DECEPTIVE CONTAINER DETERMINATIONS

The following procedures are taken from the Federal Food and Drug Net Quantity of Contents Compendium and can be helpful in reporting deceptive packaging violations (Section 12606 California Business and Professions Code).

GENERAL

While the problems of reporting results on deceptive containers are extremely diversified, a general pattern to be followed by all officials will be helpful. It is not presumed that instructions will cover all cases. The official will be left to exercise good judgment when omissions or additions in the outline are indicated. It is important that the summary sheet contains a clear and accurate description of the container together with drawings and/or photographs. A sample package should be submitted with the summary sheet. If a report is forwarded without a sample package, the summary sheet should contain a complete description and drawing or photographs.

DEFINITIONS

In order to avoid confusion and misunderstanding, the following definitions can be used for the purpose of reporting results:

A. The term "**Headspace**" is the distance from the top of the container to the top of the product. In making this measurement, any extensions of the cover or lid above the body of the container are disregarded.

B. The terms "**Volume of Container**," "**Internal Volume of Container**," and "**Capacity of Container**" are synonymous and mean the space occupied by the product plus the headspace. (Methods I and II below)

C. The term "**Calculated Volume of Container**" means the internal volume (capacity) of the container obtained solely by calculation from dimensional measurements of length, height, and thickness.

D. The terms "**Displacement Volume of Container**" and "**External Volume of Container**" are synonymous and refer solely to the external volume of the container exclusive of paneling, indentations, etc. (Method III)

E. The term "**Apparent Displacement Volume of Container**" means the external volume of the container plus the volume due to paneling, indentations, etc. (Method IV)

F. The terms "**False Bottom Volume of Container**," "**Raised Cover Volume of Container**," etc., mean the additional volumes which are added to the internal volume of the container by means of these devices.

G. The term "**Maximum Volume of Product**" means the largest space occupied by the product after fluffing. (Method V)

H. The term "**Minimum Volume of Product**" means the smallest space occupied by the product. (Method V)

I. The term "**Average Volume of Product**" means the average of G and H.

LABORATORY EXAMINATION

It has been found that determination of volume by direct measurement is more accurate in most cases than calculated volume. This is due to the fact that many containers are not perfect geometric figures. Volumes, therefore, should be determined by direct measurement whenever possible and direct measurement should be used for all subsequent calculations. Calculated values, using dimensional measurements, may be used for check purposes and in cases where there is no doubt as to their accuracy.

Method I - (Volume of bottles, tin cans, etc.)

Run water at 20°C (68°F) directly into the container from a burette or other calibrated apparatus.

Method II - (Volume of cartons, baskets, etc.)

Pour mustard seed, turnip seed, or other small spherical seed directly into the container, tapping and shaking the container gently until level full. Transfer seed to graduated cylinder, tapping and shaking gently until there is no further decrease in volume.

Method III - (External volume of bottles, jars, tubes, etc.)

(a) By Weight:

Using a suitable balance, weigh the container full of water at 20°C in the air, and then weigh it submerged in water at 20°C (68°F). The difference in weight in avoirdupois ounces divided by the conversion factor 0.0352 is the displacement volume in cubic centimeters.

(b) By Volume:

Using a graduated cylinder containing a known amount of water at 20°C (68°F). submerge container and read the increase in volume.

Method IV - (Apparent displacement volume)

(a) By Weight:

Fill indentations with modeling clay (Permoplast) and proceed by Method III above. To fill indentations, remove labels and press in an excess of plastic. Excess plastic is removed and leveling accomplished by means of a knife blade held perpendicular to the plastic surface. All extraneous plastic is removed by means of a cloth; and weighings are then performed in the usual manner, although the container should not be placed in direct contact with balance pan.

(b) By Volume:

Run colored kerosene or a liquid with low surface tension at 20°C (68°F) into panels or depressions until level full. The external or displacement volume of the container plus the volume due to paneling or depressions is the apparent displacement volume.

Method V - Maximum and Minimum Volume of Product (not applicable to products where breakage will result).

The maximum and minimum volumes are determined on 2 ounces of the product; the space occupied by other weights being determined by direct proportion.

When extrapolating the maximum and minimum volumes from 2 ounces to x ounces, be sure to determine the total weight (x ounces) of the product in the container by direct weighing. Relying on the labeled weight of the commodity when computing these values can sometimes render incorrect results. If the contents of the container are greater than or less than the labeled weight, an inaccurate representation of the maximum and minimum volume in the container will occur.

Roll 2 ounces of the material back and forth on a sheet of paper 10 times. Fill into a 250 ml graduated cylinder without shaking or moving the cylinder. Level material in cylinder gently with a spatula and read maximum volume.

Tap cylinder 100 times and read volume. Tap 20 times and again read volume. Continue until 20 taps reduce the volume by less than 1 ml and read the minimum volume.

REPORT RESULTS AS FOLLOWS

The data desired on the summary sheet is illustrated below by typical examples. The determinations listed deal solely with deceptive container factors.

A. OVERSIZED CONTAINER (SLACK FILLED) (e.g., Grated Cheese)

1. Description of sample.
2. Headspace (as received).
3. Inside dimensions of container.
4. Volume of container: (direct) - (calculated).
5. Minimum volume occupied by product.
6. Maximum volume occupied by product.
7. Average volume occupied by product.
8. Percent fill of container (minimum volume).
9. Percent fill of container (maximum volume).
10. Percent fill of container (average volume).
11. Drawings or photographs of container and contents.
12. Sample to accompany summary sheet.

Illustration of Method for Reporting Results

The containers are of the shaker type and of uniform size. They are cylindrical in shape with tin ends and cardboard bodies. The bottom end is solid metal and indented .12 inch. The top end has 3 holes, each .44 inch in diameter, which are opened and closed by means of rotating the lid (not hermetically sealed). When received, the holes were covered with cellophane that must be removed before the cheese can be shaken out.

headspace (inches)	1	2	3	4	5	6	Avg.
(as received)	2.00	1.90	1.95	1.93	2.00	2.00	1.96

Inside dimensions of container = 2.30" diameter by 3.30" height

Volume of container (direct) = 224 ml
(calculated) = 13.68 cu. in. or 224.2 ml (see page 17-10 for conversion)

Minimum volume occupied by product = 93.7 ml

Maximum volume occupied by product = 124.9 ml

Average volume occupied by product = 109.33 ml

Fill of container (minimum volume) = 41.8%

Fill of container (maximum volume) = 55.8%

Fill of container (average volume) = 48.8%

B. OVERSIZED CARTON (container within carton) (e.g., Toothpaste)

1. Description of sample.
2. Distance from top of outside container to top of inside container.
3. Inside dimensions of outside container.
4. Volume of outside container: (direct) - (calculated).
5. Displacement volume of inside container.
6. Percent of height of outside container occupied by inside container.
7. Percent of volume of outside container occupied by inside container.
8. Drawings or photographs showing both containers.
9. Sample to accompany summary sheet.

Illustration of Method for Reporting Results

The package consists of tubes of toothpaste in rectangular cardboard cartons. The tubes and cardboard cartons are of uniform size. The tube has a screw top and the bottom of the tube is crimped. There are no circulars or other literature inside the carton.

Distance from top of outside container to tube = 1.60"

Inside dimensions of container = 6.40" x 1.68" x 1.16"

Volume of outside container (direct) = 204 ml
(calculated) = 12.47 cu. in. or 204.4 ml (see page 17-10)

Displacement volume of inside container = 52 ml

Height outside container occupied by inside container = 75.0%

Volume outside container occupied by inside container = 25.5%

C. FALSE BOTTOM CONTAINER (e.g., Candy)

1. Description of sample.
2. Distance from top of container to top of false bottom.
3. Total inside dimensions of container including false bottom.
4. False bottom dimensions (derived from 2 and 3).
5. Volume of container including false bottom: (direct) - (calculated).
6. False bottom volume.
7. Percent volume available for product.
8. Percent false bottom volume.
9. Drawings or photographs showing false bottom.
10. Sample to accompany summary sheet.

Illustration of Method for Reporting Results

The package is a cardboard box with extension edges (2/16 inch). It contains two layers of candy. The bottom layer has a W-shaped strip of cardboard so that it contains fewer pieces of candy than would be the case if this device were not used. The top layer contains 22 pieces of candy while the bottom layer contains 12 pieces. The box has a false bottom consisting of a sheet of cardboard supported by a .56-inch turn down side and end.

Distance from top of container to top of false bottom = 1.63"

Total inside dimensions of container including false bottom = 2.19" deep x 4.50" x 6.50"

False bottom dimensions (derived from preceding measurement) = 0.56" deep x 4.50" x 6.50"

Volume of container including false bottom (direct) = 1050 ml
(calculated) = 64.06 cu in or 1049.9 ml (see page 17-10)

False bottom volume = 269 ml

Percent volume available for product = 74.4%

Percent false bottom volume = 24.6%

D. INDENTED BOTTOM and RAISED COVER CONTAINER (e.g., Deodorant Cream)

1. Description of sample.
2. Overall height of container.
3. Height of cover above full container.
4. Depth of indented bottom.
5. Capacity of container.
6. Displacement volume of container.
7. Volume of indented bottom.
8. Apparent displacement volume.
9. Percent apparent displacement volume occupied by product.
10. Drawings or photographs of container.
11. Sample to accompany summary sheet.

Illustration of Method for Reporting Results

The package consists of a round, lithographed, metal box that fits snugly into a cardboard carton. The metal box has an indented bottom and a slip cover which extends above the contents of the box. The inside compartment, which is basin-shaped, contains a white perfumed cream.

Overall height of container = 0.64"

Height of cover above full container = 0.25"

Depth of indented bottom = 0.10"

Capacity of container = 9.0 ml

Displacement volume of container = 28.5 ml

Volume of indented volume = 5.2 ml

Apparent displacement volume = 33.7 ml

Percent apparent displacement volume occupied by product = 26.7%

NOTE: In the case of bottle measurements, the ratio of apparent displacement volume to capacity of bottle should always be included in the report.

Method VI - (For products such as breakfast cereals, canned nuts, etc.)

A Procedure for Determining Minimum and Maximum Bulk Density of Free-Flowing Food Products and Minimum and Maximum Percent of Fill.

PURPOSE

The method outlined below involves transferring the contents of a readily available standardized graduated container from which the volume of the contents can be read directly.

The inside of container is measured when empty, to the nearest 0.1 cm, so that the effects of bulge are eliminated. For a container containing a liner, determine the volume of the liner occupied in the container.

PROCEDURE

A. Open the container and transfer its contents to a standard graduated glass cylinder of such size that untapped volume will occupy more than half of the capacity of the cylinder. (Fill as many times as is necessary to get the entire volume of product.) Before reading a volume, the top surface should be leveled. (A point midway between the highest and lowest point of the inclined surface may be used in place of leveling the surface.)

B. Record this total volume as the maximum volume in cubic centimeters.

C. Carefully pour out the product and divide into quarters. Transfer each quarter successively to the graduate cylinder, firmly tapping the container 5 times after addition of each quarter. When all of the product is transferred, or the cylinder is filled, continue tapping to obtain full settling -- when 5 taps result in additional settling of less than 2.0%. Fill cylinder as many times as is necessary to obtain the total settled volume of the contents (level top surface of contents as before). It is desirable to use a cylinder of such size that the four quarters will be contained in one filling.

NOTE: Tapping is accomplished by raising the cylinder vertically about 2" and then dropping onto a firm, level surface; impact should be sufficient to effect settling of the product but not so severe as to cause product breakage. The cylinder should be tapped onto a cork pad or corrugated cardboard paper.

D. Record this total volume as the minimum volume in cubic centimeters.

E. Determine the available volume of the container in the following manner: calculate the inside volume of the container in cubic centimeters.

F. Calculate the percent fill as follows:

$$\frac{\text{Maximum volume of product in ml}}{\text{Available volume of container in ml}} \times 100 = \text{maximum \% fill}$$

$$\frac{\text{Minimum volume of product in ml}}{\text{Available volume of container in ml}} \times 100 = \text{minimum \% fill}$$

NOTE: Many products are fragile and subject to breakage. If excessive, breakage can significantly lower the apparent percent fill determined by the above method. If the percent fill for a particular lot of product appears low, the possibility of excessive breakage should be investigated.

SUGGESTED OPERATIONAL STEPS

Measuring volume and fill of container for free-flowing food products such as mixed nuts in cans, jars, etc., using Method VI.

A. Determine gross weights of 10 full and intact containers.

B. Open can from the top, using a can opener. Do not use key.

C. Determine headspace on 5 containers (with liner in place).

D. Determine maximum and minimum fill of 5 containers by the above procedure.

E. Calculate apparent volume of containers, subtracting from the height the two double seams. Do not correct for indentations; assume ends (lids) to be flat.

F. 1. Determine water capacity of one container opened at the top.

2. Refill the container to water capacity with the nut product, adding as required from contents of other containers. Add about a quarter of the estimated required quantity at a time and tap in the container as directed in Method V, last paragraph, page 11-3. The surface of the product should be level, and as near 3/16" below the top edge of the double seam as possible. Determine the weight of the contents.

G. For the purpose of obtaining the volume of indentations, proceed as follows:

Determine the water capacity of one can from the top and one can from the bottom, using the countersink dimension as measured for the height of the double seam instead of 3/16" or titrate top and bottom indentations, using odorless kerosene or another liquid of equal or lower capillary action.

H. Compute volume of indentations of the top and bottom lids by taking the difference between the calculated apparent volume and the water capacities as previously determined (e.g., calculated apparent volume minus water capacity determined from bottom equals volume of top indentation).

I. Determine volume of corrugated liners, using the distance from trough to crest as thickness.

J. Sketch cross section of container (side view).

K. Submit 2 intact containers.

L. Submit a color photograph of a representative portion of the nuts.

M. Report results as in following format.

REPORTING FORMAT

A. Net contents declared.

B. Net contents found.

C. Maximum volume of nuts.

D. Minimum volume of nuts.

E. Calculated apparent volume of can.

F. Measured water capacity of can:

1. Maximum weight the can will hold when completely filled to water capacity.

2. Divide net contents (B) by (A) and multiply by 100 to obtain percent.

G. Calculate available volume: (Subtract volume of bottom indentation from water capacity F).

H. Volume occupied by corrugated liner.

I. Volume of top indentation (countersink dimension).

J. Volume of bottom indentations (countersink dimensions).

K. Headspace.

L.	% Maximum fill based on:	Measured available volume	[C/(F-I)] x 100 =
		Calculated available volume	(C/G) x 100 =
		Calculated apparent volume	(C/E) x 100 =
M.	% Minimum fill based on:	Measured available volume	[D/(F-I)] x 100 =
		Calculated available volume	(D/G) x 100 =
		Calculated apparent volume	(D/E) x 100 =