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English Version

Plastics piping systems - Glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resin (UP) - Report on the determination of mean abrasion after a defined number of test cycles

Systèmes de canalisations en plastique - Plastiques thermodurcissables renforcés par du verre (PRV) à base de résine de polyester non saturé (UP) - Rapport sur la détermination de l'abrasion moyenne après un nombre défini de cycles d'essai

Kunststoff-Rohrleitungssysteme - Glasfaserverstärkte duroplastische Kunststoffe (GFK) auf der Grundlage ungesättigten Polyesterharzes (UP) - Bericht über die Bestimmung des mittleren Abriebs nach einer festgelegten Anzahl von Durchläufen

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Foreword

This document (CEN/TR 15729:2010) has been prepared by Technical Committee CEN/TC 155 "Plastics piping systems and ducting systems", the secretariat of which is held by NEN.

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Introduction

The procedure described in this Technical Report is intended to be used as a means of assessing and comparing the performance of GRP pipes after being subject to a specified regime of abrasion. The main difference between this regime and other similar procedures is the use of a graded man-made abrasive, Corundum.

The specification of the abrasive, ISO 8486-1, specifies the designation and determination of grain size distribution of fused aluminium oxide, silicon carbide and other abrasive materials for bonded abrasives and for general industrial applications. This document, which is indispensable for the application of the proposal, is an ISO standard, which is recognised by the abrasive manufacturing industry throughout the world. The use of corundum addresses some of the vital issues for abrasion testing, namely particle shape or structure by being a man-made material with consistent chemical formulation and fracture characteristics.

The abrasive to be used, i.e. corundum, a crystalline oxide of aluminium that has crystallized in a Trigonal system, may not be similar to some materials found in sewer piping systems but is used because of its availability world-wide and thereby ensures the consistency of the abrasive used in the test. The test is not intended to simulate any particular conditions in piping systems for which pipes conforming to EN 14364 are intended to be used but is merely intended to be a reproducible test procedure for use in a testing laboratory that can be used to provide data for the assessment of abrasion resistance.

GRP pipes complying with EN 14364 have not been found to be susceptible to abrasion in typical sewerage or drainage applications. In the small number of situations where abrasion has been found to be a problem the conditions on site are found to be unusual and also difficult to reproduce in a laboratory and this leads to major difficulties in correlating the performance in the laboratory with those existing on such sites. Data is not currently available which shows a definite relationship between the test and actual pipe operation. However data obtained from this test could be used to establish the relationship if it exists.

With the limited amount of testing already carried out it is considered that there is an improvement in repeatability of the test compared to DIN 19565-1 (no longer published) and testing is continuing to confirm these early findings.

1 Scope

This Technical Report describes a method for determining the mean abrasion of the inner surface of glass-reinforced thermosetting polyester resin (GRP) pipes conforming to EN 14364, measured after a defined number of test cycles of a specified water/abrasive mixture.

NOTE The test is performed on a semi-circular channel-pipe test-piece.

2 Terms and definitions

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

2.1

abrasion

a

reduction in wall thickness, along the test length at the invert of the channel-pipe test-piece, caused by the test piece being abraded by abrasive during a number of test cycles

NOTE It is expressed in millimetres (see Clause 9).

2.2

abrasive

particles of a specified inorganic material (i.e. corundum), which is used for abrading the inner surface of the test-piece

2.3

corundum

crystalline oxide of aluminium (Al_2O_3), that has crystallized in a Trigonal system

NOTE Corundum has a hardness which is next to diamond, which accounts for its use as an abrasive.

2.4

mean abrasion

a_{mean}

mean value of the set of data recording the reduction in wall thickness at predefined points along the test length at the invert of the channel test-piece

NOTE It is expressed in millimetres (see Clause 9).

2.5

test cycle

cycle which is a double traverse of the abrasive along the test length at the invert of the test piece, caused by the test piece covering an angle from either $+ 22,5^\circ$ to $- 22,5^\circ$ or $- 22,5^\circ$ to $+ 22,5^\circ$ and then returning to the starting position

NOTE See Figure 1.

3 Principle

A semi-circular channel pipe, with a length of $(1\,000 \pm 10)$ mm, is closed at its ends by end plates to form watertight seals. The test piece is filled with a specified water/corundum mixture and then covered with a plate. The channel-pipe test-piece is tilted alternately with a uniform rate in the longitudinal direction, covering an angle from either $+ 22,5^\circ$ to $- 22,5^\circ$ or $- 22,5^\circ$ to $+ 22,5^\circ$ and then returning to the starting position thereby completing a test cycle (see 2.5 and Figure 1). During each tilt the abrasive slides from one end of the test-