

## General Storage Guidelines

Below are general guidelines for the most commonly stored types of items in a humanitarian context.

### Medical Items

- Boxes should not receive direct sunlight.
  - Temperature in the warehouse should be controlled and recorded daily, and fridge temperature should be controlled and recorded where cold chain items are stored.
  - Drugs should ideally be stored by type of drug: infusions, injectables, oral drugs, diagnostic tests, etc.
  - Always store medical supplies separately from chemicals or food (pesticides, fertilisers, cement, fuel included), and dangerous goods. This also applies when loading onto vehicles.
  - If stored on pallets, all cartons should be clearly labelled with their contents.
  - Always record batch numbers (found on the outer cartons and on each container of the drugs, allocated by the manufacturer) and expiry dates of medical supplies upon receipt and record batch references at all stock movements, including on all stock/bin cards and all warehouse ledgers.
  - It is good practice to track medical supplies on stock cards raised by batch number. Alternatively, you can record the batch number of the drugs as they moved in and out of stock.
  - Expired drugs are not fit for human consumption and should be destroyed safely. Contact your local Food and Drug Administration to enquire about the regulations around the destruction of medical supplies.
  - Expired or damaged drugs must be quarantined until they can be safely destroyed. Keep a record of drugs placed in quarantine on the relevant bin and stock cards.
  - It is advisable that all medical items be rotated following the FEFO (first expired, first out) principle.
  - Some national authorities require special licenses for the storage of drugs and medical supplies. Check with local authorities to find out what is required in the area of operation.
  - More information on specific guidelines for storage medical items can be found in the [health supply chain section](#) of this guide.
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**Food Items**

- Food needs to be protected from sun, rain, humidity and extreme temperatures.
- Covered and protected storage space is always preferable.
- If uncovered and unprotected storage cannot be avoided, make sure outside storage is only temporary (maximum 10 to 15 days).
- Always store food separately from chemicals (including pesticides, fertilisers, cement, and fuel), dangerous goods and drugs. This also applies to when transporting items as well.
- If you are treating a warehouse that contains food against pests, make sure the chemical used is food-safe (consult your regional logistics support if you are unsure).
- Ensure the storage areas are cleaned daily, and that all cleanings are recorded (daily sweep, weekly clean and wipe-down, monthly deep clean).
- Pay particular attention to infestation signs
- Immediately separate and quarantine infested stocks from the rest. All infestations must be reported immediately to country managers.
- Expired food items must be quarantined and stored separately until they can be destroyed.
- Expired food must be disposed of immediately. Check with local health authorities to determine whether it can be used as animal feed or for the appropriate disposal method (incineration or burial). Be mindful that the destruction of food may sometimes cause strong cultural reactions.
- Pay particular attention to the reception process to confirm weight received: weigh five to ten per cent of the consignment and extrapolate weight of the full consignment to estimate total weight of the consignment against documented weight or use a truck weighbridge to compare the actual weight to the documented weight on the GRN/delivery note/waybill. Record any discrepancy on the GRN.
- Always record batch numbers and expiry dates of food items upon receipt and stock movement, including on all stock/bin cards and all warehouse ledgers.
- It is advisable that all food items be rotated following the FEFO (first expired, first out) principle.

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**Construction Materials**

- Small parts such as screws, nails, turns and bolts are usually measured and accounted by weight rather than units.
  - For poles, sticks, metal bars and other long and/or bulky items, build “reference” storage areas, with items separated by quantity. For example, store wooden poles in bins with 100 pieces in each. This will help managing stocks per FIFO principles and avoid the deterioration of stock.
  - For sand, gravel and other loose materials, build tank storage per cubic metre to help track stock levels. A good option is to build one cubic metre “bins” and cover them to preserve the quality of the material.
  - The maximum height of a stack of cement should not exceed 15 bags, to prevent lumping from pressure.
  - Cement must always be kept dry and away from the walls of the warehouse. Ideally cover cement stacks with tarpaulin to protect the bags.
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**Chemical Products**

- Chemicals can never be stored with food or drugs supplies.
  - Many chemical products are defined as dangerous goods – [dangerous goods should be identified and labelled/handled appropriately](#).
  - When conducting routine warehouse checks, check the packaging of chemicals thoroughly for wet cartons, chewed plastic, broken seals and spilt liquids.
  - Most chemicals are perishable. Maintain an alert system to warn of pre-expired chemicals.
  - The disposal of chemicals is extremely sensitive. Always refer to local laws and regulations.
  - Fuel and chlorine are the most commonly stored chemicals in humanitarian contexts – make sure they are managed accordingly.
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Adapted from the [British Red Cross Warehousing Guidelines](#), [WFP Food Storekeepers Guideline](#), and the [DELIVER Drug Storage Manual](#).

## Temperature Controlled Items

The need for temperature-controlled storage has been increasing in the humanitarian operations over the past few decades, and agencies are becoming more aware of the challenges surrounding temperature sensitive cargo. Temperature control ranges are generally defined in the following ranges:

| Temperature Range                                                 | Common Name                                      |
|-------------------------------------------------------------------|--------------------------------------------------|
| Surrounding naturally occurring temperature "Ambient Temperature" |                                                  |
| Above +40°                                                        | "Excessive Heat"                                 |
| +30° to +40°C                                                     | "Warm"                                           |
| +15°C to +25°C                                                    | "Controlled ambient" or "Temperature-Controlled" |
| +8°C to +15°C                                                     | "Cool"                                           |
| +2°C to +8°C                                                      | "Cold" or "Chilled" or "Refrigerated"            |
| -25°C to -15°C                                                    | "Deep freeze" or "Frozen"                        |
| Different ranges between -80°C to -40°C                           | "Ultra-low"                                      |

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Field level humanitarian working conditions also frequently preclude any type of temperature-

controlled storage capacity, so the need for temperature-controlled conditions must be factored into operational plans when selecting and establishing storage. Any form of temperature-controlled space will require basic equipment – air-conditioners, refrigerators, freezers – and some form of power, most commonly electricity.

**NFIs** - Fortunately, the vast majority of non-medical related NFI items can be stored in the ambient range, and many durable goods can be stored in high temperature conditions for long periods of time with minimal effect.

**Basic Pharmaceuticals** - The majority of basic pharmaceuticals can be stored for months at a time in the climate-controlled range (15° to 25°C), and can be stored in ambient temperature for relatively short periods of days or weeks. Exposure to temperatures above 25°C won't immediately damage most basic pharmaceuticals, but can experience reduced shelf life and efficacy if exposed to excessive heat for long periods of time. Prolonged exposure to temperatures below 15°C can also damage basic pharmaceuticals, and warehouse managers should be mindful of both ends of the ranges. Some pharmaceuticals require special temperature ranges – these should either be indicated on the packaging and/or communicated prior to the arrival of the cargo at the facility.

A climate-controlled space can be easily achieved with a regular split air conditioner unit with an automatic temperature sensor built in, and basic insulation. As long as the air conditioner can be set to maintain a specific temperature and have access to electricity, the climate-controlled range is achievable. Climate controlled storage spaces are more effective when built into smaller rooms, with proper insulation and limited access to prevent heat loss. Thermometers should be kept in climate-controlled spaces at all times for quick reference, and agencies may wish to invest in remote sensors that don't require the storage area door being opened, or data loggers that continually record temperatures. Where power isn't available 24 hours a day, climate-controlled storage should be built to remain below 25°C for at least 70% of any 24-hour period.

**Cold-Chain** - Cold-chain storage includes anything in the "frozen," "refrigerated," or "cool" categories. Cold-chain management requires equipment specifically planned and used for the required temperature ranges. This might include keep cool boxes, specially calibrated refrigerators, and refrigerated trucks/containers. Cold-chain also requires special monitoring and training. For more information on cold chain management, please refer to the [cold-chain section of this guide](#).

## Dangerous Items

Warehouses are frequently a holding and consolidation point for extremely dangerous items, and humanitarian storage facilities are no exception. Humanitarian agencies may be handling and storing highly volatile or reactive compounds without understanding them. Field level warehouses may not have the proper storage set up for dangerous items, and workers may not be fully educated on the proper handling of dangerous items.

**Reactive Substances** - A reactive substance is any substance that interacts with other nearby objects, altering one or both in noticeable and possibly dangerous ways. In the context of warehousing, two seemingly inert or relatively stable compounds may be safe when stored by themselves, but when stored next to each other or in a facility may cause adverse or violent reactions.

Reactive substances can cause quick and noticeable reactions, or slow and hard to immediately recognise reactions. Both can be damaging to inventory, physical structures and pose hazards

to humans. A notable example of a substance frequently used by humanitarian agencies is HTH Calcium Hypochlorite (Granulated Chlorine) used in health responses.

- HTH emits fumes, even in its solid form, that corrode metal. HTH stored in an enclosed space can degrade other NFIs near by (metal shovels, medical consumables), and even degrade metal racks and warehouse structures.
- HTH combined with water - forming liquid chlorine - can cause a flammable reaction when combined with liquid fuels such as gasoline or diesel.

Other notable reactive compounds used by humanitarian agencies might include lead acid batteries, cleaning agents, and synthetic fertilisers.

Reactive substances should be properly labelled on their exterior packaging, and warehouse workers should be aware of the nature of the reactive substance while handling them. Reactive substances must be stored in well ventilated spaces inside storage facilities. Any known reactive substance should be well inspected to ensure packing isn't compromised, and there is no evidence of leakage. Warehouse managers should work with program staff to ensure reactive substances are stored for as short a time as possible, minimising hazards to the warehouse workers.

**Fuel** – Storage and management of fuel can be extremely hazardous. Liquid or compressed gas fuels by their nature are highly combustible and should be treated separately than other storage items.

Fuel should be stored in a separate storage area outside the main facility, and at least 10 meters (preferably more) away from the main structure. Any fuel storage area should be well ventilated, and be accessible only by designated persons. Fuel storage areas should have the appropriate fire suppression equipment nearby, and staff should be instructed not to smoke or perform external work in the immediate vicinity of the storage area. **Never** store fuel in a completely enclosed storage facility such as a shipping container, or a facility that can reach excessive heats. For more fuel guidelines, please see the [Fuel Management section of this guide](#).

**Sharp or other dangerous items** – Some objects may be inert, but still dangerous, such as syringes, nails or farm equipment. Wherever possible, cartons/overpacking containing sharp objects should be well marked, and if necessary cartons should be double packed. Cartons/packaging containing sharp or dangerous items should be inspected for holes or damage. Warehouse workers should use gloves and other protective gear as needed when handling sharp objects.

Other dangerous goods common to humanitarian operations might include compressed gas cylinders. Even if a compressed gas cylinder is storing non-flammable compounds, contents under pressure can cause violent eruptions that can harm or kill handlers. Compressed gas cylinders should never be stored in excessive heat, and should be laid on the ground or securely fastened to a wall. If possible, avoid storing compressed gas altogether, or for as short as possible.

For more information on proper warehousing and storage of dangerous goods, please reference the [dangerous goods section of this guide](#). Take extra [note of the table of dangerous goods that should not be stored](#) in the same warehouse, or next to each other in the same warehouse.

## Regulated Items

Some items may not be dangerous to handle, but are considered “regulated,” either due to their value or for legal reasons. Some governments may deem some medications, communications equipment, or other special items as regulated items, resulting in a requirement for special handling. Controlled storage spaces might also be used for bonded or pre-cleared cargo.

Regulated items should be safely separated from the rest of the storage facility. Regulated storage space should be access controlled, with only appropriate personnel having keys or authority to enter. Depending on the specific regulation, regulated items may require special labelling, and more frequent inspection, and may even require inspection from outside companies or government offices.

## **Mechanical Equipment**

The proper storage of mechanical equipment can be frequently overlooked in storage settings. Mechanical equipment, including generators, vehicles and pumping equipment, will still require routine inspection and maintenance. Equipment with engines will still have plastic and rubber components - including sealants, filters, valves and tubing - which will degrade over time and render the equipment useless. Equipment with liquids - such as motor oils, gear lubricants, or fuel - can evaporate, harden or even slowly corrode machine parts. Large external rubber surfaces - such as tires, water bladders or inflatable boats - are especially prone to damage in long term storage or excessive heat.

If organisations choose to keep equipment in storage, there are several steps to keep equipment running well:

- Vehicles should be “exercised” once every month - meaning the engines turned on and if possible driven a short distance. If possible, generators should be turned on and run for a few minutes to cycle fluids inside.
- Large rubber surfaces, such as boats or water bladders, should be unfurled and inspected every six months to inspect for breakage or damage to seams.
- Once a year, a mechanic or technician should be brought in to do an inspection of all the equipment. All tubing and filters should be repaired or replaced if necessary.

The longer equipment is stored for, the more likely it is to not be usable when the time comes. This is especially problematic in pre-positioning facilities, but should be observed in field warehouses as well. Where required, storage of special mechanical equipment should be kept for as short a time as possible.