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BUREAU OF INDIAN STANDARDS

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भारतीय मानक मसौदा

आंतरिक दहन इंजन — रेडिएटर दबाव कैप्स — विशिष्टि

(IS 12996 का *पहला पुनरीक्षण)*

Draft Indian Standard

INTERNAL COMBUSTION ENGINES — RADIATOR PRESSURE CAPS — SPECIFICATION

(*First Revision of* IS 12996)

ICS: 43.060

Last date for receipt of comments is XX/XX/XXXX

Automotive Primemovers, Transmission Systems and Internal Combustion Engine Sectional Committee, TED 2

FOREWORD
(Formal Clause to be added later)

This Standard was first published in 1990. This revision incorporates the experience gained with the use of this standard and brings the standard in line with the latest development in the field.

In this standard two types of pressure caps, namely, A and B depending on the nominal opening pressure of automotive radiators are covered. It also covers the systems having provisions for auxiliary tanks.

In this draft for first revision of the standard following changes have been made:

a) Referencing standards have been updated;
b) Figures have been redrawn for improved clarity; and
c) Editorial changes have been carried out to update the standard with latest BIS formatting.

The composition of the Committee responsible for the formulation of this standard is given at **Annex A (Will be added later).**

For the purpose of deciding whether a particular requirement of this standard is compiled 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.

Draft Indian Standard

INTERNAL COMBUSTION ENGINES — RADIATOR PRESSURE CAPS — SPECIFICATION

(*First Revision*)

1 SCOPE

This standard specifies the general requirements and test methods for pressure caps used on radiator, particularly for automotive vehicles.

2 REFERENCES

The following standards 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 indicated below:

IS No.	*Title*
IS 410: 1977	Cold rolled brass sheet, strip and foils (*Third revision*)
IS 2500 (Part 1): 2000 ISO 2859-1: 1999	Sampling procedures for inspection by attributes ─ Part 1: sampling schemes indexed by acceptance quality limit (AQL) for lot - By - Lot inspection (*Third revision*)
IS 3331: 2007	Copper and brass strips/foils for radiator cores - Specification (*Second revision*)
IS 4454 (Part 4): 2001	Steel wires for mechanical springs ─ Part 4: stainless steel wire (*second revision*)
IS 5522: 2014	Stainless steel sheets and strips for utensils ─ Specification (*Third revision*)
IS 7608: 1987	Specification for phosphor bronze wire for general engineering purposes (*First revision*)
IS 7611: XXXX[a)]	Internal combustion engines — Radiators — Specification (*First revision*)

NOTE ─ Standard Marked with superscript ‘a)’ is under the process of revision. The year of publication of this standards will be updated at the time of printing of this draft standard.

3 TYPES

3.1 Depending upon the nominal opening pressure of main valve, the caps are categorized as given below:

Type	*Pressure*
A	50 kPa (0.5 kgf/cm^2)
B	90 kPa (0.9 kgf/cm^2)

3.2 The caps shall be of single or double acting depending on use for main and auxiliary tanks.

4 TERMINOLOGY

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

4.1 Radiator Cap ─ A removable device which closes the cooling system filler neck and which incorporates both relief pressure and vacuum braking valves.

4.2 Auxiliary Tank ─ A separate tank in the cooling system is provided to perform one or more of the following functions:

a) Filling;
b) Coolant reservoir;
c) Deaeration;
d) Retention of coolant expelled by expansion and/or after boil; and
e) Visible fluid level indication.

4.3 Deaeration ─ The removal or purging of gases (air, steam and/or combustion gas) which have been entrapped in the coolant.

4.4 After Boil ─ Boiling of the coolant following engine shutdown or slow idling after heavy loading caused by excessive residual heat in the engine.

4.5 Main Valve ─ A device to release coolant/air/steam at pre-set pressure rating of cap.

4.6 Vent Valve ─ A device to release vacuum inside radiator/ cooling systems by allowing air/coolant from atmosphere or auxiliary tank at pre-rated pressure of cap to equalize the cooling system to atmospheric conditions.

5 GENERAL REQUIREMENTS

5.1 Dimensions and Tolerances

These shall be as per agreement between the manufacturer and the purchasers.

6 MATERIAL

6.1 All metallic components of caps in contact with the coolant/steam shall be of brass conforming to IS 410 or IS 3331. The springs shall be of phosphor bronze conforming to IS 7608. Alternatively, the sheets and spring wire shall be of stainless steel conforming to IS 5522 and IS 4454 (Part 4) respectively. The rubber components shall be nitryl based and capable of withstanding temperatures up to 120°C.

7 WORKMANSHIP AND FINISH

7.1 The seal gasket from cracks or tears. shall be smooth and free The metallic parts shall be free from stains, oxidations or other similar defects. The caps shall be free from burrs.

8 PERFORMANCE TESTS

8.1 Operational Characteristics

Testing shall be carried out on caps after ageing in a mixture of equal parts of water and suitable coolant solution at a temperature of 110°C for 72 hours and on caps after ageing in air at 110°C for 49 hours.

8.2 Before testing, the caps shall be rinsed in water at a temperature of 27 ± 5°C to ensure removal of dirt, foreign matters from rubber seating of main and vent valves. It is then installed on suitable fixture having filler neck requirements conforming to IS 7611 to simulate operating conditions with the cap installed on the radiator filler neck (*see* Fig. 1).

8.3 The following tests shall be carried out:

a) Initial opening pressure; and
b) Gasket seal.

8.4 Initial Opening Pressure

8.4.1 *Main Valve (All Types)*

Install pressure cap under test on the fixture shown in Fig. 2 after connecting a hose to port *R1*. Immerse the hose in water. Another hose leading from a suitable source of air shall be connected to port *R2*. The control valve (*CV1*) is opened. Air is gradually passed into Chamber A by operating control valve (*CV2*).

For caps without spring on the vent valve the delivery of air shall be preceded by a slight increase

in pressure to ensure vent valve closing.

The opening pressure of the main valve revealed be continuous flow of air bubbles through water shall be within the limits specified in Table 1. After the first measurement repeat the test with the cap rotated through 180° in relation to the first position.

Table 1 Pressure Characteristics of Main and Vent Valves Top Seal
(*Clauses* **8.4.1, 8.4.2** and **8.5.1**)

S. No.	Cap Components	Characteristics	Pressure Rating Kgf/cm^2	
			Type A	Type B
(1)	(2)	(3)	(4)	(5)
i)	Main valve	Both mounting conditions	0.5 ± 0.1	0.9 ± 0.15
ii)	Vent valve (with calibrated spring)	Opening	0.005 to 0.20	0.0005 to 0.20
iii)	Top seal	Testing with seal towards outside	0.5	0.5

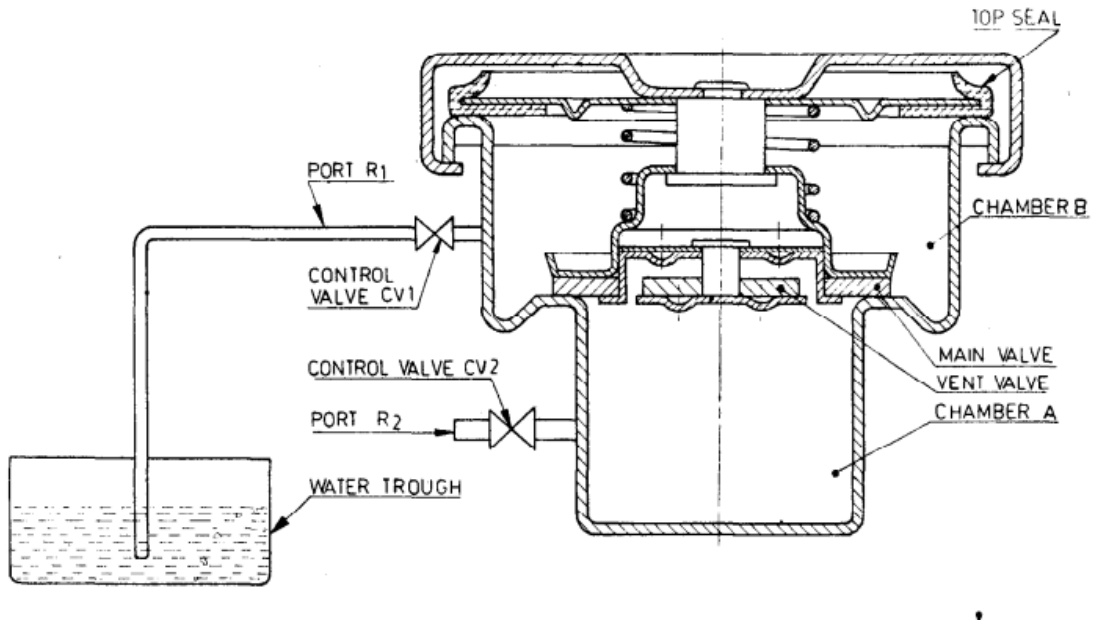

Fig. 1 Test Arrangement for Cap Opening Pressure Test

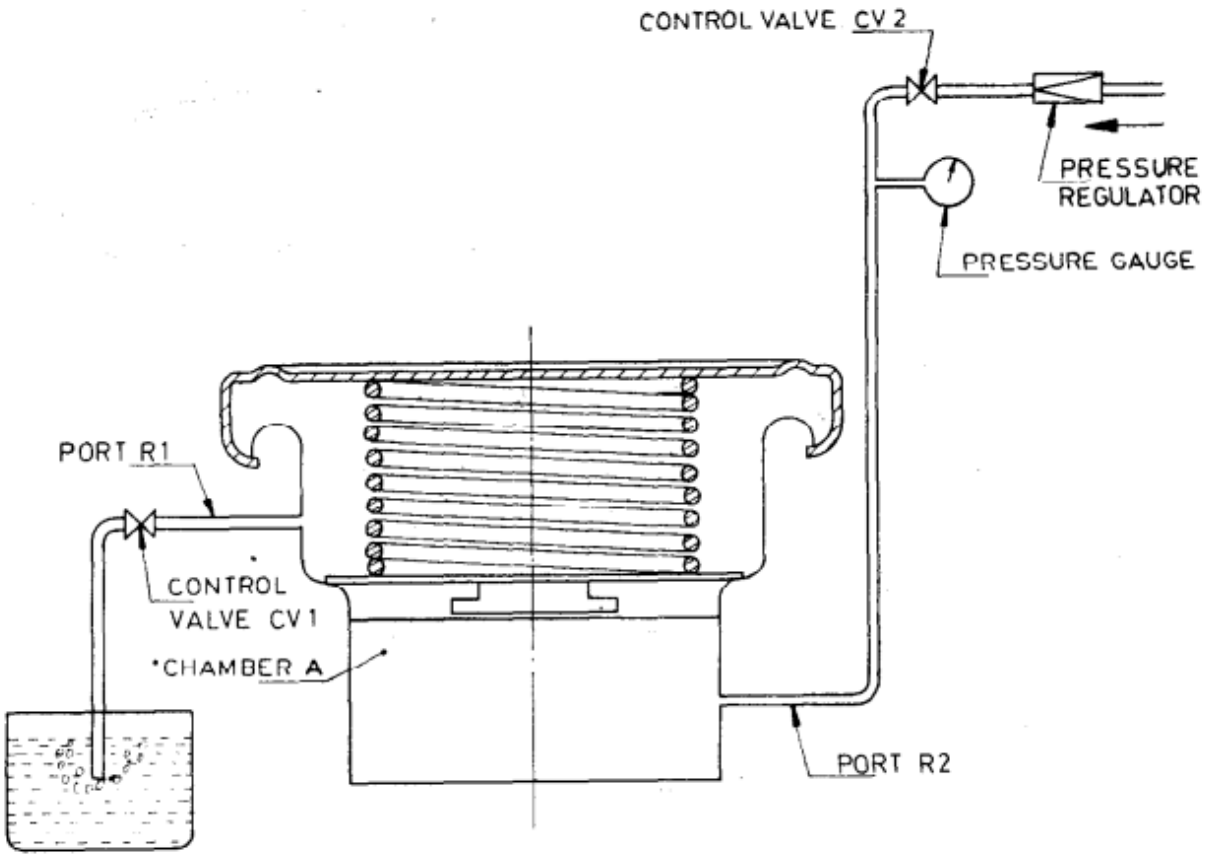

Fig. 2 Arrangement for Main Valve Opening Pressure Test

8.4.2 *Vent Valve (Double Acting Types)*

Install pressure cap under test on the fixture described in **8.2** (*see* Fig. 3). The port *R2* shall now be connected to a hose leading to a vessel containing water. Keep *CV2* open. Admit air into Chamber B through port *R1* by operating *CV1*. Opening pressure of inlet valve, as revealed by air bubbles emerging from water, shall be within the limits specified in **8.4.1** (*see* Table 1).

8.5 Top Seal Test (for the Caps for Auxiliary Tanks)

Install pressure cap under test on the fixture described in **8.2** Close *CV2* and cannect port *R1* to an air pressure point using a suitable hose; totally immersed the fixture into a vessel containing water and gradually admit air through port RI by operating *CV1*. Leakage into the atmosphere as revealed by air bubbles emerging through cap gasket, shall occur at a pressure value greater than or equal to that specified in **8.4.1** (*see* Table 1).

9 MARKING

9.1 Each cap shall be indelibly marked with the indication of source of manufacture, nominal opening pressure and date of manufacture.

9.2 A suitably worded warning may also be provided on the cap as a safety feature, as for example, 'Allow to cool before opening'. Alternatively, an embossed cautionary figure may be provided.

9.3 BIS Certification Marking

Each radiator pressure caps may also be marked with the Standard Mark.

9.3.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

10 SAMPLING

10.1 Lot

All the radiator pressure caps of the same type and size manufactured from the same material under similar conditions of production shall be grouped together to constitute a lot.

10.2 For ascertaining the conformity of the lot, the procedure for sampling and inspection as given in IS 2500 (Part 1) shall be followed. The type of sampling plan, inspection level and acceptable quality level (AQL) to be followed for various characteristics shall be as given in **10.2.1** and **10.2.2**.

10.2.1 For ascertaining the conformity for dimensional requirements and workmanship and finish, a single sampling plan with Inspection Level IV and AQL of 2.5 percent as given in Tables 1 and 2 of IS 2500 (Part 1) shall be followed.

10.2.2 For operational test, a single sampling plan with Inspection Level II and AQL of 1.5 percent as given in Tables 1 and 2 of IS 2500 (Part 1) shall be followed.

11 PACKING

11.1 It shall be such as to protect from any damage.

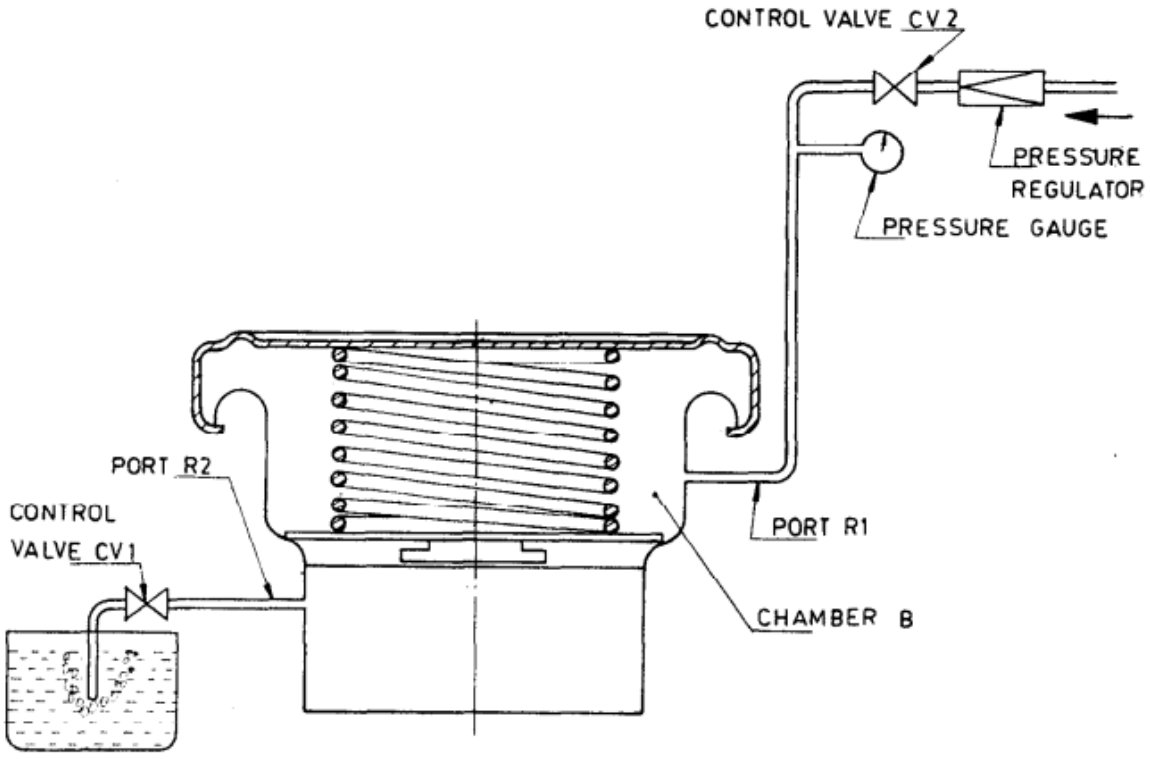

Fig. 3 Arrangement for Vent Value Opening Pressure Test

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

AUTOMOTIVE PRIMEMOVERS, TRANSMISSION SYSTEMS AND INTERNAL COMBUSTION ENGINE SECTIONAL COMMITTEE, TED 02

Will be added later