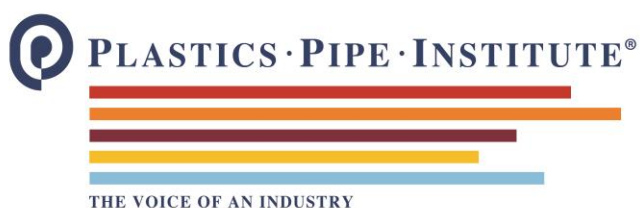


LONG TERM RESISTANCE OF AWWA C906 POLYETHYLENE (PE) PIPE TO POTABLE WATER DISINFECTANTS

TN-44/2015



Foreword

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The Plastics Pipe Institute, Inc.

www.plasticpipe.org

November 2015

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1. INTRODUCTION

The operational service life of a piping system depends on many factors. Resistance to disinfectants is one of these factors. Polyethylene (PE) pipes intended for potable water applications contain additives to provide resistance to the long term oxidizing effects of water disinfectants. Research programs conducted on PE piping compounds resulted in the development of a model that projects the performance of PE pipes in chlorinated (i.e. free chlorine and chloramine) potable water distribution and transmission systems.¹

The model is based on testing in accordance with ASTM F2263, "Test Method for Evaluating the Oxidative Resistance of Polyethylene (PE) Pipe to Chlorinated Water" and projects the performance of PE pipes due to specific end use conditions. PE pipe compounds intended for potable water applications are classified for oxidative resistance in accordance with ASTM D3350. The oxidative resistance categories include CC1, CC2 and CC3 (highest performance).

CC1, CC2 and CC3 PE pipe compounds provide long term resistance to disinfectants in most potable water service applications. Table 1 shows a selection of utility specific conditions and the resultant resistance to disinfectants of pipes produced from PE4710 CC1 compounds.

Table 1: Resistance to Disinfectants at Selected Utilities for AWWA C906 Pipe

	Average US Utility	Indiana Utility-1	Indiana Utility-2	North Carolina	California Utility-1	California Utility-2
Disinfectant type		Chloramine	Chlorine	Chlorine	Chloramine	Chlorine
Average Disinfectant Residual (ppm)		1.6	1.4	0.9	1.9	0.9
Average pH		7.7	8.8	8.6	9.0	7.9
Estimated ORP (mV) ²	650	650	740	680	650	750
Average Annual Water Temperature (°F) ³	57	57	54	68	61	64
Pipe DR and Pressure Class, PC (psi)	DR21 PC100	DR21 PC100	DR21 PC100	DR21 PC100	DR21 PC100	DR21 PC100
Average Working Pressure (psig)	70	70	70	70	65	77
Projected Oxidative Resistance under the specific operating conditions (years)	>100	>100	>100	>100	>100	>100

This technical note provides a method to determine the resistance to disinfectants for different conditions than those shown above.

¹ Jana Technical Report, "JP 916: Jana Mode 3 Shift Functions", March 2012

² Oxidative Reduction Potential (ORP) is a measure of the ability of a chemical substance to oxidize.

³ The Average Annual Water Temperature (AAWT) is a weighted average of the daily water temperature, not the highest temperature observed in the system.