



EPA/WRF Project 04485 – Durability and Reliability of Large Diameter (16 in. and Larger) HDPE Pipe for Water Mains

Survey Definition

Buckling: Unpredictable deformation observed in the pipe as a result of instability of pipe due to the increasing loads which might lead to complete loss in carrying capacity of pipe (*Plastics Pipe Institute, 2008*)

Corrosion: The destruction of materials or its properties because of reaction with its (environment) surroundings (*Plastics Pipe Institute, 2008*)

CUIRE: Center for Underground Infrastructure Research and Education

Durability: Ability of pipe and fittings to remain in service during its design life without significant deterioration (*AWWA, 1994*)

Excessive Internal Pressure: Force exerted circumferentially on the pipe from inside per square unit area of the pipe is internal pressure. Excessive term is used if it results in pipe failure (*Plastics Pipe Institute, 2008*)

Electrofusion: A heat fusion joining process where the heat source is an integral part of the fitting (*Plastics Pipe Institute, 2008*)

Fatigue: The phenomenon leading to fracture under repeated or fluctuating stresses having a maximum value less than the tensile strength of the material (*Plastics Pipe Institute, 2008*)

HDPE: A plastic resin made by the copolymerization of ethylene and a small amount of another hydrocarbon. The resulting base resin density, before additives or pigments, is greater than 0.941 g/cm (*Plastics Pipe Institute, 2008*)

Joint: The means of connecting sectional length of pipeline system into a continuous line using various type of jointing materials (*Plastics Pipe Institute, 2008*)

Life Cycle Cost: Sum of all recurring and one-time (non-recurring) costs over the full life span or a specified period of a good, service, structure, or system. It includes purchase price,

installation cost, operating costs, maintenance and upgrade costs, and remaining (residual or salvage) value at the end of ownership or its useful life (*Plastics Pipe Institute, 2008*)

Manufacturing Defects: An error or flaw in a pipe, introduced during the manufacturing rather than the design phase (*Plastics Pipe Institute, 2008*)

Oxidation: The erosion damage observed in the pipe due to its surrounding environment (*Plastics Pipe Institute, 2008*)

PE3608/3408: The term PE3608/3408 is based on the standard thermoplastics pipe material designation code defined in ASTM F412 and has been referenced extensively within the North American piping industry since the early 1980's. It identifies the piping product as a polyethylene grade P36 with a density cell class of 3 in accordance with D3350, a slow crack growth cell class of 4 also in accordance with D3350, and an 800 psi maximum hydrostatic design stress at 23°C (73°F) as recommended by the Plastics Pipe Institute (*Plastics Pipe Institute, 2008*)

PE4710: The term PE4710 identifies the piping product as a polyethylene grade P47 with a density cell class of 4 in accordance with D3350, a slow crack growth cell class of 7 also in accordance with D3350, and an 1000 psi maximum hydrostatic design stress at 23°C (73°F) as recommended by the Plastics Pipe Institute (*Plastics Pipe Institute, 2008*)

Permeation: Permeation of piping materials and non-metallic joints can be defined as the passage of contaminants external to the pipe, through porous, non-metallic materials, into the drinking water. The problem of permeation is generally limited to plastic, non-metallic materials (*Plastics Pipe Institute, 2008*)

Polyethylene (PE): Polyethylene (PE) is a thermoplastic material produced from the polymerization of ethylene. PE plastic pipe is manufactured by extrusion in sizes ranging from ½" to 63". PE is available in rolled coils of various lengths or in straight lengths up to 40 feet. Generally small diameters are coiled and large diameters (>6" OD) are in straight lengths. PE pipe is available in many varieties of wall thicknesses, based on three distinct dimensioning systems: • Pipe Size Based on Controlled Outside Diameter (DR) • Iron Pipe Size Inside Diameter, IPS-ID (SIDR) • Copper Tube Size Outside Diameter (CTS) PE pipe is available in many forms and colors such as the following: • Single extrusion colored or black pipe • Black pipe with coextruded color striping • Black or natural pipe with a coextruded

colored layer • Third Party Damage: Damage caused by someone other than pipeline operator and owner (*Plastics Pipe Institute, 2008*)

Reliability: Consistency of performing the required function without degradation or failure (*AWWA, 1994*)

References

AWWA (1994). “Minimizing Earthquake Damage, A Guide for Water Utilities,” Denver, Co, 39.

Plastics Pipe Institute (2008). “Handbook of Polyethylene Pipe.” Second Edition, Irving, Texas, USA.