
**Plastics piping systems — Glass-reinforced
thermosetting plastics (GRP) pipes —
Determination of the creep factor under dry
conditions**

*Systèmes de canalisations en matières plastiques — Tubes plastiques
thermodurcissables renforcés de verre (PRV) — Détermination du
coefficient de fluage en condition sèche*

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 7684 was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 6, *Reinforced plastics pipes and fittings for all applications*.

This International Standard is technically identical to EN 761:1994.

Annex A of this International Standard is for information only.

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International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet central@iso.ch
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

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Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of the creep factor under dry conditions

1 Scope

This International Standard specifies a method for determining the dry creep factor of glass-reinforced plastics pipes.

It is applicable to pipes with an initial specific ring stiffness of not less than 630 N/m^2 , when determined by the method specified in the referring standard.

NOTE - For this purpose plates or beam bars are considered to be equally valid for loading the test piece up to a relative deflection of 28 %. When it is expected that the relative deflection will be more than 28 %, then the test is to be conducted using beam bars (see 8.3).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 7685:—¹⁾ *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes — Determination of initial specific ring stiffness*

ISO 10928:—¹⁾ *Plastics piping systems — Glass-reinforced thermosetting plastics (GRP) pipes and fittings — Methods for regression analysis and their use*

1) To be published

3 Definitions

For the purposes of this International Standard, the following definitions apply:

3.1 specific ring stiffness (S): A physical characteristic of the pipe which is a measure of the resistance to ring deflection under external load.

This characteristic is determined by testing and is defined, in newtons per square metre, by the equation:

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

where

E is the apparent modulus of elasticity as determined in the ring stiffness test, in newtons per square metre;

I is the moment of inertia (the second moment of area) in the longitudinal direction per metre length, expressed in metres to the fourth power per metre, i.e.

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

where e is the wall thickness of the pipe, in metres;

d_m is the mean diameter (see 3.2) of the pipe, in metres.

3.2 mean diameter (d_m): The diameter of the circle corresponding to the middle of the pipe wall cross section.

It is given, in metres, by either of the following equations:

$$d_m = d_i + e$$

$$d_m = d_e - e$$

where

d_i is the average of the measured internal diameters, in metres;

d_e is the average of the measured external diameters, in metres;

e is the average of the measured wall thicknesses of the pipe, in metres.

3.3 initial specific ring stiffness (S_0): The specific ring stiffness when measured 3 min after the beginning of loading.

It is expressed in newtons per square metre.

3.4 compressive load (F): A load applied to the horizontal pipe to cause a vertical deflection.

It is expressed in newtons.

3.5 vertical deflection (y): The vertical change in diameter of a pipe in a horizontal position in response to a vertical compressive load (see 3.4).

It is expressed in metres.

3.6 initial deflection ($y_{3\min}$): The vertical deflection caused by the compressive load and measured 3 min (i.e. 0,05 h) after the beginning of loading.

It is expressed in metres.

3.7 long-term vertical deflection under dry conditions ($y_{x,\text{dry}}$): The estimated vertical deflection after x years, obtained by extrapolation of long-term deflection measurements at a constant load under dry conditions.

It is expressed in metres.

3.8 dry conditions: The test environment in air at the prevailing humidity.

3.9 dry creep factor ($\alpha_{x,\text{dry}}$): The factor given by the following equation:

$$\alpha_{x,\text{dry}} = \frac{y_{3\min}}{y_{x,\text{dry}}} \times \frac{f_x}{f_{3\min}}$$

where

x indicates a specified period of time, in years;

f is the applicable deflection coefficient.

3.10 deflection coefficient (f): The coefficient which takes into account the 2nd order theory and of which the value is given by the following equation:

$$f = [1\,860 + (2\,500 \times y/d_m)] \times 10^{-5}$$