GLASS CONTAINER DEFECTS
AND
THEIR CAUSES AND REMEDIES
The Examination of a Container

A good container is a container that will go through the customer’s filling line without causing any difficulty and will carry his product to the consumer.

It is, therefore, essential that before a container is released for sale from the glass plant, it successfully passes on inspection with standards set to meet the customer’s needs.

There are approximately one hundred defects which can develop in the container during the production process, some beyond the control of the operator, for example stones; but by far the largest number occur either in the feeder or machine operation.

It is important that all production personnel learn to recognize the defects and understand what remedies to use in order to eliminate them.

When a glass container fails on the customer’s filling line because of a manufacturing defect, the reputation of glass suffers, which results in a loss of customer good-will. Always remember; "The Price of a Quality Container is Eternal Vigilance."

Remedies offered hopefully give you a basic understanding of defects and their causes. In some instances, several remedies may be needed to correct the causes.
The Various Parts of a Container

In order to identify defects in a container, it is most useful to know all the various types and parts of the container.

Types of Containers

![Narrow Neck](image1)

![Wide Mouth Type](image2)

Parts of a Container

![Diagram](image3)

**The Finish**
This is the top of the container above the neck ring parting line.
It includes: The Sealing Surface, Bore, Bead or Collar.
The Sealing device is in the finish (see next section), also the bore or mouth for filling and emptying.
The bead or collar is used to assist in transferring the parison into the blow mold.

**The Neck**
The part which extends from the parting line to the curve at the base of the neck.

**The Shoulder**
This extends from the base of the neck to the straight part of the body.

**The Body**
The main part of the container which holds the product.

**The Bottom**
The part of the container on which it stands when upright.

**Insweep**
The curve between body and bottom which helps to improve glass distribution and thus strength.

**Push-Up**
The center of the bottom which is raised up to provide a flat surface on the outer edge of the bottom and thus provide a firm seating.

When producing a glass container, various items of mold equipment are used as follows: Blank Mold, Baffle, Plunger, Neck Ring, Blow Mold and Bottom Plate. Where these individual items join, seams are produced in the container. If the seams do not meet the standard specified, then the container is rejected. It is, therefore, essential that all mold equipment be examined in the mold shop and again in the Production Department. It must also be stored correctly and handled with care at all times.

**Neck Ring Parting Line**
Where the neck ring and the blank mold join, there is a seam.

**Blank Seam**
The blank mold is in two parts. It closes around the neck ring and then receives the hot gob of glass. Where the two halves of the blank mold join, there is a seam, which can sometimes be seen as a wavy line on the finished container.

**Baffle Mark**
The baffle sits on top of the blank when counterblow takes place to form the parison. If there is a bad match between blank mold and baffle, then a baffle mark or seam may be seen in the container bottom.

**Mold Seam**
The blow mold action is the same as the blank except that is closes around the bottom plate. Where the two halves join, there is a mold seam, which runs vertically on the whole length of the container.

**Bottom Plate Parting Line**
Where the blow mold and bottom plate join there is a seam.

Suggestions for Remediing Container Defects

It is essential that the machine operator be able to identify defects quickly and accurately, and to know how to remedy them. Major defects have been listed, with an accurate description and a sketch indicating the appearance of the defect and the position in the container where it is most commonly found. The causes and remedies for each defect are also listed.

The operator should frequently examine the containers passing along the conveyor from machine to stacker. Approximately once every twenty minutes, but depending on production speed, one container from each mold should be set out and allowed to cool so that it can be handled and thus examined more closely for defects. Don’t waste these containers if they are not faulty and have not been damaged—put them into the lehr.

Before correcting a defect, always remember the following:

1. How many of the particular defects are rejects?

2. If corrected, what other types of defects may be produced as a result of the adjustment made?

3. Only make adjustments when certain it will produce a better container.

For Example:
If a few checks were appearing in the finish, do not immediately reduce settle blow pressure of time, if it is known that the finish or bore will then be outside specification.
Definition of Terms Used

Incorrect: Too High or Too Low

Too Much or Too Little
Too Long or Too Short

Blank: Blank Mold

Mold: Blow Mold

Parison: The Shape of hot glass as it comes from the Blank mold.

Alphabetical List of sections - Causes and remedies

A. Feeder
B. Machine setup and operation
C. Mold Equipment
D. Conveyor
E. Stacking Equipment
F. Inspection Equipment
G. Lehr operation
FINISH DEFECTS
BULGED FINISH

A finish which is bulged out of shape, either by blowing or mechanical action.

Note: It may prevent good capping of the container, which will spoil the product.

CAUSES:

1 Feeder

- Glass too hot
- Incorrect gob shape

2 Machine Setup and Operation

- Finish is not set hard enough, caused by insufficient time and/or pressure of settle blow or a dry blank, reducing the contact between glass and finish mold equipment
- Plunger contact time is too short
- Neck ring is too hot
- Internal cooling tube too large, or too small exhaust hold
- Blowhead out of alignment
• Not enough counterblow

3 Mold Equipment

• Blowhead is too shallow, causing contact
• Equalizing holes blocked I blowhead
• Neck of mold too small for parison, causing contact between blowhead and finish

REMEDIES:

1. Machine Setup and Operation

• Increase settle blow time and swab the blank
• Increase the plunger contact time
• Use the neck ring cooling nozzle
• Use a smaller final blow tube and/or a larger exhaust hold
• Realign the blowhead over the mold
• Increase the counterblow

2. Feeder

• Adjust gob temperature
• Reshape the gob
CHIPPED FINISH

A finish from which a small section is broken on the top or side.

CAUSES:

1 Feeder
   • Glass too cold

2. Machine Setup and Operation
   • Neck ring closing too soon when reverting pinching the finish
   • Insufficient or unequal neck ring opening
   • Incorrect cushioning of invert mechanism on the blow mold side
   • Neck ring opening too hard
   • Incorrect setting of blowhead (out of center)
   • End of outstroke cushioning on take-out incorrect
   • Take-out tongs are out of line or closing too hard
   • Incorrect setting of neck ring over the mold
   • Bottom plate too high

3. Mold Equipment
   • Bottom plate too tight in mold recess (resulting in mold opening too hard)
   • Shoulder radius too sharp (for odd shape bottles) causing bottles to rock on bottom plate resulting in damage form take-out fingers
4. Inspection Equipment

- Incorrect operation of gauging equipment

REMEDIES:

1. Feeder

- Adjust the feeder temperature

2. Machine Setup and Operation

- Retard neck ring closing
- Increase neck ring opening
- Adjust cushioning of invert mechanism
- Adjust neck ring opening for smoother action
- Adjust blow head over blow mold
- Adjust outstroke cushioning of invert mechanism
- Adjust take-out tongs, allowing them to close slower
- Set neck ring over blow mold to neck ring setting gauge
- Correct the bottom plate mechanism setting

3. Mold Equipment

- Check equipment against mold gauges
- Ensure shoulder radius has some relief

4. Inspection Equipment
• Correct timing of gauging equipment (cold end inspection)
NECK RING SEAM

A fin or seam of glass lying across the top or the side of the finish.

CAUSES;

1 Feeder

• Glass too hot

2 Machine Setup and Operation

• Neck ring not closing properly because of carbon accumulation or glass in ring
• Finish and locking thimble not engaging correctly in the guide ring
• Plunger up pressure too high (press and blow)
• Blank closing pressure too low (press and blow)
• Bland supporting mechanism worn
• Wear on mold opening and closing mechanism linkage
• Improper timing of the machine

3 Mold Equipment

• Blank mold recess for neck ring too large or neck ring diameter too small
• Neck ring, finish guide ring or finish thimble worn or dirty or out of dimension
• Interference between tongue and groove of neck ring
• Blank volume too small for glass weight and plunger size (press and blow process)

REMEDIES:

1. Feeder
   • Adjust feeder temperature

2. Machine Setup and Operation
   • Change neck ring
   • Change thimble and/or adjust height of plunger mechanism
   • Reduce pressing pressure
   • Check blank closing pressure
   • Change blank supporting mechanism linkage
   • Change linkage on blank closing mechanism

3. Mold Equipment
   • Check against gauges
   • Renew neck ring.
NECK DEFECTS

SEAM ON NECK RING PARTING LINE

A seam which has a fin of glass around the parting line between the finish and the neck of the container.
1. Machine Setup and Operation

- Dirt prevents the blank mold from completely closing
- Neck ring and plunger are dirty

2. Mold Equipment

- Neck ring diameter is too small for the bland mold
- Blank mold dovetail too large for the neck ring
- Neck rings are not correct matched

REMEDIES:

1. Machine Setup and Operation

- Change the dirty mold equipment
- Change all dirty neck rings and plungers

2. Mold Equipment

# Increase the neck ring diameter.
# Change neck rings for a correctly matched pair.
BENT NECK
A neck where the finish is tilted to one side.

CAUSES:

1. Feeder
   • Gob temperature too high

2. Machine Setup and Operation
   • Mold is running too hot, causing the container to be pulled to one side
• Machine speed too high
• Blow head not setting properly over the molds
• Take-out operating too fast and swinging bottle
• Incorrect counterblow pressure and time of application.
• Neck rings not relieving correctly
• Bottle blowing time too short
• Take-out tongs are out of line
• Neck ring is running hot

3. Mold Equipment

• Incorrect plunger design (blow and blow)
• Blow head not deep enough
• Take-out tongs out of shape

REMEDIES:

1. Feeder

• Adjust gob temperature

2. Machine Setup and Operation

• Increase the cooling wind
• Reduce the machine speed
• Adjust blow head setting on the mold
• Adjust the take-out height and adjust the cushioning
• Increase the counterblow time and/or pressure

• Adjust blank and mold cycle

• Shorten plunger contact time

• Increase blank contact time

• Increase reheat and mold contact time

• Change to a larger exhaust hole on blow head

3 Mold Equipment

• Correct plunger design

• Check the depth of the blow head cavity and correct if necessary

• Replace the take-out tongs

Note: It can cause trouble on the filling line and should be corrected at once.
DIRTY NECK

A neck which has a dirty or scaly appearance.

CAUSES;

1 Machine Setup and Operation

- Too much cooling on the blank mold
- Buildup of carbon on neck of the blank due to excessive swabbing
- Dirty swab
- Swabbing compound too thick
- Swab made of incorrect material and wrong shape
- Wrong grade of mold lubricant
- Excessive oil on the delivery equipment

2 Mold Equipment
• Poor surface of blank cavity

REMEDIES:

1. **Machine Setup and Operation**
   
   • Reduce the blank cooling
   
   • Change blank
   
   • Use a new clean swab of correct shape
   
   • Use a correct grade swabbing compound
   
   • Use a swab made form cotton
   
   • Use correct grade of mold lubricant
   
   • Fit drip plan to deflector

2. **Mold Equipment**
   
   • Improve polish on mold equipment surfaces
SHOULDER DEFECTS
SHOULDER CHECKS

Surface cracks on the shoulder of the containers. They are usually wavy in appearance.

CAUSES:

1. Feeder
   - Incorrect glass temperature-can be either too hot or too cold.

2. Machine Setup and Operation
   - Bottom plate is set too high or too low, causing drag on bottle shoulder when mold is opening
   - Mold is running too hot, causing the bottle to stick to the mold
   - Mold holders are worn, causing the mold to drag on the bottom plate when opening
   - Too much final blow pressure blowing the bottle up too hard against the mold. (Final blow pressure should be regulated to be sufficient to keep the bottle in shape).

3. Mold Equipment
   - Mold not sufficiently relieved on bottom plate, causing bottle to drag on mold when mold is opened
   - Flat shoulder container with insufficient relief on shoulder
   - Incorrect positioning of parting line (add shaper containers)

REMEDIES:

1. Feeder
   - Set feeder at correct temperature

2. Machine Setup and Operation
   - Lower or raise bottom plate mechanism
• Apply more cooling wind to mold
• Change mold holders. Check the old mold holders against repair dimensions
• Reduce final blow pressure
• Adjust cooling wind application
• Check and adjust blow head timing
• Raise the height of take-out tong heads

3. Mold Equipment

• Improve relieve on bottom plate
• Ensure relief on mold shoulder
• Ensure correct positioning of parting line in mold

1. Feeder

• Uneven gob temperature
• Gob too long

2. Machine Setup and Operation

• Glass is improperly loaded (off center)
• Blank mold not properly swabbed
• Final blow takes place too late, allowing excessive run of parison
• Blank mold too hot

3. Mold Equipment

• Incorrect blank design
• Funnel size incorrect

REMEDIES:

1. Feeder

• Adjust forehearth temperature so that gob does not curl
• Shorten the gob

2. Machine Setup and Operation

• Adjust deflector to center of blank-check size of deflector
• Swab blanks more frequently
• Advance final blow
• Adjust blank cooling

3. Mold Equipment

• Check for correct blank design
• Check funnel size
BODY DEFECTS
BLANK AND BLOW MOLD SEAMS

Seams which are relatively large, extending from the shoulder to the bottom of the container. Blank seams tend to veer off from the mold seam.

CAUSES:

1. Feeder
• Glass too cold, causing difficult pressing on '62' operation when producing lightweight ware or tall jobs like milk bottles

• Glass too hot

• Gob weight too heavy (62 process)

2. Machine Setup and Operation

• Wear on blank and mold holders

• Wear on blank and mold linkage

• Incorrect blank and blow mold linkage alignment

• Incomplete stroke of blank and blow mold piston in cylinder

• Misalignment of plunger mechanism

• Carbon deposit on blank and blow mold halves

• Glass in interlocking fit or blank or blow mold

• Interference between blank and/or blow mold with block lock at operation temperature

• Plunger mechanism too high

• Excessive plunger and counterblow pressure

• Neck ring incorrectly set

• Bottom plate running too hot

• Blank mold too hot

• Baffle too hot

3 Mold Equipment

• Recess on blank and mold for either plunger or block lock location incorrectly made or too tight fit

• Interference between neck ring and blank mold neck ring diameter too large
• Unsuitable pressing gate on parison design (press and blow)

• Blank and molds insufficiently hollow scraped - insufficient relief or interlocking fits and for tongue and groove fits

• Blank and mold warped and/or worn out

• Bottom plate holding blow mold open

• Incorrect selection of bottom plate size

REMEDIES:

1. Feeder

• Adjust gob temperature

• Check gob weight

2. Machine Setup and Operation

• Change mold holders and check the old ones against repair dimensions

• Check blank and mold supporting for wear

• Check with mold and blank linkage aligning fixture

• Realign the plunger mechanism

• Change mold and blank

• Clean the mold and blow out the glass

• Check block lock fitting at operating temperature for tightness

• Adjust plunger mechanism height

• Reduce counterblow pressure

• Check invert mechanism with neck ring mechanism aligning fixture

• Apply cooling to bottom plate

• Increase the cooling on blank