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GRP tanks and vessels for use above ground - Part 4: Delivery, installation and maintenance

Oberirdische GFK-Tanks und -Behälter - Teil 4: Auslieferung, Aufstellung und Instandhaltung

Réservoirs et récipients en PRV pour applications hors sol - Partie 4: Livraison, installation et maintenance

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ICS:

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Foreword

This document (EN 13121-4:2005) 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of an identical text or by endorsement, at the latest by July 2005, and conflicting national standards shall be withdrawn at the latest by July 2005.

Document EN 13121 consists of the following parts under the general title *GRP tanks and vessels for use above ground*:

— *Part 1: Raw materials —Specification conditions and acceptance conditions.*

— *Part 2: Composite materials — Chemical resistance.*

— *Part 3: Design and workmanship.*

— *Part 4: Delivery, installation and maintenance.*

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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1 Scope

This document gives requirements for delivery, installation and maintenance of GRP tanks and vessels in accordance with prEN 13121-3.

2 Normative references

Not applicable.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
delivery
delivery includes loading, transportation and off-loading of the GRP tank or vessel at the site designated by the purchaser

3.2
installation
installation includes the preparation of the support(s), erection or placement on the supports and fixing the tank or vessel, inspection and tests before commissioning

3.3
bedding material
bedding material for flat-bottomed tanks, pliable during installation and load bearing before commissioning

3.4
screed
hard setting material to correct minor surface irregularities

3.5
transporter
organisation in charge of the transport of the tank/vessel from the place of loading to the place of storage or installation

3.6
installer
organisation in charge of installing the tank/vessel in its place of use

4 Delivery

4.1 General

If the manufacturer considers that the requirements of this document are insufficient for the loading and the transportation of the GRP tank or vessel for the purposes of any particular delivery, he shall provide the necessary additional information.

NOTE A recommended check list of those items which should be verified is given in Annex C (informative).

4.2 Low temperature effects

The possible effects on the material properties of the GRP tank or vessel of ambient temperatures experienced during transportation shall, as far as possible, be taken into consideration, especially temperatures less than 5 °C.

4.3 Pre-delivery check

A pre-delivery check shall be made to ensure that:

— the appropriate inspection certificate is available;

— the tank/vessel is correctly identified;

— the tank/vessel is in its as-released condition;

— all branches are blanked with either service blanks or temporary covers.

NOTE To avoid damage to the GRP tank or vessel during delivery, temporary bracings should be used.

4.4 Storage

If, after unloading, the GRP tank or vessel cannot immediately be installed in its final position, it shall be stored as follows:

a) Wherever possible the GRP tank or vessel shall be stored in the design orientation i.e. vertical tank or vessel shall be stored (supported and anchored) vertically. If it is not possible to store the item in their operational orientation it may be stored otherwise with special considerations on supporting and anchoring. The use of saddles or supporting timbers with wedges may be necessary.

b) The storage area shall be level and free from protrusions or ridges to avoid point loading. The GRP vessel or tank shall be located in an area remote from vehicular traffic or suitably protected from traffic. Consideration shall be given to movements due to wind on the empty item and temporary anchors shall be provided.

4.5 Lifting devices

Where the lifting device will make direct contact with GRP surfaces, synthetic fibre flat webbing slings shall be used. The minimum width of the slings shall be 80 mm.

4.6 Loading

The GRP tank or vessel shall be lifted and handled in a suitable manner according to the state of the art; appropriate manners are shown in the examples in Annex A (informative) and Annex B (informative).

The lifting devices shall be attached to the GRP tank or vessel in correspondence with the design of the tank or vessel.

All lifts shall take into the consideration the site and atmospheric conditions, especially wind.

All lifts shall avoid any impact.

Loading details shall be recorded.

NOTE This may be done by e.g. using the form given in Annex C (informative).

4.7 Transportation

Loads occurring during transport shall be considered to ensure that undue stress, local loads and abrasion are not imposed on the GRP tank or vessel.

The GRP tank or vessel shall be secured by webbing slings or ropes.

NOTE At the destination and before off-loading the GRP tank or vessel should be visually inspected. The results of inspection should be recorded, e.g. using the form Annex C (informative).

5 Installation

5.1 General

The manufacturer shall advise the methods of installation of the GRP tank or vessel.

NOTE 1 The installation should be carried out by trained personnel only.

NOTE 2 The details of installation should be recorded, e.g. using the form given in Annex D (informative).

5.2 Pre-installation checks

A pre-installation check shall be made to ensure that:

a) supporting structures or foundations are suitable for the installation;

b) supporting structures or foundations are within the specified tolerances;

c) if necessary, the item is protected from flotation.

Pre-installation details shall be recorded, e.g. using the form given in Annex D (informative).

5.3 Preparation of installation location

5.3.1 Requirements for installation surfaces

The supporting structure shall meet the requirements of the manufacturer of the GRP tank or vessel.

5.3.2 Preparation for support and erection of tanks or vessels

5.3.2.1 Flat-bottomed tanks or vessels

a) Installation on flat and even surfaces

The foundation shall be flat and level within 2 mm/m with an overall maximum deviation of 5 mm. Flat-bottomed tanks/vessels shall be erected vertically with a maximum deviation of 0,5°.

b) Installation using a bedding material

On uneven foundations or in case of uneven tank or vessel bottoms, a fresh bedding material of a sufficient thickness shall be used to ensure contact between the foundation and the bottom.

NOTE The bedding material, e.g. cement screed, polymer concrete, sodium/potassium water glass sand mixtures and bituminous sand mixtures, rubber, bitumen felt should be laid shortly before erection ensuring that any orientation marks are visible. The bedding material should be covered to prevent adhesion to the tank/vessel.

c) Installation on piers or beams

Installation on piers, beams or gratings shall be in accordance with the design.

5.3.2.2 Horizontal tanks/vessels

Saddle supports shall be as designed.

NOTE The saddle support should be installed with a tolerance of ±1 mm/m separation.

5.3.2.3 Circumferential skirt supported vertical tanks or vessels

The tank or vessel shall be installed vertically with a maximum deviation of 0,5°. The alignment may be achieved by placing suitable load-bearing shims, on either side of the anchor bolts. Any gap between the skirt and the supporting structure shall be filled with a load-bearing infill before commissioning.

5.3.2.4 Tanks or vessels with supporting legs

Tanks or vessels with supporting legs shall be installed vertically with a maximum deviation of 0,5° and securely anchored to the supporting structure. The legs shall be shimmed using a load-bearing material to ensure that the tank or vessel is uniformly supported.

5.3.2.5 Drop-through tanks or vessels with separate supporting rings

When using drop-through tanks or vessels it shall be ensured that the support arrangement, whether continuous or split, will support the tank/vessel uniformly.

5.4 Bolting

5.4.1 Anchor bolting

The bolting work shall be carried out in accordance with the design of the tank or vessel.

5.4.2 Nozzle bolting

The opposite lying bolts shall be tightened in pairs. Any following pair of bolts shall to be selected at the widest angle to the axis of the previous pair.

5.4.3 Bolt torques

5.4.3.1 Torques for anchoring

Nuts shall be tightened until they reach the contact surface. All nuts shall be locked by a counter nut.

5.4.3.2 Torques for bolting

The torques for bolting shall be specified by the manufacturer.

5.5 Connections

Pipework shall be supported at all times so that local loads on nozzles do not exceed the design value.

NOTE Flange and nozzle protection (e.g. covers) should be left during installation of the tank or vessel until needed for connection of piping or ancillary equipment.

5.6 Attachments

Ladders, platforms and other attachments shall be fitted in accordance with the design and without causing undue stress to the tank/vessel.

5.7 Inspection and tests

After completion of installation the tank or vessel shall be inspected and tested as required in the operating instructions given by the manufacturer of tank or vessel and shall include as a minimum.

a) Visual inspections shall indicate the general state of the tank or vessel, the state of wall material, nozzles, connections and joints. Subject of inspections shall be the outer surfaces and, for reasons of impact damage

or abrasion, the inner surfaces. Visual inspections shall be performed before and after hydrostatic or pressure tests.

b) Hydrostatic or pressure tests, tests on safety or on operational devices and spark testing of lining seams.

NOTE 1 Within hydrostatic or pressure tests, accoustic emission tests should be performed.

Conditions and results of inspections and tests shall be recorded.

NOTE 2 Inspection and test reports should be kept by the user until tank or vessel is decommissioned.

6 Maintenance

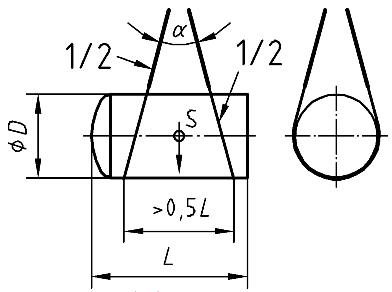
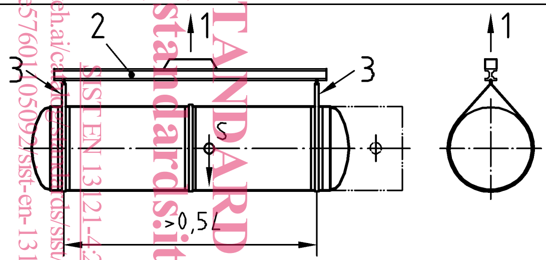
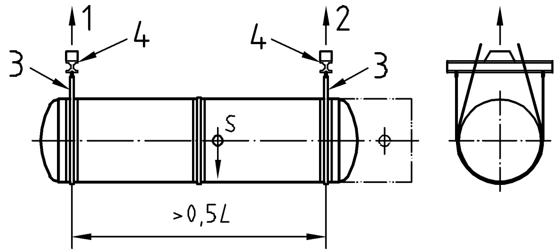
Maintenance is a set of preventive and other measures applied to enable availability and safety of tanks or vessels and to avoid danger to health and to the environment under the service conditions of the tanks or vessels within their working lives.

NOTE The manufacturer should provide appropriate advice on cleaning, servicing, repairing or replacing of defective parts, visual inspections and tests, e.g. as proposed in Annex E (informative).

Annex A
(informative)

Allowable lifting methods for straight vertical lift

Table A.1 - Allowable lifting methods for straight vertical lift

Method	One crane	Two cranes
a) Cylindrical tank girded by synthetic webbing slings. Angle $\alpha \leq 30°$ Sling distance > 0,5 L	 **Key** 1 Rope 2 Synthetic webbing slings S Centre of gravity	
b) Cylindrical tank girded by synthetic webbing slings. Sling distance > 0,5 L	 **Key** 1 Crane 2 Lifting beam 3 Synthetic webbing sling S Centre of gravity	 **Key** 1 Crane 1 2 Crane 2 3 Synthetic webbing sling 4 Lifting beam optional S Centre of gravity