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Specification for glass fibre reinforced cisterns of one piece and sectional construction, for the storage, above ground, of cold water

Spezifikation für textilglasverstärkte Einkammer- oder Mehrkammertanks für die oberirdische Lagerung von Kaltwasser

Spécification pour citernes monoblocs et réservoirs compartimentés en PRV pour le stockage hors sol d'eau froide

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EUROPEAN STANDARD

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English version

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Kaltwasser

This European Standard was approved by CEN on 9 June 2001.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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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of an identical text or by endorsement, at the latest by February 2002, and conflicting national standards shall be withdrawn at the latest by February 2002.

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 European Standard specifies the requirements for rectangular and vertical cylindrical glass reinforced plastics (GRP) one piece cisterns and rectangular sectional tanks for the storage of water above ground for both domestic and industrial use within the following capacity ranges,

- a) one piece cistern 500 l to 100 000 l.
- b) sectional tank 500 l and larger

Particular requirements for additional components for cisterns for domestic use are also included.

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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 (including amendments).

EN 59	Glass reinforced plastics - Measurement of hardness by means of a Barcol impresser
EN 578	Plastics piping systems - Plastics pipes and fittings - Determination of the opacity
EN 10025:1993	Hot rolled products of non-alloy structural steels - Technical delivery conditions
EN 10088-3:1995	Stainless steels - Part 3: Technical delivery for semi finished products, bar, rod and sections for general purposes
prEN 13121-1:1998	GRP tanks and vessels for use above ground - Part 1: Raw materials - Acceptance conditions and usage conditions
EN ISO 2078	Textile glass - Yarns - Designation
ISO 75-3 : 1993	Plastics - Determination of temperature of deflection under load - Part 3: High strength thermosetting laminates and long-fibre-reinforced plastics
ISO 472	Polyester resin systems – Designation
ISO 1461	Metallic coatings - Hot dip galvanized coatings on fabricated ferrous products - Requirements
ISO 4759-1	Tolerances for fasteners - Part 1: Bolts, screws, studs and nuts - Product grades A, B and C

EN 13280:2001 (E)

ISO 8605 Textile glass reinforced plastics; sheet moulding compound (SMC); basis for a specification

3 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply.

**3.1
cistern****3.1.1****one piece cistern**

rectangular or vertical cylindrical fixed container for holding water at atmospheric pressure at a maximum temperature of 39 °C

3.1.2**sectional tank**

rectangular fixed container assembled from panels for the storage of water at atmospheric pressure at a maximum temperature of 39 °C. This temperature is higher than is acceptable for drinking water which has a maximum upper limit 25 °C as defined within the Drinking Water Directive, 80/778/EEC

3.2**water for domestic purposes**

water supplied for drinking, washing, cooking and sanitary purposes

3.3**feed and expansion cistern**

cistern for supplying cold water to and receiving expansion water from a hot water system

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3.4**primary expansion cistern**

cistern connected to a primary circuit of space heating or hot water heating system which accommodates the increase in volume of water in that system when it is heated from cold

3.5**secondary water heating system**

part of the hot water system comprising the cold feed pipe, any storage cistern, the water heater and flow and return pipework from which hot water for use is conveyed to all points of draw off

3.6**nominal capacity**

volume contained in the cistern, measured up to the top edge of the side walls

3.7**actual capacity**

volume contained in the cistern up to the maximum working level

3.8**top edge of tank**

top edge of the upper side panels or the lowest point of the cover, whichever is the lower

3.9**raised level inlet chamber**

enclosed chamber above the level of the cover incorporating an access lid or panel, permitting the level control mechanism or piped inlet to be mounted at a higher level than would otherwise be possible

3.10**maximum working depth**

depth of water to the lower edge of the overflow pipe or warning pipe, whichever is the lower

3.11**jointing sealant**

material used to effect a watertight seal between the modular panels of a sectional tank construction

3.12**vent pipe**

pipe open to the atmosphere and used in connection with a hot water system for the escape of air and/or steam

3.13**vent**

fitting on the cistern cover providing a protected opening to atmosphere to allow for the movement of air resulting from changes in the water level so that the water always remains at atmospheric pressure

3.14**warning pipe**

pipe so fixed that its outlet, whether inside or outside a building, is in a conspicuous position where the discharge of water can be readily seen

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3.15**overflow pipe**

pipe connected to the cistern to discharge any overflow therefrom

3.16**bracing system**

internal or external structure which provides support to the side walls, divisions, weirs and baffles of the cistern or tank

3.17**baffle**

internal wall within a cistern or tank, which partially subdivides the cistern or tank in order to increase the length of the flowpath between the inlet and the outlet of the cistern or tank

3.18**weir**

internal wall within a cistern or tank, which divides the cistern or tank but to less than its full depth such that the contents can spill over from one side of the weir to the other

3.19**division**

internal wall within a cistern or tank which divides the tank into watertight compartments

EN 13280:2001 (E)**3.20****tank base**

panel or panels, principally in the horizontal plane, which form the bottom of the sectional tank

3.21**foundation**

structure upon which the cistern or tank is constructed

3.22**rupture**

complete or catastrophic structural failure

3.23**cover**

rigid close-fitting cover secured to cistern or tank sides which excludes light and the ingress of particles and/or insects from the cistern or tank

3.24**test water line**

line at 100 mm below the top edge of the side walls of a one piece cistern

4 Designation**iTeh STANDARD PREVIEW**

Each one piece cistern or sectional tank shall be designated by a code with the following components, in the order presented.

- a) The number and date of this European Standard, i.e. EN 13280: 2001.
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- b) The capital letters GRP.
- c) The capital letters and numbers 'A1', 'A2' or 'B' where;

'A1' and 'A2' indicates class A one piece cisterns or sectional tanks, which are for use in potable water storage as one of the following;

- 1) a cold water storage one piece cistern or sectional tank;
- 2) a feed one piece cistern or sectional tank or a combined feed and expansion one piece cistern or sectional tank, supplying a secondary water heating system;
- 3) a combination of these;

'A1' indicates a class A one piece cistern or sectional tank, which is for use in potable water storage, and is supplied for use with the additional fittings specified in clause 9;

'A2' indicates a class A one piece cistern or sectional tank, which is for use in potable water storage and is supplied for use without the additional fittings specified in clause 9;

NOTE These fittings are required for use in potable water storage but in that case are supplied and fitted by other parties.

'B' indicates a class B one piece cistern or sectional tank which is for use in the storing of cold non-potable water as one of the following;

- 1) a cold non-potable water one piece cistern or sectional tank;

2) a combined feed and expansion one piece cistern or sectional tank to a primary circuit;

3) an expansion one piece cistern or sectional tank.

d) A number representing the nominal capacity in litres.

For example, a sectional tank of nominal capacity 20 000 l intended for use in potable water storage and supplied without the additional fittings specified in clause 9 would be designated as EN 13280 :2001/GRP/A2/20000

5 Materials

5.1 Resins

Polyester resin systems, where used, shall conform to ISO 472 and be selected from the resin types specified in prEN 13121-1:1998.

5.2 Fibrous reinforcement

The glass fibre reinforcement used shall be of type 'E' glass.

A type 'E' glass, comprising either an alumino-borosilicate glass or an alumino-calco-silicate glass, with or without other oxides, comprising mainly aluminium trioxide for enhanced corrosion resistance.

NOTE The description for 'E' glass is consistent with, but more specific than that given in EN ISO 2078.

The reinforcement shall be made from continuously drawn filaments of a glass conforming to the above description, and the filaments shall have a sizing compatible with the resin to be used. It may be used in any form free from longitudinal splitting, e.g. as continuous or chopped filaments, strands or rovings, mat or fabric.

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5.3 Sheet moulding compound

5.3.1 General

Sheet moulding compound (SMC) shall conform to the requirements of ISO 8605.

EN 13280:2001 (E)**5.3.2 Reinforcement**

The glass fibre reinforcement in the SMC shall contain 25 mm and/or 50 mm long 'E' glass strands, cut from glass fibre rovings conforming to the requirements given in EN ISO 2078.

Where required, additional glass reinforcement shall be used in the moulded part consisting of glass fibre woven fabrics or continuous filament mat conforming to EN ISO 2078.

5.4 Other materials**5.4.1 Aggregates**

Where required, inert granular materials of particle size between 5 mm and 0,05 mm shall be used as a design part of the structure, e.g. graded silica sands.

5.4.2 Inert fillers

Where required, an inert filler shall be used with a maximum partical size of 60 µm.

5.4.3 Additives

Where required, release agents, shrinkage control agents, pigment, curing agents, wetting agents, etc. shall be used as necessary to control those characteristics of the sheet-moulding compound necessary to achieve the requirements of the moulded panels.

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5.5 Metal bracing

Where a metal brace is supplied with the cistern or tank, it shall be corrosion resistant and free from sharp edges, sharp corners and surface projections.

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6 Appearance and configuration**6.1 Appearance and quality of finish of cisterns**

The internal surfaces of one piece cisterns and sectional tanks and their covers shall be free from such imperfections which may inhibit the cleaning of these internal surfaces.

6.2 Configuration of one piece cisterns and sectional tanks**6.2.1 One piece cisterns**

When a change in the direction of the cistern wall is necessary this shall be accomplished by the use of a radius of not less than 10 mm. Where the walls of the cistern are tapered, this taper shall not exceed 7 degrees from the vertical.

6.2.2 Sectional tanks

The tank shall consist of base and side plates, all constructed from flanged GRP panels with a jointing sealant between. The flanges of all panels may be internal or external as required.

6.2.2.1 Corners

The corners of a tank shall be formed by either:

- a) bolting side panels to each other; or
- b) bolting each side panel to a corner angle member.

In each case a jointing sealant shall be used.

6.3 Division plates

Where required, one piece cisterns and sectional tanks shall be subdivided into two or more compartments by the inclusion of a division plate constructed from GRP sheet or panels. Division plates shall be sealed leak tight and be capable of supporting water on either side to the maximum working depth.

6.4 Baffle and weir plates

One piece cisterns and sectional tanks shall be fitted with baffle plates and/or weir plates if required. They shall be constructed to withstand only the additional forces created by the water movement they are designed to induce, and in the case of weir plates, to withstand any additional force due to any imbalance in water pressure created by their use.

6.5 Access ladders

Where requested by the purchaser (see annex L), one piece cistern and sectional tanks of depths 1,5 m or more shall be provided with internal and external access ladders. Consideration for the requirements of external ladders shall take into account the height of the tank above floor level. All internal ladders shall be protected against corrosion.

NOTE There may be difficulties with the provision of safety hoops, should they be considered necessary, because of space limitations.

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6.6 Manholes or access hatches

A manhole or access hatch of at least 600 mm diameter or side dimension shall be provided in one piece cisterns and sectional tanks of capacities greater than 1 000 l and so designed to prevent the ingress of rain water, dust and vermin.

6.7 One piece cistern and sectional tank covers

Covers shall be fitted on all class 'A1' and 'A2' one piece cisterns and sectional tanks. Class 'B' one piece cisterns and sectional tanks shall be fitted with a cover when required by the purchaser (see 8.2).

In any event covers for class 'A1' and class 'A2' cisterns and tanks covers shall be rigid and close fitting, having a gap of less than 0,65 mm and be secured or mechanically fixed with an effective seal to ensure the exclusion of light and the ingress of particles and/or insects and where connections pass through the cover they shall be sealed.

All covers of greater plan area than 2 m² shall be capable of sustaining an imposed load of 0,6 kN/m² or 0,9 kN concentrated load, whichever produces the maximum deflection.

EN 13280:2001 (E)**6.8 Raised level control valve chambers**

Raised level control valve chambers shall be fitted when required by the purchaser and shall be designed so as to:

- a) withstand the forces imposed by the weight and operation of the valve;
- b) permit free and unrestrained movement of the float and arm where the valve is of this type;
- c) provide a seal at the junction of the cover to chamber.

NOTE It is recommended that an adequate means of access for control valve maintenance is provided (see 6.6) but of a size compatible with the raised level control valve chamber selected.

6.9 Venting

One piece cisterns and sectional tanks shall be fitted with either an air inlet or a breather (see 9.1).

NOTE The size of the vent is determined from the information provided by the purchaser (see annex L).

6.10 Fasteners

Fasteners used inside a cistern or tank shall be made from stainless steel in accordance with grade 1.4401 in EN 10088-3:1995.

The fasteners shall have dimensions in accordance with ISO 4759-1.

Fasteners used outside a tank shall be made from grade A, B and C bolts and nuts in accordance with ISO 4759-1 and protected from corrosion by galvanising in accordance with ISO 1461 or from stainless steel. Where the tank is situated within a building, external fasteners may be zinc plated.

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6.11 Bracing system

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Internal metallic bracing system members shall be manufactured from stainless steel in accordance with grade 1.4401 or other appropriate steel selected from Table 3 of EN 10088-3:1995. External structural supports shall be manufactured either from mild steel in accordance with S275JO of EN 10025:1993 encapsulated in GRP laminate or suitably protected from corrosion or galvanized in accordance with ISO 1461 or from stainless steel.

NOTE The design of bracing systems should minimise the possibility of bimetallic corrosion, e.g. where internal and external fittings are connected.

7 Requirements for one piece cisterns and sectional tanks**7.1 General performance requirements****7.1.1 Opacity**

The one piece cistern or sectional tank structure shall not transmit more than 0,2 % of the visible light incident on it, when tested by the method given in EN 578.