

*Preliminary Draft*

**BUREAU OF INDIAN STANDARDS**

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*भारतीय मानक मसौदा*

**चाय के वितरण हेतु स्टेनलेस स्टील की थर्मस — विशिष्टि**

**Draft Indian Standard**

**INSULATED STAINLESS STEEL THERMOS FOR DISPENSING TEA —  
SPECIFICATION**

ICS 67.250

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Initial Draft Prepared by  
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Last date for receipt of  
comment is .....

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**FOREWORD**

*(Formal clause to be added later)*

Stainless steel thermos for dispensing tea is 5 to 20 litre thermal insulated storage dispenser that greatly lengthens the time over which its contents remain hotter than the container's surroundings. The gap between the two containers is stuffed with food-grade thermal insulation which significantly reduces heat transfer by conduction or convection. The cover or lid is of similar construction.

In the Indian context, this type of stainless steel thermos is used for hot or cold tea, coffee, milk or hot soup. Normally, it is used for commercial purposes.

The height of the dispenser has been restricted to 400 mm, to ensure that it can be stocked under the train or truck seats.

The relevant SI units and corresponding conversion factors are given below for guidance:

$$\begin{aligned} 1 \text{ kgf/cm}^2 &= 98.066 5 \text{ kPa (kilopascal)} = 10 \text{ m of Water column (WC)} \\ &= 0.098 066 5 \text{ MPa (Megapascal)} \\ &= 0.980 665 \text{ bar} \\ &= 1 \text{ N/m}^2 \end{aligned}$$

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.

## **1 SCOPE**

This standard covers the minimum requirements of insulated stainless steel thermos for storage, maintaining the temperature, and dispensing of hot and cold liquids for drinking purposes of a nominal capacity of 5 litres to 20 litres.

## **2 REFERENCES**

The Indian Standards listed below contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions 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 editions of the standards listed below:

<i>IS No</i>	<i>Title</i>
IS 5522 : 2014	Stainless steel sheets and strips for utensils — Specification ( <i>third revision</i> )
IS 6527 : 1995	Stainless steel wire rods — Specification ( <i>first revision</i> )
IS 6603 : 2001	Stainless steel bars and flats — Specification ( <i>first revision</i> )
IS 6911 : 2017	Stainless steel plate, sheet and strip — Specification ( <i>second revision</i> )
IS 9845 : 1998	Determination of overall migration of constituents of plastics materials and articles intended to come in contact with foodstuffs - Method of analysis ( <i>second revision</i> )
IS 10742 : 1983	Specification for cast gun metal rods and bars
IS 5856 : 2022	Welding consumables Wire electrodes strip electrodes wires and rods for arc welding of stainless and heat resisting steels Classification ( <i>third revision</i> )

## **3 TERMINOLOGY**

For the purpose of this standard, the following definitions shall apply.

**3.1 Stainless Steel Thermos** — A double-wall stainless steel container with food-grade thermal insulant in between. The lid is of a similar connection. The container has a tap which is used for dispensing hot or cold liquid. The container has two small loop handles and/or one-half large loop handles.

**3.2 Tap** — Used for dispensing liquid from the thermos.

**3.3 Handle for container** — Stainless steel loop made of steel wire having polymer sleeves

**3.4 Lid** — Double-walled stainless-steel lid with food-grade insulant in between, having a loop to enable opening/closing and side strips to enable locking in loops provided on the container. The lid may be provided with a seal (food-grade O-ring or washer).

**3.5 Washer** — Depending on the assembly in the container the tap may be provided with two silicone or ABS washers.

**3.6 Flange Nut** — The tap may be provided with a nut that is used along with the washer to locate the tap from inside. Thus, it would also help to ensure no leakage of liquid from inside to outside.

## **4 NOMINAL CAPACITY, SHAPE, AND SIZE**

**4.1** The dispenser normally comes with a nominal capacity of 5 to 20 Litres. The nominal capacity is the usable volume in litres at room temperature required to fill the inner container, when in the upright position, to a level 5 mm below the neck. No negative tolerance is allowed.

**4.2** The typical shape of the dispenser should be round at the side and flat on top and bottom. The height of the dispenser shall not be more than 400 mm.

**4.3** The SS thermos may have a hollow round bottom stand fitted or welded to the bottom. The stand bottom should be rounded off to avoid sharp edges and burrs.

**4.4** The top opening should be a minimum of 100 mm in diameter to enable internal cleaning with the forearm and visual checking of the weld. The typical sketch is given in Annex A for understanding and brief details.

## **5 MANUFACTURE AND WORKMANSHIP**

**5.1** The stainless steel thermos shall be clean, and reasonably free from distortion, dents, wrinkles, wavy surface, colouring, burrs, scratches, pitting, deep tool marks and other surface defects normally associated with stainless steel. There shall not be any sharp edges.

**5.2** The stainless steel thermos shall be subjected to all the tests and meet the minimum requirements specified in 7.

**5.3** The inner container shall be one piece, deep drawn/spun. The top on the inner container can be a single piece butt-welded to the bottom portion. It shall not be a lap joint.

**5.4** Metal-to-metal welding if done, the weld shall be free from welding defects. The welding electrode shall conform to grade 308 L (07Cr18Ni9) as per IS 5856. The weld shall be finished properly so that when a finger is passed on the joint, it shall be smooth.

**5.5** The fixing of tap is as agreed to between the purchaser and manufacturer. It could be either of the two as given in **5.5.1** and **5.5.2**.

**5.5.1** A inner threaded SS 304 ferrule is welded in a hole made in the inner and outer container on the side, at the bottom. The tap is screwed in with a thread seal to ensure no leakage. Refer typical sketch given in Annex A.

**5.5.2** A SS 304 ferrule is welded in a hole made in the inner and outer container on the side, at the bottom. The SS or brass tap is located by using a food-grade silicone/ABS washer on both sides (inside and outside), with a SS 304 flange nut (*see* Fig. 1) screwed from inside on the threaded portion of the tap. The washer's outer diameter shall be equivalent to or greater than the flange nut's maximum outer diameter by around 1 mm. The silicone shall be on the inside and the silicone or ABS can be on the outside. (*see* 7.1.5)

NOTE – First, the SS 304 ferrule is welded to the inner container and later to the outer container.

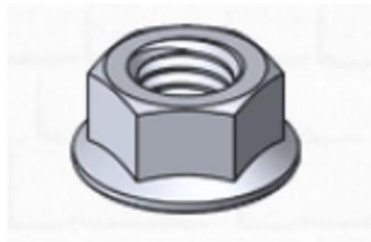


FIG. 1 NUT WITH A BUILT IN WASHER LIKE FLANGE

**5.6** Provision on the top of the outer container and bottom of the stand can be made to enable stocking of SS thermos one above the other. If provided, instructions shall be suitable printed on the outer container sides, only one SS thermos can be placed above the other. It is better to avoid this due to safety reasons.

NOTE – Refer sketch of the stainless steel thermos in Annex A for typical details of assembly.

## **6 SAMPLING**

For the purpose of conducting the tests, three products of each individual size shall be tested. In the event of one of the 3 products failing the test, an additional 7 products shall be tested and these shall all pass.

NOTE – Visual (naked eye or corrected vision) check is normally 100 percent, as agreed to between the purchaser and manufacturer.

## **7 REQUIREMENTS AND TESTS**

### **7.1 Materials**

#### **7.1.1 Inner Containers**

The materials used to manufacture the inner containers shall be stainless steel of grade 304 as per IS 5522. The sheet thickness used shall be a minimum of 0.7 mm, and should not be less than 0.5 mm at any point in the finished product.

#### **7.1.2 Outer Container**

The materials used to manufacture the outer containers shall be stainless steel of Grade 304 as per IS 5522. The sheet thickness used shall be a minimum of 0.7 mm, and should not be less than 0.5 mm at any point in the finished product

**7.1.2.1** The two strip loops on either side of the opening, on top, to enable locking of the lid shall be made of grade 304 as per IS 5522, minimum thickness of 0.7, and a minimum width of 15 mm. If spot welding is done either side shall have at least four spots. The spot-welding process should be under control/qualified. Refer to **7.2** for fixing of the handle(s).

NOTE — The purpose of these two strips is to ensure the lid can be locked. When the lid is placed and rotated, it should lock or unlock based on the direction of rotation of the lid.

### **7.1.3 Lid**

The materials used to manufacture the SS thermos lid shall be stainless steel of grade 304 as per IS 5522. The thickness shall be a minimum of 0.7 mm.

NOTE — The tea side/inside portion of the lid is also known as the plug and the outer, top portion is known as the closure.

**7.1.3.1** The strip loop to enable opening/closing and side strips to enable locking is made of grade 304 as per IS 5522, with a minimum thickness of 0.7 and a minimum width of 15 mm. If spot welding is done either should be at least two spots. The spot-welding process should be under control/qualified.

**7.1.4** In case a thermally insulating material is used between the containers, it should be polyurethane foam or any other similar thermal insulation material

*Example:*

Fabric-based insulation, soft insulation

NOTE — The thermal insulating material shall be food safe and non-hazardous. Supplier certificate shall be acceptable.

**7.1.5** In case a silicone gasket/washer/O-ring is used, it shall be food-grade silicone. Refer to Annex N of IS 3565 for information on silicone.

The gasket/washer/O-ring, when visually (naked eye or corrected vision) examined, shall be free from blisters, pinholes, cracks, embedded foreign matters and other defects which may impair their serviceability. No joints allowed.

NOTE — Silicone manufacturer's certificate for food grade is acceptable.

**7.1.5.1** In case other than silicone, a food-grade material is used for the washer, it should be compatible with hot or cold tea, coffee, milk, and hot soup as a minimum and withstand a liquid temperature above 98 °C. A food grade certificate, and a compliant certificate from the supplier is acceptable.

**7.1.5.2** The gasket/washer/O-ring as indicated in **7.1.5** and **7.1.5.1**, when visually (naked eye or corrected vision) examined, shall be free from blisters, pinholes, cracks, embedded foreign matters, and other defects which may impair their serviceability. No joints are allowed. Only physical and chemical properties requirements are to be complied with for silicone gaskets.

### **7.2 Handle(s)**

Normally the handle(s) would be part of the outer container. The handles should be covered with a polymer sleeve (width of  $70 \pm 2$  mm).

**7.2.1** The two side handles are made of SS wire as per IS 6527, 6 mm thick, formed like a loop (full or half or as shown in Annex A), one side held in brackets welded on the outer container side (typically 2/3 of the overall height of the SS thermos, around  $300 \pm 5$  mm, measured from the bottom). The loop handle should have a width of a minimum of 100 mm and a height perpendicular to the outer container minimum of 70 mm.

**7.2.2** Load the SS thermos with 3 times the marked capacity (use steel balls), using only the handle(s) lift and lower the container 1500 times or hang the container (should be free from touching any surface) for 30 minutes. There should be no sign of damage or breakage.

### **7.3 Capacity Test**

Ensure the SS thermos is empty, take water in a calibrated jar, and pour the water from the calibrated jar into the insulated container to a level 5 mm below the edge of the inner container. Note down the volume of water poured into the container from the calibrated jar. No negative tolerance is allowed.

### **7.4 Heat and Cold Retention Capability**

#### **7.4.1 Heat Retention Capability**

The heat retention capacity of an SS thermos is determined by filling hot water at  $95 \text{ }^\circ\text{C}$  in it in the manner prescribed below and measuring the temperature of water at intervals of 1, 6, 12, and 24 hours, respectively (*see Annex B*). While carrying out the test, maintain the atmospheric conditions at  $27 \pm 2 \text{ }^\circ\text{C}$  and  $65 \pm 5$  percent RH. The samples are to be pre-conditioned at  $95 \pm 2 \text{ }^\circ\text{C}$  for a minimum period of two hours before starting the test.

Rinse the SS thermos with water at  $95 \pm 2 \text{ }^\circ\text{C}$  and drain out water. Quickly fill with boiling water. Allow the temperature to drop slowly to  $95 \text{ }^\circ\text{C}$ , close the SS thermos with the lid and note the time. Note the temperature of water in the SS thermos at the end of 1, 6, 12, and 24 hours respectively from the time the water in the inner container attain the temperature of  $95 \text{ }^\circ\text{C}$ .

NOTE — In no case shall the SS thermos be disturbed or opened except for measuring the temperature as stated above.

**7.4.1.1** The SS thermos shall be taken as having passed the test if the temperatures measured at the end of 1, 6, 12, and 24 hours are not less than those specified in Table 1 below.

**Table 1 Heat Retention Capability**

(Clause 7.4.1.1)

Sl No.	Capacity of the Inner	Temperature Attained not less than ( $^\circ\text{C}$ )			
		After 1 hour	After 6 hours	After 12 hours	After 24 hours

	<b>Container in Litre</b>				
(1)	(2)	(3)	(4)	(5)	(6)
i)	5	80	60	50	40
ii)	10	88	70	56	42
iii)	15	91	78	60	58
iv)	20	92	82	70	60

**7.4.1.2** For routine testing, the SS thermos shall be tested for 1 hour and 6 hours test. For 12 hours and 24 hours, the heat retention test shall be a type test.

### **7.4.2 Cold Retention Capability**

The temperature of water cooled to 5 °C and kept in the flask, in accordance with the method prescribed in Annex C when measured after 6 hours, shall not be greater than the mentioned in Table 2.

**Table 2 Cold Retention Capability**  
(Clause 7.4.2)

<b>Sl No.</b>	<b>Capacity of the Inner Container in Litre</b>	<b>Temperature Attained not more than (°C) (After 6 hours)</b>
(1)	(2)	(3)
i)	5	13
ii)	10	11
iii)	15	10
iv)	20	10

### **7.5 Impact Resistance Test**

#### **7.5.1 Drop Impact Test**

Fill water in the SS thermos up to its full capacity at the normal temperature and drop it on a hardwood board of 30 mm or more in thickness fixed horizontally from the height of 400 mm in a vertical state and checked for any change in the appearance and carry out the test given in 7.4. The lid shall not come off. There should be no splash of liquid from the SS thermos.

### **7.6 Leakage Test**

**7.6.1** Fill the SS thermos to 75 percent of its nominal capacity with water at 95 °C containing 0.5 percent surfactant. Close the lid. Thoroughly dry the outside surface of the lid and outer protective casing (container). Put the SS thermos upside down position for at least 10 minutes. No drops shall appear on the casing or on the surface on which the insulated container has been overturned.

**7.6.2** The empty SS thermos without lid (body) shall be weighed (weigh balance accuracy upto 10 mg). The SS thermos with the lid closed shall be dipped fully in a water bath for at least 5 minutes. After taking out the SS thermos, the inside and outside of the SS thermos shall

be wiped dry. The SS thermos without a lid shall be weighed again. There shall be no increase in weight (not more than 15 g).

**7.6.3** The lid shall be weighed (weigh balance accuracy up to 10 mg). The lid shall be dipped fully in a water bath for at least 5 minutes. After taking out the lid, both sides of the lid shall be wiped dry. The lid shall be weighed again. There shall be no increase in weight (not more than 15 g).

**7.6.4** The SS thermos shall be filled with hot water at  $95 \pm 2$  °C fully, wipe dry the outer surface, and place on a white sheet of paper (the paper size shall be more than the SS thermos by at least 50 mm). The SS thermos need not be closed with the lid. Keep the SS thermos for 12 hrs, there should be no leakage of water onto the white paper.

### **7.7 Staining Test**

The inner and outer surfaces of the SS thermos shall be thoroughly washed with hot soapy water. Thoroughly rinse and then degrease the test specimens in acetone or methylated spirits, then wipe using a soft cloth. The SS thermos, when dipped for 16 h in each of the following solutions maintained at  $60 \pm 2$  °C temperature, shall not show any sign of staining after removal from the solutions at the end of the above period:

- a) 10 g of glacial acetic acid (99 percent purity/AR grade material) dissolved in distilled water to make 100 ml; and
- b) 5 g of pure sodium chloride (AR grade material) dissolved in distilled water to make 100 ml.

### **7.8 Check for Insulation and Material thickness**

A separate product other than as specified in **6** is taken and cut to check if the insulating material used is as specified (*see 7.1.4*). The same product can be cut to check the thickness of various components of the product.

### **7.9 Stability Test**

When the SS thermos filled with water to the full capacity is placed upright over a rough  $10^\circ$  inclined plane, it shall not overturn or fall (shall not overbalance).

### **7.10 Load Test**

Fill the SS thermos with tap water, close the lid, and apply a dead load equivalent to the weight of the fully filled SS thermos on the top. There should not be any deformation.

### **7.11 Seepage Test**

Fill the SS thermos up to 50 percent with blue-coloured water (water with blue indelible ink). Close the insulated container and shake the container up and down through a distance of  $200 \pm 50$  mm, 25 times in  $15 \pm 2$  seconds. Empty the container, and dry all the exposed surfaces.



Dismantle or cut apart the container and lid to assess any seepage into the insulant. There should be no seepage (no blue colour in the insulation).

## **7.12 Tap**

Tap shall be made of grade 304 Stainless Steel (preferred, as per IS 6603 or IS 6527) used for dispensing liquid. The tap would have a silicone washer, and handle with heat insulated cover. The tap would have a collar to ensure a washer can be used between this collar and the outer container surface. The thread would be sufficient or more than the width of the double wall to enable assembly of the washer and nut inside the thermos or similar to that shown in Annex A.

NOTE – The assembly would have a complete tap with two washers and a nut. In case, the other option as per Annex A is used, the ferrule welded on the thermos should be made to enable assembly of the tap.

**7.12.1** The tap fixed on an empty SS thermos shall be opened and closed 25 000 times. None of the tap parts or tap should become loose. Then the thermos is kept on a level clean surface, tap closed, SS thermos is filled with tea and kept for 2 hours. There shall be no leakage (no dripping from the tap or tap connection).

## **8 INSTRUCTIONS FOR USE**

**8.1** SS thermos shall carry adequate printed instructions to the user for its proper use to ensure satisfactory performance.

**8.2** The manufacturer shall supply along with each SS thermos leaflet or booklet containing at least the following information in verbatim or to mean what is given below:

- a) How to unpack and take care of the environment;
- b) How to stock the SS thermos in case the SS thermos is not going to be used, to avoid pitting or getting contaminated;
- c) Wash thoroughly before and after use;
- d) Always rinse with clean water (preferably warm water) before each use;
- e) Ensure the SS thermos is cleaned, empty, and dry before stocking after each use;
- f) Do not use for carrying ice cubes;
- g) Do not use to store or carry carbonated drinks;
- h) In order to minimize bacterial growth, do not use or keep warm milk products for long. Ensure the SS thermos is dry and does not stink before using warm milk, thermos should be properly cleaned using a mild detergent along with hot water and later rinsed with drinking water;
- j) The SS thermos should be periodically cleaned;
- k) When disposing off the product, please ensure it is done as per government guidelines;
- m) Handle the SS thermos properly, do not drop, always store upright, do not sit or stand on the SS thermos;
- n) Do not stock the SS thermos one above the other unless specified by the manufacturer; and
- p) Keep these instructions safe.

## **9 MARKING**

**9.1** Each SS thermos shall be legibly and permanently marked with the following minimum information:

- a) Nominal capacity;
- b) Grade of material of the Container (body and lid);
- c) Type of insulant used;
- d) Name or trademark of the manufacturer; and
- e) Batch number.

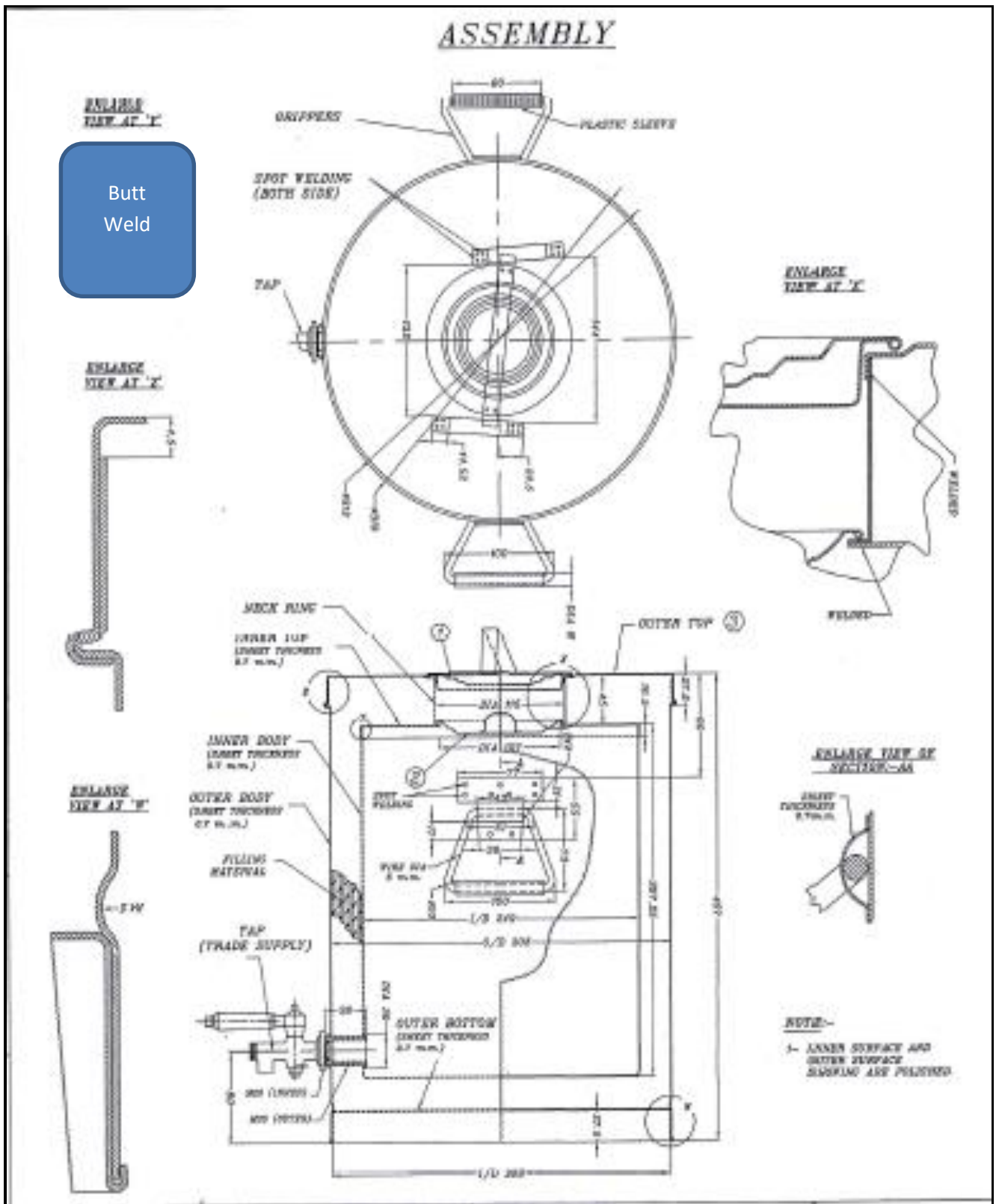
## **9.2 BIS Certification Marking**

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 thereunder, and the product(s) may be marked with the Standard Mark.

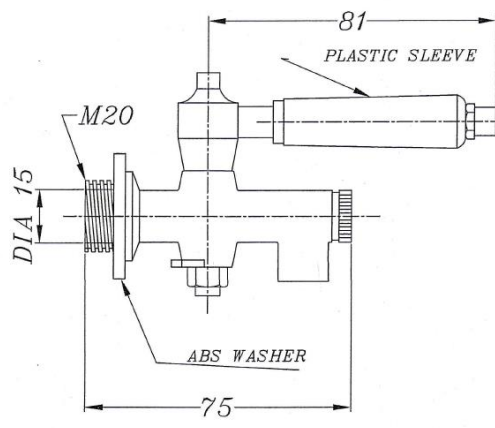
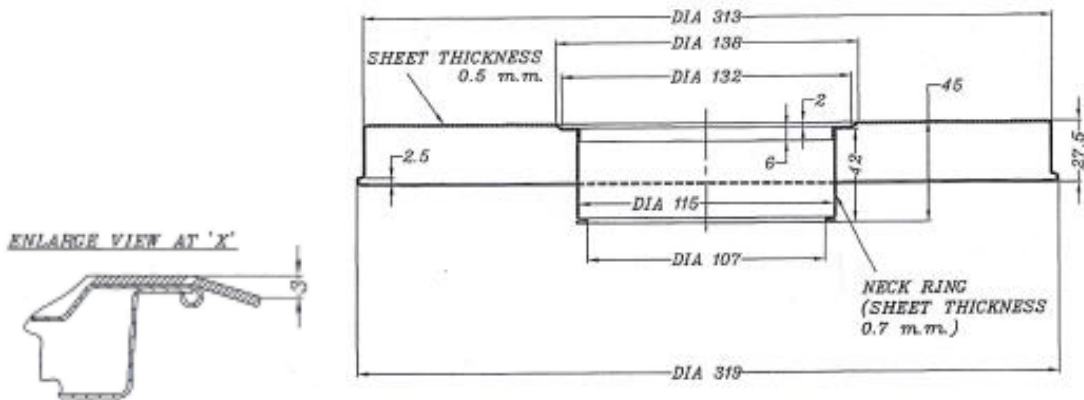
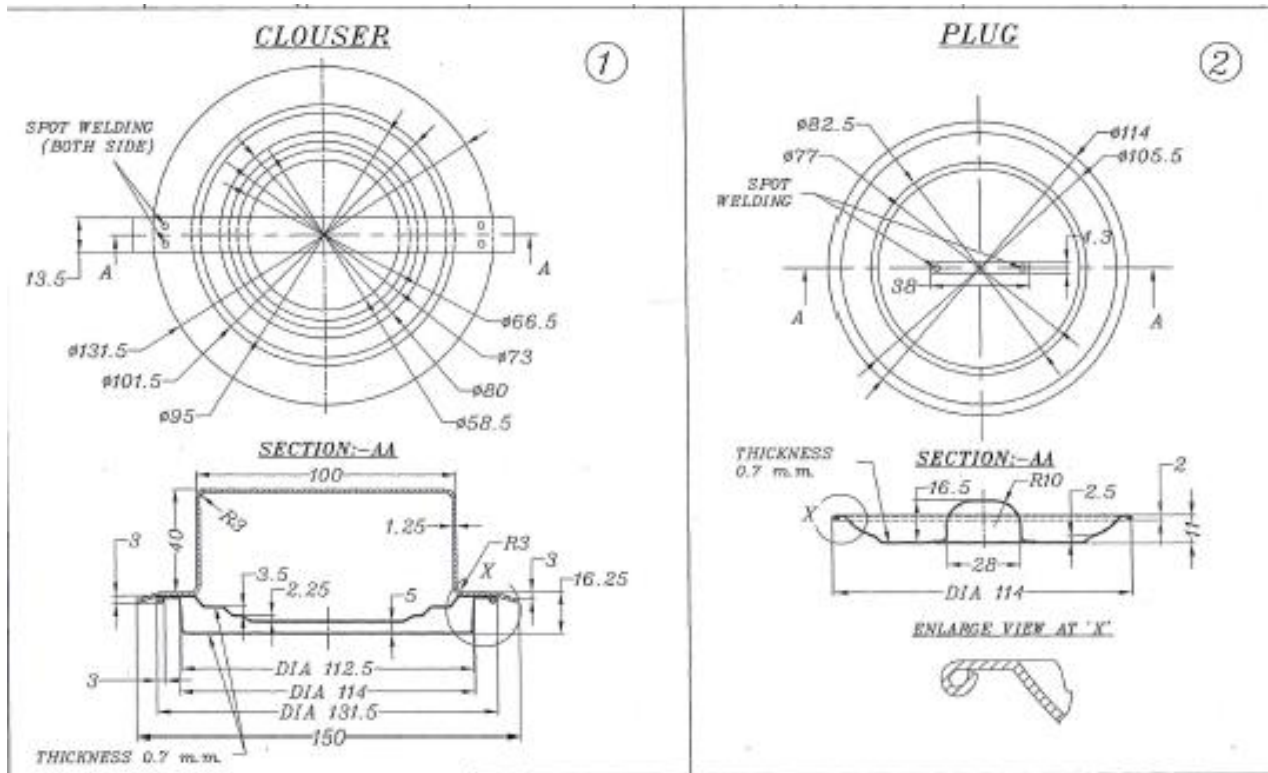
## **10 PACKAGING**

Each SS thermos shall be suitably packaged to avoid any damage during transit. The packaging shall be eco-friendly.

ANNEX A  
(Clauses 4.4, 5.5.1, 5.6, 7.2.1, and 7.12)  
TYPICAL SKETCH OF TEA DISPENSER



All dimensions in millimetres



**Typical Tap Diagram**

(All dimensions in millimetres)

**ANNEX B**  
(*Clause 7.4.1*)

**TEST FOR HEAT RETENTION CAPACITY**

**B-1 GENERAL**

**B-1.1** The heat retention capacity of an insulated thermos is determined by filling hot water at 95 °C in it in the manner prescribed in **B-2** and measuring the temperature of water at intervals of 1, 6, 12 and 24 hours, respectively. While carrying out the test, maintain the atmospheric conditions at  $27 \pm 2$  °C and  $65 \pm 5$  percent RH. The samples are to be pre-conditioned at  $95 \pm 2$  °C for a minimum period of two hours before starting the test.

**A-2 PROCEDURE**

**A-2.1** Rinse the flask with water at  $95 \pm 2$  °C, and drain out water. Quickly fill with boiling water. Allow the temperature to drop slowly to 95 °C, close the flask with stopper and cup and note the time. Also, the temperature of water in the flask at the end of 1, 6, 12 or 24 hours respectively from the time the water in the flask attains the temperature of 95 °C.

NOTE— In no case, the flask shall be disturbed or opened except for measuring the temperature as stated above.

**A-2.2** The insulated thermos shall be taken as having passed the test, if the temperatures measured at the end of 1, 6, 12 and 24 hours are not less than those specified in **7.4.1**.

**ANNEX C**  
*(Clause 7.4.2)*

**TEST FOR COLD RETENTION CAPACITY**

**C-1 GENERAL**

**C-1.1** The cold retention capacity of the insulated thermos is determined by filling cold water at 5 °C in it in the manner prescribed below and measuring the temperature of water after 6 hours. The samples shall be pre-conditioned at  $5 \pm 1$  °C for a minimum period of two hours before starting the test.

**C-2 PROCEDURE**

**C-2.1** Rinse the insulated thermos with water at  $5 \pm 1$  °C, and drain out water. Quickly fill the flask up to the neck with ice-cold water. Allow the temperature to increase slowly to 5 °C, close the flask with the stopper and cup and note the time. Note the temperature of water in the inner container at the end of six hours.

NOTE — In no case, the flask shall be disturbed or opened except for measuring the temperature as stated above.

**C-2.2** The insulated thermos shall be taken as having passed the test if the temperature measured at the end of 6 hours is not greater than that specified in **7.4.2**.