

AMENDMENT NO. 4 (01 / 2021)

TO

AIS-110: 2009

**Automotive Vehicles -Temporary-Use Spare Wheel/
Tyres and Run Flat Tyres**

1. **Page 5/14, Clause 5.1.3**

Substitute the following text for the existing text:

5.1.3 The design speed of the temporary spare unit, shall be at least 120 km/h for types 1, 2 and 3.

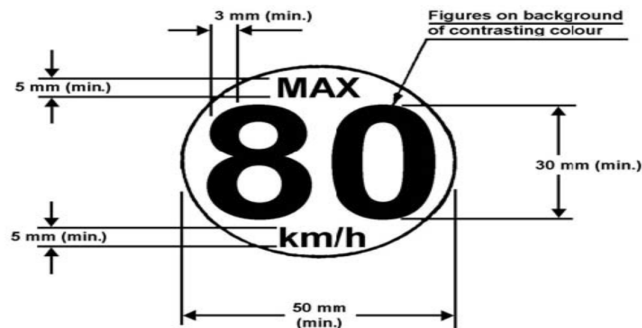
5.1.3.1 For vehicles having maximum speed <120 km/hr, the design speed of the temporary spare unit, shall be equal to maximum speed of the vehicle or above.

2. **Page 5/14, Clause 5.1.4,**

Substitute the following text for the existing text:

5.1.4 The temporary-use spare unit, shall exhibit the following characteristics:

5.1.4.1.1 An 80 km/h maximum speed warning symbol arranged in accordance with the diagram below shall be permanently displayed on the outer face of the wheel in a prominent position.



In the case of vehicles having max speed less than 80km/hr shall also have warning symbol, identical to that described above, with the exception that the figure "80" shall be replaced by Test speed as prescribed in Annex 1 clause 2.3.1), shall be permanently displayed on the outer face of the wheel in a prominent position.

3. **Page 7/14, Clause 6.1.1,**

Substitute the following text for the existing text:

6.1.1 An instruction to drive with caution and at no more than the permitted maximum speed of 80 km/h (50 mph) when a type 1, 2 or 3 temporary-use spare unit as defined in paragraphs 2.10.1, 2.10.2 or 2.10.3 is fitted, and to reinstall a standard unit as soon as possible. It shall be made clear that this instruction also applies to a type 5 temporary use spare unit as defined in paragraph 2.10.5 being used in the flat tyre running mode.

For vehicles having max speed less than 80 kmph, an instruction to drive with caution and at no more than (Test speed as prescribed in Annex 1 clause 2.3.1), shall be specified by vehicle manufacturer.

4. **Page 7/14, Clause 6.1.2,**

Substitute the following text for the existing text:

6.1.2 An instruction to drive with caution and at no more than the permitted maximum speed of 120 km/h (75 mph), when a type 4 spare unit as defined in paragraph 2.10.4 is fitted, and to reinstall a standard unit as soon as possible.

For vehicles having max speed less than 80 kmph, an instruction to drive with caution and at no more than the permitted maximum speed (Test speed as prescribed in Annex 1 clause 2.3.1) shall be specified by vehicle manufacturer.

5. **Page 9/14, Annex 1, Clause 2.2**

Substitute the following text for the existing text:

2.2 The test shall be carried out using the service braking system from an initial speed of 80 km/h or 90 percent of vehicle maximum speed, whichever is lower for M1 and N1 category and 55 km/h or 90 percent of vehicle maximum speed, whichever is lower, for L7 category, with the engine disconnected.

6. **Page 9/14, Annex 1, Clause 2.3.1**

Substitute the following text for the existing text:

2.3.1 In the case of L7-M and M1 category vehicles approved to IS: 11852 (Part 3) fitted with type (s) 1, 2, 3 and 5 temporary use spare units as defined in paragraphs 2.10.1, 2.10.2, 2.10.3 and 2.10.5 and tested using a prescribed speed of 55 km/h or 90 percent of vehicle maximum speed, whichever is lower; for L7-M category and 80 km/h or 90 percent of vehicle maximum speed, whichever is lower; for M1 category vehicles; the stopping distance achieved using a maximum force of 500 N applied to the foot control, shall not exceed value derived from following formula:

$$S (m) \text{ Max} \leq 0.1 V + V^2 / 150$$

7. **Page 10/14, Annex 1, clause 2.3.1.1**

Substitute the following text for the existing text:

2.3.1.1 In the case of L7-N and N1 category vehicles approved to IS: 11852 (Part 3) fitted with type(s) 1, 2, 3 and 5 temporary use spare units as defined in paragraphs 2.10.1, 2.10.2, 2.10.3 and 2.10.5 and tested using a prescribed speed of 55 km/h or 90 percent of vehicle maximum speed, whichever is lower; for L7-N category and 80 km/h or 90 percent of vehicle maximum speed, whichever is lower; for N1 category vehicles; the stopping distance achieved using a maximum force of 700 N applied to the foot control, shall not exceed value derived from following formula:

$$S \leq 0.15V + V^2 / 130$$

the mean fully developed deceleration (mfdd) calculated as per IS 11852(Part 3) shall be not less than 5.8 ms⁻²)

where "v" is the initial speed at which braking commences.

8. **Page 10/14, Annex 1, clause 2.3.1.2**

Substitute the following text for the existing text of Annex 1 clause 2.3.1.2:

2.3.1.2. In the case of M1 category vehicles approved to IS: 11852 (Part 3) fitted with type 4 spare unit as defined in paragraph 2.10.4. tested using a prescribed speed of 120 km/h or 90 percent of vehicle maximum speed, whichever is lower and in the case of L7M category vehicles approved to IS: 11852 (Part 3) fitted with type 4 spare unit as defined in paragraph 2.10.4. tested using a prescribed speed of 55 km/h or 90 percent of vehicle maximum speed, whichever is lower;

the stopping distance achieved using a maximum force of 500 N applied to the foot control, shall not exceed value derived from following formula

$$S (m) \text{ Max} \leq 0.1 V + V^2 / 150$$

the mean fully developed deceleration (mfdd) calculated as per IS 11852(Part 3) shall be not less than 5.8 ms⁻²)

where "v" is the initial speed at which braking commences.

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THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA
P. B. NO. 832, PUNE 411 004
ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE
UNDER
CENTRAL MOTOR VEHICLES RULES - TECHNICAL STANDING COMMITTEE
SET-UP BY
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA
12th January 2021

AMENDMENT No. 3 to AIS-110 (08/2017)
To
AIS 110: 2009 Automotive Vehicles -Temporary-Use Spare Wheel/ Tyres and
Run Flat Tyres

1 Page No. 6/14,

Add following new Clause 5.1.4.2.3 after clause 5.1.4.2.2

5.1.4.2.3 For a type 4 temporary-use spare unit as defined in paragraph 2.10.4., either the requirements of paragraph 5.1.4.1 or the requirements of paragraph 5.1.4.2. shall apply, at the request of the vehicle manufacturer.

2 Page No.8/14, Clause 10.2,

Substitute following text for existing text:

10.2 Warning symbols described at paragraph no 5.1.4.1 / 5.1.4.2 shall be marked as applicable.

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SET-UP BY
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA
11th August 2017

AMENDMENT NO. 2 (04/2018)
TO
AIS-110: 2009
Automotive Vehicles –Temporary - Use Spare Wheel/ Tyres and
Run Flat Tyres

1. Page III, Introduction, Para 2,

Substitute the following text for the existing text,

Use of run flat tyre and temporary use spare wheel conforming to UN R 64 is permitted in European countries. In view of the cost effectiveness, aesthetics, packaging and enhancement in safety, CMVR Technical Standing Committee took the decision to formulate the standard for temporary use spare wheel and run flat tyres. Run flat tyre is a new technology which contributes to safety as well as convenience. Accordingly this standard has been formulated for L7, M1 and N1 category of vehicles.

2. Page 1/14, clause 1.0 Scope

Substitute the following text for the existing text

- 1.0 This standard applies to the approval of vehicles of category L7, M1 and N1 with regard to their equipment which may include run flat tyres, a run flat system, a spare wheel and tyre unit, other than a "Standard spare unit" as defined in paragraph 2.9. of the standard, intended for temporary use in the event of damage to the wheel and tyre unit fitted to the vehicle for normal, long term, road use.

For the purposes of this standard, spare wheel and tyre substitute units in the form of run-flat tyres or a run-flat system in a totally deflated condition, are to be treated as being temporary use spare units as defined in paragraph 2.10.of the standard.

3. Page 2/14, clause 2.7; Definitions

Substitute the following text for the existing text

- 2.7 "**Tyre size designation**" means a combination of figures that uniquely identify the geometric size of the tyre, comprising the nominal section width, the nominal aspect ratio and the nominal diameter. Precise definitions of these features may be found in AIS-044 (Part 1) /IS:15636 or AIS-044(Part 2)/IS:15633 or AIS-044(Part 3)/IS 15627 as applicable"

4. Page 2/14, clause 2.8, Definitions

Substitute the following text for the existing text

- 2.8 "Tyre structure" means the technical characteristics of the tyre's carcass. This may be bias ply (diagonal or cross ply), bias-belted, radial ply or run flat tyre as further defined in AIS-044 (Part 1)/ IS:15636 or AIS-044(Part 2)/IS:15633 or AIS-044(Part 3)/IS 15627 as applicable".

5. Page 4/14, clause 5.1.1, Specifications and tests,

Substitute the following text for the existing text

- 5.1.1 Tyres intended for use as part of temporary-use spare unit as defined in paragraph 2.10, shall be approved in accordance with AIS-044 (Part 1) / IS:15633 or AIS-044(Part 2)/ IS:15636 or AIS-044(Part 3)/ IS 15627 as applicable excluding endurance test.

6. Page 8/14, clause 10.1, Marking

Substitute the following text for the existing text

- 10.1 Markings requirements shall be as laid down in clause 5.0 of IS:15633 (except for clause 5.1g, 5.1j, 5.1k and 5.3), IS:15636 (except for clause 5.1f, 5.1h, 5.1j, 5.1k and 5.1m) and IS 15627 (except for clause 5.1j, 5.1k and 5.1q) as applicable.

7. Page 9/14, Annex 1, clause 2, Braking and deviation test

For clause 2.2, substitute the following text for the existing text

- 2.2 The test shall be carried out using the service braking system from an initial speed of 80 km/h for M1 & N1 category and 55 km/h for L7 category, with the engine disconnected.

8. Page 9/14, Annex 1, clause 2, Braking and deviation test

For clause 2.3, substitute the following text for the existing text

- 2.3 The braking performance shall correspond to the test procedure given in IS: 11852(Part 3) for categories L7, M1 and N1 vehicles for the Type P (cold performance) test with the engine disconnected:

9. Page 9/14, Annex 1, clause 2.3.1, Braking and deviation test

For clause 2.3.1, substitute the following text for the existing text

- 2.3.1 In the case of L7-Mand M1 category vehicles approved to IS: 11852 (Part 3) fitted with type (s) 1, 2, 3 and 5 temporary use spare units as defined in paragraphs 2.10.1, 2.10.2, 2.10.3 and 2.10.5 and tested using a prescribed speed of 55 km/h for L7-M category and 80 km/h for M1 category vehicles;

the stopping distance achieved using a maximum force of 500 N applied to the foot control, shall not exceed 25.7 m for L7-M and 50.7 m for M1 category and;

the mean fully developed deceleration (mfdd) given by the following formula shall be not less than 5.8 ms⁻²:

$$\text{mfdd} = v^2/41.14 \text{ s}$$

where "v" is the initial speed at which braking commences and "s" is the distance covered during braking between 0.8 v and 0.1 v.

10. Page 10/14, Annex 1, clause 2.3.1.1, Braking and deviation test

For clause 2.3.1.1, substitute the following text for the existing text

2.3.1.1 In the case of L7-N and N1 category vehicles approved to IS: 11852 (Part 3) fitted with type(s) 1, 2, 3 and 5 temporary use spare units as defined in paragraphs 2.10.1, 2.10.2, 2.10.3 and 2.10.5 and tested using a prescribed speed of 55 km/h for L7-N category and 80 km/h for N1 category vehicles;

the stopping distance achieved using a maximum force of 700 N applied to the foot control, shall not exceed 31.5 m for L7-N and 61.2 m for N1 category and;

the mean fully developed deceleration (mfdd) given by the following formula shall be not less than 5.0 ms⁻²:

$$\text{mfdd} = v^2/41.14 \text{ s}$$

where "v" is the initial speed at which braking commences and "s" is the distance covered during braking between 0.8 v and 0.1 v.

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MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA

19 April 2018

Amendment No. 1 17 December 2013
To
AIS-110 : 2009 Automotive Vehicles -Temporary-Use Spare Wheel/ Tyres and
Run Flat Tyres

1. Page No.1/14, Clause 2.2,

Add following text for existing text with the following text

2.2. **"Vehicle type"** means a category of vehicles which do not differ significantly in such essential aspects as:

2.2.1. **"Vehicle type with regard to its temporary-use spare unit":**

2.2.1.1. Maximum axle loads of the vehicle, as defined in paragraph 2.12;

2.2.1.2. Characteristics of the temporary-use spare wheel and tyre unit;

2.2.1.3. Method of drive (front wheel, rear wheel, four wheels);

2.2.1.4. Suspension;

2.2.1.5. Braking system;

2.2.1.6. Wheel size/tyre size;

2.2.1.7. Wheel offset.

2.2.2 **"Vehicle type with regard to its tyre pressure monitoring system"**

2.2.2.1 The manufacturer's trade name or mark;

2.2.2.2. Vehicle features which significantly influence the performances of the tyre pressure monitoring system;

2.2.2.3. The type and design of the tyre pressure monitoring system.

2. Page No. 3/14,

Add following new clauses after clause 2.13

2.14. **"Tyre Pressure Monitoring System (TPMS)"** means a system fitted on a vehicle, able to perform a function to evaluate the inflation pressure of the tyres or the variation of this inflation pressure over time and to transmit corresponding information to the user while the vehicle is running.

2.15. **"Cold tyre inflation pressure"** means the tyre pressure at ambient temperature, in the absence of any pressure build-up due to tyre usage.

2.16. **"Recommended cold inflation pressure (P_{rec})"** means the pressure recommended for each tyre position by the vehicle manufacturer, for the intended service conditions (e.g. speed and load) of the given vehicle, as defined on the vehicle placard and/or the vehicle owner's manual.

2.17. **"In service operating pressure (P_{warm})"** means the inflation pressure for each tyre position elevated from the cold pressure (P_{rec}) by temperature effects during vehicle usage.

2.18. **"Test Pressure (P_{test})"** means the actual pressure of the tyre(s) selected for each tyre position after deflation during the test procedure.

2.19. **"Type of Tyre Pressure Monitoring System"** means systems which do not differ significantly in such essential aspects as:

- (a) The principle of operation;
- (b) Any components which are likely to have a significant influence on the performance of the system as specified under paragraph 5.3 to this Standard.

3. Page No. 6/14, Clause 5.1.6.

Substitute the following text for the existing text

5.1.6. In the case of vehicles equipped with run-flat/self-supporting tyres or run-flat/extended mobility system the vehicle shall also be fitted with a Run-Flat Warning System (defined in paragraph 2.13.) capable of operating within a speed range from 40 km/h to the maximum design speed of the vehicle and meeting the requirements of paragraphs 5.1.6.1 to 5.1.6.6. However, if the vehicle is fitted with a tyre pressure monitoring system meeting the requirements of paragraph 5.3, the additional fitment of run-flat warning system is not required.

4. Page No. 7/14,

Insert following new clause 5.3 after clause 5.2

5.3. Tyre Pressure Monitoring Systems (TPMS)

5.3.1. General Requirements

5.3.1.1. The tyre pressure monitoring system complying with the definition of paragraph 2.14. shall meet the performance requirements contained in paragraphs 5.3.1.2. to 5.3.5.5. below and shall be tested in accordance with Annex 3.

5.3.1.2. The tyre pressure monitoring system shall comply with the requirements of AIS 004 (Part 3) as and when AIS 004 (Part 3) is notified for implementation under CMV, Rules 1989.

Note: (In the case a complete vehicle fitted with TPMS is complying with AIS 004 (Part 3), then a separate compliance of TPMS with AIS 004 (part 3) is not required.)

5.3.1.3. The system shall operate from a speed of 40 km/h or below, up to the vehicle's maximum design speed.

5.3.2. Tyre pressure detection for incident-related pressure loss (puncture test).

5.3.2.1. The TPMS shall be tested according to the test procedure set out in paragraph 2.6.1. of Annex 3. When tested to this procedure, the TPMS shall illuminate the warning signal described in paragraph 5.3.5 not more than 10 minutes after the in service operating pressure in one of the vehicle's tyres has been reduced by 20 per cent or it is at a minimum pressure of 150 kPa, whatever is higher.

5.3.3. Detection for a tyre pressure level significantly below the recommended pressure for optimum performance including fuel consumption and safety (diffusion test).


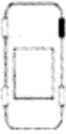
5.3.3.1. The TPMS shall be tested according to the test procedure set out in paragraph 2.6.2. of Annex 3. When tested to this procedure, the TPMS shall illuminate the warning signal described in paragraph 5.3.5. within not more than 60 minutes of cumulative driving time after the in-service operating pressure in any of the vehicle's tyres, up to a total of four tyres, has been reduced by 20 per cent.

5.3.4. Malfunction detection test.

5.3.4.1. The TPMS shall be tested according to the test procedure set out in paragraph 3.0 of Annex 3. When tested to this procedure, the TPMS shall illuminate the warning signal described in paragraph 5.3.5. not more than 10 minutes after the occurrence of a malfunction that affects the generation or transmission of control or response signals in the vehicle's tyre pressure monitoring system. If the system is blocked by external influence (e.g. radio-frequency noise), the malfunction detection time may be extended.

5.3.5. Warning indication.

5.3.5.1. The warning indication shall be by means of an optical warning signal conforming to either of the following warning symbol

Item	Symbol	Function	Illumination	Colour
Low tyre pressure (including malfunction)		Tell-tale	Yes	Yellow
Low tyre pressure (including malfunction) that identifies affected tyre	 ^{1/}	Tell-tale	Yes	Yellow

Note:

^{1/} The vehicle outline shown is not intended to be restrictive, but is the recommended outline. Alternative vehicle outlines may be used in order to better represent the actual outline of a given vehicle.

5.3.5.2. The warning signal shall be activated when the ignition (start) switch is in the "on"(run) position (bulb check). This requirement does not apply to tell-tales shown in a common space.

5.3.5.3. The warning signal must be visible even by daylight; the satisfactory condition of the signal must be easily verifiable by the driver from the driver's seat.

5.3.5.4. The malfunction indication may be the same warning signal as the one used to indicate under-inflation. If the warning signal described in paragraph 5.3.5.1. is used to indicate both under-inflation and a

malfunction of the TPMS, the following shall apply: with the ignition (start) switch in the "on" (run) position the warning signal shall flash to indicate a malfunction. After a short period of time the warning signal shall remain continuously illuminated as long as the malfunction exists and the ignition (start) switch is in the "on" (run) position. The flashing and illumination sequence shall be repeated each time the ignition (start) switch is in the "on" (run) position until the malfunction has been corrected.

5.3.5.5. The tell-tale of the warning described in paragraph 5.3.5.1. may be used in a flashing mode in order to provide information about the reset status of the tyre pressure monitoring system in accordance with the owner's manual of the vehicle.

5. Page No.8/14,

Insert new clause 6.3 after 6.2 and renumber existing clause 6.3 as 6.4

6.3. If the vehicle is fitted with a Tyre Pressure Monitoring System or a Run-flat Warning System, the owner's manual of the vehicle shall contain at least the following information:

6.3.1. A statement that the vehicle is equipped with such a system (and information how to reset the system, if the actual system includes such a feature).

6.3.2. An image of the tell-tale symbol described in paragraph 5.1.6.1. or 5.3.5.1. as appropriate (and an image of the malfunction tell-tale symbol, if a dedicated tell-tale is used for this function).

6.3.3. Additional information about the significance of the low tyre pressure warning telltale illuminating and a description of the corrective action to be undertaken if this happens.

6. Page No.8/14, Clause 6.4

Substitute following text for existing text

If no owner manual is supplied with the vehicle, the information required in paragraph 6.1 and/or 6.3 above shall be displayed in a prominent place on the vehicle.

7. Page No 14/14, Annex 3

Substitute new Annex 3 for the existing Annex 3 and renumber existing Annex 3 as Annex 4.

ANNEX 3
(see 5.3.1.1)

TESTS FOR TYRE PRESSURE MONITORING SYSTEMS (TPMS)

1.0 TEST CONDITIONS

- 1.1. Ambient temperature.
The ambient temperature shall be between 0 °C and 40 °C.
- 1.2. Road test surface.
The road shall have a surface affording good adhesion. The road surface shall be dry during testing.
- 1.3. The tests shall be conducted in an environment free of interferences from radio wave.
- 1.4. Vehicle conditions.
 - 1.4.1. Test weight.

The vehicle may be tested at any condition of load, the distribution of the mass among the axles being that stated by the vehicle manufacturer without exceeding any of the maximum permissible mass for each axle. However, in the case where there is no possibility to set or reset the system, the vehicle shall be unladen. There may be, in addition to the driver, a second person on the front seat who is responsible for noting the results of the tests. The load condition shall not be modified during the test.

- 1.4.2. Vehicle speed.

The TPMS shall be calibrated and tested:
 - (a) In a speed range from 40 km/h and 120 km/h or the vehicle's maximum design speed if it is less than 120 km/h for the puncture test to verify the requirements of paragraph 5.3.2. to this Standard; and
 - (b) In a speed range from 40 km/h and 100 km for the diffusion test to verify the requirements of paragraph 5.3.3 to this Standard and for the malfunction test to verify the requirements of paragraph 5.3.4. to this Standard. The whole speed range shall be covered during the test. For vehicles equipped with cruise control; the cruise control shall not be engaged during testing.

- 1.4.3. Rim position.

The vehicle rims may be positioned at any wheel position, consistent with any related instructions or limitations from the vehicle's manufacturer.
- 1.4.4. Stationary location.
When the vehicle is parked, the vehicle's tyres shall be shaded from direct sun. The location shall be shielded from any wind that may affect the results.

- 1.4.5. Brake pedal application.
Driving time shall not accumulate during service brake application while the vehicle is moving.
- 1.4.6. Tyres.
The vehicle shall be tested with the tyres installed on the vehicle according to the vehicle manufacturer's recommendation. However, the spare tyre may be utilized for testing TPMS malfunction.
- 1.5. Accuracy of pressure measurement equipment.
Pressure measurement equipment to be used for the tests contained in this annex shall be accurate to at least $\pm 3\text{kPa}$.

2.0 TEST PROCEDURE

The test shall be performed at a test speed within the range in accordance with paragraph 1.4.2. to this annex, at least once for the test case according to paragraph 2.6.1. to this annex ("puncture test"), and at least once for each test case according to paragraph 2.6.2. to this annex ("diffusion test").

- 2.1. Before inflating the vehicle's tyres, leave the vehicle stationary outside at ambient temperature with the engine off shaded from direct sunlight and not exposed to wind or other heating or chilling influences for at least one hour. Inflate the vehicle's tyres to the vehicle manufacturer's recommended cold inflation pressure (Prec), in accordance with the vehicle manufacturer's recommendation for this speed and load conditions, and tyre positions. All pressure measurements shall be carried out using the same test equipment.
- 2.2. With the vehicle stationary and the ignition locking system in the "Lock" or "Off" position, activate the ignition locking system to the "On" or "Run" position. The tyre pressure monitoring system shall perform a check of lamp function for the low tyre pressure tell-tale as specified in paragraph 5.3.5.2. of this standard. This last requirement does not apply to tell-tales shown in a common space.
- 2.3. If applicable, set or reset the tyre pressure monitoring system in accordance with the vehicle manufacturer's recommendations.
- 2.4. Learning phase.
- 2.4.1. Drive the vehicle for a minimum of 20 minutes within the speed range in paragraph 1.4.2. to this Annex, and with an average speed of 80 km/h (± 10 km/h). It is allowed to be outside the speed range for a maximum cumulative time of 2 minutes during the learning phase.
- 2.4.2. At the discretion of the Technical Service, where the driving test is undertaken on a track circle/oval) with only turns in a single direction,

then the driving test in paragraph 2.4.1 above should be equally split (+/-2 minutes) in both directions

- 2.4.3. Within the 5 minutes of completing the learning phase, measure the warm pressure of the tyre(s) to be deflated. The warm pressure shall be taken as the value P_{warm} . This value will be used for subsequent operations.
- 2.5. Deflation phase.
 - 2.5.1. Procedure for the puncture test to verify the requirements of paragraph 5.3.2. to this Standard. Deflate one of the vehicle's tyres within 5 minutes of measuring the warm pressure as described in paragraph 2.4.3. above, until it is at $P_{warm} - 20$ percent, or it is at a minimum pressure of 150 kPa, whichever is higher, namely P_{test} . Following a stabilisation period of between 2 and 5 minutes the pressure P_{test} shall be rechecked and adjusted if necessary.
 - 2.5.2. Procedure for the diffusion test to verify the requirements of paragraph 5.3.3. to this Standard. Deflate all four tyres within 5 minutes of measuring the warm pressure as described in paragraph 2.4.3. above, until the deflated tyres are at $P_{warm} - 20$ percent plus a further deflation of 7 kPa, namely P_{test} . Following a stabilisation period of between 2 and 5 minutes the pressure P_{test} shall be rechecked and adjusted if necessary.
- 2.6. Low tyre pressure detection phase.
 - 2.6.1. Procedure for the puncture test to verify the requirements of paragraph 5.3.2. to this standards.
 - 2.6.1.1. Drive the vehicle along any portion of the test course (not necessarily continuously). The sum of the total cumulative drive time shall be the lesser of 10 minutes or the time at which the low tyre pressure tell-tale illuminates.
 - 2.6.2. Procedure for the diffusion test to verify the requirements of paragraph 5.3.3. to this Standard.
 - 2.6.2.1. Drive the vehicle along any portion of the test course. After not less than 20 minutes and not more than 40 minutes bring the vehicle to a complete standstill with the engine switched off and the ignition key removed for not less than 1 minute or more than 3 minutes. Resume the test. The sum of the total cumulative drive time shall be the lesser of 60 minutes of cumulative driving under the conditions set out in paragraph 1.4.2. above or the time at which the low tyre pressure tell-tale illuminates.
 - 2.6.3. If the low tyre pressure signal did not illuminate, discontinue the test.

- 2.7. If the low tyre pressure tell-tale illuminated during the procedure in paragraph 2.6.above, deactivate the ignition locking system to the "Off" or "Lock" position. After a 5 minutes period, reactivate the vehicle's ignition locking system to the "On" ("Run") position. The tell-tale must illuminate and remain illuminated as long as the ignition locking system is in the "On" ("Run") position.
- 2.8. Inflate all of the vehicle's tyres to the vehicle manufacturer's recommended cold inflation pressure. Reset the system in accordance with the instructions of the vehicle manufacturer. Determine whether the tell-tale has extinguished. If necessary, drive the vehicle until the tell-tale has been extinguished. If the tell-tale does not extinguish, discontinue the test.
- 2.9. Repetition of the deflation phase.
The test may be repeated, at the same or different loads, using the relevant test procedures in paragraphs 2.1. to 2.8. above, with the relevant tyre(s) on the vehicle under-inflated, in accordance with the provisions of paragraph 5.3.2. or 5.3.3. to this Standard, whichever is relevant.

3. TPMS MALFUNCTION DETECTION

- 3.1. Simulate a TPMS malfunction, for example, by disconnecting the power source to any TPMS component, disconnecting any electrical connection between TPMS components, or installing a tyre or wheel on the vehicle that is incompatible with the TPMS. When simulating a TPMS malfunction, the electrical connections for the tell-tale lamps shall not be disconnected.
- 3.2. Drive the vehicle for up to 10 minutes of cumulative time (not necessarily continuously) along any portion of the test course.
- 3.3. The sum of the total cumulative drive time under paragraph 3.2. shall be the lesser of 10 minutes or the time at which the TPMS malfunction tell-tale illuminates.
- 3.4. If the TPMS malfunction indicator did not illuminate in accordance with paragraph 5.3.4 to this Standard, as required, discontinue the test.
- 3.5. If the TPMS malfunction indicator is illuminated or illuminates during the procedure in paragraphs 3.1 to 3.3 above, deactivate the ignition locking system to the "Off" or "Lock" position. After 5 minutes, reactivate the vehicle's ignition locking system to the "On" ("Run") position. The TPMS malfunction indicator shall again signal a malfunction and remain illuminated as long as the ignition locking system is in the "On" ("Run") position.
- 3.6. Restore the TPMS to normal operation. If necessary, drive the vehicle until the warning signal has extinguished. If the warning lamp has not extinguished, discontinue the test.

- 3.7. The test may be repeated using the test procedures in paragraphs 3.1. to 3.6.above, with each such test limited to simulation of a single malfunction.

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THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA
P. B. NO. 832, PUNE 411 004
ON BEHALF OF
AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE
UNDER
CENTRAL MOTOR VEHICLES RULES - TECHNICAL STANDING COMMITTEE
SET-UP BY
MINISTRY OF ROAD TRANSPORT & HIGHWAYS
(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)
GOVERNMENT OF INDIA

17 December 2013

AUTOMOTIVE INDUSTRY STANDARD

**Automotive Vehicles
Temporary-Use Spare Wheel /
Tyres and Run Flat Tyres**

PRINTED BY

THE AUTOMOTIVE RESEARCH ASSOCIATION OF INDIA

P.B. NO. 832, PUNE 411 004

ON BEHALF OF

AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER

CENTRAL MOTOR VEHICLE RULES – TECHNICAL STANDING COMMITTEE

SET-UP BY

MINISTRY OF SHIPPING, ROAD TRANSPORT & HIGHWAYS

(DEPARTMENT OF ROAD TRANSPORT & HIGHWAYS)

GOVERNMENT OF INDIA

May 2009

Status chart of the standard to be used by the purchaser for updating the record

Sr. No.	Corrigenda	Amendment	Revision	Date	Remark	Misc.

General Remarks:

Introduction

The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the erstwhile Ministry of Surface Transport (MoST) has constituted a permanent Automotive Industry Standards Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15, 1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CTSC). After approval, the Automotive Research Association of India, (ARAI), Pune being secretariat of the AIS Committee, has published this standard. For better dissemination of this information ARAI may publish this document on their web site.

Use of run flat tyre and temporary use spare wheel conforming to ECE R 64 is permitted in European countries. In view of the cost effectiveness, aesthetics, packaging and enhancement in safety, CMVR Technical Standing Committee took the decision to formulate the standard for temporary use spare wheel and run flat tyres. Run flat tyre is a new technology which contributes to safety as well as convenience. Accordingly this standard has been formulated for M1 and N1 category of vehicles.

While preparing this standard considerable assistance is derived from following National / International standards.

ECE R 30	Uniform provisions concerning the approval of pneumatic tyres for motor vehicles and their trailers
ECE R 64	Uniform provisions concerning the approval of vehicles with regard to their equipment which may include a temporary use spare wheel and tyre unit, run flat tyres and /or a run flat
EEC Directive 92/23/EEC	Relating to tyres for motor vehicles and their trailers and to their fitting
AIS-044 (Part 1)/ IS:15636	Automotive vehicles – pneumatic tyres for commercial vehicles
AIS-044(Part 2)/ IS:15633	Automotive vehicles – pneumatic tyres for passenger car vehicles

The Automotive Industry Standards Committee (AISC) responsible for preparation of this standard is given in Annex: 3

Automotive Vehicles

Temporary - Use Spare Wheel/Tyres and Run Flat Tyre

1. SCOPE

This standard applies to the approval of vehicles of category M1 and N1 with regard to their equipment which may include run flat tyres, a run flat system, a spare wheel and tyre unit, other than a "Standard spare unit" as defined in paragraph 2.9. of the standard, intended for temporary use in the event of damage to the wheel and tyre unit fitted to the vehicle for normal, long term, road use.

For the purposes of this standard, spare wheel and tyre substitute units in the form of run-flat tyres or a run-flat system in a totally deflated condition, are to be treated as being temporary use spare units as defined in paragraph 2.10. of the standard.

2. DEFINITIONS

For the reference purposes of this safety standard.

- 2.1. **Approval of a vehicle"** means the approval of a vehicle type with regard to its temporary use spare wheel and tyre unit.
- 2.2. **"Vehicle type"** means a category of vehicles which do not differ significantly in such essential aspects as:
 - 2.2.1. the maximum axle loads of the vehicle, as defined in paragraph 2.12,
 - 2.2.2. the characteristics of the temporary-use spare wheel and tyre unit,
 - 2.2.3. method of drive (front wheel, rear wheel, four wheels),
 - 2.2.4. suspension,
 - 2.2.5. braking system,
 - 2.2.6. wheel size/tyre size;
 - 2.2.7. wheel offset
- 2.3. **"Wheel"** means a complete wheel consisting of a rim and a wheel disc;
 - 2.3.1. **"Wheel size designation"** means a designation comprising atleast the nominal rim diameter, the nominal rim width and the rim profile;
 - 2.3.2. **"Wheel offset"** means the distance from the hub abutment face to the center line of the rim.

- 2.4. **"Tyre"** means a pneumatic tyre, being a reinforced flexible envelope that is provided with, or forms in conjunction with the wheel on which it is mounted, a continuous, essentially toroidal, closed chamber containing a gas (usually air) or a gas and liquid, that is intended normally to be used at a pressure greater than atmospheric pressure. It may be a:
- 2.4.1. **"Normal tyre"** being a tyre that is suitable for all normal, on-road, conditions of use;
- 2.4.2. **"Temporary use spare tyre"** being a tyre that is specifically designed to be different from a normal tyre and intended only for temporary use under restricted driving conditions;
- 2.4.3 **"T-type temporary use spare tyre"** means a type of temporary use spare tyre designed for use at inflation pressures higher than those established for standard and reinforced tyres;
- 2.4.4 **"Run flat tyre"** or **"Self supporting tyre"** describes a pneumatic tyre structure provided with any technical solutions (for example, reinforced sidewalls, etc.) allowing the pneumatic tyre, mounted on the appropriate wheel and in the absence of any supplementary component, to supply the vehicle with the basic tyre functions, at least, at a speed of 80 km/h (50 mph) and a distance of 80 km when operating in flat tyre running mode;
- 2.4.5. **"Run flat system"** or "Extended mobility system" describes an assembly of specified functionally dependant components, including a tyre, which together provide the specified performance granting the vehicle with the basic tyre functions, at least, at a speed of 80 km/h (50 mph) and a distance of 80 km when operating in flat tyre running mode."
- 2.5. **"Flat tyre running mode"** describes the state of tyre, essentially maintaining its structural integrity, while operating at an inflation pressure between 0 and 70 kPa.
- 2.6 **"Basic tyre function"** means the normal capability of an inflated tyre in supporting a given load up to a given speed and transmitting the driving, the steering and the braking forces to the ground on which it runs.
- 2.7. **"Tyre size designation"** means a combination of figures that uniquely identify the geometric size of the tyre, comprising the nominal section width, the nominal aspect ratio and the nominal diameter. Precise definitions of these features may be found in AIS-044 (Part 1)/ IS:15636 or AIS-044(Part 2)/IS:15633 as applicable"
- 2.8. **"Tyre structure"** means the technical characteristics of the tyre's carcass. This may be bias ply (diagonal or cross ply), bias-belted, radial ply or run flat tyre as further defined in AIS-044 (Part 1)/ IS:15636 or AIS-044(Part 2)/IS:15633 as applicable".

- 2.9. **"Standard spare unit"** means an assembly of a wheel and tyre identical in terms of wheel and tyre size designations, wheel offset and tyre structure to that fitted in the same axle position and to the particular model or version of the vehicle for normal operation. It includes the case of a wheel that is produced from a different material, for example, steel instead of aluminium alloy, that may use different wheel fixing nut or bolt designs but which is otherwise identical to the wheel intended for normal operation.
- 2.10. **"Temporary use spare unit"** means an assembly of any wheel and tyre that is not within that defined as a "Standard spare unit" in paragraph 2.9. Temporary use spare units may be of the following types:
- 2.10.1. **Type 1**
An assembly in which the tyre is a temporary use spare tyre as defined in paragraph 2.4.2.;
- 2.10.2. **Type 2**
An assembly in which the wheel has a different offset from that of the wheel fitted in the same axle position for normal operation of the vehicle;
- 2.10.3. **Type 3**
An assembly in which the tyre is of a different structure from that fitted in the same axle position for normal operation of the vehicle;
- 2.10.4. **Type 4**
An assembly in which the tyre is a normal tyre as defined in paragraph 2.4.1. but where the size designation of the wheel or the tyre or both, differ from those of the wheel or tyre fitted in the same axle position for normal operation of the vehicle;
- 2.10.5. **Type 5**
An assembly in which a wheel and tyre unit as defined in paragraph 2.4.3. or 2.4.4. is fitted to the vehicle for normal, long term road use, but used in an emergency in a totally deflated condition."
- 2.11 **"Maximum Authorized Gross Vehicle Weight (GVW)"**
Weight determined as maximum by the approved test agency given under Central Motor Vehicle Rules (CMVR) for operating conditions laid down by them.
- 2.12 **"Maximum axle weight"** means the "authorized axle weight" as defined in IS 9211-2003 and declared by the manufacturer in the formats prescribed in AIS-007.
- 2.13. **"Run-Flat Warning System"** - describes a system which delivers information to the driver that a tyre is operating in the flat tyre running mode."

3. APPLICATION FOR APPROVAL

- 3.1 The application for approval of a vehicle type with regard to its equipment with a temporary-use spare unit shall be submitted to the test agency by the vehicle manufacturer or by his duly authorized representative;
- 3.1.1 The application for approval of the spare tyre and/or run flat tyre as a component shall be submitted to the test agency by the tyre manufacturer or vehicle manufacturer or by his duly authorized representative.
- 3.2 It shall be accompanied by a description of the vehicle type with regard to the items specified in the application.
- 3.3. A vehicle representative of the vehicle type to be approved shall be submitted to the test agency responsible for conducting the approval tests.

4. APPROVAL

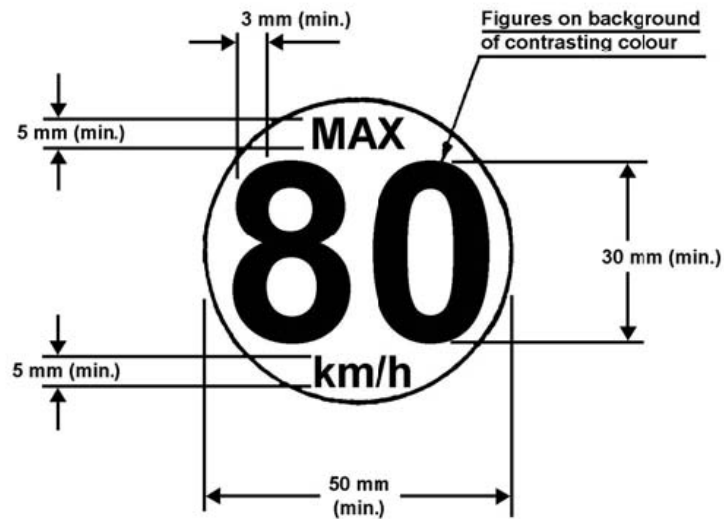
- 4.1 If the spare wheel/tyre & run flat tyre submitted for approval pursuant to this standard meets the requirements of paragraph 5 below, except those mentioned in 4.4, approval of spare wheel shall be granted.
- 4.2 An approval number shall be assigned as detailed in AIS-037 for spare tyre.
- 4.3 The approval mark shall be clearly legible and be indelible.
- 4.4 If the vehicle submitted for approval pursuant to the standard complies with the clauses 5.1.2, 5.1.5, 5.1.6, 5.2 of this standard and the spare tyre complies with other requirements of paragraph 5 below, approval of that vehicle type shall be granted.

5. SPECIFICATIONS AND TESTS

5.1 General

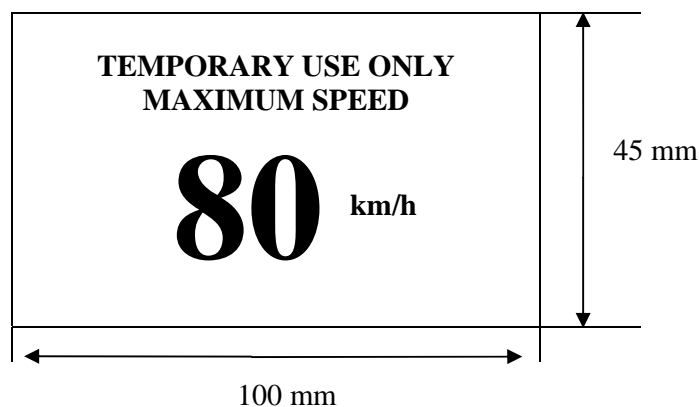
- 5.1.1 Tyres intended for use as part of temporary-use spare unit as defined in paragraph 2.10, shall be approved in accordance with AIS-044 (Part 1)/IS:15633 or AIS-044(Part 2)/IS:15636 as applicable" excluding endurance test.
- 5.1.2 For vehicles having at least four wheels, the load capacity of the temporary-use spare unit shall be at least equal to one half of the highest of the maximum axle loads of the vehicle.

- 5.1.3 The design speed of the temporary spare unit shall be at least 120 km/h for types 1, 2 and 3.
- 5.1.4 The temporary-use spare unit shall exhibit the following characteristics:
 - 5.1.4.1 Following requirements shall only apply to types 1, 2 and 3 temporary use spare unit as defined in paragraphs 2.10.1., 2.10.2 and 2.10.3."
 - 5.1.4.1.1 An 80 km/h maximum speed warning symbol arranged in accordance with the diagram below shall be permanently displayed on the outer face of the wheel in a prominent position.



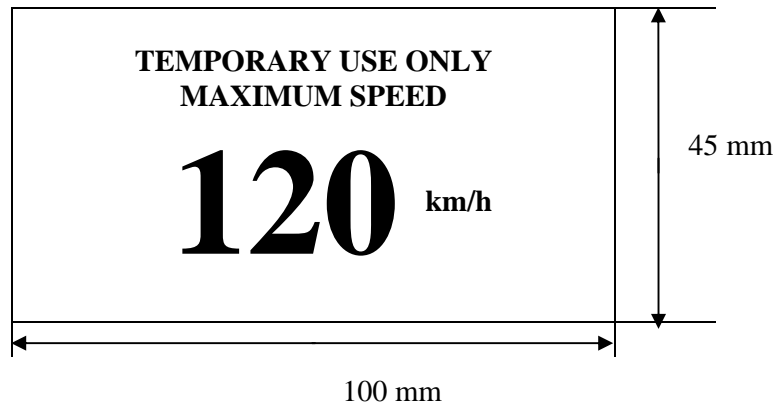
Scale - full size (1:1)

- 5.1.4.1.2 Alternatively a single warning symbol arranged in accordance with the diagram below, shall be permanently displayed on the outer face of the wheel in a prominent position.



Upper case letters shall be at least 5 mm high and the number "80" shall be at least 20 mm high with the elements that make up each character of the number at least 3 mm line thickness. Lower case text shall at least have a line height of 5 mm. All text shall be enclosed in a border and be on a background of contrasting colour.

- 5.1.4.2 Following requirements shall only apply to a type 4 temporary use spare unit as defined in paragraph 2.10.4. to be supplied for use on an M1 category vehicle.
- 5.1.4.2.1 An 120 km/h maximum speed warning symbol arranged in accordance with the diagram described at paragraph no 5.1.4.1.1 (Number 80 is to be replaced by 120) shall be permanently displayed on the outer face of the wheel in a prominent position.
- 5.1.4.2.2 Alternatively a single warning symbol arranged in accordance with the diagram below, shall be permanently displayed on the outer face of the wheel in a prominent position.



Upper case letters shall be at least 5 mm high and the number "120" shall be at least 20 mm high with the elements that make up each character of the number at least 3 mm line thickness. Lower case text shall at least have a line height of 5 mm. All text shall be enclosed in a border and be on a background of contrasting colour.

- 5.1.4.3 When mounted to the vehicle for temporary use the outward facing surface of the wheel and/or tyre shall exhibit a distinctive colour or colour pattern which is quite clearly different from the colour(s) of the standard units. If it is possible to attach a wheel cover to the temporary-use spare unit, the distinctive colour or color pattern shall not be obscured by this wheel cover.
- 5.1.5. Except in the case of a run-flat/self supporting tyres or run-flat/extended mobility system, it is permitted to supply only one temporary use spare unit with the vehicle.
- 5.1.6. In the case of vehicles equipped with run-flat/self supporting tyres or run-flat/extended mobility system the vehicle shall also be fitted with a Run-Flat Warning System (defined in paragraph 2.13.). The run-flat warning system shall be capable of operating within a speed range from 40 km/h to the maximum design speed of the vehicle.
- 5.1.6.1. The warning indication shall be by means of an optical yellow warning signal.
- 5.1.6.2. The warning signal shall be activated when the ignition (start) switch is in the "on" (run) position (bulb check).

- 5.1.6.3. A warning shall be indicated to the driver by the operation of the warning signal referred to in paragraph 5.1.6.1 at the latest when one tyre is detected to be in the flat tyre running mode.
- 5.1.6.4. Electrical failure or sensor anomaly that affects the Run-Flat Warning System, including failure of the electrical source, supply or transmission of the output signal, shall be indicated to the driver by an optical yellow run flat malfunction signal. If the warning signal described in paragraph 5.1.6.1 is used to indicate both a tyre in the run flat mode and a malfunction in the run-flat warning system, the following shall apply: with the ignition (start) switch in the "on" (run) position the warning signal shall flash to indicate a system failure. After a short period of time the warning signal shall remain continuously illuminated as long as the failure exists and the ignition (start) switch is in the "on" (run) position. The flashing and illumination sequence shall be repeated each time the ignition (start) switch is in the "on" (run) position until the failure has been corrected.
- 5.1.6.5. When the system is being manually reset in accordance with the vehicle manufacturer's instructions, the provisions in paragraphs 5.1.6.3 and 5.1.6.4 may not apply.
- 5.1.6.6. The operation of the warning signal specified in paragraphs 5.1.6.2. to 5.1.6.4 shall meet the requirements in Annex 2.

5.2 **Braking Test**

- 5.2.1 Vehicles intended to be equipped with temporary-use spare units shall meet the requirements of Annex 1 to this standard.

6 **SUPPLEMENTARY INFORMATION**

- 6.1 The owner's manual of the vehicle shall contain at least the following information:
- 6.1.1 An instruction to drive with caution and at no more than the permitted maximum speed of 80 km/h (50 mph) when a type 1, 2 or 3 temporary-use spare unit as defined in paragraphs 2.10.1, 2.10.2 or 2.10.3 is fitted, and to reinstall a standard unit as soon as possible. It shall be made clear that this instruction also applies to a type 5 temporary-use spare unit as defined in paragraph 2.10.5 being used in the flat tyre running mode."
- 6.1.2. An instruction to drive with caution and at no more than the permitted maximum speed of 120 km/h (75 mph), when a type 4 spare unit as defined in paragraph 2.10.4 is fitted, and to reinstall a standard unit as soon as possible.
- 6.1.3 A statement that operation of the vehicle is not permitted with more than one temporary-use spare unit fitted at the same time. This requirement shall only apply to a type 1, 2 and 3 temporary-use spare unit as defined in paragraphs 2.10.1, 2.10.2 and 2.10.3

- 6.1.4 A clear indication of the inflation pressure specified by the vehicle manufacturer for the tyre of the temporary-use spare unit.
- 6.1.5 For vehicles equipped with a temporary use spare unit stored in a deflated condition, a description of the procedure for inflating the tyre to the pressure specified for temporary use by means of the device referred to in paragraph 6.2. below.
- 6.2 If the vehicle is equipped with a temporary use spare unit stored in a deflated condition, a device shall be provided on the vehicle which permits the tyre to be inflated to the pressure specified for temporary use within a maximum of ten minutes.
- 6.3 If no owner manual is supplied with the vehicle, the information required in paragraph 6.1 above shall be displayed in a prominent place on the vehicle.

7 MODIFICATIONS AND EXTENSION OF APPROVAL

- 7.1 Test Agency shall grant the extension by applying the provisions in AIS-017 and AIS-037 as applicable.

8 CONFORMITY OF PRODUCTION

- 8.1 The conformity of production procedures for the spare tyre shall comply with those set out in AIS-037.

9. (Reserved)

10. MARKING

- 10.1 Markings requirements shall be as laid down in clause 5.0 of IS:15633 (except for clause 5.1g, 5.1j, 5.1k and 5.3) and IS:15636 (except for clause 5.1f, 5.1h, 5.1j, 5.1k and 5.1m) as applicable.
- 10.2 Warning symbols described at paragraph no 5.1.4.1 shall marked as applicable. Marking the words "TEMPORARY USE ONLY" shall be mandatory in all the cases.
- 10.3 In case of "T" type temporary use tyre, letter "T" shall be marked in front of the nominal section width.
- 10.4 In the case of "T" type temporary use spare tyres, the legend "INFLATE TO 420 kPa (60 psi)", shall be marked in the upper case characters being at least 12.7 mm high.

ANNEX 1

(See 5.2.1)

**BRAKING AND DEVIATION TEST FOR VEHICLES
FITTED WITH TEMPORARY-USE SPARE UNITS****1. GENERAL CONDITIONS**

- 1.1. The test track shall be substantially level and have a surface affording good adhesion.
- 1.2. The test shall be performed when there is no wind liable to affect the results.
- 1.3. The vehicle shall be loaded to its Maximum Authorized Gross Vehicle Weight as defined in paragraph 2.11 of this standard.
- 1.4. The axle loads resulting from the loading condition in accordance with paragraph 1.3. of this Annex shall be proportional to the Maximum axle weight as defined in paragraph 2.12 of this standard.
- 1.5. Except in the case of a run-flat tyre, the tyres shall be inflated to the pressures recommended by the vehicle manufacturer for the vehicle type and loading condition. A run-flat tyre shall be tested in the fully deflated condition.

2. BRAKING AND DEVIATION TEST

- 2.1. The test shall be carried out with the temporary-use spare unit fitted alternately in place of one front wheel and one rear wheel. However, if use of the temporary-use spare unit is restricted to a specific axle, the test shall be carried out only with the temporary-use spare unit fitted to that axle.
- 2.2. The test shall be carried out using the service braking system from an initial speed of 80 km/h with the engine disconnected.
- 2.3. The braking performance shall correspond to the test procedure given in IS: 11852 (Part 3) for categories M1 and N1 vehicles for the Type P (cold performance) test with the engine disconnected:
 - 2.3.1. In the case of M1 category vehicles approved to IS: 11852 (Part 3) fitted with type(s) 1, 2, 3 and 5 temporary use spare units as defined in paragraphs 2.10.1, 2.10.2, 2.10.3 and 2.10.5 and tested using a prescribed speed of 80 km/h;

the stopping distance achieved using a maximum force of 500 N applied to the foot control, shall not exceed 50.7 m and;

the mean fully developed deceleration (mfdd) given by the following formula shall be not less than 5.8 ms^{-2} :

$$\text{mfdd} = v^2/41.14 \text{ s}$$

where "v" is the initial speed at which braking commences and "s" is the distance covered during braking between 0.8 v and 0.1 v.

- 2.3.1.1. In the case of N1 category vehicles approved to IS: 11852 (Part 3) fitted with type(s) 1, 2, 3 and 5 temporary use spare units as defined in paragraphs 2.10.1, 2.10.2, 2.10.3 and 2.10.5 and tested using a prescribed speed of 80 km/h;

the stopping distance achieved using a maximum force of 700 N applied to the foot control shall not exceed 61.2 m and;

the mean fully developed deceleration (mfdd) given by the following formula shall be not less than 5.0 ms^{-2} :

$$\text{mfdd} = v^2/41.14 \text{ s}$$

where v is the initial speed at which braking commences and s is the distance covered during braking between 0.8 v and 0.1 v.

- 2.3.1.2. In the case of M1 category vehicles approved to IS: 11852 (Part 3) fitted with type 4 spare unit as defined in paragraph 2.10.4. tested using a prescribed speed of 120 km/h;

the stopping distance achieved using a maximum force of 500 N applied to the foot control, shall not exceed 108 m and;

the mean fully developed deceleration (mfdd) given by the following formula shall be not less than 5.8 ms^{-2} :

$$\text{mfdd} = v^2/41.14 \text{ s}$$

where "v" is the initial speed at which braking commences and "s" is the distance covered during braking between 0.8 v and 0.1 v.

- 2.4. Tests shall be carried out for each of the fitting conditions of temporary-use spare units specified in paragraph 2.1 of this Annex.
- 2.5 The prescribed braking performance shall be obtained without any wheel locking, deviation of the vehicle from its intended course, abnormal vibration, and abnormal wear of the tyre during the test or excessive steering correction.

ANNEX 2
(See 5.1.6.6)
TEST FOR RUN-FLAT WARNING SYSTEM

1. TEST CONDITIONS

- 1.1. Ambient temperature
The ambient temperature shall be between 0 °C and 40 °C.
- 1.2. Test road surface
The test road surface shall be dry and smooth.
- 1.3. Test location
The test location shall be other than an environment susceptible to radio wave interference such as a strong electric field.
- 1.4. Condition of the test vehicle in a stationary state
The vehicle's tyres shall be shaded from direct sun when the vehicle is parked.

2. TEST METHOD

- 2.1. Test procedures for detection of a tyre in the flat tyre running mode.
The requirements of either paragraph 2.1.1. or 2.1.2. shall be met.
 - 2.1.1. Test 1
 - 2.1.1.1. The tyres are to be inflated to the pressure recommended by the vehicle manufacturer.
 - 2.1.1.2. With the vehicle stationary and the ignition (start) switch in the "Lock" or "Off" position, turn the ignition (start) switch to the "On" ("Run") position or, where applicable, the appropriate key position. Confirm the activation of the warning signal.
 - 2.1.1.3. Turn off the ignition and reduce the inflation pressure of any one of the tyres until the adjusted tyre inflation pressure is 100 kPa below the recommended cold inflation pressure.
 - 2.1.1.4. Within 5 minutes after reducing the inflation pressure of the tyre, drive the vehicle normally between 40 and 100 km/h.
 - 2.1.1.5. The test is completed when either:
 - (a) the run flat warning system as described in paragraph 5.1.6.1. has activated or,
 - (b) a period of 5 minutes has elapsed, when determined in accordance with paragraph 2.3., from the time the test speed has been reached. If the warning does not activate the test has failed.

The vehicle shall be brought to a halt and the ignition switched off.

- 2.1.1.6. If the warning signal as required in paragraph 2.1.1.5. above has activated, wait 5 minutes before turning the ignition on; the signal shall reactivate and remain active as long as the ignition switch is in the "on" ("run") position.
- 2.1.1.7. Repeat the process described in paragraphs 2.1.1.1. to 2.1.1.6., but with a test speed of 130 km/h or higher. All the relevant requirements shall be met for both test speeds.
- 2.1.2. Test 2
 - 2.1.2.1. The tyres are to be inflated to the pressure recommended by the vehicle manufacturer.
 - 2.1.2.2. With the vehicle stationary and the ignition (start) switch in the "Lock" or "Off" position, turn the ignition (start) switch to the "On" ("Run") position or, where applicable, the appropriate key position. Confirm the activation of the warning signal. Turn off the ignition.
 - 2.1.2.3. Produce on one tyre a gradual pressure loss of between 10 kPa/min and 20 kPa/min.
 - 2.1.2.4. Drive the vehicle at any speed above 25 km/h.
 - 2.1.2.5. The test requirement is satisfied if the system delivers an alert by the time the pressure drop has reached 100 kPa.
- 2.2 Test procedures for detecting a failure of the Run-Flat Warning System.
 - 2.2.1 With the vehicle in the normal use condition, simulate a Run-Flat Warning System failure. This may be simulated by, for example, disconnecting connectors for wiring related to the power supply from the power source or wiring related to the input/output to/from the warning system control.
 - 2.2.2 With a simulated fault introduced, drive the vehicle normally between 40 and 100 km/h.
 - 2.2.3. When:
 - (a) the run flat malfunction signal as described in paragraph 5.1.6.4. has activated or,
 - (b) a period of 5 minutes has elapsed, when determined in accordance with paragraph 2.3., from the time the test speed has been reached.
 If the warning does not activate the test has failed,

The vehicle shall be brought to a halt and the ignition switched off.
 - 2.2.4 If the warning signal as required in paragraph 2.2.3. above has activated, wait 5 minutes before turning the ignition on; the signal shall reactivate and remain active as long as the ignition switch is in the "on" ("run") position.

2.3 Calculation of time duration

The time to be taken for determination of the requirements of paragraphs 2.1.1.5. and 2.2.3. shall be the total elapsed time while the vehicle is driven in the test speed range 40 km/h to 100 km/h.

The time shall be calculated over a continuous drive but it is not necessary that the vehicle maintains throughout the test a speed within the test speed range. Where the vehicle speed falls outside the test speed range, any time accumulated during such events shall not be considered as part of the total test time duration.

The type approval authority shall satisfy itself that the run flat warning system records the time within the test speed range on a cumulative basis and does not restart the time calculation if the vehicle falls outside the test speed range.

ANNEX 3
(See Introduction)

COMMITTEE COMPOSITION *

Automotive Industry Standards Committee

Chairman	
Shri Shrikant R. Marathe	Director The Automotive Research Association of India, Pune
Members	Representing
Representative from	Ministry of Shipping, Road Transport & Highways (Dept. of Road Transport & Highways), New Delhi
Representative from	Ministry of Heavy Industries & Public Enterprises (Department of Heavy Industry), New Delhi
Shri S. M. Ahuja	Office of the Development Commissioner, MSME, Ministry of Micro, Small & Medium Enterprises, New Delhi
Shri Rakesh Kumar	Bureau of Indian Standards, New Delhi
Director Shri D. P. Saste (Alternate)	Central Institute of Road Transport, Pune
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* At the time of approval of this Automotive Industry Standard (AIS)