SLOVENSKI STANDARD
SIST-TS CEN/TS 14807:2005

01-januar-2005

Cevni sistemi iz polimernih materialov - S steklenimi vlakni ojačeni duromerni materiali (GRP), ki temeljijo na nenasičeni poliestrski smoli (UP) – Navodilo za statični račun vkopanih cevovodov iz GRP-UP

Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) - Guidance for the structural analysis of buried GRP-UP pipelines

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Kunststoff-Rohrleitungssysteme - Glasfaserverstärkte duroplastische Kunststoffe (GFK) auf der Basis von ungesättigtem Polyesterharz (UP) - Anleitung für die statische Berechnung von erdverlegten GFK-UP-Rohrleitungen

SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/338370ec-2649-44d2-98a8-
[illegible]

Systemes de canalisation en plastique - Plastiques thermodurcissables renforcés de verre (PRV) a base de résine de polyester non saturé (UP) - Guide pour l'analyse structurelle des canalisations enterrées en PRV-UP

Ta slovenski standard je istoveten z: **CEN/TS 14807:2004**

ICS:

23.040.20	Cevi iz polimernih materialov	Plastics pipes
83.120	Ojačani polimeri	Reinforced plastics

SIST-TS CEN/TS 14807:2005 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

SIST-TS CEN/TS 14807:2005

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/338370ec-2649-44d2-98a8-0db09c03cf4a/sist-ts-cen-ts-14807-2005

SIST-TS CEN/TS 14807:2005

TECHNICAL SPECIFICATION

SPÉCIFICATION TECHNIQUE

TECHNISCHE SPEZIFIKATION

CEN/TS 14807

October 2004

ICS 23.040.01; 83.140.99

English version

Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) - Guidance for the structural analysis of buried GRP-UP pipelines

Systèmes de canalisations en plastique - Plastiques thermodurcissables renforcés à la fibre de verre (GRP) à base de résine de polyester non saturé (UP) - Guide pour l'analyse structurelle des canalisations en GRP-UP

Kunststoff-Rohrleitungssysteme - Glasfaserverstärkte duroplastische Kunststoffe (GFK) auf der Basis von ungesättigtem Polyesterharz (UP) - Anleitung für die Strukturanalyse von erdverlegten GFK-UP-Rohrleitungen

This Technical Specification (CEN/TS) was approved by CEN on 19 February 2004 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

CEN members are the national standards bodies of 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.

SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/338370ec-2649-44d2-98a8-0db09c03cf4a/sist-ts-cen-ts-14807-2005

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2004 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. CEN/TS 14807:2004: E

SIST-TS CEN/TS 14807:2005

Contents

Page

Foreword 3
Introduction 4
1 Scope 5
2 Normative references 5
3 Terms and definitions 5
4 Requirements 8
5 Classification and designation 9
Bibliography 12

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/338370ec-2649-44d2-98a8-0db09c03cf4a/sist-ts-cen-ts-14807-2005

SIST-TS CEN/TS 14807:2005

Foreword

This document (CEN/TS 14807:2004), has been prepared by Technical Committee CEN/TC 155 “Plastics piping systems and ducting systems”, the secretariat of which is held by NEN.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this CEN Technical Specification: 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.

This specification is a supporting standard for system standards covering plastics piping systems using glass-reinforced thermosetting plastics based on Polyester resin (GRP). System Standards are consistent with standards on general functional requirements.

NOTE: In addition to this document it is also intended that separate European Technical Specifications be published covering practices for installation, and assessment of conformity.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/338370ec-2649-44d2-98a8-0db09c03cf4a/sist-ts-cen-ts-14807-2005

SIST-TS CEN/TS 14807:2005

Introduction

The purpose of this document is to provide guidance for the selection of a suitable structural analysis procedure for buried glass-reinforced thermosetting plastics (GRP) pipes. The design approach should be founded on accepted engineering principles and have been demonstrated through field experience. The procedure should satisfy the requirements of GRP pipes and should provide dependable long-term performance.

The limiting performance criteria for buried glass-reinforced thermosetting plastics (GRP) pipes is different than other pipe products, including thermoplastics pipes. Consequently, any recommendations on the use of GRP products must take these differences into consideration. Additionally, the method of structural analysis must accommodate these limiting performance criteria, so guidance on suitable design limits are given. Any structural analysis procedure may be used provided it includes the assessment of short and long-term deflection and buckling resistance. Established structural analysis procedures, although found satisfactory for other materials, may not meet the needs of GRP.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/338370ec-2649-44d2-98a8-0db09c03cf4a/sist-ts-cen-ts-14807-2005

SIST-TS CEN/TS 14807:2005

1 Scope

This document, which is a guidance document for use with a structural analysis procedure for below ground installations, covers limits applicable to glass-reinforced thermosetting plastics (GRP) pipes used for the conveyance of liquids under pressure or gravity conditions.

This document does not specify a particular structural analysis procedure but gives guidance on the selection of a structural analysis procedure. It concludes that any established structural analysis procedure may be used provided it includes the assessment of short and long-term deflection and buckling resistance.

NOTE 1 Products complying to the applicable system standards (prEN 1796 [1] or prEN 14364 [2]), which are not subject to internal pressure, are suitable as long as the analysis shows that the long-term deflection of the installed pipes is limited to 6 %, which is the basic assumption of the system standards. Similarly products complying with the applicable system standards (prEN 1796 [1] or prEN 14364 [2]), which are subject to internal pressure, are suitable as long as the analysis shows that the initial and long-term deflection of the installed pipes does not exceed 3 %.

NOTE 2 The approach followed when preparing a structural analysis procedure in general does not depend on the nominal size(s) of the pipe(s).

NOTE 3 A suitable structural analysis procedure would normally be capable of being used for pipes operating at different temperatures provided that the corresponding temperature re-rating factors for the relevant pipe properties are applied, as specified in the referring standard(s). Nevertheless, high service temperatures may require an additional analysis of the longitudinal stresses and strains and/or a special design of the joints.

NOTE 4 Normal structural analysis procedures are intended to cover normal soil installation conditions. Pipes to be designed for installations in abnormal or unusual conditions, e.g. in quick soils or a marine sea-bed, may require special engineering. Some structural analysis procedures may include axial effects depending upon the type of joint used.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

2 Normative references

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

SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/5383700e-2049-44d2-98a8-0d809ed3e1fa/sist-ts-cen-ts-14807-2005

NOTE All supporting standards, guidelines and relevant product standards that should be applied are listed in the Bibliography.

EN 805, *Water supply — Requirements for systems and components outside buildings.*

EN 1610, *Construction and testing of drains and sewers.*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

3.1
nominal pressure
PN
alphanumeric designation for pressure classification purposes, which has a numerical value equal to the resistance of a component of a piping system to internal pressure, when expressed in bars

NOTE The designation for reference or marking purposes consists of the letters PN plus a number.

3.2
nominal size
DN/ID
alphanumerical designation of size, which is common to all components in a piping system. It is a convenient round number for reference purposes and is related to the internal diameter when expressed in millimetres

NOTE The designation for reference or marking purposes consists of the letters DN/ID plus a number.

SIST-TS CEN/TS 14807:2005

3.3
nominal stiffness
SN
alphanumerical designation for stiffness classification purposes, which has the same numerical value as the minimum initial value required, when expressed in newtons per square metre (N/m^2)

NOTE The designation for reference or marking purposes consists of the letters SN plus a number.

3.4
specific ring stiffness
S
physical characteristic of the pipe, expressed in newtons per square metre. It is a measure of the resistance to ring deflection per metre length under external load and is defined by equation (1):

$$S = \frac{E \times I}{d_m{}^3} \tag{1}$$

where:

E is the apparent modulus of elasticity as determined in a ring stiffness test, in newtons per square metre (N/m^2);

I is the second moment of area in the longitudinal direction per metre length, in metres to the fourth power per metre,(m^4/m) i.e.

$$I = \frac{e^3}{12} \tag{2}$$

iTeh STANDARD PREVIEW
(standards.iteh.ai)

where:

e is the wall thickness, in metres (m);

SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/338370ec-2649-44d2-98a8-0dd09c05e1fa/sist-ts-cen-ts-14807-2005

d_m is the mean diameter of the pipe, in metres (m) (see 3.5).

3.5
initial specific ring stiffness
$\boldsymbol{S_0}$
value of S obtained when tested in accordance with EN 1228 [3], in newtons per square metre (N/m^2)

3.6
wet creep factor
$\boldsymbol{\alpha_{x,\text{creep,wet}}}$
ratio of the long-term specific ring stiffness, $S_{x,\text{ wet}}$ at 50 years, determined under sustained loading in wet conditions when tested in accordance with ISO 10468 [4], to the initial specific ring stiffness, S_0, both measured at the same position referred to as reference position 1 . It is given by equation (5)

$$\alpha_{\text{x,creep,wet}} = \frac{S_{x,wet,1}}{S_{0,1}} \tag{3}$$

3.7
wet relaxation factor
$\boldsymbol{\alpha_{x,\text{relax,wet}}}$
ratio of the long-term specific ring stiffness, $S_{x,\text{wet}}$ at 50 years, determined under sustained deflection in wet conditions when tested in accordance with ISO 14828 [5], to the initial specific ring stiffness, S_0, both measured at the same position referred to as reference position 1 . It is given by equation (4)

SIST-TS CEN/TS 14807:2005

$$\alpha_{x,relax,wet} = \frac{S_{x,wet,1}}{S_{o,1}} \quad (4)$$

3.8
calculated long-term specific ring stiffness
$S_{x,wet}$
calculated value of S at 50 years, obtained by equation (5)

$$S_{x,wet} = S_0 \times \alpha_{X,wet} \quad (5)$$

where:

x is the elapsed time in years, 50 years, specified in this document;

$\alpha_{x,wet}$ is either the wet creep factor (see 3.6) or the wet relaxation factor (see 3.7);

S_0 is the initial specific ring stiffness, in newtons per square metre (N/m^2) (see 3.5).

3.9
re-rating factor
R_{RF}
multiplication factor that quantifies the relation between a mechanical, physical or chemical property at the service condition compared to the respective value at 23° C and 50 % relative humidity (R.H.)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

3.10
non-pressure pipe or fitting
pipe or fitting subject to an internal pressure not greater than 1 bar

SIST-TS CEN/TS 14807:2005
https://standards.iteh.ai/catalog/standards/sist/338370ec-2649-44d2-98a8-0db05e05e4a/sist-ts-cen-ts-14807-2005

3.11
pressure pipe or fitting
pipe or fitting having a nominal pressure classification which is greater than 1 bar and which is intended to be used with the internal pressure equal to or less than its nominal pressure when expressed in bars

3.12
buried pipeline
pipeline which is subjected to the external pressure transmitted from soil loading, including traffic and superimposed loads and, possibly, the pressure of a head of water

3.13
non-buried pipeline
pipeline which is subjected to negative and positive pressure, forces resulting from its supports, environmental conditions, e.g. snow and wind, and possibly pressure of a head of water

3.14
design service temperature
maximum sustained temperature at which the system is expected to operate, expressed in degrees Celsius (ºC).

3.15
minimum long-term design pressure
$P_{x,d}$
least value for mean long-term burst failure pressure, expressed in bars, which is evaluated in accordance with the procedures described in EN 705 [6] and includes a design factor of safety, $F_{s,d}$. It is one of the parameters used to determine the minimum initial design pressure