

CAPS & CLOSURES

Plastic caps and closures are essential in the packaging industry, ensuring product safety and quality across various sectors. They are widely used in food and beverage, household products, cosmetics, pharmaceuticals, and industrial applications. These vital components provide secure sealing and protection during shipping and storage, enhancing the consumer experience with user-friendly features such as flip-tops and snap-fit lids.

Thermoplastics are the preferred material for caps and closures. They offer excellent product containment, ensuring the package is sealed and leak-proof, and can withstand the rigors of shipping and ecommerce. Thermoplastics also

help extend shelf life, prevent contamination, and can be designed with tamper-evident features, making them a reliable choice for product preservation and safety.

Ergonomic closure design and ease of use are crucial, especially for elderly and disabled consumers. Designers must ensure that the torque requirements for screw-on/screw-off caps are appropriate, making them easy to open and close without excessive force. Flip-tops and squeezable closures are favored for their convenience, requiring less effort to open. Snap-fit lids are another user-friendly option, allowing consumers to securely reseal the product quickly and easily, even after multiple uses.

FOOD & BEVERAGE

Requirements: Ensure product containment, prevent leaks, and withstand pressure, especially in carbonated drinks. Must be resealable to protect unused product.

Examples: Flip-top caps for sports drinks and snap-fit lids for condiment containers.

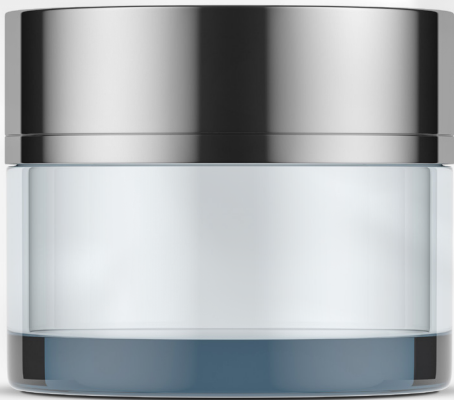




HOUSEHOLD PRODUCTS

Requirements: Prevent leaks and contamination, often need to be child-proof and tamper-evident.

Examples: Child-resistant caps for cleaning supplies and screw-on caps for laundry detergents.



COSMETICS & PERSONAL CARE

Requirements: Contribute to product preservation and safety, enhance brand presence through color and aesthetics.

Examples: Aesthetic and secure closures for shampoo bottles and makeup containers.



PHARMACEUTICALS

Requirements: Meet strict safety standards, including tamper-evident features and child-resistant designs.

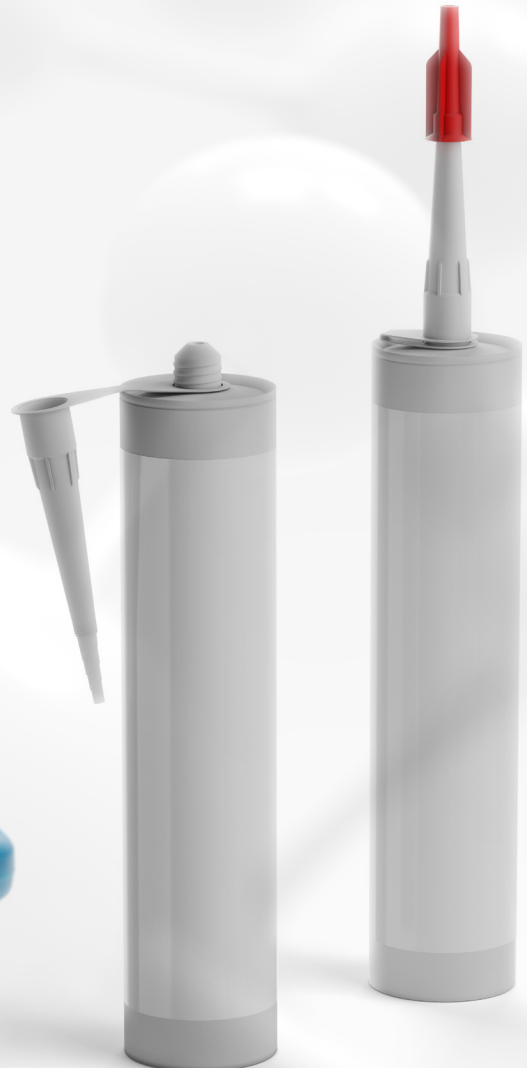
Examples: Child-resistant caps for medication bottles and tamper-evident seals for over-the-counter drugs.




INDUSTRIAL

Requirements: Withstand harsh conditions and provide a secure seal.

Examples: Heavy-duty closures for chemical containers and industrial lubricants.



FOCUS AREA	KEY REQUIREMENTS	AVIENT TECHNOLOGIES
Visual aesthetics	<ul style="list-style-type: none"> • Offer custom color design and special effects • Provide brand differentiation • Utilize cost-effective solutions • Enhance design and identification • Allow permanent and repeatable markings 	<ul style="list-style-type: none"> • Solid colorants • Lower cost-to-color liquid color concentrates • Special effects colorants – molded metallics, plated • Smartbatch™ Combination Colorants and Additives • Laser marking for decoration and identification
Dimensional stability	<ul style="list-style-type: none"> • Limit shrinkage and warpage • Maintain mechanical properties 	<ul style="list-style-type: none"> • Solid colorants • Nucleating agents
Production efficiencies	<ul style="list-style-type: none"> • Improve cycle times 	<ul style="list-style-type: none"> • Nucleating agents • Smartbatch colorants and additives • Laser marking additives • Clean processing additives • Slip agents • Antistatic additives • Laser marking for coding
Sustainability and increased post-consumer recycled content (PCR) usage	<ul style="list-style-type: none"> • Control viscosity to maintain operational efficiencies • Provide lightweighting • Extend shelf life • Mitigate odor 	<ul style="list-style-type: none"> • Melt flow modifiers or enhancers • Nucleating agents • Predictive laser measurements • Colors that manage warpage and dimensional stability • Chemical foaming agents • APR-approved oxygen scavenger in the closure • UV barrier additives • Odor adsorbers • Clarifiers • Compatibilizers and heat stabilizers
Performance	<ul style="list-style-type: none"> • Protect brand integrity • Enhance consumer experience • Prevent environmental stress cracking and hinge failure • Maintain seal 	<ul style="list-style-type: none"> • UV blockers • Solid colorants and liquid color concentrates • Impact modifiers • Antimicrobial additives • Antioxidants • TPE liners



The market for plastic caps and closures is driven by the need for innovative materials and designs that meet both functional and aesthetic requirements. By focusing on ergonomic design, material selection, and industry-specific needs, designers and manufacturers can create closures that not only protect products but also enhance the consumer experience and brand presence.

Avient is a premier provider of specialized and sustainable material solutions and services that transform customer challenges into opportunities. Our range of world-class services includes:

Color Technology: Custom color design, saturated colors, and special effects to fill market niches and eliminate secondary operations

Color & Design Services: Trend and color insights, and product development assistance to optimize design and gain speed to market, include collaborative workshops at our ColorWorks™ Design & Technology centers

Regulatory Coordination: Aid with new product approvals to reduce regulatory overhead and minimize risk

Field Technical Service: Support for tool design, startup and production optimization to gain manufacturing efficiencies

Sustainability: Innovative materials and solutions to help you meet your sustainability goals

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