

AUTOMOTIVE INDUSTRY STANDARD

**Driver-Perceived Noise Level of
Agricultural Tractors -
Method of Measurement**

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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

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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 the secretariat of the AIS Committee, has published this standard. For better dissemination of this information, ARAI may publish this document on their website.

Presently the method of measurement of noise of Agricultural Tractor at the operator's position is as per IS: 12180 Part-1 and is in force. In the process of aligning our National standards with ECE regulations and EEC Directives, Part 1 of this AIS is aligned with EEC Directive 77/311/EEC for driver - perceived noise level.

Revised requirements of noise levels will be notified in CMVR separately. Part 2 of this standard covers measurement of permissible sound level at bystander's of Agricultural Tractor.

While preparing this standard, considerable assistance has been derived from following International/ national standards:

EEC directive– 77/311/EEC as amended by Directive 82/890/EEC, 97/54/EC and 2006/26/EC) and IS:12180 (Part 1):2000	on the approximation of the laws of the Member States relating to the driver-perceived noise level of wheeled agricultural or forestry tractors
IS: 12180 (Part 1): 2000/ISO 5131 : 1996	Tractors and Machinery for Agriculture and Forestry - Noise Measurement - Method of Test - Part 1 : Noise at The Operator's Position - Survey Method

The Automotive Industry Standards Committee responsible for preparation of this standard is given in Annex: III

Driver-Perceived Noise Level of Agricultural Tractors - Method of Measurement

1. SCOPE

This standard specifies a method for measuring the A-weighted sound pressure level of the noise perceived by the driver emitted by Agricultural Tractors as defined in AIS-053, while in motion.

2. REFERENCES

- 2.1 AIS-053 Automotive Vehicles – Types – Terminology
- 2.2 IS:11113-1999/ Earth- Moving Machinery, Tractors and Machinery for
ISO-5353-1995 Agriculture and Forestry- Seat Index Point.

3. DEFINITIONS

For the purpose of this standard, the following definition shall apply:

- 3.1 **Agricultural Tractor:** As defined in 3.9 of AIS-053

4. METHOD OF MEASUREMENT

Method of measurement of driver perceived noise level emitted by tractor in drawbar - load method is specified in Annex- I and that in no-load method in Annex- II

Note: Agricultural Tractor manufacturers can opt for testing as per Annex I or Annex II.

ANNEX-I

(See 4.0)

**APPARATUS, CONDITIONS AND METHOD OF MEASUREMENT
IN DRAWBAR - LOAD METHOD****1. UNIT OF MEASUREMENT AND MEASURING APPARATUS****1.1 Unit of measurement**

Noise level shall be measured in dB with A-weighting, expressed as dB(A)

1.2 Measuring apparatus

Driver perceived noise level shall be measured by means of a sound level meter as described in the first edition of Publication 179/1965 of the International Electro technical Commission. In the case of variable readings, the average of the maximum values shall be taken.

2. CONDITIONS OF MEASUREMENT

Measurement shall be made under the following conditions:

- 2.1 The tractor shall be unladen, i.e, without optional accessories, but shall include coolant, lubricant, full fuel tank, tools and driver. The latter may not wear any abnormally thick clothing, scarf or hat. There may be no object on the tractor likely to distort the noise level;
- 2.2 The tyres shall be inflated to the manufacturers recommended pressure, the engine, transmission and drive axles shall be at normal running temperature and radiator blinds when fitted shall be kept open during measurements;
- 2.3 If it is liable to affect the noise level, extra equipment powered by the engine or self powered such as wind screen wipers, warm air fan, power take-off, for example, may not be in operation when measurements are being made; parts which normally operate at the same time as the engine, such as engine cooling fan, for example, shall be in operation when measurements are being made;
- 2.4 The test area shall be in an open and sufficiently silent location; it may take the form, for instance, of an open space of 50-metre radius, having a central part with a radius of at least 20 m which is practically level, or of a level section having a solid track with as flat a surface and as few gullies as possible. The track shall be as clean and dry as possible (e.g. free of gravel, leaves, snow, etc.). Slopes and irregularities are acceptable only if the variations in noise level caused by them lie within the error tolerances of the measuring equipment;
- 2.5 The surface of the track be such as not to cause excessive tyre noise;

2.6 Meteorological Conditions

The air temperature shall be in the range from -5 °C to 30 °C and the wind velocity shall not exceed 5 m/s at the operator's position. Other meteorological conditions shall be such that they do not influence the measurements.

The driver perceived ambient noise level due to wind or other source of noise shall be at least 10 dB(A) below the noise level of the tractor;

2.7 If a vehicle is used for measurements, it shall be towed or driven at sufficient distance from the tractor to avoid all interference. During measurements no object interfering with the measurements or reflective surfaces may be located within 20m of each side of the test track and less than 20m to the front or rear of the tractor. This condition can be considered fulfilled if the variation in noise level is within the tolerance error; if not measurement shall be discontinued for the duration of interference.

2.8 All measurements on the given series shall be carried out on the same track.

2.9 All readings of the sound level meter shall be taken with the time weighting S.

3. METHOD OF MEASUREMENT

3.1 The microphone shall be located 250 ± 20 mm to the side of the centre plane of the seat, the side being that on which the higher level of noise is encountered. The axis of the microphone shall be horizontal.

The microphone diaphragm shall face forward and centre of microphone shall be 700 ± 20 mm above the seat index point (as defined in IS 11113:1999/ ISO 5353: 1995) and 100 ± 20 mm forward of that point. Excessive vibration of microphone shall be avoided.

3.2 the maximum noise level in dB(A) shall be determined as follows:

3.2.1 all openings (e.g. doors, windows) in tractors having a closed series produced cab structure shall be closed during an initial series of measurements.

3.2.1.1. During a second series of measurements they shall be left open, provided that when open they do not create a road safety hazard, but fold-down or fold-up windscreens shall remain closed;

3.2.2 noise shall be measured using slow sound level metre response at the load corresponding to the maximum noise level in the gear giving the forward speed nearest to 7.5kmph. The governor control lever shall be fully open. Starting with no load gradually increase load till the maximum noise level is found. After each increase in load, time shall be given for the noise level to stabilize before the measurement is recorded.

- 3.2.3 noise shall be measured using slow sound level metre response at the load corresponding to the maximum noise level in any gear other than the gear specified in 3.2.2 in which the noise level recorded is at least 1dB(A) above than what recorded in the gear referred in 3.2.2. The governor control lever shall be fully open. Starting with no load, gradually increase load till the maximum noise level is found. After each increase in load, time shall be given for the noise level to stabilize before the measurement is recorded.
- 3.2.4 noise shall be measured at the maximum design speed of the unladen tractor.
- 3.3 The test report shall include noise level measurements in forward speed carried out in following conditions
 - 3.3.1 in the gear giving the speed nearest to 7.5 kmph;
 - 3.3.2. in any gear, if the conditions described in 3.2.3 are fulfilled;
 - 3.3.3. at maximum design speed.

4. ASSESSMENT CRITERIA

The measurements described in 3.2.1, 3.2.2, 3.2.3 shall not exceed the values as prescribed in CMVR.

ANNEX-II
(See 4.0)

**APPARATUS, CONDITIONS AND METHOD OF MEASUREMENT
IN NO LOAD METHOD**

1. UNIT OF MEASUREMENT AND MEASURING APPARATUS

- 1.1 Unit of measurement
Noise level shall be measured in dB with A-weighting, expressed as dB(A)
- 1.2 Measuring apparatus
Driver perceived noise level shall be measured by means of a sound level meter as described in the first edition of Publication 179/1965 of the International Electro technical Commission.
In the case of variable readings, the average of the maximum values shall be taken.

2. CONDITIONS OF MEASUREMENT

Measurement shall be made under the following conditions

- 2.1 The tractor shall be unladen, i.e, without optional accessories, but shall include coolant, lubricant, full fuel tank, tools and driver. The latter may not wear any abnormally thick clothing, scarf or hat. There may be no object on the tractor likely to distort the noise level.
- 2.2 The tyres shall be inflated to the manufacturers recommended pressure, the engine transmission and drive axles shall be at normal running temperatures and if the engine has cooling louvers, these shall remain completely open.
- 2.3 If it is liable to affect the noise level, extra equipment powered by the engine or self powered such as wind screen wipers, warm air fan, power take-off, for example, may not be in operation when measurements are being made; parts which normally operate at the same time as the engine, such as engine cooling fan, for example, shall be in operation when measurements are being made
- 2.4 The test area shall be in an open and sufficiently silent location; it may take the form, for instance, of an open space of 50-metre radius, having a central part with a radius of at least 20 m which is practically level, or of a level section having a solid track with as flat a surface and as few gullies as possible. The track shall be as clean and dry as possible (e.g. free of gravel, leaves, snow, etc.). Slopes and irregularities are acceptable only if the variations in noise level caused by them lie within the error tolerances of the measuring equipment
- 2.5 The surface of the track be such as not to cause excessive tyre noise

2.6 Meteorological conditions

The air temperature shall be in the range from -5 °C to 30 °C and the wind velocity shall not exceed 5 m/s at the operator's position. Other meteorological conditions shall be such that they do not influence the measurements. The driver perceived ambient noise level due to wind or other source of noise shall be at least 10 dB(A) below the noise level of the tractor.

2.7 If a vehicle is used for measurements, it shall be towed or driven at sufficient distance from the tractor to avoid all interference. During measurements no object interfering with the measurements or reflective surfaces may be located within 20m of each side of the test track and less than 20m to the front or rear of the tractor. This condition can be considered fulfilled if the variation in noise level is within the error tolerances. If not, measurement shall be discontinued for the duration of interference.

2.8 All measurements on the given series shall be carried out on the same track.

2.9 All readings of the sound level meter shall be taken with the time weighting S.

3. METHOD OF MEASUREMENT

3.1. The microphone shall be located 250 ± 20 mm to the side of the centre plane of the seat, the side being that on which the higher level of noise is encountered. The axis of microphone shall be horizontal and the microphone diaphragm shall face forward and centre of microphone shall be 700 ± 20 mm above the seat index point (as defined in IS 11113:1999/ISO 5353: 1995) and 100 ± 20 mm forward of that point. Excessive vibration of microphone shall be avoided.

The maximum noise level in dB(A) shall be determined as follows:

3.1.1. the tractor shall travel along the same section at the same test speed at least three times for at least 10 seconds.

3.1.2. all openings (e.g. doors, windows) in tractors having a closed series produced cab structure shall be closed during an initial series of measurements.

3.2.2.1. During a second series of measurements they shall be left open, provided that when open they do not create a road safety hazard, but fold-down or fold-up windscreens shall remain closed;

3.1.3. noise shall be measured at the maximum rpm using slow sound level metre response i.e in the gear giving the speed nearest to 7.5 kmph at the rated rpm. The tractor shall be unladen when measurements are being made

4. ASSESSMENT CRITERIA

The measurements described in 3.2.2, 3.2.3 shall not exceed the values as prescribed in CMVR

ANNEX III
(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, Small Scale Industries, Ministry of Small Scale Industries, New Delhi
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Shri T.C. Gopalan	Tractor Manufacturers Association, New Delhi
Shri K.N.D. Nambudiripad	Automotive Components Manufacturers Association of India, New Delhi
Shri Arvind Gupta	Automotive Components Manufacturers Association of India, New Delhi

Member Secretary
Mrs. Rashmi Urdhwareshe
Deputy Director
The Automotive Research Association of India, Pune

* At the time of approval of this Automotive Industry Standard (AIS)