

# TECHNICAL ASSISTANCE BULLETIN

**TOPIC:** STEEL CLOSURE BUTTON GUIDELINES

NUMBER: 0020 REVISION: E ISSUED: August 8<sup>th</sup>, 2022



## Purpose

This bulletin provides an overview of best practices to obtain a properly functioning tamper evident button on steel closures.

## Button Closures

- The button is designed to pull-down when the appropriate vacuum is met and is designed to return to an up-button position with an audible click once the vacuum seal is broken or vacuum levels drop below the minimum up-button vacuum. It is important that proper vacuum levels are maintained throughout the package life and all its storage conditions until the original seal has been broken.
- Differences between down and up flip values can be minimal. This requires packers to target high enough final package vacuums to ensure down buttons are maintained until the original seal is broken.
  - **Example:** A packer located 300-feet above sea level used an 82mm closure with an 8”Hg down flip and 4”Hg up flip and actually achieved 11”Hg when packages cooled to 70°F. Product was shipped to Denver, CO (elevation 5,300 feet) during the summer, and package temperatures reached 100°F. During transit, package vacuums dropped to 3”Hg, resulting in an up button. Once packages cooled to 70°F on the store shelf, package vacuums rose to 6”Hg but still had up buttons as down flip vacuums were not achieved. The packer should have targeted package vacuums greater than 12”Hg to avoid package vacuum dropping below the up-flip vacuum.

## Final Package Temperature

- Final package temperature will influence internal package pressures:
  - For every 10°F increase in product temperature, final package vacuum will decrease by 1”Hg.

## Final Package Elevation

- Atmospheric pressure decreases with elevation, which decreases package vacuum:
  - For every 1,000 feet of elevation, final package vacuum will decrease by 1”Hg.

## Processing Parameters That Effect Vacuum

- **Headspace:** The greater the headspace achieved pre-capping, the more vacuum that is achieved at a given capper efficiency. The larger headspace also allows more room for product expansion and less pressure build-up during pasteurization or retort processing.
- **Product Sealing Temperature:** Product contracts during cooling and expands during heating. Other factors being constant, hotter fills will result in higher vacuums and colder fills in lower vacuum when stored under ambient conditions.
- **Air in the product:** The more air that is trapped in the product, the lower the vacuum. It must be remembered that by increasing the initial product temperature the solubility of gas is lowered and a greater vacuum can be obtained.
- **Capper Vacuum Efficiency:** The ability of the capper to produce vacuum in the sealed container will impact final vacuum. The most convenient, routine check on the vacuum efficiency of a steam flow capper is the cold-water vacuum check. Vacuum on a properly head spaced container should be 22-26”Hg using a closed gauge.

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## Final Vacuum-Sensitive Products

Button Closures can be used successfully on most hot filled and forced cool products. There are products however, that cannot be packed with button closures or may require special attention:

- **Pickle Products:** Button closures can be used successfully on pickle products but may require changes in the customer's operation. Pickle and brine temperature, headspace, air in the product or foamy brine are obstacles that may have to be overcome to achieve the minimum vacuum for proper button function.
- **Peppers:** Button closures cannot be used for Pepper (chili, jalapeno, etc.) products due to air in the product. Package vacuum after processing may be sufficient to pull the buttons down but the air in the product will release overtime, resulting in up buttons later.
- **Aseptic Cold Fill Juice Products:** Buttons cannot be used on aseptic cold filled juice products. Air in the product and temperature increase experienced with cold fill and ambient storage results in insufficient vacuums to hold the button down. Products filled at 40°F (4°C) and stored at 80°F (26°C) will experience approximately 4" Hg vacuum loss. Trapped air, especially when foaming occurs, can result in as much as 10" Hg loss of vacuum from the time of sealing to storage later in a refrigerated warehouse.

## Button Closure Checklist

Many factors must be considered before converting to a button closure. The following parameters should be documented before attempting a conversion:

- Minimum vacuum requirement of closure to be used. Refer to the respective Technical Data Sheet to locate the minimum vacuum required for each closure size and type.
- Product:
  - Sensitivity to vacuum, air entrapment potential.
- At the capper (sealing machine) for each product type and size:
  - Vacuum, product sealing temperature, headspace, and capper vacuum efficiency (cold water vacuum check).
- Post processing (for each product type and size):
  - Product temperatures, headspace, and final vacuums under ambient conditions for each product.

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