

## LABORATORY MANUAL ON PACKAGING TECHNOLOGY

### Exercise-1 : Introduction : Can Sizes and Dimensions

Cans of different size and shape are usually used in canning industries. The can dimension are expressed as a product of two or three numbers based on the number of body pieces of which a can is made. For example for No. 1 Tall Can the dimensions are expressed as a product of two numbers as 301x411 (Dia x Height). The first digit of each number indicates the measurement in 'whole inch' while the second and third digit indicate the measurements in sixteenth of an inch. For example, 301x411 means that the can is  $3^{01}/_{16}$  inches in diameter and  $4^{11}/_{16}$  inches in height.

Details of dimensions of the commonly used Cans in the Canning industries are tabled below –

#### A. For 3-PIECE CANS :

Sl. No.	Common name	Dimension (Diameter & Height)
1.	8 Ounce Can	301x206
2.	8 Ounce Tall	211x304
3.	½ Tuna Can	307x113
4.	No. 1 Tall	301x411
5.	No. 1 Tun	401x206
6.	No. 2	307x409
7.	No. 2 Cylinder	307x512
8.	No. 2 Vacuum	307x306
9.	No. 2/12	401x411
10.	No. 3	404x414
11.	No. 3 Cylinder	404x700
12.	No. 13	603x700
13.	No. 1 Flat	404x206

#### B. For 2-PIECE CANS :

Sl. No.	Common name	Dimension (L x W x H)
1.	¼ Dingley	404x302x014
2.	½ Oval	309x515x103
3.	½ Oblong	508x204x103
4.	No. 1 Oval	607x406x104
5.	No. ¼	405x301x014

### Exercise-2 : Examination of Can Double Seam

Introduction : The Double seam of a Can should be examined very carefully because the success of canning depends largely on the degree of perfection achieved in sealing the Can airtight. The internal and external conditions of the double seam should be inspected visually and every measurements should be taken carefully to judge the quality of the double seam.

Equipment Required :

1. Screw gauge
2. Seam cutting saw
3. Cutting pliers
4. Magnifying glass
5. Double seamed Can (2-3 nos.)

Procedure :

A. External Examination :

i) Visual Examination

Observe carefully all round the seam end both on the body and lig. Record the presence of defects if any such as V8s, lips, cut-overs, lined seam etc.

ii) Measurement :

Measure the seam width (W), seam thickness (T), Counter sink (CS) at 3-4 points by using screw gauge.

B. Internal Examination

i) Visual Examination :

Strip can end all round by using pliers and get a ring of the cover hook portion, observe wave like 'Wrinkle' on inside surface of the cover hook and record them.

Cut seam section at 3-4 points and observe for hooking, overlapping and clearances using magnifying glass.

ii) Measurement :

Separate body hook (BH) and cover hook (CH), without altering the shape and measurement of double seam and record their lengths.

Find out average value of cover and body hook lengths.

Measure tinplate thickness (t)

Calculate overlap (OL) percentage by using following formula.

$$OL\% = \frac{BH+CH+t-W}{W-31} \times 100$$

Where :

- Body : Body Hook Length
- CH : Cover Hook Length
- W : Seam Width
- t : Tinplate Thickness
- OL : Overlap

Observation :

The measurements of double seam may be tabulated in following proforma –

Can No. & End	Seam Cutting Points	External Examination			Internal Examination			Remarks
		W	t	CH	BH	CH	OL%	
No. 1 (top)	1							
	2							
	3							
	Average							
No. 2 (Bottom)	1							
	2							
	3							
	Average							

**Exercise-3 : Canning of Fish (Natural Style)**

- Can used : No 1 tall (301x409)
- Standard New wt. : For No. 1 Tall : 454g or 425g, 8-0z : 210g
- Standard Solid wt. : Min. 65% of net weight.

Introduction :

In the natural style, fresh fishes are packed with minimum pretreatment.

Materials & Equipments :

1. Fish, Common salt, Table salt.
2. Table, Cutting boards, Trays, Tubs etc.
3. Empty Cans, Lids, Seaming machine, Autoclave /Retort, Balance.

Procedure :

Raw material	:	(whole fresh fish)
Weighing	:	
Dressing	:	Removal of fins and scales, heads slitting of belly and cleaning of entrails.
Size cutting	:	To required length discarding tail ends. For No. 1 Tall – 10.8 cm, 8-Oz : 5.5 cm. With tap water.
Washing	:	With tap water.
Weighing	:	To determine dressing yield.
Brining	:	In saturated brine of common salt. 12 min for 10.8 cm piece and 8 min for 5.5 cm. Piece.
Washing	:	Quickly by dipping in water.
Packing	:	To net wt. +2 or 3 g extra.
Salt adding	:	0.5-1.0g dry powdered table salt.
Seaming	:	By vacuum seamer or after proper exhausting.
Can washing	:	With soap water then fresh water.
Processing	:	In steam retort. At 115 <sup>0</sup> C (10 psi) 90 min for No. 1 Tall Can, 70 min for 8-Oz Can.
Cooling	:	In tap water
Storing	:	In cool, dry place.

Observation :

Collect and calculate the following

1. Total weight of fish used, dressed weight and dressing yield.
2. Total number of can produced, yield rate and yield percentage.
3. Number of manpower (in hours) and efficiency of production.

Precaution :

1. Fish cutting knives are well sharpened and free from rust.
2. Handling of fish should be minimum.
3. If dressing of fish takes long time, keep in crushed ice.
4. Avoid delay at all stages.
5. Frequent cleaning of dressing table and floor for necessary.

**Exercise-4 : Canning of Fish in Brine**

Can used	:	No. 1 Tall, 8-Oz Can
Standard Net wt.	:	
Standard Solid wt.	:	Same as Exercise No. 3

Introduction :

Very fresh fish is found to be better for this type of packing. However, the dressed fishes are precooked brined and drained to improved the appearance of the finished product.

Material & Equipments :

Same as exercise no. 3. Wooden trays for precooking and draining are necessary.

Procedure :

Material	:	Whole fish
Weighing	:	(If frozen after thawing)
Dressing	:	Removal of scales, fins, head and entrails.
Size cutting	:	10.8 or 5.5 (for No. 1 Tall and 8-Oz Can)
Washing	:	Quick dip

Time (in min)	Temperature of water in kettle ( $^{\circ}\text{C}$ )	Temperature of can food center ( $^{\circ}\text{C}$ )
12		
13		
14		
15		
16		
17		
18		
19		
20		
Cooling – 1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
21		

Draw the heating-cooling curve taking time on X – axis & temperature on Y – axis.

Note :

1. The curve should be at least 9 min above the  $60^{\circ}\text{C}$  line for products having at pH 4.3 or below.
2. The experiment may be repeated with rotating cans.

**Exercise-13 : Study of the relationship between the can closing temperature and the resultant vacuum**

Introduction :

Proper exhausting of canned foods before retorting is an important operation. Vacuum in Cans may be created, either by heat exhausting or mechanical methods using vacuum seamers or by the steam injection method. In exhausting by heat, the most significant factor is the temperature of the Can and its content just before seaming. The object of this experiment is to study how the vacuum produced in Can varies with temperature at closing.

Materials and Equipments :

1. Empty Can (30 nos.) - No. 1 Tall
2. Water for filling, heated to different temperature.
3. Physical balance for weighing
4. Double seaming machine
5. Scale, vacuum gauge, thermometer etc.

Procedure :

- a) Divide the Cans into 6 groups of 5 Cans each.
- b) Fill each group with water of different temperature 40°C, 50°C, 60°C, 70°C & 90°C upto a head space of 10 mm. Weigh each Can.
- c) Note the temperature of water in each can and immediately seam.
- d) Cool all Cans to room temperature.
- e) Wipe and dry the out side of the Cans and reweigh to check spillage if any.
- f) Test vacuum produced in each Can & find out group averages.
- g) Open the Cans and note temperature and vacuum measurement.
- h) Measure head space also.
- i) Tabulate & plot Can vacuum against temperature.

Observation :

Group	Can no.	Gross wt.	Closing Temp. (°C)	Can vacuum		Head space (mm)	Remarks

#### Exercise-14 : Cut out test for Canned Fishery Products :

Introduction :

Cut out test is done to evaluate the general quality of a canned food. In this test, the condition of the food contents, the external and internal conditions of the Can and other characteristics of the product are examined by certain organoleptic, physical and chemical tests.

Materials and Equipments :

1. Canned food : 4-6 nos. Cans
2. Tone tester
3. Physical balance
4. Vacuum gauge
5. Can opener
6. Brix refractometer
7. Scale
8. pH paper near neutral ranges

Procedure :

1. If the Cans are labeled, note the particular of the label.
2. Record the embossed code mark on the lid.
3. Observe the external condition of the cans such as rusting, dents, physical damage, seam defects etc.
4. Test the tone and get an idea about the fill and vacuum.
5. Determine the gross weight.
6. Measure the vacuum.
7. Cut the lid almost completely, open the observe the food surface and inside the lid. Measure the head space.
8. Drain the contents for 5 min. collect the liquid in a measuring jar.
9. Note the volume, turbidity, colour, texture, flavour etc. Also look for foreign matter.
10. Observe the bottom and inside the Can, looking for settled curds.
11. Wash, dry and weigh the empty Can.

### Evaluation Sheet for Cut-Out Test

Can No./Particulars	1	2	3	4	5
Product :					
Code :					
Manufacturer :					
Date of production :					
Date of Testing :					
Can size & Type :					
Std. Net wt. / Solid wt. :					
Vacuum :					
Gross Weight :					
Solid + Can wt :					
Empty Can wt :					
Solid wt :					
Liquid wt :					
Net wt :					
Solid wt :					
Net wt :					
Pack wt :					
Colour :					
Tecture :					
Flavour :					
Appearance (Style) :					
No. of pieces :					
Salt/ Sugar degree :					
Turbidity :					
Acidity :					
PH :					
Size of pieces :					
Broken of flakes :					
Adhesion :					
Curds :					
Remarks :					