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**Glass-reinforced thermosetting  
plastics (GRP) pipes — Test method  
to prove the resistance to initial ring  
deflection**

*Tubes en plastiques thermodurcissables renforcés de verre (PRV) —  
Méthode d'essai pour établir la résistance à la déflexion annulaire  
initiale*

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Published in Switzerland

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document 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 second edition cancels and replaces the first edition (ISO 10466:1997), which has been technically revised.

The main changes compared to the previous edition are as follows:

- [Clause 2](#), "Normative references", has been added;
- [subclause 5.3](#), "Dimension-measuring instruments, capable of determining", has been amended;
- [subclause 6.3](#), "Determination of dimensions", has been amended.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Glass-reinforced thermosetting plastics (GRP) pipes — Test method to prove the resistance to initial ring deflection

## 1 Scope

This document specifies a method for testing the ability of glass-reinforced thermosetting plastics (GRP) pipes to withstand specified levels of initial ring deflection without displaying surface damage and/or structural failure.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 3126, *Plastics piping systems — Plastics components — Determination of dimensions*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### vertical deflection

vertical change in diameter of a pipe in a horizontal position in response to a vertical compressive load

Note 1 to entry: It is expressed in metres.

### 3.2

#### relative vertical deflection

$y/d_m$

ratio of the vertical deflection,  $y$ , (3.1) to the mean diameter,  $d_m$  (3.3), of the pipe

### 3.3

#### mean diameter

$d_m$

diameter of the circle corresponding to the middle of the pipe wall cross-section and given, in metres (m), by either of the following formulae:

$$d_m = d_i + e$$

$$d_m = d_e - e$$

where

$d_i$  is the internal diameter, in metres;

$d_e$  is the external diameter, in metres;

$e$  is the wall thickness of the pipe, in metres.

### 3.4

#### visual evidence of structural failure

unless otherwise specified by the referring standard, a failure apparent in any of the following forms:

- interlaminar separation;
- tensile failure of the glass fibre reinforcement;
- buckling of the pipe wall;
- if applicable, separation of the thermoplastic liner from the structural wall.

### 3.5

#### strength-reduction evidence of structural failure

unless otherwise specified by the referring standard, a failure apparent in any of the following ways:

- a) during the two-minute inspection period, there is an instantaneous drop in load in excess of 10 % of the maximum load applied;
- b) when an instantaneous drop in load of up to 10 % has occurred and the test piece cannot sustain an increase in load equal to twice the reduction in load.

### 3.6

#### compressive load

$F_1$  or  $F_2$

load applied to a pipe to cause a diametric deflection

Note 1 to entry: Compressive load is expressed in newtons.

## 4 Principle

A length of pipe supported horizontally is loaded throughout its length to compress it diametrically to two successive specified levels of vertical deflection (see [Figure 2](#)). The pipe is inspected at the first deflection level for visual evidence of surface damage and/or structural failure and at the second deflection level for visual evidence of structural failure (see [3.4](#)). A performance test for structural integrity is also carried out, as a function of the resistance to loading.

NOTE It is assumed that the following test parameters are set by the standard making reference to this document:

- a) the two pipe deflection limits (see [5.1](#) and [8.3](#));
- b) the length of the test piece (see [Clause 6](#));
- c) the number of test pieces (see [Clause 6](#));
- d) the test temperature (see [8.1](#));
- e) the surface(s) of the test piece to be inspected for surface damage (see [8.3](#));
- f) the visual characteristics of surface damage and structural failure (see [8.3](#)).