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An Avure Packaging Primer - Trays for HPP

How trays containing meats, ready meals, and more can be used for HPP



Package Type:

Semi-rigid, sealed polymer container capable of use for solid foods or ready meal components consumers either consume directly from the container or remove individual items for use in recipes or placement on a serving dish. Typically labeled or decorated on flat lid film surface unless secondary pack contains the tray. Can also be vacuum skin packed with drawn film covering product placed in tray.

Typical HPP Product Uses:

- Sliced premium cured meats
- Individual protein cuts, raw or pre-cooked
- Ready meals and components

Key Characteristics:

- Generally rectangular in cross-section, generally with rounded corners; some pre-made by container supplier and provided in nested stacks to filling operation, but some produced on in-line thermoform-fill-seal lines.
- Peel seal lid films on top flange of containers; in some cases, printed paperboard sleeves or cartons are used after HPP processing.
- Wide openings for easy product access.
- Height to average width $((L1+L2)/2)$ ratios can range from below 0.1:1 to about 0.25:1, in extreme cases, up to 0.35:1.



HPP Defined: Extreme Pressure and Water

Avure's HPP uses ultra-high pressure (up to 87,000 psi or 6,000 bar) and purified, cold water to keep packaged food and beverages pathogen-free, and stay fresh longer without preservatives or chemicals. Learn more at Avure-HPP-Foods.com

Key Characteristics (cont.):

- Sufficiently rigid for ease of handling by consumer, especially if warmed, while ensuring sufficient flexibility and resiliency to accommodate distortion from the headspace compression experienced during the HPP cycle and return to original configuration after pressure release.
- Can be gas flushed to limit oxygen in headspace and extend shelf life.

Typical Container Materials & Production Process:

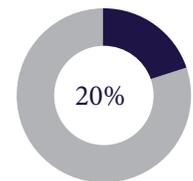
- **PET** - clear or pigmented containers. Sometimes with PE laminated film to provide sealing surface.
- **HDPE** - translucent to opaque containers.
- **PP** - good contact clarity containers, microwave compatible.
- **CPET** - opaque containers capable of microwave or conventional oven heating.
- Co-extruded structures can include EVOH or nylon for enhanced oxygen barrier; barrier lid films should be used in conjunction for high total package barrier. CPET trays inherently have equivalent oxygen barrier to EVOH barrier structures.
- Vast majority of containers are thermoformed, as for these height to width ratios, injection molded generally not practical or required.
- Lid films range from oriented films with peel-seal layers to complex and heavy weight coextruded films.



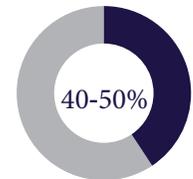
HPP helps orange juice retain 90 percent of its vitamin C even after 20 weeks of refrigeration.

Estimated Global Yearly Food Losses

Meat & Dairy Products



Fruits & Vegetables



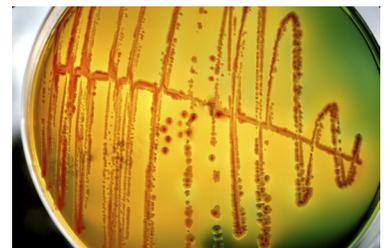
Special Design & Operational Considerations:

- Rounded corners at transition from sidewall to bottom preferred, flat areas at corners between sidewalls can provide some increased resistance to permanent distortion after pressure cycle.
- Rigid flanges minimize stress of headspace compression on lid films, avoiding seal failure or fracture of barrier layers in film lidstock. This is more difficult on inherently lighter weight form-fill-seal packs, and combination of lidding strength and bottom panel features may be required for success.
- Lid films must possess sufficient tensile strength to avoid permanent stretching during pressurization and good puncture resistance to withstand handling during processing and distribution and storage. In some cases, paperboard.
- Low sidewalls results in compression distortion being taken up primarily by sidewall corners, container bottom flexing and some reversible distortion of container flanges, particularly on long sides of tray. Simple sidewall designs with no or minimal embossed or raised features that can permanently invert during headspace compression are best.
- Minimizing headspace reduces the amount of distortion that must be taken up to avoid rupture or permanent deformation after pressure cycle; excessive headspace will lead to unacceptable container failure rates and downtime for clean up.
- While minimizing headspace, filling operations must avoid product contamination on top sealing flange or rim, as it will interfere with creation of strong seals that survive the pressure cycle.
- Alignment of containers in lid film heat-seal station crucial to create strong and uniform seals around the entire top flange or rim. Failure to achieve this will result in weak points that can rupture during pressure cycle. Form-fill-seal versions inherently have an advantage over preformed trays.
- Pre-HPP process pressure sensitive or glue-applied labels should avoid water-absorbing materials, be well adhered over entire label surface to avoid water incursion between label and bottle sidewall, and undergo reversible sidewall distortion without visible effect.
- When using pre-applied shrink sleeve labels, avoid extreme bottle sidewall contour profiles to prevent fracturing of film label during compression.
- Test post-HPP applied labels to ensure proper adhesion and smooth lay on bottle surface at the application temperature and humidity conditions.



A Selection of HPP Products

HPP foods and beverages include ready-to-eat and ready-to-cook meats, fruits and vegetables, salsa and guacamole, juices and smoothies, ready meals, soups and sauces, wet salads and dips, dairy products, seafood and shellfish.



HPP inactivates dangerous foodborne pathogens, such as E. coli and Listeria.