

Flexible Retort Pouch Defects

Identification and Classification

Status

New

Date

31/05/2002

CHAPTER 7

DEFECT CATEGORIES

- 7.1 Abrasion
- 7.2 Blister
- 7.3 Channel Leaker
- 7.4 Compressed Seal (or delamination in the seal area)
- 7.5 Contaminated Seal
- 7.6 Cosmetic Seal Only
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- 7.9 Cut (or Fracture)
- 7.10 Delamination
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- 7.24 Uneven Seal Juncture
- 7.25 Waffling
- 7.26 Wrinkle



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DEFECT: ABRASION

CLASSIFICATION:

Abrasion is considered a serious defect if:

- 1) the abrasion penetrates deeper than the outer layer; or
- 2) testing shows that there has been a loss of hermetic integrity. Deep scratches that can be felt as indentations must be tested for hermetic integrity.

Abrasions are considered to be minor defects if only the outer layer is abraded.

DESCRIPTION:

An abrasion is a scratch through any of the layers of the package. A serious abrasion penetrates the foil or the inner polypropylene layers.

A minor abrasion is also called a scuff. It will only affect the outer layer(s) of the pouch. The foil layer is not affected.

COMMON SOURCES:

- 1) The pouches were manually scraped on the retort racks, other equipment or other pouches.
 - 2) Pouches rotated or shifted over top of one another (for example, if unrestrained in retorts or in bulk packaging).
 - 3) Plastic was left on the sealing bar from previous sealing.
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DEFECT: ABRASION





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DEFECT: BLISTER

CLASSIFICATION:

A blister is considered a serious defect if the width of the continuous intact seal is reduced to less than 3 mm (3/32-inch).

A blister is considered a minor defect if there is 3 mm (3/32-inch) or more of continuous intact seal.

DESCRIPTION:

A blister appears as a void within the bonded seal. A blister resembles a bubble or has a raised appearance in the sealed area of the retort pouch.

COMMON SOURCES:

- 1) Food, grease or other contaminants were present in the seal area during seal formation.
-

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DEFECT: BLISTER





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DEFECT: CHANNEL LEAKER

CLASSIFICATION:

A channel leaker is considered a serious defect.

DESCRIPTION:

This is an area of "non-bonding" across the width of the seal that will generally leak. If a retort pouch has a channel leaker, it can usually be detected by applying pressure towards the seal.

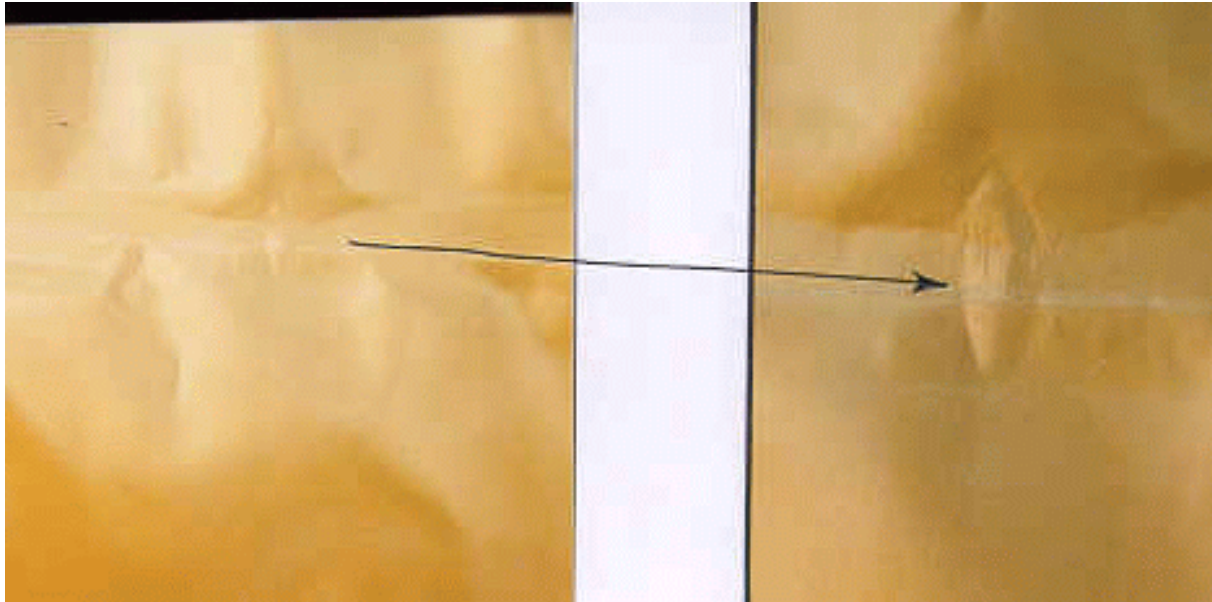
COMMON SOURCES:

- 1) The sealing bar settings were not correct (i.e., the temperature, pressure and/or dwell time).
 - 2) Contaminants were present in the seal area during seal formation.
-

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DEFECT: CHANNEL LEAKER



View of Channel Leaker from Inside of Pouch
(arrow indicates channel)



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DEFECT: COMPRESSED SEAL

CLASSIFICATION:

A compressed seal is considered a serious defect if:

- 1) there is visual evidence of seal overheating, such as bubbles or exposed foil; and
- 2) there is less than 3 mm (3/32-inch) of continuous "good" seal (non-delaminated area) remaining.

A compressed seal is considered a minor defect if:

- 1) there is some visual evidence of seal overheating, such as bubbles or exposed foil; and
 - 2) there is more than 3 mm (3/32-inch) of continuous "good" seal (non-delaminated area) remaining.
-

DESCRIPTION:

A compressed seal is any separation of the laminated plies in the seal area. The material bond strength is questionable in the area of the defect.

If the delamination continues into the "body" of the pouch, assess the defect under DELAMINATION.

COMMON SOURCES:

- 1) The sealing bars were too hot during seal formation.
 - 2) Material bond strength is inadequate.
-

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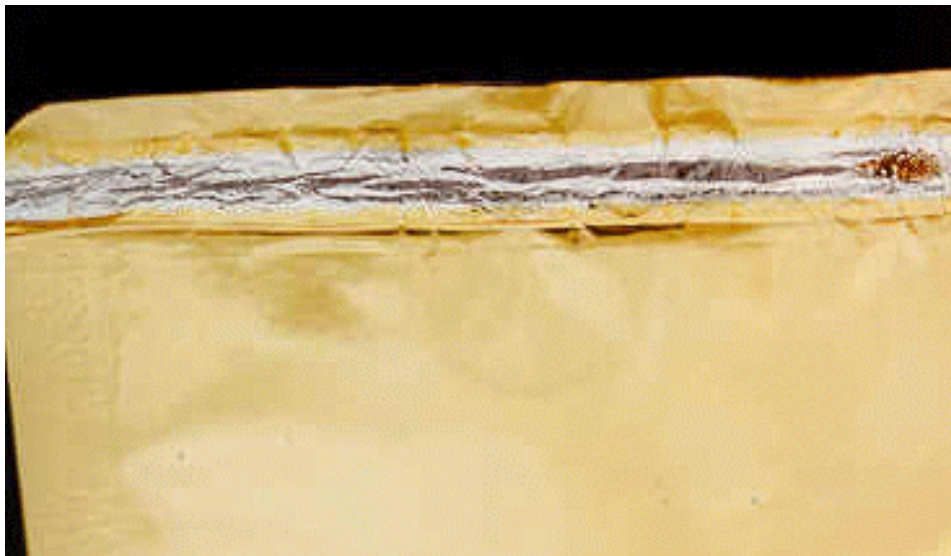
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DEFECT: COMPRESSED SEAL



Delamination and Bubbling of the Polyester Laminate



Polyester Laminate has Melted Due to Overheating of the Seal



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DEFECT: CONTAMINATED SEAL

CLASSIFICATION:

A contaminated seal is considered a serious defect if the seal width is reduced to less than 3 mm (3/32-inch).

A contaminated seal is considered a minor defect if the seal width is greater than 3 mm (3/32-inch).

DESCRIPTION:

Foreign material is trapped in the seal area. A retort pouch with contamination will have a noticeable raised area in the seal where the sealing bar has sealed over the contamination.

COMMON SOURCES:

- 1) The seal area was contaminated during the filling stage.
-



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DEFECT: CONTAMINATED SEAL





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DEFECT: COSMETIC SEAL ONLY

CLASSIFICATION:

A cosmetic seal only is considered a serious defect.

If the processor has documentation indicating that the cosmetic seal is tested using the same standards and at the same frequency as a primary seal, the cosmetic seal will be assessed as if it were a primary seal.

DESCRIPTION:

The primary seal is incomplete or non-existent and the only seal providing the hermetic condition is the cosmetic seal.

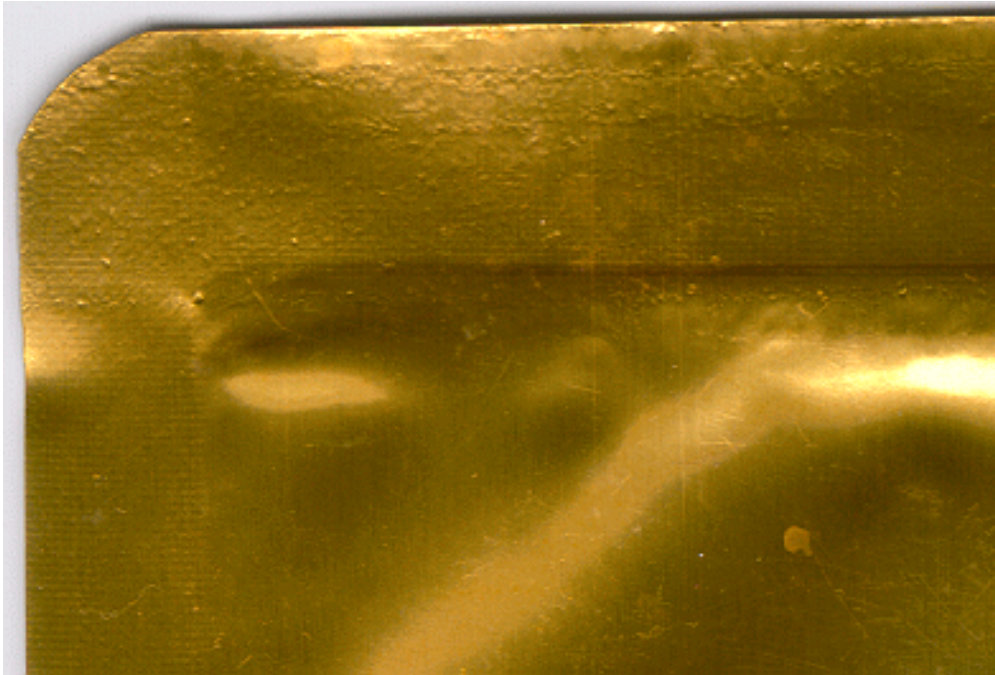
COMMON SOURCES:

- 1) A manufacturing step was missed.
 - 2) The primary sealing bar malfunctioned.
-

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DEFECT: COSMETIC SEAL ONLY



Pouch with Cosmetic Seal Only



Pouch on Left with Both Primary and Cosmetic Seals;
Pouch on Right with Cosmetic Seal Only



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DEFECT: COSMETIC SEAL OVERLAPS PRIMARY SEAL

CLASSIFICATION:

Cosmetic seal overlaps primary seal is considered a serious defect when the width of the primary seal is reduced to less than 3 mm (3/32-inch).

Cosmetic seal overlaps primary seal is considered a minor defect when the width of the primary seal has more than 3 mm (3/32-inch) of bonded seal.

DESCRIPTION:

The cosmetic seal, generally applied in a separate operation from the primary seal, overlaps into the primary seal area. The cosmetic seal must be formed before the pouch is thermally processed.

Cosmetic seals are not considered essential if the pouches are processed and handled properly. The inner edge of the primary closing seal is considered a critical factor to the hermetic seal of the pouch. The inner portion of the primary seal must be maintained as a continuous seal with a minimum width of 3 mm (3/32-inch).

COMMON SOURCES:

1) The pouch was misaligned in the jaws of the cosmetic sealer.



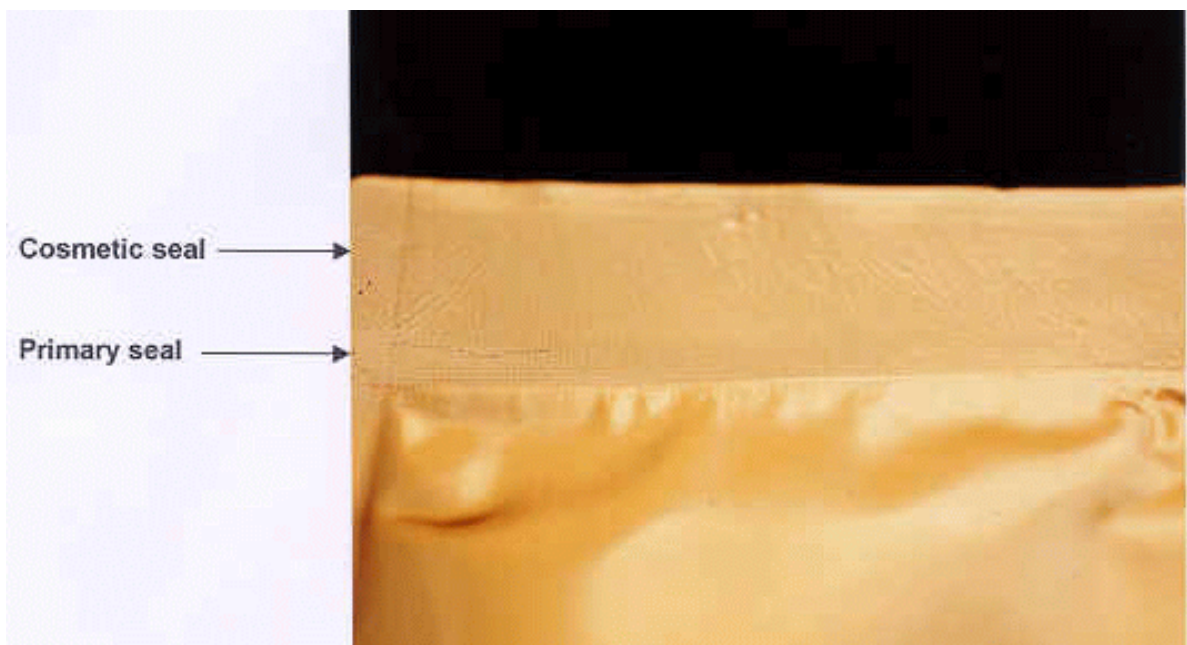
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DEFECT: COSMETIC SEAL OVERLAPS PRIMARY SEAL





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DEFECT: CROOKED SEAL

CLASSIFICATION:

A crooked seal is a serious defect if the seal width is reduced to less than 3 mm (3/32-inch).

DESCRIPTION:

A crooked seal is a seal that is not parallel to the cut edge of the pouch.

COMMON SOURCES:

- 1) The pouch was misaligned in the sealing jaws.
-



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DEFECT: CROOKED SEAL





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DEFECT: CUT (or Fracture)

CLASSIFICATION:

A cut is considered a serious defect.

DESCRIPTION:

This defect is a breach of all layers of the laminate, where the hermetic integrity of the package has been compromised. This can be a manufacturer defect if there is equipment damage or "scrap" between the laminate plies during formation. Compare to PUNCTURE.

COMMON SOURCES:

- 1) The pouch has contacted sharp edges of other pouches.
 - 2) The pouch has contacted burrs or sharp corners on equipment.
 - 3) The pouches were abused during on-line or post-process handling.
-

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DEFECT: CUT



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DEFECT: DELAMINATION

CLASSIFICATION:

Delamination from the outside edge is considered a serious defect when less than 3 mm (3/32 inch) of seal width is remaining.

Delamination of the inner or outer plies, anywhere in the body of the retort pouch, in excess of 1 cm² (or equivalent area) is considered a serious defect.

Delamination outside of the sealed area of the pouch is considered a minor defect if:

- 1) it does not extend more than 50% from the outside edge into the seal of the polyester foil; or
 - 2) the delamination of the inner or outer plies, anywhere in the body of the retort pouch, is less than 1 cm² (or equivalent area).
-

DESCRIPTION:

The laminate materials separate, often resulting in subsequent loss of the hermetic integrity of the pouch. This can occur anywhere on the pouch.

Some locations of the delamination do not affect the hermetic seal, but its presence can cause potential damage during distribution. Some delamination may be present at the edge of the pouch before retorting.

Delamination outside of the sealed area of the pouch, which extends from the outside edge into the seal of the polyester foil, could affect the integrity of the pouch seal strength.

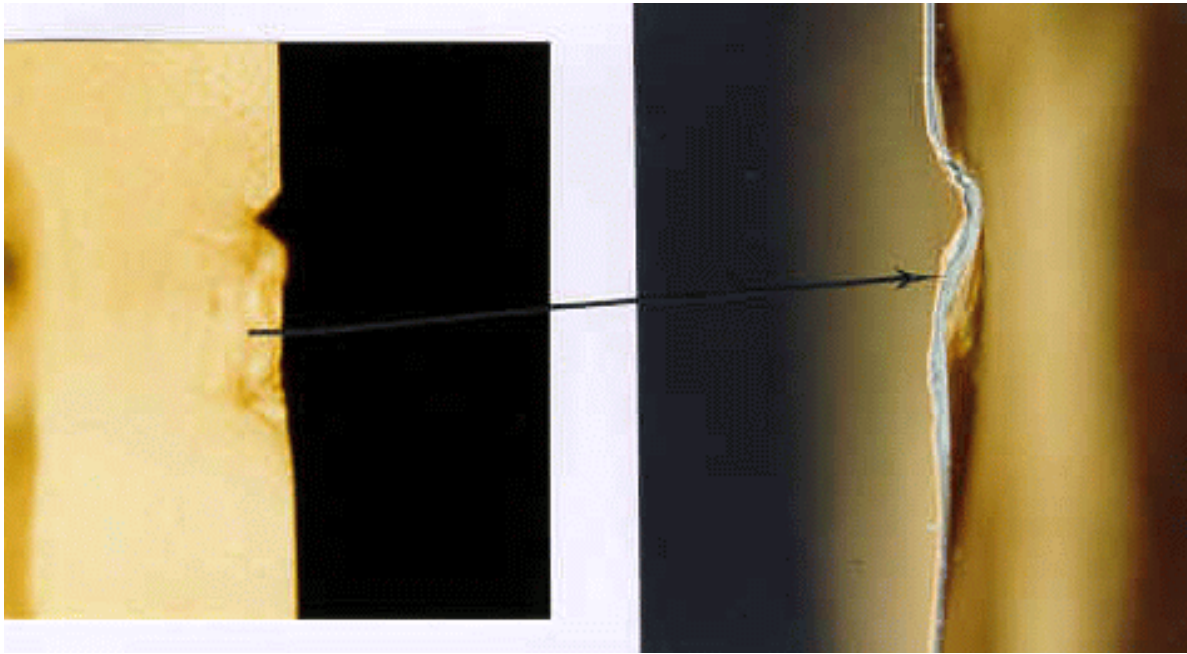
COMMON SOURCES:

- 1) If at the seal, the bars were too hot during the seal formation.
 - 2) If located elsewhere on the pouch, the material bond strength is inadequate.
 - 3) The residual air in the retort pouch was not properly controlled to eliminate sharp corners on the edge, which would make the pouch expand during retorting.
-

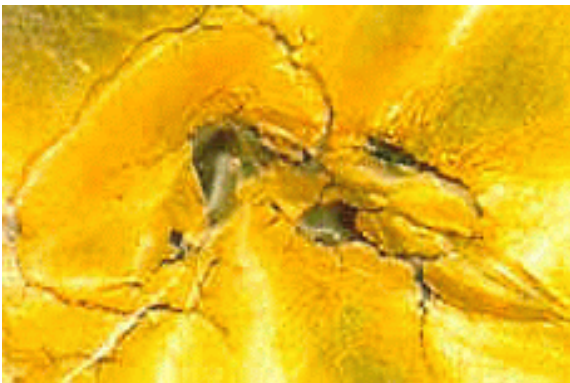
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DEFECT: DELAMINATION



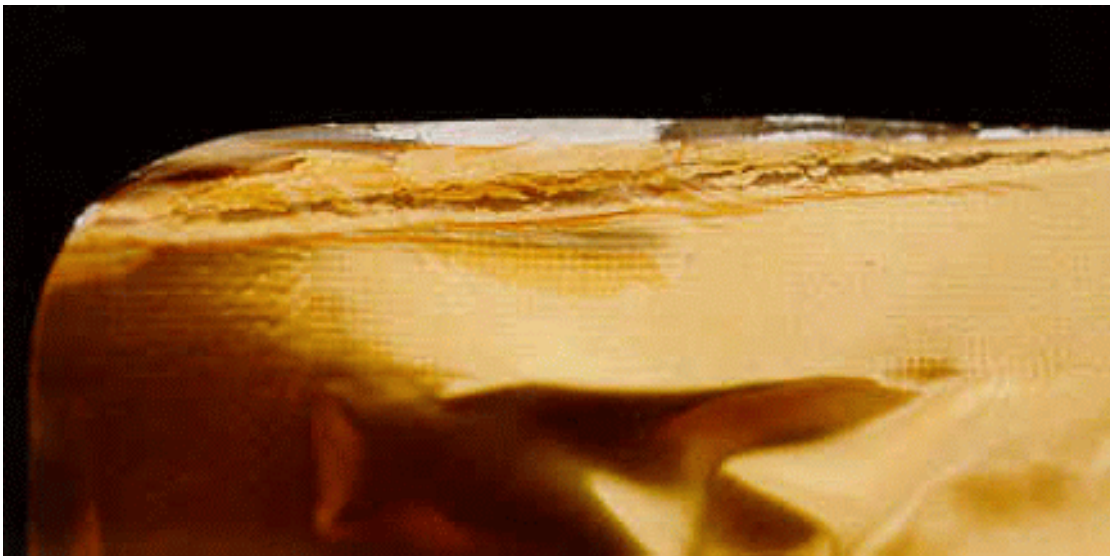
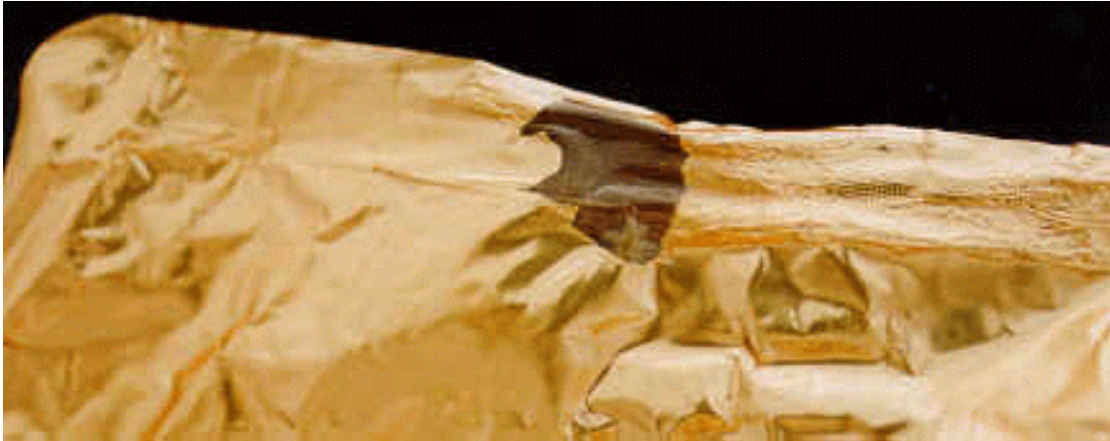
Side view of notch delamination



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DEFECT: DELAMINATION





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DEFECT: FLEX CRACKS

CLASSIFICATION:

Flex cracks are considered a minor defect.

When there is an indication that the flex crack defect has spread due to the defect location, or pouch-handling system, then the defect should be evaluated to determine if it should be classified under DELAMINATION.

DESCRIPTION:

Flex cracks are small breaks in the foil layer of the laminate; they appear as small cracks in the pouch surface, where only one layer of laminate is affected. The defect is similar to a delamination.

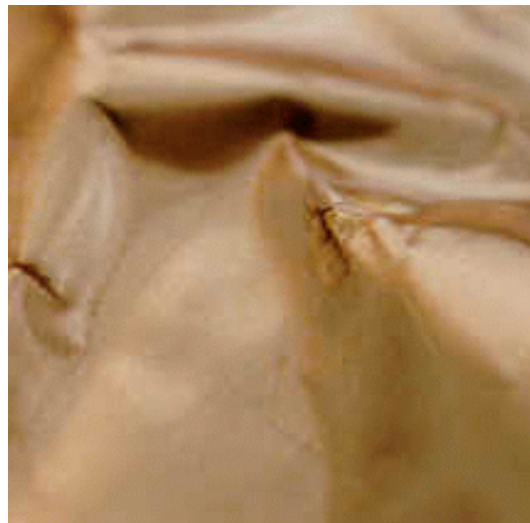
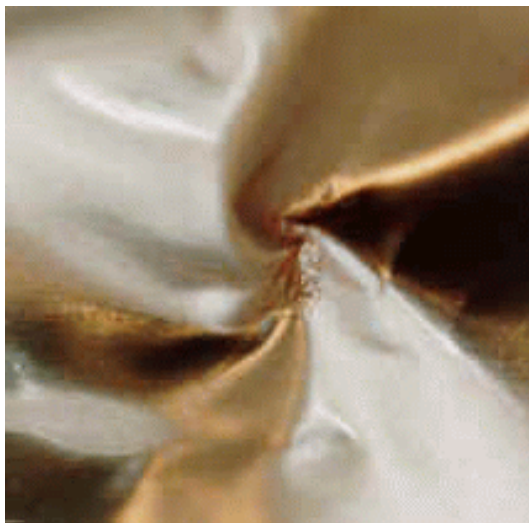
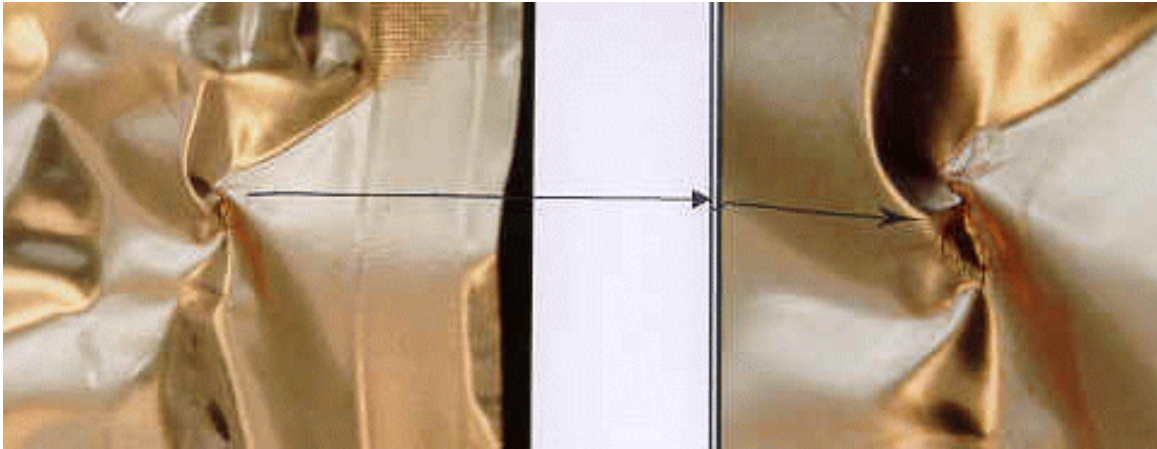
COMMON SOURCES:

- 1) The package flexed during cooking and/or handling.
 - 2) Too much of a vacuum was drawn during sealing.
-

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DEFECT: FLEX CRACKS





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DEFECT: HOT FOLD

CLASSIFICATION:

A hot fold is considered a minor defect.

DESCRIPTION:

A hot fold is a permanent bend in a seal, formed after sealing and before the area has cooled. This may appear as a large wrinkle or a fold that has been sealed over.

COMMON SOURCES:

- 1) At the sealing machine, the plastic was folded while the pouch material was still soft.
 - 2) In the retort, the edges of the pouch were folded during the cook process.
-



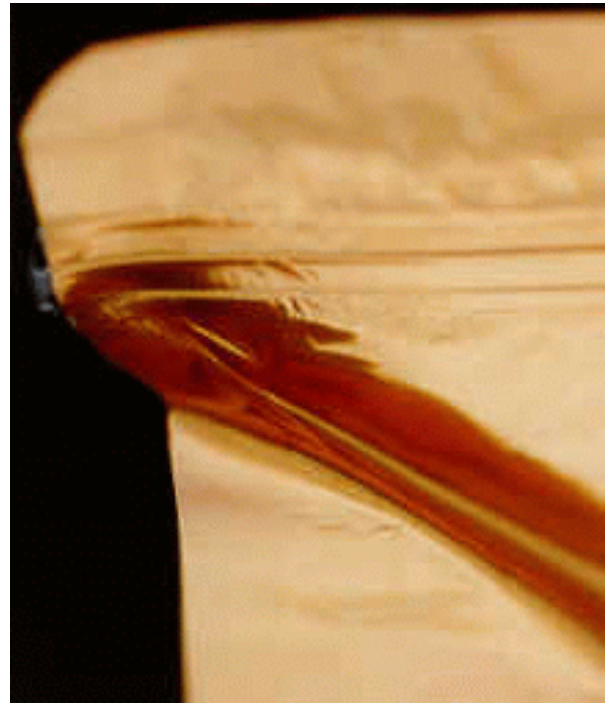
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DEFECT: HOT FOLD





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DEFECT: INCOMPLETE SEAL

CLASSIFICATION:

An incomplete seal is considered a serious defect.

DESCRIPTION:

The seal area does not extend completely across the width of the pouch.

This defect can be detected visually by the sealing bar impression on the retort pouch seal. The sealing bar impression provides an indication of uniform sealing bar settings (i.e., pressure, temperature and/or dwell time).

COMMON SOURCES:

- 1) The pouch was not positioned correctly in the sealer, the result being that the impression is from the gripper instead of the forming bar.
 - 2) The pouch was positioned away from the heating section of the sealing bar.
-

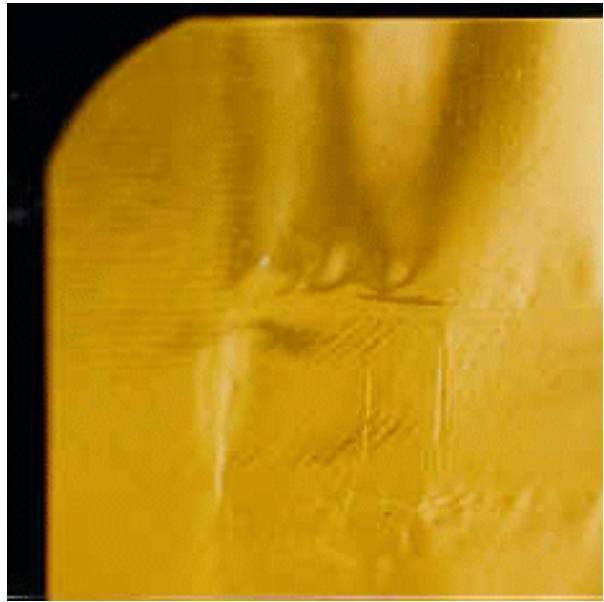
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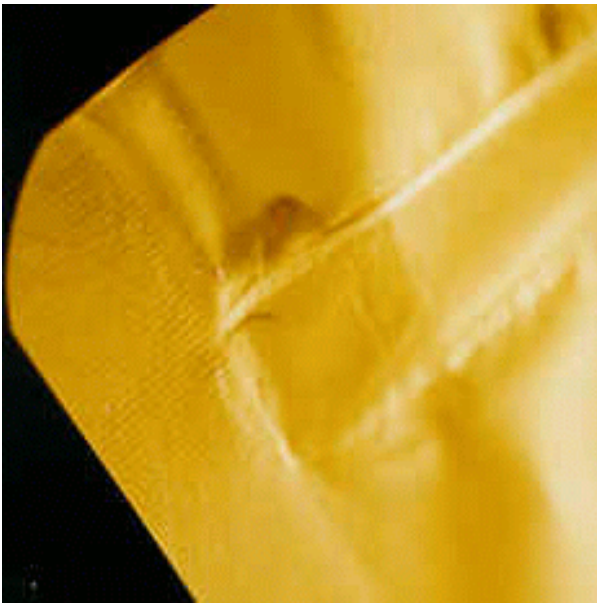
DEFECT: INCOMPLETE SEAL



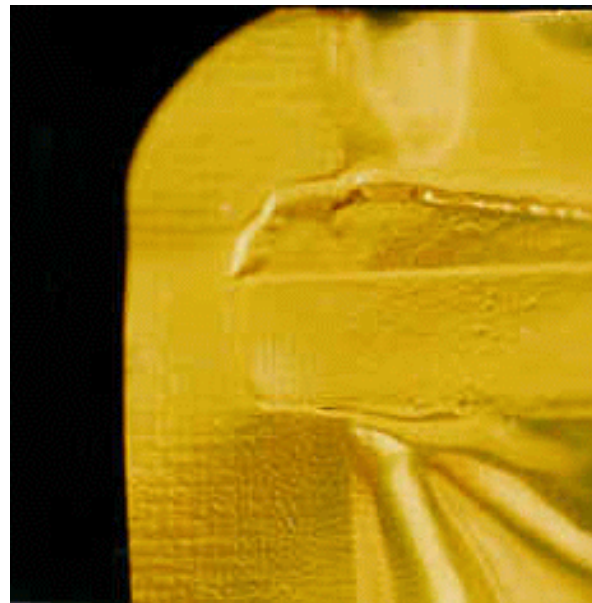
Normal sealing bar impression



Impression of gripper (no cross-over)



Primary seal incomplete



No cross-over sealing of the primary seal with the side seal



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DEFECT: LEAKER

CLASSIFICATION:

A leaker is considered a serious defect.

DESCRIPTION:

A leaker is a retort pouch that is unsealed or in some way has lost container integrity. Contents generally seep from the pouch. The leak may occur anywhere on the pouch.

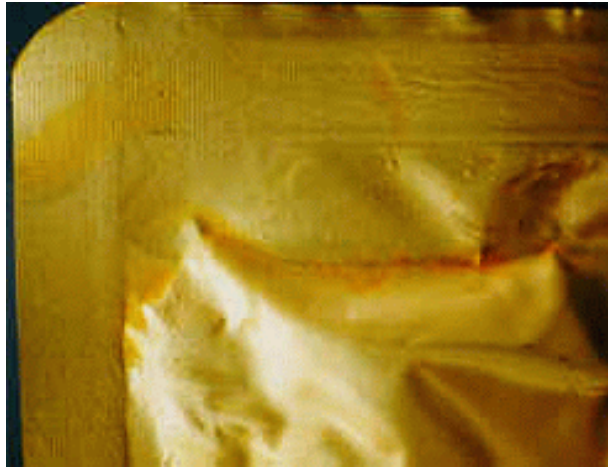
COMMON SOURCES:

- 1) The pouch was punctured or cut during processing, handling or distribution.
 - 2) The sealing bar settings were not correct (i.e., the temperature, pressure and/or dwell time).
 - 3) The seal area was contaminated with product, moisture, grease, or other contaminants.
 - 4) The corner folded during the sealing operation, resulting in non-fusion at the corner.
-

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DEFECT: LEAKER





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DEFECT: LESS THAN 3 mm OF CONTINUOUS BONDED SEAL WIDTH

CLASSIFICATION:

Less than 3 mm (3/32-inch) of continuous bonded seal is considered a serious defect.

DESCRIPTION:

The container seal area has no margin of safety to accommodate problems such as seal creep, wrinkles.

This requirement for 3 mm (3/32-inch) of continuous bonded seal is especially important in pouches where the ink stamp or embossed code is placed on the secondary or cosmetic seal. The producer should ensure that no part of any coding or stamping is placed in the primary seal area.

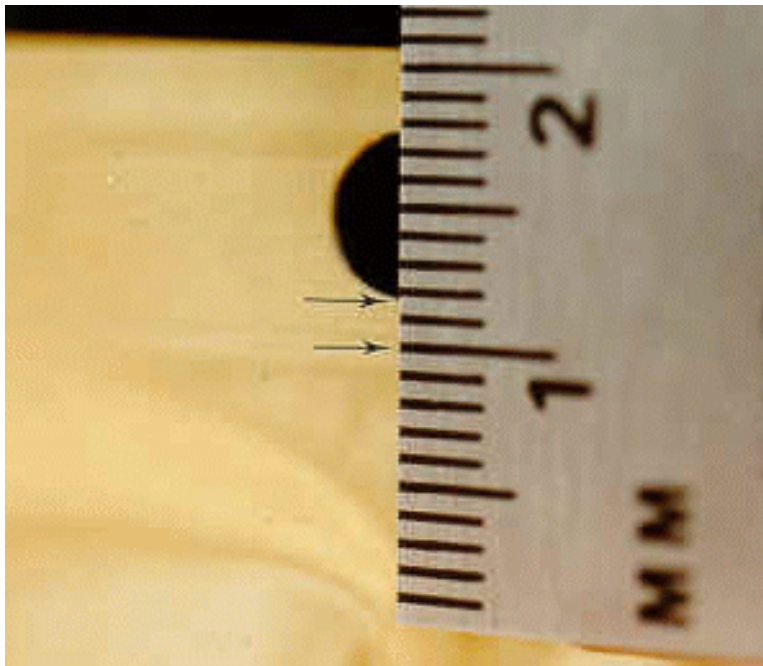
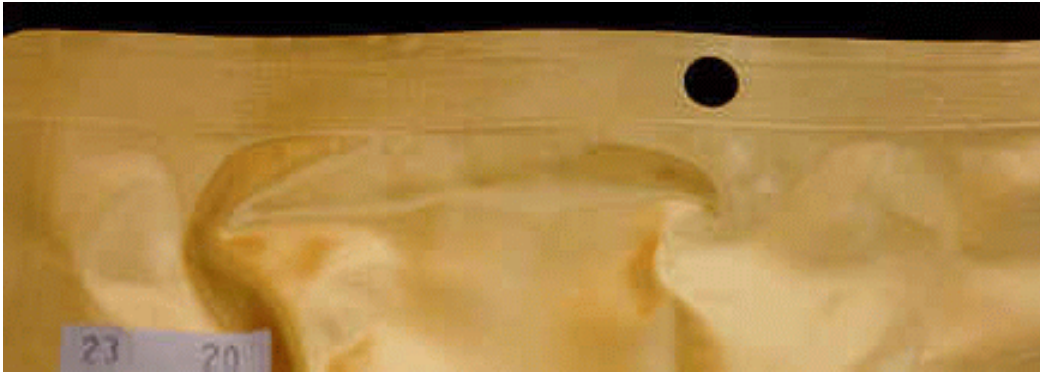
COMMON SOURCES:

- 1) Defective sealing bars reduced the seal width to less than 3 mm (3/32 inch).
 - 2) Defects that cross the seal, seal creep or mechanical separation of the weld reduce the seal width to less than 3 mm (3/32 inch).
 - 3) The ink stamp or embossed code was not placed properly on the secondary or cosmetic seal.
-

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DEFECT: LESS THAN 3 mm OF CONTINUOUS BONDED SEAL WIDTH



Manufacturer's Seal was Hole-punched Resulting in less than 3 mm of Continuous Bonded Seal Width



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DEFECT: MISALIGNED SEAL

CLASSIFICATION:

Misaligned seal is a minor defect, if there is at least 3 mm (3/32-inch) of continuous bonded seal width. If there is less than 3 mm of continuous bonded seal, the defect should be classified under LESS THAN 3 MM OF CONTINUOUS BONDED SEAL WIDTH.

DESCRIPTION:

Misaligned seal is a seal that is not formed in a continuous, straight line.

COMMON SOURCES:

- 1) The seal was positioned improperly.
 - 2) The sealing bars were misaligned.
 - 3) The pouch was not placed properly within the sealing jaws.
 - 4) The vacuum packer drew the top of the retort pouch over the shape of a rigid product (i.e., salmon side) while the pouch bottom lay flat on the sealing bar.
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DEFECT: MISALIGNED SEAL





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DEFECT: NON-BONDING

CLASSIFICATION:

Non-bonding is considered a serious defect.

DESCRIPTION:

The sealing films fail to weld (combine) during the sealing process. This defect appears as a very faint sealing bar impression on the retort pouch seal. Application of slight pressure to the seal area will cause seal failure.

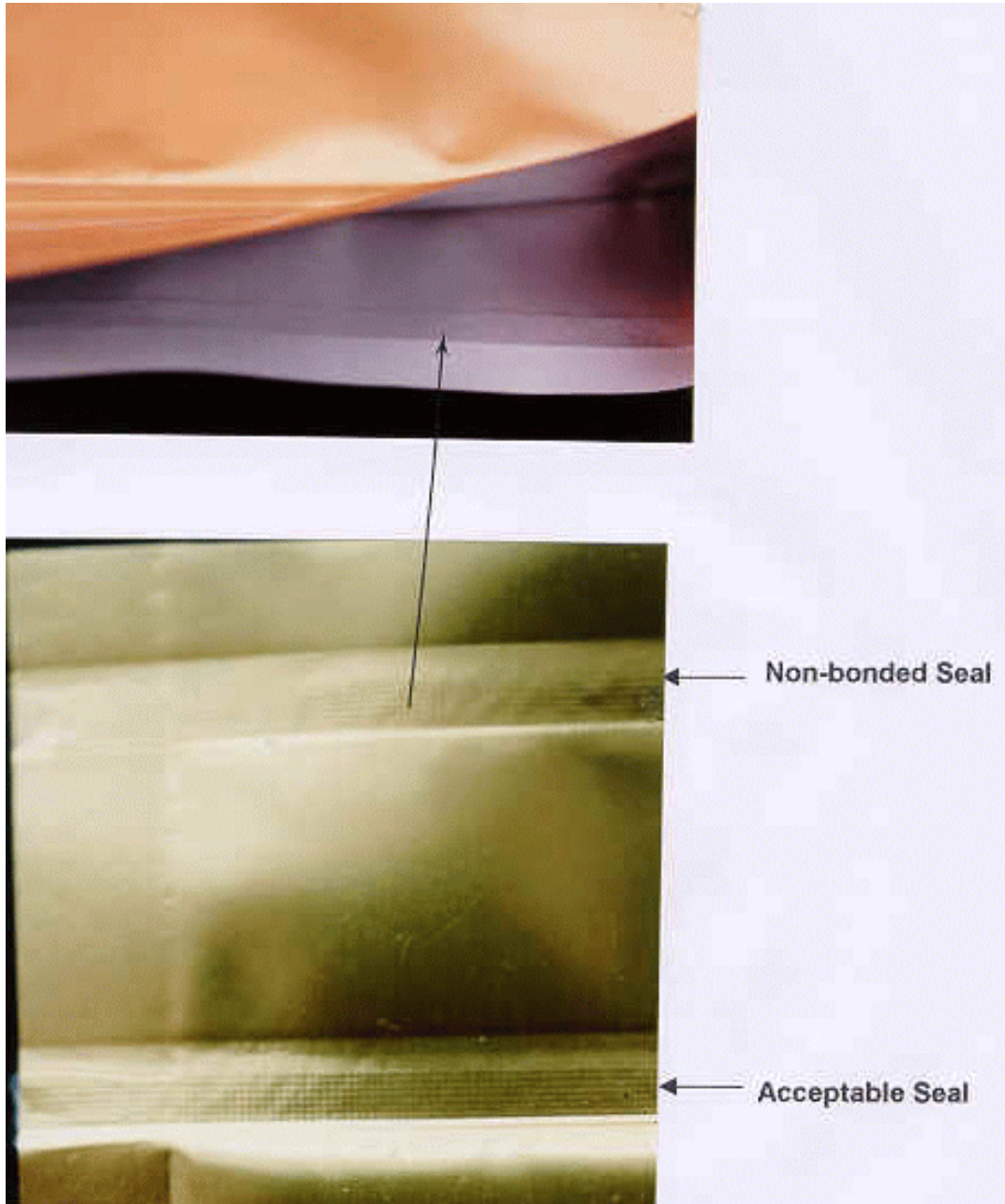
COMMON SOURCES:

- 1) The seal area was contaminated.
 - 2) The sealing bar settings were not correct (pressure/temperature/dwell time).
-

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DEFECT: NON-BONDING





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DEFECT: NOTCH LEAKER

CLASSIFICATION:

Notch leaker is considered a serious defect.

DESCRIPTION:

A leak occurring at the manufactured notch (which is intended for easy opening of the retort pouch) has compromised the container integrity.

COMMON SOURCES:

- 1) The machine setting at the pouch manufacturer was incorrect, allowing the notch to be cut too far into the seal.
 - 2) The notch was correctly formed but was torn in transit or during handling.
 - 3) The sealing bar settings (temperature, pressure and/or dwell time) were not correct during sealing "cold seal" next to the notch.
 - 4) The seal area was contaminated with product, moisture, grease, or other contaminants.
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DEFECT: NOTCH LEAKER





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DEFECT: PUNCTURE

CLASSIFICATION:

A puncture is considered a serious defect.

DESCRIPTION:

A puncture appears as a mechanical piercing of the pouch that results in the loss of hermetic integrity. Compare to CUT.

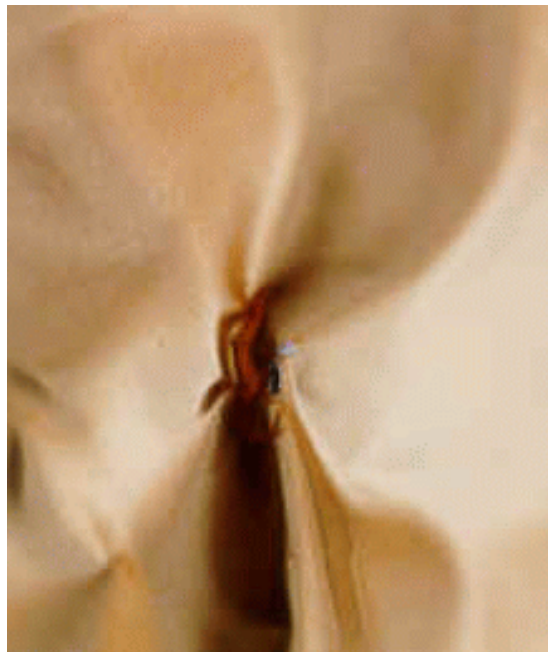
COMMON SOURCES:

- 1) Sharp objects such as staples, knives or other similar tools have punctured the pouch.
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DEFECT: PUNCTURE





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DEFECT: SEAL CREEP

CLASSIFICATION:

Seal creep is considered a serious defect when the seal width is reduced to less than 3 mm (3/32-inch).

Seal creep is considered a minor defect when the seal width has 3 mm (3/32-inch) of bonded seal present.

DESCRIPTION:

Seal creep appears as a partial opening of the inside border of the seal.

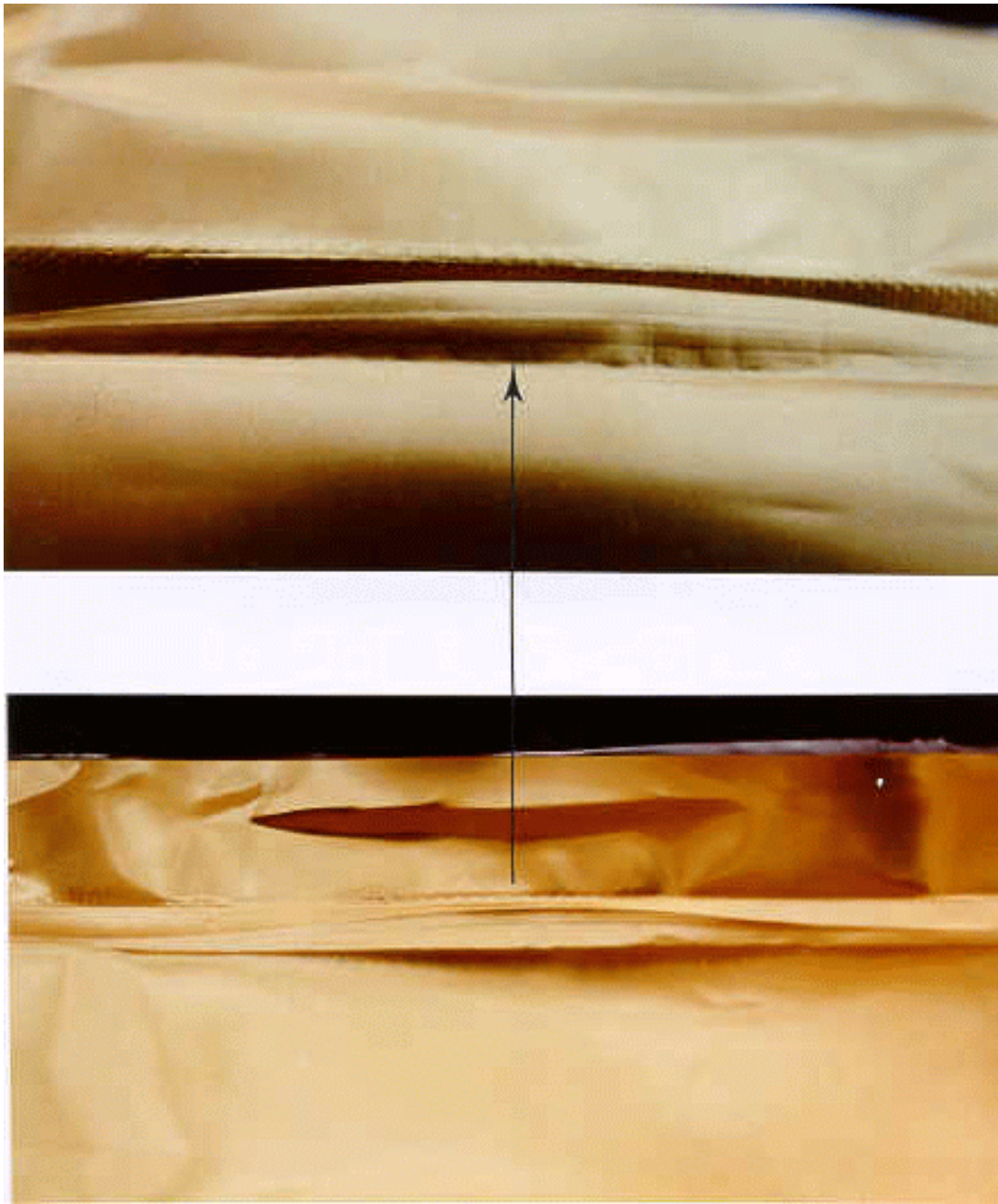
COMMON SOURCES:

- 1) The sealing bar settings (temperature, pressure and/or dwell time) were not correct during sealing.
 - 2) The seal area was contaminated with product, moisture, grease, or other contaminants.
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DEFECT: SEAL CREEP





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DEFECT: SEAL FORMED GREATER THAN 25 mm FROM THE EDGE

CLASSIFICATION:

Seal formed greater than 25 mm from the edge is considered a minor defect.

DESCRIPTION:

This defect appears as an unclosed flap between the primary seal and the top edge of the pouch.

This situation could result in water being trapped between the pouch material, making drying difficult and providing a potential location for the growth of moulds and bacteria. In order to minimise this potential hazard, it is recommended that processors consider applying a cosmetic seal to each pouch.

COMMON SOURCES:

- 1) The seal was positioned improperly.
 - 2) The sealing bars were misaligned.
 - 3) The pouch was misaligned within the sealing jaws.
-

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DEFECT: SEAL FORMED GREATER THAN 25 mm FROM THE EDGE





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DEFECT: STRINGY SEAL

CLASSIFICATION:

Stringy seal is considered a minor defect if there are excessive plastic threads showing at the edge of the seal area.

When there is an indication that the stringy seal has resulted in excessive thinning of the seal area, then the defect should be evaluated to determine if it should be classified under COMPRESSED SEAL.

DESCRIPTION:

Stringy seal appears as the presence of plastic threads emerging at the edges of the cutoff seal.

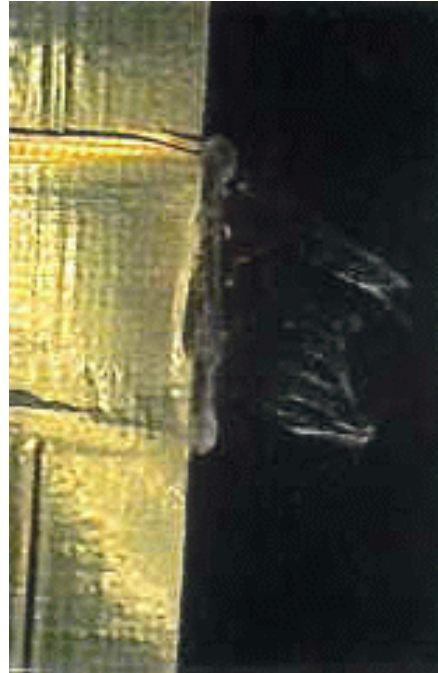
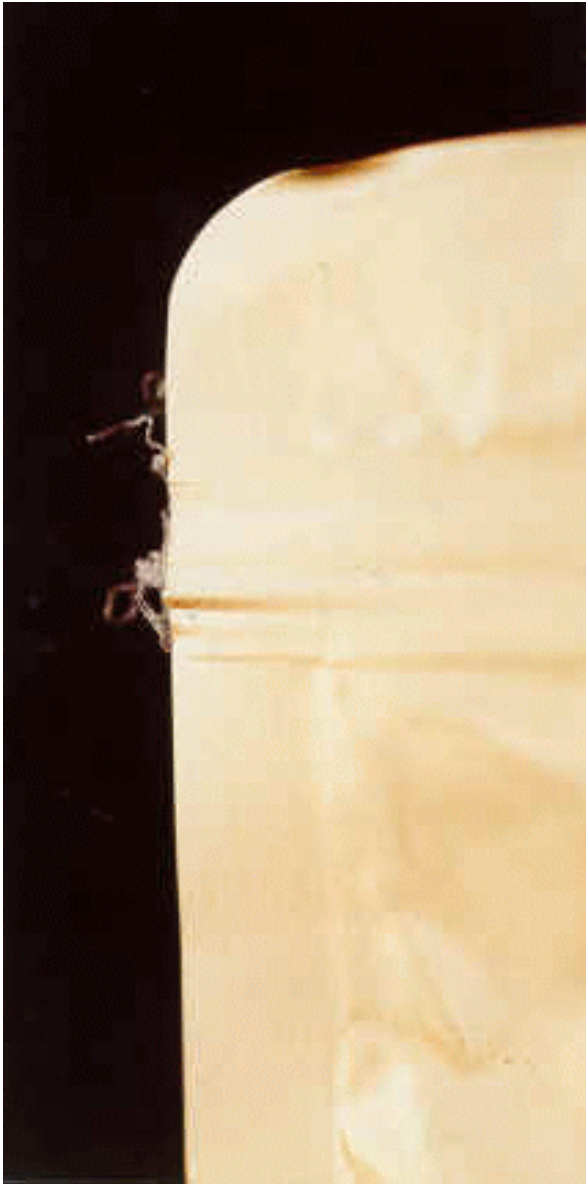
COMMON SOURCES:

- 1) The heat and pressure at sealing were excessive.
-

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DEFECT: STRINGY SEAL





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<u>Date</u>
31/05/2002

DEFECT: SWOLLEN

CLASSIFICATION:

This must be treated as a serious defect, unless testing proves otherwise.

DESCRIPTION:

The pouch bulges due to gas formation from bacterial contamination, or excess internal residual air.

The pouch must be checked for weight, microbial growth, or a chemical reaction such as hydrogen gas production.

COMMON SOURCES:

- 1) The pouch was overfilled or a proper vacuum was not drawn, which resulted in an improper thermal process.
 - 2) The pouch leaked after processing.
 - 3) The pouch was under-processed.
 - 4) There was insufficient chlorine in the cooling water.
 - 5) The post-process handling was too rough.
-

Flexible Retort Pouch Defects
Identification and Classification

Status: New Date: 31/05/2002

DEFECT: SWOLLEN





Flexible Retort Pouch Defects

Identification and Classification

<u>Status</u>
New

<u>Date</u>
31/05/2002

DEFECT: UNEVEN SEAL JUNCTURE

CLASSIFICATION:

An uneven seal juncture is considered a minor defect.

DESCRIPTION:

The bonded polymer at the inner seal juncture appears wavy or rough (may also be called wavy seal). This will appear as small wrinkles, but not the fold over type. The inner seal juncture may also have a wavy appearance.

COMMON SOURCES:

- 1) The pouch was misaligned.
 - 2) The pouch laminates were heated unevenly.
-



Flexible Retort Pouch Defects

Identification and Classification

Status
New

Date
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DEFECT: UNEVEN SEAL JUNCTURE





Flexible Retort Pouch Defects

Identification and Classification

<u>Status</u>
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<u>Date</u>
31/05/2002

DEFECT: WAFLING

CLASSIFICATION:

Waffling is considered a minor defect.

DESCRIPTION:

Waffling appears as heavy embossing of the retort tray rack pattern on the surface of the pouch body, from contact with the racks during thermal processing.

COMMON SOURCES:

- 1) The pouch expanded against the racks during thermal processing and a heavy impression was left on the surface of the pouch material.
-

Flexible Retort Pouch Defects
Identification and Classification

Status: New Date: 31/05/2002

DEFECT: WAFLING



Impressions of retort rack pattern on pouch body



Close-up of impression on surface of pouch body - Waffling



Flexible Retort Pouch Defects

Identification and Classification

<u>Status</u>
New

<u>Date</u>
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DEFECT: WRINKLE

CLASSIFICATION:

A wrinkle is considered a serious defect if:

- 1) the fold in the seal area leaves less than 3 mm (3/32-inch) continuous acceptable seal; or
- 2) the fold-over wrinkle extends through all plies across the seal area.

A wrinkle is considered a minor defect if it extends from the inner seal width, but does not form a channel across the entire seal area.

DESCRIPTION:

A wrinkle is a material fold on one seal surface, caused when one seal surface is longer than the other, at least in a localized area at the moment of seal fusion.

A wrinkle can also be a severe fold over both seal surfaces at the time of sealing. Until experience shows that these wrinkles are not hazards, they should be avoided, and seals containing such wrinkles should be rejected.

Minor wrinkles or convolutions evident on both sides of the pouch, indented on one side and raised on the other, may be caused by minor irregularities in sealing bar or anvil surfaces. These are not channels or leaks and do not constitute a hazard.

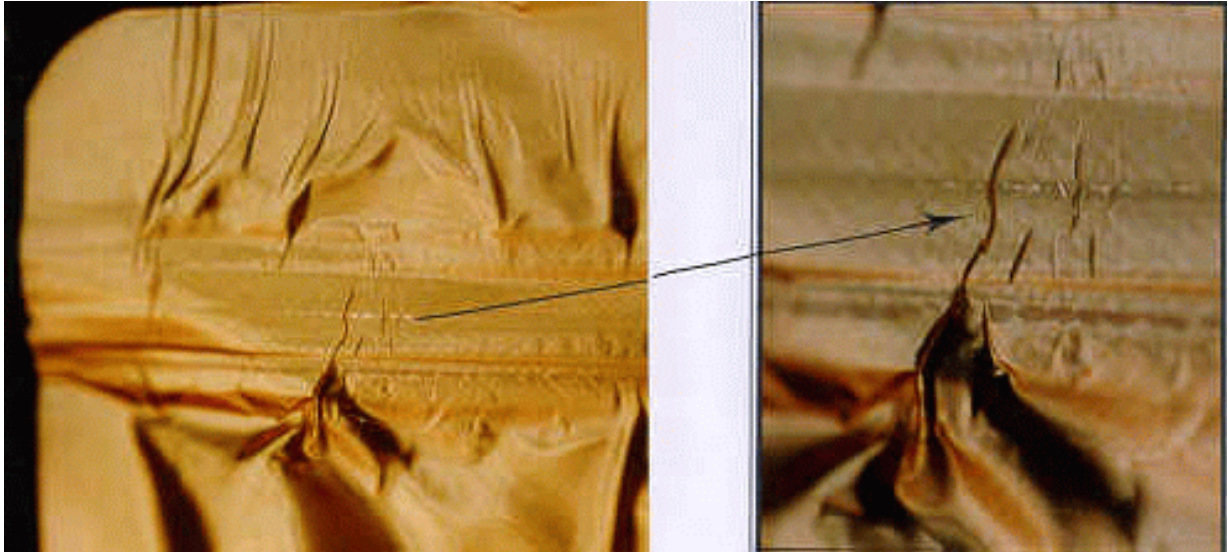
COMMON SOURCES:

- 1) The sealing surfaces were not flat and parallel or were not tensioned properly.
-

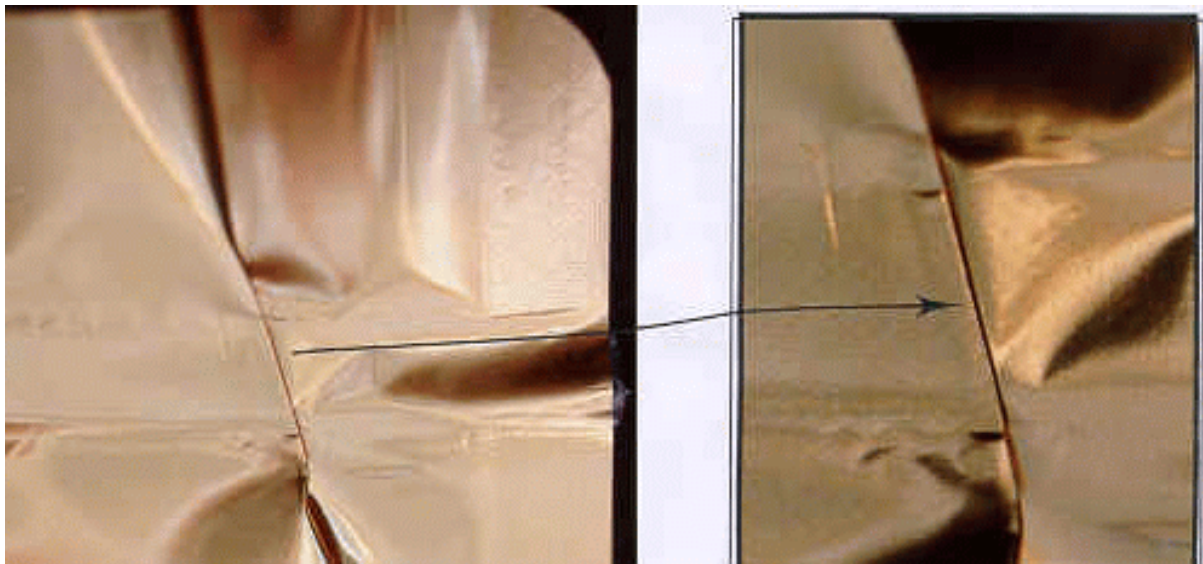
Flexible Retort Pouch Defects
Identification and Classification

Status: New Date: 31/05/2002

DEFECT: WRINKLE



Wrinkle leaves less than 3 mm of acceptable seal



Foldover wrinkle extends through all plies across the seal area