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**Cevni sistemi iz polimernih materialov za odpadno vodo – S steklenimi vlakni okrepljeni duromerni materiali (GRP), ki temeljijo na nenasičeni poliestrski smoli (UP) – Vstopni in revizijski jaški**

Plastics piping systems for drainage and sewerage - Glass-reinforced thermosetting plastics (GRP) based on polyester resin (UP) - Manholes and inspection chambers

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October 2005

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ICS

English Version

## Plastics piping systems for drainage and sewerage - Glass-reinforced thermosetting plastics (GRP) based on polyester resin (UP) - Manholes and inspection chambers

Systèmes de canalisations en plastiques pour les branchements et collecteurs d'assainissement - Plastiques thermodurcissables renforcés de verre (PRV) à base de résine de polyester (UP) - Regards et boîtes d'inspection et de branchement

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If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

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## Foreword

This document (prEN 15383:2005) has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

This document is currently submitted to the CEN Enquiry.

This European Standard is a System Standard for manholes and inspection chambers made of plastics piping systems using glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP), for drainage and sewerage. This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

This European Standard includes three informative and three normative annexes:

- ANNEX A: Guidance for the assessment of conformity (informative);
- ANNEX B: Test method for connections to sewer (normative);
- ANNEX C: Negative pressure test on units (normative);
- ANNEX D: Test method for gas-tightness of inspection chambers and manholes (informative);
- ANNEX E: Initial specific longitudinal compressive strength – test method (normative);
- ANNEX ZA: Clauses of this European Standard addressing the provisions of the EU Construction Products Directive (informative).

NOTE Separate ENV standard prCEN/TS 14632 [1], extended with annex A, covers the assessment of conformity.

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## Introduction

The performance of a sewerage network constructed with these products depends not only on the properties of the product as required by this standard but also on the design and construction of the network as a whole in relation to the environment and conditions of use.

## 1 Scope

This standard specifies the requirements for GRP-UP manholes and inspection chambers, with circular chamber and shaft sections, for use within a drain or sewer system under gravity or at low head of pressure, limited by non-pressure classification as defined in Clause 3.

This European standard covers components to be used in systems for the conveyance of one or more of the following fluids:

- domestic wastewater;
- surface water;
- other waste waters (e.g. trade effluent).

Products covered by this standard are either complete manholes and inspection chambers or individual units for the construction of manholes and inspection chambers, with an intended use in buried applications.

It specifies definitions, material specification and properties, types, characteristics, requirements, test methods, marking.

**NOTE** Complete manholes or prefabricated units can also be used for other purposes such as pumping stations, manholes for pipeline-equipment, backdrop manholes, ramp manholes, combined sewer overflow, storm water overflow, items of drainage, housings for waste water treatment systems, items for sewerage treatment or sewerage disposal, when corresponding additional requirements according to the relevant European Standards are fulfilled. If used in drinking water systems, the requirements of the relevant standards for products in contact with drinking water shall apply to the components in contact with drinking water.

## 2 Normative references

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The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 124:1994, *Gully tops and manhole tops for vehicular and pedestrian areas — Design requirements, type testing, marking, quality control.*

EN 295-1, *Vitrified clay pipes and fittings and pipe joints for drains and sewers — Part 1: Requirements.*

EN 476:1997, *General requirements for components used in discharge pipes, drains and sewers for gravity systems.*

EN 545, *Ductile iron pipes, fittings, accessories and their joints for water supply — Requirements and test methods.*

EN 598, *Ductile iron pipes, fittings, accessories and their joints for sewerage application — Requirements and test methods.*

EN 1119, *Plastics piping systems — Joints for glass-reinforced thermosetting plastics (GRP) pipes and fittings — Test methods for leak tightness and resistance to damage of flexible and reduced-articulation joints.*

EN 1120, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Determination of the resistance to chemical attack from the inside of a section in a deflected condition.*

EN 1228, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial specific ring stiffness.*

## prEN 15383:2005 (E)

EN 1394, *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of the apparent initial circumferential tensile strength.*

EN 1610:1997, *Construction and testing of drains and sewers.*

EN 1916, *Concrete pipes and fitting, unreinforced, steel fibre and reinforced.*

EN 1997:2002, *Concrete manholes and inspection chambers, unreinforced, steel fibre and reinforced.*

EN 13101, *Steps for underground man entry chambers — Requirements, marking, testing and evaluation of conformity.*

prEN 14364:2002, *Plastics piping systems for drainage and sewerage with or without pressure — Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP).*

EN 14396, *Fixed ladders for manholes.*

EN ISO 604, *Plastics — Determination of compressive properties (ISO 604:2002).*

EN ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions (ISO 3126:2005).*

EN ISO 14125, *Fibre-reinforced plastic composites — Determination of flexural properties (ISO 14125:1998).*

### 3 Terms and definitions

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For the purposes of this European standard, the following term, definitions and abbreviations apply.

#### 3.1 Manholes and inspection chambers

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##### 3.1.1

##### **manhole**

drainage and sewerage fitting which is used for connecting drainage or sewerage installations and/or for changing the direction and/or level of drainage/sewerage runs. A manhole terminates at ground level, which permits the introduction of cleaning, inspection and test equipment and the removal of debris and it provides access for personnel

##### 3.1.2

##### **inspection chamber**

drainage and sewerage fitting as a manhole, but it does not provide access for personnel

##### 3.1.3

##### **unit**

prefabricated structure, ready for assembling with other units on the construction site and forming the complete manhole or inspection chamber

##### 3.1.4

##### **component**

part of a unit and is always factory assembled to form the unit

##### 3.1.5

##### **fitting**

part of a drain or sewer system other than pipes



**3.1.6**

**closed access fitting**

manhole or inspection chamber that permits entry into the system for rodding or inspection and that has a sealed cover

**3.1.7**

**saddle**

fitting that enables a branch connection to be made in buried drainage/sewerage systems of larger diameter by cutting a hole in the pipe and is retained in position by lamination or glue

**3.1.8**

**rodding point**

component of an inspection chamber installed at ground level and fitted with a removable cover that permits the introduction of equipment for inspection and the clearance of blockages

**3.1.9**

**rodding tee**

component of an inspection chamber installed in a drainage or sewerage system that connects to a rodding point at ground level by means of a vertical shaft that permits the introduction of equipment for the clearance of blockages, and also equipment for the inspection of the connecting pipe work in one or more directions

**3.1.10**

**backdrop manhole**

manhole with a connection, by means of a vertical pipe, at or just above invert, from a drain or sewer at a higher level

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### 3.2 Prefabricated unit

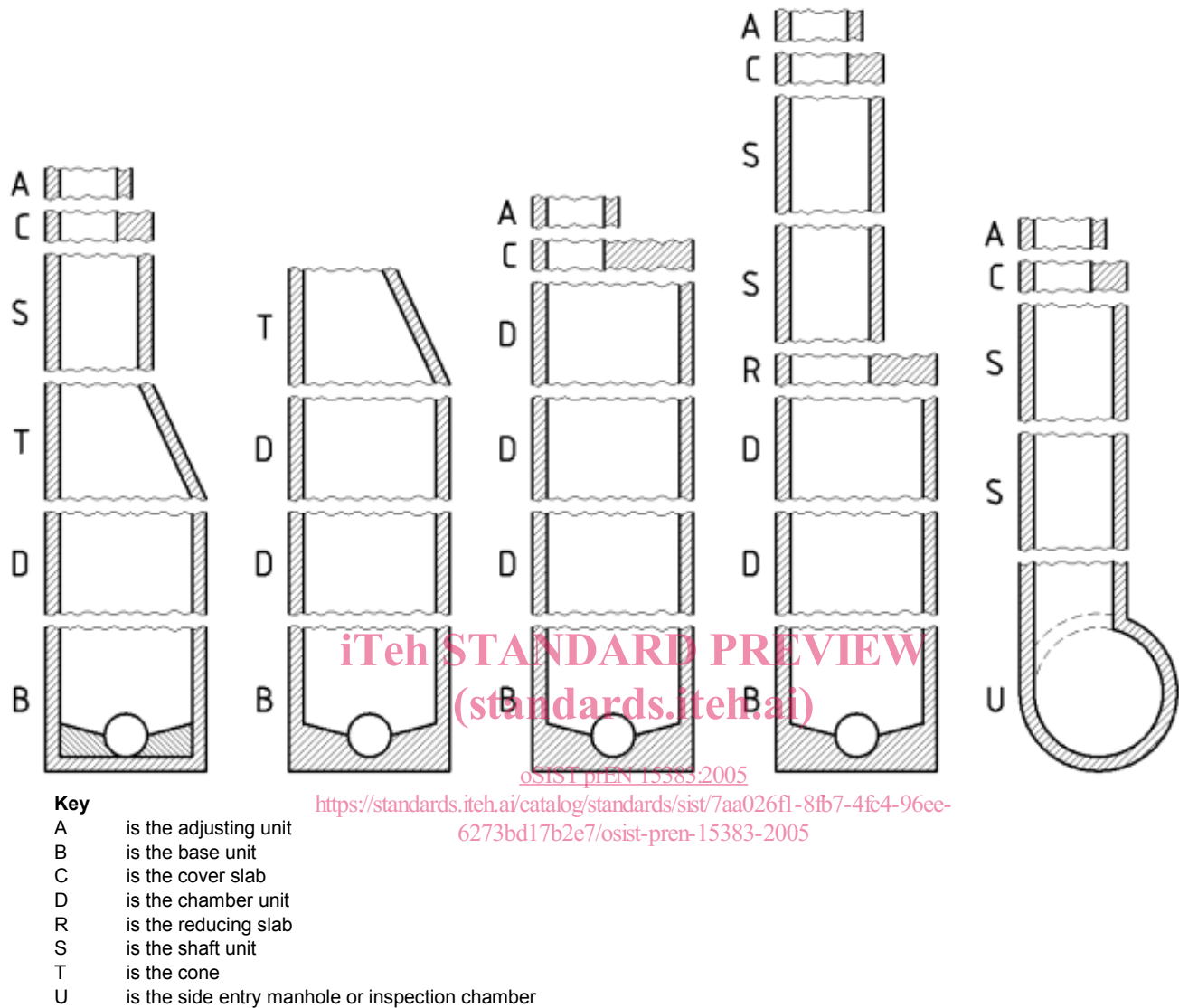


Figure 1 — Typical structures

#### 3.2.1 chamber

space with maximum diameter, inside a manhole or an inspection chamber, limited by base unit, the cover or reducing slab or cone and the chamber unit

#### 3.2.2 shaft

space above the chamber inside a manhole or an inspection chamber, with uniform diameter smaller than the chamber, limited by the cover slab or cone and the shaft unit

#### 3.2.3 base unit (see Figure 1 – unit B)

bottom section in a manhole, with or without benching, in which connections to the drain or sewer system, with or without changes in direction and/or level occur

**3.2.4****chamber unit** (see Figure 1 – unit D)

vertical hollow component of uniform cross-section. Flexible joints to accommodate connecting pipelines may be provided as for a base unit

**3.2.5****landing slab**

intermediate floor in the form of a slab built between the different ladders for reasons of safety and which has suitable means of connection the adjacent chamber units

**3.2.6****side entry manhole or inspection chamber** (see Figure 1 – unit U)

sewer pipe or fitting on which a centric or tangential saddle component is fixed for the connection to the chamber unit, shaft unit or to the capping structure

**3.2.7****shaft unit** (see Figure 1 – unit S)

section providing access to the chamber in deep manholes

**3.2.8****capping structure**

structure on top of base unit, chamber unit or shaft unit composed of:

- a manhole top, conforming to EN 124:1994 or with national safety regulations;
- adjusting unit (see Figure 1 – unit A), compatible with the cone or cover slab and with the manhole top and secured against horizontal displacement;
- a cone (see Figure 1 – unit T) or a cover slab (see Figure 1 – unit C), compatible with the base unit, chamber unit or shaft unit and secured against horizontal displacement

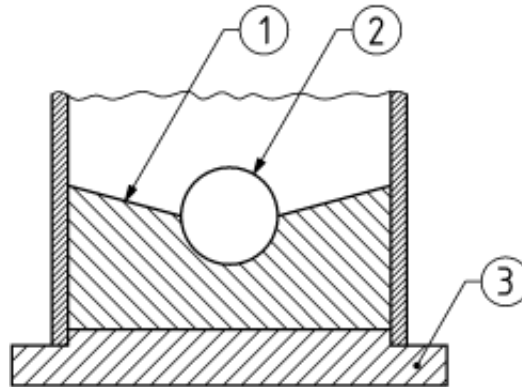
**3.2.9****reducing unit**

cone (see Figure 1 – unit T) or reducing slab (see Figure 1 – unit R).

**3.2.10****prefabricated complete manhole or inspection chamber**

manhole or inspection chamber assembled on the construction site, with all required units from bottom to cover slab, ready for fitting into the sewerage system. Jointing material between units shall be supplied by the manufacturer of prefabricated manhole or inspection chamber

### 3.3 Components of the base unit



- Key**
- 1 is the benching
  - 2 is the invert
  - 3 is the base slab

**Figure 2 — Base Unit**

**3.3.1 base slab** (see Figure 2 – item 1)  
component forming the bottom of the chamber

**3.3.2 invert** (see Figure 2 – item 2)  
lowest point of the internal surface of the benching in the base unit of the manhole and inspection chamber between sewer connections

**3.3.3 benching** (see Figure 2 – item 3)  
smooth surface forming the bottom of the base unit

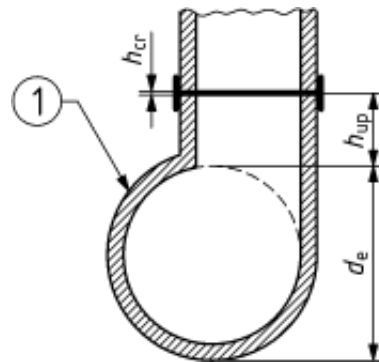
**3.3.4 connection to sewer** (see Figure 8)  
short length of pipe or a joint fitting, ready to connect sewer pipes and which is securely fixed into the wall of a chamber or the shaft unit

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### 3.4 Component of the side entry manhole or inspection chamber



**Key**

- 4 is the saddle element  
 $d_e$  is the external diameter (see 3.7.1)  
 $h_{up}$  is the height of saddle element, expressed in millimetre (mm)  
 $h_{cr}$  is the effective height of connecting ring, expressed in millimetre (mm)

**Figure 3 — Side entry manhole or inspection chamber**

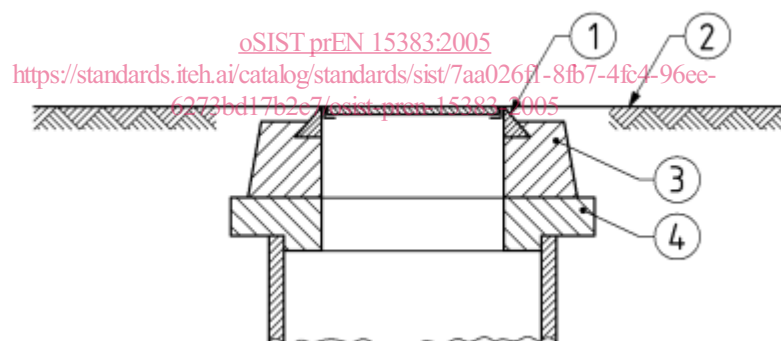
#### 3.4.1

**saddle element** (see Figure 3 – item 4)

piece of chamber, shaft or a coupling, fixed on the pipe, and making the connection with the chamber unit or shaft unit

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### 3.5 Units forming the capping structure



**Key:**

- G.L. is the ground level  
 5 is the adjusting unit  
 6 is the manhole top  
 7 is the cover slab

**Figure 4 — Capping structure**

#### 3.5.1

**adjusting unit** (see Figure 4 – item 5)

component situated above the cover slab, without a joint or installed step, to adjust the total height of a structure and/or to accommodate an appropriate frame and cover

#### 3.5.2

**manhole top** (see Figure 4 – item 6)

part of a manhole and inspection chamber, consisting of a frame and a cover and/or a grating. It provides a load bearing closure to a manhole

### 3.5.2.1

#### **cover**

movable part(s) of a manhole-top which cover(s) the manhole or inspection chamber

### 3.5.2.2

#### **grating**

movable part(s) of a manhole-top which permits the passage of water through itself to the manhole or inspection chamber

### 3.5.2.3

#### **frame**

fixed part of a manhole-top, which receives and supports a grating and/or a cover

## 3.6 Slabs and other elements used as reducing unit

### 3.6.1

#### **reducing slab** (see Figure 1 – unit R)

unit that provides a connection between the chamber unit and shaft unit with an opening for access and suitable means of connection to the adjacent units. The opening is located eccentrically or concentrically

### 3.6.2

#### **cover slab** (see Figure 1 – unit C and Figure 4 – item 7)

unit forming the horizontal roof of a manhole or inspection chamber, having an access opening, situated immediately under the manhole-top or adjusting ring, and having suitable means of connection to the adjacent units. The opening is located eccentrically or concentrically

### 3.6.3

#### **load-transmitting slab** (see Figure 14)

slab that transmits the traffic and other superimposed loads, applied on the slab, to the load bearing chamber. This slab is usual designed as a cover slab

### 3.6.4

#### **load-distributing slab** (see Figure 15, Figure 16 and Figure 17)

slab that distributes the traffic and other superimposed loads, applied to the slab, to the surrounding soil thereby avoiding loading the shaft unit or chamber unit

### 3.6.5

#### **cone** (see Figure 1 – item T)

shaft ring with variable section. It forms the sloping roof of a circular base unit or shaft unit, thereby reducing this unit to the size of the shaft unit or the shaft neck. It can be eccentric or concentric. Such unit shall be provided with appropriate means for connection to the adjoining units

### 3.6.6

#### **shaft neck**

cylindrical part connected on the upper part of a cone

## 3.7 Sizes and nominal values

### 3.7.1

#### **external diameter**

$d_e$

mean external diameter of the pipe barrel at any cross section, expressed in millimetres (mm)

### 3.7.2

#### **internal diameter**

$d_i$   
external diameter minus twice the wall thickness [see equation (1)], expressed in millimetres (mm)

$$d_i = d_e - 2 \times e \quad \dots(1)$$

where:

$d_e$  is the external diameter, expressed in millimetres (mm);

$e$  is the wall thickness of the pipe, expressed in millimetres (mm)

### 3.7.3

#### nominal size

##### DN

alphanumeric designation of size of component, which is a convenient integer approximately equal to a manufacturing dimension in mm. This can apply to either the internal diameter (DN/ID) or the external diameter (DN/OD), when expressed in millimetres

NOTE The designation for reference or marking purposes consists of the letters DN plus a number.

### 3.7.4

#### nominal stiffness

##### SN

alphanumeric designation for stiffness classification purposes, which has the same numerical value as the minimum initial specific ring stiffness value required as determined in prEN 14364:2002, when expressed in newtons per square meter (N/m<sup>2</sup>)

NOTE The designation for reference or marking purposes consists of the letters SN plus a number.

### 3.7.5

#### nominal pressure

##### PN

alphanumeric designation for pressure classification purposes, which has a numerical value equal to the resistance of a component of a piping system to internal pressure, when expressed in bars

NOTE The designation for reference or marking purposes consists of the letters PN plus a number.

## 3.8 Performance

### 3.8.1

#### pedestrian area

area reserved for pedestrians and only occasionally open to vehicular traffic for delivery, cleaning purposes or in emergency

### 3.8.2

#### pedestrian street

area where vehicular traffic is prohibited during certain periods (e.g. pedestrian areas during business hours and vehicular traffic outside these hours)

### 3.8.3

#### traffic area

carriageways or roads (including pedestrian streets), kerbside channels, hard shoulders, parking decks and parking areas, for all types of road vehicles according to Group 2, Group 3 and Group 4 of Clause 6

### 3.8.4

#### load bearing chamber

chamber that sustains to the required traffic-loads