



SLOVENSKI STANDARD
SIST EN 12716:2002
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Execution of special geotechnical works - Jet grouting

Ausführung von besonderen geotechnischen Arbeiten (Spezialtiefbau) -
Düsenstrahlverfahren (Hochdruckinjektion, Hochdruckbodenvermörtelung, Jetting)

Exécution des travaux géotechniques spéciaux - Colonnes, panneaux et structures de
sol-ciment réalisés par jet

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Ta slovenski standard je istoveten z: **EN 12716:2001**
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ICS:

93.020	Zemeljska dela. Izkopavanja.	Earthworks. Excavations.
	Gradnja temeljev. Dela pod	Foundation construction.
	zemljo	Underground works

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ICS 93.020

English version

Execution of special geotechnical works - Jet grouting

Exécution des travaux géotechniques spéciaux - Colonnes,
panneaux et structures de sol-ciment réalisés par jet

Ausführung von besonderen geotechnischen Arbeiten
(Spezialtiefbau) - Düsenstrahlverfahren
(Hochdruckinjektion, Hochdruckbodenvermörtelung,
Jetting)

This European Standard was approved by CEN on 16 April 2001.

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 Management Centre 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 Management Centre 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.

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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 European Standard has been prepared by Technical Committee CEN /TC 288, "Execution of special geotechnical works", the secretariat of which is held by AFNOR.

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 November 2001, and conflicting national standards shall be withdrawn at the latest by November 2001.

Annex A is normative, and the annexes B, C, D and E are informative.

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.

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1 Scope

This Standard is applicable to the execution, testing and monitoring of jet grouting works. Design considerations, strictly related to jet grouting works only, are given in clause 7. More general requirements that could be included in, or substituted by clauses of future editions of Eurocode 7 are listed in Annex A.

NOTE The jet grouting processes should be distinguished from the grouting processes covered by EN 12715.

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).

ENV 197-1:1992, *Cement - Composition, specifications and conformity criteria - Part 1: Common cements*

prEN 1008:1997, *Mixing water for concrete - Specification for sampling, testing and assessing the suitability of water, including wash water from recycling installations in the concrete industry, as mixing water for concrete*

ENV 1992-1-1:1991, *Eurocode 2: Design of concrete structures - Part 1: General rules and rules for buildings*

ENV 1997-1:1994, *Eurocode 7: Geotechnical design - Part 1: General rules*

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3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply:
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3.1 jet grouting

the jet grouting process consists of the disaggregation of the soil or weak rock and its mixing with, and partial replacement by, a cementing agent; the disaggregation is achieved by means of a high energy jet of a fluid which can be the cementing agent itself

3.2 jet grouted element

a volume of soil treated through a single borehole. The most common elements are :

- jet grouted column : a cylindrical jet grouted element (Fig.1 a) ;
- jet grouted panel : a planar jet grouted element (Fig.1 b).

3.3 jet grouted structure

an assembly of jet grouted elements which are partially or fully interlocked. The most common structures formed are :

- jet grouted diaphragm : a wall structure (Fig.2 a) ;
- jet grouted slab : a horizontal structure formed by essentially vertical jet grouting (Fig.2 b) ;
- jet grouted canopy : a structure formed by horizontal jet grouting – see 3.8 below (Fig.2 c) ;
- jet grouted block : a three-dimensional structure.

3.4
single system

the jet grouting process in which the disaggregation and cementation of soil are achieved by a high energy jet of a single fluid, usually a cement grout (Fig.3 a)

3.5
double (air) system

the jet grouting process in which the disaggregation and the cementation of soil are achieved by one high energy fluid (usually a cement grout) assisted by an air jet shroud as a second fluid (Fig.3 b)

3.6
double (water) system

the jet grouting process in which the disaggregation of the soil is achieved by a high energy water jet and its cementing is simultaneously obtained by a separate grout jet (Fig.3 c)

3.7
triple system

the jet grouting process in which the disaggregation of the soil is achieved by a high energy water jet assisted by an air jet shroud, and its cementing is simultaneously obtained by a separate grout jet (Fig.3 d)

NOTE In special cases the water can be substituted for other appropriate liquids or suspensions.

3.8
horizontal jet grouting

treatment performed from a horizontal or sub-horizontal borehole (within $\pm 20^\circ$ from the horizontal plane)

3.9
jet grouting rig

rotary rig able to automatically regulate the rotation and translation of the jet grouting string and tool

3.10
jet grouting string

jointed rods, with simple, double or triple inner conduit, which convey the jet grouting fluid(s) to the monitor

3.11
monitor

the tool mounted at the end of the jet grouting string, to enable jetting of the fluids into the ground

3.12
nozzle

a specially manufactured device fitted into the monitor and designed to transform the high pressure fluid flow in the string into the high speed jet directed at the soil

3.13
radius of influence

effective distance of disaggregation of soil by the jet, measured from the axis of the monitor

3.14
spoil return

the surplus mixture of soil particles and introduced fluids arising from the jet grouting process, and normally flowing to the ground surface via the annulus of the jetting borehole

3.15
jet grouting parameters

the jet grouting parameters are defined :

- pressure of the fluid(s) within the jet grouting string ;
- flow rate of the fluid(s) within the jet grouting string ;
- grout composition ;
- rotation speed of the jet grouting string ;

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double or triple inner conduit, which convey the jet grouting fluid(s) to the monitor
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— rate of withdrawal or insertion of the jet grouting string.

**3.16
prejetting**

the method in which the jet grouting of an element is facilitated by a preliminary disaggregation phase, with a jet of water and/or other fluids

NOTE Prejetting is also widely known as prewashing or precutting.

**3.17
fresh-in-fresh sequence**

the sequence of work in which the jet grouted elements are constructed successively without waiting for the grout to harden in the overlapping elements (Fig.4 a)

**3.18
primary-secondary sequence**

the sequence of work in which the execution of an overlapping element cannot commence before a specified hardening time or achievement of predetermined strength of the adjacent elements previously constructed (Fig.4 b)

**3.19
jet grouted material**

the material which constitutes the body of a jet grouted element

**3.20
reinforced jet grouting**

jet grouted columns reinforced by steel or other high strength material

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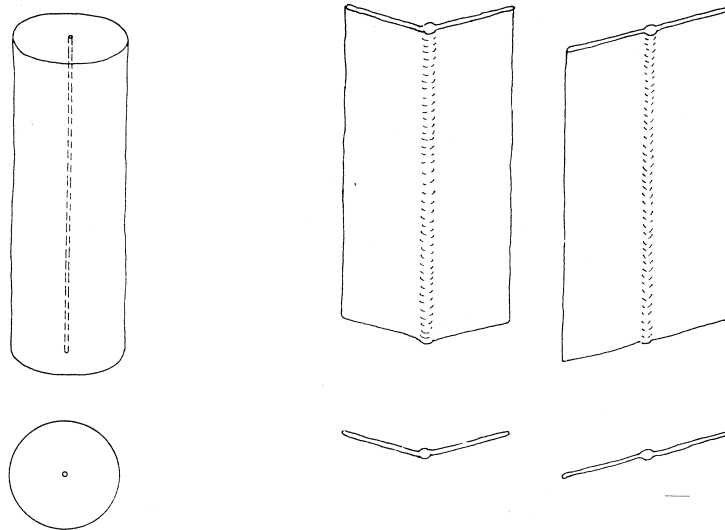


Figure 1 a) — Jet grouted column

Figure 1 b) — Jet grouted panel

Figure 1 — Examples of jet grouted elements
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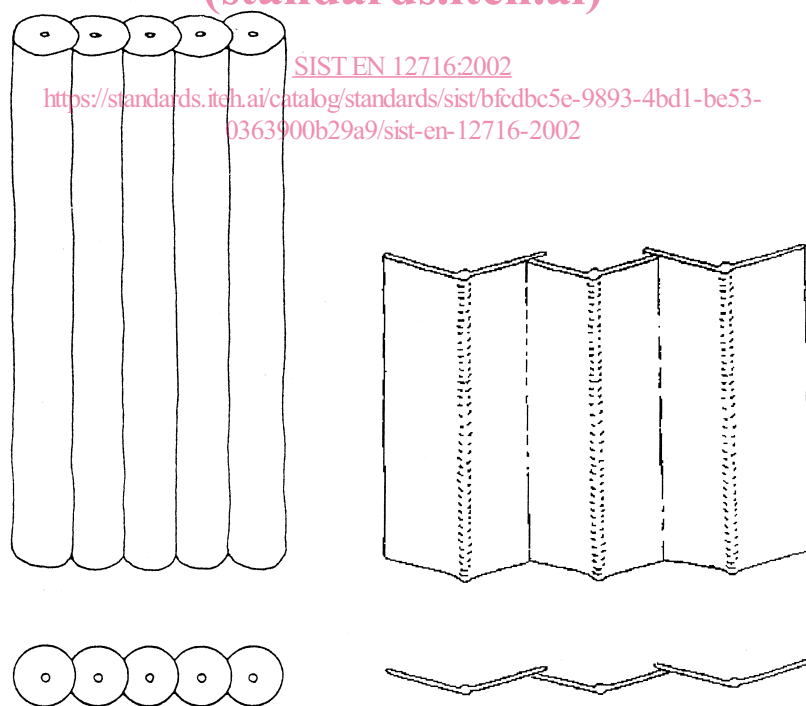
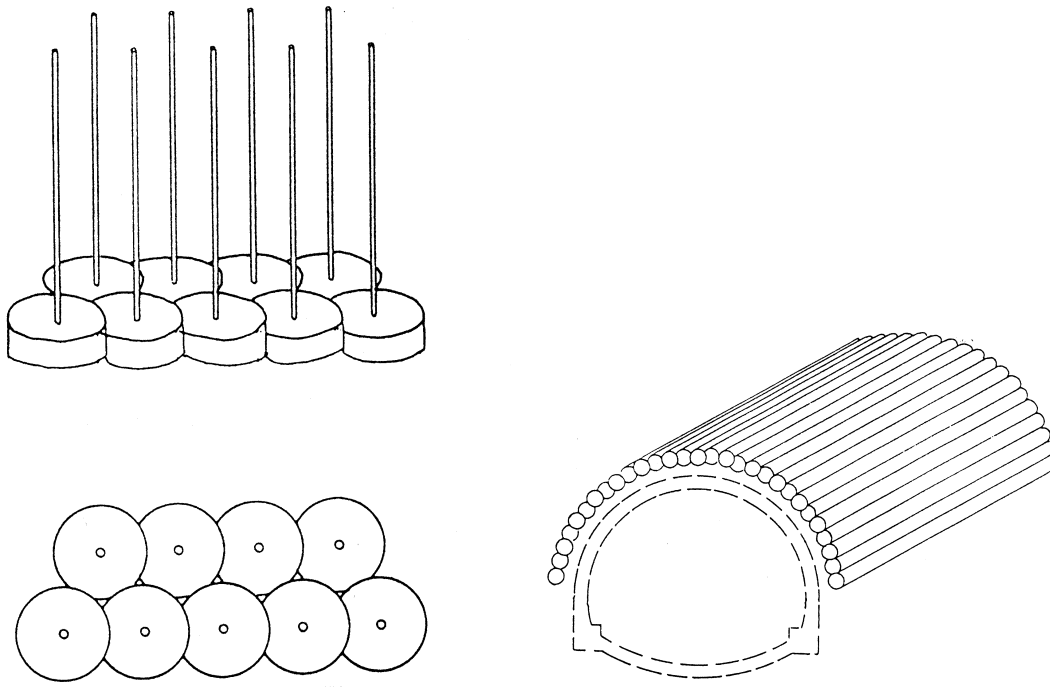


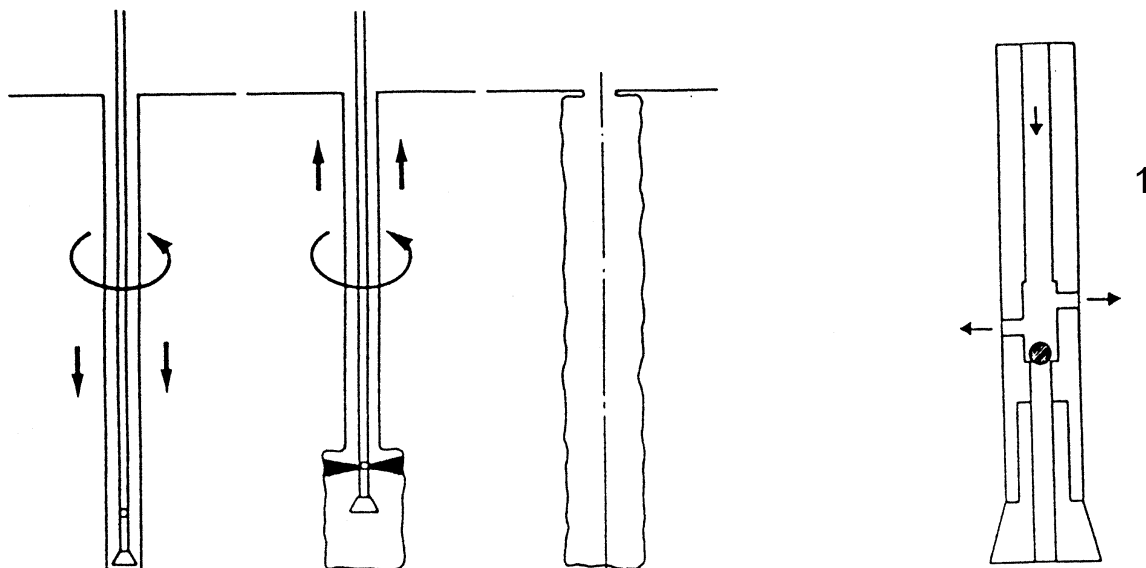
Figure 2 a) — Jet grouted diaphragms



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Figure 2 b) — Jet grouted slab (standards.iteh.ai) Figure 2 c) — Jet grouted canopy

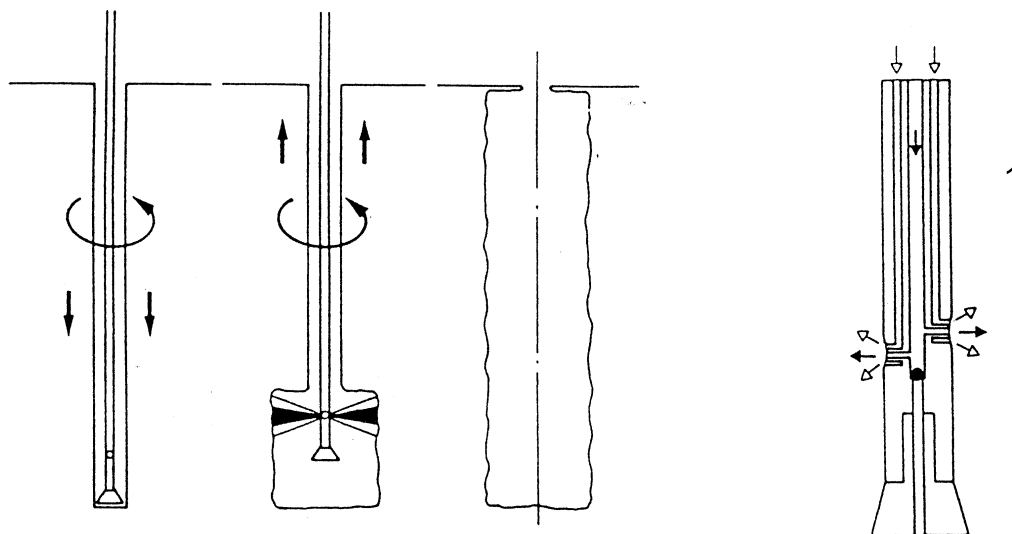
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Figure 2 — Examples of jet grouted structures
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Key

1 Monitor

Figure 3 a) — Single system



Key

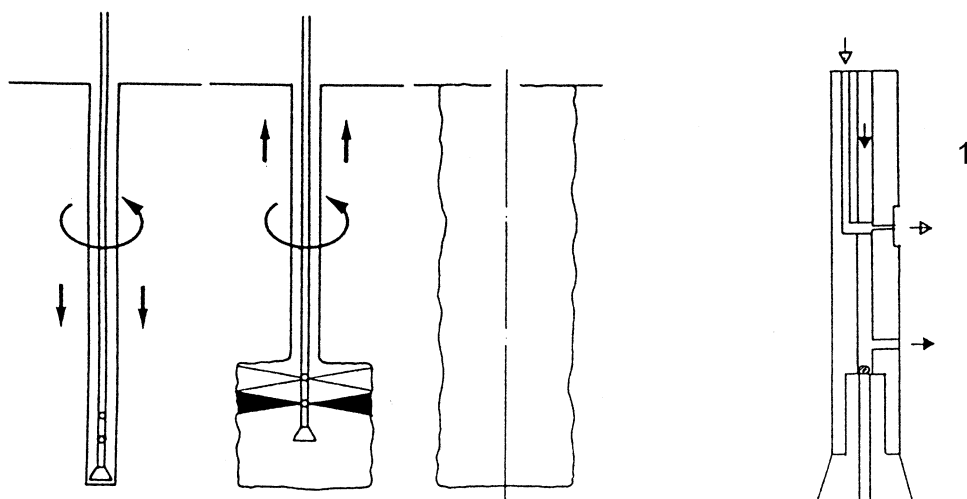
1 Monitor

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Figure 3 b) — Double (air) system

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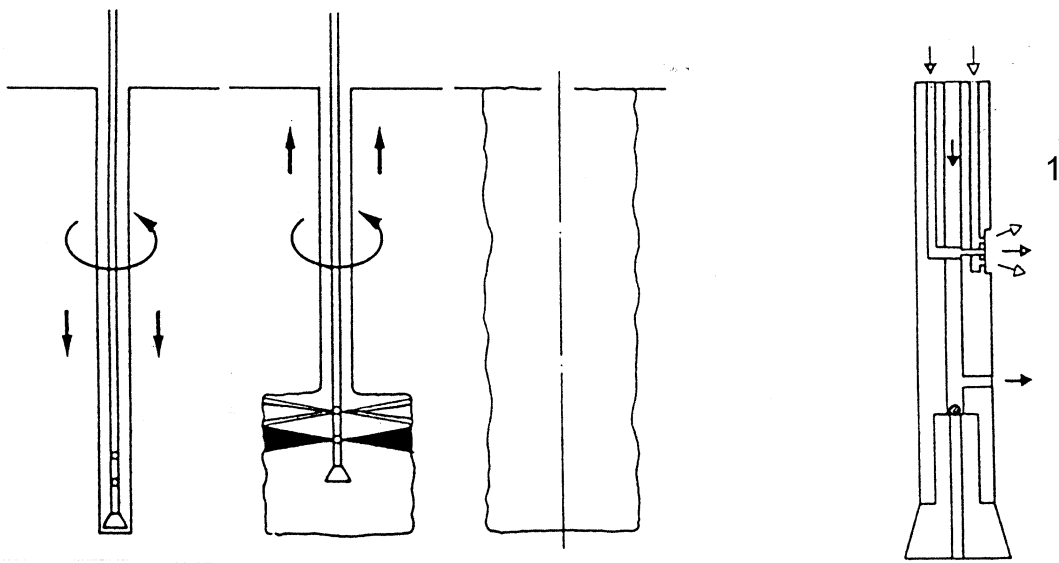
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Key

1 Monitor

Figure 3 c) — Double (water) system



Key

1 Monitor

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Figure 3 d) — Triple system
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Figure 3 — Schemes of jet grouting systems
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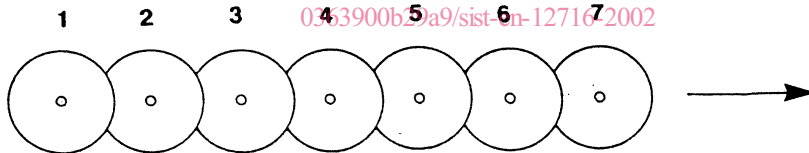


Figure 4 a) — Fresh in fresh sequence

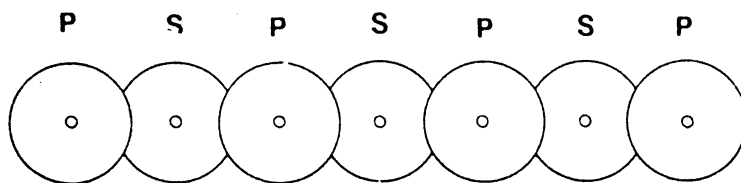


Figure 4 b) — Primary – secondary sequence

Figure 4 — Work sequences