Atta (Whole meal or resultant atta)**

<b>(i)</b>	<b>Moisture</b>	Not more than 14.0 per cent by weight ( obtained by heating the sample at 130 degree C – 133 degree C for two hours).
<b>(ii)</b>	<b>Total ash</b>	Not more than 2 per cent by weight (dry weight basis)
<b>(iii)</b>	<b>Ash insoluble in dilute HCl</b>	Not more than 0.15 per cent by weight
<b>(iv)</b>	<b>Gluten (not less than)</b>	6 percent ( on dry weight basis)
<b>(v)</b>	<b>Alcoholic acidity (with 90% alcohol) expressed as H<sub>2</sub>SO<sub>4</sub></b>	Not more than 0.18 per cent (on dry weight basis)
<b>(vi)</b>	<b>Rodent hair and excreta</b>	Shall be free from rodent hair and excreta

**(iv) Wheat flour or Maida**

<b>(i)</b>	Moisture	Not more than 14.0 per cent by weight (obtained by heating the sample at 130 degree C – 133 degree C for two hours).
<b>(ii)</b>	Total ash	Not more than 1 per cent by weight (dry weight basis)
<b>(iii)</b>	Ash insoluble in dilute Hcl	Not more than 0.10 per cent by weight
<b>(iv)</b>	Gluten (not less than)	7.5 per cent( on dry weight basis)
<b>(v)</b>	Alcoholic acidity (with 90% alcohol) expressed as H <sub>2</sub> SO <sub>4</sub>	Not more than 0.12 per cent (on dry weight basis)
<b>(vi)</b>	Rodent hair and excreta	Shall be free from rodent hair and excreta

If it is to be used for baking purpose, the following limits have been fixed:

<b>Name of the chemical</b>	<b>Maximum limit allowed (in ppm)</b>
Benzoyl per oxide	40
Potassium bromide	20
Ascorbic acid	200

**(v) Suji or Rava (Samolina)**

<b>(i)</b>	Moisture	Not more than 14.5 per cent by weight (obtained by heating the sample at 130 degree C – 133 degree C for two hours).
<b>(ii)</b>	Total ash	Not more than 1 per cent by weight (dry weight basis)
<b>(iii)</b>	Ash insoluble in dilute Hcl	Not more than 0.10 per cent by weight
<b>(iv)</b>	Gluten (not less than)	6 per cent ( on dry weight basis)
<b>(v)</b>	Alcoholic acidity (with 90% alcohol) expressed as H <sub>2</sub> SO <sub>4</sub>	Not more than 0.18 per cent (on dry weight basis)
<b>(vi)</b>	Rodent hair and excreta	Shall be free from rodent hair and excreta

3. Insecticide Tolerance Limits in PFA Act

As per PFA Act 1954, the amount of pesticide mentioned in column 2, on foodgrains mentioned in column 3 shall not exceed the tolerance limit prescribed in column 4 of the table given below:

<b>S. No. (1)</b>	<b>Name of the insecticide (2)</b>	<b>Food (3)</b>	<b>Tolerance limit in mg/kg(4)</b>
1	Aldrin, dieldrin	Foodgrains and milled Foodgrains	0.01
2	Carbaryl	Foodgrains	1.5
		Milled Foodgrains	Nil
3	DDT	-	-
4	DDVP	Foodgrains	1.0
		Milled foodgrains	0.25
5	Fenitrothion	Foodgrains	0.02
		Milled Foodgrains	0.005
6	Hydrogen Phosphide	Foodgrains	Nil
		Milled Foodgrains	Nil
7	Inorganic Bromide	Foodgrains	25
		Milled Foodgrains	25
8	Malathion	Foodgrains	4.0
		Milled Foodgrains	1.0
9	Phosphamidon	Foodgrains	0.05
		Milled Foodgrains	Nil
10	Pyrethrin	Foodgrains	Nil
		Milled Foodgrain	Nil
11	Chlrofenvinphos	Foodgrains	0.025
		Milled Foodgrain	0.006
12	Chlorpyrifos	Foodgrains	0.05
		Milled Foodgrain	0.01
13	Monocrotophos	Foodgrains	0.025
		Milled Foodgrain	0.006
14	Decamethrin/Deltamethrin	Foodgrains	0.5
		Milled Foodgrain	0.2

## CHAPTER XI

### 1. CLASSIFICATION OF FOODGRAINS

Foodgrains in storage shall be classified as Clear, Few and Heavy based on the presence of insect population as indicated below.

Classification	No. of insects
<b>Clear</b>	Lot completely free from any living infestation
<b>Few</b>	Lot having two living insects per 500 gms. of representative sample.
<b>Heavy</b>	Lot having more than two living insects per 500 gms. of representative sample.

### 2. BASIS OF CATEGORISATION OF FOODGRAINS DURING STORAGE

#### (i) Wheat/Milo/Jowar

The basis of categorization is by volume cum count method. From out of the sieved sample, 20 cc of representative sample may be measured out with the help of a measuring cylinder. This quantity shall then be analysed on a enamel plate for categorization of the stock. The weevilled grains as well as the touched/germ eaten grains shall be picked out and measured separately. If the percentage of weevilled grains alone by volume goes beyond 3.5% then the percentage of weevilled grains should be determined by count.

Category	Percentage of weevilled grains
<b>A.</b>	Upto 1%
<b>B.</b>	Above 1% and upto 4%
<b>C.</b>	Above 4% and upto 7%
<b>D.</b>	Above 7% and upto 10%

#### **Note:**

Touched/germ eaten grains though are not to be considered for categorization purposes but these shall be taken into account for the evaluation of the performance of the technical personnel responsible for the preservation of the stocks.

#### (ii) CATEGORISATION OF PADDY/BARLEY/BAJRA/MAIZE

The basis of categorization of Paddy, Barley, Bajra and Maize is the same as in the case of wheat except for incorporating the "designation" to indicate the intensity of slightly damaged/dicoloured kernels. Designation will be represented by addition 1.2.3.4 to the category as below. The categorization is to be done by the volumetric method in respect of above commodities except for maize where it is by count method.

Designation	Percentage of slightly damaged/dicoloured grains
1.	Upto 5
2.	Above 5 upto 10
3.	Above 10 upto 15
4.	Above 15 upto 20

The following illustration will elucidate how grains are to be categorized and designated:-

- (a) Grains with 1% of weevilled and 3% of slightly damaged/discoloured grains A 1.
- (b) Grains with 4% of weevilled and 12% of slightly damaged/discoloured grains B 3.
- (c) Grains with 7% of weevilled and 7% slightly damaged/discoloured grains C 2.
- (d) Grains with 10% of weevilled and 17% slightly damaged/discoloured grains D 4.

The designation should be done at the time of receipt and the process repeated at least once in three months.

### (iii) BASIS OF CATEGORISATION OF RICE DURING STORAGE

<b>CATEGORY 'A'</b> Raw rice Parboiled rice	<b>DAMAGED GRAIN</b> Upto 3% Upto 3	<b>DISCOLOURED GRAIN</b> Upto 3% Upto 3%
<b>CATEGORY 'B'</b> Raw rice Parboiled rice	<b>DAMAGED GRAIN</b> Above 3% and upto 4% Above 3% and upto 4%	<b>DISCOLOURED GRAIN</b> Above 3% and upto 5% Above 3% and upto 5%
<b>CATEGORY 'C'</b> Raw rice Parboiled rice	<b>DAMAGED GRAIN</b> Above 4% and upto 5% Above 4% and upto 5%	<b>DISCOLOURED GRAIN</b> Above 5% and upto 7% Above 5% and upto 7%
<b>CATEGORY D</b> Lot showing appreciable quantity of loose bran (more than 0.5%) or giving unpleasant smell in respect of raw and parboiled rice. 'D' category rice should be issued after cleaning where necessary.		

### 3. Management of Damaged Goods in the Warehouse:

**(I) Damaged Goods Identification:** Goods may be identified as damaged at the time of receipt in the warehouse, during the course of inspection and at the time of issue.

In case the goods are not found conforming to the prescribed quality standards at the time of receipt, these should not be accepted for storage in the warehouse. In case the goods are found damaged during the course of inspection or at the time of issue, the reasons for their damage should be investigated and immediately all possible measures should be taken to ensure that further damage to goods is checked.

Salvaging and segregation of damaged goods should be carried out immediately. Testing of salvaged as well as damaged goods should be carried out carefully. Damaged goods should be stored separately in the warehouse with clear marking of "Damaged Goods and not for Issue". These damaged goods should not be issued for public consumption/marketing.

**(II) Handling of Damaged or Deteriorated Goods under Storage:** If during periodic inspection of goods in storage, it is observed that these have been damaged or deteriorated either due to packaging failure, infestation, moisture absorption or due to natural calamity like fire, flood, excessive rain, etc, these shall be handled as under:

- a) Segregate the damaged goods and determine possibility of salvaging. In case it is possible to salvage, carryout the same under intimation to depositor/holder of goods and insurance company.
- b) Salvaged goods shall be tested for suitability before acceptance. Similarly, damaged goods shall be tested before declaring non recoverable damaged. Records of such testing shall be maintained.
- c) Salvaged goods shall be kept in separate stacks with proper identification in the "Stack Card" clearly indicating the parent stack(s) details.
- d) Damaged goods shall be kept separately to prevent mix up with acceptable goods. All damaged goods shall be stacked and marked "**NOT FOR ISSUE**". There shall also be identification of goods description and quantity on each such stack. Warehouse shall maintain record of "Damaged Goods Records".
- e) If the damaged goods requires immediate disposal, dispose of the same as per Warehousing Development and Regulatory Authority (Sales and Disposal of Goods) Regulations, 2011.

**(III) Handling of Damaged Goods at the time of Delivery:** If at the time of delivery, it is observed that goods have been damaged or deteriorated either due to packaging failure, infestation, moisture absorption, these should be handled as above. In case of partial delivery, review the entire stock for damage and decide if it requires immediate disposal. Communicate this fact to the depositor and take action on disposal of the same as per Warehousing Development and Regulatory Authority (Sales and Disposal of Goods) Regulations, 2011.

**(IV) Handling of Damaged Goods not lifted by customer after expiry of NWR.**

The procedure for disposal of damaged goods not lifted by depositors/ holders of NWRs should be followed as per Regulations mentioned above.

## CHAPTER XII

### 1. Warehouse Personnel Safety System:

#### (I) Precautions in the use of storage pesticides, first aid measures and antidotes:

A number of pesticides such as Malathion, DDVP, Aluminium phosphide, Methyl bromide, Zinc phosphide and anti-coagulants are used in the warehouses for the control of stored grain insect pests and rodents. All these pesticides are highly poisonous chemicals and toxic to human beings and animals. These pesticides should be used with due care. Their careless handling may cause serious pesticide poisoning. Some of the important precautions to be taken while handling these pesticides are as follows:

1. Always read the instructions printed on the label of the pesticides and follow them.
2. A separate pesticide stock register and a pesticide consumption register should be maintained in the warehouses.
3. All the pesticides should be kept under lock and key.
4. Pesticides should not be stored with food and feed items.
5. During the use of pesticides in the warehouses, protective clothing viz hand gloves, aprons, goggles, rubber boots and gas masks should be used by the operators.
6. Hands and other parts of body should be thoroughly washed with soap and water after using the pesticides.
7. The empty containers of the pesticides should be dumped into the earth and these should not be used for storage of food items.
8. Drinking, smoking and eating should be strictly prohibited during the use of pesticides.
9. The nozzle of the sprayer should not be cleared and blown with mouth.
10. A first aid box should be kept in the warehouses.

If the warehousemen take all these precautions, the poisoning of pesticides may be avoided. But sometimes due to accident or some or other reasons, pesticide poisoning may occur. In such cases, first aid measures should be immediately taken to minimize the toxic effect of poisoning of pesticides. Some of the important first aid measures are as follows:

- (i) Immediately remove the patient from the godown or warehouse to open place and he should be allowed to rest in the open.
- (ii) The patient should be induced vomiting so that the pesticide may come out from the stomach and may not cause damage to the vital part of the body. For vomiting, common salt or powdered mustard seed along with plenty of water may be used.
- (iii) The patient should be carried to nearest hospital or some doctor.



## **(II) Symptoms of pesticide poisoning:**

The symptoms of pesticide poisoning of some of the pesticides and their antidotes are given below:

### **(III) Organophosphorous insecticides (Malathion, DDVP):**

All organophosphorous insecticides such as Malathion, DDVP etc. are poisonous chemicals. Nausea (feeling of vomiting) is the first poisoning symptom of all organophosphorous insecticides. It is followed by vomiting, diarrhoea, headache, giddiness, vertigo and weakness. There may be difficulty in breathing and disruption of nerve functioning. Death may be caused by anoxia (lack of oxygen).

**(IV) Antedotes:** Atropine sulphate is the specific antidote of organophosphorous poisoning. This may be given in repeated doses of 2-4 mg at 5-10 minutes interval. 25-50 mg atropine sulphate may be given in a day.

**(V) Aluminium phosphide:** The poisoning symptoms are feeling of fatigue, buzzing in ears, nausea, pressure in chest, intestinal pain diarrhoea and vomiting. Oxygen therapy should be provided to the patient and drugs which stimulate blood circulation should be given. Stomach should be washed with 0.1% solution of potassium permanganate. Blood transfusion or infusion of glucose in the blood is recommended.

**(VI) Zinc phosphide:** Stomach should be washed with 0.1% solution of potassium permanganate. The small amount of copper sulphate solution in water (0.2%) should be given to the patient which will neutralize the effect of zinc phosphide.

**(VII) Anticoagulant rodenticides:** Vitamin K is the antidote of all anticoagulant rodenticides.

**(VIII) Universal Antidote:** A universal antidote consisting of activated charcoal, tannic acid and magnesium oxide may be given in all types of pesticide poisoning. 3 gm of activated charcoal, 3gm of tannic acid and 4 gm of magnesium oxide may be given with one glass of water.

## **2. Warehouse Security Management:**

The warehouse shall have fool proof security arrangements and round the clock security guards. Number of security guards shall be as detailed below:

**Table Showing the Minimum Security Guard Requirements**

Storage capacity of warehouse(in MTs)	Up to 5000	5001-10000	10001-25000	Above 25000
Security Guards	4	4	6	8

Warehouse shall ensure that the security guards are equipped with appropriate paraphernalia required for guarding the warehouse. In case the warehouse has subcontracted the security services, warehouse official shall ensure the requirements are fulfilled. Warehouse official shall ensure that the security guards are placed on rotational duties as far as possible. Warehouse official shall ensure that security guards are adequately trained in terms of following aspects:

- Adequate patrolling.
- Reporting of suspicious activities to the management.
- Handling of communication equipment.
- Handling of safety equipment.
- Details of local police, fire brigade and civic authorities to handle contingency.

Warehouse should register the details of all the vehicles / personnel entering or exiting the premises of warehouse. The warehouseman shall ensure that all the important keys are kept in a safe custody and only authorized personnel have access to withdraw the keys. The warehouseman shall ensure that before closure of the office, the number of keys is verified and in case of any deviation, appropriate actions shall be taken.

### 3. Fire Fighting System:

The warehouseman shall ensure that the facilities and the stocks stored therein are well protected from losses due to fire hazards. Warehouse security shall ensure that no personnel entering in its premises carry any match box, gas lighter, chemicals and inflammable items which can cause fire. Warehouse official shall take precautions to avoid any outbreak of fire in the premises. "No Smoking" sign boards shall be displayed at the prominent locations. To determine fire fighting facilities required in a warehouse "National Building Code 2005" - Part 4 - fire and life Safety may be referred.

Warehouse shall use the following BIS old table and mobile extinguishers in case of different types of fires:

IS 940:1989	Portable Fire Extinguishers Water Type (Gas Cartridge)
IS 2171:1985	Portable Fire Extinguishers Dry Powder Type (Cartridge)
IS 2878:1986	Fire Extinguishers Carbon Dioxide Type (Portable and Trolley - Mounted)
IS 6234:1986	Portable Fire Extinguishers Water Type (Stored Pressure)
IS 10204:1982	Portable Fire Extinguishers Mechanical Foam Type
IS 10658:1983	Higher Capacity Dry Powder Fire Extinguishers (Trolley-Mounted)
IS 11833:1986	Dry Powder Fire Extinguishers for Metal Fires
IS 13385:1992	Specifications for Fire Extinguishers 50 litre Wheel-Mounted Water type (Gas Cartridge)
IS 13386:1992	Specifications for Fire Extinguishers 50 litre Mechanical Foam Type
IS 13849:1993	Portable Fire Extinguishers Dry Powder Type (Constant Pressure)

Warehouse shall have adequate number of fire fighting extinguishers of appropriate type, fire buckets with sand and water. The capacity wise requirement of fire extinguishers and fire buckets is given below:

S.No	Capacity of Godown	No. of fire extinguishers to be provided	No. of fire (sand) buckets to be provided
1.	Upto 1,500 MTs	3	15
2.	Above 1,500 MTs and upto 3,000 MTs	4	20
3.	Above 3,000 MTs and upto 5,000 MTs	6	30
4.	Above 5,000 MTs and upto 10,000 MTs	8	40
5.	Above 10,000 MTs and upto 15,000 MTs	10	50
6.	Above 15,000 MTs and upto 25,000 MTs	15	75
7.	Above 25000 MTs	25	125

In case the hazardous and extra hazardous goods are stored in the warehouse, the number may be doubled.

**4. Water storage tank along with jet pump:** For a 10,000 MTs warehouse, a water storage tank of 1 lakh litter capacity with 24 hrs availability along with to fire jet pumps throwing water upto 30 to 40 meters with a speed of 300 to 700 litter water per minute is advised.

**5. Training in Fire Fighting:** The warehouseman and other staff of the warehouse should get training on the basic principles and general procedure of fire fighting in a warehouse. Warehouse official from time to time shall ensure that all the fire fighting equipment and devices installed in the premises are in working condition. A separate register to this effect should be maintained in the warehouse and mock fire fighting drills at frequent intervals should be carried out. Warehouse shall ensure that addresses and telephone numbers of fire station, police station, warehouse official shall be displayed at conspicuous places so that in case of emergency, the authorities may be contacted without any delay.

**5. Warehouse Laboratory:**

A Warehouse shall maintain a small physical analysis laboratory for testing the quality of the agricultural commodities/ goods stored in the warehouse. The list of equipment and other items required in the laboratory are given in the Annexure-III. Laboratory shall preserve the healthy samples of commodities stored in the warehouse as long as the commodity is stored in the warehouse. Warehouse shall ensure that only designated trained personnel are deployed for the weighment/sampling/inspection/testing/grading activities. Laboratory personnel may be trained from some organization accredited to carry out trainings. The records of the competency of the personnel performing analysis work in the laboratory shall be available within the warehouse. Laboratory shall ensure that the instruments which are not in working condition shall be legibly marked or isolated to avoid any unintended use. Laboratory shall maintain suitable environment for inspection/testing activities as well as for preservation of samples.

In case some inspection/testing facility is not available in the warehouse laboratory, the samples shall be sent to an accredited laboratory for inspection/testing. The records of inspection / testing from the external lab shall be maintained by the warehouse.

## CHAPTER XIII

### 1. WAREHOUSE MANAGEMENT SYSTEM

This chapter has two sections namely:

- a) Core Processes
- b) Management Processes

**a) Core Processes:** These are the processes which are related to understanding and receiving requirements of depositors. These activities in the warehouse enable delivery of services to the customers. The processes are:

- Registration of depositors
- Process of receipt of goods in the warehouse
- Sampling, inspection and grading of goods
- Delivery of goods to depositors / holders of NWR
- Negotiable warehouse receipt management
- Storage of goods
- Extension of storage period
- Periodic inspection of goods and physical verification of stocks
- Insurance and insurance policy management
- Sale and disposal of goods

**b) Management Processes:** These processes enable efficient management of the warehouse. These primarily include planning for resources, monitoring and measurement of core and support processes and feedback received from depositors to improve the warehousing services. These include:

- Accreditation of warehouse with accreditation agency
- Warehouse registration with the WDRA
- Control of documents and records by warehouse
- Corrective action process
- Internal audit / inspection system
- Performance review
- Disputes settlement
- Process of periodic report to Authority

**a) Core Processes:**

**(i) Registration of Depositors:** Each depositor shall be registered by the warehouse and given a unique identification which shall be used by depositor for future references. A depositor registration form along with depositor's specimen signature card shall be given to the prospective depositor willing to keep goods in the warehouse. The following information shall be used by the warehouseman to evaluate correctness and completeness:

- a) Depositor's name with identity proof
- b) Complete postal address of depositors with proof
- c) Photograph of depositor (self-attested)
- d) Acceptance of terms and conditions of storage of goods by the depositors
- e) Specimen signature of depositor

**(ii) Receipt of goods in the warehouse:** The depositor or his authorized agent desirous of depositing the goods in the warehouse shall be advised to submit their request in a deposit application. After verifying the availability of space for the goods, the warehouseman will allow the entry of the goods in the warehouse.

- (iii) **Weighment of goods accepted:** The goods accepted to be stored in the warehouse shall be verified for weight of the goods. Goods can be accepted by random sample weighment if packing of the goods is in standard packs, or on 100% weighment basis by trained weighers who shall affix his signatures and record the weight in the deposit application form. If there is no weighment facility available with the warehouse, a list of approved weighbridges shall be maintained within the vicinity of 10 km. or nearest of the warehouse from where weight of the goods shall be got checked in presence of trained weigher of the warehouse. After goods have been accepted and unloaded in the warehouse, tare weight of the empty truck shall be taken and weight of containers / bags and net weight of the goods received would be calculated as follows:

Net Weight = Total weight of truck (weighed on receipt in warehouse) – Tare weight of truck (weighed on exit) – Material not accepted for storage – Weight of packaging / Bags. The net weight of goods received would be entered in the deposit application, stack card and NWR.

- (iv) **Sampling:** Goods received shall be evaluated for quality in terms of classification and grade as applicable by taking sample from the goods as prescribed in the Manual. Minimum three samples shall be drawn by trained sampler for testing and used as under:

- First Sample: For testing in the laboratory (Internal or External as applicable) for determining the grade of the goods.
- Second Sample: To be stored in the warehouse till the complete material is issued to the depositor / warehouse receipt holder
- Third Sample: To the depositor of the goods.

Each sample drawn would have a proper sample slip bearing the name and location of warehouse, name of the commodity, date of drawing sample, godown or shed no., stack no. and signature of the person who has drawn the sample. The samples along with sample slips would be properly sealed affixing the seal of the warehouse/warehouseman.

- (v) **Valuation of Goods:** The valuation of commodities shall be done in line with the current wholesale price of the produce in the nearest wholesale market. If the produce and that variety / grade of produce is actively traded in the local market, the same will need to be documented in "Goods Market Price Record", whenever a new deposit is accepted. A Market Bulletin depicting the market price of various commodities shall be maintained in the warehouse.

In case, the produce / grade of produce is not traded in the local wholesale market, then the wholesale market rate of that product in the market in which it is actively traded shall be taken for valuation.

- (vi) **Insurance of Goods:** Before transferring the goods to godown, warehouse personnel shall ensure that goods are insured from Insurer.

- (vii) **Stacking of Goods:** For each consignment of goods received from a depositor and accepted for storage, location in terms of godown number and designated location (stack, bay, etc. as applicable) in the godown shall be identified and recorded in the deposit application. During the process of unloading of goods from vehicle of depositor in godown, the condition of the packaging of the goods (containers / bags) shall be evaluated. The goods which have been

damaged or are unworthy for storage shall be removed and may not be accepted for storage. Details of such damaged or storage unworthy goods shall be recorded in deposit application.

If during the storage of goods, it is observed that the packaging / bags are damaged / non-standard and can be accepted by changing the packaging / standardization, it can be carried out with the consent of the depositor. Record of such standardization / change of packaging and loss, if any during the standardization shall be recorded in "Record of Standardization" and deposit application.

All the goods stored shall have a tag attached to each stack / lot containing details of the goods (i.e. net weight, number of bags, containers, grades, classification, moisture contents-where applicable) as per stack card. If a depositor wishes to provide private mark on the goods or packages, it shall be allowed except in case of fungible products. A godown wise stock register of commodities would be maintained by the warehouseman. The details of goods received would be entered in the depositor's ledger. The warehouseman would maintain a daily record of all the transactions in the warehouse in the relevant registers.

**(viii) Sampling, Inspection and Grading of Goods:** Sampling, inspection and grading shall be carried out at following stages:

- a) On receipt of the goods from depositor
- b) During storage to evaluate changes in quality of the goods, if any
- c) Upon extension of storage period
- d) On issue of the goods to depositor / holder

A proper record of grading of goods would be maintained by the warehouseman and would also be recorded in the stack card.

The warehouse official will ensure de-stacking and loading the truck after counting the number of bags / packages and make entries in goods withdrawal application form. The warehouse official will also make entries in the stack card & godown-wise stock register along with his signature.

The warehouse official shall work out weight of empty bags / packages and enter the details in the goods withdrawal application form. The gross weight of the vehicle duly loaded with goods shall be got done and recorded in goods withdrawal application form. The net weight of the goods shall be calculated as follows and recorded:

Net Weight = Total Weight of Truck (Weighed at the time of delivery) – Tare Weight of Truck (Weighed at entry) – Weight of Packaging / Bags.

Shortage / excess of weight are determined based on difference of weight of goods received and issued. Shortage loss / excess in agri- products shall be permissible @ 0.7 kg. per 1% change in moisture content. However, loss in goods due to damage in storage, spillage, improper handling or storage condition, infestation of goods, theft and accident shall be on account of warehouse. Warehouse management shall be responsible to compensate the depositor / holder of NWR for the lost value which shall be calculated on the

basis at which goods were received. Warehouse shall maintain a storage loss / gain register.

- (ix) Goods Delivery:** The warehouse official shall handover the second copy of goods withdrawal application form to the depositor / holder / vehicle driver after taking their concurrence and retain original in the warehouse. The warehouse official shall update the following records:
- a) Godown-wise stock register.
  - b) Depositor's ledger.
  - c) Daily discharge report.
  - d) Daily transaction record.
  - e) Goods-wise stock register, as applicable.

### **Warehouse Receipt Management**

#### **Receipt of NWRs from WDRA & their issue control:**

This section addresses methodology of receipt of NWRs books from the WDRA and their internal issue control.

- (a) Warehouseman shall send a formal request to the Authority for issue of NWRs books through formal application.
- (b) It is suggested that warehousemen should have a stock of 30 days of NWRs while sending request to WDRA for issue of NWRs.
- (c) Only warehouseman or his authorized person shall sign the application to be sent to the WDRA for getting NWR books.
- (d) On receipt of NWRs from the WDRA, the details of the same shall be recorded in "NWR books stock register" and it shall be updated whenever a book is issued for use in the warehouse.

#### **Issue of NWR to Depositor**

The warehouseman shall issue separate NWR for each grade and standard of packing of goods. To prevent any fraudulent tampering of NWR, warehouse officials shall take following actions:

- a) Affix transparent adhesive tape on columns of weight, no of packages / bags and valuation of goods
- b) Do not leave any space for prefixing and suffixing of words and figures of number of packages/bags, weight and valuation.

**NWR Issue Record:** The warehouseman will maintain a proper and daily record of NWR issued in his warehouses.

**Endorsement of NWR:** Whenever a communication is received from the holder regarding endorsement of NWR, the warehouseman will ensure that the following information is available with the request:

- a) Photocopy of the NWR duly containing name of the endorsee and date of endorsement by the holder
- b) "NWR Endorsement Request" form duly signed by the holder and endorsee

In the following events, the warehouseman may reject the NWR endorsement request and communicate to the holder and endorsee:

- a) Name of the endorsee does not match with name given in NWR endorsement request and/or
- b) Signature of the holder does not tally with the "depositor / holder specimen signature card" or previous NWR Endorsement Request Form.

In case the endorsement has been found in order, the photocopy of the NWR containing the name of endorsee (new holder) of the goods should be attached along with the second copy of NWR maintained in the warehouse. The depositor's ledger & negotiable warehouse receipts endorsement record should be updated accordingly.

### **Lien of Goods**

When a depositor / holder or bank approaches the warehouse w.r.t. value of the goods lying in the warehouse and proposed to be pledged, the warehouseman should confirm the lien value to ensure that it does not exceed the value of goods given in NWR. The warehouseman should evaluate the bank lien / notice submitted for pledging of goods in terms of completeness and if satisfied, he should enter the details in NWR Bank lien register. Whenever NWR is discharged, it may be ensured that bank lien is fully discharged and NWR bank lien register is updated.

In case, the depositor does not pay the lien amount, the warehouse has right to dispose of the desired quantity of the goods to recover the lien amount. The process of such disposal shall be in accordance with the Warehousing Development and Regulatory Authority (Sales and Disposal of Goods) Regulations, 2011 and the warehouseman shall maintain the records of disposal of such goods.

If any dispute on bank lien with the depositor / holder of NWR, cannot be resolved mutually, the matter may be referred to the Authority for arbitration.

**Partial Withdrawal of Goods:** When a NWR holder approaches the warehouseman for partial withdrawal of goods, the warehousemen shall:

- a) Receive "Goods Withdrawal Application" from the holder.
- b) Verify the signature of depositor / holder from the specimen signature card and latest NWR endorsement request form, as applicable and ensure that the signature should tally.
- c) Verify that goods under withdrawal are free from any lien. In case, they are under lien, ensure that bank has discharged the lien.

If details are satisfactory, the warehouseman shall allow withdrawal of goods and would update NWR bank lien registers, if goods are under lien.

**Discharge of NWR:** When a holder approaches the warehouseman for discharge of the NWR, the following exercise shall be carried out:

- a) "Goods withdrawal application" from the holder would be received.
- b) The signature of the depositor / holder would be verified.



c) Verification that the goods are free from any lien would be carried out.

If details are satisfactory, the warehouseman shall allow discharge of NWR. The original NWR shall be cancelled by crossing two parallel lines on the face of the NWR and entering the words "cancelled" inside those lines. The cancelled NWRs shall be retained in safe custody of the warehouseman.

**Storage of Goods:** The warehouse shall preserve all the commodities received from the depositors, and till the time the same are handed back to the depositor / holder or to any personnel authorized by them. Rated storage capacity of a warehouse shall be calculated based on 100 Kg. of wheat occupying 0.56 sq. mt. carpet area stacked upto 18 layers high (4.6 meter). While lifting powdered material, the hooks will not be used to avoid spillage.

Appropriate stacking / storage of stocks shall be ensured to avoid damage to the stocks while in the custody of the warehouse. This shall be ensured as detailed below.

### **Stack Planning:**

a) Stack planning shall be done according to the floor area. Recommended standard size of stacks are given below:

Sl.No.	Stack Size
1	9.144 m x 6.090 m
2	6.400 m x 6.486 m
3	5.486 m x 5.486 m
4	3.657 m x 5.486 m

The warehousemen may choose to have different size depending upon span of warehouse for optimum space utilization.

b) Stack plan shall be prepared in such a manner that the stacks shall not obstruct light and free flow of air into godowns. Besides, the stacks may be covered with fumigation covers for curative treatment.

c) A minimum of 0.75 mt wide space between stacks, 0.6 mt between wall and stack and 1.20 mt between door points as haulage alleyway shall be provided for operational purpose.

### **Stacking**

a) Stacking of commodities in bags / containers / packages shall be done in the identified stacks on a suitable available dunnage material viz, bamboo mats, polythene sheet, wooden crates, poly pallets, etc.

b) Stacks shall be built in straight line uniformly within the stack area earmarked by stack lines.

c) Stack card with necessary entries shall be provided on every stack on haulage alleyways side.

### **Stack Lines**

a) Each stack shall be identified by drawing a 5cm width stack line in yellow or white colour on all four sides of the floor of the godown as per stack plan.

b) Each stack shall be given stack number neatly painted on the floor / wall / pillar in front of each stack.

### **Recommended Type of Stacks, Dunnage & Special Treatment before Acceptance:**

a) **Block stacking:** For the goods, where part withdrawal is expected, block stacking shall be used. In block stacking, each layer has tiers of length-wise and breadth-wise

bags alternating to form the block. In any two adjacent layers, this system of length-wise and breadth-wise will be reversed.

b) **Criss cross stacking:** For the long storage goods, criss cross stacking is recommended. In this process, bags are laid in complete length-wise or breadth wise tiers in alternate layers (Preferred for single commodity to be kept under long storage).

c) Immediate curative treatment shall be done, in case the goods with infestation are accepted. Such goods shall be stored in isolation shed so that the infestation may not spread. Records of such treatment shall be maintained in special conditions of "deposit application"

### Height of the stacks:

The height of the stack shall be decided on the basis of goods, size, weight, shape, strength of the packing to stand the height of the stack. Goods-wise maximum stacking height is mentioned below:

Sl. No	Commodity	Maximum Stack Height up to	
		In layers	In Meters
1.	Wheat	18	4.6
2.	Barley	18	4.6
3.	Paddy	18	4.6
4.	Jowar	18	4.6
5.	Whole Pulse	16	4.2
6.	Maize	16	4.2
7.	Rice	16	4.3
8.	Milled Pulses	12	3.0
9.	Oil tins (4 gallons tin)	2	4-3.0
10.	Oil drums	2	2.1
11.	Oil seeds & Oil cakes (except groundnut kernels)	15	3.7-4.3
12.	Groundnut Kernels	12	3-3.7
13.	Cashew kernels	12	3-3.7
14.	Sugar	12	3-3.7
15.	Coffee pods	14	3.7 - 4.3
16.	Cotton bales	3-4	3.0-3.7
17.	Chilles in bags	3-4	2.4-3.0
18.	Chilles in docras	10-12	3.0
19.	Jaggery lumps	8 Kattas	1.8
20.	Tamarind	4 Kattas	1.5
21.	Wheat Atta	12	3.0
22.	Chillies in Bags	3-4	2.4-3.0
23.	Rice Bran (In dry condition)	12-14	3.0-3.7
24.	Wheat Bran	18	4.6
25.	Sooji	12	3.0
26.	Maida	12	3.0
27.	Beasan	12	3.0
28.	Cumin Seed	15	4.0 - 4.3
29.	Arecanut	15	3.7 - 4.3
30.	Cashewnut Pods	14	3.7 - 4.3
31.	Coir Yarn	Subject to Packing	3 - 3.7
32.	Coir Fibre	10 Bales	4.6
33.	Jute Bales	4-5 bales	4.3-4.5
34.	Copra	8	1.8

The warehouseman shall ensure that mixed storage of incompatible commodities is not done. Some of the examples of incompatible commodities are:

- a) Sugar and jaggery with other commodities in the compartment.
- b) Fertilizers with foodgrains / sugar / cotton
- c) Hazardous and extra hazardous goods with non-hazardous goods in the same godown.
- d) Fumigable stocks with non-fumigable stocks in the same stack base.
- e) Spices with other commodities in the same stack.
- f) Fertilizers and cement in the same stack.
- g) Items belonging to different insurance categories attracting different rates of premium in the same compartment.

The warehouse shall maintain a mechanism for identification, traceability and test status of goods stored in the warehouse through "stack card" attached to each stack. It shall be ensured that no stocks are allowed to get mixed or left unidentified in the warehouse. In case of any customer specific requirement for identification and traceability, the warehouse shall maintain the same as per the contractual agreement.

#### **Extension of Storage Period:**

If a depositor desires to extend the storage period beyond the initial storage period mentioned in the NWR, he shall be requested to submit a request for extension of storage period to the warehouseman 15 days in advance of expiry of such initial storage period. The warehouseman shall get the quality of the goods evaluated to determine the storage worthiness for the term requested by the depositor by drawing samples as per prescribed sampling plan from the goods under storage. In addition, condition of the goods for any infestation shall also be evaluated to determine storage worthiness in the extended period. The samples shall be stored and relevant records would be maintained.

If found suitable, valuation of the goods shall be done above and shall be insured for the extended period. Expiring NWR shall be taken back from the depositor / holder and fresh NWR shall be issued.

#### **Process of periodic inspection of goods and physical stock taking**

The warehouseman shall assess the health of entire stock during storage at least once in 15 days or earlier by drawing the representative sample from each stack and analysing the physical quality parameter including degree of infestation, category, grade, moisture content etc. These parameters should be recorded in the stack card as well as in the inspection report. In case, prophylactic or curative treatments are required for the control of stored grain insect pest, these should be immediately carried out by the technical staff of the warehouse. In case, the moisture content is found higher than the normal moisture content, the stock should be properly aerated so that the moisture may be reduced.

Periodic inspection shall also check physical conditions of the godowns in terms of any deterioration of walls, floors, windows, openings, doors, or presence of any birds, rodents. Warehouseman shall take immediate remedial actions for fixing the same to bring it back to normal state.

All the sweepings and spillages from the godown may be collected, cleaned and stored in such a way that they shall be protected from infestation and contamination.

Such sweepings shall be released with the main stock at the time of delivery but after proper cleaning and testing.

The insurance for the goods deposited can be done by the depositor himself if so desired. To facilitate effective control on insurance of goods, the validity of the goods under deposit with the warehouse shall be till the last day of the month in which validity of the deposit is expiring. For example, if goods are under deposit for four months from May 10th to Sept. 10th, validity of the insurance shall be upto Sept. 30th.

The warehouse is adequately insured as per the requirement of the Authority by ensuring following:

All stocks stored in godowns shall be fully insured against fire, flood, theft, burglary, frauds/misappropriation, strikes and terrorism. Insurance premium shall be paid to insurance company in advance in full. Value of the stocks stored in godown shall not exceed the insured amount for which premium is paid in advance. If the value exceeds, then additional premium shall be immediately deposited with insurance company. Monthly declaration statements shall be submitted to insurance company. All books of record for stocks shall be maintained daily. All fire fighting equipments shall be in operational condition with in validity period. Language of each insurance policy shall be critically examined and seen so that claims are not refuted by insurance company. No two incompatible commodities shall be stored together. Spontaneous combustible commodities shall be separately dealt with. Adequate storage of water supply shall be ensured 24X365 days.

Whenever there is a disaster, the warehouseman shall proceed as under:

- a) In case of fire, the following steps would be taken immediately:
  - i) Put out the fire by using appropriate fire extinguishers / fire buckets
  - ii) Take steps to avoid loss of other adjacent stocks by removing it from burning stock.
  - iii) Call Fire Brigade
- b) In case of flood, cyclone, arrange for draining out of water and take necessary help of local civil authorities.
- c) Arrange photographs of the incidents on the same day
- d) For the fire, theft, burglary and misappropriation, lodge a FIR with the local Police Station and obtain a copy on prescribed format of Police Department.
- e) Inform the details of the incident to the Insurer (In case Goods are insured by more than one Insurance company to the Lead Insurer)
- f) Carryout the activity of salvaging and segregation of the damaged stocks.
- g) Communicate following to Insurance Companies / their surveyor to claim the loss on prescribed Claim Form:
  - i) Copy of initial intimation
  - ii) Copy of FIR
  - iii) Brief Incident Record
  - iv) Location of the Godown / Site
  - v) Details of loss (This shall be based on valuation of the Goods as per records of the warehouse minus disposal of damaged goods and expenses of salvaging with necessary evidences).
  - vi) Copy of the insurance policy.
  - vii) Photographs of the incident.
  - viii) Newspaper cutting, if any

- ix) Certification of Fire Brigade, Police, other local authorities, as applicable
- x) Relevant extracts of stock ledger, insurance register
- h) Losses sustained by the Depositor due to insurable risks shall be compensated based on valuation within one week of receipt of claim from Insurance Company.
- i) Record the incident in the Insurance Register
  - The warehouseman shall submit a report about the extent of damage to the depositor & Authority and would maintain the record of such loss.

## CHAPTER XIV

### INSPECTION AGENCY

As per the provision under section 35 (2) (i) of the Warehousing (Development and Regulation), Act 2007, the WDRA may undertake inspection of registered warehouses as well as accreditation agencies and other organisations connected with the warehousing business. The Authority or its authorized representatives may undertake periodic or surprise inspection of registered warehouses to ensure that the infrastructure, operational procedures and other provisions prescribed under the Act, the rules and regulations which are being checked by the accreditation agencies at the time of accreditation of warehouses as well as by the Authority at the time of registration of warehouses are strictly complied with by the warehousemen and these facilities continue to remain during the entire period of registration of warehouses.

**1. Eligibility for inspection agency:**

Corporates engaged in logistic management, auditing, accountancy civil engineering and inspection of companies/warehouses dealing in commodities and their storage.

**2. Administrative requirements for inspection agency:**

- i. Shall be a legal entity in India and shall be responsible for all decision making.
- ii. Shall be identifiable within that organization.
- iii. Shall have documentation which describes its functions and the capability for carrying out inspections of warehouses for which it is competent to carry out inspection.
- iv. Shall be having presence in concerned state(s) or neighbouring state(s), proposed to be covered.

The accreditation agencies registered with the Authority may are also eligible to act as an inspection agency, however, these will not be allowed to conduct the inspection of warehouses accredited by them.

**3. Periodicity:** The inspection for the warehouses shall be carried out at such intervals as may be laid down by the WDRA from time to time.

**4. The Inspection Agency shall meet the following criteria:**

- a. Independent of the warehouse inspected.
- b. Staff of Inspection Agency responsible for carrying out the inspection shall not have any employment and commercial interest relationship for last two years prior to inspection.
- c. Inspection Agency and its staff shall not engage in any activities that may conflict with their independence of judgment and integrity in relation to their inspection activities. In particular they shall not become directly involved in the management of competitive warehouse
- d. The procedures under which the body operates shall be administered in a non-discriminatory manner.

**5. The inspection agency would carry out the following job:**

- (i) tally the physical inventory with the commodities covered by outstanding NWRs and verify the system of issue of NWRs and the custody of unused NWRs with reference to records available at WDRA.
- (ii) examine and comment on all the aspects of storage, stacking arrangement, quarantine, assaying and segregation of goods from those against non-negotiable receipts.
- (iii) examine and comment on incidence of non-delivery or non-release of commodities beyond a reasonable storage time.
- (iv) comment on litigations and claims including liquidated damages during the reporting period.
- (v) examine and comment on incidence of non-delivery or non-release of commodities beyond a reasonable storage time.
- (vi) comment on litigations and claims including liquidated damages during the reporting period.
- (vii) examine insurance claims paid during the period or cases of rejections, if any.
- (viii) comment on cases of re-assaying of commodities after the validity period and revalidation of NWR after the expiry period.
- (ix) revisit all the aspects examined at the time of accreditation to find elements of improvement and deterioration, if any and put its observation on record.
- (x) Comments on action taken on previous inspection/enquiry reports, and any other matter relevant to the issues involved.

The agency would share the inspection report with warehousemen and submit the inspection report to WDRA.

**6. Fee to be charged by the inspection agency.**

These agencies may be empanelled for a period of three years. They may apply for inspection job in one or more state depending upon their field presence in these states or neighbouring state. The inspection fee to the inspection agencies would be paid by the Authority. The fee structure prescribed by the Authority is as follows:

Sl. No.	Capacity of the Warehouse	Inspection Fee per year
1.	Upto 10,000 MTs	Rs. 7,500/- for one inspection.
2.	More than 10,000 MTs	Rs. 15,000/- for one inspection.

**Records**

The Inspection records maintained by the Inspection Agency shall include at least the following:

- a. Instructions of Authority received with along with the relevant references;
- b. details of warehouse inspected;
- c. details of the goods stored;
- d. inspection conditions including; any abnormality observed in inspected material; details of equipment and facilities used for inspection including verification record, suitability and calibration status, etc;
- e. information provided by the warehouse;
- f. the inspection methods and procedures used;
- g. details of inspection observations;
- h. conformity decisions (with supporting justification);
- i. aspects not inspected, with reasons given, e.g. lack of safe access;

- j. identity of the person who performed the inspection;
- k. test report in case of subcontracted tests;
- l. details of verification of the test report and evaluation against the acceptance criteria;
- m. identity of the authorized signatory.

Additional information requirements be considered as appropriate at the times of the inspection and subsequent reporting.

### **Inspection Reports**

The Inspection Agency shall have a system for preparing and submitting report to Authority

Within five working days of completing onsite inspection. The report shall contain all the details relevant to the inspection carried out, in order to establish complete traceability to relevant and the inspection results, including any abnormality observed or other information considered important from the point of view of the inspection carried out. It shall also give details of equipment and facilities used for inspection, their specification, suitability and calibration status. In case any sample is drawn for the purpose of testing in a laboratory then the report shall give details of the sample drawn, details with respect to its packing and sealing, etc. The inspection report shall be traceable to the inspection personnel involved in the inspection activity.



**Notification of Agricultural Commodities for Negotiable Warehouse Receipt:**

The Authority had initially approved and notified the following 40 agricultural commodities including cereals, pulses, oil seeds and spices for issuing negotiable warehouse receipts:

Sr. No	Name of the Commodity	Sr. No.	Name of the Commodity
1.	Wheat	21.	Tamarind seeds
2.	Rice	22.	Cumin seeds*
3.	Paddy	23.	Castor seeds
4.	Jawar	24.	Cashew kernels
5.	Bajra	25.	Areanut
6.	Barley	26.	Black pepper*
7.	Maize	27.	Coriander*
8.	Ragi	28.	Fennel seeds*
9.	Soyabean*	29.	Fenugreek seeds*
10.	Mustard seed	30.	Guar gum*
11.	Rapeseed	31.	Sesame seeds
12.	Groundnut	32.	Horse gram
13.	Groundnut (pods)	33.	Isabgol*
14.	Whole pulses and split pulses	34.	Black gram (Flour)
15.	Sunflower oilseed	35.	Coffee beans
16.	Milled pulses	36.	Sago*
17.	Cotton bales*	37.	Turmeric*
18.	Cotton seed	38.	Ball Copra
19.	Jute bales*	39.	Cup Copra*
20.	Chillies*	40.	Cardamom*

**\*Commodities subject to need based laboratory testing.**

75 more following commodities have been approved by the Authority for the issuance of NWR

Sl. No.	Name of the Commodity
(A)	Pulses
1	Urd Whole (Black Gram)
2	Urd split (husked)
3	Urd split (unhusked)
4	Moong (whole)
5	Moong split (husked)
6	Moong split (unhusked)
7	Masoor (Lentil) whole
8	Masoor (Lentil) split (husked)
9	Arhar /Tur (Red gram) whole
10	Arhar /Tur (Red gram) split (husked)
11	Kabuli Chana

12	Chana whole (Bengal Gram)
13	Chana split (husked) / Dal Chana
14	Matki / Moth (whole)
15	Matki / Moth split (husked)
16	Yellow Peas (whole)
17	Rajma
18	Lobia
(B)	Cereals
19	Raw Milled Superfine / Fine Rice
20	Raw Milled Medium Rice
21	Raw Milled Common (Coarse) Rice
22	Parboiled Milled Superfine / Fine Rice
23	Parboiled Milled Medium Rice
24	Parboiled Milled Common (Coarse) Rice
25	Fine Broken Rice
26	Common Broken Rice
(C)	Vegetable Oils*
27	Mustard Oil
28	Groundnut Oil
29	Sesame (Til or Gingelly Oil)
30	Coconut Oil
31	Linseed Oil
32	Castor Oil
33	Niger Seed Oil
34	Safflower Seed Oil
35	Cotton Seed Oil
36	Rice Bran Oil
37	Soyabean Oil
38	Sunflower Seed Oil
39	Maize (Corn) Oil
40	Mahua (Mowrah Oil)
41	Salseed Oil (Fat)
(D)	Oilseeds*
42	Taramira Seeds
43	Sesame seeds
44	Cotton seeds
45	Safflower seeds
46	Linseeds
47	Mahua seed
48	Sal seeds
49	Niger seeds

(E)	Edible Nuts
50	Walnuts
51	Raw cashewnuts
52	Groundnuts
53	Coconut
(F)	Spices*
54	Ajowan Seeds (Whole And Powdered)
55	Mace
56	Seedless Tamarind
57	Cloves
58	Mixed Masala Powders
59	Sun Dried Raw Mango Slices And Powder
60	Compounded Asafoetida
61	Nutmeg
62	Curry Powder
63	Saffron
64	Tejpat
65	Poppy Seeds
(G)	Makhana
66	Makhana
67	Makhana Powder
68	Makhana Fried
(H)	Miscellaneous
69	Guar Seed
70	Tea **
71	Coffee, Arabica and Robusta **
72	Tobacco **
73	Rubber **
74	Desi Chana
75	Indian sugar**

\* Commodities requiring laboratory analysis.

Qualitative specifications/standards for above commodities will be of Agmark. However, in case, Agmark standards do not exist, for those commodities quality standards laid down by the Central/State Governments /Government bodies shall be applicable viz:

\*\* (i) For Tea, Tea Board specifications would be followed.

\*\* (ii) For Coffee, Indian Coffee Board specifications will be followed.

\*\* (iii) For Rubber, the BIS specification would be followed.

\*\* (iv) For Indian sugar, BIS specification would be followed.

2. For commodities requiring chemical or allied laboratory analysis, all Agmark laboratories, all accredited laboratories notified by National Accreditation Board for Testing and Calibration and laboratories recognised by Bureau of Indian Standards (BIS), are authorized for laboratory testing.

3. In addition, all Central/State Government laboratories and other laboratories recognised by them for testing of commodities, are authorized for laboratory testing.

## Annexure IV

### Minimum equipment required for preservation of foodgrains and setting up a physical analysis laboratory in a warehouse.

Sl. No	Name of the Equipment	No. required
<b>(A)</b>	<b>FIXTURES/FURNITURE IN PHYSICAL ANALYSIS LABORATORY*.</b>	
1.	Analysis table (with drawers)	<b>2</b>
2.	Balance table (with drawers)	<b>2</b>
3.	Almirah (for keeping of samples)	<b>2</b>
4.	Glass slabs / polished stone e.g. granite slabs	<b>2</b>
5.	Laboratory rack (Size 3'X 6' with 6 slabs), 4 Stools, 5 Chairs and Balance table	As per requirement
<b>(B)</b>	<b>EQUIPMENT</b>	
1.	Physical balance	<b>2</b>
2.	Moisture meter calibrated for all the commodities to be stored/handled	<b>1</b>
3.	Sieve Set	<b>1</b>
4.	Enamel plates with clean white surface	<b>12</b>
5.	Sample bags-polythene and cloth	<b>50 each</b>
6.	Parkhi (Bag trier)	<b>2</b>
7.	Sample tags	<b>100</b>
8.	Sample seal	<b>1</b>
9.	Sealing wax	<b>1 Packet</b>
10.	Calculator	<b>1</b>
11.	Magnifying glass	<b>3</b>
12.	Hygrometer	<b>1</b>
13.	Max. Min. Thermometer	<b>1</b>
14.	Petri dishes	<b>12</b>
15.	Measuring cylinders: 10 ml, 20 ml, 50 ml, 100 ml	<b>3 each</b>
16.	Slotted tube bag trier, stainless steel	<b>1</b>
17.	Borner sample divider (brass or stainless steel)	<b>1</b>
18.	Aluminum Phosphide applicator	<b>1</b>
19.	Measuring tape	<b>1</b>
20.	Verniercalipers	<b>2</b>
21.	Magnifying glass	<b>2</b>
<b>(C)</b>	<b>DISINFECTION</b>	
1.	Rat cages	<b>20</b>
2.	Foot sprayer	<b>2</b>
3.	Power sprayer	As per requirement
4.	Sand snakes	<b>100</b>
5.	Hand gloves (pairs)	<b>6</b>
6.	Air Gun / Bird Scarer	<b>2</b>
<b>(D)</b>	<b>OTHER ITEMS / EQUIPMENT</b>	
1.	Tarpaulin	<b>6</b>
2.	Ladder	<b>2</b>
3.	Sample Sieves (for screening)	<b>2</b>

Sl. No	Name of the Equipment	No. required
4.	First Aid box	<b>1</b>
5.	Fire extinguishers	
6.	Fire buckets	
7.	Platform Scales 300 kgs, 500kgs, 1000kgs, 3000 kgs	<b>As per need</b>
(E)	<b>SAFETY EQUIPMENT</b>	
1.	Gum boots, goggles, aprons etc.	<b>4 set each</b>
2.	Phosphine gas detection strips	
3.	Dragger type multi gas detector tubes	
4.	Phosphine alert personal monitor	
5.	Fire extinguisher (chemical type)#	
6.	Specimen tubes	<b>24</b>
(F)	<b>DUNNAGE MATERIALS</b>	
1.	Polythene film#	
2.	Bamboo mats / patera mats#	
3.	Wooden crates/poly crates #	
(G)	<b>GAS MASK &amp; CANISTER</b>	
1.	Gash mask (face piece, breathing tube, canister)	<b>2 each</b>
2.	Canister	<b>2</b>
3.	Halide detector	<b>1</b>
(H)	<b>Fumigation covers</b>	<b>1</b>
1.	Thermoplastic fumigation covers (IS No. 13217:1991) or	<b>As per requirement</b>
2.	Multilayered cross laminated sheets and tarpaulins/covers (IS 14611:1998)	<b>As per requirement</b>

## Annexure-V

### Indian Standards on Sampling, Storage and Handling, Testing, Test Equipment and Packaging.

<b>Sampling</b>		
	IS 2814 : 1978	Methods for sampling of smaller size foodgrains.
	IS 2860:1964	Methods of sampling and test for processed fruits and vegetables.
	IS 4115:1967	Methods of sampling of oilseeds.
	IS 4905 : 1968	Methods for random sampling.
	IS 11380 (PART1):1985	Method of sampling for the determination of pesticide residue: part1 agricultural and food.
	IS 14818:2000	Cereals and pulses and milled products - sampling of static batches.
<b>Storage &amp; Handling</b>		
	National Building Code Part IV	Fire and Live Safety.
	IS 2171 : 1999	Specification for portable fire extinguishers, dry powder (cartridge type).
	IS 2878 : 2004	Fire Extinguisher, Carbon Dioxide Type (Portable and Trolley Mounted) – Specification.
	IS 3646 Part 1 :1992	Code of practice for interior illumination: Part 1 General requirements and recommendations for Working interiors
	IS 5404:1969	Code of practice for handling food samples for microbiological Analysis.
	IS 5606:1970	Specifications for steel bins for grain storage.
	IS 5686:1970	Code of practice for handling and storage of oilseeds.
	IS 6151 PART 2 1971	Storage management code part 2 general care in handling and storage of agricultural produce and inputs.
	IS 6151 PART 3 1971	Storage management code part 3 specific care in handling and storage of agricultural produce and inputs.
	IS 7247(Part 1):1974	Code of practice for fumigation of agricultural Mar 2005 produce:Part 1 Methyl bromide.
	IS 7247(Part 3):1974	Code of practice for fumigation of agricultural produce: Part 3 Aluminium phosphide.
	IS 7247(Part 5):1974	Code of practice for fumigation of agricultural produce: Part 5 General requirements.
	IS 7716:1975	Methods for testing efficacy of fumigation for disinfestation of grains in domestic bins.
<b>Storage &amp; Handling (Contd)</b>		
	IS 10106 : Part 1 : Sec 6 : 1992	Packaging code: Part 1 Product packaging,Section 6 Protection against spoilage of packages and their contents by Microorganisms,Insects, Mites and Rodents.
	IS 10204 : 2001	Specification for portable fire extinguisher mechanical foam type
	IS 11261 : Part 1 :1985	Methods for assessment of post-harvest grain losses by rodents: Part1 General considerations, direct measurement techniques and biological aspects of survey procedures.
	IS 11261 : Part 2 :1985	Method for Assessment of Post-harvest Grain Losses by Rodents - Part 2: Loss Determination by Population Assessment and Estimation Procedures.
	IS 11816:Part1:1986	Storage of Cereals and Pulses: Part 1 General Consideration of Keeping Cereals.

	IS 11816:Part2:1986	Storage of Cereals and Pulses: Part 2 Essential Requirements.
	IS 11816:Part3:1986	Storage of Cereals and Pulses: Part 3 Control of attack by vertebrateand invertebrate animals.
<b>Testing</b>		
	IS 2860:1964	Methods of sampling and test for processed fruits and vegetables.
	IS 4333 : Part 1 :1996	Methods of analysis for foodgrains: Part 1 Refractions.
	IS 4333 : Part 2 :2002	Method of Analysis for Foodgrains - Part 2 : Determination of Moisture Content.
	IS 4333 : Part 3 :2002	Method of Analysis for Foodgrains - Part 3 : Determination of Hectolitre Weight.
	IS 4333 : Part 4 :2002	Method of Analysis for Foodgrains - Part 4: Determination of theMass of 1000 Grains.
	IS 6261 : 1971	Methods of analysis for detection of insect and rodent contamination in grains and milled products.
	IS 8077:1976	Procedure for checking technique of quick frozen food.
	IS 8184:1976	Method for determination of ergot in foodgrains.
	IS 10768:1984	Method of Test for Quality Characteristics of Pulses
	IS 11396:1985	Test methods for determination of storability (safe storage life) offoodgrains.
	IS 12529 : 1988	Storage of Foodgrains - Storage Losses by Insects - Methods forEstimation.
	IS 12700:1988	Method for determination of falling number of cereals.
<b>Testing Equipment</b>		
	IS 460 : Part 1 : 1985	Specifiction for test sieves: Part I Wire cloth test sieves.
	IS 460 : Part 2 : 1985	Specifiction for test sieves: Part II Perforated plate test sieves.
	IS 460 : Part 3 : 1985	Specifiction for test sieves: Part III Methods of examination ofapertures of test sieves.
	IS 1117:1975	One mark pipettes.
	IS 2821:1964	Specifiction of thermo sampler.
	IS 8824 : Part 1 : 1978	Electrical moisture meters: Part 1 for foodgrains.
	IS 8824 : Part 2 : 1988	Electrical moisture meters: Part 2 for jute (conductivity type).
<b>Packaging</b>		
	IS 12650:2003	Jute Bags for Packing 50 kg Foodgrains – Specification.
	IS 14887: 2000	High Density Polyethylene (HDPE)/Polypropylene (PP) WovenSacks for Packing 50 kg/25 kg Foodgrains – Specification.

**CODE OF PRACTICE FOR CONSTRUCTION OF FOODGRAINS STORAGE STRUCTURES**

**1. SCOPE**

- 1.1 This standard covers the basic constructional requirements for non perishable agricultural commodities storage structures, chiefly intended for trade and government purposes.
- 1.1.1 This code does not apply to storage of perishables or those commodities which require cold storage.

**2. TERMINOLOGY**

- 2.0 For the purpose of this standard the definitions given in IS 6151 and the following definition shall apply.
- 2.1 Foodgrains – All cereals, pulses, millets and milled products like semolina, flour and atta.

**3. LOCATION**

- 3.1 The structure shall be located on a raised well-drained site not liable to flooding or inundations and it shall be away from a place likely to be affected by seepage water.
- 3.2 In selecting the location, maximum attention should be paid to the hygienic and sanitary conditions of the area and the following minimum distances shall be maintained. The construction in residential areas shall be avoided, as far as possible:
  - a) Bone crushing mills, garbage dumping grounds, slaughter houses, tanneries and hide curing centres, sewage treatment plants, or such other places, the vicinity of which is deleterious to the safe storage of non-perishable agricultural commodities- 500 mtrs.
  - b) Kilns, Dairies (processing units) and poultry runs-300 mtrs.
  - c) Factories and other sources of fire and environmental hazard such as workshops, hay stacks, timber stores, petrol pumps, CNG stations and LPG bottling plants -150 mtrs.
- 3.3 The structure should be free from passing over of any tension electric line and in the event of such lines passing over, then the relevant Electrical Code provisions should be taken into account while planning the storage structure. The structure should be free from gas / oil pipe lines.
- 3.4 There shall be no tree, the roots of which affect the foundation, near the structure. The structure shall always be kept clear of branches of trees, poles,



etc. by at least 3 m by which rats and squirrels would otherwise find access into it. Necessary precautions for preventing attacks by termites shall be taken.

- 3.5 The structure may preferably be situated near a transport head or a main road. If the structure is located in the interior, an approach road shall be provided.
- 3.6 At the site of the structure, there shall be sufficient parking and manoeuvring space for vehicles. If the structure is situated at a ferry head, railway station, airport, etc., sufficient berthing, loading and unloading facilities shall be made available.

#### 4. ANCILLARY STRUCTURES AND OTHER AMENITIES

- 4.1 It is desirable to have ancillary structures attached to godowns having capacity of 5000 tonnes and above. The other details of the ancillary structures for small and big godowns are given in Annex A.

#### 5. CAPACITIES AND DIMENSIONS

- 5.1 The recommended capacities and dimensions of storage structures are given in Table 1. The capacities have been estimated on the basis of 16-bags high stacks. The stacking arrangement shall be as shown in Fig. 1

TABLE 1 CAPACITIES AND DIMENSIONS OF BAGGED STORAGE STRUCTURES

TYPE OF GODOWN (1)	APPROXIMATE BAGS (2)	CAPACITY (3)	INTERNAL DIMENSIONS	
			Length (4)	Breadth (5)
Small	1 120	100	12	7.5
	2 700	250	20	9
	5 400	500	34	12
	10 500	1 000	35.5	18
	28 510	2 500	97.19	14.48
Large 21.34	57 020	5 000	129.74*	of
			125.01 +	

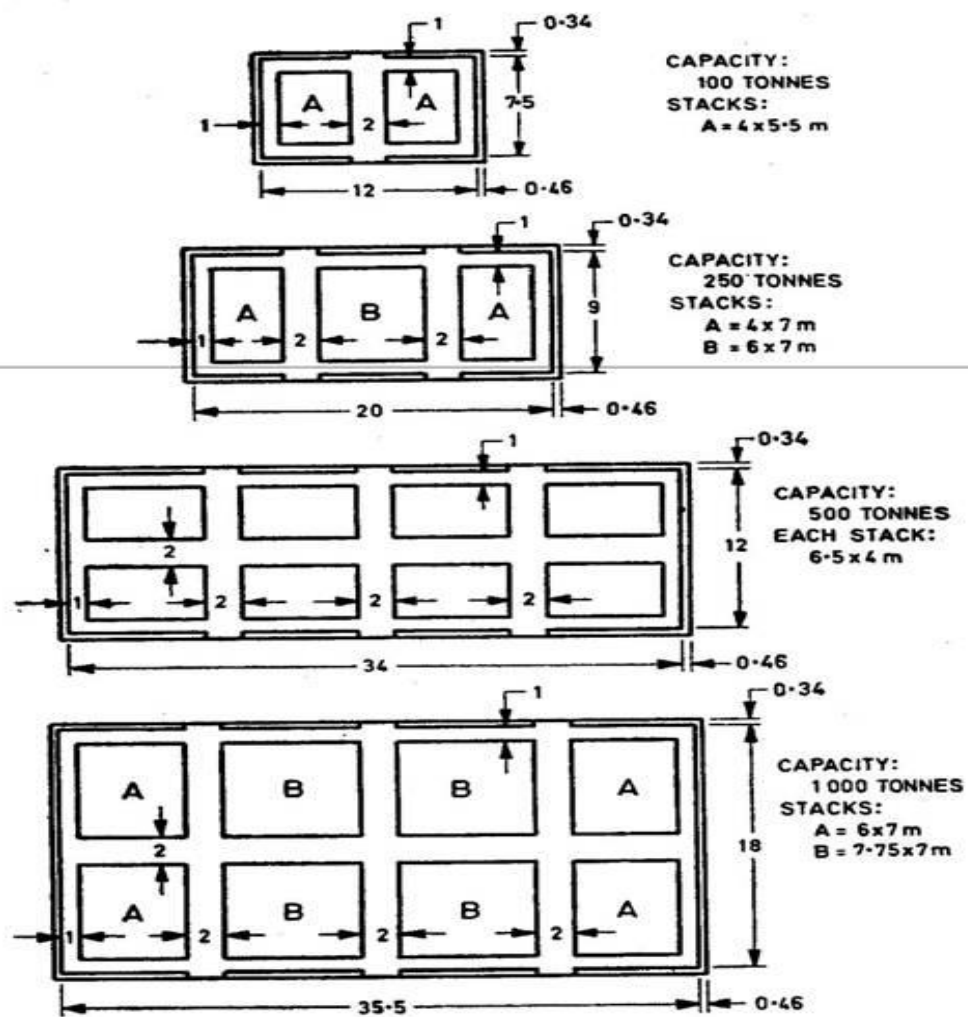
NOTE 1 - The size of the large capacity godown has been arrived at keeping the normal maximum size of each stack to 9.15 x 6.10 m that may be adopted for stack fumigation.

NOTE 2 - The above dimensions may be suitably adopted depending upon the availability of land.

NOTE 3 - For storage capacity 2 500 tonnes and above, godowns may be divided in suitable compartments depending upon the availability of land.

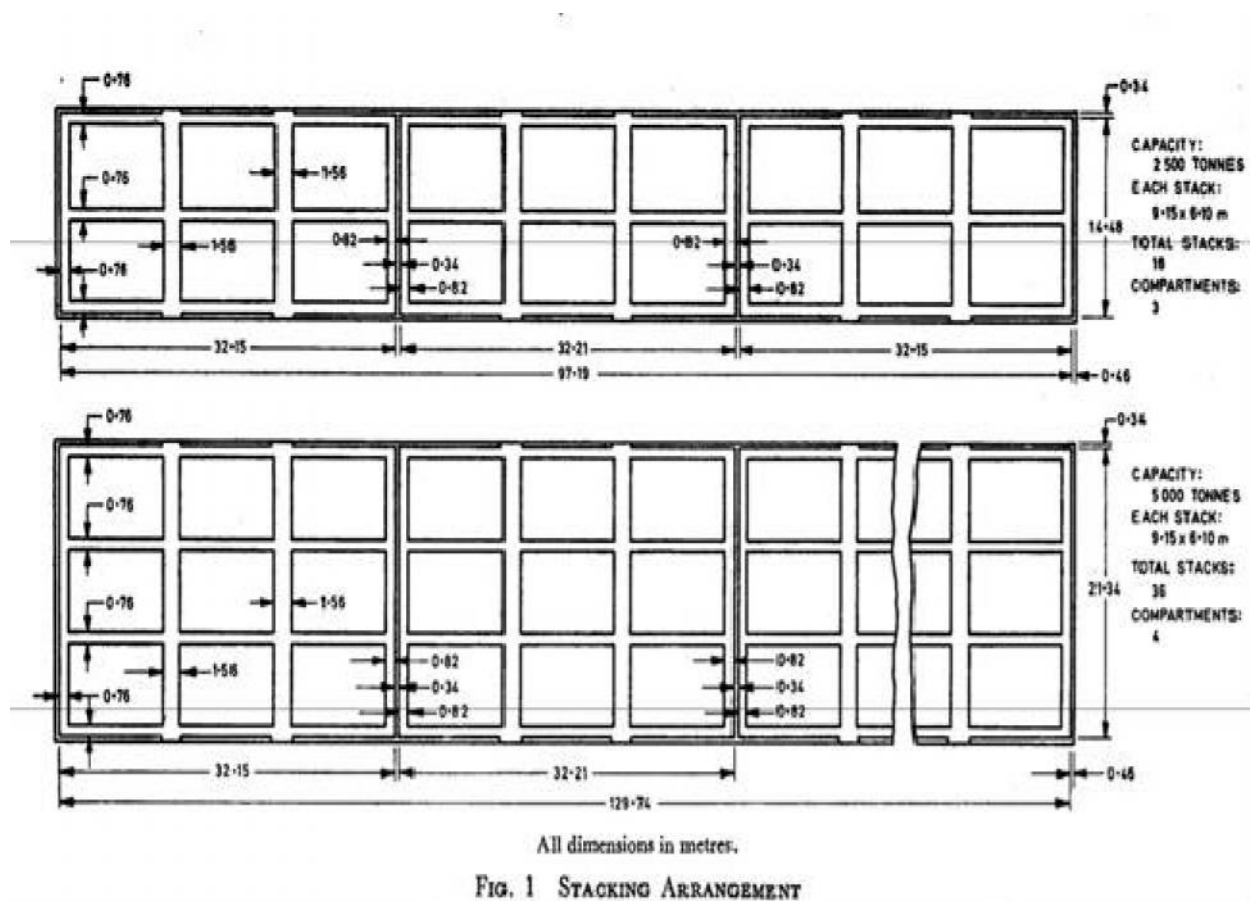
\* For four compartment design.

+ For three compartment design.



All dimensions in metres.

FIG. 1 STACKING ARRANGEMENT (Contd)



- 5.2 The non-perishable agricultural commodity storage structure shall be of single span according to the availability of land. In larger storage structures, suitable compartments may be provided according to the local requirement. General plans for typical bagged food grain structures for capacity 2500 tonnes and 5000 tonnes including the recommended arrangement for partition walls and stacking of bags are given in Fig. 2.

## 6. FOUNDATION

- 6.1 Suitable foundation depending upon the site conditions may be provided. The type of foundations will depend upon the property of the subsoil and the same may be provided according to relevant Indian Standard Codes.
- 6.2 The foundation shall, in no case, be less than one metre deep unless hard rock is met with at a depth less than one metre, subject to a minimum depth of footing not less than 75 cm. The foundation shall not be less than 120 cm deep under the cement concrete columns.
- 6.3 Wherever rock is met within the foundation depth, it shall be properly dressed, levelled and, if necessary, cut in horizontal steps so as to receive the footings of the foundation.
- 6.4 The foundation, in general, shall consist of the bed of cement concrete not leaner than the mix of 1: 5: 10 (1 cement : 5 coarse sand : 10 stone aggregate of 40 mm nominal size) for the walls and under the footing of the columns. The reinforced cement concrete columns shall be of mix not leaner than 1: 1.5 : 3 (1 cement : 1.5 coarse sand : 3 stone aggregate).

20 mm nominal size) for the nominal mix concrete and M 20 for the controlled concrete as per the requirement of design. The coarse of the lean concrete under the footings of the walls and RCC columns shall not less than be 15 cm. and 7.5 cm. respectively or otherwise as per the recommendation in the structural designs.

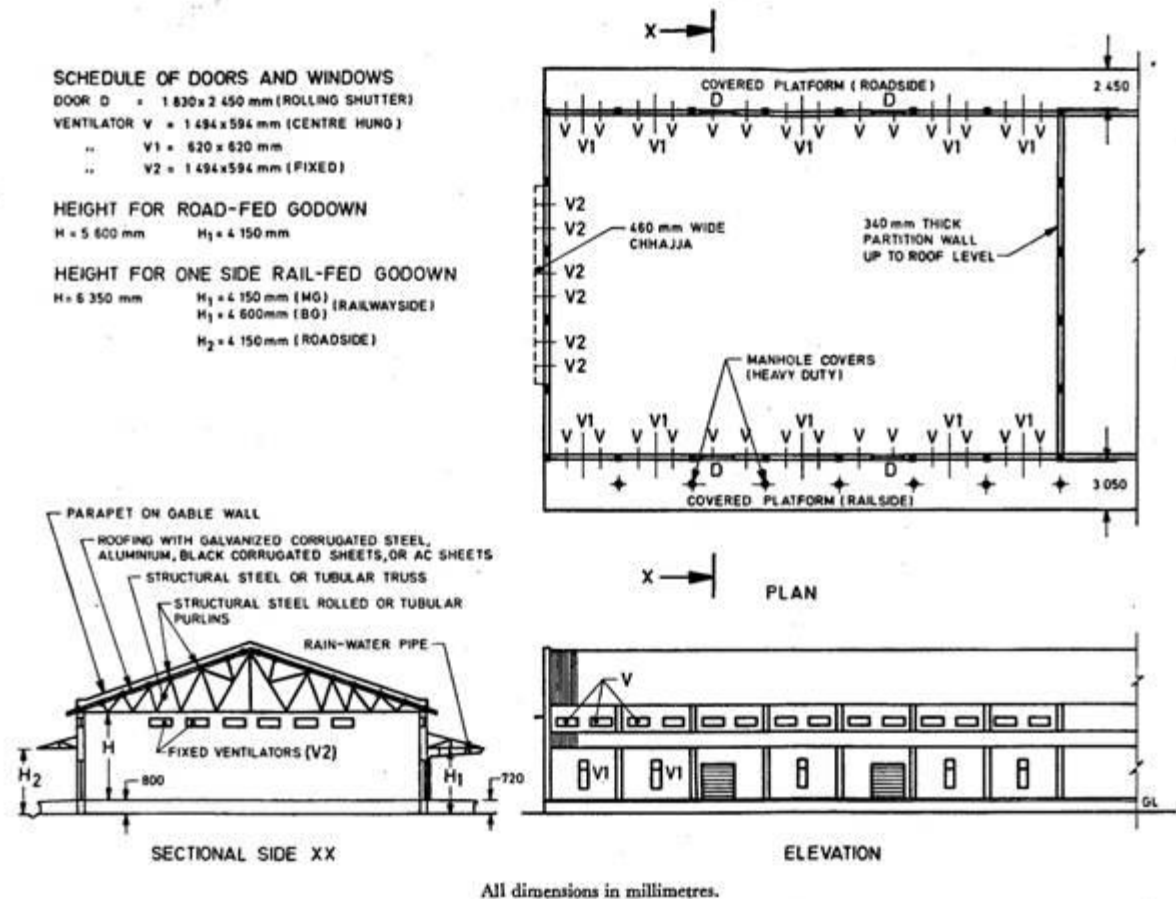


FIG. 2 TYPICAL BAGGED FOOD GRAIN STORAGE STRUCTURE FOR 5 000 TONNES CAPACITY WITH RAILSIDE PLATFORM ON ONE SIDE AND ROADSIDE PLATFORM ON THE OTHER SIDE

- 6.5 The foundation shall be carried to hard soil and to a depth at which cracks in the soil do not exist and where the bearing capacity is adequate to withstand the intensity of foundation pressure. The bearing capacity of the soil shall be properly investigated.
- 6.6 The foundation on both the sides shall be refilled with selected earth suitable for filling and free from salt, organic or other foreign matter or with sand except the seashore sand or moorum which shall be compacted and made flush with the ground level.
- 6.7 To meet the menace of white ants and rodents suitable pesticidal treatment shall be done in the foundations and under floors.

## 7. PLINTH

- 7.1 The plinth shall generally be kept 80 cm above the finished ground level and in exceptional cases, depending upon the topography of the land, the plinth height can be extended upto 90 cm, for the road-fed structures whereas for the

rail-fed structures, the plinth height shall be 106 cm above the top of corresponding broad gauge track. The minimum width of platform for the road-fed structures shall be 183 cm and 244 cm for

rail-fed structures. To prevent rain water from getting inside the godowns through the doors, the platform shall be provided with a slope of at least 1 in 40 from the wall to its outer edge. In case of the road-fed structures, the platform plinth level of the structure should be fixed taking the highest floor level into account. The general arrangement of platform plinth with coping details and other particulars is shown in Fig. 3.

7.1.1 Where platforms are provided, they shall be preferably covered.

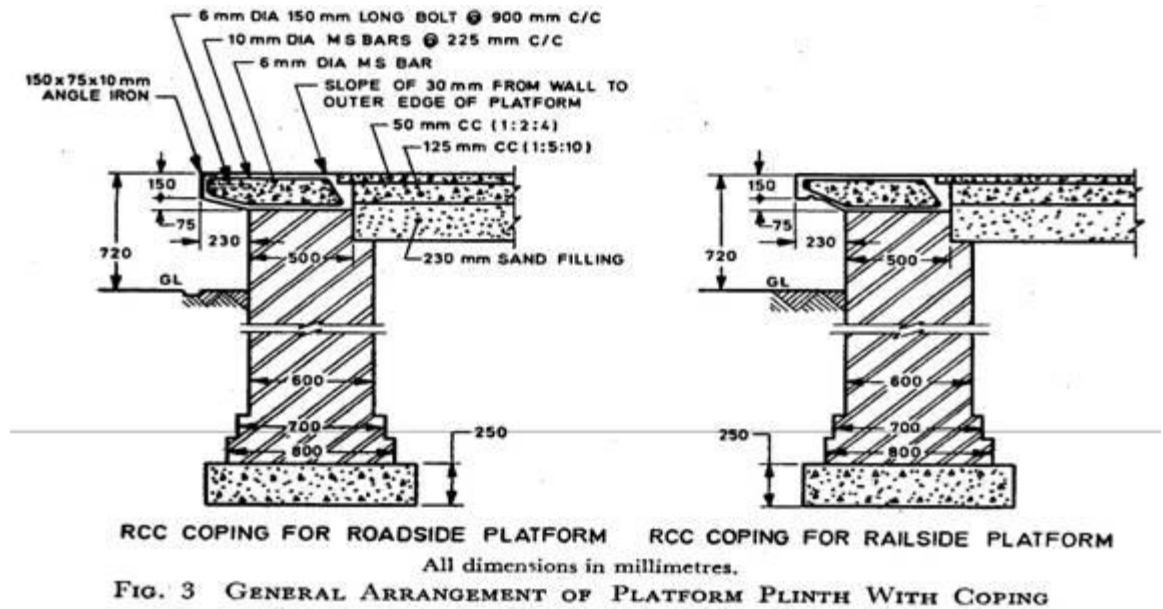
7.2 **Filling of plinth and Foundation** – The plinth shall be filled with selected earth depending upon the availability, excluding black cotton soils and other unsuitable soils, in layers not exceeding 200 mm with each layer being watered, wall rammed and consolidated. When filling reaches the finished level, the surface shall be flooded with water for at least 24 hours, allowed to dry and then rammed and consolidated in order to avoid any settlement at a later stage. The finished level of filling shall be kept in slope intended to be given on the floor. These layers shall be taken up to the formation level for the earth filling.

7.3 The plinth shall be constructed of either stone or brick masonry in cement mortar 1:6 (1 cement : 6 coarse sand) including gable walls. It shall be provided with damp proof course of well graded concrete with waterproofing compound (see IS 2645) to a minimum thickness of 40 mm on brick masonry and 50 mm on stone masonry.

NOTE – These are the usual specifications adopted for such structures. The actual specifications shall be based on proper designs and stresses developed depending upon the strength of raw material and mortar used. In seismic areas suitable precautions may be observed in the construction of building which should be according to IS 1893 and IS 4326. In case of non-availability of bricks and stone for masonry work, cement concrete hollow blocks may be used and jointing etc. may be done with cement mortar 1 : 4 (1 cement : 4 coarse sand).

7.4 **Plinth Protection** – The structure shall be provided with plinth protection of at least 900 mm width excluding platform portion around the structure and shall have minimum outward slope of 1 in 48 for satisfactory drainage of rain water. The plinth protection shall not be required on the side where rail side platform is provided. The plinth protection may consist of a layer of 115 mm thick brick or stone ballast, consolidated dry to the required slope, the surface shall be grouted evenly with fine sand  $0.06 \text{ m}^3 / 10 \text{ m}^3$  and slightly sprinkled with water and rammed. A topping of 50 mm thick cement concrete (1 : 3 : 6) may be laid in alternate panel slabs over a well-rammed brick or stone ballast and finished smooth at top. The finished surface may have a minimum outward slope of 1 in 48. Any other mode of the plinth protection may be adopted depending upon the site condition and economy of the materials for a particular locality. If vehicular traffic is likely to come on the plinth protection, the same should be suitably designed as a pavement in such portions.

- 7.4.1 It may be ensured that wherever plinth protection is laid on filled up earth; such filling shall be with selected earth properly consolidated. Black cotton soil shall not be used in such filling.



## 8. FLOOR

- 8.1 The flooring in the storage structure should be damp proof, rigid, durable and free from any cracks or crevices.

- 8.1.1 The following types of flooring may be provided for in the structure (Fig.4):

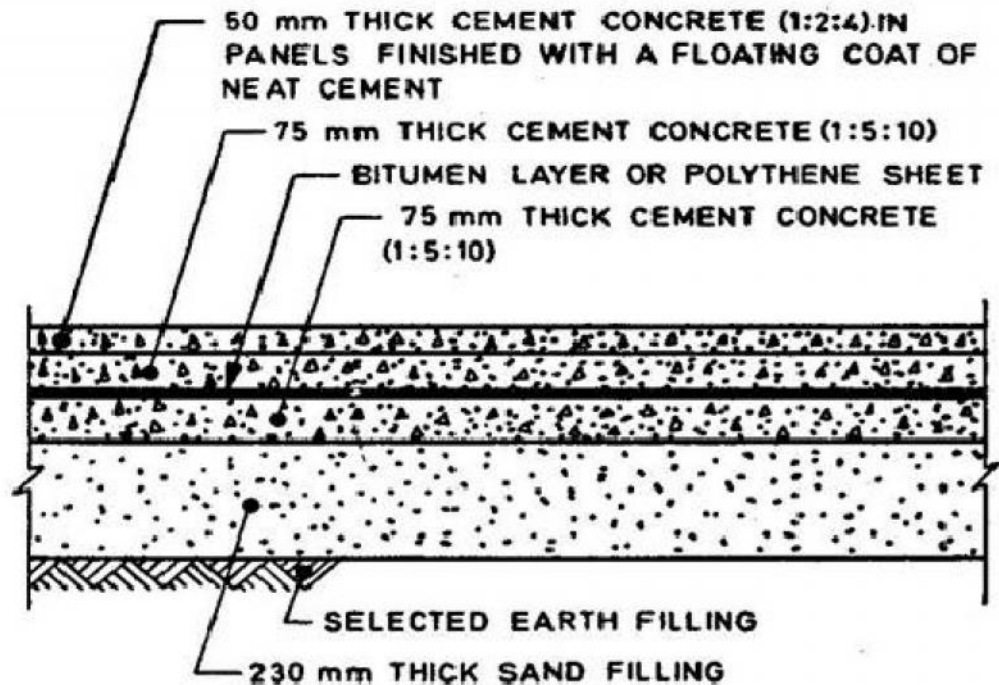
- Selected earth filling well consolidated and stabilized to avoid possibility of settlement and cracks,
- A layer of sand filling 230 mm thick thoroughly watered and well consolidated,
- A layer of cement concrete (1 : 5 : 10) 150 mm thick,

NOTE 1 – In area which may have water logging, a layer of bitumen maxphalt 80/100 or equivalent spread uniformly at the rate of 1.7 kg/m<sup>2</sup> may be provided in between the layer of cement concrete (1 : 5 : 10) as referred to in 8.1.1 (c)

NOTE 2 – In case, polythene sheet is used in place of maxphalt, a layer of 700-gauzepolythene sheet sandwiched in between the sand layers as referred to in 8.1.1 (b) shall be laid with necessary overlap of 150 mm at joints; joints hot sealed and ends properly anchored in suitable grooves left in walls for water tightness.

- A top wearing coat of 50 mm thick cement concrete (1 : 2 : 4) finished with floating coat of neat cement shall be provided. The cement concrete flooring shall be laid in panels not exceeding 3.5 m<sup>2</sup> in area

and 2.5 m and above in any direction. Such panels shall be suitably adjusted so as to avoid transfer of any uneven load at the joints under the stacking bays and alleyways. The panels shown in Fig. 5 may be suitably adopted.



**FIG. 4 DETAILS OF FLOORING ( MAIN GODOWN )**

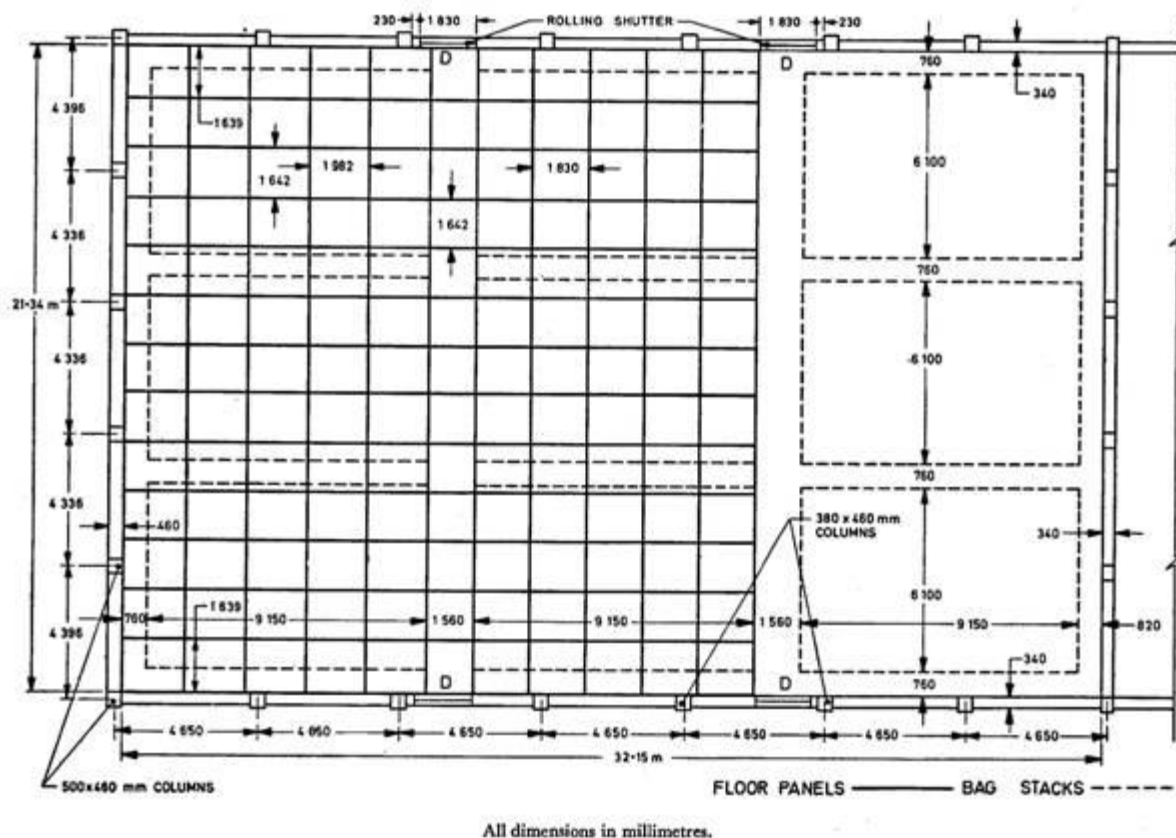


FIG. 5 TYPICAL ARRANGEMENT OF FLOOR PANELS

8.1.2 Alternatively the flooring and the course of the water bound macadam (WBM) underneath the cement concrete flooring (Fig. A4) should be provided as under:

- Selected earth in the filling well compacted and stabilized for avoiding possibility of any future settlement and cracks, etc.
- 150 mm thick WBM with stone aggregate of size 63-65 mm (Grade II) with corresponding screening and binding material.
- 75 mm thick WBM to be laid with 53-22.4 mm sized stone aggregate (Grade II) with corresponding screening and binding material.
- 50 mm thick cement concrete flooring in the cement concrete mix of 1:2:4 finished with a floating coat of cement.

8.1.3 Panelling in the cement concrete flooring shall be provided with glass strip having thickness of 4 mm and depth as per the thickness of the floor.

## 9. WALLS

9.1 The design of the walls shall be in accordance with the general constructional practices (see IS 1905) and care shall be taken that the tensile stresses do not exceed the cracking limit. The following type of walls may be provided for the storage structure.

9.1.1 The longitudinal walls shall be of brick or stone masonry in cement mortar 1 : 6 (1 cement : 6 coarse sand) and shall be at least 5 600 mm high for road-fed as well as railfed structures from the plinth level. They shall be at least 230 mm in thickness. Whenever there is non-availability of bricks / stone for masonry



work, alternatively CC hollow blocks of suitable size of mix 1 : 3 : 6 should be used. RCC columns should be provided to support the trusses connected with the beams at the top level and one more beam of RCC in the concrete mix 1 : 1.5 : 3 should be provided at the door level in the areas falling under seismic zone IV & V. The gable wall and the partition wall should be provided with the same type of masonry being provided in the longitudinal walls in the cement mortar of same ratio / mix and shall be at least 340 mm in thickness.

The walls shall be flush with the inner surface of the column and shall be plastered in cement mortar 1:6 (1cement: 6 fine sand). They shall be rendered smooth both on the outer and the inner surfaces. There shall be no offsets or projections in the wall. The inside edges of the wall where they meet the floor, all corner shall be rounded off to a radius of at least 50 mm. Spacing of the RCC columns is recommending ideally as 4650 mm from centre to centre which may also be altered as per the requirement/design/ dimension of the site / plot for optimum utilization. In seismic areas, structural engineer should be consulted for giving the earthquake resistant designs of the structure and criteria for earthquake resistant designs of structures as per IS 1893 and for earthquake resistant construction as per IS 4326 shall be followed.

NOTE – Where modular bricks are used according to IS 1077, thickness of the walls may be kept as 300 mm (nominal) for the longitudinal and intermediate partition walls and 400 mm (nominal) for the gable walls.

## **10. DOORS AND VENTILATORS**

10.1 A door shall be provided preferably opposite each gangway. The doors shall be of rolling shutters and fixed into suitable prepared openings. The doors shall be not less than 1830 × 2450 mm (see Fig. 6). Regular and periodical inspections and maintenance of the rolling shutters should be carried out to avoid defects and damages.

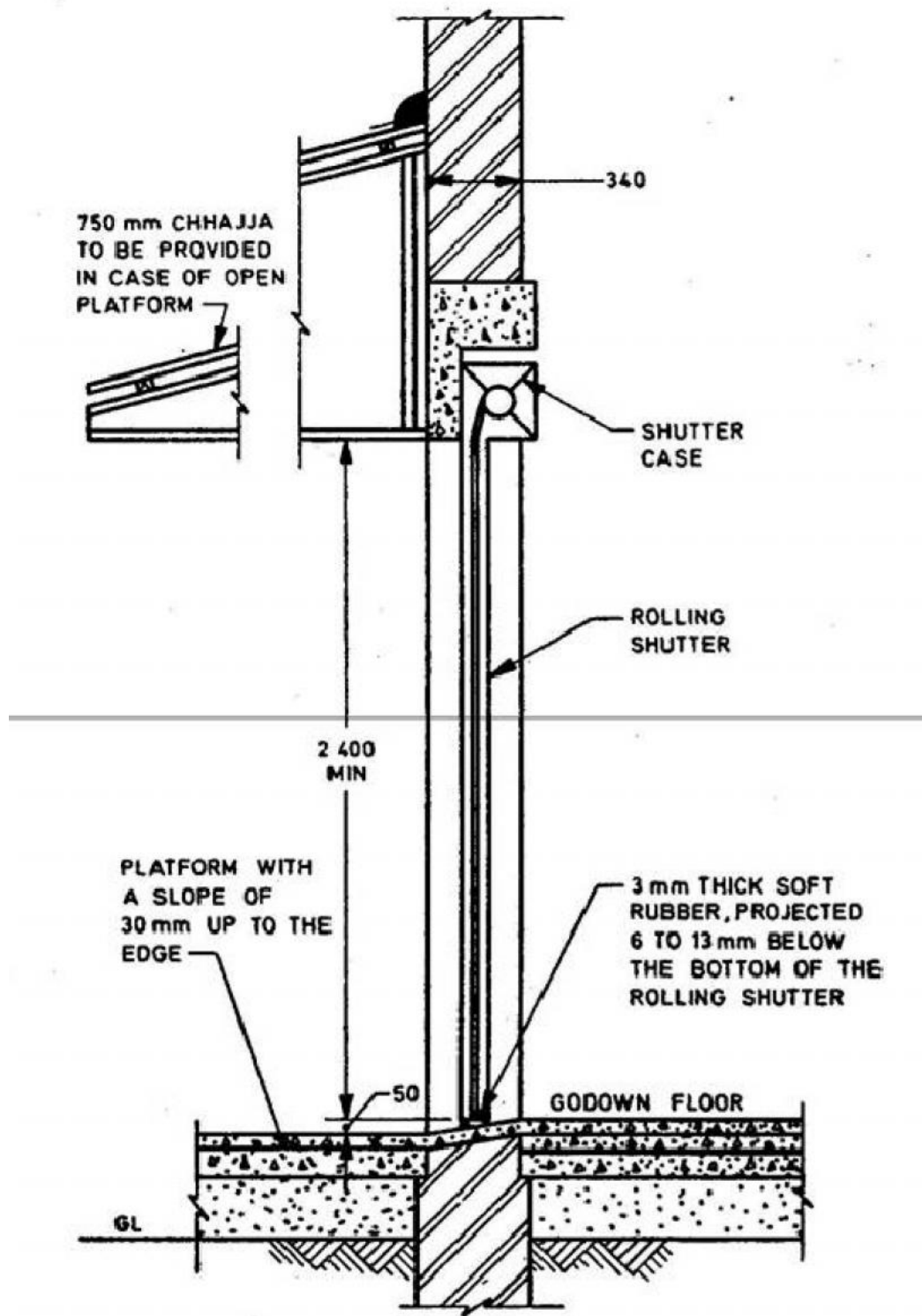
10.2 **Ventilators** — In longitudinal walls, one steel ventilators of opening not less than 1 494 × 594 mm shall be provided in each bay between RCC columns spaced at 4 650 mm from centre to centre. The ventilators shall be fixed 150 mm below the top edge of the tie beam i.e. truss level of the structure. They shall be provided with glazed centre hung with fixed wire-mesh shutters (see Fig. 7). The frames of the ventilators shall be provided with suitable beading to avoid any chance of air and moisture leakage.

Air inlets of steel ventilator 620 × 620 mm in each bay shall also be provided at 600 mm above the floor level of the structure (Fig. 8) except those which have a rolling shutter opening or garage door. These shall be protected by expanded metal / hard drawn wire fabric from inside (see Fig. 8). When closed, the shutter shall fit tight in frame.

On gable walls, suitable number of steel ventilators glazed with fixed wire-mesh may be provided, if required. These ventilators shall be protected by sunshade of at least 460 mm projection. Where good local timber is available or in coastal region where steel may be subjected to salt action, timber ventilators may be provided [see IS 1003 (Part II)].

## **11. ROOF**

- 11.1 The roof of the structure shall be of single span structural steel or tubular trusses which shall be fixed on the RCC columns of RS joists at a height of 5600 mm from the plinth level to the tie level at the column ends, both for the road-fed and rail-fed storage structures (see Fig. 9).
- 11.2 The roof of the platforms shall be of a cantilever structural steel of tubular trusses fixed on to RCC columns at a height of 4000 mm for rail-fed structures with broad gauge railway line. The height shall be measured from the floor level of the structure to the bottom tie of the truss. Outer edge of the truss should not go beyond the line of the edge / RCC coping of the platform. The width of platforms for railside and roadside shall be 2450 mm and 1830 mm respectively, which shall be measured from the face of the columns.

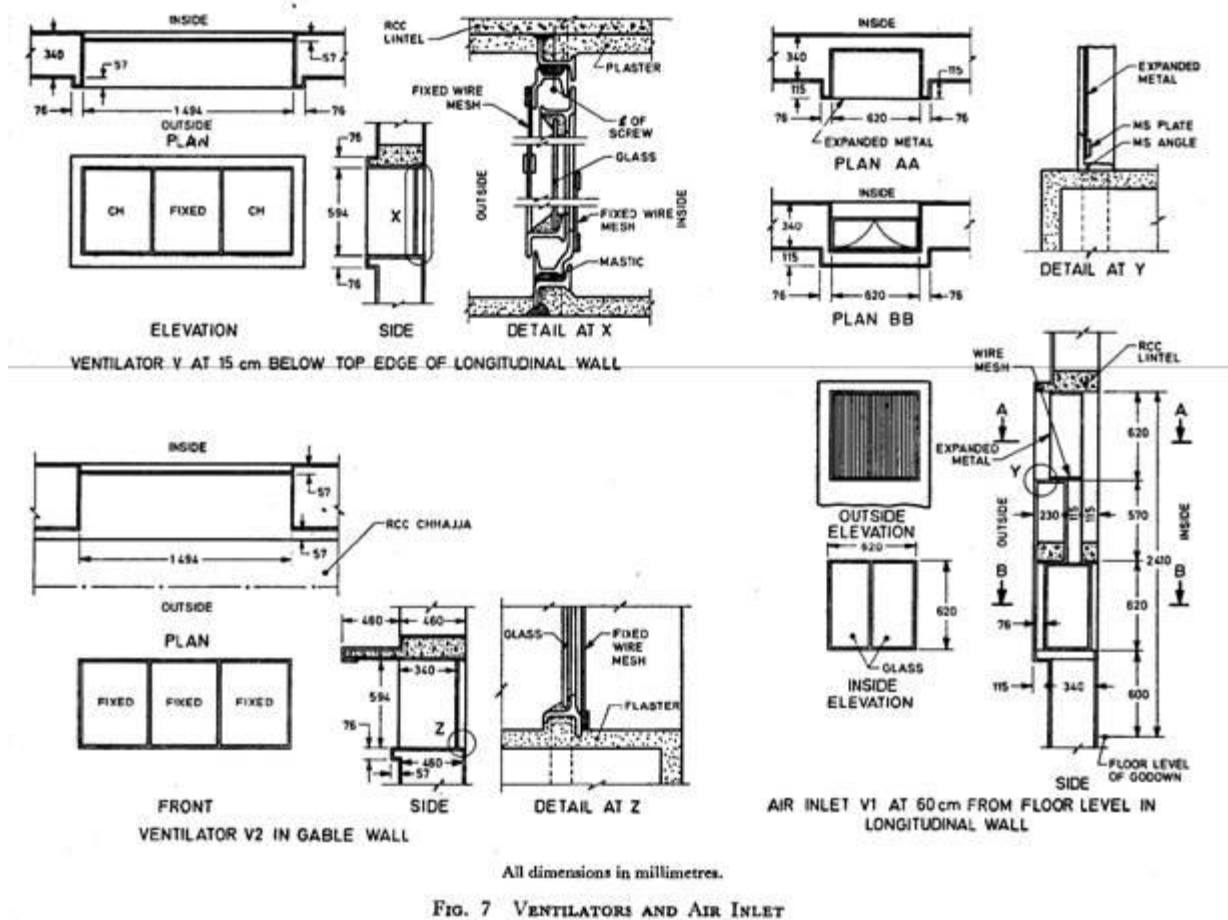


All dimensions in millimetres.

**FIG. 6 DETAILS OF ROLLING SHUTTER**

- 11.3 The trusses shall be connected by suitable sets of wind bracings and longitudinal runners etc. at the level as per the recommendations of the structural designer of the truss.

- 11.4 The design of the trusses shall be in accordance with the general constructional practices and relevant Indian Standard codes for loading standards (IS 875), tubular trusses (IS 806, IS 1161 and IS 800)



- 11.5 Roofing – Materials may be corrugated asbestos sheets (see IS 459) or galvanized corrugated (see IS 277) sheets, steel sheets or corrugated aluminium sheets or black corrugated sheet, not thinner than 0.56 mm. The sheets shall project at least 46 cm from the outer face of the longitudinal walls. The sheets shall be well anchored and secured on the purlins by means of galvanized iron **J** or **L** hooks sufficiently long to have good grip over sheets and purlins and accommodate nuts and washers. In areas liable to excessive heat, use of a heat reflecting paint may be considered.
- 11.6 Purlins may be of structural steel rolled Z or tubular sections. The spacing of purlins shall be as given in IS 3307 (Part 1).
- 11.6.1 The design of the purlins shall be in accordance with the general constructional and Indian Standard design practices.
- 11.6.2 Suitable arrangement shall be provided for expansion of purlins and bottom runners. They may be provided preferably at the partition and gable walls.
- 11.7 The trusses need not be provided on the gable and partition walls. The purlins may, however, rest and be deeply anchored on the gable and the partition walls.

- 11.8 Wind ties of MS flat of size 40 x 6 mm may be provided in a minimum of 4 rows in the godown, structure and one row on the platform proofing.
- 11.9 Transparent / translucent sheets of about 2 percent of the total area of the roof and evenly distributed may be provided for natural light.
- 11.10 Polyester coated pre-painted sheets may also be considered in the roofing.

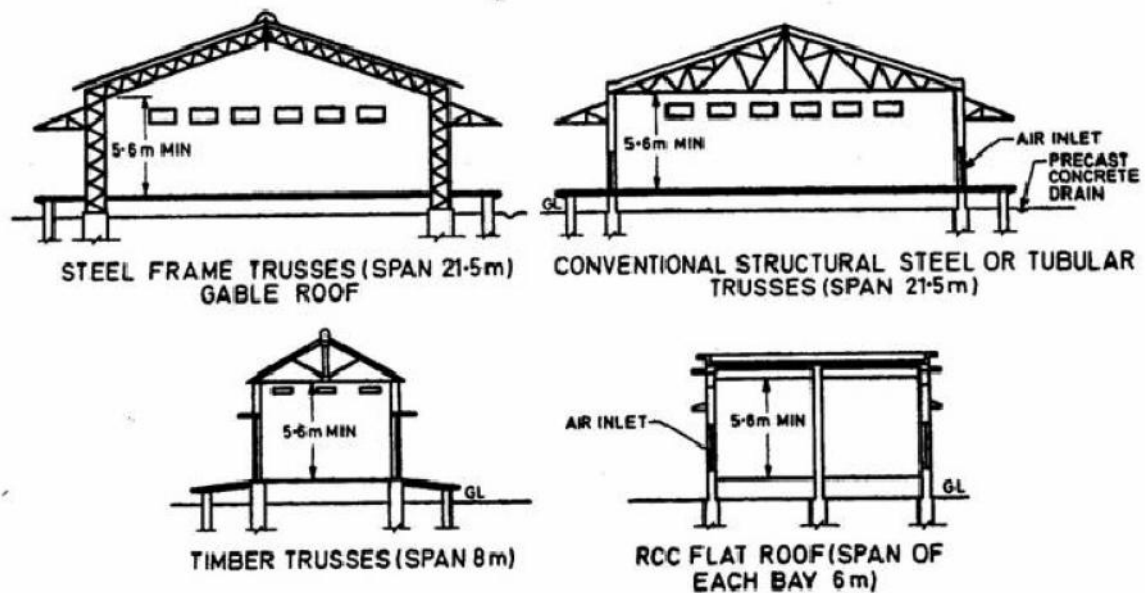


FIG. 8 DIFFERENT TYPES OF ROOFS FOR GODOWNS

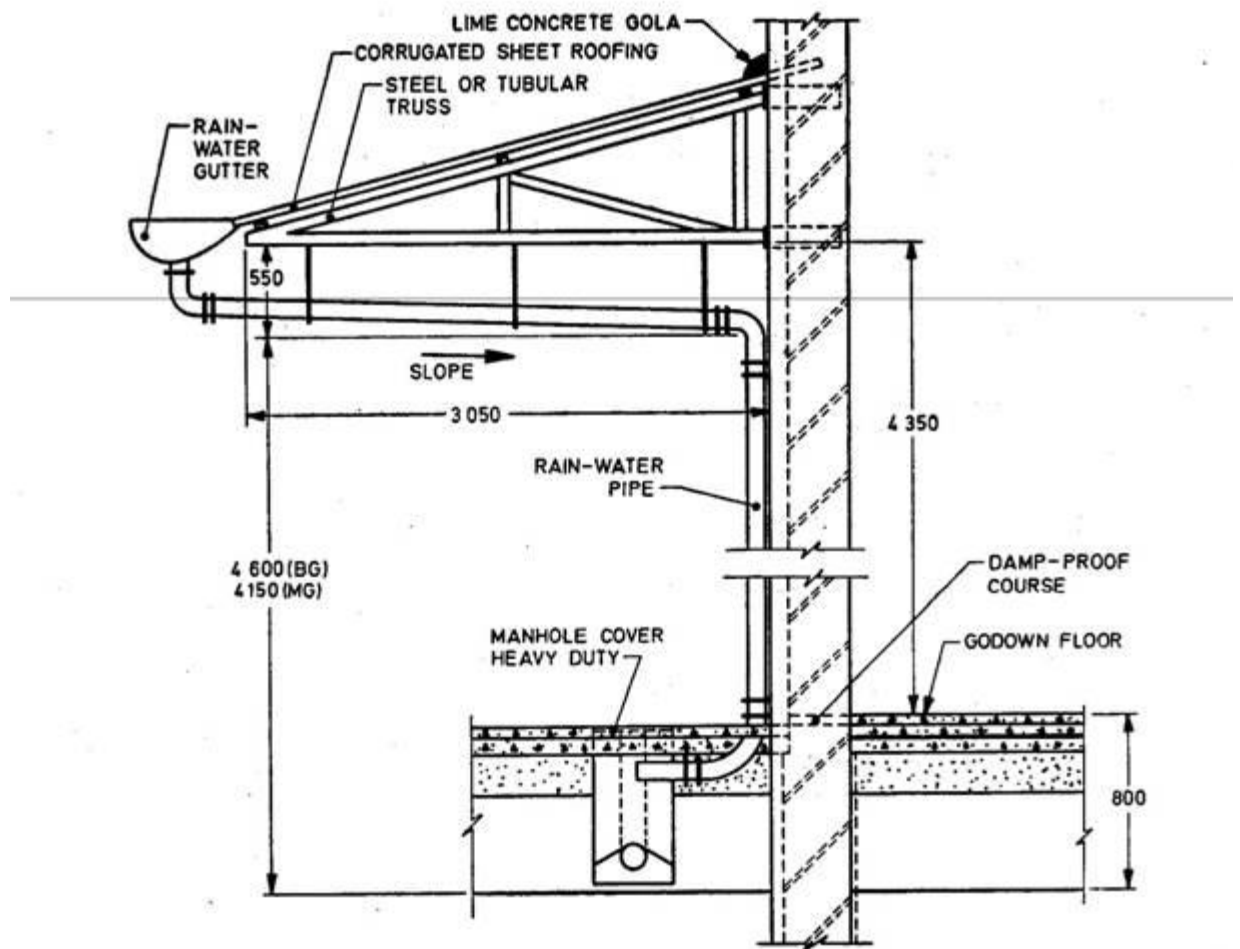
## 12. GABLE AND PARTITION WALLS

- 12.1 A beam may be provided at tie level o truss over gable and partition walls. Where gabled roof is constructed, care should be taken that no hollow space is left between the walls and the roof covering.

## 13. DRAINAGE

- 13.1 **Rain Water Pipes** — On railside platform rain-water pipes shall be provided at each bay for drainage of rain water from the roof. The rain-water eaves gutter at the outer end of the platform truss of adequate section to receive the rain water both from the main structure roof and platform roof shall be provided and suitably connected to the down take rain water pipes (Fig. 10). They shall be of cast iron or asbestos cement pipes (see IS 1626), PVC or SWR pipes of diameter not less than 110 mm. Their diameter shall also be adequate depending on the intensity of the rainfall of the place. The pipes shall be properly secured at the off take and also securely fixed with clamps to the RCC columns or walls at every 1.8 metres. The rain water shall be drained off by suitable open drains fairly away from the main structure. Where railside platforms are provided, the drain pipes shall be connected to the suitable manholes provided under platform and rain water shall be drained off by asbestos cement pipes, PVC or SWR pipes of adequate diameter connecting the manholes. The manholes shall be provided with heavy-duty covers. On the road-side platforms, a strip of 90 cm brick paving may be provided along the platform walls to protect the scouring of the road surface from the rain water falling from the roof directly. A suitable saucer drain of 300 mm diameter may also be provided by the side of platform wall to drain away the rain water of

the roof. Surface area drain to carry run off may also be provided for disposal of water of the complex.



All dimensions in millimetres.

**FIG. 9 DETAILS OF EAVES GUTTER**

## **14. FINISHING**

14.1 The internal faces of the walls of structure shall be cement plastered and external faces up to floor level shall be smooth plastered. The internal faces may be whitewashed and external faces provided with colour wash.

14.1.1 All the steelwork and woodwork shall be provided with two coats of superior quality paint over a coat of primer.

14.1.2 The galvanized iron or aluminium sheets shall be painted with two coats of superior quality paint suitable for GI or aluminium sheets over a coat of primer suitable for such surfaces. Black corrugated sheets where used shall also be painted with suitable paints which prevent rusting and deterioration of these sheets in addition to the priming and finishing coats.

14.1.3 The paint to be used inside the godown for steelwork and steel / aluminium sheets shall resist the adverse effects of fumigants.

14.1.4 In the coastal area, choice of the paint on the steel items / structure should be according to the environmental conditions so as to combat the effect of rusting etc.

14.1.5 In the heavy Rainfall areas, external surface of walls should be finished with cement water proofing paint.

## 15. LIGHTING

15.1 Sufficient lighting may be provided inside in the alleyways and on the outside of the structure to facilitate loading and unloading operations.

### APPENDIX A (Clause 4.1)

#### ANCILLARY STRUCTURES AND OTHER AMENITIES

A-1 There may be one or more ancillary structures at each site depending upon the storage capacity and scope for future expansion. A small compact block consisting of an office room, a store room and a separate room for keeping pesticides may be provided at each site with proper aeration. For small capacity godowns, the following sized of rooms are suggested which may be modified as per the actual requirements:

a) Office room	4.5 × 3.5 m
b) Store room	3.5 × 3.5 m
c) Chowkidar / Sentry room	4.0 × 2.25 m
d) Cycle / Scooter stand	
i) Upto 10 000 MT capacity	14 m <sup>2</sup>
ii) Above 10 000 and upto 50 000 MT	36 m <sup>2</sup>

A-1.1 The area of the office block would depend upon the staff pattern while that for storeroom would be on the basis of the storage capacity, the anticipated turnover of work, the quantity of dead stock articles, equipment and chemicals that may have to be kept at each centre. A room preferably separate with a suitable verandah may be provided for watch and ward purpose. For larger capacity of 5 000 tonnes and more, the following minimum areas are recommended for office block:

	Plinth Area (in square meter)
a) Upto 10 000 MT	50
b) Above 10 000 and upto 25 000 MT	100
c) Above 25 000 MT	125

A-2 For large-capacity storage structures, the following ancillary structures may be provided for each centre in addition to the administrative block.

A-2.1 **Isolation Chamber** – The size of the isolation chamber would depend upon the storage capacity at each site. The isolation chamber may preferably have RCC flat roof. In case of multi chamber storage structures, one of the chambers may be used as the isolation chamber for the keeping of infested and damaged stock separately.

A-2.2 **Lavatory Block and Sanitary Installation** – For labourers and staff working in the premises of the storage structure sufficient number of bathrooms,

urinals, lavatories and washing places shall be provided. The following yardstick for provision of lavatory block may be suggested:

Storage Capacity	WC	Urinals	Washing Places	Drinking Places
a) Up to 5 000 tonnes	1	2	1	1
b) Above 5 000 and up to 10 000 tonnes	2	3	2	2
c) Above 10 000 and up to 25 000 tonnes	3	6	4	4
d) Above 25 000 tonnes	The number may be suitably increased			

A-2.3 Water supply and the fire fighting arrangement shall be made.

A-2.4 For the staff and labourers working in the storage structure, facilities for drinking shall be provided at suitable locations.

A-2.5 For fire fighting purposes, a network of water supply pipe lines with fire hydrants at suitable locations may be provided to ensure supply of water at any time (see IS 3594 and IS 2190).

A-2.6 **Canteen** – It is recommended that the amenity of a canteen / tiffin room may be provided at each centre having a capacity of 5 000 tonnes or more. The size of canteen may be proportionately increased for godowns of higher capacities.

A-2.7 **Water Harvesting** – It is recommended that the rain water harvesting arrangements may be made in the complex to re-charge the ground water level as per the practice in the local PHE and self-government department of the State.

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