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Warehouse and warehousing for storage of dry packaged seeds and irish potato seeds —Requirements

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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 566 was prepared by Technical Committee RSB/TC 032, *Seeds and planting materials.*

Committee membership

The following organizations were represented on the Technical Committee on *Seeds and planting materials.* (RSB/TC 032) in the preparation of this standard.

Africa Supply Ltd

INNOPRO Ltd

Rwanda Agriculture and Animal Resources Development Board (RAB)

Rwanda Institute for Conservation Agriculture (RICA)

Zamura Feeds Ltd

Rwanda Standards Board (RSB) – Secretariat

Introduction

Warehouses are intended for the storage and physical protection of seeds from the weather, prevention of the entry of pests and security. They also include materials and equipment required for inspection, drying, screening, sorting, grading, packaging and handling of bagged seed and storage pest control. The structure should be properly built to provide good storage conditions, easy access and safe working conditions, and should not provide harbourage for pests.

Warehouse and warehousing for storage of dry packaged seeds and irish potato seeds — Requirements

1 Scope

This Draft Rwanda Standard specifies requirements for location, structure, facility, safety and management of a warehouse intended for storage of dry packaged seeds and irish potatoes seeds.

This document excludes vegetative planting materials such as seedlings, vines and cuttings, suckers.

2 Normative references

There are no normative references in this document

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply

3.1

warehouse

building for storage of seeds meant for trade, exchange and food security programmes

3.2

pallet

building for storage of seeds meant for trade, exchange and food security programmes

3.3

competent authority

any person or organization that has the legally delegated or invested authority, capacity, or power to perform a designated function

3.4

warehousing

performance of administrative and physical functions associated with storage of seeds. These functions include cleaning and maintenance of a warehouse, drying, screening, sorting and grading of seeds, packaging, labelling, stacking, pests prevention and control, records keeping and any other activity necessary to store seeds safely

4 Requirements

4.1 Location

4.1.1 The location of a warehouse shall be authorized by competent authority

4.1.2 The site shall be located at relatively high elevation to avoid water logging and safe from natural flooding calamities.

4.1.3 The orientation of the warehouse should be such that radiant heat gain from the sun is minimal.

4.1.4 The warehouse shall be accessible by road.

4..1.5 The warehouse shall have facilities such as clean water, and power supply.

4.1.6 Warehouse shall not be located near the site for waste disposal and surroundings shall be kept clean.

4.1.7 The warehouse shall not be near any facility where the danger of fire is constantly present.

4.1.8 Warehouses shall not be located near busy public facilities such as schools and hospitals. Existing warehouse near public facilities shall take necessary measures to mitigate the effects of their operations.

4.1.9 There should be ample space to facilitate operations related to movement, parking and loading and offloading.

4.2 Structure

4.2.1 General

4.2.1.1 The construction and building materials shall conform to the National Building Regulations and relevant standards.

4.2.1.2 The material shall be durable, non-toxic, wind and water tight.

4.2.2 Foundation

The foundations shall be of adequate strength to take the weight of the building and of the seeds filling, and should be termite proofed.

4.2.3 Floor

4.2.3.1 The floor shall be adequately strong and capable of withstanding heavy loads and vibrations.

4.2.3.2 The floor shall be elevated or constructed higher than the existing ground.

4.2.3.3 The floor shall be smooth, hard and easy to clean.

4.2.3.4 The floor shall be free from cracks where moisture from the ground may affect the stored seeds. Moisture sealing compound or asphalt should be provided to fill the floor cracks against moisture.

4.2.3.5 [General warehouse space shall be floored with a concrete slab to carry wheel loads and withstand the abrasion generated by the continual use of hard rubber and steel-wheeled forklift and trucks.]

4.2.4 Walls

4.2.4.1 The surfaces of the walls shall be smooth and free from projections to eliminate dust-laden surfaces, facilitate cleaning of the store and avoid interference with other operations.

4.2.4.2 The junction between walls and roof shall be well sealed in order avoid birds and rodents to access the store rooms.

4.2.4.3 A water/damp-proof barrier shall be incorporated into the base of the walls. Water proofing compound may be incorporated during the plastering and finishing of the walls.

4.2.5 Roofs

4.2.5.1 Roof design shall be in a way that facilitates pest control and other stock management procedures.

4.2.5.2 Internal pillars supporting roof frames should be avoided as much as practicable

4.2.5.3 Roof shall be provided with the necessary lateral and vertical wind brace to resist forces due to strong winds and earthquakes.

4.2.5.4 The roof covering materials shall be reflective and keep the warehouse dry.

4.2.5.5 The inclination of the roofs shall be sufficient to drain rainwater quickly, taking into account that the water may be forced up by the wind.

4.2.5.6 Roofs shall be watertight and gulleys kept clear of debris and leaves.

4.2.5.7 The roof shall be a good thermal insulator, not affected by condensation, and give protection against attack by pests and moulds.

4.2.5.8 It shall be designed so as not to provide harbourage for insects and mites. An internal ceiling is not advised, as it may provide harbourage for predators.

4.2.5.9 Rainwater drainpipes shall be not less than 90 mm in diameter.

4.2.5.10 All drain pipes from roof gutters shall be external, well fitted and shall have mesh baffles fitted inside their lower open ends.

4.2.6 Doors

4.2.6.1 The number of doors shall not be less than two for warehouse that store 500 tones or below. One door shall be added to any more 500 tonnages.

4.2.6.2 The door shall fit tightly for insect control and fumigation.

4.2..6.3 The door shall be made of steel. If it is made of timber, the lower part of both the door and the frame should be covered by a steel strip protecting them against attack by rodents.

4.2.6.4 The door shall be provided with a secure locking system.

4.2.6.5 The size of the entrance shall depend on loading and unloading operations and shall be not less than 2.5 m wide and 2.5 m high.

4.2.7 Ventilation

4.2.7.1 Vents shall be provided near the floor level in the wall, at the top of the walls near the grid line. A suitable meshed ventilation duct should be placed in each gable so that warm air accumulating under the roof can escape.

4.2.7.2 Ventilation openings shall be fitted on the outside with anti-bird grills (10mm) and walls shall be designed to prevent entry of insects. Where applicable, insect screens shall be used. (1mm mesh).

4.2.7.3 In addition to natural ventilation exhaust, fans may be introduced for forced ventilation.

4.2.7.4 Windows should be kept to a minimum or avoided. They should be left open as little as possible. Windows shall be protected by mesh grilles to keep birds out when the windows are open.

4.2.8 Lighting

4.2.8.1 Lighting inside the warehouse shall be sufficient that lights shall not be too bright or too dim.

4.2.8.2 Artificial lighting is preferable for the interior of the warehouse, where sky lighting is used; it shall be aligned along the corridors and not directly above the seed stacks.

4.2.8.3 Lights shall be made in a way that minimizes risks of contamination.

4.2.8.4 Warehouse shall be lit around the entire warehouse and the external gate

4.2.9 Control of access

4.2.9.1 The site shall be secured against the unauthorised entry of person and animals.

4.2.9.2 Whenever there is a fence, gates shall be adequate for their purpose and wide enough to allow easy vehicular access.

4.2.9.3 Measures to prevent acts of sabotage shall be put in place. Potentially sensitive areas within the warehouse shall be identified, mapped, and subjected to access control. Where feasible, access should be physically restricted by use of locks, electronic card key or alternative systems.

4.3 Facility

4.3.1 General

There shall be rooms separate from the seed storage areas and may include but not limited to the facilities for reception, offices, changing room and shower, toilets and urinals, equipment and chemical store, Other facilities may be availed such as laboratories.

4.3.2 Office space and related facilities

The office space shall be:

a) easily accessible for staff and other visitors;

b) clearly signposted;

c) well aerated;

d) safe and unobstructed; and

e) clean, naturally well-lit and suitably furnished.

4.3.3 Toilets and urinals

4.3.3.1 Toilets and urinals for male and female shall be separately provided in the premises of the warehouse.

4.3.3.2. The facility shall have measures to accommodate people with disability.

4.3.3.3 The floor of the toilets and urinals shall be non-absorbent, washable and non-slip materials.

4.3.3.4 The wall shall be smooth, easy to clean and disinfect with a height not less than 2 metres.

4.3.3.5 The toilets and urinals shall be furnished with hand washing facilities and clearly signposted.

4.3.3.6 The number of toilets shall be adequate for the number of employees. The number of toilets may be determined using table 1 below:

Table 1 — Number of toilets and urinals in accordance with number of employees

S/N	Number of employees	Number of toilets and urinals
i.	1 - 15	1

ii.	16 - 35	2
iii.	36 - 55	3
iv.	56 - 80	4
v.	81 - 110	5
vi.	111 - 150	6
NOTE Over 150 employees one additional fixture for each additional 40 employees		

4.3.4 Changing room and shower room

4.3.4.1 The warehouse shall provide suitable changing room and shower room for workers.

4.3.4.2 Changing rooms shall be furnished with lockers.

4.3.4.3 All cleaning materials shall be provided.

4.3.5 Equipment store

4.3.5.1 Stores for equipment used for fumigation, sampling and cleaning shall be separated from the seed storage.

4.3.5.2 The floor shall be non-absorbent and washable.

4.3.6 Chemical store

4.3.6.1 Chemicals such as pesticide, rodenticides and fumigants may be stored at the warehouse. Such chemicals shall be stored in a separate room whose access is restricted.

4.3.6.2 Chemicals shall be clearly labelled for easy identification.

4.3.6.3 The floor and the wall shall be easy to clean.

4.3.6.4 Chemical store shall be clearly identified as such.

4.3.6.5 chemicals for other purposes other than those stated in 4.3.6.1 shall be kept in a separate room.

4.3.7 Laboratory

4.3.7.1 The warehouse may be provided with laboratory for internal control

4.3.7.2 The laboratory shall have facilities to undertake basic tests such as purity, moisture content and germination as per annex A

4.3.7.3 The laboratory shall have equipment and sufficient area for test to be conducted. This equipment may include moisture meters, sieves, screening kits, weighing balance and shelves,.

4.3.7.4 The floor and the wall shall be easy to clean.

4.3.7.5 The testing area shall be sufficiently lit.

4.3.7.6 The laboratory shall have a designated area for keeping of reference sampler and other laboratory consumables.

4.4 Safety

4.4.1 Warning signs or boards shall be fixed in hazardous/dangerous places.

4.4.2 Firefighting equipment in working condition (fire extinguishers, fire hydrants) shall be provided and be installed in an appropriate and easily accessible location.

4.4.3 Warehouse should be equipped with smoke detectors.

4.4.4 There shall be provisions for first aid facilities.

4.4.5 Safety signs and fire exits shall be indicated.

4.5 Warehouse operations and management

4.5.1 Cleaning and maintenance

4.5.1.1 The buildings, equipment, utensils and all other physical facilities of the establishment, including drains shall be always maintained in good repair and in an orderly condition.

4.5.1.2 The store and environment of the warehouse shall be kept clean and shall be disinfected regularly to prevent pest infestation.

4.5.1.3 Waste from warehouse cleaning, sorting and screening of seeds shall be disposed in an environment friendly manner and in such a way that does not harbour pests and disease vectors

4.5.1.4 Changing facilities and toilets shall be kept clean.

4.5.2 Physical analysis, drying, screening, sorting and grading

4.5.2.1 General

Prior to introduction into the store, incoming seeds shall be inspected, dried to acceptable moisture level and sorted as required to remove unfit materials. Such operations shall be carried out in a clean and sanitary manner. Only clean and sound product shall be stored.

4.5.2.2 Physical analysis

4.5.2.2.1 The general appearance of the products shall be checked during the process of unloading; if the seeds are moist, insect infested, insect damaged, or contain an unusual amount of dirt, debris or other foreign material.

4.5.2.2.2 If the observations from physical analysis do not allow taking the decision, a sample from the suspected lots shall be taken and accurate tests conducted before any acceptance of the lot.

4.5.2.3 Drying

4.5.2.3.1 If seeds brought to the warehouse do not comply with maximum moisture content stated in relevant Standards, the seeds shall be dried and moisture content reduced to the specified level.

4.5.2.3.2 If heated air is used for moisture reduction, temperature and drying time shall be synchronized so that they do not result in adverse effect on quality of the seed.

4.5.2.3.3 If drying is done under the sun, drying should be held on plastic sheets, preferably black. The seed should be spread in a thin layer and raked at intervals, to remove the evaporated moisture.

4.5.2.3.4 Whatever the drying system, care shall be taken to avoid attack by insects, rodents,birds and foreign matters.

4.5.2.4 Screening, sorting and grading

4.5.2.4.1 Seeds shall be screened, sorted and graded according to relevant standards prior to warehousing.

4.5.2.4.2 Seeds shall be screened and/or aspirated to remove all defective seeds, noxious weed seeds, vegetable matter, seeds other than the main constituent seed, straw and chaff. .

4.5.2.4.3 Screening shall be done in such way as the operation does not pollute the surrounding places.

4.5.2.4.4 Sorting shall be performed before any seed treatment to ensure the removal of defective seeds.

4.5.2.4.6 Containers of defective seeds shall be removed as soon as practicable from the warehousing area.

4.5.3 Seed coating

4.5.3.1 Only approved chemicals shall be used for seed coating.

4.5.3.2 Records for chemicals used shall be retained.

4.5.3.3 Appropriate techniques shall be deployed to keep quality of seeds after coating.

4.5.4 Loading and unloading

4.5.4.1 Loading and unloading may be done mechanically or manually.

4.5.4.2 If manual loading and unloading is used, the floor should be 1m above the ground to permit easy loading or unloading into trucks at the sides of the warehouse.

4.5.4.3 Loading and unloading shall not take place in open area when it is raining. A canopy should be constructed over every entry door to allow continuous loading and unloading even when it rains. Maximum package weight shall be of 50 kg where human loading and offloading is involved.

4.5.4.4 Loading and unloading shall be done in a way that does not affect the quality of seeds.

4.5.5 Provision of spacers

4.5.5.1 The spacers /pallets shall be used to avoid the sacks being in direct contact with the ground and shall be strong enough to resist the weight.

4.5.4.2 Spacers should be standard pallets, of manageable size, and therefore easy to lift. They shall be treated with pesticides and stacked neatly when not in use.

4.5.6 Stacking

While deciding the whereabouts of bag stacks the following shall be considered:

a) Containers of seeds in each lot shall be stacked in basic patterns of cluster formation so they can be easily counted and quality maintained; where necessary, potato seeds should be bagged.

b) stacking around pillars shall be avoided, as this makes inspection and fumigation difficult, and it can damage the building;

c) the stack shall be built at least one (1) meter away from the walls of a store. This allows easy inspection, prevents moisture ingress from contact with the wall and facilitates fumigation treatments

d) gangways leading to the doors shall be at least one (1) meter wide to allow for proper inspection and spraying. An inspection walkway shall always be left between stacks;

e) the stack shall not be built too high and not closer than 1.5 m to the store roof beams so that staff can work on top of stacks;

f) when using jute or sisal bags the stack can be built to around 18 - 20 layers, any higher then there is a risk to stability and it is difficult for storage workers. When using polypropylene or plastic bags the stack heights shall be lower as they are less stable than jute or sisal;

g) different commodities, different consignments (new and old) shall be placed in different stacks, i.e. separated in batches based also on the time of their reception in store, as far as the available space will allow.

4.5.7 Pests prevention and control

4.5.7.1 Warehouses shall be free from live and dead insects and vermin.

4.5.7.2 Pests can be prevented and controlled by:

a) keeping seeds below the temperature or the humidity necessary for increase in pest numbers (for example drying, aerated storage, refrigerated storage);

b) spraying the floors and walls with approved pesticides;

c) dusting of seeds by approved pesticides;

d) by fumigation; and

e) by using rodent baits.

4.5.7.3 Where control is by fumigation the following provisions shall apply:

a) approved fumigants shall only be used by properly trained and authorized persons/organizations who understands the dangers and the necessary safeguards;

b) there shall be no human habitations within close proximities of the planned fumigation; if there are, the arrangements shall be made for people to be relocated during the treatment;

c) fumigated piles shall be kept closed and post warning signs displayed until the gas concentration is below the concentration which does not cause any effect to the workers;

d) the stacks shall be well sheeted and there shall be no store imperfections, e.g. cracks in the floor, unfilled floor joints, roof leaks etc., which might jeopardise the success of the fumigation; and

e) at the end of the fumigation, warehouse shall be aerated carefully to minimize dangers.

4.5.8 Record keeping

Warehouse shall keep records of:

a) origin, and volume of each lot of seeds kept;

b) laboratory tests carried out;

c) names of chemicals used such as for pests control and coating;

d) fumigation details: fumigant used, the date and method of fumigation;

e) names of employees and training undertaken;

f) Authorization on environment by a competent authority;

g) servicing and calibration of equipment for weighing and measuring; and

h) cleaning activities.

4.6 Personnel

4.6.1 Workwear and protective clothing

Personnel who work in, or enter into, areas of seeds handling shall wear protective clothing that is fit for purpose, clean and in good condition. Where gloves are used for product contact, they shall be in good condition. Shoes for use in processing areas shall be fully enclosed and made from non-absorbent materials.

4.6.2 Health status

Employees shall undergo a medical examination at intervals defined by the laws of the Republic of Rwanda.

4.6.3 Illness and injuries

Employees shall be required to report the following conditions to management for possible exclusion from seed-handling areas: jaundice, diarrhoea, vomiting, fever, sore throat with fever, visibly infected skin lesions (boils, cuts or sores) and discharges from the ear, eye or nose.

4.6.4 Personal cleanliness

Personnel in seed handling areas shall be required to wash and, where required, sanitize hands:

a) before starting seed-handling activities

b) immediately after handling any potentially contaminated material.

c) For irish potato seeds; Fingernails for seed handlers shall be kept trimmed to protect the quality of seeds.

Annex A
(normative)

Basic tests for seeds

CROPS/	/PURITY Minimum %	GERMINATION Minimum %	MOISTURE CONTENT Maximum %
STAPLE CROPS			
Maize	98	85	13
Sorghum	98	75	13
Wheat	98	75	15
Rice	98	75	13
Beans	98	85	15
Peas	98	85	15
Pigeon peas	98	85	15
OIL CROPS			
Soybeans	98	75	11
Groundnut	98	75	7
Sunflower	98	85	9
LEGUMINOUS FODDER CROPS			
Cajanus cajan	98	70	15
Caliandra calothvrsis			10
Calapogonium muconoides	93	70	10
Centrosema pubescens	94	70	10
Crotalaria iuncea	98	70	10
Desmodium distortum	94	70	10

Desmodium intortum	94	70	10
Desmodium uncinatum	94	70	10
Glycine javanica	97	60	10
Lablab purpureus	97	75	10
Leucena leucocephala	97	60	10
Lotononis bainesii	93	50	10
Lupinus albus	98	80	10
Lupinus luteus	98	80	10
Macrotiloma axillare	98	60	10
Macrotiloma uniflorum	98	60	10
Macroptilum atropurpureum	97	70	10
Medicaf];o sativa	98	80	10
Mucuna duringiana	98	70	10
Neonotonia wightii	97	60	10
Pueraria phaseoloides	93	50	10
Stylosanthes guianensis	90	40	10
Stylosanthes humilis	90	40	10
Stylosanthes scabra	90	80	10
Trifolium semipilosum	97	60	10
Trifolium repens	93	75	10
Vicia sativum	98	60	10
GRAMINEOUS FODDER CROPS			
Andropof];on ayanus	30	10	10
Bothriochloa insculpta	20	20	10
Brachiaria decumbens	50	15	10
Brachiaria humidicola	40	15	10
Cenchrus cHiaris	90	20	10
Chloris ayana diploid	85	20	10
Chloris ayana tetraploid	75	10	10
Eragrostis curvula	75	70	10

Lolium perenne	96	80	10
Panicum coloratum	80	20	10
Panicum maxicum	75	25	10
Paspalum dilatatum	60	60	10
Pennisetum c1andestinum	93	60	10
Setaria sphacelata	60	20	10
VEGETABLES			
Amaranthus	95	60	9.0
AsparaJZus	98	78	9.0
Beet	99	80	9.0
Brocolli	99	80	10.0
Brussels sprout	99	80	10.0
Cabbage	99	82	10.0
Canteloupe /melon	99	82	9.0
Carrot	97	75	9.0
Cauliflower	99	80	10.0
Celery	99	78	10.0
Chicory	97	75	10.0
Chinese cabbage	98	70	10.0
Collard/kale	97	75	10.0
Cucumber	99	86	9.0
Dill	98	70	10.0
Endive	97	75	11.0
Garden cross	98	70	9.0
Gourdes (several species)	99	82	9.0
Kohl rabi	97	75	10.0
Leek	99	80	11.0
Lettuce	99	82	8.0
Okra	98	60	11.0
Onion	99	80	11.0
Paraley	99	75	10.0
Paranip	98	70	10.0

Pepper	99	78	9.0
Pumpkin/squash	98	75	9.0
Radish	99	82	8.0
Rhubarb	95	60	6.0
Rutabaga	98	75	10.0
Spinach/swiss chard	99	82	11.0

Annex B
(informative)

Typical seed storage warehouse

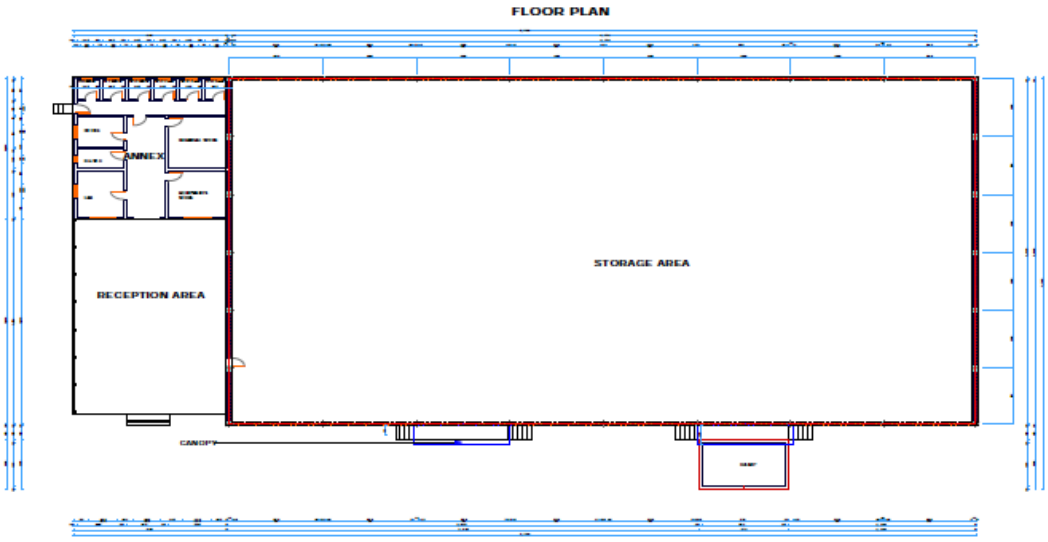

Figure B.1 — Warehouse floor plan

Figure B.2 — Warehouse front and back views

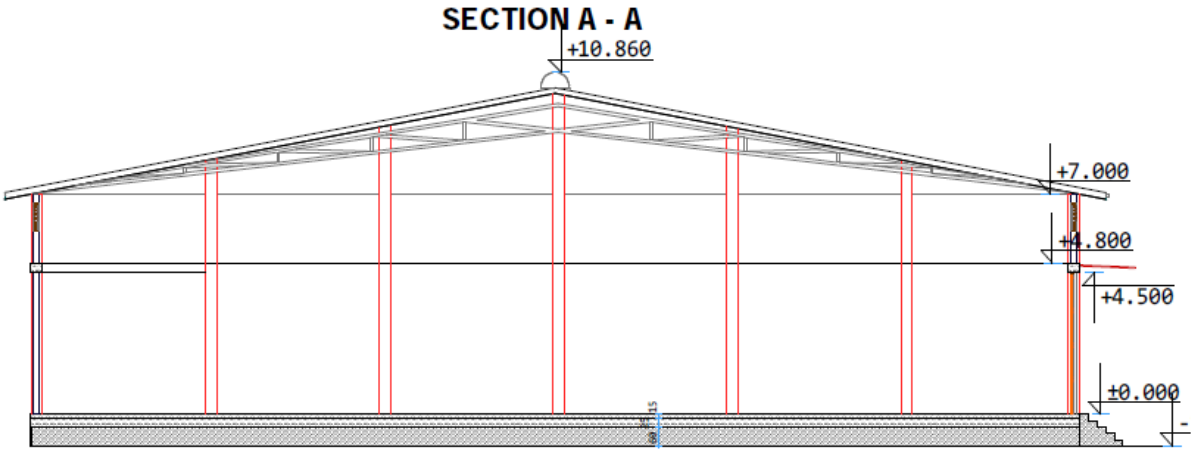

Figure B.3 — Warehouse section

Bibliography

[1] RS 264: 2020 Warehouse and warehousing for storage of bagged grains — Requirements

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