भारतीय मानक

Indian Standard

IS 18427 : 2024

(Superseding IS 2034 : 2012, IS 9396 (Part 1) : 1987, IS 9396 (Part 2) : 2012, IS 9976 : 1981, IS 9991 : 1981, IS 11078 : 2012 and IS 12219 : 1987)

खाद्य और पेय पदार्थों के लिए तीन खंड से बने गोल खुले शीर्ष वाले धातु के कैन — विशिष्टि

Three Piece Round Open Top Metal Cans for Foods and Beverages — Specification

ICS 55.120

भारतीय मानक ब्यूरो
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July 2024 **Price Group 13**

Metal Containers Sectional Committee, PGD 38

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Metal Containers Sectional Committee had been approved by the Production and General Engineering Division Council.

This standard supersedes following Indian Standards on open top cans:

a) IS 2034 : 2012 Round open top sanitary cans for butter and cheese — Specification (*second revision*)
b) IS 9396 (Part 1) : 1987 Round open top sanitary cans for foods and drinks: Part 1 Tinplate (*first revision*)
c) IS 9396 (Part 2) : 2012 Round open top sanitary cans for foods and drink — Specification: Part 2 Sizes and general requirements (*second revision*)
d) IS 9976 : 1981 Method of sampling of open top sanitary (OTS) cans
e) IS 9991 : 1981 Specification for condensed milk cans
f) IS 11078 : 2012 Round open top sanitary cans for milk powder — Specification (*second revision*)
g) IS 12219 : 1987 Methods of determination of gross — Lidded capacity of open top sanitary cans

This standard refers to IS 18317 : 2024 'Lacquers and decorative finishes for three piece round open top metal cans for foods and beverages — Specification', which has been formulated along with this standard by the Committee considering the importance of the internal lacquer in performance and safety of the can.

The composition of the Committee responsible for formulation of this standard is given in Annex K.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*).' The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

THREE PIECE ROUND OPEN TOP METAL CANS FOR FOODS AND BEVERAGES — SPECIFICATION

1 SCOPE

This standard covers the raw material, dimensional, manufacturing and testing requirements of three piece hermetically sealed round open top metal cans up to the nominal capacity of 10 kg used for packing thermally and non-thermally processed food products.

This standard does not cover containers for *ghee*, *vanaspati* and edible oil (*see* IS 10325 and IS 10339).

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the edition indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of these standards.

3 TERMINOLOGY

For the purpose of this standard, the terms given in IS 1993, IS 11104 and the following shall apply.

3.1 Body — The main cylindrical part of the can which holds the contents.

3.2 Bottom NEO End — The seamed NEO end which forms the base of the can.

3.3 Top NEO End — The seamed NEO end which forms the top of the can.

3.4 Body Hook — The flanged portion of a can body which is engaged by the end in the double seaming operation.

3.5 Blank — Plain flat piece of plate for body or end of a container which is cut to size but not formed to shape.

3.6 Bottom — The seamed end of a built-up body can.

3.7 Bead — A single corrugation which may be convex or concave, mechanically formed in the body or end of a can.

3.8 Bright Finish — Finish on flow melted tinplate using smooth finish black plate.

3.9 Countersink — The recess formed in the end(s) of built-up cans into which the chuck fits during double seaming. This would also refer to the recess on the base of seamless bodies.

3.10 Can Height — The height of the factory finished empty can.

3.11 Coil — A rolled flat strip product which is wound into regularly superimposed laps so as to form a coil with almost flat sides.

3.12 Decoration — The result of printing in a printing press, or by a process such as silk screening or transferring either in one colour or in a multi-colour design.

3.13 Double Seam — A joint incorporating five thicknesses of metal interlocked and pressed together by means of which the edges of the end and body of a metal receptacle may be jointed together.

3.14 Edge Camber — Deviation of edge of coils/sheets from a straight line forming its chord.

3.15 End Hook or Cover Hook — That portion of a seamed end which is tucked up into the body hook and helps in forming the double seam.

3.16 Embossing — Raised lettering or design on the tin metal body or in NEO ends.

3.17 End — Collective term for devices serving to close, protect and secure the top and/or bottom.

3.18 EOE Ends — Easy open ends; seamed-on rigid end which can be opened without using a tool by means of a ring-pull feature.

3.19 Film Weight — The weight in grams or milligrams of compound enamel, lacquer strips or varnish per unit or unit area of the coated plate.

3.20 Finish — Surface appearance of tinplate, determined by surface roughness, *Ra*, of the steel base together with the conditioning of the tin coating which can be either flow melted or un-flow melted.

3.21 Flanging — Flaring out of a can's open end(s) to receive an end for seaming.

3.22 Flattened Can — An un-flanged body formed by seam welding and then collapsed by flattening. Closure and bottom components supplied loose.

3.23 Food Grade — The material made of substances which are safe and suitable for their intended use and shall not endanger human health or result in unacceptable change in the composition of the food or bring about deterioration in the organoleptic characteristics.

3.24 Ink — Material containing resins, pigment and additives that when mixed allows to obtain a viscous fluid suitable to be applied on metal sheets by an offset printing process.

3.25 Lacquer — Coating products of variable viscosity grade suitable to be applied over a metal support.

3.26 Lacquering Process — Lacquer application process generally performed by the application of thermoset coatings to a metal coil or to a flat sheet or to a final product. Roll, spray or electrostatic deposition are the main adopted process.

3.27 Lining — Application of a (elastomer) sealing compound intended to make an end seam leak proof.

3.28 Margin — In enamel and litho layouts, the portion that is left plain (uncoated) along the side seam for welding purposes. Also called weld margins or enamel margins.

3.29 Matt Finish — Finish resulting from the use of temper-mill work rolls with dull surface textured by a shot blast, electro discharge texturing (EDT), electro beam texturing (EBT) or another suitable method, together with un-flow melted tin coating.

3.30 Neck — End side of the cylinder where the product is discharged during the use.

3.31 Necking — Forming inwards of the upper end or both end of a can body to allow the application of a smaller diameter end.

3.32 NEO Ends — Non easy open ends.

3.33 Nominal Can Diameter — The nominal can diameter is the internal cross-section of the body determined to nearest 0.1 mm the resultant figure being rounded to the nearest whole millimeter (if the first decimal is 0.5 mm or above, round up; in all other cases, round down). In all instances internal body diameters are determined by using a plug gauge or by derivation from external body dimensions measured with Vernier calipers.

3.34 Non-Thermally Processed Foods — Open top cans which are filled at room temperature.

3.35 Offset Printing Process — Ink application process over a metal sheet based on the process of transferring the ink from a printing plate to the metal support by the action of a rubber cylinder.

3.36 Pallet — Base platform on which a product is placed to facilitate ready transportation.

3.37 Printing — The process of applying lettering and surface design in printing ink on to the enamel surface of the tinplate.

3.38 Peel Off End (POE) — End with a flexible foil heat-sealed on a metal ring which can be opened without using a tool by means of foil tab feature.

3.39 Score — Thinning of the metal of an easy opening end such that it tears readily when the tear tab/ring is pulled.

3.40 RLT — Ring, lid and tagger assembly.

3.41 Roll Seaming — The process of applying an end to a can body specially interlocking the end with the flange of the can.

3.42 Side Seam — Welded joint when a rectangular body blank for a three piece can is formed into a body cylinder.

3.43 Side Stripe — Protection of side-seam area with an organic coating.

3.44 Stone Finish — Finish on flow melted tinplate characterized by a directional pattern, resulting from the use of final-mill work rolls that have been grounded to higher level of roughness than those used for the smooth finish.

3.45 Tab/Ring-Pull — Feature of an easy opening end which provides the grip for a manual opening.

3.46 Temper — The value of hardness of metal plate which indicates the forming properties.

3.47 Thermally Processed Foods — Open top cans which are not filled at room temperature.

3.48 Thermoset Coating — A coating product in solvent, or as powdered solid which, when applied to a metal substrate and heated, develops its mechanical and chemical resistance properties through further chemical reaction (cross-linking).

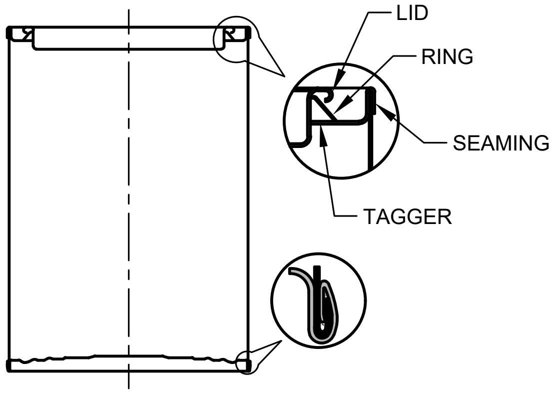
3.49 Three Piece Metal Can or Built-Up Can — A can made from at least three main components: body, top end and bottom end.

3.50 TRF — Tagger ring foil assembly.

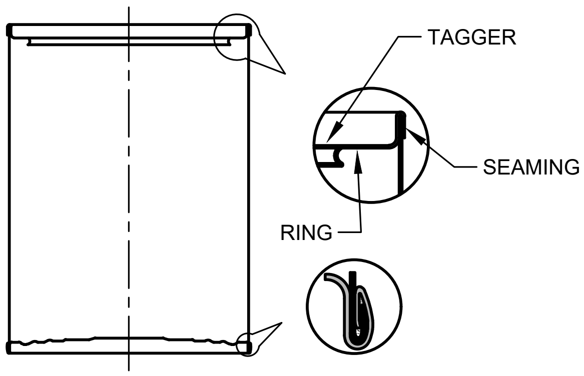
4 TYPES

The different types of three-piece metal cans can be as given below (*see* Fig. 1):

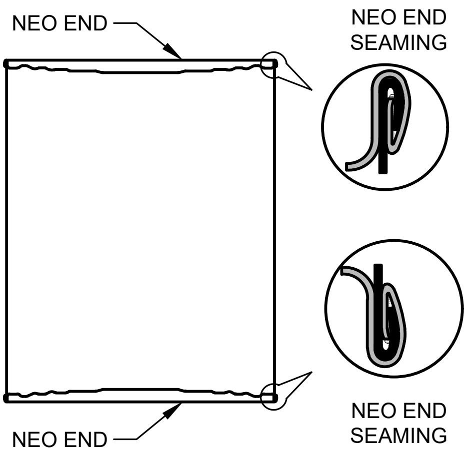
a) Top side RLT seamed can;
b) Top side POE seamed can;
c) Top side NEO (non-easy open) end seamed can;
d) Top side EOE (easy open end) seamed can;
e) One end single necked-in can;
f) Both side single necked-in can; and
g) Top side double necked-in and bottom side single necked-in can.



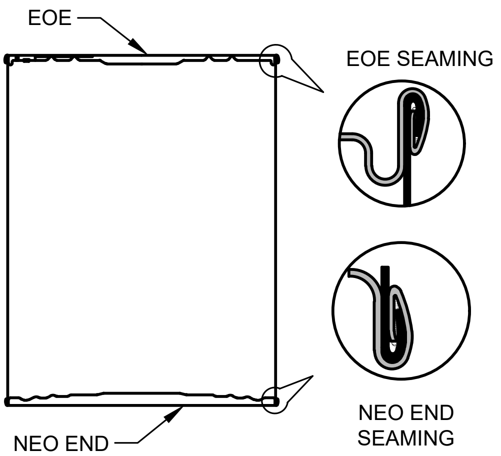
1A Top Side RLT Seamed Can



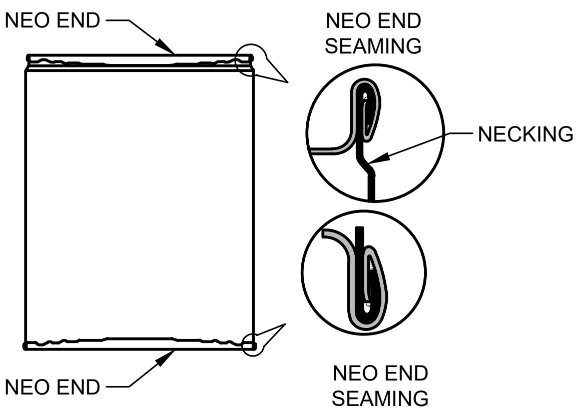
1B Top Side POE Seamed Can



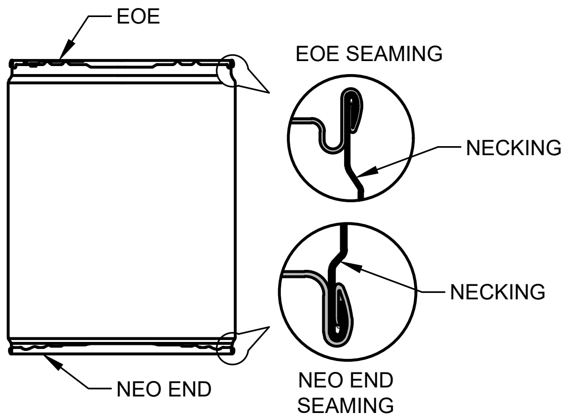
1C Top Side NEO (Non-easy Open) End Seamed Can



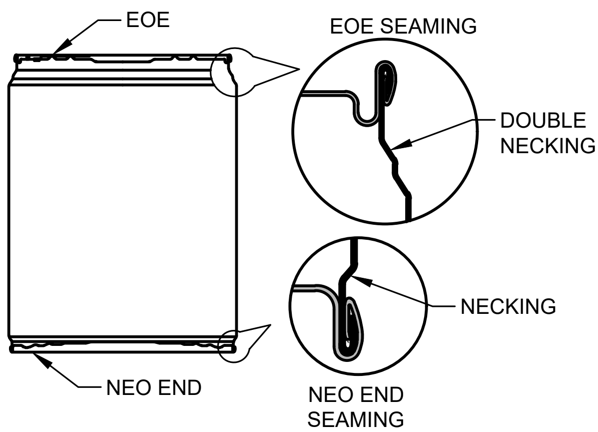
1D Top Side EOE (Easy Open End) Seamed Can



1E One End Single Necked-in Can



1F Both Side Single Necked-in Can



1G Top Side Double Necked-in and Bottom Side Single Necked-in Can

FIG. 1 TYPES OF THREE PIECE METAL CAN

5 RAW MATERIAL

5.1 Tinplate

The cans shall be made of the standard grade electrolytic tinplate (ETP) as defined in IS 1993 produced from base plate of MR or equivalent grade steel with the chemical composition conforming to the chemistry as given in **5.1.1**.

NOTE — MR – Medium residual.

5.1.1 *Chemical Composition*

Sl No.	*Element*	*Mass Fraction (Max), Percent*
(1)	(2)	(3)
i)	C	0.13
ii)	Si	0.03
iii)	Mn	0.60
iv)	P	0.020
v)	S	0.030

5.1.2 *Tinplate Thickness*

Open top metal can for thermally and non-thermally processed food should be made of tinplate of thickness as specified in Table 1 and Table 2, respectively. Tinplate of lower thickness for the thermally/non-thermally processed food can body may be used for beaded cans made from conventional tinplate or straight walled cans made from double reduced tinplate. The reduced body and end plate thickness shall be as agreed to between the manufacturer and the purchaser. The tolerance and method of measurement of tinplate thickness shall be as given under **10.2** of IS 1993. Tolerance on linear dimension and flatness of the tinplate shall be according with **10.4** and **10.7** of IS 1993, respectively.

5.1.3 *Tin Coating*

The tin coating for body and ends should be as given in the Table 3. The tolerance for tin coating masses shall be as per Table 2 of IS 1993.

Table 1 Tinplate Thickness for Thermally Processed Food Cans

(*Clause* 5.1.2)

All dimensions in millimetres.

Sl No.	**Trade Size (Diameter of Can)**	**Trade Over Seam Diameter, *D***	**Nominal Diameter**	**Tinplate Nominal Thickness**			
				Flattened Body	Built-up Can Body		NEO Ends
					Beaded	Un-beaded	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	202	55	52	0.19	0.18	0.19	0.19
ii)	211	68	65	0.20	0.19	0.20	0.20
iii)	300	76	73	0.21	0.19	0.21	0.21
iv)	307	87	83	0.22	0.20	0.22	0.22
v)	401 × (up to 301.5 height)	102	99	0.22	-	0.22	0.22
vi)	401 × (above 301.5 height)	102	99	0.24	0.20	0.24	0.22
vii)	404	108	105	0.24	0.22	0.24	0.24
viii)	603 (up to 700 height)	157	153	0.28	0.26	0.28	0.26
ix)	603 (above 700 height)	157	153	0.28	0.28	0.28	0.26
x)	700	178	174	0.29	0.28	0.28	0.28
xi)	709	193	189	0.29	0.28	0.28	0.28

Table 2 Tinplate Thickness for Non-Thermally Processed Food Cans

(*Clauses* 5.1.2 *and* 7.2.2.3)

All dimensions in millimetres.

Sl No.	Trade Size (Diameter)	Trade Over Seam Diameter, *D*	Nominal Diameter	SR/DR	Tinplate Nominal Thickness				
					Un-beaded Body	Beaded Body	NEO End	Ring	Lid
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	202	55	52	SR	0.17	0.17	0.16	0.16	0.16
				DR	0.15	0.15	0.15	0.15	0.15
ii)	211	68	65	SR	0.17	0.17	0.16	0.16	0.16
				DR	0.15	0.15	0.15	0.15	0.15
iii)	300	76	73	SR	0.17	0.17	0.16	0.16	0.16
				DR	0.15	0.15	0.15	0.15	0.15
iv)	301	77	74	SR	0.17	0.17	0.16	0.16	0.16
				DR	0.15	0.15	0.15	0.15	0.15
v)	307	87	83	SR	0.18	0.17	0.17	0.17	0.17
				DR	0.16	0.15	0.16	0.16	0.16
vi)	401	102	99	SR	0.18	0.17	0.16	0.17	0.17
				DR	0.16	0.16	0.15	0.16	0.16
vii)	404	108	105	SR	0.18	0.17	0.16	0.17	0.17
				DR	0.16	0.15	0.15	0.16	0.16
viii)	502	130	127	SR	0.22	0.20	0.20	0.18	0.18
				DR	0.17	0.15	0.17	0.16	0.16
ix)	509	141	138	SR	0.22	0.20	0.20	0.18	0.18
				DR	0.17	0.15	0.17	0.16	0.16
x)	603	157	153	SR	0.22	0.20	0.22	0.22	0.22
				DR	0.20	0.17	0.18	0.18	0.18
xi)	700	178	174	SR	0.24	0.22	0.22	0.22	0.22
				DR	0.20	0.17	0.18	0.18	0.18
xii)	709	193	189	SR	0.24	0.22	0.22	0.22	0.22
				DR	0.20	0.17	0.18	0.18	0.18

NOTES

1 The tinplate thickness indicated in the above tables are only for reference. Lower or higher tinplate (material) thickness may be used as agreed between manufacturer and purchaser.

2 Aluminium EOE may also be used. The aluminium grade and thickness shall be as per **5.6.2**.

3 The trade sizes are included here because the canning trade is still more familiar with these. When the canning trade becomes fully familiar with metric nomenclature, the trade size column will be omitted.

Table 3 Tin Coating Mass

(*Clause* 5.1.3)

Sl No.	Product	Tin Coating Mass g/m^2			
		Internal Plain Cans	Internal Lacquered Cans	External Plain Cans	External Lacquered Cans
(1)	(2)	(3)	(4)	(5)	(6)
i)	Mango pulp – Body and ends	11.2	2.8	-	2.8
ii)	Pineapple – Body and ends	11.2	2.8	5.6	2.8
iii)	All other thermally processed cans – Body and ends	8.4	2.8	5.6	2.8
iv)	Non-thermally processed can – Body and ends	2.8	2.8	2.8	2.8
v)	Ring and lid	2.8	2.8	2.8	2.8
vi)	POE ring	2.8	2.8	2.8	2.8

NOTES

1 The external surface of the can body/NEO end may be either lacquered or lithographed as per customer requirement.

2 Standard grade electrolytic chromium/chromium oxide-coated steel (ECCS) as per IS 12591 may also be used for the ends with lacquering. The coating mass for ECCS products shall be as per IS 12591.

3 The above tin coating is only for reference. Different tin coated material may also be used if agreed between manufacturer and purchaser.

5.1.4 *Surface Finish*

The tinplate used shall be in bright or stone finish with the surface roughness, *Ra* ≤ 0.35 µm for bright finish and 0.35 µm to 0.60 µm for stone finish as per **7.3** of IS 1993. The tinplate or electrolytic chromium/chromium oxide-coated steel used shall also be free from major surface defects like white patches, matt patches, deep scratches, untinned spots, wood grain finish, patchy/excess oil, quench/water stains.

5.1.5 *Tin Grain Size*

For internally plain cans with tin coating of 8.4 g/m^2 (or above) to be used for thermally processed foods, the tin grain size on the heavier coated side shall be between 6 to 9 grains per square inch of the surface etched in accordance with the method given in Annex B.

5.1.6 *Iron Solution Value*

For internally plain cans with tin coating of 8.4 g/m^2 (or above) to be used for thermally processed foods, the iron solution value on the heavier coated side shall be 20 µg (*Max*). The iron solution value shall be determined by the method given in Annex C.

5.1.7 *Surface Oil*

Tinplate surface shall be oiled with dioctyl sebacate or butyl stearate oil (*see* IS 12591). Oil film mass on the tinplate shall be in the range of 5 mg/m^2 to 12 mg/m^2 (both sides together) and oil shall be uniformly distributed on the sheets.

5.1.8 *Passivation Treatment*

The tinplate may be subjected to passivation treatment as agreed to between the manufacturer and the purchaser. The usual passivation procedure is a cathodic treatment in an acidic chromate solution (*see* **7.4** of IS 1993). The typical range of this passivation is generally up to 10 mg/m^2 for each side.

5.1.9 *Edge Camber and Out-of-Squareness*

Tinplate shall meet the requirements of edge camber of coil/sheet and out-of-squareness of sheet as per **10.5** and **10.6** of IS 1993 respectively.

5.1.10 *Mechanical Properties*

The mechanical properties of the tinplate shall meet the requirement as given in **9** of IS 1993.

5.2 Lacquers and Decorative Coatings

The specification and testing for internal lacquer, external lacquers and decorative coatings shall be as per IS 18317.

5.3 Inks

Printing inks in metal packaging which are usually applied to the external surface of the packaging is not intended to come into direct contact with food. Printing inks for use on open top metal cans shall conform to IS 15495.

5.4 Lining Compound/Can End Sealants

5.4.1 Can end sealants act as sealants inside the double seam by which the can end is attached to the can body providing a hermetic seal preventing ingress of microbial contamination. They are polymeric products based on natural or synthetic rubber. They can be water borne (water dispersible or water soluble), or solvent-borne.

5.4.2 Lining compound shall be of food grade.

5.5 Side Stripe Systems

The liquid side stripe and powder side stripe for use on metal cans shall be as per IS 18317.

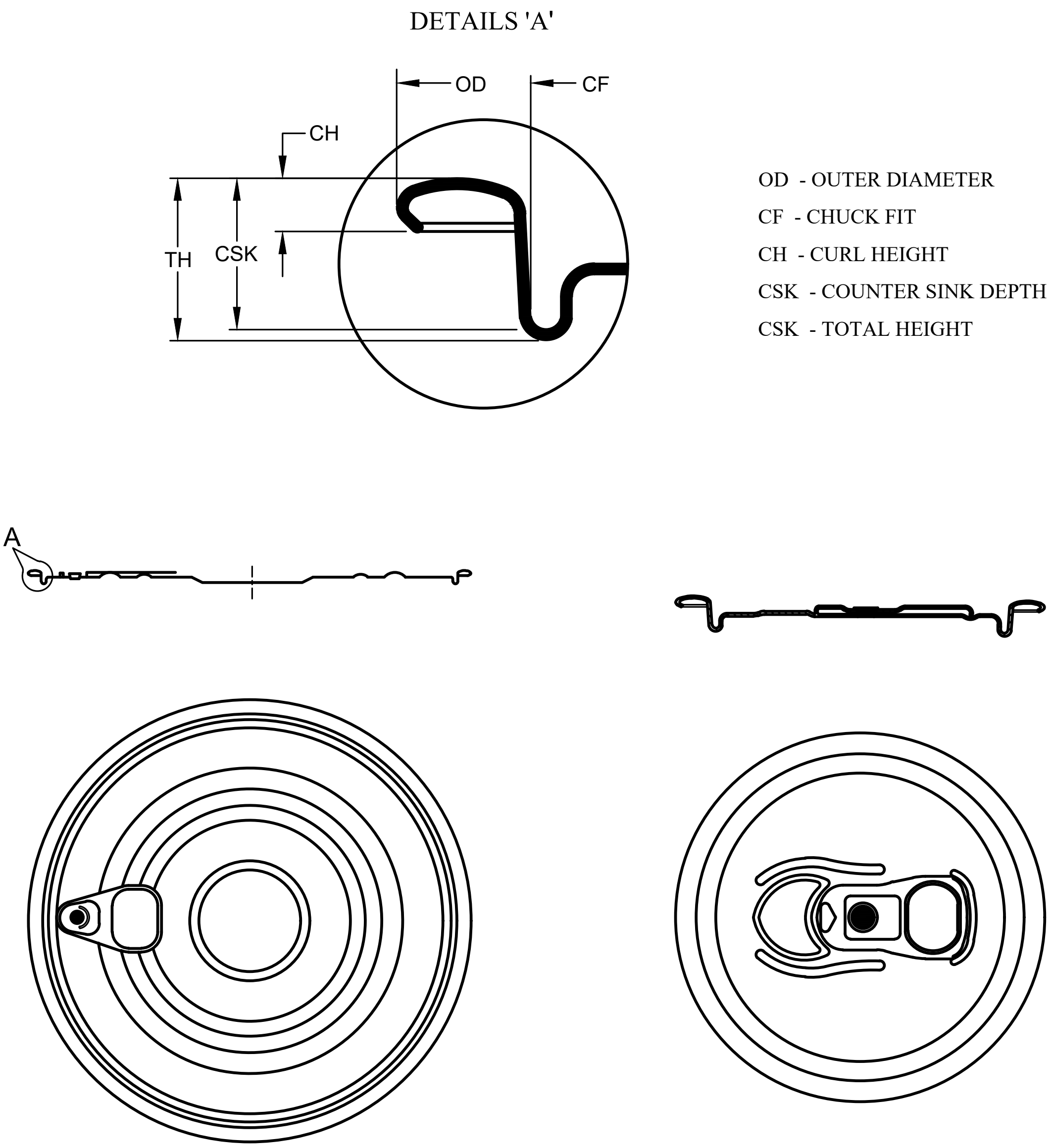
5.6 Easy Open End

5.6.1 *Types of Easy Open Ends*

The types of different EOE can be as given below (*see* Fig. 2):

a) Full apertures easy open end — This is used for general use food products; and

b) Stay on tab easy open end — This is used for the direct consumption of the contents.



EOE - FULL APERTURE EASY OPEN END (ETP/ECCS/ALUMINIUM)

SOT - STAY ON TAB (ALUMINIUM)

FIG. 2 PROFILE AND TYPES OF EOE

5.6.2 *Raw Material Requirements*

5.6.2.1 The raw material used for manufacturing of the easy open end shall meet all the below requirements:

a) The EOE shall be manufactured using tinplate as per **5.1** or aluminium alloy as per the table given below:

b) Internal lacquer, external lacquer and score repair lacquer shall be as per **5.2**;

c) Inks shall be as per **5.3**; and

d) Lining compound shall be as per **5.4**.

5.6.2.2 The nominal thickness of the full aperture ETP/ECCS and aluminium EOE is given in Table 4.

Sl No.	*Grade*	*Chemical Composition* (*Mass Fraction*) %											
		Al	*Si*	*Fe*	*Cu*	*Mn*	*Mg*	*Cr*	*Zn*	*Ti*	*Ga*	*V*	*Others Total*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
i)	3104	Remainder	0.6	0.8	0.05 - 0.25	0.8 to 1.4	0.8 to 1.3	-	0.25	0.10	0.05	0.05	0.15
ii)	5042	Remainder	0.20	0.35	0.15	0.20 to 0.50	3.0 to 4.0	0.10	0.25	0.10	-	-	0.15
iii)	5052	Remainder	0.25	0.40	0.10	0.10	2.2 to 2.8	0.15 to 0.35	0.10	-	-	-	0.15
iv)	5082	Remainder	0.20	0.35	0.15	0.15	4.0 to 5.0	0.15	0.25	0.10	-	-	0.15
v)	5182	Remainder	0.20	0.35	0.15	0.20 to 0.50	4.0 to 5.0	0.10	0.25	0.10	-	-	0.15
vi)	5251	Remainder	0.40	0.50	0.15	0.10 to 0.50	1.7 to 2.4	0.15	0.15	0.15	-	-	0.15

NOTE — Composition limits are in weight percent maximum, unless shown as a range or a minimum.

Table 4 Diameters of EOE and Material Thickness

(*Clauses* 5.6.2.2 *and* 7.4.3)

All dimensions in millimetres.

Sl No.	Trade Size (Diameter of the EOE)		Nominal Thickness of ETP/ECCS EOE		Nominal Thickness of Aluminium EOE	
	Straight Diameter	Necked-in Diameter	Thermal	Non-Thermal	Thermal	Non-Thermal
(1)	(2)		(3)		(4)	
i)	202	113/200	0.18	0.18	0.22	0.19
			0.18	0.18	0.22	0.19
ii)	211	208.5	0.18	0.18	-	0.20
			0.18	0.18	-	0.20
iii)	300	214	0.18 to 0.20	0.18	-	0.21
			0.18 to 0.20	0.18	-	0.21
iv)	307	305	0.20 to 0.21	0.18	-	0.23
			0.20 to 0.21	0.18	-	0.23
v)	401	315	0.21 to 0.22	0.18	-	0.23
			0.21 to 0.22	0.18	-	0.23
vi)	404	403	0.21 to 0.22	0.18	-	-
			0.21 to 0.22	0.18	-	-
vii)	603	600	0.25 to 0.26	0.20 to 0.22	-	-
			0.25 to 0.26	0.20 to 0.22	-	-

5.6.2.3 *Material specification for SOT aluminium EOE*

Sl No.	*Trade Size*	*Type*	*Nominal Thickness mm*
(1)	(2)	(3)	(4)
i)	200	End	0.22 - 0.24
ii)		Tab	0.29 ± 0.01
iii)	202	End	0.22 - 0.24
iv)		Tab	0.29 ± 0.01

NOTE — The tinplate and aluminium thickness indicating in above table are only for reference. Lower or higher material thickness may be used if agreed between manufacturer and purchaser.

5.6.3 The following parameters shall be maintained as agreed between manufacturer and purchaser:

a) Profile of the EOE (ETP/ECCS/aluminium) end and tab; and
b) Physical and dimensional parameters.

5.7 Aluminium Tagger

5.7.1 Aluminium tagger shall conform to IS 15392.

5.7.2 Nitro cellulose coating or suitable food grade coating shall be used for top and bottom coating.

5.7.3 The table below indicates nominal aluminium tagger thickness used for RLT assembly. Higher or lower thickness may be used as agreed between manufacturer and purchaser.

Sl No.	*Trade Size*	*Nominal Thickness, µm*
(1)	(2)	(3)
i)	202	50
ii)	211	50
iii)	300	50
iv)	301	50
v)	307	50
vi)	401	60
vii)	404	60
viii)	502	60
ix)	509	60
x)	603	70
xi)	700	90
xii)	709	90
xiii)	901	90

5.8 Peel Off Ends (POE)

The peel off ends consist of ETP ring and peel off aluminium foils with pull ring for customers to open (*see* Fig. 3). The POE design can be available in customized ETP ring and aluminium foil without affecting the performance.

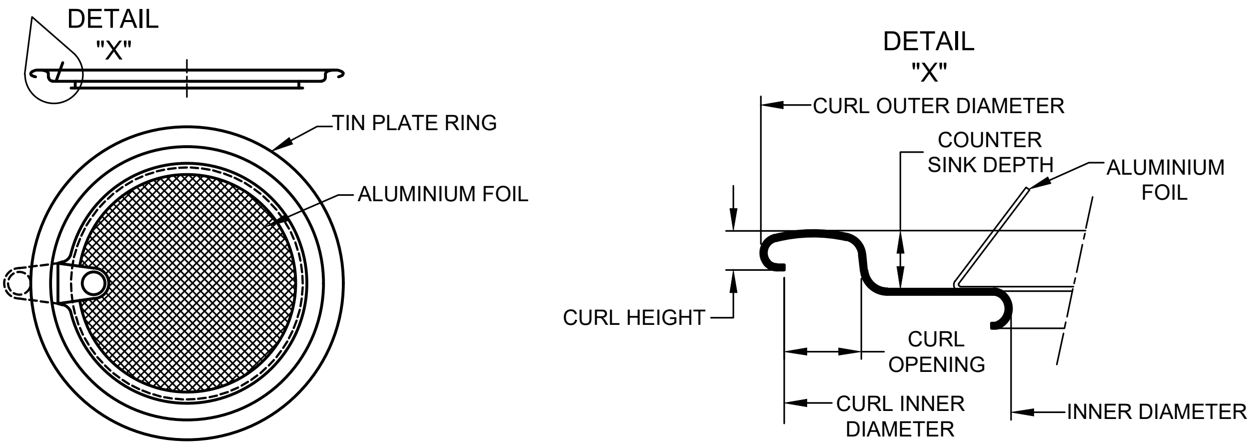


FIG. 3 POE DRAWING WITH IMPORTANT PARAMETERS

5.8.1 *ETP Specification*

The tinplate for the ring shall conform to IS 1993.

5.8.2 *Aluminium Foil Specification*

The aluminium foil should conform to following requirements:

Thickness	:	80 µm to 100 µm
Opening force	:	10 N to 25 N

5.8.3 The lacquer and decorative coating on ETP and aluminium foil shall be as per IS 18317 and its application may be as follows:

a) Clear lacquer on both sides;
b) Clear lacquer on one side and plain on the other side; and
c) Clear lacquer on one side and colour coated on the other side.

5.8.4 The following parameters shall be maintained as agreed between manufacturer and purchaser:

a) Shape of the pull ring, printing, embossing profile, graphics on the tagger, advertising information on the POE ring and the foil; and
b) Physical and dimensional parameters.

5.9 Surface Lubrications and Rust Prevention Oils

All the surface lubrications used for manufacturing of the product and the rust prevention oil used for preventing the external surface of the can from the environmental conditions shall be of food grade quality and shall meet requirements of IS 16912.

NOTE — Various natural and synthetic organic surface lubrications are used for manufacturing of different types of metal packaging. Different types of corrosion resistance lubricants or oils are used at external surface of the metal cans. The surface lubrications or the corrosion resistance oils completely cannot be removed from the surface of the metal cans.

6 DIMENSIONAL REQUIREMENTS

6.1 Diameter

The nominal diameters of the cans and the corresponding internal diameters should be as given in Table 5. These are given for reference of the manufacturer.

6.2 Capacities

The capacities of open top metal cans shall be as given in Table 6.

Table 5 Diameter of the Can

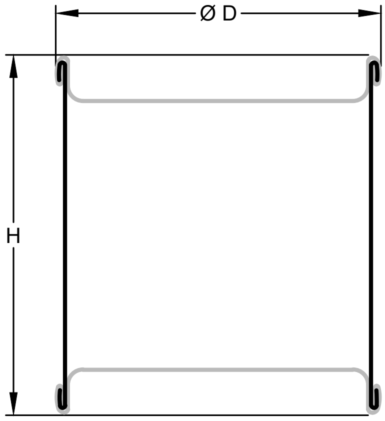
(*Clause* 6.1)

Sl No.	Trade Size	Nominal Diameter	Internal Diameter	Necked-In Can	
				Necked-In Side Trade Size	Necked-In Side Nominal Diameter
		mm	mm		mm
(1)	(2)	(3)	(4)	(5)	(6)
i)	202	52	52.30 ± 0.1	113	47
ii)	202	52	52.30 ± 0.1	201.5	49
iii)	209	63	62.41 ± 0.12	207.5	60
iv)	211	65	65.45 ± 0.12	208.5	62
v)	300	73	72.80 ± 0.15	214	70
vi)	301	74	74.01 ± 0.15	-	-
vii)	307	83	83.40 ± 0.15	305	80
viii)	401	99	98.90 ± 0.16	315	96
ix)	404	105	105.10 ± 0.18	403	102
x)	502	127	126.50 ± 0.22	500	123
xi)	509	138	138.40 ± 0.22	-	-
xii)	603	153	153.40 ± 0.22	600	149
xiii)	700	174	174.10 ± 0.2	-	-
xiv)	709	189	188.90 ± 0.22	-	-

NOTE — This deviation is given for the guidance of the manufacturer and should not be confused with manufacturing tolerances.

Table 6 Open Top Metal Can Capacities for Round Food Cans

(*Clause* 6.2)



Sl No.	Trade Size	Trade Over Seam Dimensions, *D* × *H* mm	Nominal Diameter mm	Gross Lidded Capacities ml
(1)	(2)	(3)	(4)	(5)
i)	202 × 108	55 × 38	52	67 ± 3
ii)	202 × 308	55 × 89	52	171 ± 5
iii)	202 × 504	55 × 133	52	266 ± 6
iv)	211 × 302	68 × 78	65	248 ± 6
v)	211 × 400	68 × 102	65	310 ± 8
vi)	211 × 410.5	68 × 118	65	366 ± 9
vii)	211 × 601	68 × 154	65	486 ± 12
viii)	300 × 203	76 × 56	73	200 ± 6
ix)	300 × 204	76 × 57	73	200 ± 6
x)	300 ×309	76 × 90	73	343 ± 9
xi)	300 × 401	76 × 103	73	395 ± 10
xii)	300 × 409	76 × 116	73	452 ± 11
xiii)	301 × 109	77 × 40	74	130 ± 5
xiv)	301 × 201	77 × 52	74	185 ± 6
xv)	301 ×203	77 × 56	74	198 ± 6
xvi)	301 × 206	77 × 60	74	219 ± 7
xvii)	301 × 302	77 × 80	74	300 ± 9
xviii)	301 × 304	77 × 82	74	311 ± 8
xix)	301 × 309	77 × 90	74	349 ± 9
xx)	301 × 315	77 × 100	74	390 ± 10
xxi)	301 × 409	77 × 116	74	458 ± 11

Table 6 (*Concluded*)

Sl No.	Trade Size	Trade Over Seam Dimensions, $D \times H$ mm	Nominal Diameter mm	Gross Lidded Capacities ml
(1)	(2)	(3)	(4)	(5)
xxii)	307 × 408	87 × 114	83	572 ± 11
xxiii)	307 × 414	87 × 124	83	626 ± 12
xxiv)	401 × 206	102 × 60	99	400 ± 10
xxv)	401 × 208	102 × 64	99	415 ± 10
xxvi)	401 × 300	102 × 76	99	512 ± 11
xxvii)	401 × 301	102 × 79	99	540 ± 11
xxviii)	401 × 411	102 ××119	99	841 ± 17
xxix)	401 × 504	102 × 133	99	957 ± 19
xxx)	401 × 604	102 × 159	99	1 152 ± 23
xxxi)	404 × 206	108 × 60	105	450 ± 11
xxxii)	404 × 209	108 × 65	105	515 ± 10
xxxiii)	404 × 212	108 × 70	105	526 ± 12
xxxiv)	404 × 404	108 × 108	105	865 ± 18
xxxv)	404 × 412	108 × 121	105	968 ± 19
xxxvi)	404 × 504	108 × 133	105	1 079 ± 21
xxxvii)	404 × 512	108 × 146	105	1 189 ± 24
xxxviii)	502 × 500	130 × 127	127	1 479 ± 22
xxxix)	502 × 601	130 × 154	127	1 819 ± 27
xl)	502 × 605	130 × 160	127	1 899 ± 29
xli)	509 × 502	141 × 130	138	1 816 ± 27
xlii)	509 × 601	141 × 154	138	2 175 ± 27
xliii)	509 × 703	141 × 183	138	2 605 ± 40
xliv)	603 × 600	157 × 152	153	2 646 ± 30
xlv)	603 × 700	157 × 178	153	3 100 ± 30
xlvi)	603 × 912	157 × 248	153	4 503 ± 50
xlvii)	700 × 611	178 × 170	174	3 819 ± 38
xlviii)	700 × 800	178 × 203	174	4 613 ± 46
xlix)	700 × 900	178 × 229	174	5 280 ± 52
l)	709 × 810	193 × 219	189	6 000 ± 52

NOTES

1 The trade sizes are included here because the canning trade is still more familiar with these. When the canning trade becomes fully familiar with metric nomenclature, the trade size column will be omitted.

2 Canning trade size normally referred as $D \times H$, where D is the over seam diameter and H is the over seam height as shown in the above figure.

3 The can height given in this table is only for reference. Can height shall be maintained as per the mutual understanding between manufacturer and purchaser.

4 The nominal gross lidded capacity or the nominal filling capacity shall be calculated according to the method given in the Annex D.

7 MANUFACTURE

7.1 Lacquering, Coating and Printing

7.1.1 *Application of Internal Lacquers*

Internal coating for metal packaging is applied either by roller coating or spraying, which then undergoes a thermal curing. The coatings are applied before and after formation, as per the requirements. In some of the cases, the internal coating or lacquers are applied more than one layer. Each layer may be of different chemistry. Each layer of coating shall be cured before the application of the next one.

7.1.1.1 *Selection of suitable internal food contact lacquer*

A wide range of different types of resinous thermoset coatings are applied to the food contact surface of metal packaging. The selection of a specific food contact coating for metal packaging depends on several factors. The most important factors are:

a) Type of metal packaging;
b) Type of food stuff, processing conditions and shelf life; and
c) Specific technical conditions of metal packaging manufacturing.

7.1.2 *Application of External Decorative Coating and Printing*

7.1.2.1 The purpose of external decoration is protection of the external surface from the environmental conditions, decoration of the external surface, brand information and printability.

7.1.2.2 *Types of decorative finishes*

a) Either single pass or two passes of lacquers as per customer requirements.
b) External base coat, printing as per customer requirements and finally varnishing to withstand product and process conditions.

7.2 NEO End, RLT Manufacturing

7.2.1 *Non Easy Open* (*NEO*) *Ends*

Each component shall be made from a single piece of tinplate conforming to IS 1993 or IS 12591 in case of electrolytic chromium coated steel (ECCS). The NEO end when made using ECCS shall have both external and internal lacquer coating.

7.2.1.1 *Dimensions*

The dimensional parameters given in Fig. 4C shall be maintained as per the specification agreed between manufacturer and purchaser based on the product filling, equipment used for seaming and thermal processing conditions. The panel profile of NEO ends shall be as agreed to between manufacturer and purchaser.

7.2.1.2 *Stack height specification*

The number of NEO ends stacking for two inches is denoted as shown in Fig. 5. Number of NEO ends for two inches shall be as agreed between manufacturer and purchaser.

7.2.2 *Ring Lid Tagger* (*RLT*) *Assembly*

This is also known as top ring foil (TRF).

7.2.2.1 RLT assembly consist of three components, that is, ring, lid and tagger. Ring and lid shall be made of tinplate conforming to **5.1**.

7.2.2.2 The tinplate used for ring and lid may be plain or lacquered externally and internally as per customer requirement, end use and environmental conditions.

7.2.2.3 Refer Table 2 for tinplate thickness and **5.1.3** for tin coating mass.

7.2.2.4 Refer **5.7** for tagger specification and thickness.

7.2.2.5 Different types of ring, lid and tagger assembly are as follows (Fig. 6):

a) small lid RLT assembly with handle;
b) full lid RLT assembly; and
c) small lid RLT assembly without handle.

NOTES

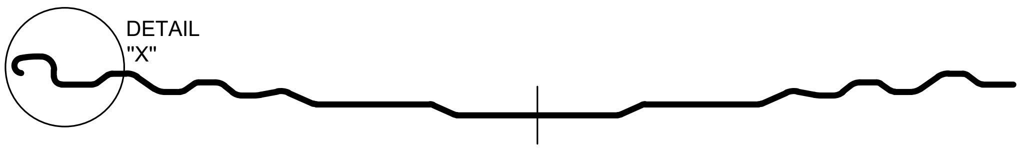
1 The dimensional parameters shall be maintained as per the specification agreed between manufacturer and purchaser.
2 The profile of the ring, lid and tagger shall be maintained as agreed between manufacturer and purchaser.
3 Lining shall be done as per the end customer requirements.

7.2.2.6 Ring, lid and tagger assembly technical drawing, illustrating the specification parameters, is shown in Fig. 7.

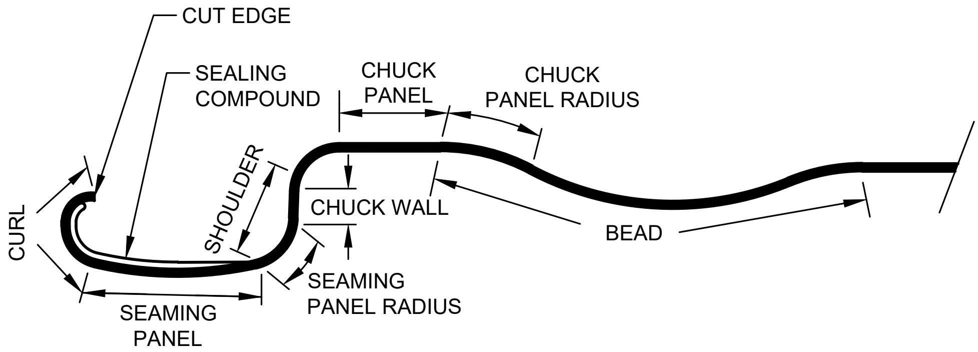
7.2.3 *Lining*

The NEO ends/rings for RLT assembly shall be lined with a suitable food grade, non-toxic, compatible with the product packed, shall not impart off flavor and shall be resistant to the processing conditions.

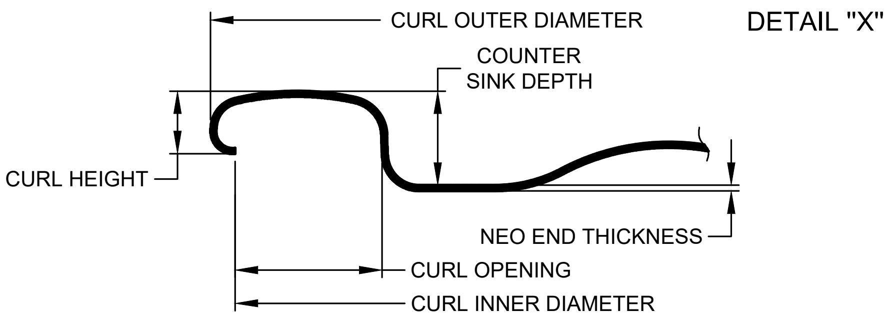
7.2.3.1 *Lining compound application placement in NEO ends/rings* (*see* *Fig. 8*)



4A NEO End Drawing



4B NEO End Drawing With Technical Terminology



4C Details "X" With Important NEO End Dimensional Parameters

FIG. 4 NON EASY OPEN END

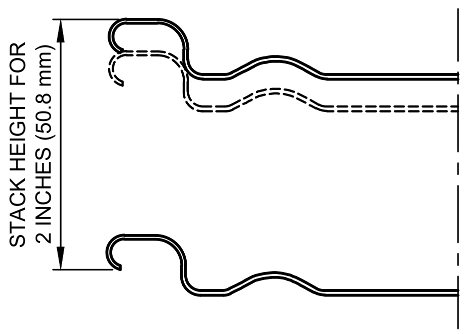
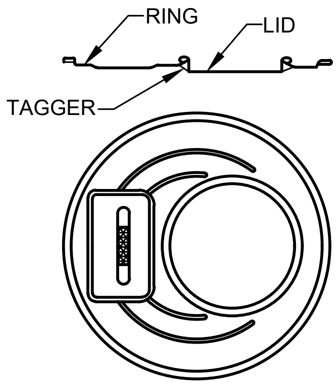
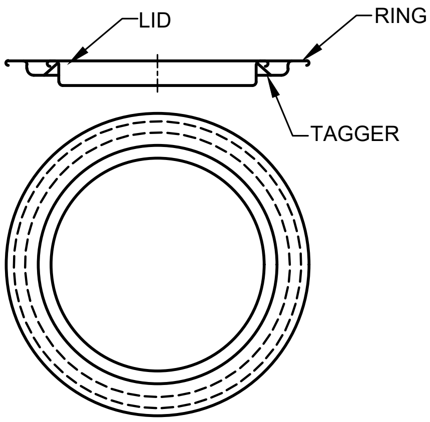


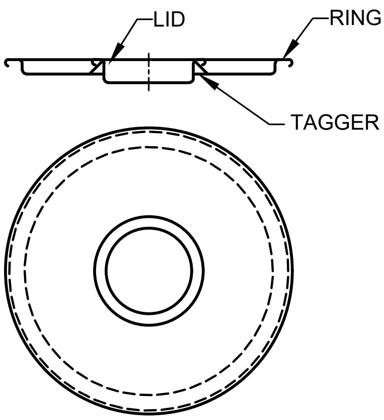
FIG. 5 MEASURING THE STACK HEIGHT



6A Small Lid RLT Assembly With Handle



6B Full Lid RLT Assembly



6C Small Lid RLT Assembly Without Handle

FIG. 6 TYPES OF RLT ASSEMBLY

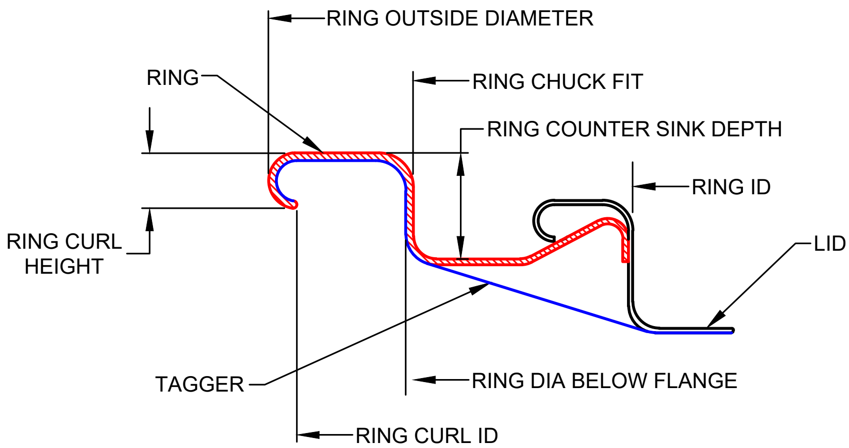


FIG. 7 RLT ASSEMBLY DRAWING WITH SPECIFICATION PARAMETERS

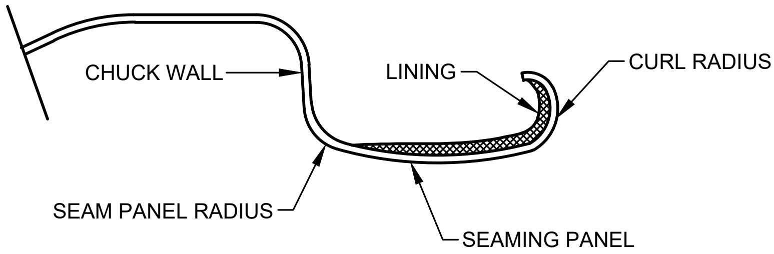


FIG. 8 PLACEMENT OF LINING COMPOUND IN NEO ENDS/RINGS

7.2.3.2 *Lining compound weight*

The lining compound volume should be as per table given below. Lining compounds have different dry film densities (specific gravities). The lining compound film weight may vary depending on the compound used. However, the suggested lining compound volume will remain constant in a given end size regardless of the compound in use. This is the reason the suggested amounts are provided in units of volume.

The dry film weight of the lining compound can be calculated by using the following formula:

$$\text{Film weight} = LCV \times DLSG$$

where

LCV = lining compound volume, in mm^3; and

$DLSG$ = dried lining specific gravity, mg/mm^3.

Sl No.	*NEO End Size*	*Lining Compound Volume* (*in* mm^3) *Recommended Tolerance:* ± 10 *percent*
(1)	(2)	(3)
i)	200	35
ii)	202	41
iii)	211	45
iv)	300	48
v)	307	54
vi)	401	64
vii)	404	74
viii)	502	96
ix)	509	105
x)	603	117
xi)	700	132
xii)	709	142

7.2.3.3 *Testing*

The specimen lined end/ring shall be selected from the lot and can be tested for moisture retention as per Annex E.

7.3 Side Seam/Welding

The side seam or welding is usually made using the two short edges of the body blank, which may be welded by using any of the technology as in **7.3.1**.

NOTE — Super wima welding is widely used for thermally processed can.

7.3.1 *Different Types of Welding*

7.3.1.1 *Butterfly weld*

This is a resistance welding where the overlap is in the range of 3 mm to 5 mm and welded using a round copper wire as electrode (Fig. 9). The name is derived from the cross section of the weld.

7.3.1.2 *Wima welding*

Wima welding is a resistance welding with an overlap of 0.5 mm to 0.8 mm, using a flattened copper wire as an electrode (Fig. 10).

7.3.1.3 *Super wima weld*

Super wima welding is a resistance welding with an overlap of 0.4 mm to 0.6 mm, using a flattened copper wire as an electrode (Fig. 11).

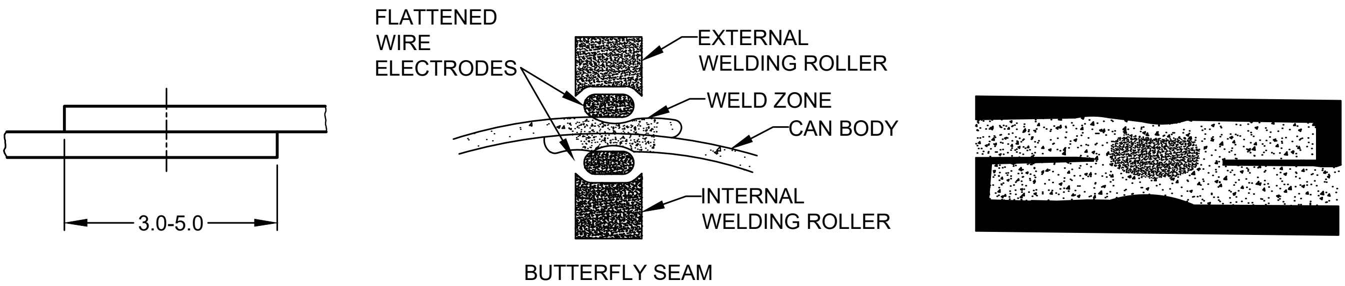


FIG. 9 BUTTERFLY WELD

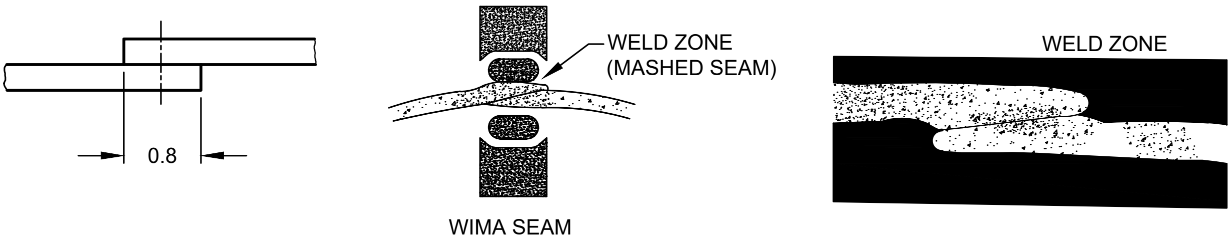


FIG. 10 WIMA WELD

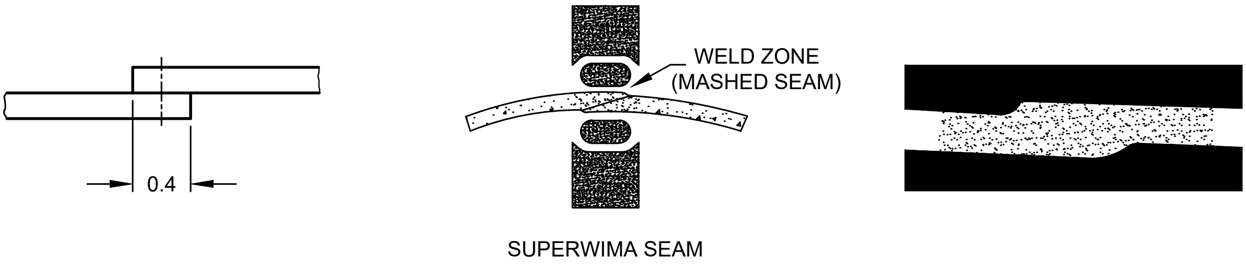


FIG. 11 SUPER WIMA WELD

7.3.2 *Precautions to Enhance Welding Quality*

Following are the best practices followed in the industry to get a good quality welding. This is only a guideline for achieving a good welding. Metal packing manufacturer should follow the best manufacturing practices recommended by the machine supplier to achieve the quality of the welding, as per the customer requirements.

7.3.2.1 *Steel grain orientation or texture* (*see* Fig. 12)

Metal packing manufacturer should follow the recommendation by the machine supplier.

7.3.2.2 *Welding nuggets*

Welding nuggets are the spots where the material fusion occurs. This depends on the welding speed and frequency used. For a good weld, machine manufacturer recommendation should be followed.

7.3.3 The quality of the welded side seam shall be satisfactory when tested as follows:

a) Ball test as per Annex F — This test is suitable for judging the quality of the weld and weld integrity; and

b) Cone test as per Annex G — This test procedure ensures the weld integrity at the leading edge and trailing edge of the can body by expanding the diameter.

7.3.4 *Protecting Weld Side Seam and Welding Margin*

After the welding process, the side seam and surrounding un-coated welding margin shall be covered with suitable protective side stripe lacquer or powder side stripe, depending on the level of protection, end use and appearance as per the table below:

Sl No.		*Application Surface*	*Liquid Side Stripe*	*Powder Side Stripe*
(1)	(2)	(3)	(4)	(5)
i)	Thermally processed food cans	Internal side	R	R
		External side	R	-
ii)	Non-thermally processed food cans	Internal side	O	O
		External side	O	-

R – Required, O – Optional (as agreed between manufacturer and purchaser).

NOTES

1 The welded side seam together with margin shall be protected by application of coatings to increase the shelf life of the can.

2 The internal weld seam shall be protected by food grade lacquer or powder, which shall cover the welded side seam and margin to withstand the thermal process parameters.

3 The internal protection shall not get migrated into the food.

4 The external weld seam and margin shall be protected with the suitable food contact side stripe to withstand the environmental conditions.

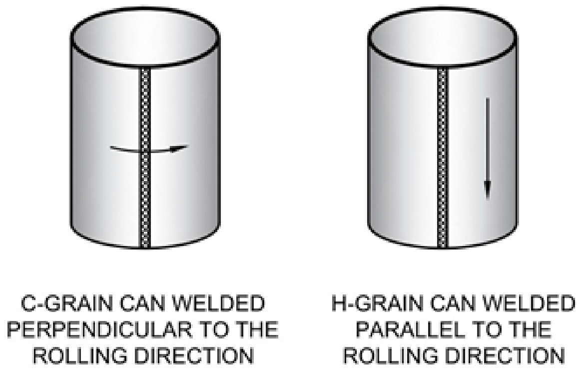


FIG. 12 GRAIN ORIENTATION WITH RESPECT TO WELD SEAM

7.4 Necking

7.4.1 Necking is the process of reducing the diameter of the can either at one end or at both the ends. This process is adopted to make the can stackable or add aesthetics or make it consumer friendly.

7.4.2 *Different Types of Necking* (*see Fig.* 13)

7.4.3 Refer Table 4 for technical dimensions/ diameters.

7.5 Flanging

7.5.1 Flanging is a pre-process for seaming operation. It is done by radial expansion of the body to create the material for body hook (*see* Fig. 14). To attain good/correct seaming parameters, flanging plays a vital role. The lesser the variation in flanging, the accuracy of the seaming improves.

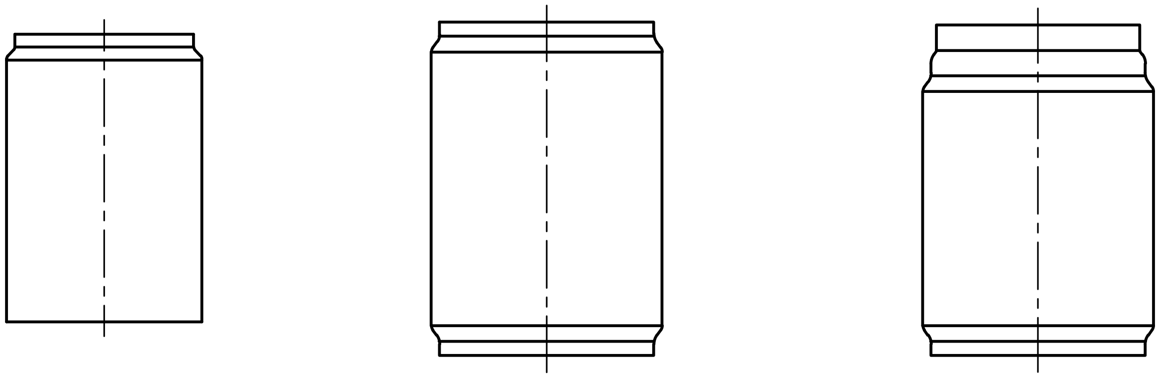


FIG. 13 TYPES OF NECKING

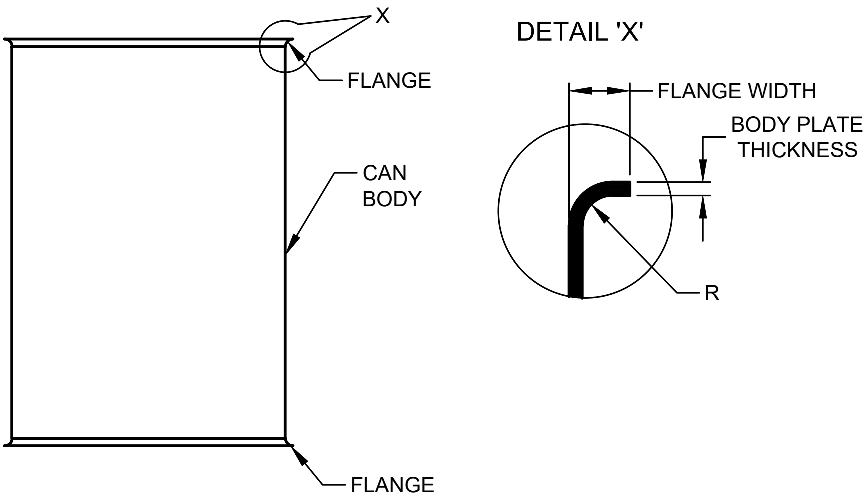


FIG. 14 FLANGING

7.5.2 Flange width measurement shall be as per the table given below. Flange shall be free from mushroom, squeeze, bend or wrinkles.

Sl No.	*Can Diameter*	*Flange Width* (*in mm*)
(1)	(2)	(3)
i)	202	2.30 ± 0.20
ii)	211	2.40 ± 0.20
iii)	300	2.60 ± 0.20
iv)	307	2.60 ± 0.20
v)	401	2.80 ± 0.20
vi)	404	2.80 ± 0.20
vii)	502	3.00 ± 0.20
viii)	509	3.00 ± 0.20
ix)	603	3.20 ± 0.30
x)	700	3.30 ± 0.30
xi)	709	3.30 ± 0.30

NOTE — Flange width is based on average value of three measurements at 120° angle (*see* Fig. 19).

7.6 Beading

7.6.1 Cans may have multiple beads in the body of a can. This is adopted mainly for thinner gauges, to provide strength for the can, and to withstand thermal process.

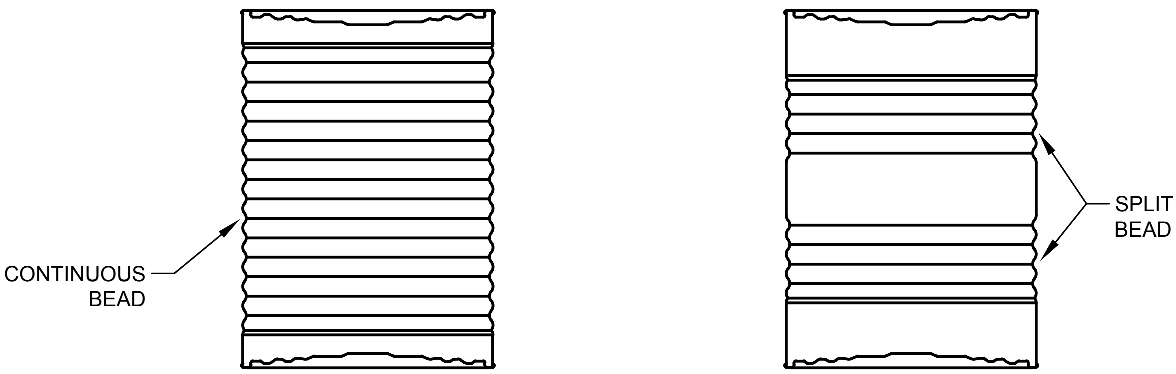
7.6.2 *Different Types of Beading* (*Fig. 15*)

7.6.3 *Specification*

The bead shall have the following parameter:

a) Bead depth;
b) Geometry of the bead;
c) Pitch;
d) Number of beads; and
e) Positioning of beads (Fig. 16).

The bead profile depends on the customer requirement and thermal processing conditions.



15A Continuous Bead

15B Split Bead

FIG. 15 TYPES OF BEADING

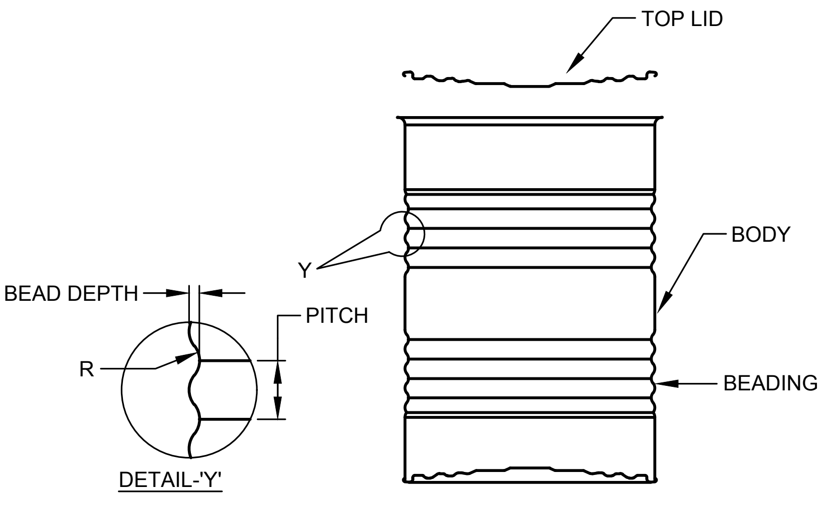


FIG. 16 BEADING PARAMETERS

7.7 Double Seaming

7.7.1 Double seaming involves closing of a flanged can with a curled NEO end/EOE/RLT/POE using a seam roll technology (Fig. 17). This seaming operation results in hermetically sealing of the can as shown in the Fig. 18. This seam consists of 5 layers of tinplates holding the sealing compound in position. This is done to ensure the product packed inside is not leaked while processing and during its shelf life time before usage.

7.7.2 *Seam Specification*

The seam specification of thermally process cans and non-thermally processed cans shall be as per Table 7 and Table 8, respectively.

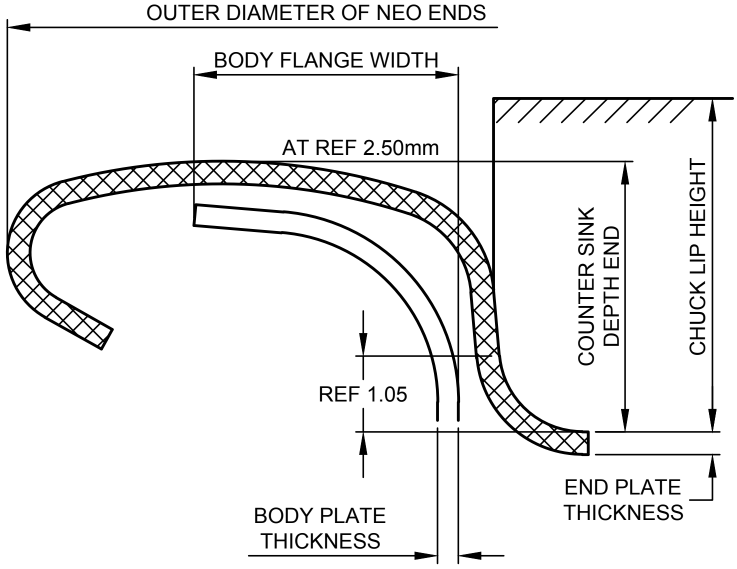


FIG. 17 NEO END/EOE PLACING ON TOP OF FLANGED CYLINDER

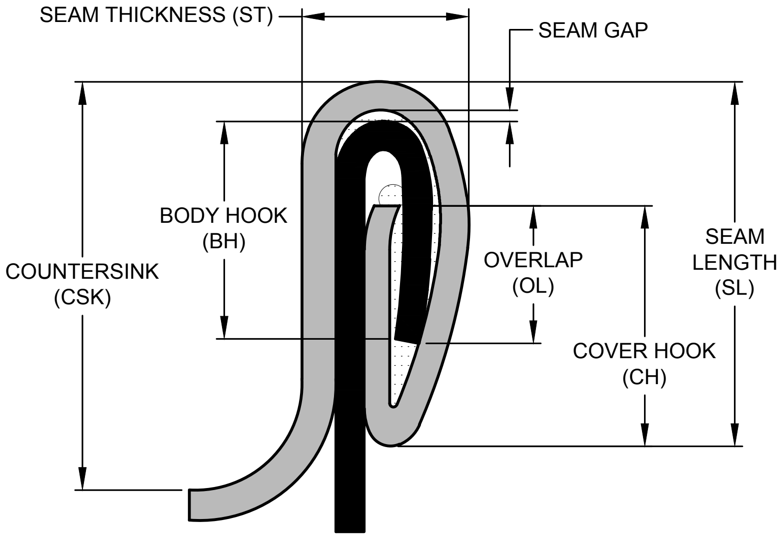


FIG. 18 HERMETICALLY SEALED SEAM AREA DIAGRAM

Table 7 Seam Specification for Thermally Processed Food Cans

(*Clause* 7.7.2)

Sl No.	Can Diameter	Seam Length mm	Body Hook mm	Cover Hook mm	Minimum Overlap	Overlap Percent, *Min*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Based on average value of three measurement at 120° angle						
i)	202	2.65 ± 0.20	1.65 ± 0.20	1.65 ± 0.20	0.90	45
ii)	211	2.80 ± 0.20	1.90 ± 0.20	1.90 ± 0.20	1.00	45
iii)	300	2.80 ± 0.20	2.00 ± 0.20	2.00 ± 0.20	1.00	45
iv)	307	2.80 ± 0.20	2.00 ± 0.20	2.00 ± 0.20	1.00	45
v)	401	2.90 ± 0.20	2.00 ± 0.20	2.00 ± 0.20	1.00	45
vi)	404	2.90 ± 0.20	2.00 ± 0.20	2.00 ± 0.20	1.00	45
vii)	603	3.10 ± 0.20	2.05 ± 0.25	2.05 ± 0.25	1.10	45
viii)	700	3.10 ± 0.20	2.05 ± 0.25	2.05 ± 0.25	1.20	45
ix)	709	3.20 ± 0.20	2.05 ± 0.25	2.05 ± 0.25	1.20	45

Table 8 Seam Specification for Non-Thermally Processed Food Cans

(*Clause* 7.7.2)

Sl No.	Can Diameter	Body Hook, *Min* mm	Cover Hook, *Min* mm
(1)	(2)	(3)	(4)
Based on average value of three measurement at 120° angle			
i)	202	1.40	1.40
ii)	211	1.40	1.40
iii)	300	1.40	1.40
iv)	307	1.40	1.40
v)	401	1.50	1.50
vi)	404	1.50	1.50
vii)	502	1.50	1.50
viii)	509	1.50	1.50
ix)	603	1.60	1.60
x)	700	1.60	1.60
xi)	709	1.60	1.60
xii)	901	1.60	1.60

7.7.3 *Analysis of Double Seam Parameters*

7.7.3.1 Seam length (*SL*), seam thickness (*ST*), body hook (*BH*) and cover hook (*CH*) (Fig. 18) shall be measured in the places as shown in Fig. 19 using can seam micrometer (Fig. 20).

7.7.3.2 *Formulae for calculation of seam thickness*

Seam thickness = [3 × end plate thickness (*EPT*) + 2 × body plate thickness (*BPT*)] + free space

Free space (minimum) = 0.14 mm.

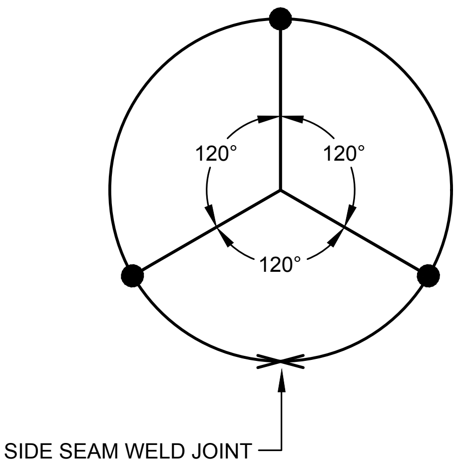


FIG. 19 MEASUREMENT POINTS FOR ANALYSIS OF DOUBLE SEAM PARAMETERS

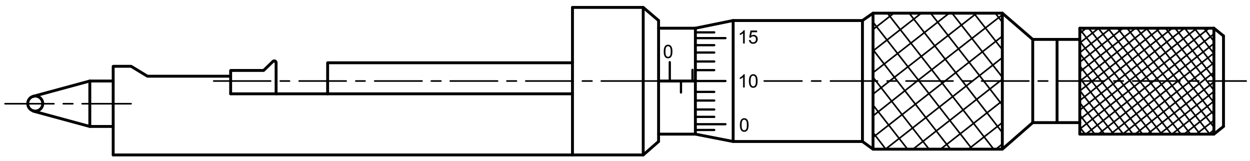


FIG. 20 CAN SEAM MICROMETER

7.7.3.3 *Overlap and percentage overlap*

The overlap refers to the distance the cover hook laps over the body hook. Minimum acceptable overlap shall be 1.00 mm.

Overlap (*OL*) = *BH* + *CH* + *EPT* – *SL*

The overlap may also be expressed as a percentage of the theoretical optimum of 100 percent. The overlap percentage is calculated using following formula:

Overlap percent =

$$\frac{BH + CH + EPT - SL}{SL - (2EPT + BPT)} \times 100$$

where

BH = body hook, in mm;
CH = cover hook, in mm;
EPT = end plate thickness, in mm;
SL = seam length, in mm; and
BPT = body plate thickness.

NOTE — The calculation gives an approximation of the overlap based on the accuracy of measurement and uniformity of above components. Take average value of all components for calculation and the calculated percentage overlap should be treated only as a guide.

7.7.3.4 *Wrinkle rating and tightness rating*

This is applicable only for thermally processed food cans. The formula for calculation of wrinkle rating and tightness rating is given below (*see* Fig. 21).

Wrinkle rating percent (*WR*) = (cover hook wrinkle depth/cover hook length) × 100

Tightness rating percent (*TR*) = 100 – *WR*

For good double seam for thermally processed food cans, the *WR* should be below 30 percent and *TR* should be above 70 percent.

7.7.4 *Guidelines on Frequency of Measuring/Analysis of Double Seam*

7.7.4.1 Each manufacturer may select an inspection program to assure the quality of the container that it is producing.

7.7.4.2 All measurements should be made as per the defined specification:

a) during the set-up approval;
b) during the beginning of each shift; and
c) after the beginning of every minor stoppage.

7.7.4.3 Can maker and packer should visually examine one can from each head of each seamer at least once in every 30 min, and more frequently, if found to be helpful or necessary. Also, it is advisable to record all defined seam measurements of one can of each head at least once in every 4 h and more frequently, if required.

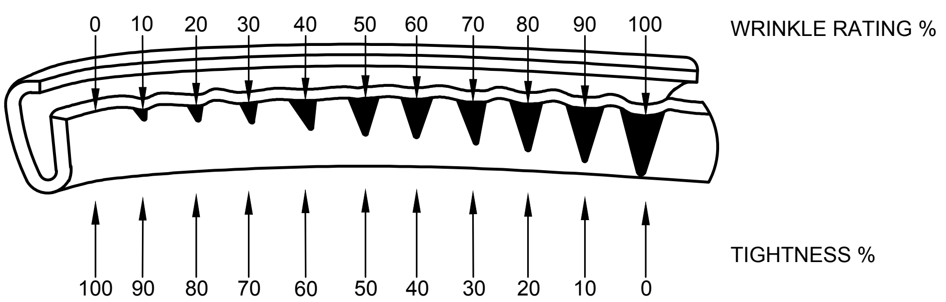


FIG. 21 WRINKLE AND TIGHTNESS RATING

8 TESTING

8.1 Air Pressure Test

The test can, with both ends seamed shall be first immersed in boiling water for a period of 5 min and then subjected to an internal air pressure test as per IS 2471 and at pressure as specified in Table 9 for a period of 15 s.

The can shall not show any signs of leakage when tested in water.

Table 9 Parameters for Air Pressure Test

(*Clause* 8.1)

Sl No. (1)	Type of Can (2)	Can Diameter (3)	Pressure (4)
i)	Thermally processed food cans	Up to and including 99 mm for EOE/NEO end seamed can	100 kPa (14.50 psi)
		Over 99 mm for EOE/NEO end seamed can	70 kPa (10.15 psi)
ii)	Non-thermally processed food cans	For all NEO ends/EOE/RLT/ POE seamed cans	15 kPa (2.15 psi)

8.2 Vacuum Test

The vacuum test is applicable for non-thermally processed cans and shall be done as per Annex H.

NOTE — The above testing is done based on the nature of the food content packed into the metal can. The above testing is included only for the guidelines. The manufacturer and purchaser may mutually agree to specific requirement of the metal can based on the nature of the product filled into the metal cans.

8.3 Migration Test

8.3.1 *Overall Migration Limit* (*OML*)

The acceptable overall migration limit shall be 10 ± 1 mg/dm^2 or 60 mg/kg when tested in accordance with IS 9845.

8.3.2 *Specific Migration Limit* (*SML*)

The specific migration shall not exceed the maximum limit given in Table 10. The sample for the specific migration test shall be prepared as per IS 9845 wherein the lacquer would be exposed to the simulants. The extracted simulants shall be then detected for elements given in Sl No. (i) to (viii) of table below in accordance with the test method specified in IS 3025 (Part 2) or IS 3025 (Part 65). DEHP shall be measured as per the method specified in ISO 18856.

No migration of BPA shall be permitted from lacquer applied to materials and articles specifically intended to come into contact with infant formula, follow-on formula, processed cereal-based food, baby food, food for special medical purposes developed to satisfy the nutritional requirements of infants and young children or milk-based drinks and similar products specifically intended for young children.

Table 10 Specific Migration Limit

(*Clause* 8.3.2)

Sl No. (1)	Substances (2)	SML mg/kg (3)
i)	Barium	1
ii)	Cobalt	0.05
iii)	Copper	5
iv)	Iron	48
v)	Lithium	0.6
vi)	Manganese	0.6
vii)	Zinc	25
viii)	Antimony	0.04
ix)	Phthalic acid, bis(2-ethylhexyl)ester (DEHP)	1.5

9 PACKING

The can bodies may either be packed in flattened condition with both ends loose or fully formed built up cans with one end seamed on and the other end supplied loose. The flattened bodies, built up cans and ends shall be packed in suitable cartons/wooden/plastic pallets. Pallets should be wrapped with protective film/paper.

10 MARKING AND LABELLING

10.1 Marking

The cans may be marked with the manufacturer's identification. The marking on the cans shall be done in such a manner that it does not lead to any contamination or deterioration of the food packed in the can.

10.2 Labelling

The packed flattened bodies, built up can pallets and ends packed in corrugated boxes shall be identified with packing slip. The format of the packing slip shall be as agreed between customer and manufacturer.

11 SAMPLING

The sampling and criterion for ascertaining the conformity of a lot of cans on the basis of the routine tests shall be as per Annex J.

12 GUIDELINES FOR MINIMIZING CORROSION

12.1 External Corrosion

The lacquer at external surface of the metal can is susceptible to mechanical damage during the various can manufacturing process, product filling and subsequent thermal treatments. The corrosion process is influenced by the water, oxygen, temperature, solutes in the water, paper sleeves, spillage of media, chlorides/sulphides in cooling water, dissolved solids in the water, corrosive additives and condensation of moisture by various reasons. Following precautionary measures are recommended to minimize the corrosion in the metal can during its shelf life period:

a) Empty cans should be stored in dry place and should be kept away from moisture with properly packed condition.
b) Excess chlorination of the water should be avoided. The chlorine content should be less than 2 ppm.
c) Use dry wooden pallets for storing the cans. The corrugated boxes used for storing the can should be as per industrial guidelines.
d) Do not use too acidic or too alkaline label adhesive.
e) Filled can should be stored away from the processing section.
f) After completion of processing, dry the metal cans properly before storing the can. If required, apply suitable air dry lacquer on double seam and weld seam to prevent the corrosion.
g) Coastal region packer should take maximum care while preserving the empty can and filled can.

12.2 Internal Corrosion

a) Avoid scratching of the can at the time of can fabrication, filling and storage.
b) Avoid overflowing or under filling of the can. Maintain head space of 5 mm to 10 mm.
c) Elimination of the maximum amount of oxygen by an efficient exhausting process before sealing the can.
d) Elimination of corrosion accelerating substances like nitrates, sulphur contents, high sulphur dioxide, calcium chloride etc from the raw materials used in canning.
e) Water used in canning should be free from nitrates.
f) Rapid cooling of the cans to a temperature of 35 °C to 40 °C after processing.
g) Storage of canned products at a low temperature preferably below 25 °C.
h) Suitable lacquered can to be used depending on the product conditions, preservative, shelf life period and storage conditions.
j) A few inhibitors may also be tried to inhibit nitrate-induced corrosion.

13 BIS CERTIFICATION MARKING

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed there under, and the product(s) may be marked with the Standard Mark.

ANNEX A

(*Clause* 2)

LIST OF REFERRED STANDARDS

IS No./Other Standard	*Title*
IS 1993 : 2018/ ISO 11949 : 2016	Cold-reduced tinmill products — Electrolytic tinplate (*fifth revision*)
IS 2471 : 1963	Methods of tests for metal containers
IS 3025	Methods of sampling and test (physical and chemical) for water and wastewater:
(Part 2) : 2019/ ISO 11885 : 2007	Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) (*first revision*)
(Part 65) : 2022/ ISO 17294-2 : 2016	Application of inductively coupled plasma mass spectrometry (ICP-MS) — Determination of selected elements including uranium isotopes (*first revision*)
IS 9845 : 1998	Determination of overall migration of constituents of plastics materials and articles intended to come in contact with foodstuffs — Method of analysis (*second revision*)
IS 10325 : 2000	Square tins — 15 kg/litre for *ghee*, *vanaspati*, edible oils and bakery shortenings — Specification (*second revision*)
IS 10339 : 2000	*Ghee*, *vanaspati*, edible oil tins up to 10 kg/litre capacity — Specification (*second revision*)
IS 11104 : 2012	Glossary of terms relating to open top sanitary cans (*first revision*)
IS 12591 : 2018/ ISO 11950 : 2016	Cold-reduced tinmill products — Electrolytic chromium/chromium oxide — Coated steel (*second revision*)
IS 15392 : 2003	Aluminium and aluminium alloy bare foil for food packaging — Specification
IS 15495 : 2004	Printing ink for food packaging — Code of practice (*first revision*)
IS 16912 : 2018	Safety of machinery — Lubricants with incidental product contact — Hygiene requirements
IS 18317 : 2024	Lacquers and decorative finishes for open top metal cans for foods and beverages — Specification
ISO 18856 : 2004	Water quality — Determination of selected phthalates using gas chromatography/mass spectrometry

ANNEX B

(*Clause* 5.1.5)

METHOD OF CHECKING TIN GRAIN SIZE

B-1 OUTLINE OF METHOD

Tin grain size is revealed by acid etching of a 1 square inch disc/panel of the sample in a test solution.

B-2 MATERIAL

B-2.1 Test Disc/Panel

A disc/panel of suitable size punched out from a hand press prepared by de-greasing with acetone.

B-2.2 Test Solution

A solution prepared by mixing 100 g of ferric chloride crystals and 0.5 g to 1.0 g of sodium sulphide dissolved in 1 litre of water.

B-3 PROCEDURE

B-3.1 Immerse the test disc/panel in the test solution for 5 s to 15 s, take out and rinse in water.

B-3.2 Compare the crystal structure of the disc/panel, that is, revealed with the standard ASTM chart.

ANNEX C

(*Clause* 5.1.6)

METHOD OF DETERMINATION OF IRON SOLUTION VALUE

C-1 OUTLINE OF METHOD

The iron solution value measures in micrograms the total amount of iron dissolved when an area of 19.35 cm^2 of tinplate surface is exposed to 50 ml of test solution for 2 h at 27 °C ± 2 °C.

C-2 MATERIAL

C-2.1 Test Disc

A tinplate disc of 50 mm diameter punched out by a hand press from the tinplate in sheet form in as received condition.

C-2.2 Test Solution

A solution prepared by mixing the following:

a) 23 ml of 2.18 N sulphuric acid (AR grade);
b) 2 ml of 3 percent hydrogen peroxide [AR grade (10 volume oxygen)]; and
c) 25 ml of 4 percent ammonium thiocyanate (AR grade).

C-2.3 Standard Test Bottles — bottles with 63 mm lip diameter

C-3 PROCEDURE

C-3.1 Cathodically clean the tinplate disc in 1 percent sodium carbonate solution at a current density of 0.08 A/cm^2 for 30 s. Rinse the disc in distilled water and dry.

C-3.2 Place the disc in the cap of a standard test bottle and secure with PVC gasket.

C-3.3 Apply a thin layer of silicone grease (Metroark 211 compound) on the lip of the bottle to prevent leakage of the test solution.

C-3.4 Screw the cap containing the test disc firmly on to the bottle.

C-3.5 Invert the bottle and allow to stand for 2 h at 27 °C without agitation.

C-3.6 Place the bottle upright, remove the specimen, add 1 ml of 3 percent hydrogen peroxide and swirl again.

C-3.7 Prepare a standard calibration curve by measuring the optical densities of solution of known iron concentrations.

C-3.8 Determine the iron content of the solution by colorimetric technique using the standard calibration curve for comparison.

ANNEX D

(*Table* 6)

METHOD OF DETERMINATION OF GROSS LIDDED CAPACITY

D-1 GENERAL

All the methods of determining capacity rely on obtaining the mass of water in the can. For cans with a capacity equal to or greater than 400 ml, a correction factor as given in table below, can be applied but only if a very precise determination of capacity is necessary.

Sl No.	*Water Temperature, °C*	*Correction Factor, F*
(1)	(2)	(3)
i)	12	1.0005
ii)	14	1.0008
iii)	16	1.0011
iv)	18	1.0014
v)	20	1.0018
vi)	22	1.0022
vii)	24	1.0027
viii)	26	1.0033
ix)	28	1.0038
x)	30	1.0044

D-1.1 Accuracy of the Balances

The scales used for the weighing of the cans shall be at least as accurate as specified in table below:

Sl No.	*Mass of the Can, m (in g)*	*Accuracy, G*
(1)	(2)	(3)
i)	m ≤ 500	± 0.5
ii)	500 < m ≤ 2 500	± 1.0
iii)	2 500 < m ≤ 5 000	± 2.5
iv)	5 000 < m	± 5.0

D-1.2 Cans with Flexing Top and Bottom Ends

The development of containers in relatively thin materials has, in some cases, led to the introduction of top/bottom ends with intentional flexibility: these ends are produced in convex shape; after sterilization and cooling, the bow changes to concave similar to other open-top can ends. They are used for large cans on which the body would collapse due to the vacuum produced as a result of hot-filling irrespective of whether they are beaded or not. On account of the changing bow of the ends, the container has no absolute fixed capacity. As long as there is no acceptable method of measuring the capacity of cans with such flexing ends, this capacity has to be considered as equal to the capacity of similar cans with non-flexing ends.

D-2 DETERMINATION OF GROSS-LIDDED CAPACITY, C, OF EMPTY CAN

The gross capacity is normally determined with empty cans. If the capacity of filled cans has to be determined, the method described in **D-3** can be applied.

D-2.1 Attach one end to the body by the usual method for three piece cans only.

D-2.2 Drill two holes 3 mm to 6 mm in diameter and about 7 mm apart, in the loose end of the can from the inside surface outwards (the position of the holes depends on the end profile). In non-round ends, drill the holes as close as possible to a corner radius.

D-2.3 Attach this end to the body by the usual method.

D-2.4 Determine the mass of the empty can, m_1, in grams as exactly as possible (*see* **D-1.1**).

D-2.5 If necessary, measure the temperature of water to be used (*see* **D-1**).

D-2.6 Fill the can with water through one of the holes, with the can inclined at an angle to the vertical so that the holes are as high as possible.

D-2.6.1 When water runs out of the second hole, close the holes with finger, shake the can gently, and complete filling.

D-2.7 If the above filling method results in distortion (due to deformation of the can) then use the following method:

a) Place the can in a container, filled with water, and the can inclined at an angle to the vertical so that the holes are as high as possible.
b) Fill the can completely with water through one of the holes. The water in the container should be not more than 10 mm below the highest point of the can.

c) Close the holes with small pieces of adhesive tape. Remove the can from the container.

D-2.8 Remove any surplus water from the outside of the can.

D-2.9 Determine the mass of the filled can, m_2, in grams as exactly as possible (*see* **D-1.1**).

D-2.10 The difference between the weighing (m_2 - m_1), multiplied by the relevant correction factor (*see* **D-1**), if necessary, represents the gross-lidded capacity, *C*, in ml.

D-3 DETERMINATION OF GROSS LIDDED CAPACITY (CAN FILLED WITH THE PRODUCT)

D-3.1 Apparatus

D-3.1.1 *Top-Loading Balance* (*see* Fig. 22A)

NOTE — The double-pan torsion type of balance is not an acceptable substitute.

D-3.1.2 *Water Tank*

The level and the contents of the water tank shall be adjustable. The tank shall be large enough to hold a submerged can without overflowing.

D-3.2 Method

D-3.2.1 The can to be tested shall be free from dents or buckles.

D-3.2.2 Fill the tank to a suitable level with water.

D-3.2.3 Measure the temperature of the water, if a correction factor is to be applied (*see* **D-1**).

D-3.2.4 Zero the balance with the water level adjusted to the mark on the can holder, by means of a small weight, *S*, set on the balance pan (*see* Fig. 22B) and which shall stay here during the further operations.

D-3.2.5 Vent the can to the atmosphere. It may be necessary to make a small hole to do this. Seal any such hole with adhesive tape.

D-3.3 Determination of Mass of Filled Can in Air (m_{fa})

D-3.3.1 Place the filled can on the balance pan.

D-3.3.2 Adjust the tank to bring the water level to the mark (*see* Fig. 22C).

D-3.3.3 Read the mass of the filled can, m_{fa}, in grams as accurately as the scale permits.

D-3.4 Determination of Mass of Filled Can in Water (m_{fw})

D-3.4.1 Attach the filled can to the magnet under water (*see* Fig. 22D). Avoid trapping any air.

NOTE — If the magnet does not hold the can, it will be necessary to bind the can to the magnet. In this case, start again at **D-3.2.4** with the binding wire attached to the magnet.

D-3.4.2 If the filled can floats in water, add weights *B* (*see* Fig. 22E) to the balance pan until a positive reading is seen on the scale.

D-3.4.3 Adjust the tank to bring the water level to the mark (*see* Fig. 22D or Fig. 22E).

D-3.4.4 Read the mass of the can on the scale in grams. For cans which do not float in water the reading is m_{fw}. For cans which do float in water, m_{fw} shall have a value equal to the scale reading minus *B*. Note that in this latter case, m_{fw} will be negative.

D-3.5 Determination of Mass of Empty Can in Air (m_{ea})

D-3.5.1 Open the can, remove the contents and wash and dry the can.

D-3.5.2 Place the complete, empty can on the balance pan.

D-3.5.3 Adjust the tank to bring the water level to the mark (*see* Fig. 22C).

D-3.5.4 Read the mass of the can, m_{ea}, in gram as accurately as the scale permits.

D-3.6 Determination of Mass of Empty Can in Water (m_{ew})

D-3.6.1 Attach the complete, empty can to the magnet under water. Avoid entrapping any air.

D-3.6.2 Adjust the tank to bring the water level to the mark (*see* Fig. 22D).

D-3.6.3 Read the mass of the can, m_{ew}, in grams.

D-3.7 Calculation of the Gross-Lidded Capacity of the Can

The gross-lidded capacity of the can, *C*, filled with the product, in milliliters, is calculated using the following equation:

$$C = F\,[(m_{fa} - m_{fw}) - (m_{ea} - m_{ew})]$$

where

F = correction factor to be used, if necessary (*see* D-1);

m_{fa} = mass, in g, of the filled can in air (*see* D-3.3);

m_{fw} = mass, in g, of the filled can in water (*see* D-3.4);

m_{ea} = mass, in g, of the empty can in air (*see* D-3.5); and

m_{ew} = mass, in g, of the empty can in water (*see* D-3.6).

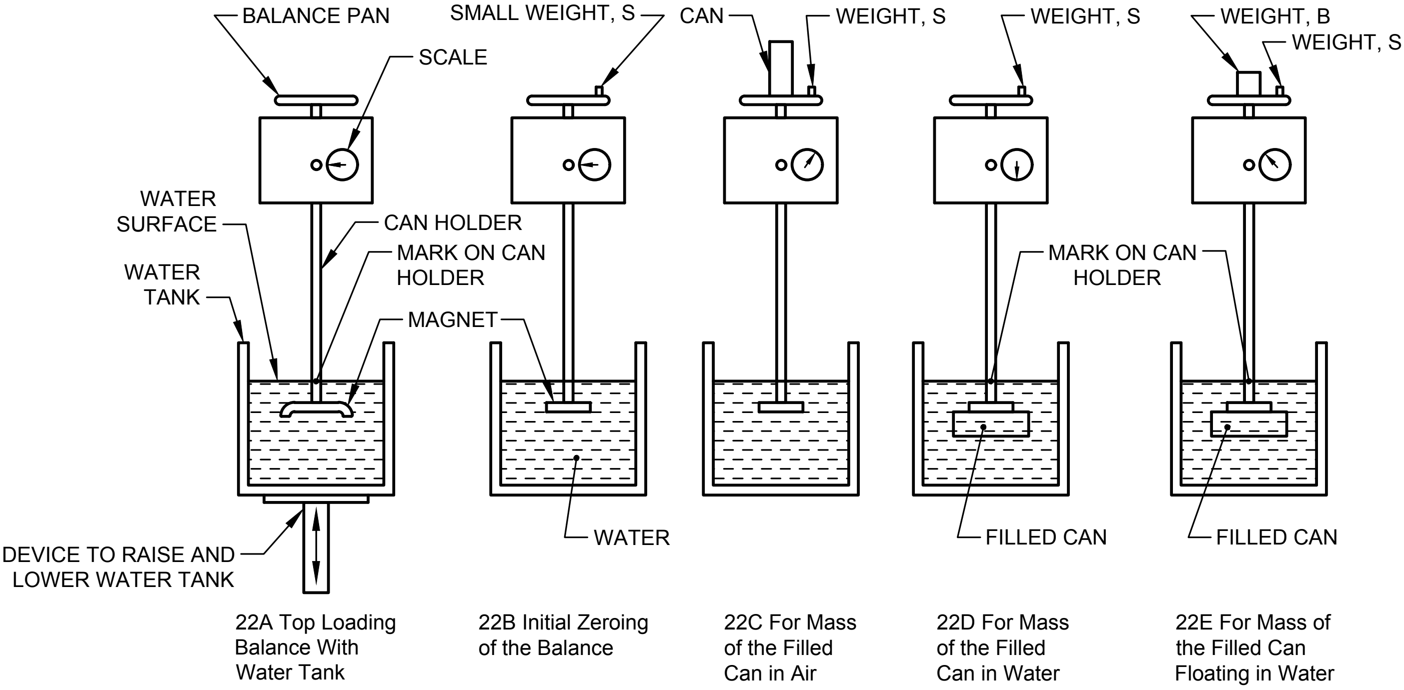


FIG. 22 SEQUENCE OF WEIGHING

ANNEX E

(*Clause* 7.2.3.3)

METHOD OF TESTING MOISTURE RETENTION PERCENTAGE FOR LINED COMPOUND

E-1 OUTLINE OF METHOD

To calculate the moisture retention percentage in lined ends and to ensure the lined ends are moisture-free at the time of packing by using weight loss method.

E-2 MATERIAL

E-2.1 Test Specimen — lined or unlined ends for analysis

E-2.2 Oven — to reduce the moisture in the lining compound

E-2.3 Ammonia — to remove the lining compound

E-3 PROCEDURE

E-3.1 Testing Method to Check the Moisture Content in the Lining Component During Lining

E-3.1.1 Take weight of the unlined ends and mention as ‘*A*’.

E-3.1.2 Take weight of the lined and cured ends and mention as ‘*B*’.

E-3.1.3 Keep the cured ends in oven for 30 min at 105 °C.

E-3.1.4 Allow to cool the ends after taking out from the oven. Take the weight of the ends and mention as ‘C’.

E-3.1.5 *Evaluation*

Moisture retention percentage =

$$\frac{(B - C)}{(C - A)} \times 100$$

E-3.2 Testing Method to Check the Moisture Content in the Lined Component after the Lining Operation or During Random Sampling

E-3.2.1 Take weight of the lined ends and mention as ‘*B*’.

E-3.2.2 Keep the cured ends in oven for 30 min at 105 °C.

E-3.2.3 Allow to cool the ends after taking out from the oven. Take the weight of the ends after 30 min and mention as ‘*C*’.

E-3.2.4 Removing lining ends by using following procedure:

a) spill ammonia solution (NH_3) into the curl opening of the ends;

b) allow the lining of ends to wet in the ammonia (NH_3); and

c) remove the lining compound using knife.

E-3.2.5 Dry the component and take the weight and mention as ‘*A*’.

E-3.2.6 *Evaluation*

$$\text{Moisture retention percentage} = \frac{(B - C)}{(C - A)} \times 100$$

E-4 ACCEPTANCE CRITERIA

E-4.1 Moisture retention percentage should be less than 5 percent after the lining.

E-4.2 If it is more than 5 percent need to increase the curing oven temperature or travelling time.

E-4.3 Moisture retention percentage should be less than 2 percent during packing.

ANNEX F

(*Clause* 7.3.3)

BALL TEST

F-1 OUTLINE OF METHOD

To check the continuity of seam weld by using ball tester.

F-2 MATERIAL

F-2.1 Test Specimen — seam welded cylinder

F-2.2 Ball Tester — to test seam welding continuity (*see* Fig. 23A)

F-3 PROCEDURE

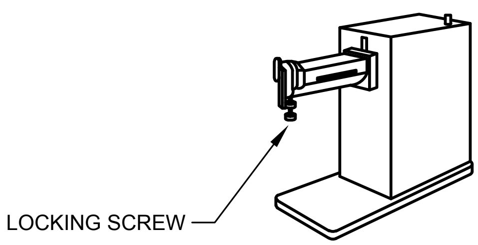
F-3.1 Keep the ball tester ready for testing.

F-3.2 Calibrate the instrument as per machine manufacturer recommendation.

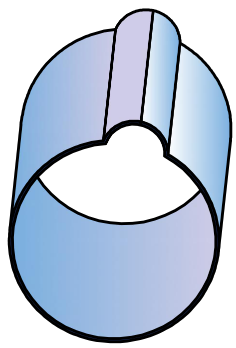
F-3.3 Insert the specimen metal can with weld upwards and cantered on ball.

F-3.4 Switch on the ball tester. Ball will pass through the weld seam area from front edge to rear edge and vice versa. The weakest point in the weld seam area will open up.

F-3.5 If seam weld continuity is found, then the weld is satisfactory (*see* Fig. 23B).



23A Ball Tester



23B Specimen Can After Passed Test

FIG. 23 BALL TEST

ANNEX G

(*Clause* 7.3.3)

CONE TEST

G-1 OUTLINE OF METHOD

To check the welding integrity at leading edge and trailing edge of seam weld by using cone tester or flanging tool.

G-2 MATERIAL

G-2.1 Test Specimen — seam welded cylinder

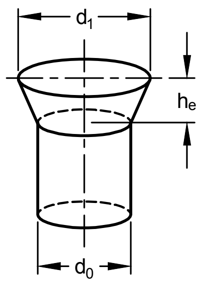
G-2.2 Test Tool — conical tester/flanging tool (*see* Fig. 24)

G-3 PROCEDURE

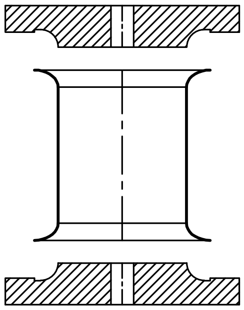
G-3.1 This test can be done by using both cone tester and flanging machine tools as expanding mandrel as illustrated in the Fig. 24.

G-3.2 A hydraulic cylinder equipped with the suitable expanding mandrel penetrates at constant speed into the welded body and widens it conically.

G-3.3 If any rupture is noticed in leading edge and trailing edge, then these cans are not suitable for thermally processed food packing.



24A Using Conical Expander



24B Using Flanging Tool

FIG. 24 DIFFERENT METHODS FOR CONE TEST

ANNEX H

(*Clause* 8.2)

VACUUM TEST

H-1 OUTLINE OF METHOD

To check the micro leakage at seam weld and double seam of the can by using vacuum tester.

H-2 MATERIAL

H-2.1 Test Specimen — double side seamed empty can

H-2.2 Air Pressure Generator — to remove the vacuum

H-2.3 Vacuum Tester — for testing

H-3 PROCEDURE

H-3.1 Apparatus

H-3.1.1 *Transparent Vessel* — large enough to permit the test specimen(s) to be immersed in the test fluid with a minimum headspace of 20 percent, fitted with a flat vacuum-tight lid.

H-3.1.2 *Vacuum Gauge* — Inlet tube from a source of vacuum, and outlet tube to the atmosphere, shall be sealed into the cover. The inlet and outlet tubes shall be equipped with hand operated valves. The vacuum gauge shall be of laboratory quality with a full-scale range from 0 mmHg to 800 mmHg. A suitable moisture trap, to prevent back-flow of liquid, should be fitted between the vacuum gauge and the source of vacuum.

H-3.1.3 Water shall be used as a test fluid, at ambient temperature.

H-3.1.4 A suitable means to hold the specimen metal can(s) with the transparent retaining plate is required. The retaining plate should be within 25 mm under the surface of the test fluid. The method of restraint should not affect the results of the test.

H-3.2 Test Specimens

H-3.2.1 Test specimen metal cans shall be closed empty cans.

H-3.2.2 The sample metal cans shall be conditioned by immersing in boiling water for a period of 5 min.

H-3.2.3 Cool the metal can(s) for ambient temperature.

H-3.2.4 Unless otherwise specified, test at least three cans.

H-3.3 Preparation of Apparatus

H-3.3.1 Assemble the apparatus in accordance with Fig. 25.

H-3.3.2 Immerse the test metal can(s) in the water solution inside the transparent test chamber.

H-3.3.3 More than one metal can specimen can be tested at a time provided that there is sufficient space in the test chamber to allow clear observation of each specimen. If this is done, affix the test metal can so that the closures are sufficiently separated to permit individual observation of each, to detect leakage.

H-3.3.4 Seal the lid, open the hand valve on the inlet tube, and close the hand valve on the outlet tube to the atmosphere. Turn on the vacuum so that the gauge rises slowly to a specified pressure.

H-3.3.5 After reaching the specified pressure maintain the vacuum for 15 s and observe for any continuous bubbles from weld joint and double seaming area.

H-3.3.6 Isolated bubbles caused by trapped air should not be considered as evidence of leakage. Only continuous stream or recurring succession of bubbles to be considered as leakage.

H-3.3.7 Turn the vacuum off and release it slowly by opening the hand valve on the outlet tube. Keep the test metal can(s) immersed for at least 30 s at ambient pressure. Remove the metal can(s) and examine for any water particles inside the specimen can. Water particles inside the metal can is also evidence of leakage.

H-3.4 However, appropriate alternative testing procedure may also be adopted but suitable vacuum pump/gauge is the essential requirement.

H-4 EVALUATION

The specimen shall be tested at 250 mmHg for 15 s. If the specimen is not showing any continuous stream of bubble at welded side seam and double seam, the metal can shall be considered as suitable for packing non-thermally processed food cans.

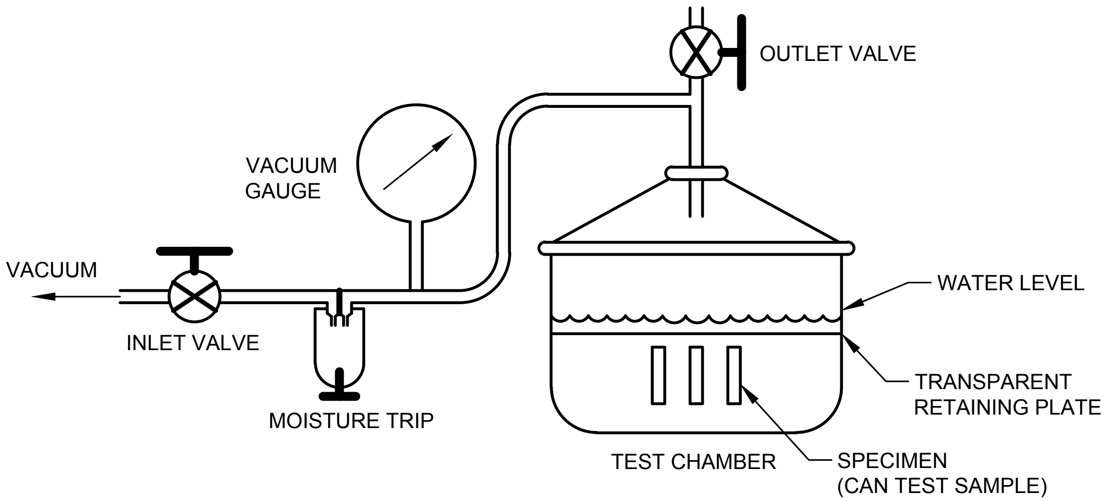


FIG. 25 TYPICAL TEST SETUP FOR LEAKAGE TESTING OF METAL CANS BY VACUUM METHOD

ANNEX J

(*Clause* 11)

METHOD OF SAMPLING

J-1 VISUAL EXAMINATION

Containers shall be drawn at random, according to Table 11, and examined for the defects given in Table 12 and Table 13.

Any container failing in one or more of the visual characteristics shall be considered as defective. If in the first sample the number of defective containers is less than or equal to the corresponding acceptance number, the lot shall be declared as conforming to the requirements of the visual characteristics. If the number of defectives is greater than or equal to the rejection number, the lot shall be deemed as not meeting the requirements for the visual characteristics. If the number of defectives is greater than the acceptance number but less than the rejection number, a second sample of the size equal to that of the first shall be taken to determine the conformity or otherwise of the lot. The number of defectives found in the first and second samples shall be combined and if the combined number of defectives is less than or equal to the corresponding acceptance number, the lot shall be declared as conforming to the requirements of visual characteristics, otherwise not.

Table 11 Scale of Sampling and Permissible Number of Defectives for Visual Characteristics

(*Clause* J-1)

Sl No.	Number of Items in the Lot	Sample	Sample Size	Cumulative Sample	Visual characteristics	
					a	r
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Up to 10 000	1st	80	80	6	10
		2nd	80	160	15	16
ii)	10 001 to 35 000	1st	125	125	9	14
		2nd	125	250	22	23
iii)	35 001 and above	1st	200	200	11	16
		2nd	200	400	26	27

a – Acceptance number, r – Rejection number

Table 12 Visual Defects and their Assessment on Bodies

(*Clause* J-1)

Sl No. (1)	Defect (2)	Assessment (3)
i)	Open weld	Weld opening out after flanging without finger pressure
ii)	Unsound weld	weld opening out after flanging with light finger pressure without distorting the can
iii)	Open side seam	Two side seam overlap not fully or partly engaged
iv)	Knocked down flange	The body flange or end curl failing to engage
v)	Mushroom flange	Periphery of the flange turned backwards affecting the double seam
vi)	Edge cut on flattened bodies	Beyond 0.8 mm for the extreme ones
vii)	Split flange	Beyond 0.8 mm for the extreme ones
viii)	Out of square	Beyond 0.8 mm for the extreme ones
ix)	Scratches on lacquered surface	Scratches to be considered if visible by naked eye at arm length in normal light, the size of scratches to be counted if greater than 20 mm long and 1.0 mm wide. Scratches near the flange within 5.0 mm from the edge will not be counted.
x)	Dirty inside	Dirt which cannot be removed by automatic washing
xi)	Scorched lacquer on side seam inside	Burning of lacquer exceeding 40 mm^2 which can be removed by firm finger pressure
xii)	Rust	Obvious objectionable rust
xiii)	Print defects	Extreme shade variation, colour missing, blurred letters, etc.
xiv)	Lacquer porosity	0 to 10 spots of porosity in 100 cm^2 area will not be considered

Table 13 Visual Defects and their Assessment on Ends

(*Clause* J-1)

Sl No. (1)	Defects (2)	Assessment (3)
i)	Gap in lining	Discontinuity which can be easily seen
ii)	Clipped curl	Part of the curl exceeding 1 mm in depth missing
iii)	Damaged curl	Damage affecting double seam
iv)	Pin hole	Hole through which light can be seen
v)	Cracked metal	Metal fracture
vi)	Rust or dirt	Obvious rust or dirt on the component
vii)	Scratches on lacquered surface	Scratches to be considered if visible by naked eye at arm length in normal light, the size of scratches to be counted if greater than 20 mm long and 1.0 mm wide.
viii)	Lacquer porosity	0 to 10 spots of porosity in 100 cm^2 area will not be considered

J-2 LEAKAGE TEST

A sub-sample of cans is to be drawn from the parent sample for the purpose of various testing after eliminating obvious grossly defective cans (rogues) as their occurrence will be rare and will not be spread over the run whose quality is being evaluated.

J-2.1 The sample metal cans shall be selected either from built up cans and flattened cans. The flattened cans are to be reformed, flanged and seamed according to the requirements. In both the cases seam characteristics shall be ensured to open top standards.

J-2.2 The sample cans for testing shall be drawn from the lot as defined in the table below. If the first sample drawn from the lot is not acceptable as per the below table, a set of second samples to be drawn from the lot. The combination of first and second sample should meet the requirement as set in the given table below.

Test Type	*Sample*	*Sample Size*	*Cumulative Sample*	*Visual Characteristics*	
				a	*r*
(1)	(2)	(3)	(4)	(5)	(6)
Air pressure test	1st	20	20	0	1
	2nd	20	40	1	2
Vacuum pressure test	1st	20	20	0	1
	2nd	20	40	1	2

Example:

Take a sample of size 20 cans first. Subject the cans to air pressure as given in **8.1**. If no leakage in 20 pieces is observed, the lot shall be acceptable. If one can show leakage, a second sample of 20 cans are to be taken from the batch. There should be no leakage in the second sample, that is, a maximum of one leakage, out of combined sample size of 40 is allowed for acceptance of the lot.

ANNEX K

(*Foreword*)

COMMITTEE COMPOSITION

Metal Containers Sectional Committee, PGD 38

Organization	*Representative(s)*
In Personal Capacity (*Flat No. P04, IVY Tower, Nahar Amrit Shakti, Chandivali, Powai, Mumbai - 400072*)	DR N. C. SAHA (***Chairperson***)
Ace Cans Manufacturing Company, Mumbai	SHRI KANAK RAJ PARMAR SHRI DINESH PARMAR (*Alternate*)
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Asian Paints Limited, Mumbai	SHRI NAVNINDER SINGH MS SHWETA TIWARI (*Alternate*)
Ball Beverage Packaging (India) Private Limited, Bengaluru	SHRI GANESH NETHA
Balmer Lawrie and Company Limited, Mumbai	SHRI R. S. PATEL SHRI AMIT MITRA (*Alternate*)
Balmer Lawrie-Van Leer Limited, Mumbai	SHRI TUSHAR SHIRWALKAR
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Canpack India Private Limited, Aurangabad	SHRI SWAPNIL KHESE SHRI AKSHAY SUDAME (*Alternate* I) SHRI ANOOP KAPADIA (*Alternate* II)
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Panel for Open Top Cans for Foods and Beverages, PGD 38/P1

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Hindustan Tin Works Limited, New Delhi	SHRI R. K. TYAGI
Kaira Can Company Limited, Mumbai	SHRI K. M. SHENOY
Nestle India Limited, Gurugram	SHRI BISWAJIT BASU
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This Indian Standard has been developed from Doc No.: PGD 38 (19358).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi