BS ISO 18488:2015

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Polyethylene (PE) materials for piping systems — Determination of Strain Hardening Modulus in relation to slow crack growth — Test method

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Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Principle **3**
5 Apparatus **3**
6 Test specimens **4**
6.1 Test specimen geometry and dimensions 4
6.2 Test specimen preparation 4
7 Test procedure **5**
8 Data analysis **6**
9 Test report **6**
Annex A (informative) **Neo-Hookean constitutive model** **8**
Bibliography **10**

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Foreword

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The committee responsible for this document is ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 5, *General properties of pipes, fittings and valves of plastic materials and their accessories — Test methods and basic specifications*.

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Introduction

Resistance to slow crack growth is related in general to the lifetime of polyethylene and thus, the lifetime of polyethylene products, e.g. pipes and fittings. The slow crack growth behaviour can be regarded as a combination of yield stress and the capability of disentanglement of tie molecules as reported by Kramer and Brown.[3],[6],[7] The disentanglement capability of a polymer will determine its resistance against slow crack growth.

The strain hardening modulus of a polymer is a measure of the disentanglement capability of the tie molecules of this polymer and is an intrinsic property. The strain hardening modulus of polyethylene is obtained from a stress-strain curve above the natural draw ratio. The stress-strain curve of a compression moulded sample is relatively easily obtained using a tensile test apparatus equipped with an optical extensometer. The test time of the strain hardening modulus is a consequence of the speed of tensile testing and is therefore constant for all measurements and independent of the slow crack growth property of the tested material itself.

The strain hardening modulus value allows discrimination between materials. It has been demonstrated that the strain hardening modulus corresponds very well with several environmental stress cracking test methods for high density polyethylene.[4],[5],[8]

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