

DIN EN 12889
Trenchless Construction and Testing of
Drains and Sewers

and

DWA-A 125E
Pipe Jacking and Related Techniques

Mai 2009, corrected version September 2020

DINE EN 12889
Grabenlose Verlegung und Prüfung von
Abwasserleitungen und -kanälen

DWA-A 125
Rohrvortrieb und verwandte Verfahren

PREVIEW

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DWA-A 125

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Standard DWA-A 125 and DVGW Standard GW 304 (German version) are identical in content.



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Trenchless construction and testing of
drains and sewers
January 2000



DWA-A 125E
Pipe Jacking and Related Techniques
December 2008

The German Association for Water, Wastewater and Waste (DWA) is strongly committed to the development of secure and sustainable water and waste management. As a politically and economically independent organisation it is professionally active in the field of water management, wastewater, waste and soil protection.

In Europe DWA is the association with the largest number of members within this field. Therefore it takes on a unique position in connection with professional competence regarding standardisation, professional training and information. The approximately 14,000 members represent specialists and executives from municipalities, universities, engineering offices, authorities and companies.

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Introduction to the Joint Publication

The European Standard EN 12889 “Trenchless Construction and Testing of Drains and Sewers” was developed within the scope of harmonising the European rules and standards with the aim of reducing trade barriers.

With the publication of DIN EN 12889 in March 2000, the standard was awarded the status of a German standard. Thus, it represents the state of technology for trenchless installation and testing of new drains and sewers with pre-fabricated pipes and their connections.

Standard DWA-A 125E “Pipe jacking and related techniques” deals with the underground installation of pre-fabricated pipes with different geometry of the cross-section. During the installation, a cavity is created in the ground by displacing, ramming, drilling, pressing or other installation. The pipes are either pulled, pushed or pressed into this cavity, or existing sewers or pipelines are passed and/or replaced.

DIN EN 12889 and Standard DWA-A 125E do not exclude each other and they do not regulate the same facts in different ways either.

For enhanced handling and legibility, this joint publication provides the reader with both texts – DIN EN 12889 and Standard DWA-A 125E – in a clearly structured way.

For enhanced legibility, the texts have been synoptically summarised in sections. The text taken from DIN EN 12889 is highlighted white. The supplementary information and recommendations contained in Standard DWA-A 125E succeed the text taken from DIN EN and are highlighted grey.

National Foreword (DIN EN 12889)

This European standard was elaborated by the Technical Committee TC 165 “Waste water engineering” (German office) of the European Committee for Standardization (CEN).

The work was conducted by the “Installation of buried pipes for gravity drain and sewer systems” working group (WG 10) of CEN/TC 165. Task force V 34 “Installation of buried pipes for gravity drain and sewer systems” (CEN/TC 165/WG 10/CEN/TC 164/TC 165/JWG 1) of the “Water supply” (NAW) was involved in the work for Germany.

EN 12889 “Trenchless Construction and Testing of Drains and Sewers; German version 12889: 2000” is the first European standard that deals with trenchless installation of drains and sewers as a supplement to the common open-cut method of construction according to EN 1610. Standard ATV-A 125E “Pipe driving”, September 1986 edition (identical with DVGW Advisory Leaflet 304 “Pipe jacking”), which was elaborated by the joint ATV-DVWK working group 1.5.3 “Trenchless construction methods” and introduced in European committees by the AA V 34 “Installation of buried pipes for gravity drain and sewer systems” task force of NAW in cooperation with working group 1.5.3, provided the fundamental basis for elaborating this European standard, which has now been included as national standard DIN EN 12889 in the German DIN set of standards. However, it was not possible to consolidate the areas of water supply, wastewater discharge and gas supply in one European standard on “trenchless installation of pipelines” at the level of European standards as regulated by A 125/GW 304.

DIN EN 12889 and ATV-A 125E and/or DVGW GW 304 do not exclude each other and they do not regulate the same facts in different ways either. Yet, in many aspects, A 125E/GW 304 contains details that are not yet dealt with and covered by this first version of the European standard. Therefore, both technical regulations supplement each other.

Later revisions of A 125E/GW 304 and/or DIN EN 12889 reserve the right to amend technical contents or edit the text and to consider other European standards and further requirements.

Owing to the current situation and by taking the positive practical experience into account, which has been gained with A 125E/GW 304, it is essential to also consider ATV Standard A 125E and/or DVGW Advisory Leaflet GW 304 when working with DIN EN 12889.

Introduction

English version

Trenchless Construction and Testing of Drains and Sewers

Mise en oeuvre sans tranchée et essai des branchements et collecteurs d'assainissement

Grabenlose Verlegung und Prüfung von Abwasserleitungen und -kanälen

This European Standard was approved by CEN on 15 November 1999.

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. 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.

This European Standard exists 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.

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 July 2000, and conflicting national standards shall be withdrawn at the latest by July 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following This European Standard has 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.

Annex A is informative.

Since the publication of the previous version of this Standard, there have been numerous technical developments. To a large extent, the structure of this Standard was adapted to DIN EN 12889 "Trenchless construction and testing of drains and sewers". On this note, Clause 6 takes additional techniques relating to pipe jacking into account.

Neither do this Standard and DIN EN 12889 exclude each other, nor do they regulate the same facts in different ways. However, this Standard contains details in many aspects that the European Standard does not yet deal with at this point.

Standards DVGW GW 304 and DWA-A 125 are identical. Technical developments may cause changes, especially in the numerical values given here. The state of the technology shall be taken into consideration.

The presented process engineering and empirical data were taken from current practice. The empirical data may be exceeded under unbeneficial circumstances.

In technically founded individual cases, it can be deviated from the regulations of the Standard – with the agreement of the institution responsible.

Note:

This publication contains DIN EN 12889 and Standard DWA-A 125E respectively in the original [English] text. The passages of text originating from Standard DWA-A 125E have a grey background.

Authors

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Terms of Clause 3 in alphabetical order

For the purposes of this European Standard the following definitions apply:

3.1 Cutting Head

Tool or system of tools on a common support, which excavates at the face of a bore. The term usually applies to mechanical methods of excavation.

3.2 Expander

A tool which enlarges a bore by displacement of the surrounding ground rather than by excavation.

Abrasiveness

Property of rock causing wear on the drilling tools during drilling.

Blowouts

Release of compressed air or supporting fluid at the ground surface or into a body of water with a large or complete loss of pressure.

CAI

CERCHAR Abrasiveness Index: Rock abrasiveness determined through laboratory tests according to: The Cerchar Abrasivity Index – Plan; Centre d'Etudes et Recherches de Charbonnages de France; Verneuil, 1986.

Construction Prohibition Strip

Protected zone in which the construction of buildings is prohibited. Furthermore, constructions that are to be connected directly or indirectly to national trunk roads via approaches or accesses are subject to the extension prohibition (see Bundesfernstraßengesetz [Federal German Trunk Road Law])

External Diameter

Mean external diameter of the pipe barrel at any cross-section (see DIN EN 14457 and DIN EN 476).

Gradient

The degree of slope of the longitudinal vertical profile (see DIN 18709-2).

Gravity pipeline

Pipeline where flow is caused by the force of gravity and where the pipeline is designed normally to operate partially full.

Internal Diameter

Mean internal diameter of the pipe barrel at any cross section (see DIN EN 14457).

Joint Closure

Constructive measure taken to prevent dirt and foreign substances from entering the joint; no sealing function.

Layout of the Line

Definition of a line in the form of a sequence of line elements (e.g. straight, circle, clothoid, gradient) (see DIN 18709-2).

Line

Horizontal alignment of tunnel or pipejack. (see DIN 18709-2)

Manned technique

Technique involving the use of personnel working in the excavated bore during installation.

Liquefaction

Liquefaction of the soil; complete loss of shear strength as a consequence of dynamic loading.

Overbreak

The extent by which the excavated void including accidental ground losses initially exceeds the outside dimension of the pipe.

Overcut

The annular space around the pipe deliberately created by using a cutting head or shield of greater dimension than the outside dimension of the pipe.

Overcut

Half of the difference of borehole diameter and external pipe diameter (ideally, an even annular space around the pipeline).

Pipe jacking

A system of directly installing pipes behind a cutting head and/or shield, by hydraulic jacking from a drive shaft, such that the pipes form a string in the ground.

Pipe Length

Length of the internal pipe barrel (see DIN EN 14457).

Reamer

A cutting head attached to the end of a drill string or pilot rod to enlarge the pilot diameter during a pull-back or pushing operation, to enable a pipe or pipes to be installed.

Relevant Authority

Organisation with appropriate statutory powers of control (see DIN EN 752).

Renovation

Work incorporating all or part of the original fabric of the pipeline by means of which its current performance is improved (EN 752-5: 1997).

Replacement

Construction of a new drain or sewer, on or off the line of an existing drain or sewer, the function of the new drain or sewer incorporating that of the old (EN 752-5: 1997).

RQD-Index

Rock Quality Designation: Property used to describe rock; designates given rock quality based on the length of the drilling cores recovered (in accordance with ASTM D6032-02).

Shield Cradle

Bearing construction in the starting pit to support the machine and pipes.

Spoil

Material excavated and removed in the course of installation.

Sticking Potential

Tendency of clayey soils to stick or adhere, e.g. to the excavation tools of jacking stations.

Subsoil

Soil and/or rock including all substances (e.g. groundwater and contaminations), which serves as a foundation or bedding for structures or which is otherwise affected by construction work (see DIN 4020).

Trenchless construction technique

Any technique for constructing pipelines in the ground without opening trenches.

Pressure Transfer Ring

Component to transfer longitudinal forces between the end faces of the jacking pipes during installation.

Pressure Distribution Ring

Component used to distribute and evenly transfer the forces of the jacking cylinders to the end face of the jacking pipes.

Unmanned technique

Technique avoiding the use of personnel working in the excavated bore during installation.

Weathering Level

Present condition of a rock and/or rock mass as a consequence of the weathering process (in accordance with FGSV 543).

Work Face

Location of where the subsoil is excavated in pipe jacking.

PREVIEW

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PREVIEW

User Notes

This Standard is the result of honorary, technical-scientific/economic collaboration which has been achieved in accordance with the principles applicable therefore (statutes, rules of procedure of the DWA and Standard DWA-A 400). For this, according to precedents, there exists an actual presumption that it is textually and technically correct and also generally recognised.

Application of this Standard is open to everyone. However, an obligation for its application can arise from legal or administrative regulations, a contract or other legal reasons.

This Standard is an important, however not the only source of information for correct solutions. With its application no one avoids responsibility for his own actions or for its correct application in specific cases; this applies in particular for correct use of margins described in this Standard.

1 Scope

This European Standard is applicable to the trenchless construction and testing of new drains and new sewers in the ground, which are normally operating as gravity pipelines, formed using prefabricated pipes and their joints. The trenchless construction and testing of drains and sewers operating under pressure is also covered by this European Standard together with prEN 805:1999 as appropriate.

This European Standard also applies to trenchless replacement techniques. Renovation techniques for existing sewers and drains are not covered by this European Standard.

Methods of trenchless construction include

- manned and unmanned techniques;
- steerable and non-steerable techniques.

NOTE 1: Mining or tunnelling (e.g. in situ construction or the use of prefabricated segments) are not covered by this European Standard although some parts may apply to these methods. Additional requirements apply for mining and tunnelling methods for the construction of drains and sewers.

Additionally other local or national regulations should be taken into account, e.g. concerning health and safety, pavement installation, tolerances for deviation in line and level and requirements for leaktightness testing.

NOTE 2: Requirements for associated pipeline installation work other than trenchless construction, e.g. for manholes and inspection chambers, are given in EN 1610 'Construction and testing of drains and sewers'.

This Standard deals with the underground installation of pre-fabricated pipes with different geometry of the cross-section. During the installation, a cavity is created in the ground by displacing, ramming, drilling, pressing or other excavation. The pipes are pulled, pushed or jacked into this cavity or into existing sewers or pipelines are relined and/or replaced.

For shield drives (e.g. segment lining, shotcrete), which are not described in the Standard, the Standard can be applied correspondingly. However, it does not apply to mining techniques.

This Standard does not apply to processes related to pipe jacking if the respective requirements are summarised in individual DVGW and/or DWA Standards or Advisory Leaflets. This exception does not apply to railway property, Federal German trunk roads or waterways.

If techniques related to pipe jacking are used for purposes other than public gas, water supply and/or wastewater disposal, it is recommended to apply the respective Standards and Advisory Leaflets as well.

Clause 9 only applies to drains and sewers. If water or gas pipelines are built under federal trunk roads, the technical regulations contained or specified in the licence agreement are applied.

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