SLOVENSKI STANDARD
SIST-TP CEN/TR 14920:2005

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Odpornost delov cevi za odpadne vode in kanalizacijo pri visokotlačnem brizganju - Preskusna metoda s premičnim brizganjem

Jetting resistance of drain and sewer pipes - Moving jet test method

Widerstandsfähigkeit von Rohrleitungsteilen für Abwasserkanäle und -leitungen beim Hochdruckspülen - Prüfung mit beweglicher Düse

Résistance des tubes pour les branchements et les collecteurs d'assainissement durant le curage sous haute pression - Méthode d'essai a vitesse variable

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93.030	Zunanji sistemi za odpadno vodo	External sewage systems

SIST-TP CEN/TR 14920:2005 **en**

TECHNICAL REPORT

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English version

Jetting resistance of drain and sewer pipes - Moving jet test method

Résistance des tubes pour les branchements et les collecteurs d'assainissement durant le procédé de débourbage sous haute pression - Méthode d'essai

Widerstandsfähigkeit von Rohrleitungsteilen für Abwasserkanäle und -leitungen beim Hochdruckspülen - Prüfung mit beweglicher Düse

This Technical Report was approved by CEN on 23 August 2004. It has been drawn up by the Technical Committee CEN/TC 165.

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Foreword

This document (CEN/TR 14920:2005) has been prepared by Technical Committee CEN/TC 165 “Waste water engineering”, the secretariat of which is held by DIN.

High pressure water jetting has become more used in cleaning practice of drains and sewers. Considering that, CEN/TC 165 decided to develop a test method for the resistance of pipe materials against high pressure water jetting.

Due to a low level of experience with the newly developed test method applied to different materials and considering some aspects of reproducibility have not been proved, a European Standard is not feasible for the time being. Therefore CEN/TC 165 decided to give initial guidance to the market by publishing a test method as a Technical Report (CEN/TR).

The test method specified in this document is intended to simulate the effect of high pressure cleaning on drains and sewers.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this CEN Technical Report: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This document specifies a test method for the resistance to high pressure clean water jetting of pipes, fittings and joints used for drains and sewers.

This test method is also applicable to components for renovation and replacement of drains and sewers.

2 Definitions and Symbols

For the purposes of this Technical Report, the following definitions and symbols apply.

2.1 Definitions

2.1.1
jet power
P_j
energy per time unit of the jet leaving a nozzle

NOTE Jet Power is expressed in Watts.

2.1.2
jet power density
D_j
jet power per unit of the impinged area

NOTE Jet power density is expressed in Watts per square millimetres.

2.1.3
jet spread angle
ω
spread of the jet related to its axis

NOTE Jet spread angle is expressed in degrees.

2.1.4
Nozzle
assembly of components which convert high pressure water flow into a jet (see Figure 1a)

2.1.5
Nozzle insert
special ceramic component to form a specified jet (see Figure 1c)

2.2 Further symbols

Table 1 — Symbol

Symbol	Term	Unit
α	angle of the jet axis to the test surface (see Figure B.1)	°
C_d	coefficient of discharge of a nozzle	—
d	orifice diameter of the nozzle insert	mm
h	vertical distance between the test surface and the centre of the nozzle orifice	mm
p	pressure measured not more than one metre upstream of the nozzle	MPa
Q	flow rate	l/min

3 Test method

3.1 Principle

A high pressure water jet is directed at a specified angle to and distance from the test surface. It is moved relative and parallel to the test surface. The resulting mechanical load (expressed as jet power density) is kept within specified limits for the duration of the test by controlling the parameters of water pressure, flow rate, distance and jet spread angle. The nozzle and the insert to be used are specified in this document.

After the test the surface of the test piece is inspected.

3.2 General Requirements

3.2.1 Water source

The water is in accordance with drinking water quality standards in respect of chemicals and particulates.

3.2.2 Pressure measurement

A pressure measurement device with an accuracy of ± 0,1 % is connected to the water supply no more than 1 m from the nozzle. The pipe between the position where the pressure is measured and the nozzle shall have an unrestricted bore not less than 15 mm.

3.2.3 Test temperature

The test is carried out at an ambient air temperature of (15 ± 10) °C with water at a temperature of (15 ± 10) °C near the pump inlet.

3.3 Apparatus

3.3.1 Pump unit

The pump unit is capable of delivering water at a pressure of at least 15 MPa and a flow rate of at least 60 l/min. A pressure equaliser is incorporated, if necessary, to limit the pressure variations due to pump action to ± 1 % of the mean value.

3.3.2 Flow rate and pressure accuracy

A means of measuring flow rate to an accuracy of ± 0,1 l/min at a flow rate of (46 ± 0,5) l/min and a means of measuring the pressure no more than 1 m from the nozzle to an accuracy of ± 0,1 % at a pressure of (12 ± 0,2) MPa is used

3.3.3 Nozzle

All dimensions of the nozzle shall conform to Figure 1. The nozzle shall have a ceramic insert with an orifice diameter of (2,80 ± 0,02) mm. The diameter is measured to an accuracy of ± 0,002 mm. The ceramic insert shall produce a jet spread angle of $\omega \leq 3{,}3°$ and is checked according to Annex B.

When using this nozzle together with the specified nominal test parameters, the jet power density D_j is 480 W/mm^2 when calculated according to Annex C. Nominal test parameters are in accordance with Table 2:

Table 2 — Nominal test parameters

Test parameter	Value	Note
Q	46 l/min	(see 3.6.1)
p	12 MPa	(see 3.6.1)
h	10 mm	(see 3.4)
α	30°	(see 3.4)
d	2,8 mm	(see 3.3.3)

Measurements in mm

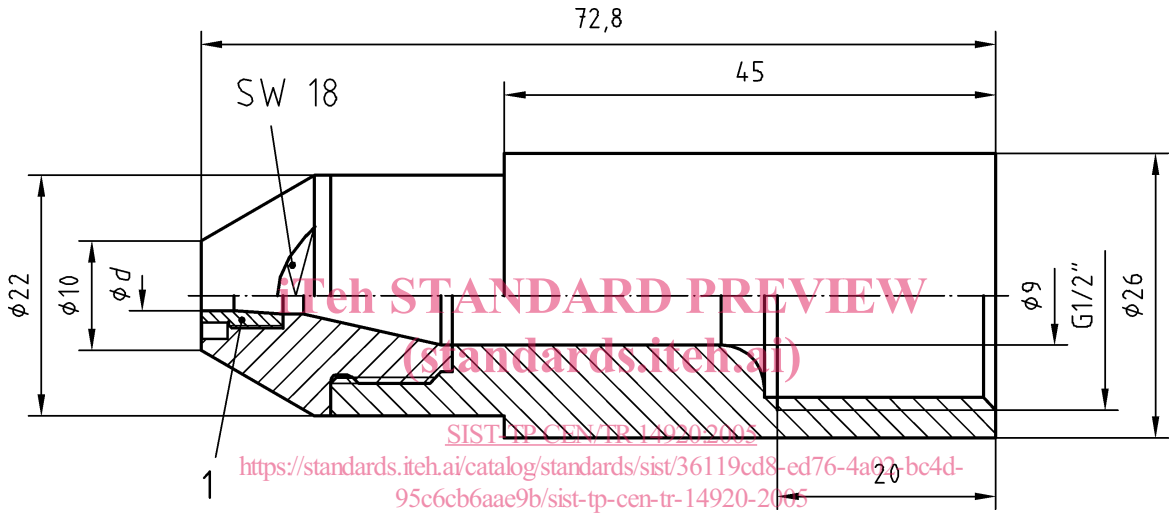

Figure 1a – Nozzle

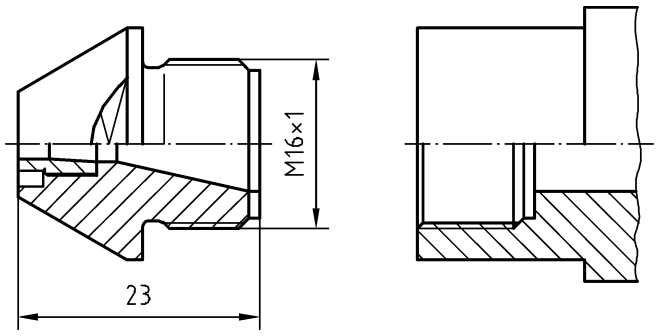

Figure 1 b — Nozzle details

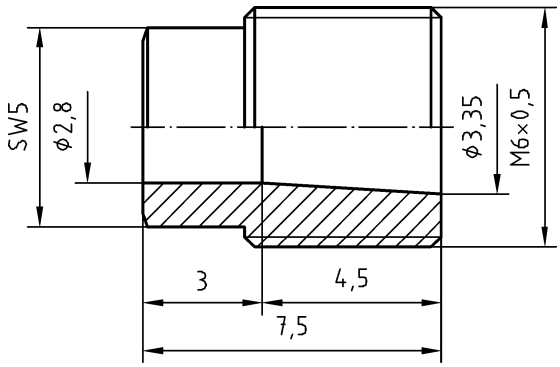

Figure 1c — Nozzle insert

Figure 1 — Nozzle geometry

3.4 Test rig

The test rig is capable of supporting the test section and holding the nozzle at an angle α of (30 ± 1)° to the test surface, at a vertical distance h of $(10^{\ 0}_{-2})$ mm measured to the centre of the orifice, from the internal test section

surface. There is a means of moving the jet relative to the test section or vice versa. Ensure that this longitudinal traverse is parallel to the test section axis and the path of the jet is along the invert of the test section. The velocity of travel is (1 ± 0,1) metres per minute.

3.5 Test assembly

The test assembly shall consist of a half section pipe and a half section of a junction joined together, including the sealing element. A typical test assembly is shown in Figure 2. The overall length of the test assembly is at least 1,8 m to allow at least 150 mm beyond either end of the 1,5 m test length for change of direction of travel and acceleration to the test velocity.

In cases when it is impractical to include the sealing element into the test assembly, a separate test is carried out on a small test assembly comprising two short lengths of full section jointed pipes.

In cases were it is possible to do the tests on full sections, this is permitted if full evaluation can be guaranteed.

3.6 Procedure

3.6.1 Pre-test procedure

Start the pump unit with the flow running to dump, then divert to the nozzle, adjust the pressure p at (12 ± 0,2) MPa and measure the flow rate. Confirm that at this pressure the flow rate Q is (46 ± 1) l/min. If the flow is not in this range, then check the nozzle orifice diameter/conditions and all connections or replace the nozzle insert. Repeat the pre-test procedure until the unit is running at a steady rate at the specified conditions. Take a photograph and determine ω in accordance with Annex B.

The interior surface of the test length is inspected prior to testing and any imperfection is recorded.

Place the test assembly into the rig and adjust to level. The nozzle is fixed at α of (30 ± 1)° to the surface of the test assembly prior to the start of the test length as given in Figure 2. Adjust the centre of the nozzle orifice to (10 +0/-1) mm vertically above the lowest point of the pipe invert along the test length.

3.6.2 Test procedure

Start the pump and ensure that the settings according to 3.6.1 are maintained. Move the test assembly relative to the jet or vice versa so that the jet travels along the line of the invert over the test length until it reaches at least 50 mm beyond the end of the test length. Reverse the direction of travel and repeat the process. The rate of travel is 1 m/min with the tolerance according to 3.4. Repeat this cycle 50 times. The interior surface of the test length is inspected after testing.