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IS 12996 (1990): Internal Combustion Engines - Radiator Pressure Caps [TED 2: Automotive Primemovers]



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भारतीय मानक

अंतर्दाही इंजन — विकिरक दाब टोपियां — विशिष्ट

*Indian Standard*

**INTERNAL COMBUSTION ENGINES —  
RADIATOR PRESSURE CAPS —  
SPECIFICATION**

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**BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BHADUR SHAH ZAFAR MARG  
NEW DELHI 110002**

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards on 18 May 1990, after the draft finalized by the Automotive Primemovers Sectional Committee had been approved by the Transport Engineering Division Council.

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.

## Indian Standard

# INTERNAL COMBUSTION ENGINES — RADIATOR PRESSURE CAPS — SPECIFICATION

### 1 SCOPE

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

### 2 REFERENCES

2.1 The following Indian standards are necessary adjuncts to this standard:

IS No.	Title
410 : 1977	Cold rolled brass sheet, strip and foils ( <i>third revision</i> )
2500 (Part 1) : 1973	Sampling inspection tables: Part 1 Inspection by attributes and by count of defects ( <i>first revision</i> )
3331 : 1977	Copper and brass strips/foils for radiator cores ( <i>first revision</i> )
4454 (Part 4) : 1974	Steel wires and cold formed springs: Part 4 Stainless spring steel wire for normal corrosion resistance ( <i>first revision</i> )
5522 : 1978	Stainless steel sheets and coils
7608 : 1987	Phosphor bronze wires for general engineering purposes ( <i>first revision</i> )
7611 : 1975	Automotive radiators — copper brass core construction

### 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 <sup>2</sup> )
B	90 kPa (0.9 kgf/cm <sup>2</sup> )

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 : 1977 or IS 3331 : 1977. The springs shall be of phosphor bronze conforming to IS 7608 : 1987. Alternatively, the sheets and spring wire shall be of stainless steel conforming to IS 5522 : 1978 and IS 4454 (Part 4) : 1974 respectively. The rubber components shall be nitril based and capable of withstanding temperatures up to 120°C.

7 WORKMANSHIP AND FINISH

7.1 The seal gasket shall be smooth and free from cracks or tears. 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  $27 \pm 5^\circ\text{C}$  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 : 1975 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 by 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 )

Cap Components	Characteristics	Pressure Rating kgf/cm <sup>2</sup>	
		Type A	Type B
Main valve	Both mounting conditions	0.5 ± 0.1	0.9 ± 0.15
Vent valve (with calibrated spring)	Opening	0.005 to 0.20	0.005 to 0.20
Top seal	Testing with seal towards outside	0.5	0.5

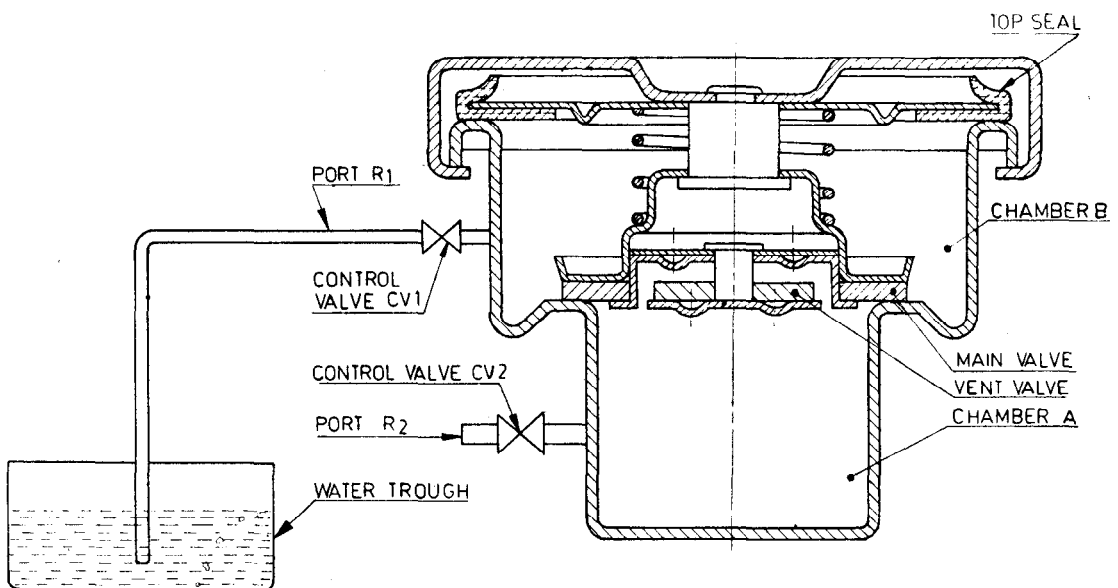


FIG. 1 TEST ARRANGEMENT FOR CAP OPENING PRESSURE TEST

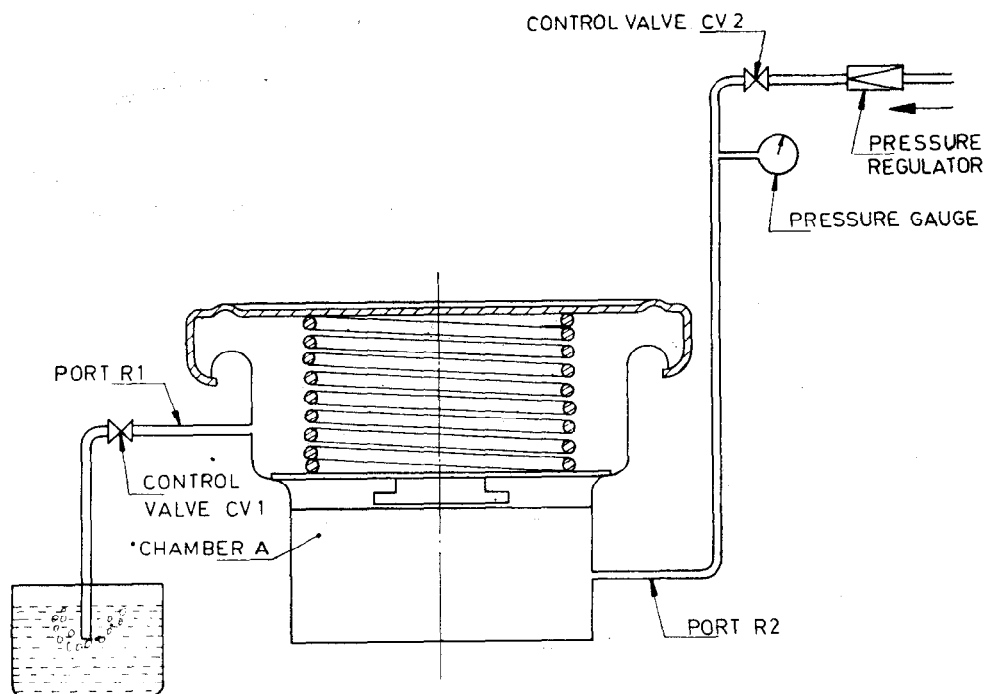


FIG. 2 ARRANGEMENT FOR MAIN VALVE OPENING PRESSURE TEST

#### 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 )

##### 8.5.1 Seal Towards Outside

Install pressure cap under test on the fixture described in 8.2. Close CV2 and connect 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 R1 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.

### 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 ) : 1973 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 ) : 1973 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 ) : 1973 shall be followed.

### 11 PACKING

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



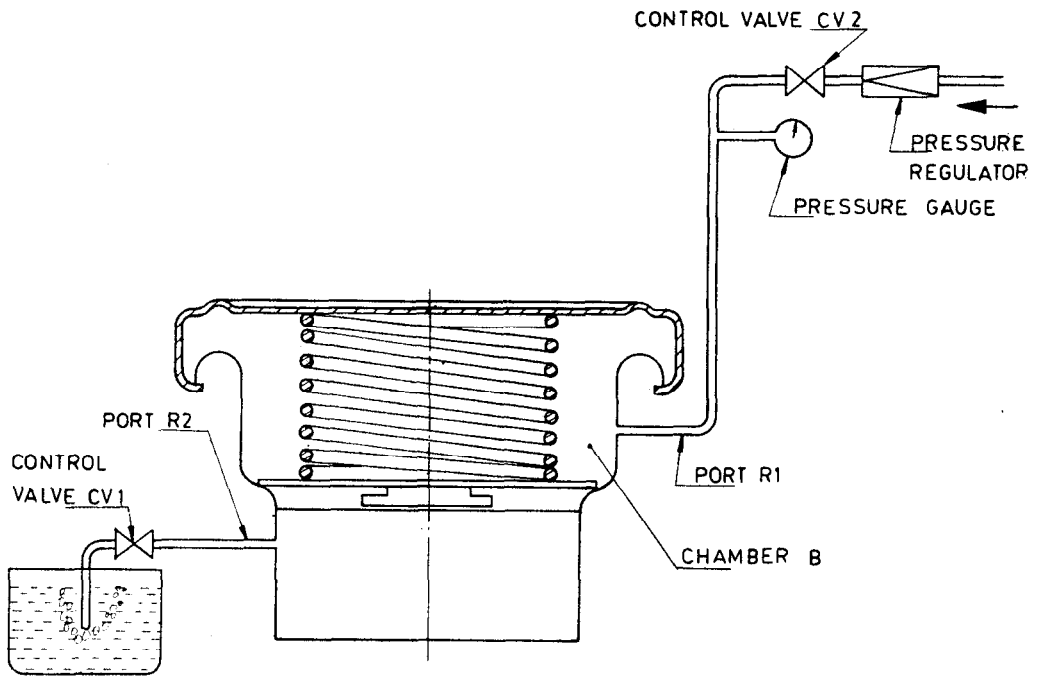


FIG. 3 ARRANGEMENT FOR VENT VALVE OPENING PRESSURE TEST

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## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002  
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha  
( Common to all Offices )

### Regional Offices:

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg  
NEW DELHI 110002

Telephone

{ 331 01 31  
331 13 75

Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola  
CALCUTTA 700054

37 86 62

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036

2 18 43

Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113

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