भारतीय मानक
Indian Standard

IS 17526 : 2021

घरेलू स्टेनलेस स्टील वैक्यूम फ्लास्क / बोतल — विशिष्टि

Domestic Stainless Steel Vacuum Flask / Bottle — Specification

ICS 67.250

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
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February 2021 **Price Group 6**

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Utensils, Cutlery Domestic Hardware Sectional Committee had been approved by the Mechanical Engineering Divisional Council.

A vacuum flask/bottle is an vacuum insulated storage vessel that greatly lengthens the time over which its contents remain hotter or cooler than the flask's/bottles's surrounding. The gap between the two flasks/bottles is partially evacuated of air, creating a near-vacuum which significantly reduces heat transfer by conduction or convection.

While preparing this standard, assistance has been taken from BS EN 12546-1 : 2000 'Materials and articles in contact with foodstuffs. Insulated containers for domestic use — Part 1: Specification for vacuum ware, insulated flasks and jugs' while implementing this standard, the manufacturer shall ensure compliance with relevant statutory regulations. For staining test has been derived from IS 14756 : 2017 Stainless steel cookware — Specification (*first revision*).

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

Pressure 1Pa (Pascal) = 1 N/m^2

1 kgf/mm^2 = 9.806 65 MPa

The composition of the committee responsible for the formulation of this standard is given in Annex C.

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 : 1960 'Rules for rounding off numerical values (*revised*)'. 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

DOMESTIC STAINLESS STEEL VACUUM FLASK / BOTTLE — SPECIFICATION

1 SCOPE

1.1 This standard covers minimum requirements of domestic vacuum insulated stainless steel flask/bottle for storage and maintaining the temperature of hot and cold liquids used for drinking purpose.

1.2 This standard specifies the sampling and tests for domestic vacuum insulated stainless flask/bottle.

NOTE — The flask/bottle can be for transporting or table top.

2 REFERENCES

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

IS No.	*Title*
3565 : 2018	Teats for feeding bottles — Specification (*first revision*)
5522 : 2014	Stainless steel sheets and strips for utensils — Specification (*third revision*)
5856 : 2017	Welding consumables — Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels — Classification (*second revision*)
9730 : 2008	Non-stick unreinforced plastics coatings on domestic cooking utensils — Specification (*first revision*)
9806 : 2001	Methods of test for and permissible limits of toxic materials released from ceramicware, vitreous enamelware, glassware and glass-ceramicware in contact with food (*first revision*)
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*)
15997 : 2012	Low nickel austenitic stainless-steel sheet and strip for utensils and kitchen appliances — Specification

3 TERMINOLOGY

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

3.1 Domestic Stainless Steel Vacuum Flask/Bottle — Domestic stainless-steel vacuum flask/bottle is a stainless-steel container consisting of two stainless steel containers with vacuum in between. Normally the mouth portion of the flask/bottle may be narrow or wide for storage or transporting of hot and cold liquid used for drinking.

3.2 Nominal Capacity — Volume of water at room temperature required to fill the inner container, when in upright position, to a level 10 mm below the lowest part of the inserted closure.

3.3 Table Top Use — Flask/bottle generally is provided with a handle.

3.4 Use for Transportation — Flask/bottle is normally provided with a strap, cord or handle.

4 TYPES (SHAPE, SIZE AND NOMINAL CAPACITY)

The stainless-steel vacuum flasks/bottles normally comes in various capacities from 150 ml to 2 500 ml. The mouth portion (size) comes in typically two variants (wide mouth above 45 mm and narrow mouth 45 mm and below).

5 MANUFACTURE AND WORKMANSHIP

The shape, size and nominal capacity of the inner container shall be as agreed to between the purchaser and the manufacturer. However, the nominal capacity of the inner containers shall be declared by the manufacturer.

5.1 The flask/bottle shall be clean, reasonably free from distortion, dents, wrinkles, wavy surface, colouring, burrs, scratches, pitting, deep tool marks and other surface defects. The design of the flask/bottle shall be such that it is easy to clean and prevent accumulation of dirt.

5.2 The flasks/bottles shall be subjected to all the tests and meet the specified minimum requirements specified in **7**.

5.3 Welding if done, the weld shall be free from welding defects. The welding electrode shall conform to grade 308 L (07Crl8Ni9) or higher grade as per IS 5856. The weld shall be finished properly so that when a finger is passed on the joint, it shall be smooth.

6 SAMPLING

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

7 REQUIREMENTS AND TESTS

7.1 Material

7.1.1 *Inner Containers*

The materials used to manufacture the inner containers shall be stainless steel of grade 304 or higher grade as per IS 5522.

7.1.2 *Outer Protective Case and Accessories*

Outer protective case and accessories shall be of materials which shall be rigid enough to hold the inner container securely under conditions of use, corrosion resistant and protect it from damage in normal handling. The material used for the outer container shall be of stainless steel as per N2 of IS 15997 or 304 series or higher according to IS 5522. The minimum thickness of the outer container shall be 0.3 mm for flasks/bottles with capacity less than 1 000 ml and 0.4 mm for flasks/bottles with capacity 1 000 ml and above.

7.1.2.1 The flask/bottle, if coated fully or partially externally, shall conform to the thickness test, salt water corrosion test, adhesion test procedures as per IS 9730. The limit for lead and cadmium of the coating shall be as per IS 9806 (*see* sl. no iv) and v) of Table 1 of IS 9806) when measured as per standard test method. The minimum thickness of the coating shall be declared by the manufacturer.

7.1.3 *Stopper*

The stopper of the inner container shall be of non-toxic and food grade material (*see* IS 9845). If stainless steel is used, it shall conform to the material specified for the inner container. When fitted to the inner container it shall not slip off and shall provide a leak-proof fitting.

If and O-ring or washer is provided it shall be food grade silicone, refer to Annex N of IS 3565 for information on Silicone.

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

NOTES

1 Silicone manufacturers certificate for food grade is acceptable.

2 Only physical and chemical properties of needs to be complied with for silicone O-ring or washer (inclusive of Note 1).

7.1.4 *Auxiliary Closure*

The auxiliary closure(s), also intended for use as drinking cup(s), shall be non-toxic, food grade material and shall not deform under normal conditions of use (*see* IS 9845). The materials shall not contain Bisphenol A (BPA).

7.2 Arrangement for Holding and Suspension

Suitable handle or arrangement for suspension may be provided on a stainless-steel vacuum flask/bottle.

7.3 Capacities

The nominal capacities may be declared one amongst 150 – 2 500 ml, other capacities may be as agreed to between the purchaser and the manufacturer. The tolerance on the nominal capacity shall be + 5 percent. No Negative tolerance is permitted.

7.3.1 Volume of water at room temperature required to fill the insulated container, when in an upright position, to a level 10 mm below the lowest part of the inserted closure.

Ensure the Flask/bottle in empty, take water in a calibrated Jar, pour the water from the calibrated jar into the flask/bottle, to a level 10 mm below the lowest part of the inserted closure, the difference in reading of water level in the calibrated jar is the capacity.

7.4 Heat Retention Capability

The temperature of water heated to 95 °C (+1 °C/– 0 °C) and kept in flask/bottle, in accordance with the method prescribed in Annex A when measured at intervals of 1, 6, 12 and 24 hrespectively, shall be not less than as given in Table 1.

7.4.1 For routine testing, the flasks/bottles shall be tested for 1 h, 6 h and 12 h test. Type test for 24 h heat retention test.

7.5 Cold Retention Capability

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

Table 1 Heat Retention Capability

(*Clause* 7.4)

Sl No.	Capacity of the Flask/Bottle (ml)	Temperature Attained Not Less Than (°C) for Narrow Mouth				Temperature Attained Not Less Than (°C) for Wide Mouth			
		After 1 hour	After 6 hours	After 12 hours	After 24 hours	After 1 hour	After 6 hours	After 12 hours	After 24 hours
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
i)	150-250	80	60	50	40	80	60	50	40
ii)	251-500	88	70	56	42	80	60	50	40
iii)	501-750	91	78	60	50	80	60	50	40
iv)	751-1 000	91	80	70	55	88	70	56	42
v)	> 1 000	91	80	70	55	88	78	68	50

Table 2 Cold Retention Capability

(*Clause* 7.5)

Sl No.	Capacity of Inner Containers (ml)	Temperature Attained not More than for Narrow Mouth after 6 h (°C)	Temperature Attained Not more than for Wide Mouth after 6 h (°C)
(1)	(2)	(3)	(4)
i)	150-250	13	14
ii)	251-500	11	12
iii)	501-750	10	11
iv)	751-1 000	10	11
v)	> 1 000	09	10

7.6 Impact Resistance

7.6.1 *Drop Impact*

Fill water in the inner container up to its full capacity at the normal temperature and drop it on a hard wood board of 30 mm or more in thickness fixed horizontally from the height of 400 mm in a vertical state as shown in Fig. 1.

The flask/bottle shall be free from defects harmful to use and no defects such as water leakage, crack, etc., and comply to heat or cold retention capacity as specified in **7.4** or **7.5** respectively.

7.6.2 *Pendulum Impact*

Fill water in the inner container up to its full capacity at the normal temperature, raise the flask/bottle to the position of 45 degrees by making the length of the shoulder strap 400 mm as shown in Fig. 2 and make the flask/bottle collide with a hard wood board of 30 mm or more in thickness fixed vertically.

The flask/bottle shall be free from defects harmful to use and no defects, such as water leakage, crack, etc. and comply with heat or cold retention capacity as specified in **7.4** or **7.5** respectively.

7.7 Fixing Strength of the Handle

A handle if provided, shall be subjected to the following test.

Weigh the flask/bottle with water filled to its maximum capacity along with the stopper(s) and cup(s). Gradually apply a load, preferably using a tensile tester, equal to a minimum of six times its mass as shown in Fig. 3. After the maximum load is attained, keep for 5 minand examine the presence of any abnormality.

The flask/bottle and handle shall be free from any abnormality.

7.8 Test for Strength of Shoulder Strap

A shoulder strap if provided, shall be subjected to the following test.

Weigh the flask/bottle with water filled to its maximum capacity along with the stopper(s) and cup(s). Gradually apply a load, preferably using a tensile tester, equal to a minimum of ten times its mass as shown in Fig. 4. After the maximum load is attained, keep for 5 min and examine the presence of any abnormality.

The flask/bottle and shoulder strap shall be free from any abnormality.

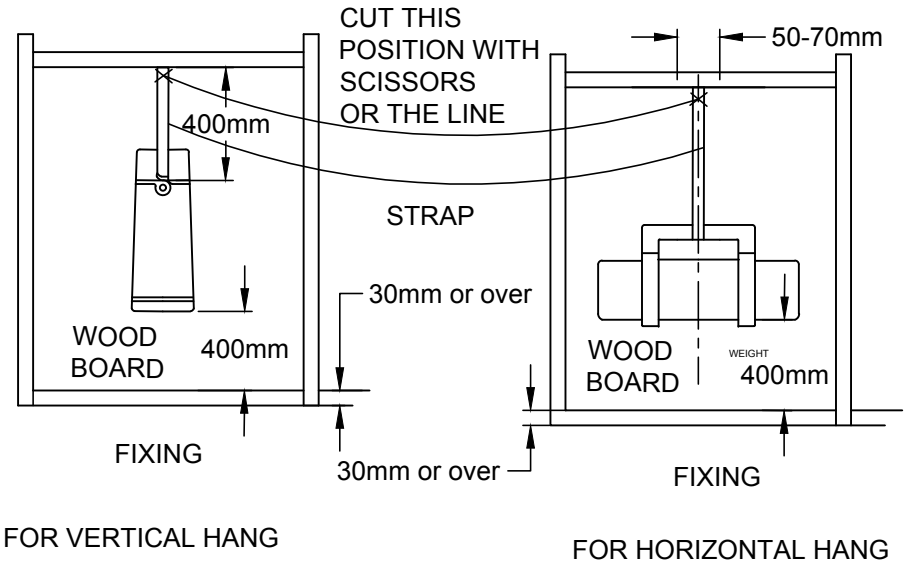

FIG. 1 DROP IMPACT TEST

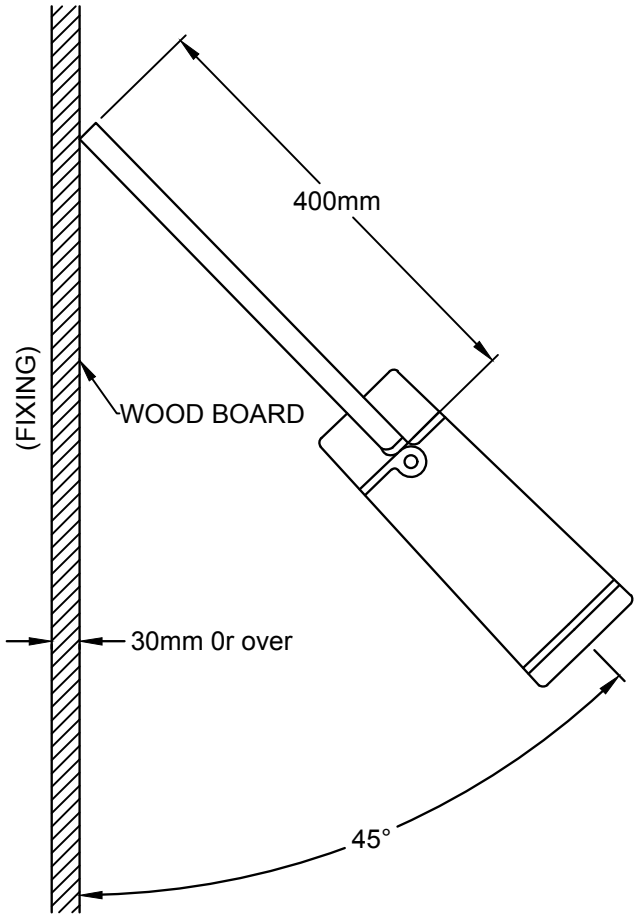

FIG. 2 PENDULUM IMPACT TEST

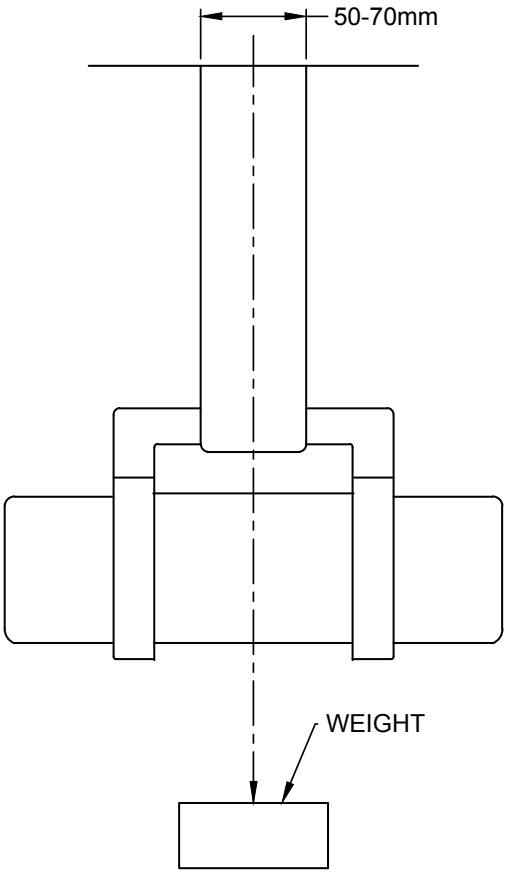

FIG. 3 TEST FOR THE HANDLE

7.8.1 *Test for Strength of Cord*

In case instead of a shoulder strap if a cord is provided to tag the bottle to a hook, the strength of the cord shall be tested as per **7.8.1.1**.

7.8.1.1 Take a random sample other than that specified in clause 6. Put small steel balls equivalent to 3 times the weight (volume/capacity) of water that flask/bottle can hold. Hang the filled flask/bottle by a suitable means for 30 min. Ensure that flask/bottle is hanging freely without touching any surface.

7.8.1.2 After/during this test, the strap shall not break. The area on the flask/bottle to which the strap is fastened shall not show any signs of damage or defect. The elongation under load shall not exceed 10 percent of the total length of the cord. Initial stretching due to unwinding of the cord shall not be taken as elongation for the purpose of calculation.

NOTE — The material of the strap or cord may be flexible and shall not be affected by water.

7.9 Leakage Test

Fill the container to 75 percent of its nominal capacity with water at 95 degree centigrade containing 0.5 percent surfactant. Close the stopper with a torque of 2 Nm or, if not fitted with a screwed stopper, push in the stopper to its full extent. Thoroughly dry the outside of the stopper, spout and outer protective casing (container). Put the flask/bottle upside down position for at least 10 min. No drops shall appear on the stopper, spout, casing or on the surface on which the flask/bottle has been over turned. The flask/bottle shall be tested without the cup if the design of the flask/bottle is a cup along with the stopper.

7.10 Joint Leak Test

The empty flask/bottle without stopper or plug or lever shall be weighed (weigh balance accuracy upto 10 mg). The flask/bottle shall be dipped fully in a water bath for atleast 5 min. After taking out the flask/bottle, the inside and outside of the flask/bottle shall be wipe dry. The flask/bottle shall be weighed again. There shall be no increase in weight.

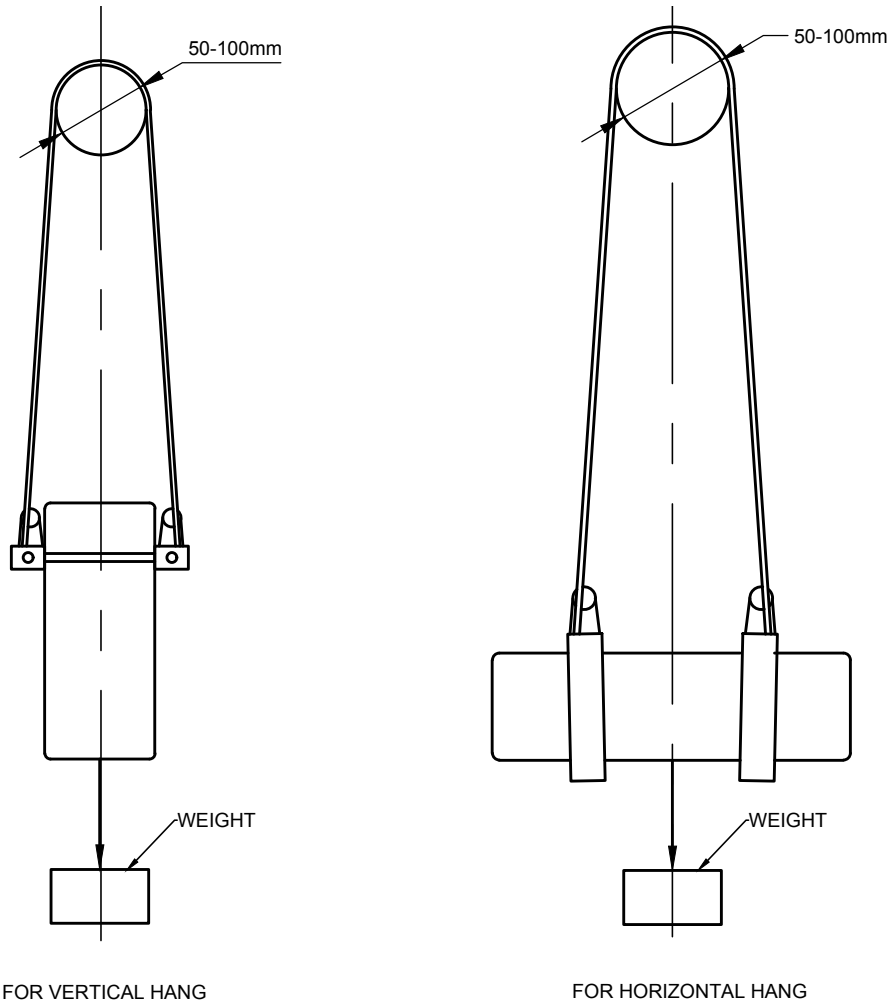

FIG. 4 TEST FOR THE SHOULDER STRAP

7.11 Staining Test

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

a) Ten gram of glacial acetic acid (99 percent) dissolved in distilled water to make 100 ml; and
b) Five gram of pure sodium chloride dissolved in distilled water to make 100 ml.

7.12 Length of the Shoulder Strap

The length of the shoulder strap, if provided, shall be 400 mm or over when measured as given in Fig. 5 and the length of strap shall be adjustable.

7.13 Stability of Flask/Bottle

When the flask/bottle filled with water to the full capacity is placed upright over a rough 10° inclined plane, it shall not overturn or fall or overbalance.

7.14 Pour Test

No spluttering shall occur when liquid is poured out of the flask/bottle.

A cup with a month opening of 60 to 80 mm diameter is placed approximately in the centre, above a sheet of white paper of 200 mm × 200 mm, When a black tea or coffee is poured out of the flask/bottle from a height of around 50 mm, measured from the pouring edge of the flask/bottle to the edge of the cup placed on the white paper, no stains caused by the sputtering shall appear on the white paper. For purpose of this test, the flask/bottle shall be 3/4th filled.

NOTE — After all tests are performed , the sample flask/bottle which was tested should pass the leakage test.

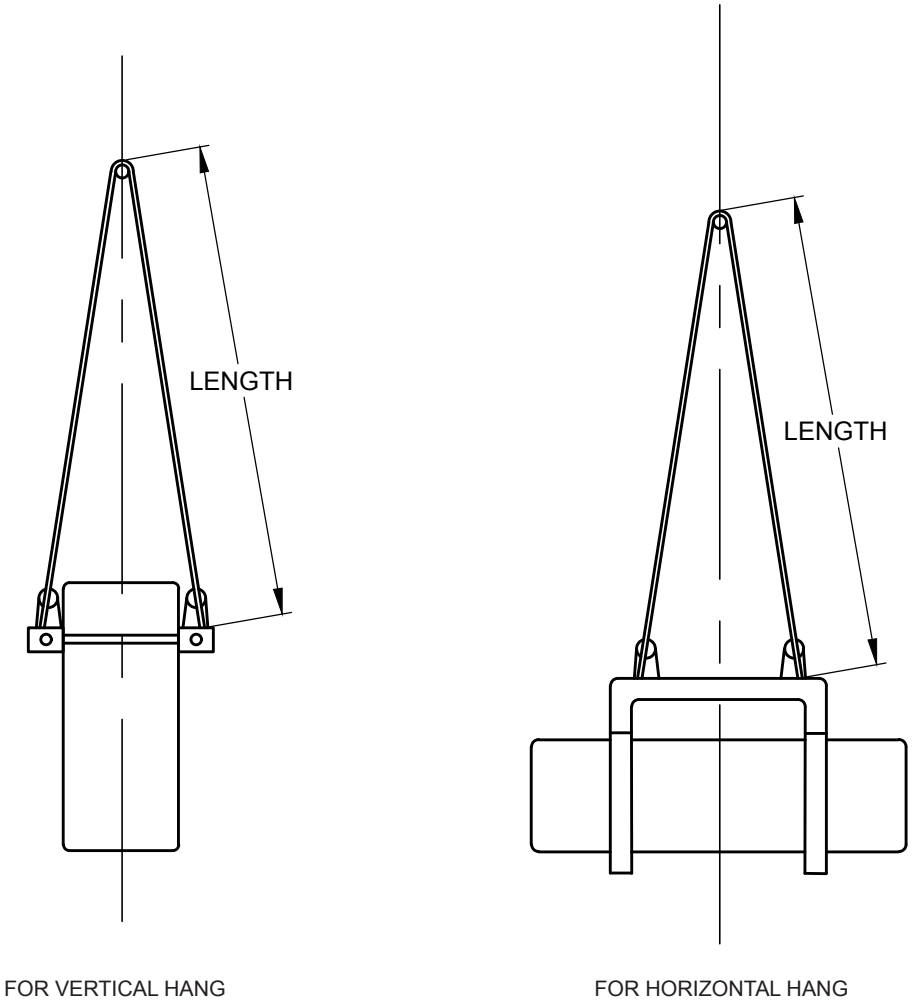

FIG. 5 LENGTH OF THE STRAP

8 INSTRUCTIONS FOR USE

8.1 Stainless steel vacuum flasks/bottles shall carry adequate instructions to the user for its proper use to ensure satisfactory performance.

8.2 The Manufacturer shall provide the following minimum information along with each flask/bottle given below:

a) How to unpack and take care of environment;

b) How to stock the flask/bottle in case the flask/bottle 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 flask/bottle 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 to keep warm milk products or baby food for long. Follow b, c and ensure dry before using warm milk or baby food. The flask/bottle should not stink and should be properly sterilized first with hot water and later rinsed with ro/purified drinking water. Ensure the flask/bottle is dry and does not stink;

j) The container should be periodically cleaned;

k) Never use in a dishwasher, unless otherwise stated by the manufacturer;

m) Never use the flask/bottle if there is suspected leakage between the two containers (empty the flask/bottle and shake the flask/bottle there should be no sound of water in between the containers);

n) Handle the flask/bottle carefully, do not drop the flask/bottle; and

p) Keep these instructions safe.

9 MARKING

9.1 Each domestic vacuum stainless steel flask/bottle shall be legibly and permanently marked with the following minimum information:

a) Nominal capacity;

b) Grade of material of inner container and outer container and its IS No;

c) Name or trade mark of the manufacturer; and

d) 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 flask/bottle shall be suitable packaged in a carton to avoid any damage during transit.

ANNEX A

(*Clause* 7.4)

TEST FOR HEAT RETENTION CAPACITY

A-1 GENERAL

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

A-2 PROCEDURE

A-2.1 Rinse the inner container with boiling water, draining out as much water as possible. Quickly fill it up to the neck with boiling water. Allow the temperature to drop slowly to 95 °C, close the mouth with the stopper and note the time. Note the temperature of water in the inner container at the end of 1, 6, 12 and 24 h respectively from the time the water in the inner container attained the temperature of 95 °C.

NOTES

1 In no case shall the inner container be disturbed or opened except for measuring the temperature as stated above.

2 For an inner container having the inner stopper to be fixed by screw fastening, the inner stopper shall be fastened by 0.1 N-m (100 N-cm).

A-2.2 The flasks/bottles shall be taken as having passed the test if the temperatures measured at the end of 1, 6, 12 and 24 h are not less than those specified in **7.4**.

ANNEX B

(*Clause* 7.5)

TEST FOR COLD RETENTION CAPACITY

B-1 GENERAL

The cold retention capacity of an inner container 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 are to be pre-conditioned for a minimum period of two hours before starting the test.

B-2 PROCEDURE

B-2.1 Rinse the inner container with cold water, draining out as much water as possible. Quickly fill it up to the neck with ice cold water. Allow the temperature to increase slowly to 5 ± 1 °C, close the mouth with the stopper and note the time. Note the temperature of water in the inner container at the end of six hours.

NOTES

1 In no case shall the inner container be disturbed or opened except for measuring the temperature as stated above.

2 For an inner container having the inner stopper to be fixed by screw fastening, the inner stopper shall be fastened by 0.1 N-m (100 N-cm).

B-2.2 The flasks/bottles shall be taken as having passed the test if the temperature measured at the end of 6 h shall not be greater than that specified in **7.5.1**.

ANNEX C

(*Foreword*)

COMMITTEE COMPOSITION

Utensils, Cutlery Domestic Hardware Sectional Committee, MED 33

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BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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