



SLOVENSKI STANDARD SIST EN 976-2:2000

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Underground tanks of glass-reinforced plastics (GRP) - Horizontal cylindrical tanks for the non-pressure storage of liquid petroleum based fuels - Part 2: Transport, handling, storage and installation of single wall tanks

STANDARD PREVIEW
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Unterirdische Tanks aus textilglasverstärkten Kunststoffen (GFK) - Liegende zylindrische Tanks für die drucklose Lagerung von flüssigen Kraftstoffen auf Erdölbasis - Teil 2: Transport, Handhabung, Zwischenlagerung und Einbau einwandiger Tanks

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Réservoirs enterrés en plastiques renforcés de verre (PRV) - Réservoirs cylindriques horizontaux pour le stockage sans pression de carburants ou combustibles pétroliers liquides - Partie 2: Transport, manutention, stockage et installation de réservoirs a simple paroi

Ta slovenski standard je istoveten z: EN 976-2:1997

ICS:

23.020.10 ㅂ^] |^ { ã } ^ Á [• [á ^ Á Stationary containers and tanks
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EUROPEAN STANDARD

EN 976-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 1997

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Descriptors: Petroleum products storage, storage tanks, underground tanks, thermosetting resins, reinforced plastics, glass reinforced plastics, specifications, transportation, installation, certification

English version

**Underground tanks of glass-reinforced plastics
(GRP) - Horizontal cylindrical tanks for the
non-pressure storage of liquid petroleum based
fuels - Part 2: Transport, handling, storage and
installation of single wall tanks**

Réservoirs enterrés en plastiques renforcés de verre (PRV) - Réservoirs cylindriques horizontaux pour le stockage sans pression de carburants ou combustibles pétroliers liquides - Partie 2: Transport, manutention, stockage et installation de réservoirs à simple paroi

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 210 "GRP tanks and vessels", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 1998, and conflicting national standards shall be withdrawn at the latest by January 1998.

The 4 parts of this European Standard cover the construction and installation requirements of horizontal, cylindrical GRP tanks used for the underground non-pressure storage of petroleum based fuels, e.g. petrol and diesel fuel storage in service stations, heating oil storage for buildings.

The 4 parts are :

Part 1 : Requirements and test methods for single wall tanks

Part 2 : Transport, handling, storage and installation of single wall tanks

Part 3 : Requirements and test methods for double wall tanks

Part 4 : Transport, handling, storage and installation of double wall tanks

The Standard is written in different parts in order to clearly define the involvement and responsibilities of different parties in the construction of the tank, its installation and the assurance of a good, safe performance during use.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This Part 2 of European Standard EN 976 specifies the requirements for the transportation, site handling, storage and installation of horizontal, cylindrical single wall tanks made of glass reinforced thermosetting resins used for the underground non-pressure storage of liquid petroleum based fuels, complying with the requirements of EN 976-1.

Ancillary equipment vital to the satisfactory operation of the installation comprising access chamber, cover and frame are also described.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

prEN 976-1 Underground tanks of glass-reinforced plastics (GRP) - Horizontal cylindrical tanks for the non-pressure storage of liquid petroleum based fuels - Part 1 : Requirements and test methods for single wall tanks.

3 Definitions

For the purposes of this standard the following definitions apply :

3.1 cylinder : Part of the tank that forms the cylindrical portion of the body.

3.2 end : Curved portions of the tank located at the ends of the cylindrical portion.

3.3 cylinder reinforcing ribs : Circumferential external ribs fully bonded to the cylinder or integrally formed with it.

3.4 compartment : Portion of the tank created by an internal partition.

3.5 manway : Hole in the uppermost portion of the cylinder or tank allowing access.

3.6 manway lid : Plate bolted to the manway.

3.7 access chamber : Chamber to provide access to the manway lid.

3.8 anchorage positions : Clearly marked positions on the tank which can be used as the location of the holding down straps used to anchor the tank.

3.9 anchorage points : Positions to which the holding down straps can be secured.

3.10 holding down straps : Straps used to hold down the tank.

3.11 backfill : Non-cohesive, granular material used to surround the tank and provide support and restraint.

3.12 excavation : Pit into which one or more tanks may be installed.

3.13 tank installer : Company responsible for the tank installation.

3.14 manufacturer : Company creating and selling the tank complying with EN 976-1.

3.15 sleepers; deadmen : Concrete beams laid parallel to the tank axis which allow the soil weight above the beams to be utilized in tank anchoring (See figure B.4).

3.16 lifting position : Position on the tank used for lifting purposes.

3.17 water table : Permanent, short term, tidal or frequently changing water level below ground level at the tank location which marks the upper level of the zone of groundwater saturation.

3.18 high water table : Site with a water table having the depth below ground to the average seasonal water level of between 0 and 4 m.

3.19 tank : Tank complying with EN 976-1.

3.20 visual inspection : Examination of the tank by the unaided eye.

3.21 sheet pile : Timber or steel sheeting used to support the sides of an excavation.

4 Transport

The tank shall be placed on the transporter ensuring that it is not placed on any sharp protrusions that will cause damage. Suitable cradles or chocks shall be used.

The tank shall be secured on the vehicle by means of GRP, nylon or similar non-metallic straps.

The straps shall only be tightened sufficiently so as to prevent tank movement. Care shall be taken not to overtighten the straps and cause damage of the tank.

5 Handling

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When demounting the tanks from the transporter, the tank shall only be lifted by devices provided by the tank manufacturer or at lifting positions marked on the tank using non-metallic straps or webbing. See figure 1.

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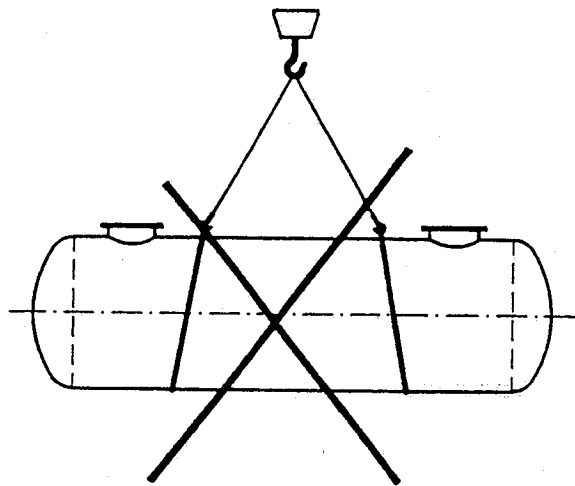
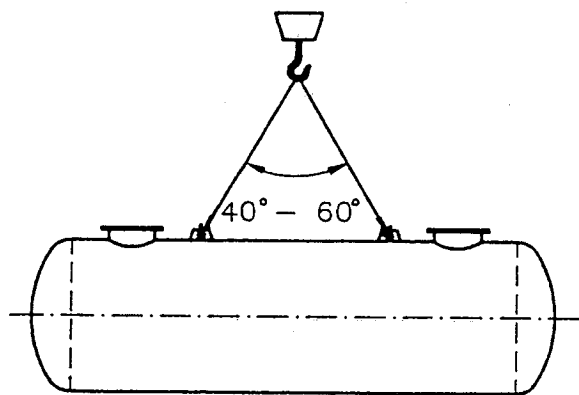
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Control of the tank whilst suspended shall be effected by the use of guide ropes.

6 Storage

If stored on site the tanks shall be stored on a level surface free from sharp protrusions and supported to prevent local damage. The storage location shall be selected so as to minimise accidental damage. Tanks shall be chocked.

7 Tank certification

Prior to installation the installer shall obtain from the manufacturer (or third party certification body) a certificate certifying that the tank complies with EN 976-1.



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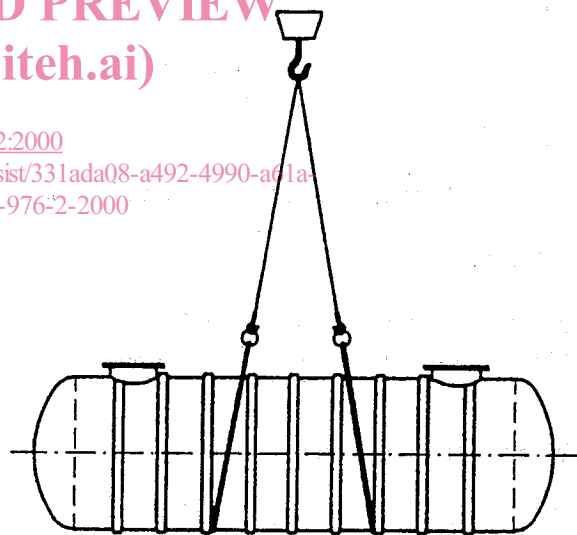
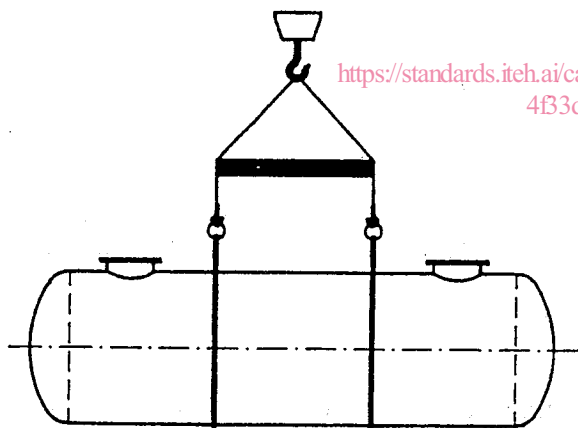


Figure 1 : Handling of tanks

8 Installation procedure

8.1 Preliminary checks

Prior to the commencement of installation, the native soil conditions should be determined and recorded and the installation type selected as defined in annex B. The type of ground will determine the dimensions of the excavation, the need for any earth work support or geotextiles.

The paths of underground or overhead services shall be identified and where necessary diverted prior to the commencement of work.

8.2 Preparation of the excavation

Set out the excavation. Begin the excavation taking care not to undermine existing structures nor damage underground services.

All excavated material shall be removed from the immediate vicinity of the excavation to ensure it does not contaminate the backfill.

Keep the excavation dry by using pumps where necessary.

Level the excavation base.

8.3 Ground works

When the ground has been classified as unstable then preventative measures such as "battering back" or sheet piling should be taken to prevent inward collapse of the side walls into the excavation.

When sheet piling is used care shall be taken to ensure that neither tank nor backfill material is disturbed by sheeting removal. Voids behind the sheeting and voids created by sheeting removal must be filled with backfill compacted to required density. It is advised to pull the sheeting in stages as backfilling progresses to allow the backfill to be properly placed and compacted against the native pit walls.

8.4 Excavation dimensions

a) Stable soils

The excavation shall be large enough to provide a minimum of 450 mm between the excavation sides and the walls and ends of the tank(s) and 450 mm between tank(s).

b) Unstable soils

The excavation shall be large enough to provide a minimum of 1/2 diameter between the excavation sides and the walls and ends of the tanks and 450 mm between tanks, except when permanent sheet piles are used to confine the excavation.

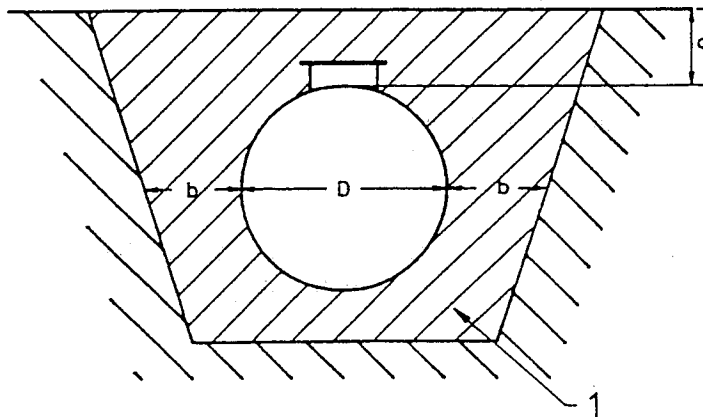
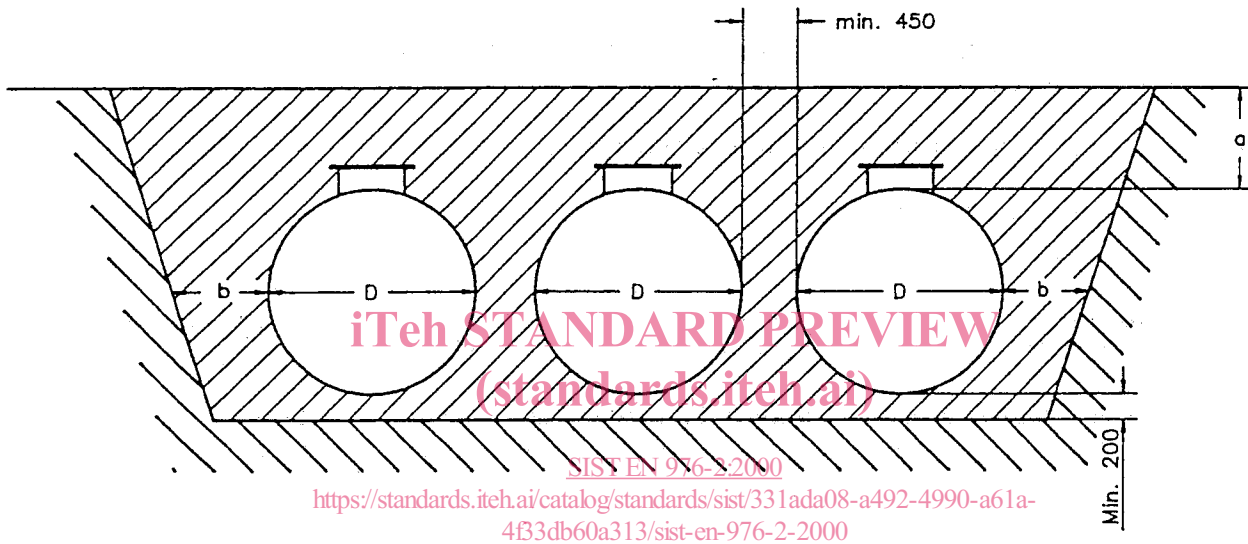
The excavation shall provide for the minimum cover (see 8.19) of backfill above the tanks and minimum 200 mm below. The maximum cover above the tanks allowable is 2 m. The depth shall take into account any falls provided in the delivery pipework.

See table 1 and figures 2 and 3.

Table 1 : Excavation dimensions

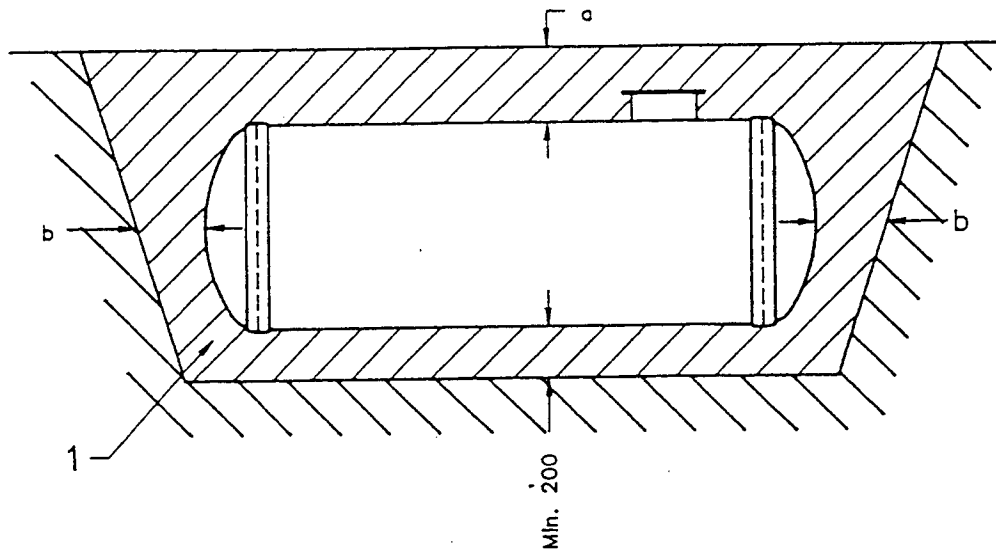
NORMAL INSTALLATION		INSTALLATION WITH TRAFFIC LOAD	
a	500 to 2 000 mm (min. 200 mm backfill)	650 to 2 000 mm (backfill plus reinforced concrete)	1 000 to 2 000 mm (backfill plus asphalt or paving slabs)
b	Stable soil : min. 450 mm Unstable soil : min. 1/2 diameter	Stable soil : min. 450 mm Unstable soil : min. 1/2 diameter	

Note - Traffic load is based on a single wheel load of 8 tons.



1 Backfill

Figure 2 : Installation depth and distance to excavation side, front view



1 Backfill

Figure 3 : Installation depth and distance to excavation side, side-view

8.5 Geotextiles

In cases of unstable ground as defined in annex B, clause B.4, or where ground water conditions could lead to migration of the backfill material, a geotextile filter fabric shall be installed. The geotextile shall be laid in accordance with the geotextile manufacturer's instructions.

The geotextile shall extend under any base slab a minimum of 300 mm. Alternatively, the geotextile can be placed over the base slab a minimum of 1000 mm and covered by backfill. Where sleepers are used the geotextile shall pass underneath the sleepers and cover the entire excavation base. Ensure that the geotextile extends to the highest level anticipated for the backfill material. A minimum 300 mm overlap shall be provided where geotextiles are overlapped.

8.6 Tank anchoring

When the ground load above the tank is calculated as insufficient to prevent tank uplift (a final total cover depth of 0,7 tank diameter is usually sufficient to prevent flotation of a single tank installation), then anchoring shall be provided by methods such as base slabs or sleepers. The number of anchoring points on each side of the tank shall be equal to the tank anchoring positions indicated on the tank.