

1 SECTION 1 - OBJECTIVES

2 This Code aims to provide specific guidance for the appropriate handling, storage
3 and transport of grains to ensure prevention and reduction of physical, biological and
4 chemical factors that contribute to the quality, quantity and safety of grains during storage.

5 SECTION 2 - SCOPE, USE AND DEFINITION**6 2.1 Scope**

7 This Code covers general warehousing practices relevant to handling storage and transport
8 of grains. It also considers the provisions of the Good Agricultural Practices (GAP) and Good
9 Manufacturing Practices (GMP) to ensure food safety, quality of produce and worker's
10 health, safety and welfare.

11 2.2 Use

12 This Code considers the relevant provisions of the *Republic Act 10611: The Food Safety Act,*
13 *National Food Authority (NFA)'s Revised Rules and Regulations on Grains Business* and other
14 relevant national and private standards for the handling, transport and storage of
15 grains. This Standard should be used in conjunction with the *Good Agricultural Practices*
16 *(GAP) for Corn (PNS/BAFPS 20:2007) and Rice (PNS/BAFS 141:2014)*. Moreover, this Code is
17 consistent with the *Philippine Agricultural Engineering Standard (PAES)____:2015,*
18 *Agricultural Structures – Warehouse for Bag Type Storage for Grains*. Relevant provisions
19 that pertain to practices that ensure prevention and reduction of physical, biological and
20 chemical factors that contribute to the quality, quantity and safety of grains during
21 storage and promote agricultural product safe-keeping and quality preservation are
22 expounded in this Code.

23

24 2.3 Definitions

25 For the use of this Code, the following terms should apply:

Contamination	The introduction or occurrence of a hazard into the environment
Farm	Any premise, or area in which crops especially grains are grown and harvested
Fertilizer	Includes any solid or liquid substance either organic or inorganic nutrient elements – singly or in combination with other materials, applied directly to the soil, foliage or plant for the purpose of promoting plant growth, increasing crop yield or improving product quality.
Food	Any substance or product whether processed, partially processed or unprocessed that is intended for human consumption. It includes drinks, chewing gum, water and other substances which are intentionally incorporated into the food during its

	manufacture, preparation and treatment.
Food safety	Assurance that food will not cause harm to the consumer when it is prepared or eaten according to its intended use
Good Manufacturing Practices (GMP)	Quality assurance system aimed at ensuring that products are consistently manufactured, packed, repacked or held to quality standards appropriate for the intended use. It is thus concerned with both manufacturing and quality control procedure
Grains	Shall mean the husked or unhusked, milled or unmilled, seeds or fruits of various food plants more specifically the cereal grasses.
Milled Rice	Product obtained after the removal of husks and bran.
Pest	An unwanted animal or plant that affects the production, quality and safety of-food agricultural crops- for example, insects, diseases, weeds, rodents and birds
Pesticide	Any substance or product, or mixture thereof, including active ingredients, adjuvants and pesticide formulations, intended to control, prevent, destroy, repel or mitigate directly or indirectly, any pest.
Shelled Corn	Corn kernels, mainly either dent or flint varieties of the plant <i>Zea mays</i> . It is also known as 'maize' or 'corn grain'.
Warehouse	Building used for storing paddy, milled rice and other grains.
Warehousing Practices	System or procedure of storing goods to ensure that these are always available, accessible and in good condition

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27 **SECTION 3 – SITE LOCATION AND CONSTRUCTION**

28 This Section shall conform with the provisions of the *Philippine Agricultural Engineering*
 29 *Standard (PAES) ____:2015, Agricultural Structures – Warehouse for Bag Type Storage for*
 30 *Grains.*

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32 In addition to the requirements specified in PAES ____: 2015 standard, the following are
 33 additional considerations:

- 34 • The warehouse should be constructed away from sources of potential contaminants
 35 that may affect the quality of produce and pose risk to the worker's health and
 36 safety.
- 37 • The storage establishment should be located away from environmentally polluted
 38 areas and sources of industrial activities, flood prone areas, zones that may

39 encourage insect infestation and entry of stray animals and places where waste
40 either solid or liquid cannot be removed effectively.

- 41 • The warehouse should be constructed where there is accessible road.
- 42 • The load-bearing capacity, resistance to compaction and drainage characteristics of
43 soil in which the storage and warehouse is to be constructed should be determined.
- 44 • The location and distance of the warehouse from other farm structures or the
45 production area should also be considered during construction.
- 46 • Other factors that may be taken into account are the following: accessibility, ease of
47 movement of stocks, and permission for vehicle movement and maneuvering.

48 In terms of building specification, there should be sufficient area in the storage and
49 warehouse that will allow handling and storage of grains in a manner that will not result to
50 adulteration of stored grains.

51 **SECTION 4 - STORAGE WAREHOUSE DESIGN AND SPECIFICATION**

52 This Section shall conform with the provisions of the *Philippine Agricultural Engineering*
53 *Standard (PAES) ____:2015, Agricultural Structures – Warehouse for Bag Type Storage for*
54 *Grains and Food and Agricultural Organization (FAO): The Purposes of Warehouses, and*
55 *Basic Requirements*. The succeeding sections provide additional parameters that should be
56 taken into account.

57 **4.1 Ventilation**

58 Ventilation systems should be designed and constructed to provide proper aeration and to
59 maintain the desired temperature. Moreover, the ventilation systems should be maintained
60 in normal conditions and cleaned regularly.

61 **4.2 Flooring and Drainage**

62 The floors should be constructed to be adequately strong, sufficiently above ground level
63 and free from cracks where moisture from the ground may affect and/or contaminate the
64 stored grains. It should be made from durable, impervious, non-toxic, and non-adsorbent
65 materials. Proper drainage system should be installed to prevent water stagnation. The
66 drainage canals should be protected by a grille.

67 **4.3 Walls and Ceilings**

68 All ceilings and walls should be constructed and finished so as to prevent condensation,
69 leakage and formation of mold. The walls and ceilings should be painted white or any light
70 colored material. Moreover, it should be made of smooth, durable, impervious, crack-
71 resistant materials that can be cleaned easily.

72 **4.4 Openings/Doorways/Windows**

73 Openings leading to the exterior should be installed with mesh screen windows and tight-
74 fitting doors, to prevent entry of unauthorized personnel, and stray animals and pests.

75 **4.5 Lightings**

76 Adequate lightings should be provided to allow adequate and effective cleaning of the
77 warehouse facility and to ensure that storage operations can be carried out in a hygienic
78 manner. Shatterproof materials should be used to enclose the lightings fixtures inside the
79 warehouse to ensure that the grains are protected by contamination due to breakages.

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82 **4.6 Roof**

83 Roof frames should be designed in a way that it can transfer the weight of the roof to the
 84 supporting columns (in framed buildings), or to the walls for small warehouses. The
 85 materials to be used in the construction of these roof frames should be made of steel or
 86 wood that is well dried and chemical treated.

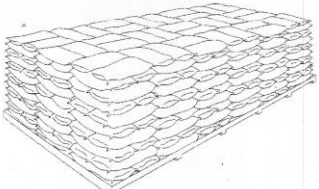
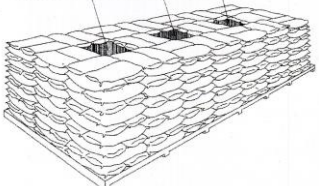
87 There should be no opening between the wall and the roof to avoid entry of pests and to
 88 minimize contamination. In the event that the existing warehouses have gaps between the
 89 roof and the wall, a mesh should be installed to prevent entry of animals, and pests.

90 **SECTION 5-PILING SYSTEM**

91 To provide aeration and avoid contamination, pallets, square timbers or any local
 92 substitute shall be used as the base of all the stocks of grains. The pallets may be covered
 93 with clean and new empty sacks or plastic sheets to prevent accumulation of spilled grains
 94 beneath the pallets. The floor sheets may be used for fumigation purposes.

95 In terms of moisture content, grains shall be stored and piled following the
 96 recommendations in the table below:

97 Table 1- Storage and Piling System for Grains in reference to its Moisture Content (MC)

MC (%)	Storage and Piling System	Description	Remarks	Illustration
≤14	Block or Chinese Method	1 layer after the other	---	
	Japanese Method	1 layer after the other with hole in the middle for aeration	Temporary piling only	

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99 All grains above 14% moisture content should be subjected to further drying operations
 100 prior to storage.

101 The piles shall be stacked in a tight, neat and squared off manner. The stack heights and
 102 stacking density should conform with the recommended provisions of the *Philippine
 103 Agricultural Engineering Standard (PAES) ____:2015, Agricultural Structures - Warehouse
 104 for Bag Type Storage for Grains*.

105 At least one-meter space shall be provided between piles, between piles and walls, and
 106 between piles and posts to facilitate cleaning and application of pest control measures. An
 107 updated bin card shall be attached to every pile. The standard information in the bin card
 108 shall be the following:

- 109 a. Date received or date procured
 110 b. Source of stock

- 111 c. Moisture content
- 112 d. Quantity of bags
- 113 e. Variety or code
- 114 f. Pest control measures applied and date of application
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116 **SECTION 6 – GOOD WAREHOUSEKEEPING**

117 **6.1 Warehouse Maintenance**

118 There should be monthly scheduled inspection of roofs for the presence of any holes,
119 leakages or damages in the roofing system. The Warehouse officer shall immediately act
120 upon any report of leaks or damage. Structural defects in gutters and downspouts shall be
121 immediately and properly repaired. In case of cracks and crevices, cement plaster shall be
122 used to properly fill up the damage.

123 **6.2 Warehouse Hygiene and Sanitation**

124 Prior to storage, the warehouse and its immediate surroundings shall be thoroughly
125 cleaned. The warehouse must be free from unnecessary materials like pieces of lumber and
126 old machines. After cleaning, residual spraying shall be applied to the entire storage
127 structure, which includes walls, floors and posts. The entire warehouse structure must be
128 cleaned and brushed down at least once a month to prevent contamination from dirt.
129 Moreover, the surrounding areas of the warehouse should be weed-free.

130 Machines must be cleaned to avoid accumulation of grain residues, dust and waste. A
131 weekly cleaning of the periphery of the piles should be done to remove dust and webs and
132 to eliminate the possible breeding place of rats, birds, and insects. Damaged or gnawed
133 sacks should be immediately mended to avoid spillages, collapse of the pile, and further
134 attack from pests. Warehouse including pallets must be cleaned immediately upon grain
135 disposal to remove accumulated grain residues, dust, and cobwebs. Unused pallets
136 and empty sacks should be cleaned and properly stored.

137 If possible, bags or containers should not be re-used since use of returned sacks is a serious
138 source of insect infestation. However, if sacks are intended to be used again, immediate
139 cleaning and fumigation should be done after each use with particular attention to the
140 seams where pockets of grains may lodge. Unserviceable empty sacks and totally damaged
141 grains should be properly disposed.

142 A separate room should be provided for pesticides and cleaning materials. Sacks and
143 pallets should be properly stored in a separate portion of the warehouse and stacked
144 neatly and orderly and provided with a physical separator. Proper signage should be
145 provided for all rooms. Moreover, no portion of the warehouse should be used as living
146 quarters.

147 **6.3 Stock Maintenance and Preservation Standards**

148 Representative samples shall be taken randomly from a batch of bagged grains and
149 measured using calibrated moisture meters. Newly received grains with moisture content
150 above 14% shall be temporarily stored and subjected to drying to 14% MC and below. Dried
151 stocks may be grouped according to their varietal characteristics.

152 Laborers shall be discouraged and prevented from using hook or “gancho” to maintain the
153 integrity of the bags and avoid spillages. The spillages shall be immediately collected. These

154 collected grains may be either be sacked and piled separately or cleaned and added to
155 busted bags.

156 At least 100 g sample of every variety of stocks of milled rice or shelled corn stored in the
157 warehouse should be maintained at the warehouse office for easy reference. It shall be
158 packed in plastic containers or sample bottles with proper identification. Warehouse
159 temperature/humidity as well as grain temperature must be measured daily. Grain
160 thermometer and thermohygrometers should be installed for monitoring purposes.

161 Warehouse atmosphere must be controlled by either opening or closing windows/doors
162 or installing ventilation fans. Windows and doors must be opened during daytime for
163 proper aeration of stocks. All windows and other openings except doors must be screened
164 to avoid pilferages and entry of pests.

165 Damaged grains that are no longer fit for consumption shall be disposed immediately. Daily
166 inspection of stocks shall be done to detect signs of infestation in order that pest control
167 measures can be recommended and effected.

168 **6.4 Pest Control Administration**

169 A pest monitoring and inspection program must be in place to prevent harborage and
170 breeding of pests on the grounds and within the warehouse facility. Whenever stocks are
171 disposed and the warehouse is vacated, residual spraying of the whole or sections of the
172 storage structure should be carried out after thorough cleaning. Space treatment should be
173 conducted at dawn or dusk when flying insects are most active. For crawling insects,
174 external stock treatment consisting of spray application to the four sides and the top
175 surface of the pile should be conducted regularly. For heavily infested stocks, fumigation,
176 conducted by licensed fumigators only, should be done as a remedial measure to control
177 internal infestation. Rodent control through the use of traps or poison baits should be
178 carried out regularly.

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180 Only pesticides for stored products approved by the competent authority shall be used.
181 Monitoring of the efficacy of the treatment used should be done at least one week after the
182 application.

183 184 **6.5 Transport**

185 The harvested grains or stored grains should be transported using clean vehicles or other
186 appropriate mode of transportation. Transport vehicles should be cleaned before and after
187 usage to avoid contamination and residual infestation.

188 189 **SECTION 7: WORKER'S HEALTH, WELFARE AND TRAINING**

190 **7.1 Personnel Hygiene**

191 There shall be a strict observance of the "no smoking", "no spitting" and "no eating" policy
192 inside the warehouse since this practices will induce contamination. Any person who has
193 or appears to have an infectious disease, open lesion, including boils, sores, or infected
194 wounds, or any other abnormal source of microbial contamination must be excluded from
195 any operations. Hygienic practices through established/documented procedures including
196 specific instructions should be made for all personnel.

197 Grain handlers should follow personal hygiene recommendations as indicated in
198 FDA/BFAD Revised Guidelines on Current Good Manufacturing Practice in Manufacturing,
199 Packing, Repacking or Holding Food (AO No. 153 s.2004) or the latest issuance and Codex
200 Recommended International Code of Practice General Principles of Food Hygiene
201 (CAC/RCP 1-1969,Rev. 4-2003) or the latest issuance. The following recommendations
202 should include but not limited to:

203 7.1.1 Wearing of appropriate clothing and shoes applicable to the operation and can serve
204 as protection for food contamination and an aid on the workers health and welfare.

205 7.1.2 Wearing appropriate masks during handling and transport of grain produce.

206 7.1.3 Washing of hands thoroughly and sanitizing, if necessary, in the appropriate hand-
207 washing facility before the start of any handling operation, after each absence from the
208 work station and at any given time when possible contamination can be encountered by
209 the worker.

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211 **7.2 Personnel Training**

212 Before a job is assigned, the training background and ability of the personnel shall be
213 considered. Training and re-orientation of the warehouse personnel should be done at least
214 every two (2) years. The following trainings recommended for the personnel specific on
215 his/her assigned task are the following:

216 7.2.1 Inventory and management

217 7.2.2 Acquisition and purchasing

218 7.2.3 Supply chain and logistics

219 7.2.4 Transportation and freight operations

220 7.2.5 Personnel hygiene and food safety

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222 **SECTION 8: MANAGEMENT AND SUPERVISION**

223 Grain operators should have adequate knowledge on food hygiene principles and practices
224 to be able to assess potential risks, take appropriate preventive and corrective action, and
225 ensure that effective monitoring and supervision is carried out. Formal training on food
226 safety (GMP/GHP) is necessary and further trainings in HACCP are extremely helpful.
227 Trainings on food safety for grains businessmen, grains operators and warehouse
228 personnel should be conducted.

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230 **SECTION 9: DOCUMENTATION AND RECORDS**

231 All cleaning and pest management activities should be properly documented in a
232 recommended form.

233 Appropriate records from all warehousing practices should be kept and retained for a
234 period that exceeds the shelf life of the product. Records should be to facilitate recalls and
235 product safety investigations, if required.

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238 SECTION 10: TRACEABILITY

239 Proper packaging and labeling for grains should conform with the provisions stated under
240 the revised edition of the National Food Authority's Primer on Philippine Grains
241 Standardization Program. The labeling information should contain the following whenever
242 applicable: Classification (ie. well milled, regular milled or under milled for rice and white
243 or yellow corn and flint or dent corn for shelled corn), variety, grade(optional except for
244 special rice), net weight, name and address of the Miller and in case of custom milling,
245 name and address of owner.

246 Proper labeling and record keeping should be made to facilitate any forward or backward
247 tracing of food products. Records of deliveries should be kept (delivery receipt, personnel
248 from in and out of the warehouse, date of delivery, and classification of goods delivered).

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250 SECTION 11: RECALL PROCEDURES

251 Warehouse operators should ensure that effective procedures are in place to deal with any
252 food safety hazard and to enable the complete, rapid recall of any implicated lot of the
253 finished food from the market in case of complaint or issues regarding product quality and
254 safety. Where a product is withdrawn because of an immediate health hazard, other
255 products which are produced under similar conditions, and which may present a similar
256 hazard to public health, should be evaluated for safety. The need for public warnings
257 should be considered.

258 Recalled products should be held under supervision until they are destroyed, used for
259 purposes other than human consumption, determined to be safe for human consumption,
260 or reprocessed in a manner to ensure their safety.

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