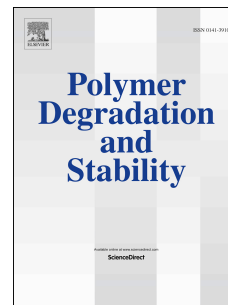


Accepted Manuscript

Effect of carbon black distribution on the properties of polyethylene pipes part 1:
Degradation of post yield mechanical properties and fracture surface analyses

Suleyman Deveci, Nisha Antony, Birkan Eryigit



PII: S0141-3910(18)30018-1

DOI: [10.1016/j.polyimdegradstab.2018.01.011](https://doi.org/10.1016/j.polyimdegradstab.2018.01.011)

Reference: PDST 8436

To appear in: *Polymer Degradation and Stability*

Received Date: 17 October 2017

Revised Date: 14 December 2017

Accepted Date: 9 January 2018

Please cite this article as: Deveci S, Antony N, Eryigit B, Effect of carbon black distribution on the properties of polyethylene pipes part 1: Degradation of post yield mechanical properties and fracture surface analyses, *Polymer Degradation and Stability* (2018), doi: 10.1016/j.polyimdegradstab.2018.01.011.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Effect of Carbon Black Distribution on the Properties of Polyethylene Pipes

Part 1: Degradation of Post Yield Mechanical Properties and Fracture Surface Analyses

Suleyman Deveci^a, Nisha Antony^b, Birkan Eryigit^c

Borouge Pte. Ltd., Innovation Centre, Sas Al Nakhl, 6951, Abu Dhabi, United Arab Emirates

Abstract

In this study, we investigated the effect of carbon black distribution on the degradation of mechanical properties of high-density polyethylene in the form of plastic pipes used in water distribution networks. Polyethylene pipes with similar carbon black concentrations but different carbon black distributions were produced with industrial scale compounding and extrusion equipment. Tensile specimens were directly prepared from extruded pipe samples and elongated to fracture at different strain rates. Carbon black distributions of bulk samples and fracture surfaces were investigated using stereo and scanning electron microscopy (SEM). It was found that the carbon black distributions, fracture surfaces and fracture modes were significantly different in these pipes. Although the yield properties were similar, the post-yield properties of samples were significantly different, dramatically decreasing with the increasing inhomogeneity of carbon black distribution. Pipes with a certain level of heterogeneity in the carbon black distribution showed ductile and brittle fractures in the same fracture plane, whereas homogenous black and natural polyethylene (without carbon black) showed ductile fractures only.

*Corresponding author e-mail: suleyman.deveci@borouge.com, Borouge Pte. Ltd., Innovation Centre, Sas Al Nakhl, 6951, Abu Dhabi, United Arab Emirates

Keywords: polyethylene pipe; carbon black distribution; tensile properties; fracture surface; mechanical degradation

Download English Version:

<https://daneshyari.com/en/article/7824167>

Download Persian Version:

<https://daneshyari.com/article/7824167>

[Daneshyari.com](https://daneshyari.com)