

**Plasttorustikusüsteemid.
Klaassarrusega termokõvenevast
plastist (GRP) torud ja liitmikud.
Regressioonanalüüsi meetodid ja
nende rakendused**

Plastics piping systems - Glass reinforced
thermosetting plastics (GRP) pipes and fittings -
Methods for regression analyses and their use

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 705:1999 sisaldab Euroopa standardi EN 705:1994+AC:1995 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 12.12.1999 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 705:1999 consists of the English text of the European standard EN 705:1994+AC:1995.</p> <p>This document is endorsed on 12.12.1999 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>Käesolev standard määrab kindlaks menetluse, mis sobib selliste andmete analüüsiks, mis väärtuste logaritmideks teisendatuna on kas normaalse või kaldsümmeetrilise jaotusega. Menetlus on ette nähtud kasutamiseks koos testimismeetodiga ja vastavate standarditega, mis käsitlevad klaassarrusega plastist torusid või liitmikke nende omaduste analüüsimiseks, tavaliselt aja funktsioonina. Neid tehnikaid kasutades laieneb ekstrapoleerimine tüüpiliselt suundumusele, et umbes 10 000 tunni pikkuse perioodi jooksul kogutud andmed võimaldavad anda ennustuse umbes 50 aasta kohta.</p>	<p>Scope:</p>
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ICS 23.040.20, 23.040.45

Võtmesõnad: andmed, arvutamine, klaas, konstruktsioon, kontrollimine, plasttorud, sarrusplastid, statistiline analüüs, termokõvenevad vaigud, toruliitmikud, torustikud

UDC 621.643.2-036.067.5:621.643.06:620.1:519.2

Descriptors: Pipework, plastic pipe, glass reinforced plastics, regression analysis, fitting.

English version

Plastics piping systems

**Glass-reinforced thermosetting plastics (GRP)
pipes and fittings**

Methods for regression analyses and their use

Systèmes de canalisations plastiques;
tubes et raccords plastiques thermodur-
cissables renforcés de verre et raccords
(PRV); méthodes pour une analyse de
régression et leurs utilisations

Kunststoff-Rohrleitungssysteme; Rohre
und Formstücke aus glasfaserverstärkten
duroplastischen Kunststoffen (GFK);
Verfahren zur Regressionsanalyse und
deren Anwendung

This European Standard was approved by CEN on 1994-04-11.

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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.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This standard was prepared by CEN/TC 155 "Plastics piping systems and ducting systems".

This standard is based on document N 197 "Glass-reinforced thermosetting plastics (GRP) pipes and fittings - Standard extrapolation procedures and their use" prepared by working group 1 of subcommittee 6 of technical committee 138 of the International Organization for Standardization (ISO). It is a modification of ISO/TC 138/SC 6/WG 1 N 197 for reasons of possible applicability to other test conditions and alignment with texts of other standards on test methods.

The modifications are:

- examples have been introduced to enable validation of alternative calculation facilities;
- material-dependent requirements are not given;
- editorial changes have been introduced.

The material-dependent test parameters and/or performance requirements are incorporated in the referring standard.

Annex A, which is informative, describes procedures for solving the given set of equations (see 3.2.3) on a mathematical basis using the example shown in 3.2.6.

No existing European Standard is superseded by this standard.

This standard is one of a series of standards on test methods which support System Standards for plastics piping systems and ducting systems.

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 1994, and conflicting national standards shall be withdrawn at the latest by October 1994.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

Introduction

This standard has been prepared to describe the procedures intended for analysing the regression of test data, usually with respect to time, and the use of the results in design and assessment of conformity with performance requirements. Its applicability has been limited to use with data obtained from tests carried out on samples. The referring standards require estimates to be made of the long-term properties of the pipe for such parameters as circumferential tensile strength, deflection and creep.

The committee investigated a range of statistical techniques that could be used to analyse the test data produced by tests that were destructive. Many of these simple techniques required the logarithms of the data to

- a) be normally distributed;
- b) produce a regression line having a negative slope; and
- c) have a sufficiently high regression correlation (see table 1).

Whilst the last two conditions can be satisfied, analysis has shown that there is a skew to the distribution and hence this primary condition is not satisfied. Further investigation into techniques that can handle skewed distributions resulted in the adoption of the covariance method for analysis of such data for this standard.

The results from non-destructive tests, such as creep or changes in deflection with time, often satisfy these three conditions and hence simpler procedures, using time as the independent variable, can also be used in accordance with this standard.

1 Scope

This standard specifies procedures suitable for the analysis of data which, when converted into logarithms of the values, have either a normal or a skewed distribution. It is intended for use with the test methods and referring standards for glass-reinforced plastics pipes or fittings for the analysis of properties as a function of, usually, time. However it can be used for the analysis of any other data.

For use depending upon the nature of the data, three methods are specified. The extrapolation using these techniques typically extends the trend from data gathered over a period of approximately 10000 h, to a prediction of the property at 50 years.

2 Principle

Data are analysed for regression using methods based on least squares analysis which can accommodate the incidence of a skew and/or a normal distribution and the applicability of a first order or a second order polynomial relationship.

The three methods of analysis used comprise the following:

- **method A:** covariance using a first order relationship;
- **method B:** least squares with time as the independent variable using a first order relationship;
- **method C:** least squares with time as the independent variable using a second order relationship.

The methods include statistical tests for the correlation of the data and the suitability for extrapolation.