



### **The Pressure to “Go Green”**

As the global economy expands, the demand on resources continues to grow at an increasing rate. These current conditions create the ideal opportunity to identify and utilize products manufactured with recycled materials. However, it is important to carefully review specifications for products manufactured with recycled materials to ensure that performance is not compromised, compared to their virgin (or non-recycled) equivalents.

### **Lack of Industry Specifications for Recycled Materials**

The acceptance of construction products manufactured with recycled materials has been relatively slow. Therefore, there is limited availability of standard specifications to support recycled materials. With respect to corrugated HDPE, there are currently no specifications to specifically address recycled HDPE. There is, however, ASTM F2648: *Standard Specification for 2 to 60 inch Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications*. While this specification does not specifically *exclude* the use of recycled materials, ASTM F2648 is intended for use in land drainage or agricultural applications, and does not contain current industry accepted testing criteria for Slow Crack Growth (SCG) resistance.

### **ASTM F2648 Deficiencies**

ASTM F2648 does include test criteria for Environmental Stress Crack Resistance (ESCR) testing (ASTM F1693), however, this test method, by itself, has proven to poorly represent real world slow crack growth (SCG) resistance. ESCR testing applies a constant strain to the material allowing for stress relaxation and does not accurately measure slow crack growth resistance in installed applications. Furthermore, ESCR testing can have variability in test results by as much as 200%. As a result of these test accuracy concerns (along with AASHTO funded research completed in 1999), ESCR testing was replaced by Notched Constant Ligament-stress (NCLS) testing in 2000.

### **Accurate Slow Crack Growth Resistance Testing**

NCLS testing (ASTM F2136) is required by the two primary standard specifications for virgin Corrugated HDPE pipe – AASHTO M294 and ASTM F2306. Within these standards, an NCLS test value of 24 hours is required at a stress level of 600psi for non-pigmented resins. This testing is conducted on an HDPE plaque made from pre-processed material cut into a notched “dog-bone” shaped sample and then tested in an igepal/water bath mixture at elevated temperatures. The NCLS testing has proven to be a reliable SCG resistance test with consistent and accurate test results.

### **Prinsco’s ECOFLO WT® Testing Exceeds Industry Specifications**

Prinsco performs this critical materials testing on our recycled materials, however, we perform the test on materials from our finished product and target 30 hours. AASHTO funded research has shown that pigmented resins with NCLS times of 18 hours are equivalent to non-pigmented resin times of 24 hours. This means that the NCLS performance of Prinsco’s ECOFLO WT® pipe has a target safety factor of 65% over the AASHTO M294 requirement.

### **Prinsco – An Industry Leader Since 1975**

Prinsco has been a materials technology leader in the corrugated HDPE pipe industry since 1975. During that time we have developed and refined our polymer science technology to manufacture our corrugated HDPE pipe products with first class product performance. All of our material blends are engineered to meet or exceed AASHTO requirements to ensure our customers receive quality products with a maximum service life. We apply this same technology, with additional scrutiny, to our recycled materials to make certain our ECOFLO WT® meets or exceeds those same AASHTO requirements, with the exception of the recycled material content. Prinsco performs extensive testing and analysis on all incoming raw material streams to ensure our recycled materials are not contaminated and are capable of meeting our minimum performance requirements. Once the materials are



analyzed, they are then optimized with virgin material resulting in a material with performance attributes that exceed the requirements of AASHTO M294.

### **Superior Quality Control and Level of Performance**

Prinsco's quality control system implements multiple checks and balances to ensure our product quality and performance exceeds the AASHTO requirements. Our testing does not stop once the pipe is manufactured. Both our virgin and recycled products are subjected to finished product testing, which includes materials testing (NCLS) to ensure the critical SCG resistance criteria is met. While AASHTO requires a value of 24 hours for NCLS testing, Prinsco targets a value of 30 hours, exceeding the minimum required value by 65%. Obviously, this level of material performance is not currently required by an industry, however, we feel it is necessary to leverage our proprietary polymer science technology to provide our customers with a superior level of performance. It has been shown that if HDPE material has poor SCG resistance, failure could occur in a year or two, however, if material has good SCG resistance, the pipe perform for hundreds of years.

### **ECOFLO WT® – Go Green By Going Gold**

With the impact of SCG resistance on long-term performance, it is paramount that material used for corrugated HDPE pipe, whether recycled or virgin, exhibit the performance criteria as specified by AASHTO. These requirements have been implemented as a result of in-depth research, testing, and analysis, and are enforced to ensure that long-term service life is met. It is Prinsco's position that these requirements should not be bypassed, regardless of the material used for the pipe, or the application in which the pipe is used. Don't settle for anything less. Demand The Pipe with Gold Stripe – ECOFLO WT® from Prinsco.