
**Underground installation of flexible
glass-reinforced thermosetting resin (GRP)
pipes —**

Part 3:
Installation parameters and application limits

*Installation enterrée de canalisations flexibles en plastique renforcé de
fibres de verre/résine thermodurcissable (PRV) —*

Partie 3: Paramètres d'installation et limites d'application



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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 main task of ISO technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 10465-3, which is a Technical Report of type 2, 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*.

The reasons which led to the decision to publish this document in the form of a type 2 Technical Report are explained in the introduction.

ISO/TR 10465 consists of the following parts, under the general title *Underground installation of flexible glass-reinforced thermosetting resin (GRP) pipes*:

- *Part 1: Installation procedures*
- *Part 2: Comparison of static calculation methods*
- *Part 3: Installation parameters and application limits*

This document is not to be regarded as an International Standard. It is proposed for provisional application so that experience may be gained on its use in practice. Comments should be sent to the secretariat of TC 138/SC 6.

Introduction

Work in ISO/TC 5/SC 6 (now ISO/TC 138) on writing standards for the use of glass-reinforced plastics (GRP) pipes and fittings was approved at the subcommittee meeting in Oslo in 1979. An *ad hoc* group was established and the responsibility for drafting various standards was later given to a Task Group (now ISO/TC 138/SC 6).

At the SC 6 meeting in London in 1980, Sweden proposed that a working group be formed to develop documents regarding a code of practice for GRP pipes. This was approved by SC 6, and Working Group 4 (WG 4) was formed for this purpose. Since 1982, twenty-eight WG 4 meetings have been held which have considered the following areas:

- procedures for the underground installation of GRP pipes;
- pipe/soil interaction with pipes having different stiffness values;
- minimum design features;
- an overview of various static calculation methods.

During the work of WG 4, it became evident that unanimous agreement could not be reached within the working group on the specific methods to be employed. Therefore WG 4 agreed that all documents should be made into a three-part type 2 Technical Report, of which this is part 3.

Part 1 describes procedures for the underground installation of GRP pipes. It concerns particular stiffness classes for which performance requirements have been specified in at least one product standard, but it can also be used as a guide for the installation of pipes of other stiffness classes.

Part 2 presents a comparison of the two primary methods used internationally for static calculations on underground GRP pipe installations (ATV-A 127 and AWWA M-45).

Part 3 gives additional information, which is useful for static calculations when using an ATV-A 127 type design system in accordance with part 2 of this Technical Report, on items such as:

- parameters for deflection calculations;
- soil parameters, strain coefficients and shape factors for flexural-strain calculations;
- soil moduli and pipe stiffnesses for buckling calculations with regard to elastic behaviour;
- parameters for rerounding and combined-loading calculations;
- the influence of traffic loads;
- the influence of sheeting;
- safety factors.

Underground installation of flexible glass-reinforced thermosetting resin (GRP) pipes —

Part 3:

Installation parameters and application limits

1 Scope

This part of ISO/TR 10465 gives information on parameters and application limits for the installation of GRP pipes. It is particularly relevant when using an ATV-A 127 type design system.

Explanations of the long-term safety factors incorporated in the GRP system standards, based on simplified probability methods, are given in annex G.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/TR 10465. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/TR 10465 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/TR 10465-1:1993, *Underground installation of flexible glass-reinforced thermosetting resin (GRP) pipes — Part 1: Installation procedures.*

ISO/TR 10465-2:1999, *Underground installation of flexible glass-reinforced thermosetting resin (GRP) pipes — Part 2: Comparison of static calculation methods.*

ASTM D 1586:1984, *Standard test method for penetration test and split-barrel sampling of soils.*

ASTM D 2166:1991, *Standard test method for unconfined compressive strength of cohesive soil.*

ATV-A 127, *Guidelines for static calculations on drainage conduits and pipelines* (December 1988).

AWWA M-45, *Fiberglass pipe design manual M-45* (1997).

BS 1377 (all parts), *Methods of test for soils for civil engineering purposes.*

DIN 19565-1:1989, *Centrifugally cast and filled polyester resin glass fibre reinforced (UP-GF) pipes and fittings for buried drains and sewers; dimensions and technical delivery conditions.*

OENORM B 4419-1:1985, *Erd- und Grundbau; Untergrunderkundung durch Sondierungen; Rammsondierungen.*

OENORM B 5012-1:1990, *Statische Berechnung erdverlegter Rohrleitungen im Siedlungs- und Industrierwasserbau; Grundlagen.*

WRc, Water Research Centre, Swindon, UK: *Pipe materials selection manual — Water supply*, 2nd edition, June 1995.