The Association of Postconsumer Plastic Recyclers

HDPE Bottle Application Test
HDPE-A-01

The Association of Post Consumer Plastic Recyclers (APR) recognizes that packaging innovation drives the growth of bottles available for recycling and that growth in the supply of these bottles is essential to the well being of the plastic bottle recycling industry. APR also recognizes that some innovations may create bottles that present technical challenges for recycling. This document represents a tool to help the innovator understand the approximate effect of the innovation on high density polyethylene (HDPE) plastic bottle recycling processes.

The APR encourages Innovators to perform comprehensive recycle evaluation studies on new innovation materials intended to be introduced into the HDPE bottle stream. This Applications Guidance Document describes the protocols to be followed to evaluate the mechanical recyclability of the following Innovation materials that are intended to be made into or incorporated onto HDPE bottles:

1. HDPE Resins
2. Additives
3. Coatings
4. Labels
5. Adhesives
6. Multilayer resins

In particular, a comprehensive recycling evaluation is accomplished by following a step-wise process involving the evaluations of the innovation using Testing Protocols that have been developed by APR. APR recognizes accomplishment and allows upon petition for the Innovator to publicize that they have completed each step. The steps include:

STEP 1 1.00 CRITICAL GUIDANCE DOCUMENT
1.10 Resins, Additives, Coatings, Labels, Adhesives and Multilayer Resins Evaluation Protocol, Critical Guidance

STEP 2 2.00 APPLICATIONS GUIDANCE DOCUMENT
2.10 Bottle-To-Bottle Evaluation, (BtB)

Upon the completion of all parts of STEP 2, meeting or exceeding all of the strictest guidance, APR would consider a petition for full Recycling Guidance Recognition.

The screening tool referred to above in STEP 1 as the HDPE Critical Guidance document (CGD) is intended to help identify possible technical challenges that a new Innovation might create for the HDPE recycle stream. An Innovator is requested to first test an innovation material following the CDG before proceeding to STEP 2 and the more extensive Bottle-to-Bottle evaluation.

When coupling the CGD screening protocol with a Bottle-to-End-Use evaluation, it is necessary to increase the quantity of the Control and Innovation materials used in the CGD protocol to produce sufficient material for making the final test bottles

The guidance contained in this document does not include time as a variable. Innovations which include time as a factor will require additional considerations.

THIS DOCUMENT IS NOT A SPECIFICATION AND DOES NOT IMPLY IN ITS DEFINITIONS, PROCEDURES, OR VALUES FITNESS FOR USE, MARKET ACCEPTABILITY, SAFETY, OR ANY GUARANTEE OR WARRANTY. MEETING THESE GUIDELINES DOES NOT OBLIGATE APR MEMBERS TO BUY BOTTLES CONTAINING THE INNOVATION.

Moreover, the inability of an innovation to meet specified values does not imply recycling failure, but should be a clear message that significant technical challenges might exist under certain circumstances and mitigation of the issue may be needed to avoid degrading the value of the stream of recyclable bottles.

THE FOLLOWING PROTOCOLS DO NOT PURPORT TO ADDRESS ALL OF THE SAFETY ISSUES, IF ANY, ASSOCIATED WITH THEIR USE. IT IS THE RESPONSIBILITY OF THE USER TO ESTABLISH APPROPRIATE SAFETY AND HEALTH PRACTICES AND DETERMINE THE APPLICABILITY OF REGULATORY LIMITATIONS PRIOR TO USE.

1.0 CRITICAL GUIDANCE DOCUMENT (CGD)

Introduction

The CGD is intended to be a screening tool that can be used by Innovators to gain a quick understanding on the impact of their innovation on the HDPE recycle stream before proceeding to the more extensive Bottle-to-Bottle Protocol and other end use protocols. While the CGD protocol is designed as a recycle screening protocol, the material that has been processed in the CGD study can then be used as the starting material to continue the recycle evaluation through a Bottle-to-Bottle study.

Testing Procedures

The procedures needed for performing the tests called for in the recycling protocols are listed below:

- Color (ASTM D6290)
- Melt Index (ASTM D1238)
- Density (ASTM D1505, ASTMD792, or equivalent)
- Melt filtration
- % polypropylene in HDPE (ASTM D7399)

Testing Protocols

The detailed protocols to be followed are listed below and are described in detail in this document.

- 1.10 Resin, Additives, Coatings, Labels, Adhesives, and Multilayer Resins, Critical Guidance

Control Resins

The virgin control resins that can be selected for use following the CGD are listed below. The Innovator is requested to select a Control resin based upon its intended end-use application. These resins are to be used to make both the Control flake and the Innovation bottle flake that will contain the additive, coating, label, adhesive or multilayer resin for the recycle study.

Homo Polymer HDPE
Chevron Phillips Marlex® EHM 6007
Dow UNIVAL™ DMDH-6400 NT 7
Exxon-Mobil Paxon™ HDPE AD60-007

Copolymer HDPE
Chevron Phillips Marlex® HHM 5502BN
Chevron Phillips Marlex® 9505H
Dow UNIVAL™ DMDA-6230 NT 7
Dow UNIVAL™ DMDA-6200 NT 7
ExxonMobil Paxon™ HDPE AB50-003

Labels and Adhesives

If the innovation does not involve labels or adhesives, and if it can be correctly argued that labels and adhesives have no impact on the innovation, the innovation samples can be made and processed without the presence of labels or adhesives.

1.10 Resins, Additives, Coatings, Labels, Adhesives and Multilayer Resins Evaluation Protocol, CRITICAL GUIDANCE

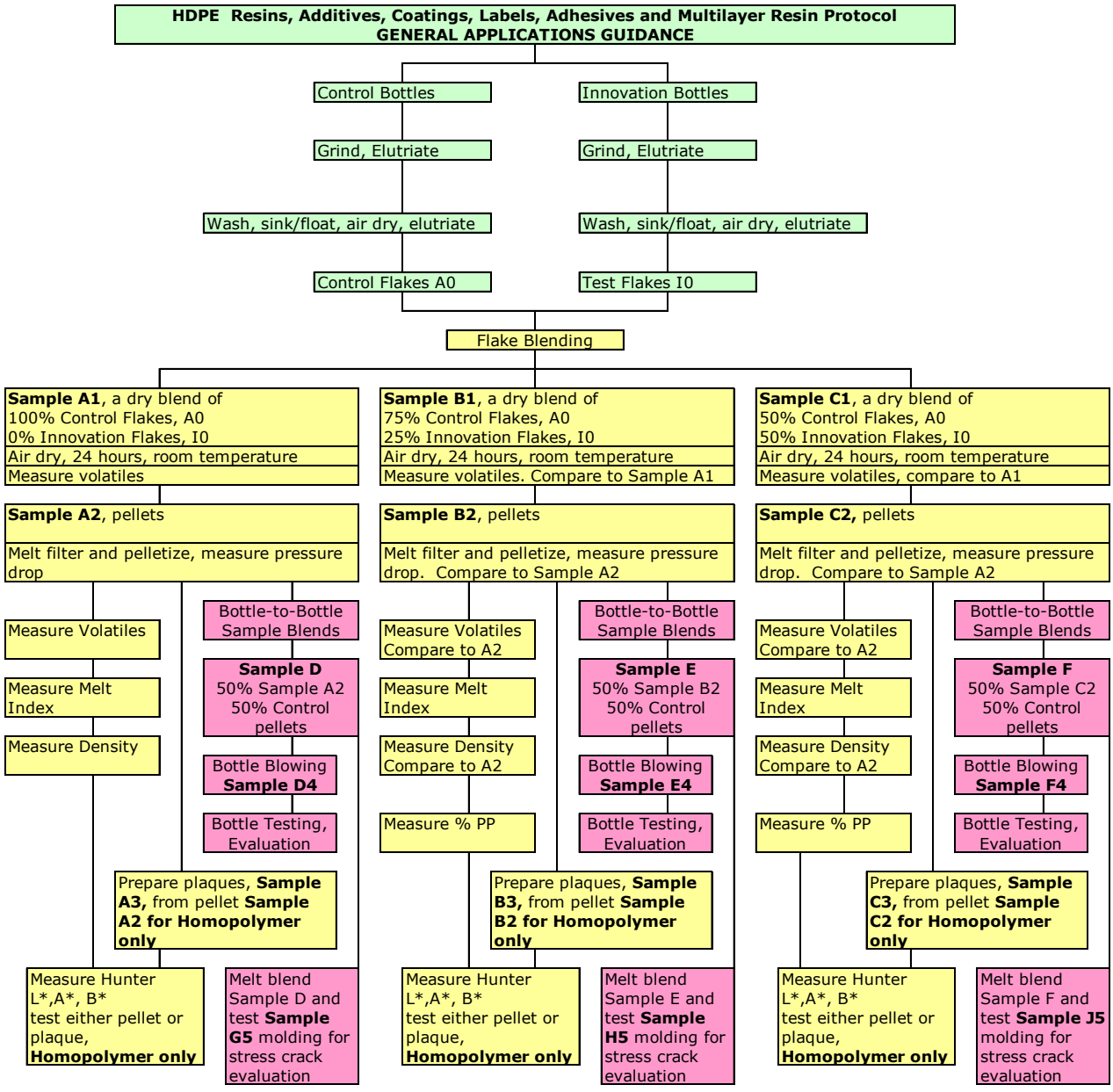
Background

The control bottles required for this test must be made from one of the APR-named control resins. The bottles can be supplied from commercial sources or blown as a separate test set and do not have to be of any special design or size. The additive, coating, label, adhesive or multilayer resin to be evaluated should be incorporated into or onto bottles made using the same control resin.

Resins, Additives, Coatings, Labels Adhesives, and Multilayer Resins Test Protocol

For all extrusion and molding steps, the process should first be established on the Control resin and then used without changes for the innovation materials. Any required processing changes for the innovation material content samples should be documented and reported. It is recognized that minor process changes may be needed and these will not be considered significant when judging the innovation materials suitability for recycling.

Resins, Additives, Coatings, Labels, Adhesives, and Multilayer Resins Evaluation Flow Schematic



Control and Innovation/Variant Bottle Manufacture

1. Control bottles should be made from one of the named resins listed in the APR Bottle Recycle Evaluation Protocol. The Innovation bottles should be made with this same resin incorporating the resin, additive, coating or multilayer resin at the intended use level.

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