



**THERMAL PROCESSING
TRAINING**

Module 17. Closures for Glass Containers

Section 9 CFR 431.2(c)



Purpose and Objectives



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- Purpose of Module 17:
 - Provide knowledge of common closures and techniques to evaluate closures for glass containers.
- Performance Objectives:
 - Can evaluate glass closure examinations and determine whether recorded results are complete and within specification.



The Basic Parts of a Glass Container



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- **Finish:** Holds cap or closure
- **Body:** Made in body mold
- **Bottom:** Made in bottom plate



CONTINUOUS THREAD
(C.T. FOR SCREW CAPS)



PUSH ON
TWIST OFF (PT)

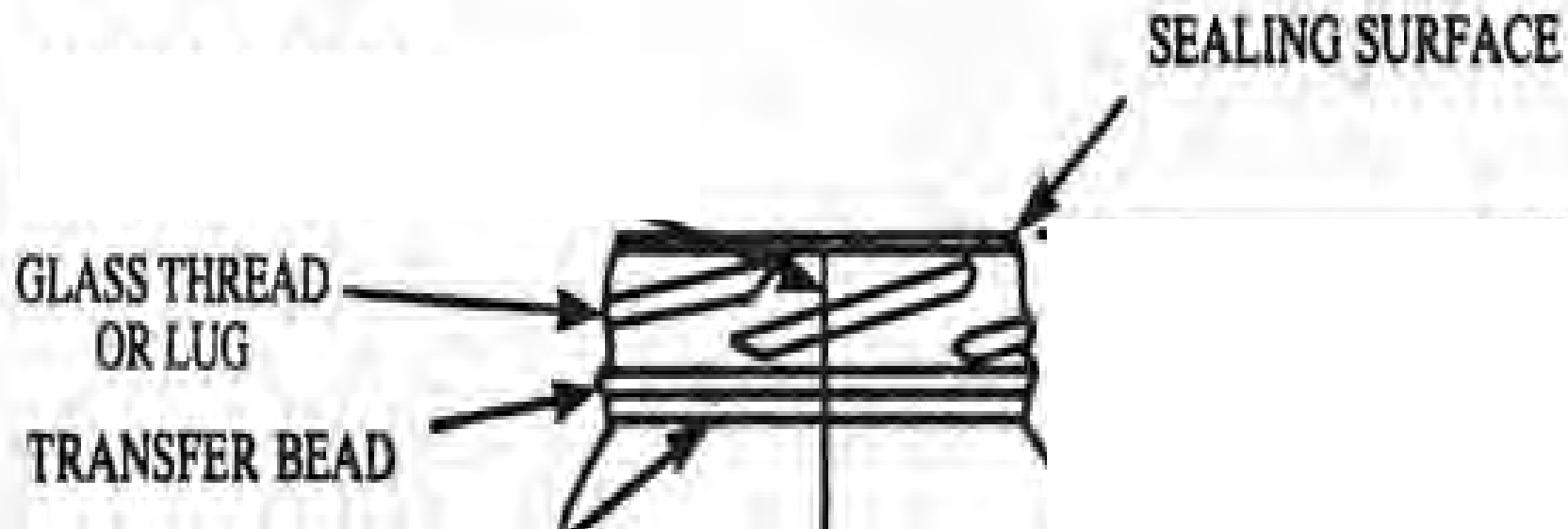


The Finish



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- **Sealing Surface:** Contacts sealing gasket
- **Glass Thread or Lug:** Protruding ridges for fastening closure
- **Transfer Bead:** aids in transfer of container



The Finish (2)



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- **Vertical Neck Ring Seam:** A line from matching the two parts of neck ring
- **Neck Ring Parting Line:** Horizontal line from matching neck ring parts with body-mold parts

VERTICAL NECK
RING SEAM



NECK RING
Parting Line

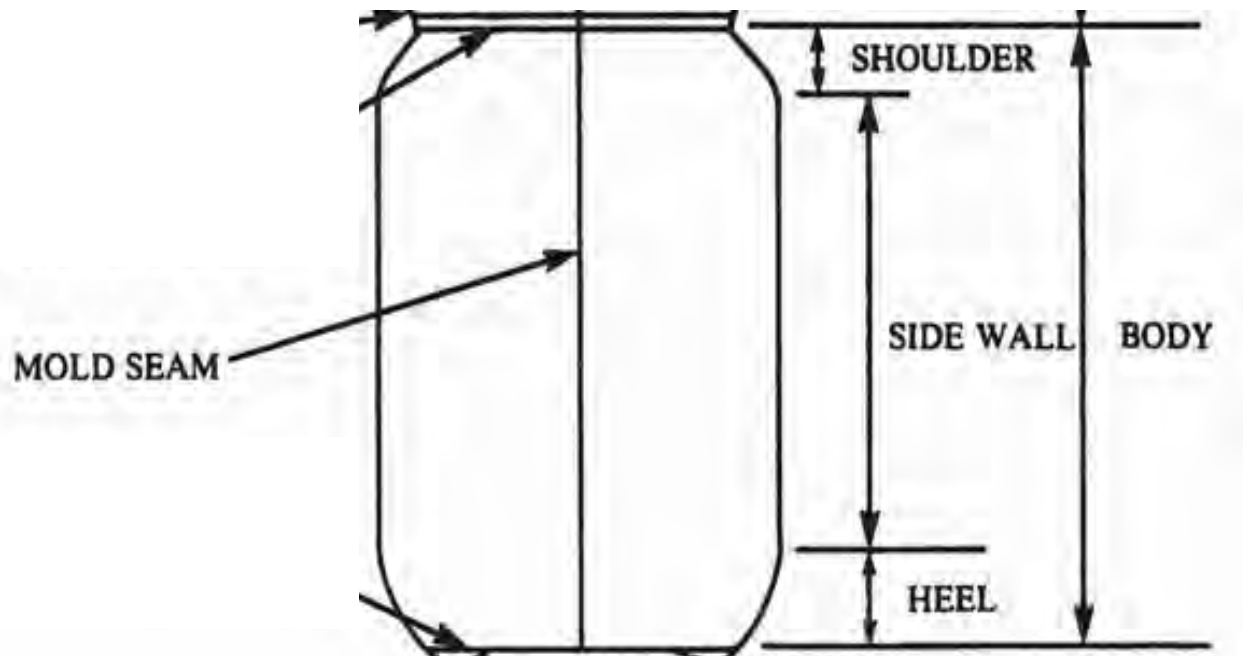


The Body



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- **Shoulder:** Top portion where diameter decreases
- **Side Wall:** Area between shoulder and heel
- **Heel:** Curved portion at bottom
- **Mold Seam:** Vertical line from matching two parts of body mold

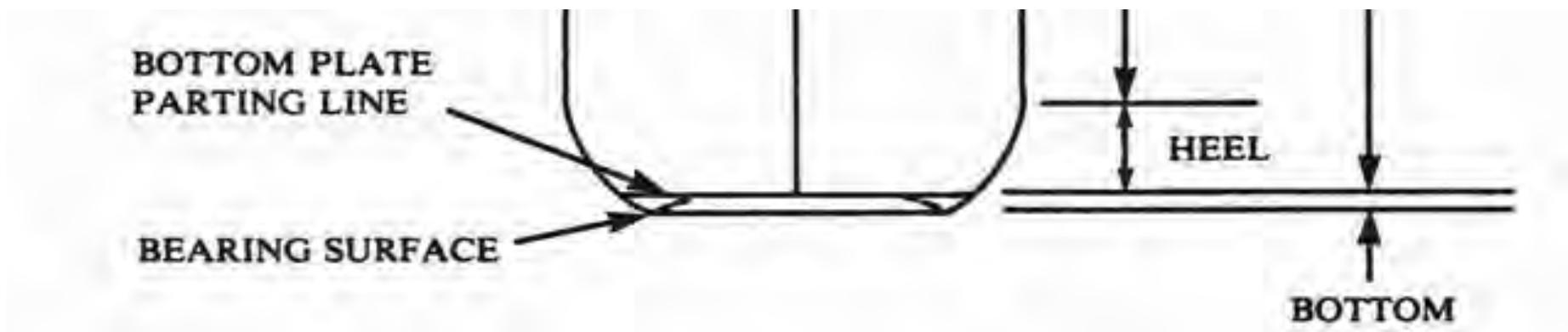


The Bottom



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- **Bottom Plate Parting Line:** Horizontal line from matching body-mold parts with bottom plate
- **Bearing Surface:** Portion on which container rests



Discussion of the Finish



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- Hundreds of different finishes
- Specific finishes are designed for specific closures
- Glass finishes are standardized

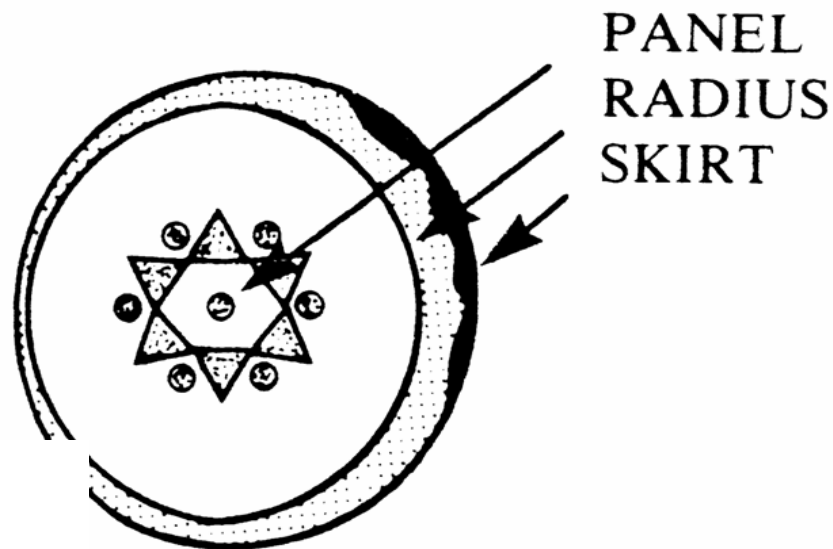


Terms for Glass Closures



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- **Panel:** Flat center of cap top
- **Radius of Shoulder:** Connects panel and skirt
- **Skirt:** Side of cap that serves as gripping surface

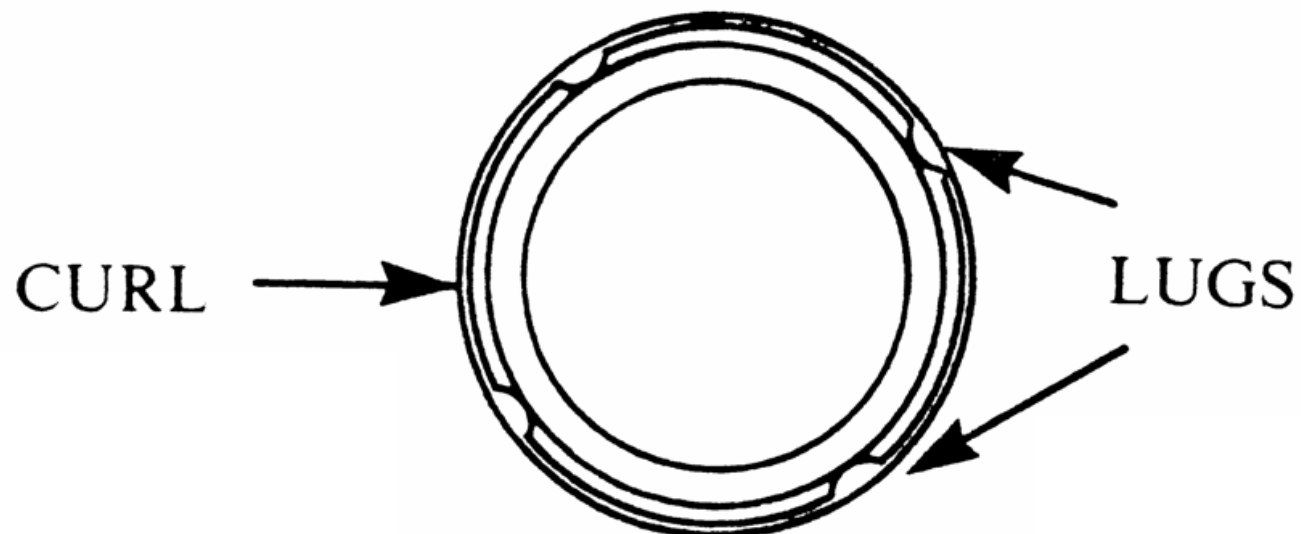


Terms for Glass Closures



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- **Lug:** Protrusion from curl that holds cap in place
- **Thread:** Spiral groove on continuous thread closures



Terms for Glass Closures (4)



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- **Coatings:** Protect cap metal, adhere gasket material and decorate closure
- **Gasket:** Sealing member of cap
- **Plastisols:** Gasket material
- **Safety Button or Flip Panel:** Raised, circular area in panel center used in dud detection and as an indicator to consumer



Factors Affecting Vacuum Formation



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The vacuum within the container plays a vital role in forming and maintaining a good seal.

1. Headspace
2. Product sealing temperature
3. Air in product
4. Capper vacuum efficiency



3 Principal Vacuum Closure Types



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- Low-acid products:
 - Lug or twist cap
 - PT (Press-on Twist-off) cap
- Acidified products:
 - Lug or twist cap
 - PLCT (plastisol-lined continuous thread) closure



Closure Evaluation



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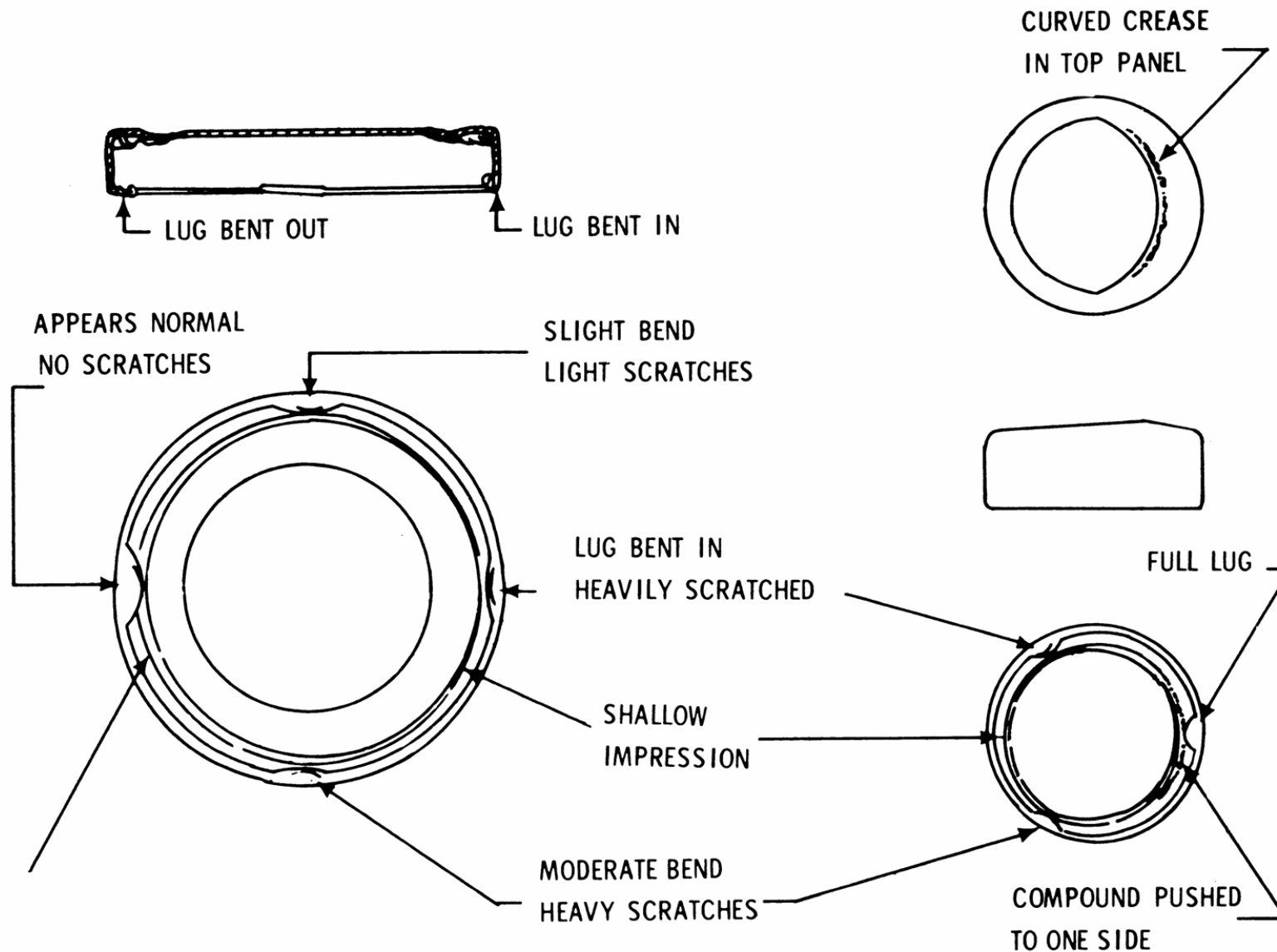
- Visual examinations (non-destructive)
- Closure examinations and tests (destructive)
 - These examinations must be made either before or after thermal processing
 - The establishment must have specification guidelines for closure integrity on file and available for review by Program employees



Tests and Observations for Closure Application and Defects



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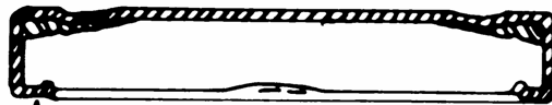


Tests and Observations for Closure Application and Defects



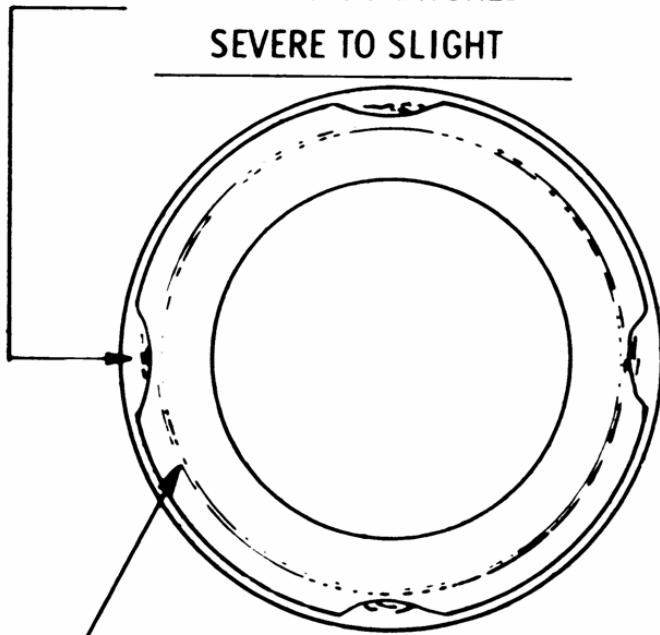
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CRUSHED LUGS



SLIGHT BEND INWARD
ALL LUGS

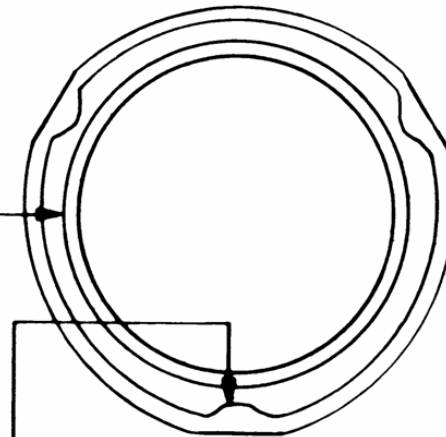
ALL LUGS SCRATCHED
SEVERE TO SLIGHT



IMPRESSION EVEN BUT LIGHT

STRIPPED CAP

NOTE OUT OF ROUND
CONDITION



BARE METAL VISIBLE
ON INSIDE OF EACH LUG

IMPRESSION LIGHT AND SLIGHTLY
IRREGULAR



Frequency of Inspection



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- **Must** be inspected by a trained technician at regular intervals to ensure satisfactory closures
- Includes both visual and destructive tests



Visual Examinations



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- At least one container from each capper
- Include an examination for closure and container defects



Visual Examinations



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- Defects **must** be recorded along with corrective actions
- Should examine every 30 minutes
- Must examine at start of production, after container jam, and after machine adjustment



Cocked-Cap Detectors and Ejectors



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- Serve to eliminate problem containers at capper
- Signal that problem exists



Dud Detectors



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If properly maintained and checked, will monitor seal quality and serve as useful tool.



Physical Examinations



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- Must be conducted EITHER before OR after thermal processing
- Should be made at intervals not to exceed four hours of continuous closing machine operation
- Results along with any necessary corrective action must be promptly recorded



Physical Examinations



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- Additional examinations should be made at start of production, after a container jam, and after machine adjustment



Security



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- Most reliable measurement of proper lug cap application
- Security value ranges are specified by closure manufacturer



Security Value Measurement



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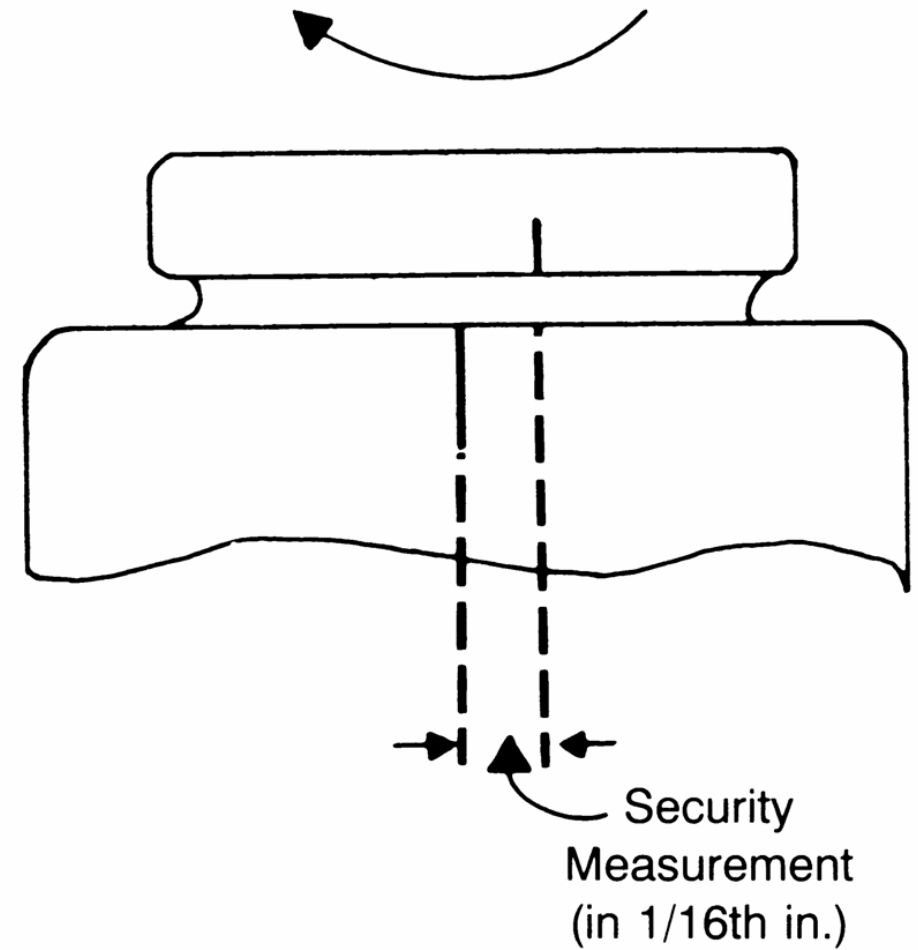
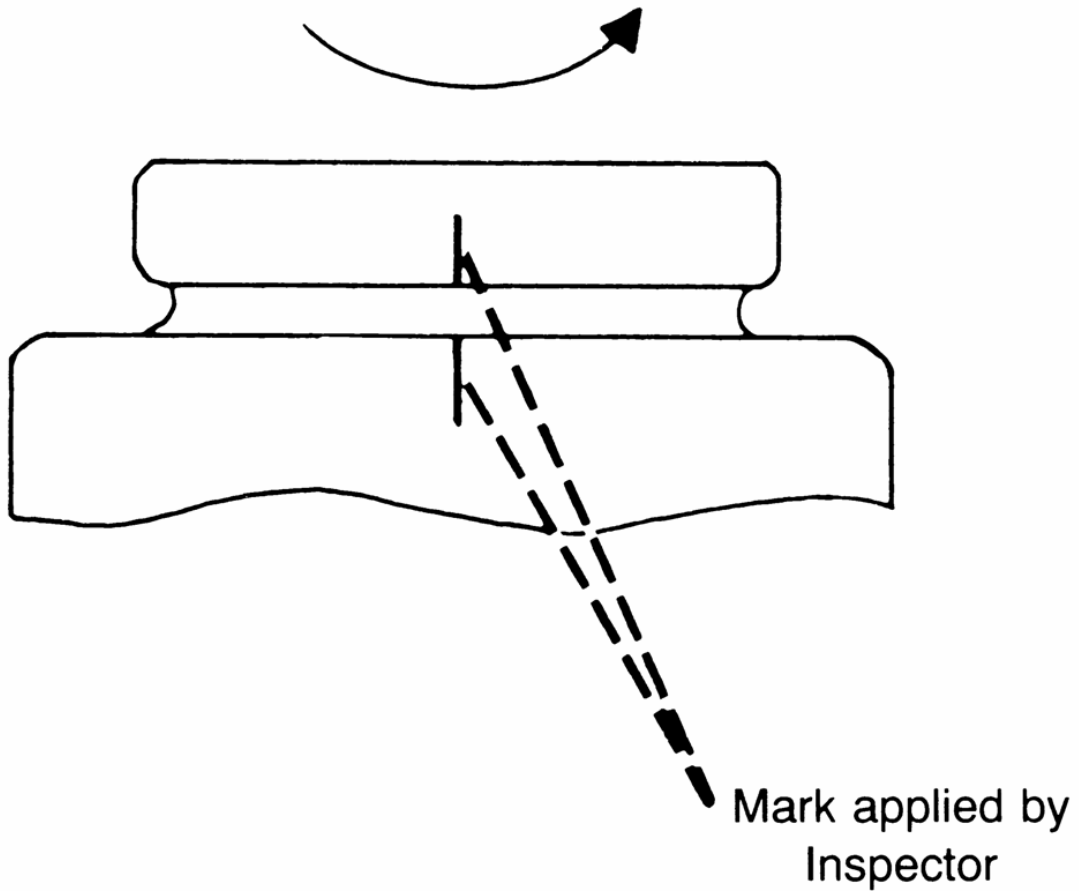
- Make vertical line on cap and jar
- Open cap until vacuum is broken and reapply until it is finger-tight
- Measure distance between vertical lines



Security Value Measurement



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Security Value Measurement



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After processing and cooling values will be lower.



Key Notes



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- Headspace, product temperature, entrapped air in the product, and capper vacuum efficiency affect vacuum formation.
- Examinations of cap application should be done to assure that the cap is level and properly seated on the finish, vacuum is adequate and for gasket impression checked after processing.



Key Notes (2)



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- Lug cap application should be evaluated for level cap, pull-up, security, adequate vacuum and gasket impression after processing.
- PT cap application should be evaluated for level cap, adequate vacuum and gasket impression after processing.
- Corrective action must be taken when readings outside of specifications exist or when caps are loose.



Questions



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Questions?

