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Institut luxembourgeois de la normalisation
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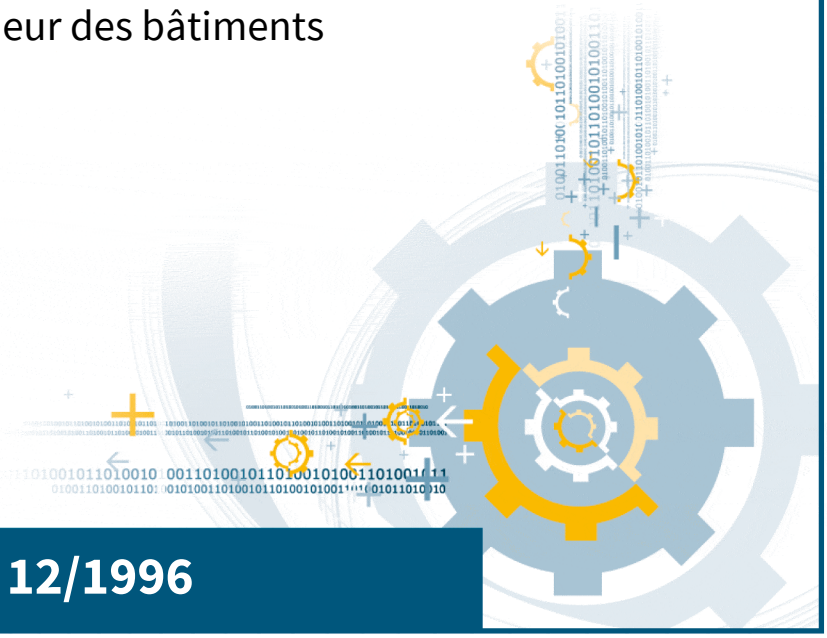
# ILNAS-EN 1091:1996

## Vacuum sewerage systems outside buildings

Unterdruckentwässerungssysteme
ausserhalb von Gebäuden

Réseaux d'assainissement sous vide à
l'extérieur des bâtiments



12/1996

**National Foreword**

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English version

# Vacuum sewerage systems outside buildings

Réseaux d'assainissement sous vide à l'extérieur des bâtiments

Unterdruckentwässerungssysteme außerhalb von Gebäuden



This European Standard was approved by CEN on 1996-11-30. 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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**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 165 "Waste Water Engineering", 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of an identical text or by endorsement, at the latest by June 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

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



## INTRODUCTION

This European Standard has been prepared for specifiers, designers, constructors and operators of vacuum sewerage systems. This European Standard covers vacuum sewerage systems transporting domestic sewage but not rainwater.

## 1 SCOPE

This European Standard specifies the performance requirements of negative pressure driven sewerage systems carrying domestic waste water independent of their material. It also covers additional performance characteristics that are of importance to the specifiers, designers, constructors and operators of vacuum sewerage systems.

It does not provide for the evaluation of conformity of systems.

This European Standard gives guidance on the design and construction of vacuum sewerage systems which convey domestic waste water but not rainwater. It does not deal with internal vacuum drainage systems. The components of the system should be evaluated by reference to the appropriate product standard. In the absence of a product standard, this standard may be used as a reference for drawing up a product specification.

The design requirements of this European Standard are minimum requirements and do not constitute in themselves a comprehensive design guide sufficient to ensure a correctly functioning system. Every system must be individually designed, based on the design parameters of the system employed; where proprietary systems are employed, account should be taken of the advice of the system suppliers.



## 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.

| | |
|---|---|
| EN 752-2 | Drain and sewer systems outside buildings - Requirements |
| prEN 805 | Water supply - Requirements for systems and components outside buildings |
| prEN 1293 | General requirements for components used in pneumatically pressurised discharge pipes, drains and sewers |

## 3 DEFINITIONS

For the purpose of this standard the following definitions apply.

### 3.1 batch volume
Volume of the sump up to the level at which the level sensor activates the controller.

### 3.2 collection chamber
Collection sump and interface valve pit.

**3.3 collection sump**
Sump provided to store flows of domestic waste water until sufficient has been accumulated to activate the interface valve.

**3.4 controller**
Device which, when activated by the level sensor, opens the interface valve and, after the passage of sewage and air, closes the valve.

**3.5 forwarding pumps**
Devices, installed at the vacuum station to deliver the sewage from the vacuum system.

**3.6 interface valve**
Valve which admits the flow of sewage and air into the vacuum sewer via the service connection.

**3.7 level sensor**
Device which senses the presence of sewage in the collection sump and activates the valve controller when a batch volume has collected in the sump.

**3.8 lift**
Section of vacuum pipeline with an increase in invert level in the direction of flow.

**3.9 pipeline profile**
Vertical alignment of the vacuum pipeline.

**3.10 service connection**
Part of the vacuum pipeline which connects a single collection chamber to the vacuum sewer.

**3.11 vacuum generator**
Equipment installed at the vacuum station to generate a vacuum in the sewer.

**3.12 vacuum pipeline**
Pipeline under negative pressure.

**3.13 vacuum recovery time**
Time taken, after the operation of an interface valve, for the negative pressure at the valve to be restored to a value sufficient to operate the valve again.

**3.14 vacuum sewer**
Part of the vacuum pipeline into which the service connections feed.

**3.15 vacuum station**
Installation comprising the vacuum generators, vacuum vessel (or sewage sump), means of discharge and control equipment.

**3.16 vacuum vessel**
Negative pressure vessel connected to the vacuum generator and vacuum sewer.

**3.17 water-logging**
Accumulation of wastewater at low points which fills the cross section of the vacuum pipeline.

## 4 DESCRIPTION OF THE SYSTEM

### 4.1 Collection Chamber and Vacuum Pipeline

When the volume of domestic waste water draining into a collection chamber reaches a predetermined level in the sump the normally closed interface valve opens. The differential pressure between the vacuum sewer and atmosphere forces the waste water from the collection chamber into the sewer. After the sump is emptied the valve closes. Air is admitted simultaneously with, or after, the admittance of the waste water. The waste water is driven along the sewer until frictional and gravitational forces eventually bring it to rest in the lower section of the pipe profiles. The characteristics of the vacuum sewerage system ensure that peak discharges into the sewer are rapidly attenuated. The vacuum sewer discharges into the vacuum vessel or sewage sump at the vacuum station. The vacuum is maintained, by a vacuum generator, at a predetermined level. The waste water is generally pumped from the vacuum station by forwarding pumps.

### 4.2 Vacuum Station

The vacuum station is similar to a conventional sewage lift station with the addition of vacuum generators and a closed vacuum vessel or sewage sump. Vacuum sewers discharge into the vacuum vessel which is held under vacuum if vacuum pumps are employed, or into a sewage sump if the vacuum is generated by an ejector pump. The level of the sewage in the vacuum vessel is monitored by a level controller which activates the forwarding pumps or discharge valves. If the sewage rises too high in the vessel then a high level sensor stops and locks out the vacuum pumps to prevent the flow of sewage into the vacuum pump. The vacuum in the vacuum vessel is maintained within the operational range by pressure switches.

## 5 REQUIREMENTS

### 5.1 General Requirements

The system shall convey domestic sewage from the household drainage system to the vacuum station and forward it downstream and meet the following performance requirements:

a) the interface valve and pipework shall operate without blocking;