Non-Metallic Cap Liners for Agricultural Chemicals

Study for the ACRC Technical Committee
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Background

• Asked to look into different non-metallic cap liner options in the marketplace today
• Will discuss the Pros and Cons of Induction Foils
• No recommendations will be made – just an information gathering presentation
Foil Liners – the pros and cons

- **Pros**
  - Excellent seal when applied correctly
  - Tamper Evidence and Counterfeit protection (branded holograms on foils in LATAM)
  - Can act as a chemical barrier layer
  - Commonly used in AgChem industry

- **Cons**
  - Can have over/under induction heating
  - One year shelf life and climate control of foil liners to avoid layer delamination
  - Chemical attack and pinholes
  - Residual foil will remain on HDPE bottles even after multiple cleanings resulting in recycle contamination and/or premature screen pack fouling
Example of Residual Induction foil on an AgChem container land
Other issues on foil induction sealing to consider

- Some companies use foil as a liner presence detection in post capping QC.
- Foil is typically used for a one-time seal – especially with a pulp backer, not resealable
- “Dirty Seals” – without a tab or easy peel, can lead to farmers opening with pocket knife
- Would thinner foil layers come off the land better or at least extend the life of the screen packs at ACRC recyclers?
Foam Liner Options

- Polyethylene Foam Liner types (F-217, F-219, F-828 (PE/PP blend))

F217 Liners:
A three-ply liner composed of a low density foam core between two solid layers of low density polyethylene.

Benefits: F217 liners have excellent chemical resistance and a low moisture transmission rate. F217 also has good taste and odor resistance.

Buy F217 Lined Caps

Polyethylene Foam Liners:
An ideal general-purpose liner material, the compressible PE foam creates a stable seal.

Benefits: PE foam has good chemical resistance against acids, alkalis, solvents, alcohols, oils, household cosmetics, and aqueous products.

Disadvantages: It has fair to poor resistance against hydrocarbon solvents.
Poly Vinyl/Pulp Liners

A pulp / poly liner consists of a poly-vinyl film adhered to a white pulp paper backing.

Benefits: A good liner for chemical resistance, mild acids, alkalis, solvents, alcohols, oils and aqueous products.

Disadvantages: Not recommended for active hydrocarbons or bleaches.
Foamed PEs (F-217 based) with enhanced barrier and chemical resistance
More foamed PE with barrier layers

- Barex – Barex® is a traditional reseal closure liner consisting of an impact-modified acrylonitrile-methyl acrylate copolymer film laminated to EPE (expanded polyethylene, C25) foam with excellent gas barrier and chemical resistance properties.
- Lasan Polyester II -- Lasan Polyester II™ is a multi-purpose material that combines the properties of PET/PVDC and exceptional chemical resistance.
- Esterfoam -- Esterfoam™ is a primary base liner with a foam core with a PET film on both sides.
PolyCone Lined Caps

Made from LDPE plastic, these cone liners provide a wedge-type seal across the top of the container as well as the inside diameter.

Benefits: Commonly used for liquid products, cone liners are stress crack resistant, offer superior torque retention, and have excellent sealing characteristics.
Vented Foam Liners

- Full-faced foam
- Single-point foam
Molded Components – another option for venting
Summary

• Reviewed the Pros and Cons of induction foils with respect to the agricultural chemical container recycling community
• Presented several options of non-metallic cap liners to consider
• Induction Foil OEMs all have an extensive foam cap liner business so you can go to your current supply channels for foamed cap liners.