



The Association of Postconsumer Plastic Recyclers

Labels, Closures and Attachments Floatability Test PET-S-05

APR recognizes that packaging innovation drives the growth of bottles available for recycling and growth of supply of 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 is a preliminary screening procedure to help innovators determine potential difficulties in plastic labels, closures, and attachments to be used for PET bottles. In particular, sleeve labels proposed for PET bottles should be considered for the Floatability Test. Experience has shown some sleeve labels can be technically problematic.

This test is not for paper labels due to floatability evaluation.

The intent of this Floatability Test is to meld successful results here with expectation of successful testing by APR's Critical Guidance for Sleeve Label Substrate Document. **The Floatability Test does not replace the more thorough Critical Guidance testing**, but should be considered a preliminary screening for color effects. The Floatability Test applies to decorated labels.

The guidance contained in this document does not guarantee acceptance or rejection of tested materials. APR encourages users of this protocol to discuss results with various knowledgeable parties using and specifying post consumer PET material to determine usefulness of subject test materials. Any guarantees or warranties are expressly disclaimed, including without limitation any implied warranties of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

Note to the Reader

THIS GUIDANCE HAS BEEN PREPARED AS A SERVICE TO THE PLASTICS PACKAGING INDUSTRY TO PROMOTE THE MOST EFFICIENT USE OF THE NATION'S PLASTICS RECYCLING INFRASTRUCTURE AND TO ENHANCE THE QUALITY AND QUANTITY OF RECYCLED POSTCONSUMER PLASTICS. THE INFORMATION CONTAINED HEREIN REFLECTS THE INPUT OF APR MEMBERS FROM A DIVERSE



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CROSS-SECTION OF THE PLASTICS RECYCLING INDUSTRY, INCLUDING PROFESSIONALS EXPERIENCED IN THE RECYCLING OF THE POSTCONSUMER PLASTIC BOTTLES DISCUSSED IN THIS GUIDANCE. IT OFFERS VALUABLE INSIGHT ON HOW LABEL DESIGN IMPACTS CONVENTIONAL PLASTICS RECYCLING SYSTEMS AND PROVIDES USEFUL RECOMMENDATIONS FOR UNDERSTANDING HOW TO MAKE THEM COMPATABLE WITH CURRENT RECYCLING SYSTEMS.

BECAUSE NEW TECHNOLOGY DEVELOPMENTS ARE ALWAYS BEING MADE, THIS GUIDANCE CANNOT ANTICIPATE HOW THESE NEW DEVELOPMENTS MIGHT IMPACT PLASTIC BOTTLE RECYCLING. WHILE THE INFORMATION IN THIS GUIDANCE IS OFFERED IN GOOD FAITH BY APR AS AN ACCURATE AND RELIABLE DISCUSSION OF THE CURRENT CHALLENGES FACED BY THE PLASTICS RECYCLING INDUSTRY, IT IS OFFERED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING **WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED.**

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I. Sink/Float Test

The PET recycling process relies on non-clear, non-PET materials being removed in order to obtain technically desired product. A number of removal unit operations may be conducted. The sink/float unit operation is relied upon to separate materials with a specific gravity less than 1.0 from PET. The following procedure assesses the sink/float separation potential for labels, closures, and attachments in an environment similar to unit operations.

The protocol does not purport to address all of the safety issues, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to determine the applicability of regulatory limitations prior to use.



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Equipment/Supplies List

- Test Labels
 - Wrap-around, 0.6% by weight per test
 - Sleeve/Stretch, 3% by weight per test
 - Adhered, 20% surface area per test
 - Closure, 15% by weight per test
- PET Flake
 - Ground flake about 1 cm (3/8 inch) nominal in size
 - Quantity determined by the number of tests to be run and batch sizes required for each test
- Glass Beakers sized appropriately for the batch size
 - Example: 2000 ml beaker to prepare a 1000 ml caustic wash solution.
- Stainless Steel baffled beaker preferred for washing sized appropriately for batch size
 - Example: 6 inch diameter by nine inches in height with four 3/4 inch baffles for a 250g flake wash.
- Hot plate capable of heating to 100⁰C
- Scale or balance capable of measuring 500 (+\ - 0.5) grams
- Overhead stirrer capable of 1000 rpm
- Stirring impeller - 3 blades, pitched, and 3.0 inch diameter/or sized appropriate for batch vessel
- Colorimeter/spectrophotometer
- Thermometer
- Strainer - non-aluminum, fine mesh
- Graduated cylinder, 1000 ml
- Triton X- 100 nonionic surfactant
- Caustic (NaOH)

*** Be sure to read all material safety data sheets.**

Label or Closure (lined/unlined) Sample Procedure

1. Prepare Sample A – Unlabeled Control PET Flake
2. Prepare Sample B – Test Flake (500 grams). Cut up labels into 1.0 cm (3/8 inch) squares and Sample with PET as required.



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- i. 0.6% Wrap (by weight %)
 - ii. 3% Sleeve (by weight %)
 - iii. 20% adhered area
 - iv. 15% Closure (by weight %)
3. Weigh the cut labels, closures, or attachments. Record exact weight of cut up label, closure, or attachment.
4. Prepare a wash solution of 0.3% by weight Triton X-100 (6.0 gms or 5.7 ml per 2,000 ml water) and 1.0% by weight caustic (20 gms NaOH per 2,000 ml water).

Note: Triton X-100 must be dissolved in warm (nominal 100°F) water prior to the addition of caustic.
5. Wash each Bottle Flake Sample separately at a ratio of 500 grams solids per 2,000 ml wash solution. Wash in highly agitated (1000rpm) water at 88 ± 2 °C (190°F) for 15 minutes. After 15 minutes of washing, stop agitation and remove agitator. Stop heating. Let mixture of solids and solution stand for several minutes to allow floatable materials to float. Skim off floatables.
6. Separate sinking solids from wash solution by pouring mixture through a strainer. Add sinking solids to room temperature rinse water at an approximate ratio of 500 grams sinking solids to 2 liters of water. Let stand for five minutes to allow remaining lights to float to the surface.
7. Repeat sink/float once again until all visual floatable labels have been removed.
8. Transfer PET flakes to strainer, rinse flakes in cold running tap water while vigorously stirring the flakes for 10 minutes using the manual stirring bar. Drain the material.
9. Air dry flake.
10. Examine without magnification from a distance of 12 inches using illumination typical for reading and remove all visual labels from test sample.



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Evaluation

Testing has shown that 95% of typical polyolefin labels, acceptable for recycling, are removed by this specific washing and sink/floating procedure. Additional separation is expected by elutriation. Closure and attachments are not expected to be removed by elutriation.

These results do not imply passing this test will mean meeting or exceeding Critical Guidance testing. Additional testing is needed