



FERTILIZER PRODUCT STORAGE INSTRUCTION - ANVISTAR



Contents

1. Structure and location of warehouse	4
2. Equipment and vehicles used at the storage area.....	7
3. General principles for storage	9
4. Storage of fertilizers with other products	10
5. Storage of fertilizers in 25 kg, 50 kg and big-bags.....	11
6. Final notes	13

INTRODUCTION

The storage instruction includes principles on retention and storage of Anvistar nitrogen fertilizer, which arise from national, European legislation, guidelines of the European Fertilizer Manufacturers Association - Fertilizers Europe and recommendations of the manufacturer. Adherence to the principles contained herein and adherence to the guidelines is aimed at minimizing the risks associated with the storage of fertilizer while ensuring the preservation of high quality as well as functional properties (looseness) of the product supplied by ANWIL S.A.

More data is available at: <https://www.fertilizerseurope.com/publications/> and in this document published on the Seller's website at www.anwil.pl – “Distributor Zone”.

In order to satisfy constantly growing requirements within the scope of offering safe nitrogen products to customers, which at the same time are of the highest quality and effective in use, ANWIL S.A., as a member of Fertilizers Europe, has undertaken to propagate the association's recommendations. The recommendations contained herein aim at providing information the observance of which contributes to minimisation of the risk of deterioration of quality and minimisation of the risk of fire and decomposition of fertilizers.

The storage instruction includes obligatory guidelines the non-observance of which results, inter alia, in a loss of the right to guarantee or warranty.

This storage instruction pertains to the principles of storage of the following products:

- **Anvistar,**

The major objective of storage of nitrogen fertilizers is to protect products against variable ambient conditions, in particular against changes of temperature and humidity. These conditions are a result of an explicit impact of ambient conditions on the change of qualitative parameters of the product, mainly reflected in a strong tendency of fertilizers to absorb humidity from air (hygroscopicity), which in consequence may lead to a natural phenomenon of granule getting stuck together in bigger agglomerates, so-called natural product wedging, and to clumping, that is, the permanent combination of granules with their simultaneous degradation. Therefore, compliance with the principles on storage of nitrogen fertilizers is so significant.

1. Structure and location of warehouse

- 1.1. Selection of the warehouse location should be made in consideration of the following aspects:
 - 1.1.1. An impact of the hazard posed by stored fertilizers on adjacent population centres. Fertilizer warehouses should not be in the vicinity of public utility buildings for which there is a suspicion that it may be considerably difficult to carry out an evacuation and rescue action (e.g. hospitals, schools, kindergartens, nursery schools, etc.)
 - 1.1.2. Improperly stored fertilizers may be a source of serious contamination of ground and surface waters. As far as possible, fertilizers must be stored at least 10 metres from water channels or drainage ditches and at a considerable distance (e.g. 50 metres) from boreholes, wells, etc. to avoid contamination.
 - 1.1.3. Protection of a fertilizer against theft and improper use of nitrogen fertilizers.
- 1.2. Structure of a warehouse should ensure free entry to and exit from the warehouse and in case of fire - easy access to emergency and fire-fighting equipment.
- 1.3. In the vicinity of the building there should be a hydrant with fire-fighting water. It is also advisable to have fire extinguishers on the spot, with the reservation that it is necessary to remember that fire extinguishers with chemical agents are ineffective for extinguishing nitrogen fertilizers.
- 1.4. Warehouses and places where the Anvisar product is stored is subject to total prohibition of smoking and use of open flames. Moreover, it is absolutely necessary to comply with generally binding OHS and fire prevention provisions. In visible places it is necessary to display boards with the inscription: "No smoking".
- 1.5. A warehouse should be properly ventilated in case of fire or decomposition of fertilizers in order to release heat and smoke.
- 1.6. It is necessary to consider equipping a warehouse with appropriate and solid fire detection systems. They should be chosen based on such factors as quality and type of stored fertilizer, structure of the building and its location, submission to national provisions. Exemplary fire detection systems may include detection of smoke, measurement of temperature, detection of gases (e.g. N_2O , NO_x and NH_3).
- 1.7. It is advisable for fertilizers to be stored on a bed without a basement, located at the ground level.
- 1.8. Construction materials used for building the warehouse should not be flammable. Toxic smokes might be generated from such materials during fire. Wood and other flammable materials should also be avoided too. Laminated wood or wood protected with another fireproof agent may be used in the form of beams provided that there is

no direct contact between wooden construction elements of the warehouse and the fertilizer. Additionally, safe storage of fertilizers in warehouses with wooden construction elements should be confirmed by way of a positive assessment of a fire risk in a given facility. Brick, concrete and steel, properly protected against corrosion, are the best non-flammable materials applicable as construction materials for building the warehouse. A substrate of the warehouse should not be made of flammable materials either. Concrete (preferably without joints or bituminous coating) and highly hardened asphalt (typical class from 6 - 12% of bitumen) are the best materials applicable as a bed of the warehouse.

- 1.9** Due to possible reactions of zinc and copper with fertilizers, zinc-plated elements such as: metal sheets, grids or components of ventilation system should be avoided in warehouses.
- 1.10** To avoid accumulation of fertilizer in uncontrolled places and mixing of such a fertilizer with other materials, warehouses should not have an internal sewage system, drainage holes or channels. Any possible sewage system installation must be plugged.
- 1.11** It is advisable to equip the warehouse with sensors for measurement of temperature and air humidity.
- 1.12** It is necessary to take an extremely cautious attitude to equipping warehouses with fixed heating installations. Power supply and electric network (which release heat) should be designed in such a way so that the fertilizer will not be in contact with its elements under any circumstances (especially when the warehouse is full). This also applies to steam networks, pipes with hot water and heaters as well as other sources of heat. The above is also applicable to electric cables which release heat and lighting. Electric heaters cannot be used with bare heating elements. The electric installation must be consistent with provisions and must undergo periodic inspections in accordance with regulations.
- 1.13** The main electric off switches and fuses should be placed outside the warehouse area. Any and all local off switches and cabling inside the warehouse area must be placed in such a way so that they will have no contact with the stored fertilizer.
- 1.14** Due to the fact that particular elements of electric installation generate heat, it is necessary to avoid dust depositing on elements of the electric installation. In particular, it is necessary to pay attention to:
- 1.14.1** protection of electric devices against corrosion through separation of the electric installation from direct contact with fertilizers;
 - 1.14.2** minimisation of the use of metal parts, e.g. by using polycarbonates for such devices as: connecting boxes, connecting switches, indicator stations, etc. due to corrosive properties and hygroscopicity of fertilizers;
 - 1.14.3** use of high-class insulations, at least in IP54 standard;

- 1.14.4** use of sealed plastic fittings for lighting, in particular in dusty areas.
- 1.15** Any and all electrical repairs must be carried out immediately.
- 1.16** To avoid contact between the fertilizer and any source of heat, the upper layer of stored fertilizer placed in piles in packaging should be at least at a distance of 1 metre from roof, exhaust hood, load-bearing beams, ceiling conveyor (and its load-bearing elements) as well as lighting fittings. Therefore, LED lighting is preferred in warehouses in place of lighting such as traditional bulbs due to lower temperature. All elements of mounted lighting should be made of non-flammable materials. While placing and securing lamps, it is necessary to take into consideration reduced accumulation of dusts. Fulfilment of this condition aims at avoiding contact between the product and e.g. sources of heat (warm room, heat generated as a result of friction) and unintended contamination of fertilizer.
- 1.17** Electric motors, transformers and other electric equipment, both inside the warehouse and any electric equipment linked with the warehouse must have protections against overloading.
- 1.18** If there are skylights or windows in the warehouse, they must be covered to avoid a continuous impact of sunlight on the product.
- 1.19** Warehouses should be equipped with a lightning protection system.
- 1.20** Access to all warehouse areas, both inside the warehouse and outside, should be permitted solely for authorized persons.
- 1.21** Warehouses where in a given moment loading or unloading is not carried out should be protected and closed.
- 1.22** The whole warehouse area should have an identifier of stored materials.
- 1.23** A valid list of stored materials, including the type of fertilizer, its quantity and arrangement in the warehouse, should be available in the warehouse. In each and every case, the foregoing information should be available. Such information may be needed for safety reasons in emergency and in case of fire.
- 1.24** It is necessary to conduct a regular control of the condition of the warehouse and keep order in the warehouse. Any and all waste must be removed quickly, safely and in accordance with applicable provisions.

2. Equipment and vehicles used at the storage area

- 2.1 Any and all devices which are in contact with nitrogen fertilizers in the warehouse should not be made of flammable materials.
- 2.2 Special attention must be paid to belt conveyors (type of rubber, oil-resistant properties and their resistance to sustained combustibility) and related protection systems such as: overloading blockade, antistatic protections, alarm, high temperature blockade and drive drum and tightening drum damage blockade.
- 2.3 All machines and devices used at the storage area, in particular: intake hoppers, conveyors (belt, bucket, worm, etc.), scoopers, charging hoppers, discharge systems, loaders, containers and other, forming part of the storage area equipment, cannot have an influence on the change of physical and chemical parameters of the product.
- 2.4 Anvistar nitrogen fertilizer should be stored far from any sources of heat, e.g. heating installations, collectors with steam or hot water as well as electric network which emits heat. To avoid potential sources of heat, any and all movable elements of belt conveyor should be cleaned and kept in good condition. Any and all equipment must be protected in particular against leakage of oil which might contaminate the fertilizer.
- 2.5 Equipment and facilities at the storage area should be in good working order. Damaged vehicles, such as e.g. forklift trucks and loaders, with a visible leakage of oil or fuel should not be admitted to work with the fertilizer - such vehicles should be repaired. After the end of loading processes, vehicles must be cleaned, preferably in places that are especially intended for this purpose. Such procedures will allow to protect the product against contact with petrol, oils and lubricants. It is prohibited to park vehicles without supervision of an operator in places of storage.
- 2.6 To ensure cleanness and cleanliness of the storage area, vehicles such as forklift trucks and loaders which are not used for loading or unloading fertilizers should be parked outside the warehouse or in its specially separated part, isolated from the fertilizer with a fireproof barrier (e.g. wall).
- 2.7 Vehicles must not be left unattended with their engines running.
- 2.8 It is necessary to pay attention to fumes so that they will not heat fertilizers.
- 2.9 LPG, CNG propelled vehicles or vehicles with electric drive are the preferred type of vehicles. Vehicles cannot be refuelled in the warehouse. Discharged batteries should be charged in a separate place as well.
- 2.10 It is advisable to mark out passageways for vehicles and pedestrians.
- 2.11 Any and all vehicles, forklift trucks, loaders should be equipped with fire extinguishers.

- 2.12** If equipment made of plastics is used, such as pipes or containers, it is necessary to take into consideration and protect them against effects of static electricity.

3. General principles for storage

- 3.1 Anvistar fertilizer should be stored in storage areas in such a way as to protect it from the direct effects of atmospheric conditions, in particular solar radiation, precipitation, penetration of moisture into the product in the unit package, temperatures above 30°C and temperature variation.
- 3.2 Goods in the storage area must not be exposed to sunlight. In storage areas, the product must be isolated from direct impact of solar radiation in warehouses equipped with windows or having other places through which light falls inside on a permanent basis.
- 3.3 Storage of fertilizers at a temperature below 30°C and air humidity: maximum up to 60% is a warranty of maintenance of high quality of fertilizers, with preservation of their performance properties (looseness).
- 3.4 Loading machines cannot run down the product. This applies to product spilled during handling operations of packaged goods. It is also necessary to avoid formation of layers of compact fertilizer on the warehouse floor. With regard to spilled fertilizer or in case of formation of a compact layer of fertilizer on the substrate, it must be definitely separated and removed.
- 3.5 The oldest fertilizer should be given first from the warehouse, in accordance with the FIFO principle (First In, First Out).
- 3.6 Do not allow contamination of the walls, floor and equipment in the storage area.
- 3.7 It is necessary to avoid fouling of pallets, strings, canvass hoods.

4. Storage of fertilizers with other products

- 4.1** In the case of storing Anvistar product with other materials which are not fertilizers and which are flammable and chemically reactive, it is necessary to take special care. Such materials should be separated from each other by means of a fireproof barrier, appropriately adapted to the quantity and nature of stored substances.
- 4.2** Examples of the aforementioned substances are:
- 4.2.1** Solid and liquid materials (organic suboxides) sensitive to explosive decomposition.
 - 4.2.2** Flammable liquids such as: petrol, fuel oil and other oils and lubricants.
 - 4.2.3** Gas bottles (including those used while welding).
 - 4.2.4** Pesticides based on oils.
 - 4.2.5** Caustic liquids, acids and other reactive substances, such as: chlorides, hypochlorites, chlorinated organic compounds, bleaches, chromates, nitrates, copper and zinc salts, permanganates.
 - 4.2.6** Flammable liquid and solid products, such as: sulphur, powdered metals and substances of organic origin, such as: hay, straw, sawdust, crops and animal fodders.
 - 4.2.7** Products, such as: burnt lime and calcium cyanamide which generate heat in the presence of humidity.
 - 4.2.8** Products, such as: cement, lime and other alkaline substances which contribute to generation of ammonia gas from nitrogen fertilizers.
 - 4.2.9** Other products used in agriculture, which in the presence of ammonium nitrate may behave in unpredicted manner, e.g. pesticides, disinfection agents, herbicide agents.
 - 4.2.10** Other fertilizers, in particular non-specified.
- 4.3** Materials that are thermally stable and that do not react with ammonium nitrate (i.e. DAP, sodium nitrate, lime meal, nitro-chalk) may be stored in the same area as Anvistar, provided precautions are taken to avoid contamination of these products.
- 4.4** Prevent mixing and direct contact of various type of fertilizers.
- 4.5** Prevent mixing and direct contact of the same type of fertilizers coming from different manufacturers.

5. Storage of fertilizers in 25 kg, 50 kg and big-bags

- 5.1 To ensure stability of stored pile, any and all damaged and broken bags must be removed. Fertilizer spilled during these and other similar operations should be immediately swept and safely removed.
- 5.2 Small quantities of spilled fertilizer should be swept and properly marked. Do not mix spills with other fertilizers, in particular with other substances and chemicals used in agriculture.
- 5.3 During transportation of stored pile of fertilizer, e.g. by forklift truck, it is necessary to pay attention to the fact whether the transported pile of fertilizers will not catch against equipment and construction elements of the storage area, such as lighting or upper door beam.
- 5.4 A pile of packaged product should be laid in such a way so that there will be a passage along one side of each pile. This passage should be wide enough to enable access for unloading vehicles, in particular in case of emergency.

Different types of fertilizer should not be stored in one pile.

- 5.5 When storing different types of fertilizers with other materials which are not fertilizers in adjacent piles, it is necessary to check whether there will be a reaction between the stored materials.
- 5.6 To avoid damaging bags during any and all operations carried out at the storage area, it is necessary to ensure an appropriate distance between the stored piles or to adapt length of forklift truck's forks in such a way as not to damage the bags in adjacent rows of piles with the fertilizer.
- 5.7 Pallets made of wood, plastic or steel are appropriate provided that they are sufficiently resistant to predicted loading. Empty pallets and plastic packaging should be stored in a place that is appropriately intended for this purpose, far from fertilizers. Damaged pallets should not be used. Pallets used for fertilizers should be checked in terms of cleanness and cleanliness and, if necessary, they should be cleaned before use.
- 5.8 In particular, **the following is prohibited** at the storage areas:

- 5.8.1 Use hooks for carriage of bags unless they have been designed especially for this purpose.
- 5.8.2 Use ropes for carriage of bags.
- 5.8.3 Drop unit packaging with fertilizer from big heights (bigger than 1 metre).
- 5.8.4 Carry bags if not necessary.

- 5.9** Do not store fertilizers with oxidizing properties (UN2067) with fertilizers which sustain combustion (UN2071) in the same storage area. If they are stored after all in the same storage area, it is necessary to determine strict procedures the observance of which will ensure their effective separation, in particular in case of fire or decomposition.
- 5.10** Fertilizer in 25 kg packaging must be stored in piles composed of maximum 16 layers of bags.
- 5.11** Fertilizer in 50 kg packaging must be stored in piles composed of maximum 12 layers of bags.
- 5.12** Bags of 25 and 50 kg stored on pallets should be stored in 2 layers of loading units at most.
- 5.13** It is permissible to store big-bags with a nominal weight of 500 kg in three layers for a maximum of 6 months of storage (while observing all conditions for safe storage described in this manual). After this time, reduce the number of layers to a maximum of 2.
- 5.14** Big-bags with a nominal weight of more than 500 kg should be stored in one layer.
- 5.15** The distance from the walls to the storage area should be at least 0.2 metre and from heating devices - at least 1.5 metres.
- 5.16** Gaps between piles of ammonium nitrate (Anvistar) must be at least one metre.
- 5.17** Fertilizer stored in a pile should be placed in a stable way (it should not slope or fall over).
- 5.18** Damaged bags must be protected against spillage of goods and must be stored separately.
- 5.19** With regard to ammonium nitrate (Anvistar) in one pile do not store more than 300 tons. In rooms where a bigger quantity of saltpetre (Anvistar) is stored, piles of packaging must be separated with at least one-metre corridors. The pile is understood as loading units (big-bags or bags on pallets) adhering to each other.
- 5.20** **NOTE!** Anvistar is a non-flammable product, however it has strong explosive properties. The temperature at which an explosive reaction starts is 180 °C. This product must absolutely be isolated from sources of fire.
- 5.21** Anvistar is a hazardous product within the meaning of the Act on the carriage of hazardous goods. This product can be transported, handled and stored solely under the principles specified in the Act on fertilizers and fertilization of 10 July 2007 (OJ 2020.796 consolidated text) and the Act of 19 August 2011 on the carriage of hazardous goods (OJ 2011 No 227 item 1367)

6. Final notes

- 6.1** Storage area which are suitable to store nitrogen fertilizers, including to conduct unloading processes of fertilizers delivered by rail or by car, storage and loading processes are considered those which correspond with the aforementioned conditions and have an appropriate set of machinery and equipment for receiving and giving fertilizers.
- 6.2** Storage of Anvistar fertilizer inconsistently with the conditions indicated above in particular pertaining to temperature, humidity and height of piles and heaps gives rise to the risk of change of properties of granules, which in consequence may lead to loss of looseness and to the necessity to use mechanical procedures aimed at restoring looseness of fertilizer.
- 6.3** If despite observance of the foregoing instructions the product has been degraded, which resulted in formation of excessive amount of dust or durable, irreversible lumpiness, such a product must be immediately separated, and the supplier must be immediately informed about this fact.