

Chemical & Abrasion Resistance

Chemical & Abrasion Resistance of Corrugated Polyethylene Pipe

Brought to you by the CPPA,
a non-profit industry trade
association dedicated to
providing unbiased, non-branded
information about the use and
installation of corrugated
polyethylene pipe.

Your Information Resource



A division of the Plastics Pipe Institute, Inc.



Preface

The material presented in this technical booklet has been prepared in accordance with recognized principles and practices, and is for general information only. The information should not be used without first securing competent advice with respect to its suitability for any general or specific application.

While the material is believed to be technically correct, the Corrugated Polyethylene Pipe Association makes no representation or warranty of any kind, and assumes no liability therefore. Inquiries on specific products, their attributes, and the manufacturer's warranty should be directed to member companies. An up-to-date directory of the membership of the Corrugated Polyethylene Pipe Association is available on request.

Table of Contents

Introduction	4
Resistance to Chemically Aggressive Environments	5
Durability Under Abrasive Conditions	7
Abrasion Resistance Testing	7
Combined Abrasion and Chemical Corrosion Testing	9
Durability and Service Life	12
Summary	13
References	14

Introduction

Pipe environments are determined by the chemical and physical characteristics of the effluent and soil, vary from site to site and are not always predictable. Materials that can withstand some environments may not be as tolerant of others, and so may not perform as expected.

Aggressive pipe environments that include effluent and soil can result in pipe corrosion or abrasion. These factors, alone or in combination, can lead to a shortened product life or loss of structural integrity. It is very important to select durable materials to ensure long term performance in adverse environments.

Corrugated polyethylene pipe has a documented performance record of almost 30 years. Existing installations have provided the industry with a tremendous amount of information. Research has added to that knowledge base through material analysis and by comparison with other pipe materials. Available data indicates that specifiers can confidently expect a minimum service life of 50 years in typical drainage applications, and in all likelihood even more.

Through research and testing, corrugated polyethylene pipe has demonstrated that it can last longer than many other pipe materials. Specifically, because of corrugated polyethylene pipe's material properties, it withstands corrosion and abrasion better than traditional drainage pipe materials.

Chemical corrosion is the deterioration of the pipe that can result from the chemical action of the effluent or soil on the pipe material. In storm sewers, evidence of chemical corrosion usually shows as deterioration of the pipe invert. Highly corrosive conditions can eventually lead to a total loss of the invert, and a corresponding loss of structural integrity.

Corrugated polyethylene pipe is the preferred choice for installations that are subjected to acidic mine runoff, aggressive landfill leachate or strong acids with a pH as low as 2.0. Plastics withstand the effects of most basic and acidic chemicals, and polyethylene is one of the most chemically stable plastics used in drainage pipe applications.

In fact, acidic or alkaline-based industrial solutions; hydrocarbon-based fluids such as gasoline, motor oil, diesel fuel and kerosene; and detergents, bleaches and other cleaning solutions are often stored, shipped and sold in high density polyethylene packaging. Sometimes polyethylene is even used for rehabilitating concrete pipe to extend its life in a corrosive environment. And protective coatings are often times used to prolong the life of concrete and steel pipe, but always with added cost.

Traditional drainage pipe materials such as concrete, steel and aluminum have varying levels of resistance to chemicals. Acidic chemicals and saline conditions, from road salts or sea water can often cause deterioration in these materials.

Most corrugated polyethylene pipe systems include some type of gasket, usually made of a natural rubber or ethylene propylene (EPDM) compound. In terms of the success of the overall installation, gaskets are a critical link in the drainage system. As such, the effects of caustic solutions and chemicals on the gasket material have also been thoroughly investigated and tested. Detailed information on gasket chemical resistance can be obtained by contacting individual CPPA manufacturing members.

Potentially aggressive chemicals commonly found in storm sewers include road salts, fuels, and motor oils. In some parts of the country, acidic runoff from mines creates very severe conditions. Contaminated soils, such as those with high levels of certain hydrocarbons, can also factor into the overall picture of chemical impact.

A sampling of chemicals that have been tested for compatibility with polyethylene pipe of various materials is shown in Table 1.