

# Equipments of tanks



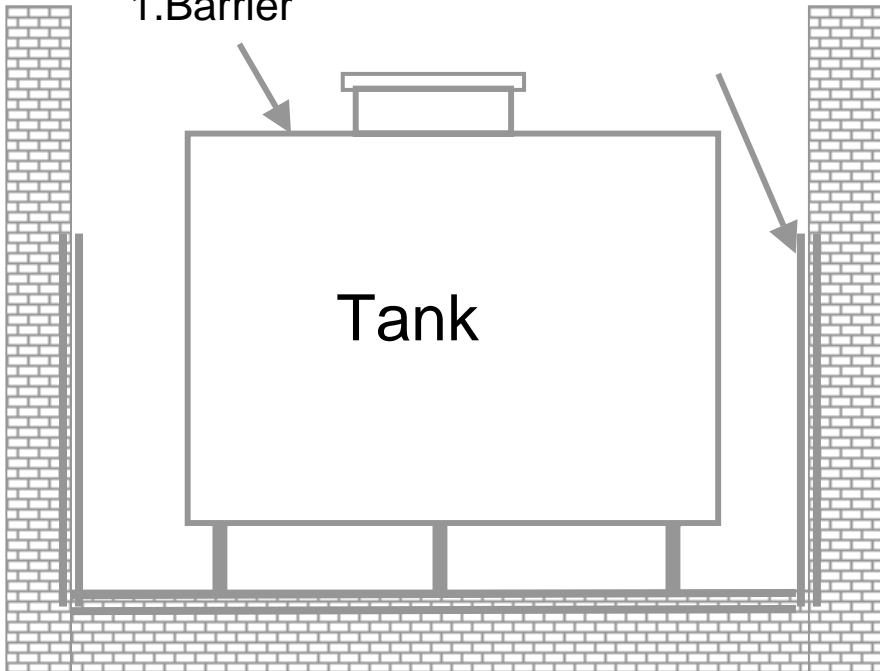
## Equipments of tanks

## Double barrier concept

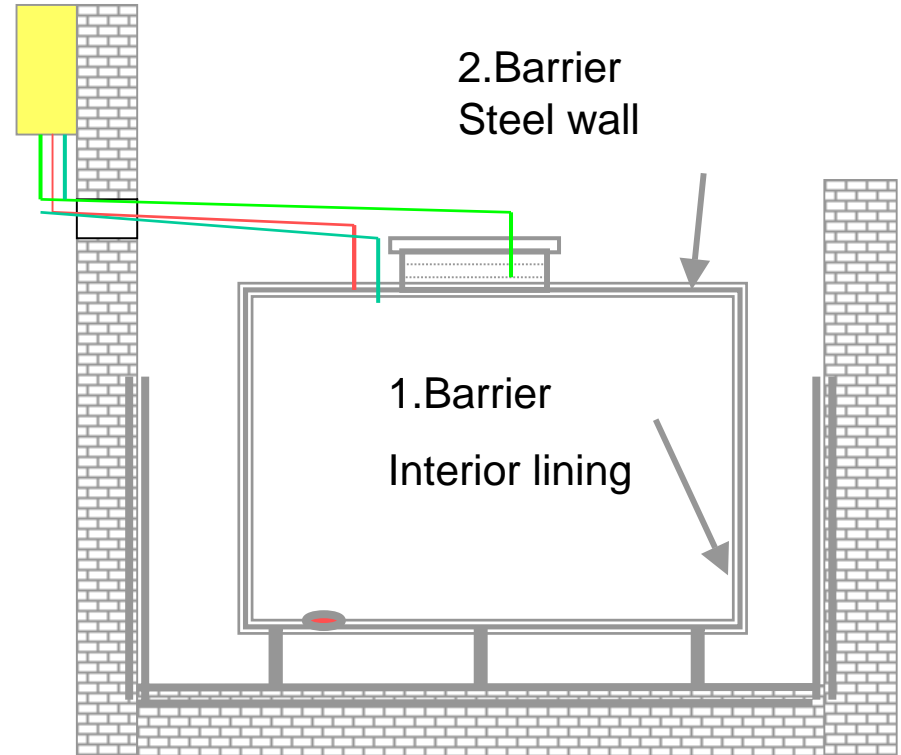
2.Barrier  
(protective paint,  
coating or lining)

1.Barrier

Tank



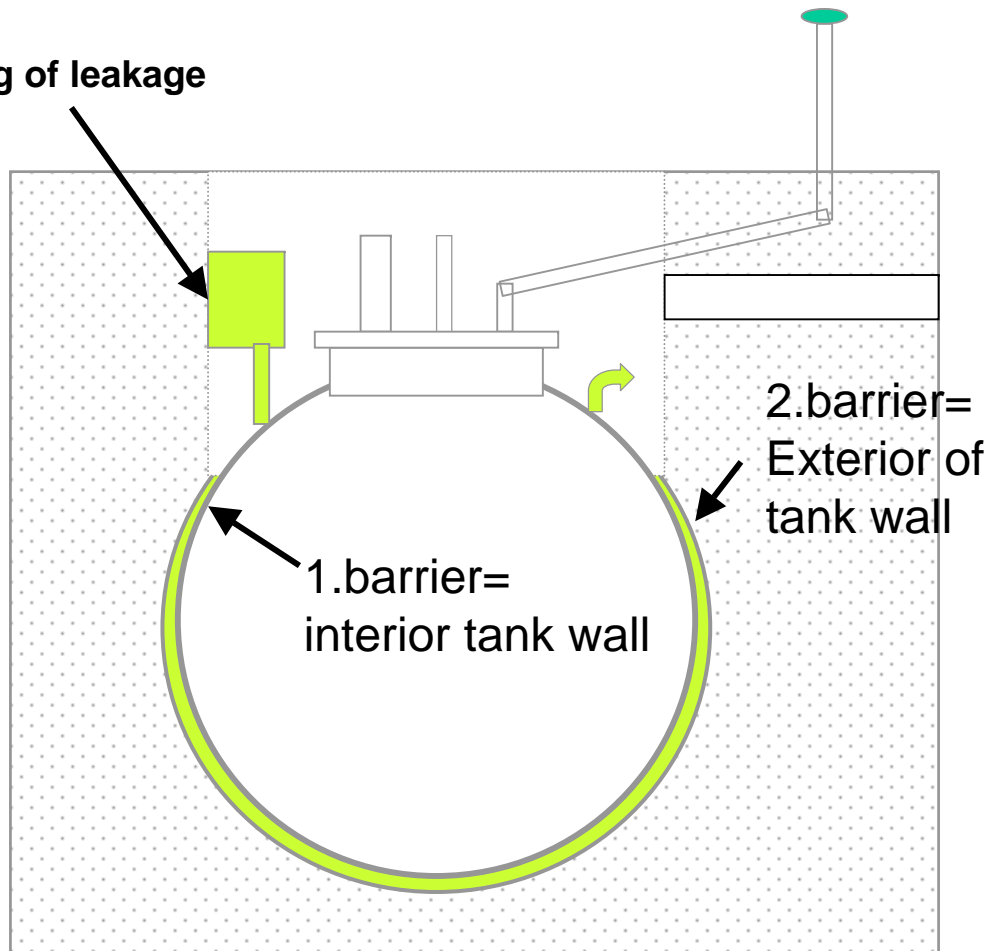
Over-ground tank in a sec. containment



Over-ground tank with interior lining

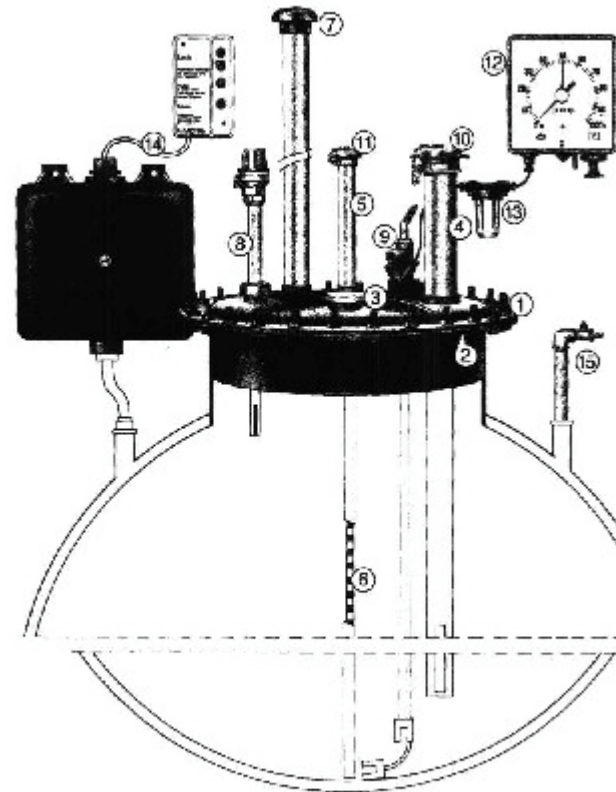
## Double barrier- concept

Monitoring of leakage



Underground double shell tank

Equipments of a doubled shell under-ground tank



- |                          |                          |                     |
|--------------------------|--------------------------|---------------------|
| 1. Kernventil            | 7. Entlüftungshaube      | 11. Füllstoppventil |
| 2. Dichtung              | 8. Grenzwertgeber        | 12. Füllstandgeber  |
| 3. Blindstopfen          | 9. Kombi-Kontrollventil  | 13. Abdruckventil   |
| 4. Füllrohr mit Nachrohr | 10. Kombi-Kontrollventil | 14. Lockwertgeber   |
| 5. Füllrohr              | 11. Füllstoppventil      | 15. LWS-Messgerät   |
| 6. Ventile               |                          |                     |

## Equipments of containers

- Aeration and venting device**
- Liquid level gauge**
- Overfill safety device**
- Leakage indicator**
- Shut-off valve for pipelines**
- Filling and emptying mechanisms**
- Access hatches (Entry and inspection ports or manhole)**
- Markings or Labelling**
- Protection against undue over/-under-pressure**

## Requirements on aerating and venting devices

- Tanks **should be equipped with aerating and venting devices** to prevent dangerous under-pressure and overpressure.
- Venting devices should not be equipped with **shut-off valves**.
- Venting devices should be compact and resistant to vapour from the stored liquids in regard to **the strain that could be expected**. Furthermore **they should be sufficiently durable and resistant to the effects of fire**.
- Venting devices should be **sized** to prevent the occurrence of dangerous under- and overpressure at high flow rate of pumps and fluctuating temperatures in the tank.
- The aeration and venting of several tanks through a joint pipe is only allowed if they contain liquid of the same danger class and only such liquid that can not form dangerous mixture with one another.

# Equipments of tanks



## Requirements on aerating and venting devices

- The aerating pipe of underground tanks belonging to a plant must end at least 50 cm above the filling port and at least 50 cm above the ground.
- The discharge port of the venting devices should be protected from rainwater.
- Aerating devices are not allowed to end in a closed room and not in a dome shafts (does not generally apply to over-ground single tanks with a capacity of 1000 l for storing fuel or diesel fuel)

Testing overpressure of container	2 bar and more	At least 0,3 bar but below 2 bar	At least 1,3 of static pressure of water, but below 0,3 bar
diameter	40 mm	40 mm	50 mm

**Example for the sizing of venting devices**

# Equipments of tanks





## Requirements on liquid level gauge

- Each tank must have a device for detecting the **level of the liquid content**. This device can be left out for over-ground tanks if the shell is made of a transparent material (e.g. plastic).
- **Opening for dip stock must be closable** and designed in such a way to prevent unintentional opening.
- **Liquid level glasses must be protected from damages** and must be partitioned into sections of not more than 2,5 m. If liquid level glasses are not equipped with a safety device to prevent release of liquid when damaged, then they should be fitted with emergency shut-off device. The shut-off device should only be opened when checking the liquid level.

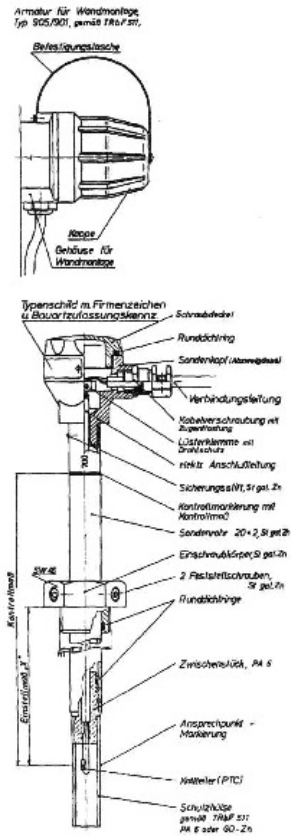
# Equipments of tanks



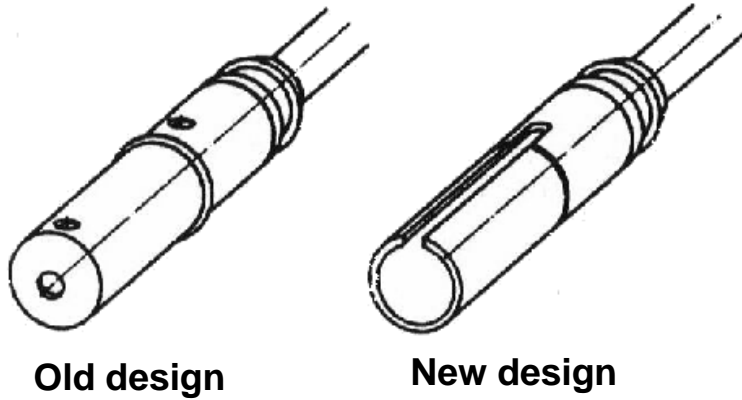
## Overfill safety device

- Each tank must be equipped with an **overfill safety device**, which automatically interrupts the filling process in time before the permissible capacity is reached or trigger off an acoustic alarm.
- Over-ground **single tank with a capacity of up to 1000 l** are only allowed to be filled with automatic dispensing valve according to the „Totmann’s principle“.
- Filling ports and ports, where overfill safety device (limit value transmitter) are mounted should be **clearly marked or labelled**.

## Overfill safety device



# Equipments of tanks



Old design

New design



## Requirements on leakage indicators

- Leakages on the wall of double shell containers must be indicated with an automatic leakage indicator.
- Leakage indicators are only allowed to be used if they are approved for the respective application.

# Equipments of tanks

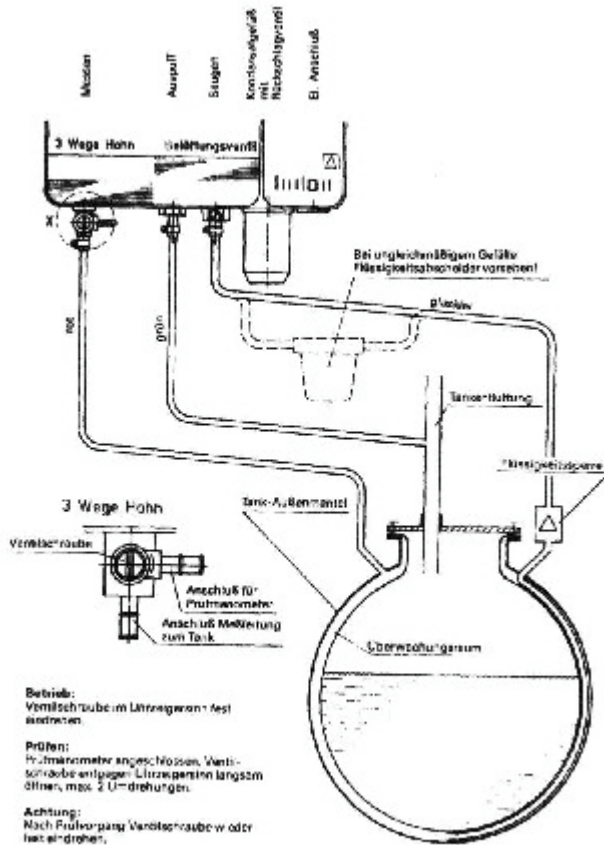


## ■ Double shell tank with visual leakage indicator



# Equipments of tanks

## Leakage indicator device for under- and over-pressure



LAZ-04/3





## Requirements on shut-off valves for pipelines

- Each pipe connected **below the permissible level of liquid** in a tank must be fitted with a shut-off valve.
- Pipe connections **above the permissible level of liquid** in a tank must be fitted with a shut-off valve, if there is a possibility of the content of the tank being siphoned through the pipe.
- The shut-off valve must be fitted **as close as possible to the tank**, and must be easily accessible and easy to operate.
- Tank fittings of **underground tanks should only be mounted on the top or in the vertex of the tank**. The fittings must be easily accessible.

## Shut-off devices



## Requirements on filling and emptying devices

- For the process of filling and emptying, each tank must be fitted with a system that allows a safe connection of a stationary or a detachable pipeline (does not generally apply to single over-ground tanks with a capacity of up to 1000 l).
- The filling device must have a liquid-proofed closing cap.
- There shouldn't be the danger of bursting due to sparks when attaching and detaching pipelines.
- The development of dangerous electrostatic charges must be prevented. The discharge point of the filling pipe must be fitted near the bottom of the tank. Sprinkling or spillage of liquid hazardous to water must be prevented.

# Equipments of tanks



## Filling devices



## Requirements on access hatches (entry and inspection ports)

- Each tank must be equipped with at least an **entry or inspection port (manhole)**.
- The diameter of the access hatch (manhole) must be **at least 600 mm**. A diameter of at least 500 mm is enough for entry hatch having a connecting neck with a height of not more than 250 mm.
- A **liquid-proofed dome shaft** must be fitted above the access hatch of every tank which is completely buried beneath the earth surface.

# Equipments of tanks



## Access and inspection hatches



## Requirements on labelling (Marking)

- Each tank must be furnished with a **manufacturer's label**, which contains all tank characteristics.
- The manufacturer's label must be permanent and legible. It must not be replaceable and must contain at least **the followings**:

Name of Manufacturer or manufacturer's logo, serial number, year manufactured, capacity in m<sup>3</sup>, testing pressure in bar.

- **Filling ports of storage tanks next to each other** and serving as inlet ports for liquids of different danger class or liquids that can form dangerous compounds when they come in contact must be characterised with **a storage goods label**.

## Additional requirements on tanks with internal overpressure and under-pressure

- Tanks with internal overpressure must be equipped with a device to **control the pressure**.
- Tanks with internal overpressure must be equipped with a safety device to control **excess pressure** if the permissible operating overpressure in the tank can be exceeded.
- Liquids or their vapour being released through **safety relief valves** must be safely **disposed off**.
- In very special cases, **other safety device** can be used instead of safety relief valves to control excess pressure (e.g. bursting disc safety device).



## Additional requirements on tanks with internal overpressure and under-pressure

- If the permissible operating pressure of a tank is less than the possible pressure from the pressure generator by 2 bars or more, an automatic device must be installed in the pressure supply line to reduce the pressure, so that the permissible operating pressure will not be exceeded.
- Tanks in which under-pressure could occur but are not designed to resist such under-pressure must be fitted with an appropriate device to prevent under-pressure in the Tanks.
- Each pressure pipe connection of a tank must be fitted with a shut-off device.
- Inspection glass must be resistant to internal overpressure, the effects of the stored flammable liquid as well as their vapour and be protected from damages.

## Safety device against over-pressure



## Other equipments of tank facilities e.g.:

- Heaters
- Interior and external corrosion prevention
- Fire protection devices such as e.g. Fire alarm device
- Protection against lightning
- Protection against explosion
- Fittings with flame arrester, Protection against explosion
- Gas pendulum devices, etc.