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भारतीय मानक मसौदा

अंतर्दाही इंजन — विकिरक — परीक्षण पद्धति
(पहला पुनरीक्षण)

Draft Indian Standard

INTERNAL COMBUSTION ENGINES – RADIATORS – METHODS OF TEST
(First Revision)

ICS: 43.060.40

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B U R E A U O F I N D I A N S T A N D A R D S
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Automotive Primemovers, Transmission Systems and Internal Combustion Engine Sectional Committee, TED 2

FOREWORD
(Formal Clause to be added later)

This Indian Standard forms an important adjunct to the specification for radiators, IS 7611. The test procedures for pressure impulse, vibration would be further standardized after availability of data on equipment. The test such as bump test, test for paint and test for resistance to petrol etc., shall be optional and agreed to between the manufacturers and the suppliers.

IS 12996: 1990 'Radiator pressure caps — Specification' is an important adjunct to this standard. Heat dissipation performance test for radiators is covered separately in IS 13687: 1993

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

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off it shall be done in accordance with IS 2: 2022 ‘Rules for rounding off numerical values (*Second Revision*)’.

Draft Indian Standard

INTERNAL COMBUSTION ENGINES ─ RADIATORS ─ METHODS OF TEST

(First Revision)

1 SCOPE

This Indian Standard covers various test methods for radiators conforming to IS 7611.

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*
13687: 1993	Internal combustion engines — Radiators — Methods of test for heat dissipation performance
7611 : 1993	Internal combustion engines - Radiators - Specification (first revision)

3 TESTS

3.1 The tests shall consist of type and routine tests.

3.2 Type Tests

3.2.1 The following shall constitute the type tests:

a) Visual examination (*see* **3.5**),
b) Pressure test (*see* **3.6**),
c) Leakage test for filler neck (*see* **3.7**),
d) Internal cleanliness test (*see* **3.8**),
e) Heat dissipation performance (*see* **3.9**),
f) Pressure impulse (*see* **3.10**),
g) Vibration (*see* **3.11**), and
h) Resistance to paint (*see* **3.13**).

3.3 Routine Tests

3.3.1 The following tests shall be carried out on each radiator:

a) Visual examination (*see* **3.5**), and
b) Pressure test (*see* **3.6**).

3.4 Acceptance Tests

3.4.1 The following shall comprise of acceptance tests:

a) Leakage test for radiator filler neck-cap (*see* **3.7**);
b) Internal cleanliness (*see* **3.8**); and
c) Dimensions (*see* **3.12**).

3.5 Visual Examination

Each radiator shall be examined visually for workmanship and finish. The radiator shall be free from manufacturing defects such as dents, soldering defects.

3.6 Pressure Test

3.6.1 *Procedure*

The radiator is connected to a compressed air supply line. It is then immersed into a suitably sized water tank, kept full with water at normal ambient temperature. When subjected to internal air pressure at twice the cap pressure for one minute, the radiator shall reveal no leakage.

3.7 Leakage Test for Filler Necks

3.7.1 *Procedure*

The test is carried out to assess the sealing efficiency at the neck seat. The radiator, complete with pressure cap is immersed into water at room temperature. A gradually increasing air pressure is applied to coolant ducts. The radiator shall show no leakage when the pressure is increased up to 5 kPa below the main valve opening pressure. The test shall be performed at both positions of filler cap.

3.8 Internal Cleanliness Test

3.8.1 The amount of chloride present in a cleaned core is assessed and calculated as the cleanliness of radiator.

3.8.2 *Procedure*

A total volume of water about one-third of the total radiator volume may be used for extraction of the chlorides present. The dry radiator is filled with half the computed volume with distilled water and shaken thoroughly for at least ten minutes. The contaminated water is poured into a clean container. The procedure is repeated with the same quantity of water and the resultant is poured into the same container with the contaminated water. The amount of chloride present in the solution is determined by titrating with standard silver nitrate solution and a suitable indicator. The total chloride is calculated and expressed as weight in grams per litre of radiator volume capacity.

3.9 Heat Transfer Performance

3.9.1 This test shall be carried out in accordance with IS 13687.

3.10 Pressure Impulse Test

3.10.1 The pressure impulse test shall be done between 1 and 1.5 times the operating pressure (relief valve setting) for 10000 cycles with water in tank and air for cyclic pressure impulse. The cycle time shall be between 5 and 10 seconds.

3.11 Vibration Test

3.11.1 This test shall be carried out on a test rig, which vibrates in vertical direction. The radiator with water filled up at working pressure maintained at room temperature shall be mounted on the rig. The test is done along with mounting pad, mounting brackets as used on the vehicle under the following conditions:

Frequency, cycles/minute	1440
Testing time in vertical direction	100 h
Amplitude	l.2 mm

3.12 Dimensions

3.12.1 The dimensions of the radiator filler neck shall comply with Table 1 and Fig. 10 of IS 7611. The radiator volume shall be in accordance with the manufacturer's recommendations and measured by filling up with water.

3.13 Resistance to Paint (Only for Painted Radiators)

3.13.1 *Chequering Test*

A representative specimen preferably fiat, taken from top and bottom tank zone shall be subjected to the 'cheque pattern' test. This test shall be conducted by arranging a series of files held side by side. Incisions are made in the surface in two directions at right angles to each other. The printed surface shall not reveal any flaking or peeling.

3.13.2 *Resistance to High Octane Petrol (Only for Newly Manufactured Engine Radiators)*

Immerse a part of the radiator in high octane petrol for 30 minutes at room temperature. The paint film shall not dissolve or rankle, nor show blisters immediately after it is taken out of the bath.

3.13.3 *Resistance to Corrosion (Only for Newly Manufactured Engine Radiators)*

The radiator is exposed to a salt mist spray for 96 h. At the end of the period the radiator shall be thoroughly washed and examined for any corrosion. The edges of the internal sheet plating shall not reveal any signs of corrosion.

ANNEX A
(*Foreword*)

COMMITTEE COMPOSITION

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

Will be added later