

Recommendations of the International for storing water hazardous substances

Storing is the process of keeping substances hazardous to water in containers (tanks, tank container and other vessels) to serve as a depot for consumption or source of supply to others. This also includes serving as a point of storage, if loading or offloading processes does not start within 24 h or the next working day.

If this working day is a Saturday, then the time limit ends on the next working day. Storages are grouped according to types in:

- Overground and
- Underground storage.

In such cases the following recommendations are made:

- 1 For reasons of fire, explosion and environmental protection, liquids hazardous to water should be stored in such a way that accidental release is ruled out. Storage equipments should be tight, stable and sufficiently resistant to possible physical and chemical influences
- 2 Single shell containers and pipelines are generally not allowed. This, however, does not apply to solid and liquid substances that are hazardous to water.
- 3 If liquids hazardous to water are stored in one or several containers in overground storage, the containers should be placed in a secondary containment. This does not apply to storage units where other adequate environmental safety measures have been taken to prevent mechanical damages to the container shell. (e.g. double shell container with leakage indicator and small barrel storage: these are barrels and storage units with containers of less than 0,02 m³ volume).
- 4 Secondary containment should be large enough to accommodate all the stored products in instances of accidental discharge. They should be able to contain at least:
 1. the volume of the units placed in it or the volume of the biggest tank if several units are placed in the containment. It should be able to retain at least 10 % of the whole volume of all units placed in it. Communicating containers are considered to be one container,
 2. when storage is done in movable containers:
 - a. with a total capacity of up to 100 m³, then it should be able to accommodate 10 % of the volume of all containers or at least an equivalent of the volume of the largest container,
 - b. with a total capacity above 100 m³ to 1 000 m³, then it should be able to accommodate 3 % of the volume of all containers or at least 10 m³,
 - c. With a total capacity of up to 1000 m³, it should be able to accommodate 2 % of the volume of all containers or at least 30 m³.

3. The requirements on containment capacity of a secondary containment of Storage units with small barrels are seen as fulfilled when substances are stored outside in containers or closed packages secured against damage and climatic influences or in closed rooms where damages can be repaired with simple operational means and are stated in the operating instructions.
4. The containment of fire-fighting water should be considered when calculating the entire capacity of the secondary containment.
5. Single-shell tanks, pipelines and other equipment must have enough space between them and walls and other structural components to make instant detection possible at all times by simple inspection. If for justifiable reasons this is not possible, then one or several leakage probes should be installed at a suitable point whereby an acoustic and optical alarm would be released each time the level reaches a critical stage.
6. Tanks should be installed in such a way as to avoid displacement, inclination and constraint which could affect its safety and that of its equipment.
7. The stability of overground tanks must be guaranteed to withstand the effect of fire for duration of 30 minutes.
8. In open-air storage for overground tanks, measures for the protection of the tanks against lightning are required.
9. When underground tanks are installed in the ground, it must be ensured that they are intact before installation and are embedded with suitable filling material. Moreover, they should not be exposed to corrosive agents and mechanical stress and their position should be stable.
10. The tanks should be installed in a way to ensure adequate protection against all possible external danger.
11. In case of a possible displacement of the plant due to groundwater, static water and flood, the tank should be secured with suitable means against the force of buoyancy.
12. As a measure of safety against the effects of fire, adequate distance and if necessary security zones should be maintained between open-air overground tanks and neighbouring plants and buildings. This should depending on the type of tank as well as amount and danger class of the stored flammable liquid substances.
13. Units for storing flammable liquid substances should be installed and equipped as well as maintained and operated in such a way as to guarantee the safety of the personnel and the public, especially in case of fire outbreak and in cases where the liquids are heated beyond their flash point and there is also a danger of explosion.

- 14 The quantity of flammable liquids in storage facilities should be limited with regard to fire outbreak.
- 15 The ban on joint storage should be observed.
- 16 Containers and all other components of the plant that can act as transmitters should be installed in such a way as to not constitute electrical polarities which can lead to the formation of explosive sparks, dangerous corrosion or a hazard to human.
- 17 Plants and plant components must be secured against electrostatic charges, which can lead to dangerous discharging processes. The process of filling a container should be carried out in such a way that danger of electrostatic charges does not occur.
- 18 Units for storing flammable liquids must be equipped with adequate fire protection devices. The necessity of fire protecting devices applies to storage in containers of all kind in open space as well as in rooms.
- 19 Units used for storing solid substances hazardous to water must fulfil the following criteria:
 - a. They must have a bottom that is resistant and impermeable to the substances under all operational and climatic conditions and
 - b. the substances:
 - a) should be stored in tight containers or packages. The containers or packages should be protected against damages and other climatic influences.
 - b) should be stored or transshipped in a room. Closed rooms are considered as spaces which are protected against climatic influences and entry of water or other liquids in such a way that the substances can be released.
- 20 Storage units should be equipped with clearly visible signs to indicate the kind of substances hazardous to water they handle and at which operational pressure.