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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

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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.

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.

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.

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.

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.