FEED TECHNO VISION 2024

Selko®

Grain Grading Handling and Storage How to get it right?

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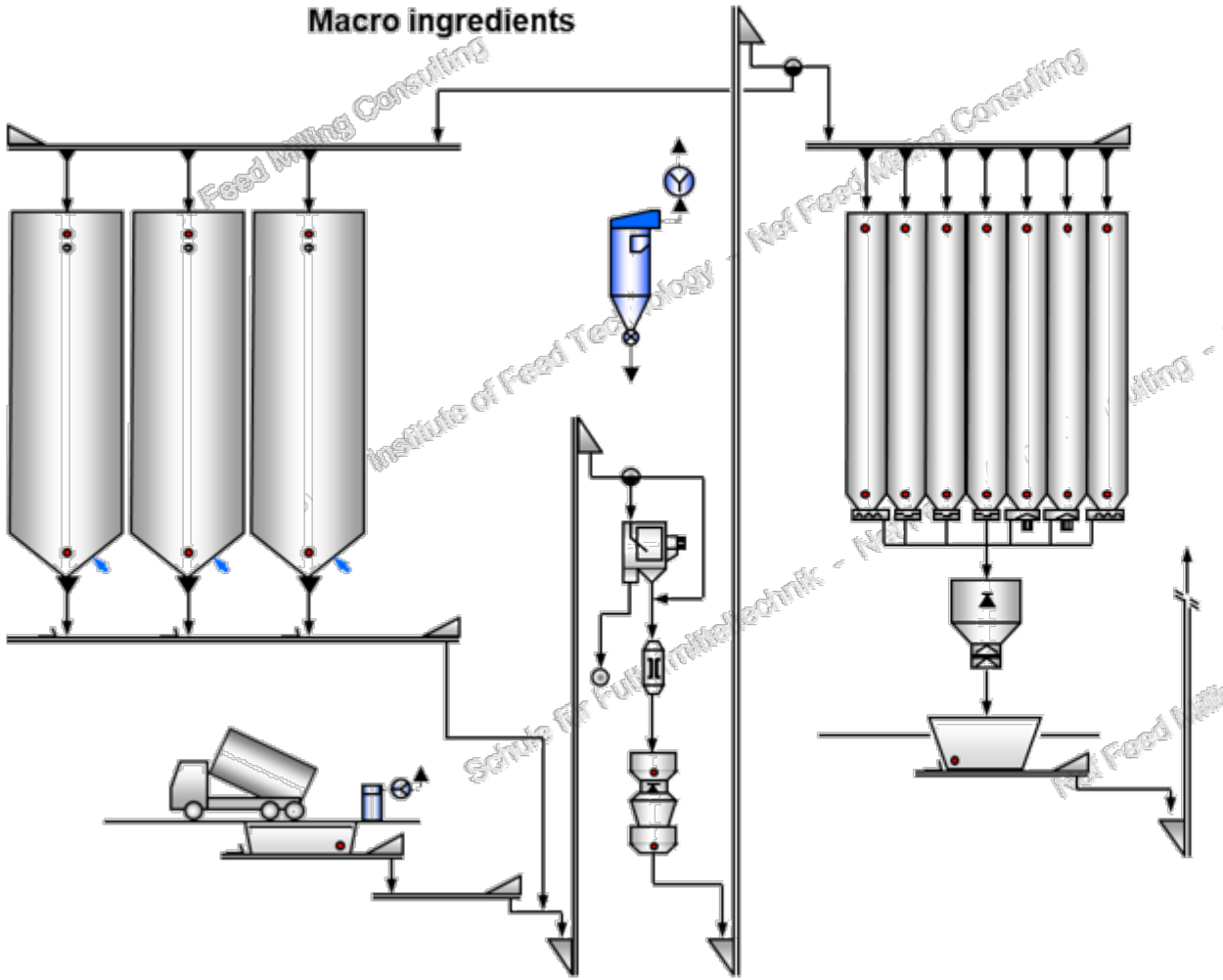
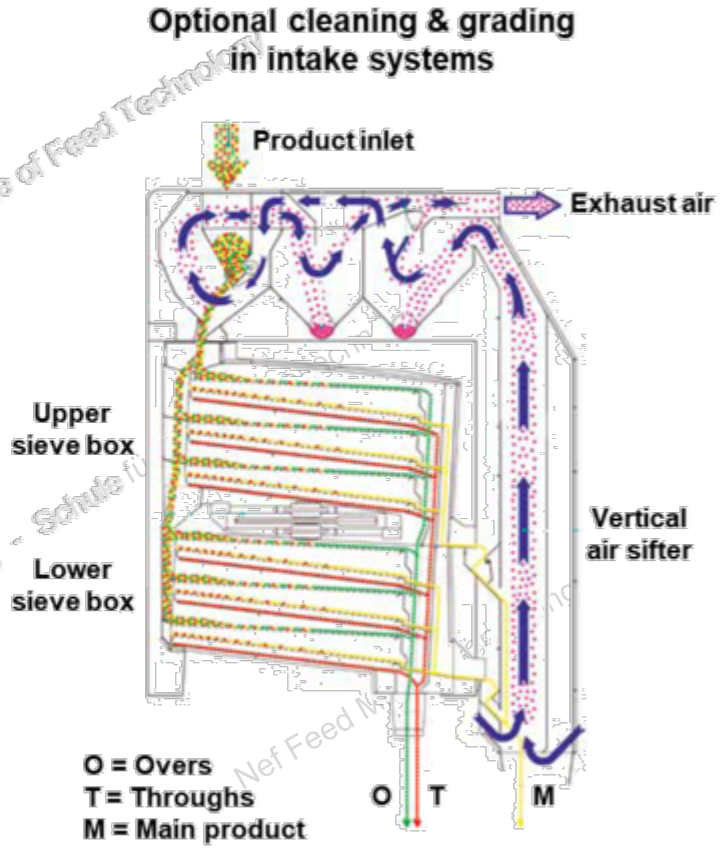
trouw nutrition
a Nutreco company

Intake and cleaning of grains – Simplified flow sheet.





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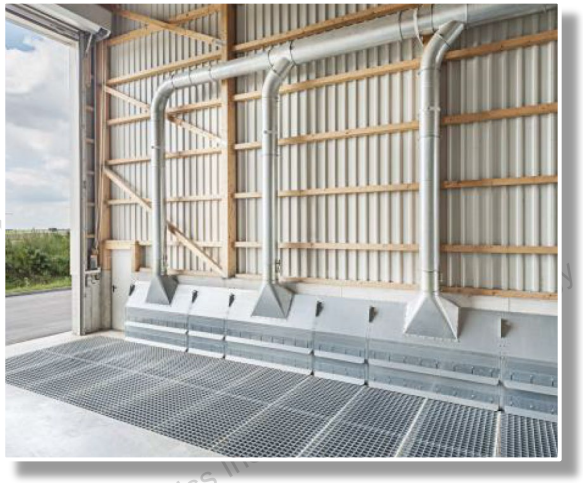
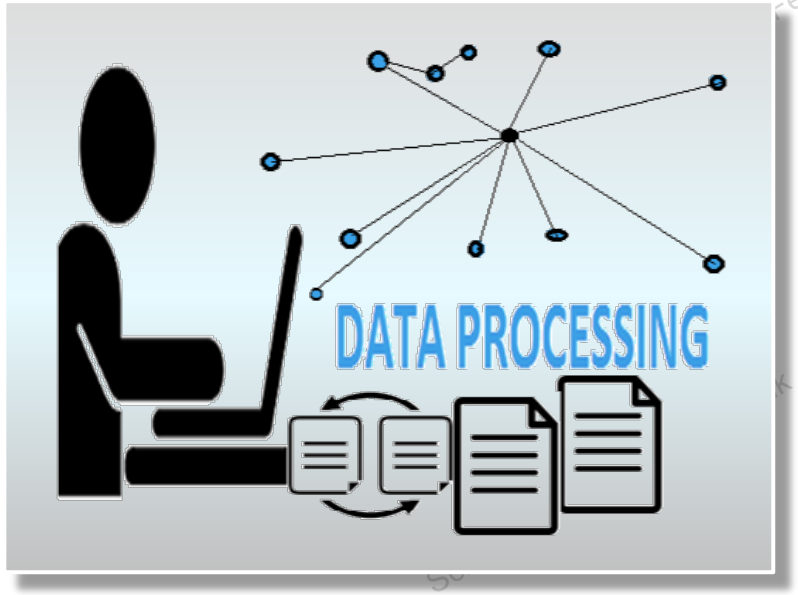
Truck-intake of grains – Points to be taken into consideration.



Requirements to the dumping pit section.

- ***Strong floor gratings – drivable for all vehicles.***
- ***Vehicles equipped with hydraulic tipping devise.***
- ***Length and capacity adapted to the largest vehicle.***
- ***Pit inclination adapted to cereals or mealy products.***
- ***Well-designed aspiration system indispensable.***
- ***Possibility to close building – roller doors.***
- ***Discharge conveyor equipped with VSD.***

Intake of grains – Traceability and quality control.



- **Documentation and organisation.**
  - **Issuing an intake or unloading protocol.**

    Internal stock control & traceability.
  - **Minimum content of the protocol.**

    - Type and origin of ingredient.
    - Quality assessment.
    - Weight delivered.
    - Packing material.
    - Mode of storage.
    - Name of supplier.
    - Date & name of responsible person.

Intake of grains – Traceability and quality control.

Technical / sensorial values
- physical properties
- appearance
- colour
- taste etc.

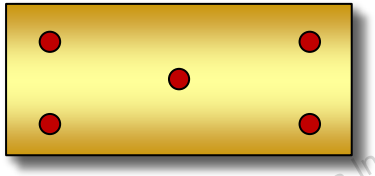
Undesired substances
- mycotoxin
- bacteria
- pesticide
- pest infestation etc.

Nutritive values
- NIR or wet analysis
- moisture
- protein
- fibre etc.

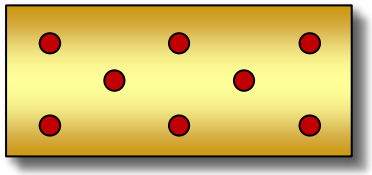
- **Sampling – an important contribution to feed safety and quality assurance.**
  - ***Quality control at the intake pit.***
  - ***Most common macro analysis and rapid determinations.***
    - ***Moisture content [%H_2O].***
    - ***Bulk density [kg/dm^3].***
    - ***Pest infestation [±].***
    - ***Mycotoxins quick tests [DON ppm].***

Intake of grains – Sampling.

Reference value for no. of individual samples to be taken from a bulk delivery.



Up to 25t vehicle content
5 individual samples



25 – 50t vehicle content
8 individual samples

In case of bagged material , a single sample commonly taken für every 100 bags (group).

- **Samples supposed to be taken according to internal guidelines or a sampling schema (Part of quality management system).**
- **Samples should be as representative as possible from the lots they are taken from.**

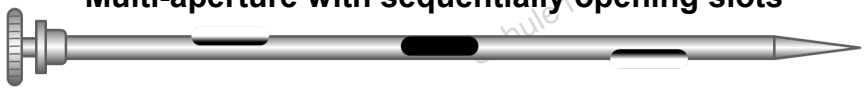
- ***Points to be considered are ….***
  - ***…. condition of material to be sampled.***
  - ***…. sampling location (bag- or bulk delivery).***
  - ***…. no. of individual samples to be taken.***
  - ***…. available tools, devises, aids, (safety).***
  - ***…. labeling of the samples.***
  - ***…. storage condition & time of retained samples.***

Intake of grains – Manual sampling.

Single aperture

Multi-aperture with/without compartment

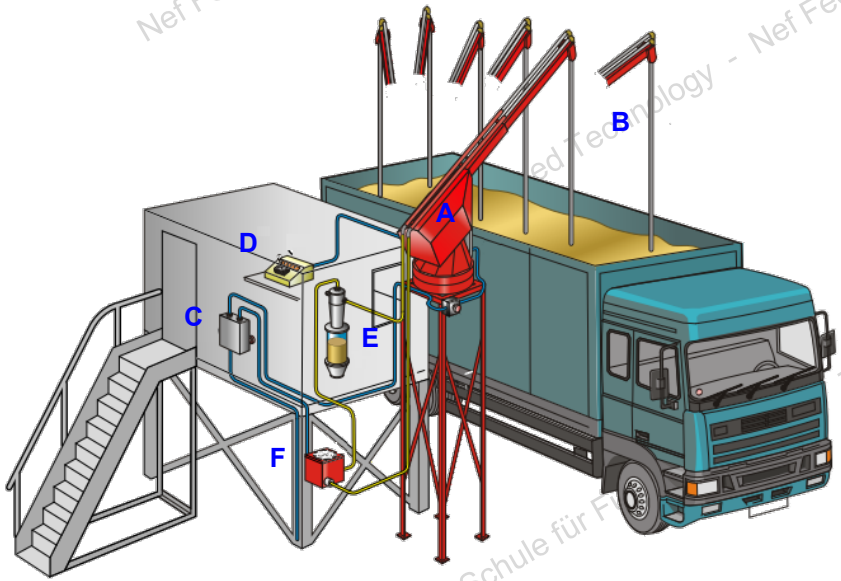
Multi-aperture with sequentially opening slots



- **Application of manual samplers**
  - ***Depending on raw material and size of container, samplers are available in different lengths, and different designs.***
  - ***Sampler enters in closed position into the product to be inspected.***
    By turning the handle, the sampler opens.

    The staggered arrangement of openings ensures that taken sample corresponds to a good average.
  - ***Samplers with one single opening are applied for specific application.***
  - **Common sample sizes** ***approx. 500 g***

Intake of grains – Automatic sampling.



Schematic layout

A *Extendable machine head and distribution box.*
- Motor circuit breaker, contactors, PLC controller.

B *Unispear.*
- Using air flow and gravity for sample extraction.

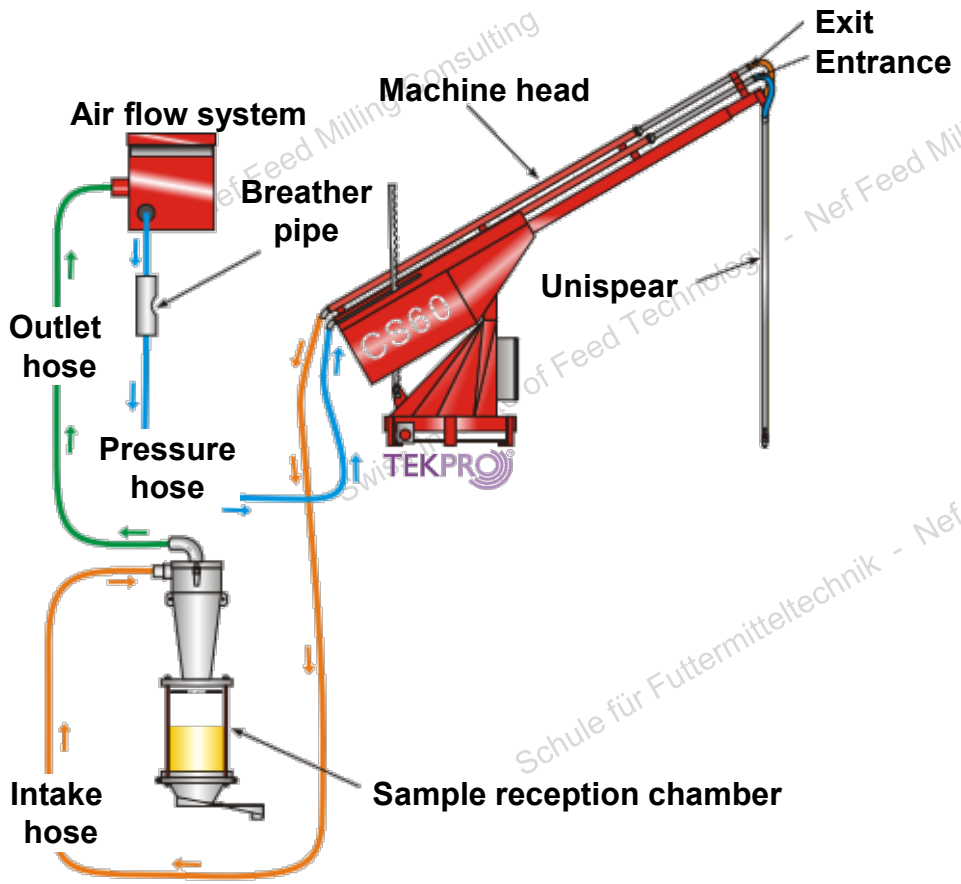
C *Supply terminal box.*
- Emergency stop with non-voltage isolation switch.

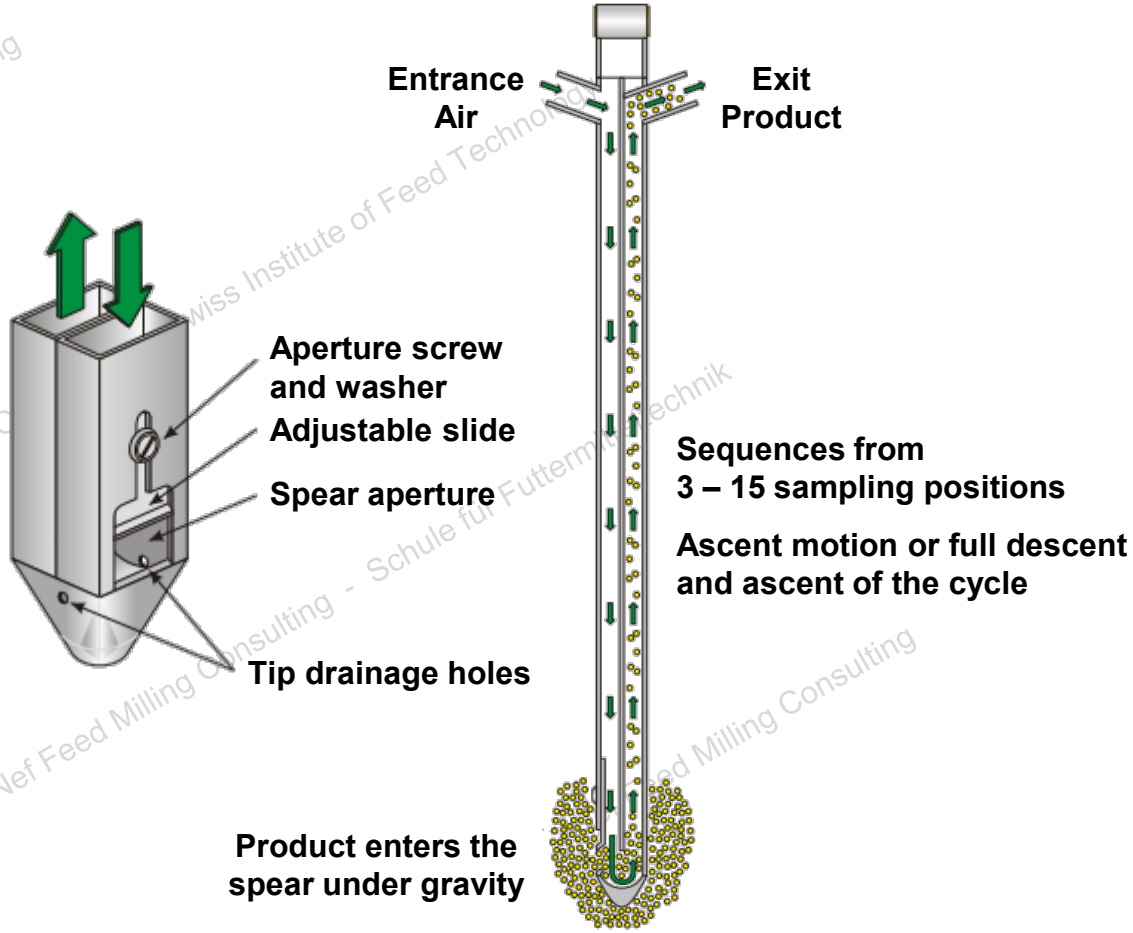
D *Control unit.*
- Joystick control with number of operations counter.

E *Sample reception chamber.*
- Clear viewing tube.

F *Air flow motor system.*
- transfer product from unispear to reception chamber.

Intake of grains – Automatic sampling.



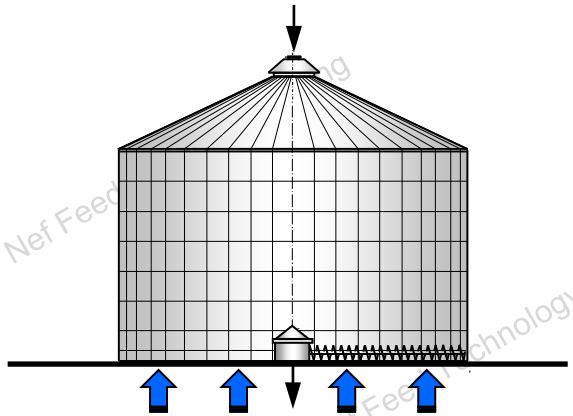


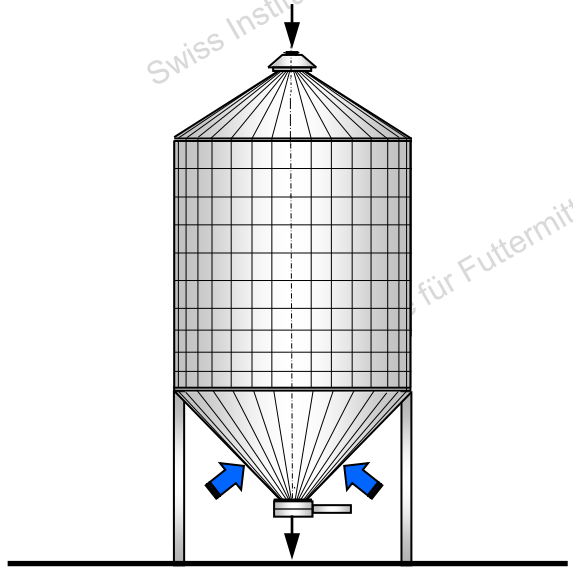
Grain storage possibilities.

Round steel storage silos

- **Factors of influence while selecting the most suitable storage possibility.**
  - **Product quantity and properties.**
    - ***Flowability / hygroscopicity of raw material.***
    - ***Tendency to compact at long-term storage.***
    - ***Level of commercialization.***
    - ***Cost involved.***
  - **Round, square or rectangular storage silos in concrete or steel construction.**
    - ***Mainly applied for free-flowing products like grains or pelleted by-products.***
    - ***Whenever possible, this is the most ideal storage.***

Round steel silos with different discharge characteristic.



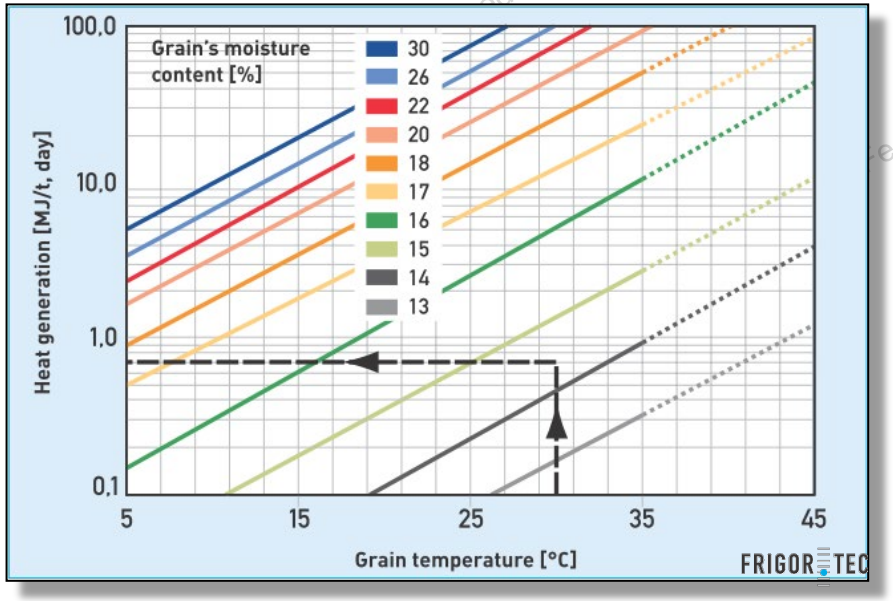


- **Round steel storage silo with flat-bottom.**
  - *Discharge by gravity and rotary sweeping screw.*
  - *Large in diameter but lower in height.*
  - *Aeration system complex and expensive.*
  - *Mass flow “fist in fist out” not guaranteed.*

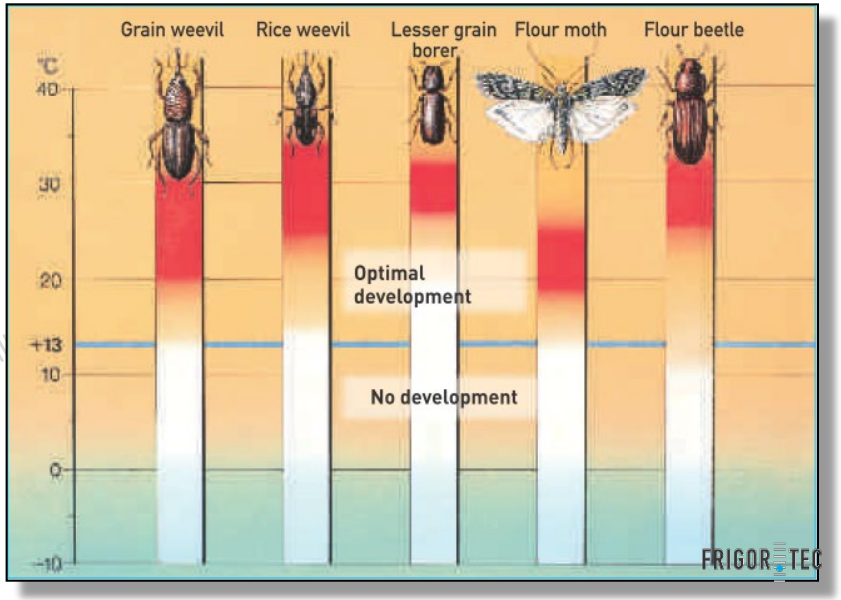
- **Round steel storage silo with conical outlet.**
  - *Discharge by gravity and slide gate / vibro-bottom.*
  - *Smaller in diameter but more height required.*
  - *Aeration system simple and inexpensive.*
  - *Provides mass flow “fist in fist out”.*

Points to be considered during long term storage.

- Stored organic matters remain biological active - depending on the weather conditions, they continue lose moisture or absorb moisture from ambient air.
- In case of an excessive moisture increase, cellular respiration of a product becomes more intensive,
  - *absorbs oxygen - converts carbohydrates into carbon dioxide - water and heat.*
- As a consequence, losses in dry substance and an increase in propagation of moulds and insects can be observed.



Heat generation during grain storage modified acc. to Jouin



Generation of relevant insect species dependent on temperature

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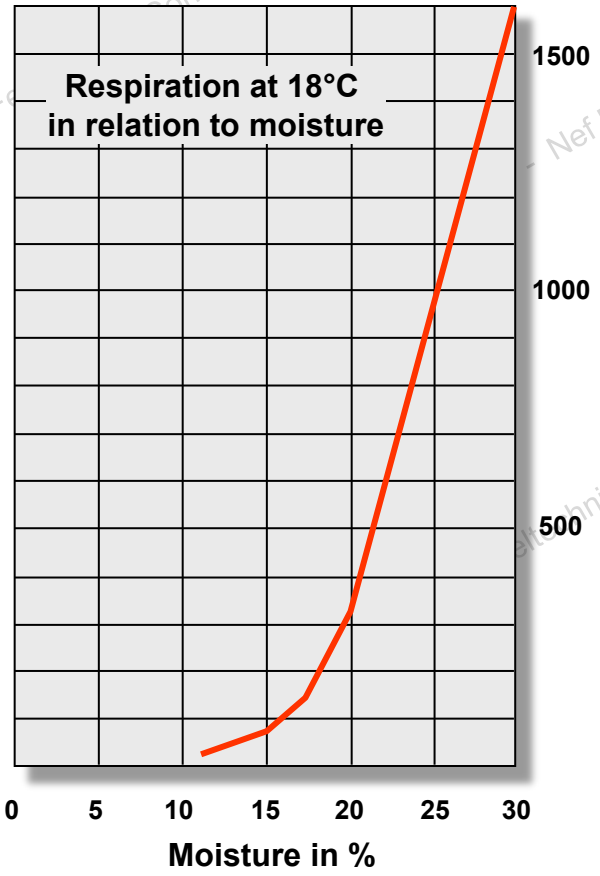
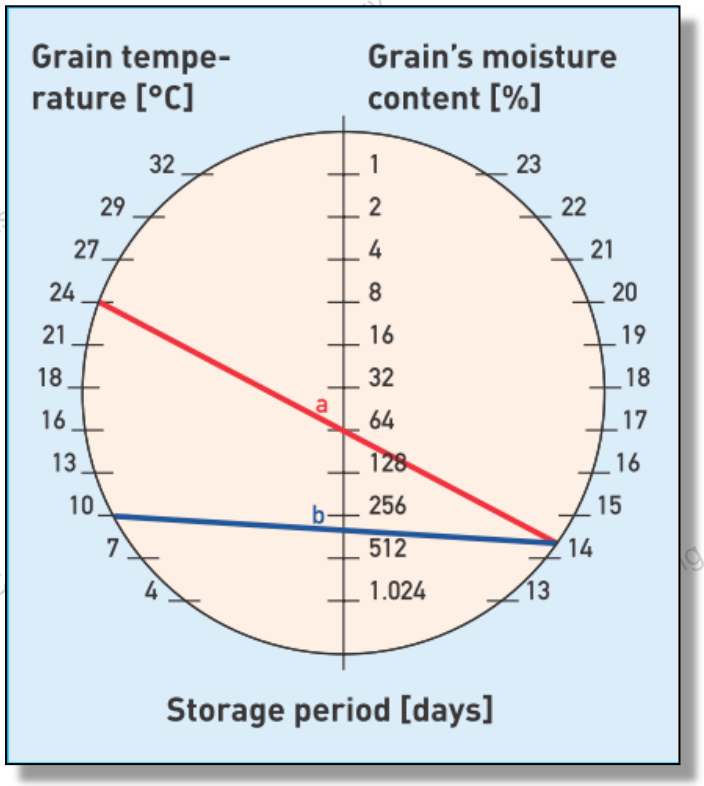
Storage of wheat – Respiration and storability in days.

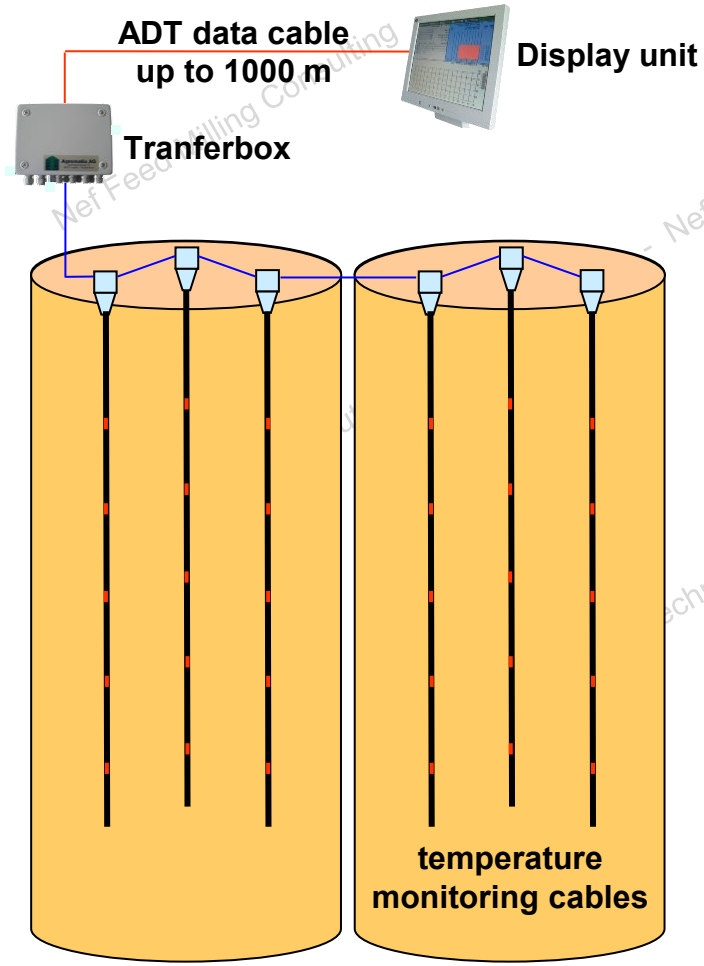
Amount of CO_2 in mg/kg/24hrs



Storability in days

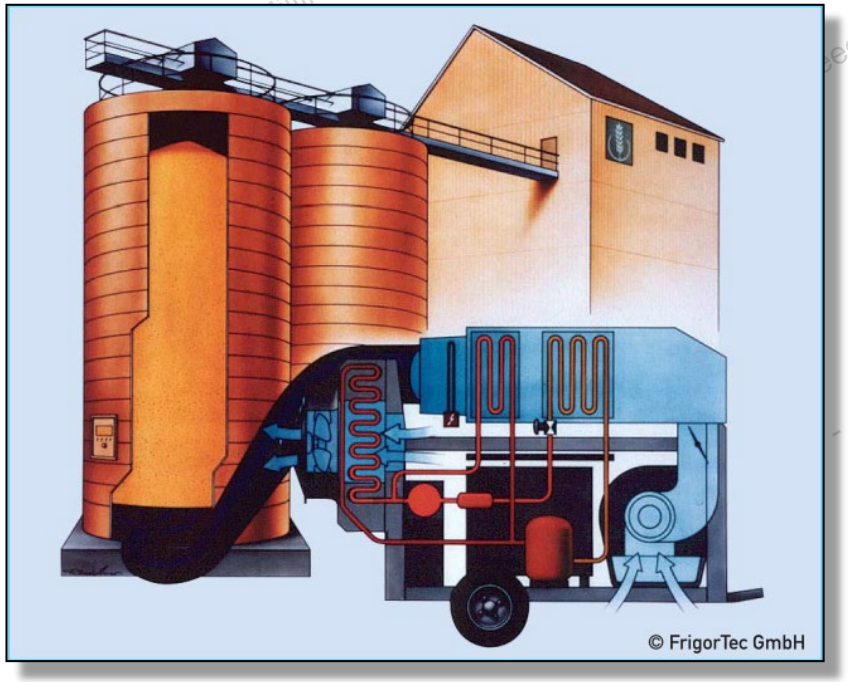


Temperature measurement in storage bins.



- **Amount and division of measuring cables.**
  - ***The number and the arrangement of the cables depend on the diameter of the bin.***
  - ***The number of temperature sensors per content of the bin depends on the kind of stored product.***
  - ***Temperature monitoring cables are designed for tensile loads up to 10kN and lengths up to 100 m.***

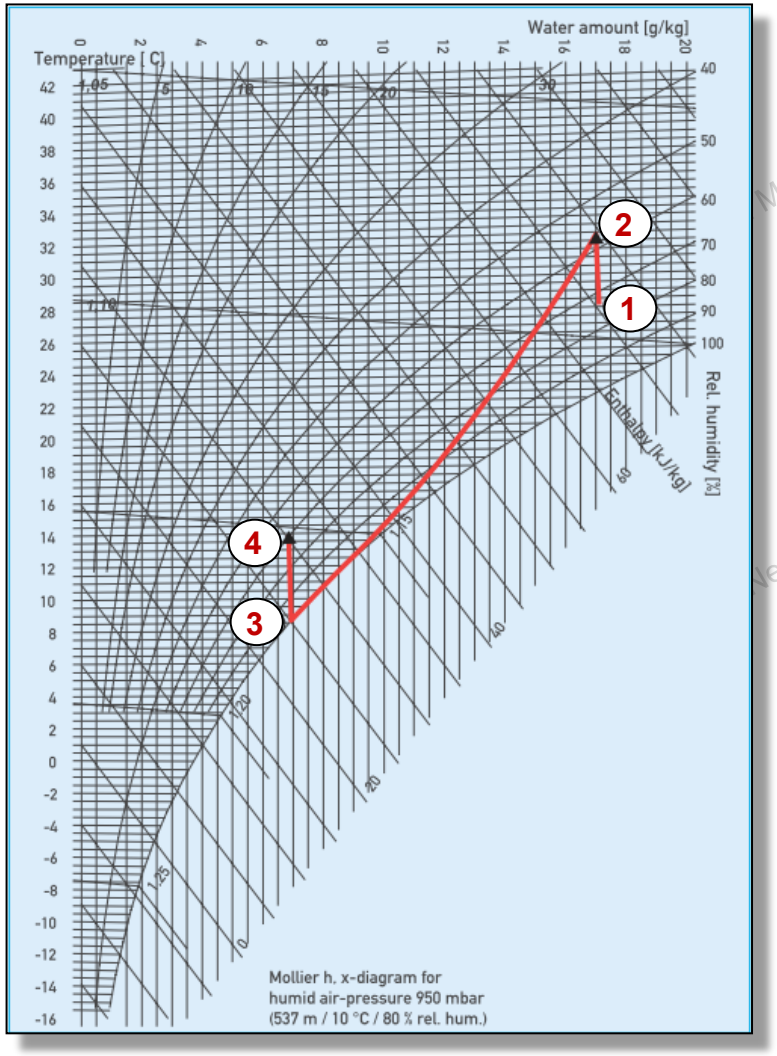
Treatment of grains through conservation cooling.



Process principle of a GRANIFRIGOR grain cooling unit

- **A GRANIFRIGOR grain cooler offers many advantages that must be considered in terms of economic efficiency.**
  - ***Risk-free long-term storage without quality loss.***
  - ***Protection from insect feed and propagation.***
  - ***Protection from mildew and their mycotoxins.***
  - ***Avoiding expensive chemical treatment.***
  - ***Minimising respiration losses.***
  - ***No time-consuming circulation required.***
  - ***Implemented independently of weather conditions.***

Treatment of grains through conservation cooling.



Cooling and dehumidifying of air with GRANUIFRIGOR.

- *The grain cooling fan draws in ambient air.*
  Point 1
- *The fan heats the drawn-in air.*
  Point 2
- *This air is cooled by air a conditioner to the desired temperature and thereby dehumidified.*
  Point 3
- *The HYGROTHERM unit warms the cold and humid air again to lower the relative humidity.*
  Point 4
- *This renewed warming makes use of the energy from the cooling process.*

  Hence no further energy costs are generated.

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Message to take home.

- **Grain handling and storage – How to get it right.**
  - ***Well-designed intake section reduces unloading times, dust formation & access of rodents /vermin.***
  - ***Proper sampling is mandatory, it contributes to feed safety and quality assurance.***
  - ***Selection of correct storage bins, traceability upstream & downstream must be possible.***
  - ***Stored grains remain biologically active, temperature & moisture control required.***
  - ***For economic efficiency aeration-systems must be considered.***

>> Never bring moist air into dry grain.
>> Never bring warm air into cooler grain.

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THAT'S IT – THANK YOU

QUESTIONS ??