

Attachment to test certificate

Constructional requirement of depots

Transport, foundation, installation and set-up of tanks

General instructions

- (1) Tanks have to be installed or set up by a qualified firm. The firm is also responsible for the proper foundation of the tank.
- (2) Tanks have to be founded and installed or set up in a way that dislocations, deviations and restraints that could endanger the tank or its equipment cannot occur.
- (3) Foundation and installation of tanks have to be operated in accordance to the soil conditions. Further foundations may be necessary. The possibility of ground settlement, e.g. in mining regions, and of floods has to be taken into account.
- (4) Necessary space between tanks and buildings and between several tanks: see no. 6 and 7.
- (5) An upward clearance of at least 50 cm has to be kept for tanks with access openings on the crown of the tank with inside diameter of at least 600 mm, of at least 60 cm clearance for tanks with smaller access openings.
- (6) Tanks have to be transported in a way that avoids damages of insulation and deformation of the walls. Chains, ropes and bindings must not damage the insulation.
- (7) Tanks have to be loaded and unloaded using adequate devices such as crane trucks or vehicles with special equipment for unloading. Blows have to be avoided. Hoisting devices may be attached only to lifting lugs installed by the manufacturer if there are no instructions for the use of other fastenings (e.g. use of belts).

Surface tanks

Bedding

If the tank or its end rests on a bedding, this must not affect the leak tightness of the tank. The bedding must not be considerably uneven. The tank has to rest on the bedding in a way that the shell of the tank is not strained punctually or lengthwise.

Supporting structures

- (1) The stability of surface tanks has to be guaranteed during an exposure to fire for at least 30 minutes.
- (2) The above is considered as maintained if the supporting structure has a fire resistance of 30 minutes acc. to e.g. DIN 4102, of if the security of the supporting structure is proved by an officially accredited plant fire brigade
  - by construction
  - by coating
  - by a shell

Underground tanks

Installation of tanks

- (1) For the installation of underground tanks equipment has to be used that guarantees that the tanks can be put down without damage. Sliding or rolling is not allowed.
- (2) Directly before putting down the tank the intactness of the tank has to be established and attested by a qualified firm.
- (3) Directly before the installation of the tank a high voltage test of the insulation has to be conducted by a qualified firm. For a standard bitumen insulation, e.g. acc. to DIN 6068 page 1 or 2, a test voltage of 14000 V is sufficient. For thicker bitumen

insulations or for special insulations, the test voltage has to be increased up to 30000 V in correspondence to the thickness of the insulation.

- (4) If the insulation is damaged, the damaged areas have to be repaired carefully with adequate material to ensure the functionality of the insulation. To prove the full functionality of the insulation, a high voltage test acc. to (3) is necessary.
- (5) If the shell of the tank is damaged, the tank may only be installed if
  - an authorized expert acc. to § 16 par. 1 VbF (flammable liquids ordinance),
  - for tanks for flammable liquids of danger class AIII: an authorized expert acc. to "Verordnung über Anlagen über den Umgang mit wassergefährdenden Stoffen und über Fachbetriebe des jeweiligen Bundeslandes"checked and attested that the tank is still qualified for underground installation.
- (6) Usually the insulation has to be removed, especially in the area of weld seams, to enable the assessment of the damaged shell parts. The authorized expert decides if and which repairs have to be conducted. The expert decides in particular if the shells have to be inspected again after the reparation respective the withstanding of the required design pressure without leakage or permanent and substantial deformation.
- (7) The authorized expert states with a certificate that the tank is still qualified for underground installation, specifies the kind of damage and the measures of repair. If necessary, the authorized expert also certifies the accomplishment of an additional high voltage test.
- (8) Lifting lugs and other steel parts that protrude from the insulation, have to be protected against corrosion before the cavity is backfilled.

#### Grounding of tanks

- (1) The cavity has to be prepared in a way that the tank will not be damaged during the installation and that a dislocation is not to be expected after the backfilling of the cavity.
- (2) The tank has to rest equally on its entire length in a way that its shell is not stressed punctually or lengthwise. Unstable ground has to be solidified sufficiently, otherwise the tank has to be grounded on a foundation.
- (3) If the tank is to be installed in an area in which a dislocation caused by groundwater, retained water or flood must be expected, it has to be anchored or secured against flotation by adequate loads. The safety factor of the anchoring or loading against the floatation of the empty tank has to be at least 1.3 in relation to the highest water level.
- (4) The cavity has to be prepared so that the tank can be placed in a way that residual amounts can be removed. For single chamber tanks this is fulfilled if there is a downward slope of 1 % towards the end of the dome and for several chamber tanks, if the tank rests horizontally. The positioning has to be checked on the crown line of the tank.

#### Backfilling of the cavity

- (1) After the backfilling of the cavity, tanks have to be completely surrounded by a sufficient (at least 20 cm) layer of non-flammable filling material that does not endanger the insulation. Between tank and filling material there may not be any voids.
- (2) The demands of (1) are met if sand of grain size  $\leq 2$  mm or other materials are used that are free of sharp-edged pieces, stones, ashes, slag or other allochthonous or aggressive substances are used for the preparation of the base and for the filling of the cavity.
- (3) The gap between the base of the tank and a concrete slab beneath used as flotation control must not be filled with sand or other flowable material. For this purpose, layers of bitumen bound sand or adequate rubber or synthetics should be used. Any damage of the insulation, especially at the base and near the straps is to be avoided.

The measures are to be conducted in a way that, if required, cathodic protection against corrosion is not compromised, and sufficient passive protection is maintained.

- (4) The covering of tanks that are completely surrounded by ground, walls or concrete or several of these materials should not be stronger than 1 m. The thickness of the covering is to be measured on the crown of the tank. We refer to (7).
- (5) If required, additional measures have to be taken for tanks which are covered with more than 1 m soil or which might be unduly affected by traffic loads in order to exclude these loads. These measures have to be determined together with an authorized expert acc. to § 16, 1 VbF.

#### Certification of installation

The correct installation of the tank has to be certified by a qualified company acc. to no. 15.4 par. 2 and 3.

#### Dome shafts

- (1) A dome shaft has to be placed above each access opening of tanks that are installed completely underground.
- (2) Dome shafts have to be wide enough to allow access to all pipe connections and to allow to freely conduct all necessary operations and inspections. The internal diameter of the dome shaft should not be considerably less than 1 m and at least 0,2 m wider than the dome cover. The shaft may be drawn-in upwards. ? The internal diameter of the dome cover has to allow the dismounting of the cover.
- (3) Dome shafts have to be covered accident-proof. The manhole cover has to withstand the expectable loads. This is achieved if the classification and demands of DIN EN 124 – attachments and covers for traffic zones – (August 1994) are met.
- (4) Dome shafts have to be covered in a way that surface water cannot enter.
- (5) Dome shafts may not transfer loads onto the tank that may cause damage of the shell or the insulation. This is also relevant for welded or bolted dome shafts of steel.
- (6) Dome shafts have to be leak-proof and built in a way that even small amounts of leakage are retained, noticed and can be dispatched.
- (7) Connections to drainpipes are not allowed in dome shafts.
- (8) Openings for wires and pipes have to be protected against infiltration by flammable liquids and its vapour, if
  1. the dome shafts are in the scope of filling hoses or equipment for filling of flammable liquids of danger class AI, AII or B
  2. flammable liquids of danger class AIII are stored together with flammable liquids of danger class AI, AII or B in divided underground tanks
  3. flammable liquids of danger class AI, AII or B are stored in underground tanks.
- (9) The protection acc. to (8) can e.g. be provided by sealing with elastic mortar or with filler or by filling or foaming.

#### Protection against damage

- (1) The vessels have to be set up in a manner that they are sufficiently protected against possible damages from the outside.
- (2) The protection can be realized by:
  1. Sheltered set-up
  2. Traffic protection
  3. Set-up in an adequate catchment area
- (3) For underground tanks inside the traffic area traffic loads have to be considered.

We hereby confirm that the installment and set-up of the vessel was accomplished according to the standard TRbF 20.