

SVENSK STANDARD

SS-EN 14701-2:2013

Fastställt/Approved: 2013-05-03
Publicerad/Published: 2013-05-03
Utgåva/Edition: 2
Språk/Language: engelska/English
ICS: 13.030.20

Karaktärisering av slam – Filtreringsegenskaper – Del 2: Bestämning av specifikt motstånd mot filtrering

Characterisation of sludges – Filtration properties – Part 2: Determination of the specific resistance to filtration

This preview is downloaded from www.sis.se. Buy the entire standard via <https://www.sis.se/std-89962>

Standarder får världen att fungera

SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.

Delta och påverka

Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

Ta del av det färdiga arbetet

Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standardpaket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

Utveckla din kompetens och lyckas bättre i ditt arbete

Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på www.sis.se eller ta kontakt med oss på tel 08-555 523 00.



Standards make the world go round

SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.

Take part and have influence

As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

Get to know the finished work

We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

Increase understanding and improve perception

With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

If you want to know more about SIS, or how standards can streamline your organisation, please visit www.sis.se or contact us on phone +46 (0)8-555 523 00



Europastandarden EN 14701-2:2013 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 14701-2:2013.

Denna standard ersätter SS-EN 14701-2:2006, utgåva 1.

The European Standard EN 14701-2:2013 has the status of a Swedish Standard. This document contains the official version of EN 14701-2:2013.

This standard supersedes the Swedish Standard SS-EN 14701-2:2006, edition 1.

© Copyright/Upphovsrätten till denna produkt tillhör SIS, Swedish Standards Institute, Stockholm, Sverige. Användningen av denna produkt regleras av slutanvändarlicensen som återfinns i denna produkt, se standardens sista sidor.

© Copyright SIS, Swedish Standards Institute, Stockholm, Sweden. All rights reserved. The use of this product is governed by the end-user licence for this product. You will find the licence in the end of this document.

Uppllysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna uppllysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Karaktärisering av avfall, mark och slam, SIS/TK 535.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD

EN 14701-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2013

ICS 13.030.20

Supersedes EN 14701-2:2006

English Version

Characterisation of sludges - Filtration properties - Part 2: Determination of the specific resistance to filtration

Caractérisation des boues - Propriétés de filtration - Partie
2: Détermination de la résistance spécifique à la filtration

Charakterisierung von Schlämmen -
Filtrationseigenschaften - Teil 2: Bestimmung des
spezifischen Filtrationswiderstands

This European Standard was approved by CEN on 1 March 2013.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents		Page
Foreword		3
Introduction		4
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	Principle	5
5	Apparatus	6
6	Procedure	6
6.1	General	6
6.2	Reduced pressure (Figure B.1)	6
6.3	Under pressure (Figure B.2 a))	7
6.4	Under pressure with a piston (Figure B.2 b))	7
7	Expression of results	8
8	Precision	10
9	Test report	10
Annex A (informative) Supplementary information to Darcy's law		11
Annex B (informative) Filtration apparatus		13
Annex C (informative) Table of viscosity		15
Annex D (informative) Result of validation trial		16
Bibliography		20

Foreword

This document (EN 14701-2:2013) has been prepared by Technical Committee CEN/TC 308 "Characterization of sludges", 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 October 2013, and conflicting national standards shall be withdrawn at the latest by October 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14701-2:2006.

Other parts of EN 14701 are:

- *Part 1: Capillary suction time (CST);*
- *Part 3: Determination of the compressibility;*
- *Part 4: Determination of the drainability of flocculated sludges.*

Most significant changes made since the latest edition:

- "Part 4 ..." added to Foreword;
- Introduction modified;
- CEN/TR 14742 added to Normative References;
- Clause "Principle" modified and better specified;
- List Entry 5.1.3 modified and better specified;
- List Entry 5.8 added;
- Clause 6 better specified;
- In Formula (1), " m " instead of " C_o ";
- Table 1 simplified;
- text added in Clause 7;
- List Entry c) added in Clause 9;
- former Annex A deleted;
- bibliographical references added.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

The specific resistance to filtration is a parameter which indicates the suitability of sludge to be filtered. The value of the specific resistance to filtration has great importance in filtration processes as it can be useful for estimating the performance of full-scale filtering devices, mainly pressure filters, and comparing filterability characteristics of sludges produced in different plants. Specific resistance measurements can also give indications on both the optimal type and dosage of conditioner to be used (CEN/TR 14742).

This revised version only includes editorial changes that do not influence the original, validated method.

1 Scope

This European Standard specifies a method for determining the specific resistance to filtration of conditioned and non-conditioned sludges, provided that no sedimentation occurs during filtration (i.e. single phase suspension with particles in suspension).

This European Standard is applicable to sludges and sludge suspensions from:

- storm water handling;
- urban wastewater collecting systems;
- urban wastewater treatment plants;
- industrial wastewater that has been treated similarly to urban wastewater (as defined in Directive 91/271/EEC);
- water supply treatment plants.

This method is also applicable to sludge and sludge suspensions of other origins.

2 Normative references

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

EN 12832:1999, *Characterization of sludges — Utilization and disposal of sludges — Vocabulary*

EN 12880, *Characterization of sludges — Determination of dry residue and water content*

CEN/TR 14742, *Characterization of sludges — Laboratory chemical conditioning procedure*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12832:1999 and the following apply.

3.1

specific resistance to filtration

property representing the resistance to filtration of a layer of particles having a unit mass of dry solids deposited on a unit filtering area

4 Principle

This method is based on the flow of a liquid through a porous medium in accordance with Darcy's law (see Annex A). The specific resistance to filtration is determined by pouring a suitable volume of sludge into a filtering device, allowing the liquid to be filtered under constant vacuum or pressure, whilst recording the amount of filtrate over time.

Considering that for sludges this parameter is affected by pressure value, this standard has been validated for the determination of specific resistance to filtration at pressure values (50 ± 5) kPa, (150 ± 10) kPa and (300 ± 15) kPa, as specifically indicated in Clause 6.

If necessary, as in the case of tests intended to size or optimise industrial filters, tests may be carried out at different pressures, provided results have been validated in advance.

SS-EN 14701-2:2013 (E)

5 Apparatus

5.1 Filtration apparatus with a capacity of 250 ml, and filter diameters between 60 mm and 90 mm (see Annex B).

5.1.1 Apparatus for filtration under reduced pressure (see Figure B.1).

5.1.2 Apparatus for filtration under pressure up to 1 MPa (see Figure B.2 a)).

5.1.3 Apparatus for filtration under pressure up to 1 MPa with a piston (see Figure B.2 b)) equipped with a pressure sensor under the piston to measure the actual applied pressure.

If this set-up is not given, piston friction is not taken into account in the pressure measurement and air filtration is preferred.

5.2 Graduated cylinders with a capacity of 100 ml and 250 ml.

5.3 Vacuum pump, or air pressure system, or hydraulic system for pressure application, including pressure adjustment system (regulator or reducer) and pressure gauge.

5.4 Chronometer, e.g. stopwatch, computer.

5.5 Beaker with a capacity of 500 ml.

5.6 Pipettes.

5.7 Filtering medium, filter paper (extra fast, ash-free), with a particle retention between 20 μm and 25 μm and a filtration flow rate of about 100 ml/min and a thickness of 0,22 mm (e.g. Whatman 41^{®1}).

Synthetic, or stainless metallic cloth may also be used if they can be shown to lead to the same results.

5.8 Filtering medium support.

5.9 Apparatus for determining sludge dry residue and water content (see EN 12880).

5.10 Thermostatic cell, for determinations at non-ambient temperatures.

6 Procedure

6.1 General

Measure the dry residue of the sludge, C_o , in accordance with EN 12880 and assume that the dry residue measured in g/kg is equivalent to the concentration measured in g/l. Prior to measuring, ensure the sludge is at room or test temperature.

If sludge has to be conditioned, this operation shall be carried out according to CEN/TR 14742.

6.2 Reduced pressure (Figure B.1)

6.2.1 Keep the valve between filter (5.1) and vacuum/pressure system (5.3) closed during the procedure, maintaining the system at an absolute pressure of (50 ± 5) kPa.

1) This information is given for the convenience of users of this document and does not constitute an endorsement by CEN of the product named. Equivalent products may be used if they can be shown to lead to the same results.

6.2.2 Put the filtering medium (5.7) in the funnel, moisten it with water and avoid any air entrance into the filter.

6.2.3 Measure the temperature, put (100 ± 1) ml of non-conditioned sludge or (200 ± 2) ml of conditioned, or of easily filterable sludge into the funnel after gentle homogenisation by pouring the sludge 3 times to 4 times from one beaker to another (only in case of non-conditioned sludge), open the valve and start filtration.

6.2.4 Record filtrate volumes, V , and corresponding times, t , only after collecting at least 10 % of the initial filtrate volume. Recording depends on flow rate and could range from every 5 s at the beginning until every 60 s or more (for sludge of low filterability) at the end. Stop the filtration when one of the following conditions occurs:

- pressure drops down (breaking of cake);
- filtrate flow rate instantaneously drops down;
- plot t/V vs. V deviates from linearity;
- filtration time exceeds 60 min.

6.2.5 Measure the dry mass of the cake after filtration in accordance with EN 12880, and measure the dynamic viscosity of the filtrate at test temperature.

6.3 Under pressure (Figure B.2 a))

6.3.1 While keeping the valve between the filter (5.1) and the air pressure system (5.3) closed, adjust the system to (50 ± 5) kPa, or (150 ± 10) kPa, or (300 ± 15) kPa above atmospheric pressure. The pressure shall be constantly maintained during the whole procedure.

6.3.2 Put the filtering medium (5.7) into the filtration cell, moisten it with water and avoid any air entrance into the filter.

6.3.3 Measure the temperature and put 100 ml of non-conditioned sludge or 200 ml of conditioned, or of easily filterable sludge into the apparatus after gentle homogenisation by pouring the sludge 3 times to 4 times from one beaker to another (only in case of non-conditioned sludge).

6.3.4 Close the sludge inlet, open the valve of the air pressure system and start the filtration process.

6.3.5 Record filtrate volumes, V , and corresponding times, t , only after collecting at least 10 % of the initial filtrate volume. Recording depends on flow rate and could range from every 5 s at the beginning until every 60 s or more (for sludge of low filterability) at the end. Stop the filtration when one of the following conditions occurs:

- pressure drops down (breaking of cake);
- instantaneous filtrate flow rate drops down;
- plot t/V vs. V deviates from linearity;
- filtration time exceeds 60 min.

6.3.6 Measure the dry mass of the cake after filtration in accordance with EN 12880 and measure the dynamic viscosity of the filtrate at test temperature.

6.4 Under pressure with a piston (Figure B.2 b))

6.4.1 Follow the procedure as described in 6.3.1 to 6.3.3.