

INTERNATIONAL STANDARD

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Agricultural tractors — Test procedures —

Part 11:

Steering capability of wheeled tractors

Tracteurs agricoles — Méthodes d'essai —

Partie 11: Performances du dispositif de direction des tracteurs à roues



Reference number
ISO 789-11:1996(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 789-11 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 2, *Common tests*.

ISO 789 consists of the following parts, under the general title *Agricultural tractors — Test procedures*:

- Part 1: Power tests for power take-off
- Part 2: Rear three-point linkage lifting capacity
- Part 3: Turning and clearance diameters
- Part 4: Measurement of exhaust smoke
- Part 5: Partial power PTO — Non-mechanically transmitted power
- Part 6: Centre of gravity
- Part 7: Axle power determination
- Part 8: Engine air cleaner
- Part 9: Power tests for drawbar
- Part 10: Hydraulic power at tractor/implement interface

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— *Part 11: Steering capability of wheeled tractors*

— *Part 12: Low temperature starting*

Annex A forms an integral part of this part of ISO 789.

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Agricultural tractors — Test procedures —

Part 11:

Steering capability of wheeled tractors

1 Scope

This part of ISO 789 specifies test procedures for normal and emergency steering modes of an agricultural wheeled tractor having at least two axles fitted with pneumatic tyres. It does not apply to track-type or skid-steered agricultural tractors.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 789. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 789 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 10998:1995, *Agricultural wheeled tractors — Steering requirements*.

3 Definitions

For the purposes of this part of ISO 789, the following definitions apply.

3.1 turning diameter: Diameter of the circular path described by the centre of tyre contact with the surface of the test site of the wheel describing the largest circle.

3.2 turning radius: Radius of the circular path described by the centre of tyre contact with the surface of the test site of the wheel describing the largest circle.

3.3 steering effort: Force applied tangentially to the average outside radius of the steering-wheel by the driver to steer the tractor. (See ISO 10998.)

4 Apparatus, measurement units and tolerances

4.1 Apparatus

4.1.1 Device to measure turning radius.

4.1.2 Device to measure steering effort.

4.1.3 Device to measure elapsed time.

4.2 Measurement units and tolerances

The following units and tolerances are used in this part of ISO 789:

- a) time, in seconds: $\pm 0,2$ s
- b) distance, in metres or millimetres: $\pm 0,5$ %
- c) force, in newtons: ± 1 %
- d) mass, in kilograms: $\pm 0,5$ %
- e) pressure, in kilopascals: ± 2 %

5 General requirements

5.1 Test area

The test area shall be a compacted or paved dry surface affording good tyre adhesion, capable of displaying legible markings, and resistant to defacement by turning tractors. The test surface shall be visually flat, with no more than 3 % grade in any direction. The test area shall be large enough to accommodate the test tractor as it negotiates the appropriate tests.

5.2 Test tractor tyres and wheel equipment

The tyres, wheels and fender equipment used for the test shall be those which create the highest loading in the steering equipment (as specified by the manufacturer) when the direction of movement of the tractor is altered. This is usually, but not always, with the largest diameter tyres.

The tyres, wheels and fender equipment used on the test tractor shall be stated in the test report (see annex A). Tyre pressures, tractor ballast, any use of front or rear dual wheels, and the mass on each axle shall be recorded.

6 Test

6.1 Test tractor specifications

All component parameters related to steering capability shall be within the manufacturer's specifications. Tractors with the option of different tyre sizes shall be tested with the arrangement which requires the highest steering effort. This is created by using tyres with the maximum load carrying capacity for the maximum design speed specified by the manufacturer.

Tractors shall be ballasted to the manufacturer's limit for overall tractor mass, with ballast distributed within the manufacturer's allowable limits to provide the highest steering effort.

Tyre inflation pressures shall be within the range recommended by the manufacturer for driving on the road at maximum design speed. Front wheel drive that can have the front wheel drive manually or auto-

matically disconnected shall be tested in the disconnected mode. Differential locks shall not be engaged unless they are automatic, in which case they shall be left in the automatic mode.

6.2 Test procedure

Drive the tractor in a spiral line at a speed of $10 \text{ km/h} \pm 2 \text{ km/h}$ starting from the straight ahead position. Start the time measuring device. A turn shall be initiated from the straight ahead position and the steering effort maintained on the steering wheel until the tractor reaches a position corresponding to a 12 m turning radius as shown in figure 1. Record the time taken to reach this position and the steering effort.

One complete test shall be made turning only to the left and a second test turning only to the right. If the tractor is equipped with a tractor energy source as defined in ISO 10998, then simulate a failure of the source by disconnecting the power source and repeat the tests. Turning radius measurement can be made with a marking device or by measuring the actual turning diameter.

7 Test report

A suitable test report form is shown in annex A. The test report shall include the following information:

- the name and address of the manufacturer;
- the type and model of tractor;
- tractor mass and ballast description;
- tractor drive;
- tractor tyre sizes and pressures, in kilopascals;
- steering characteristics;
- test conditions;
- data on steering effort, and time to achieve a 12 m turning radius.

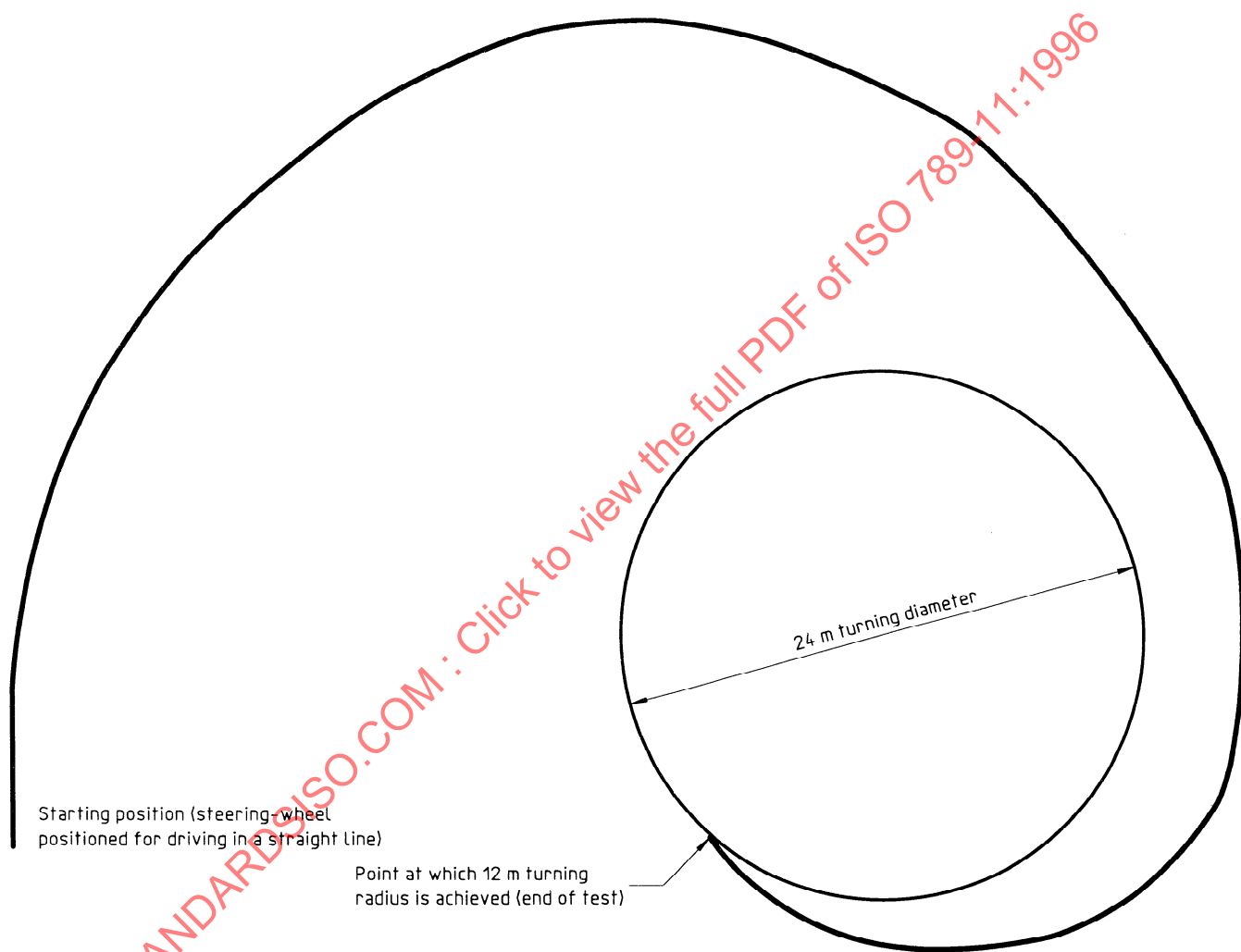


Figure 1 — Steering course

Annex A
(normative)

Specimen test report

A.1 Tractor

Manufacturer's name and address:
.....
.....
Tractor make: Model:
Mass of tractor submitted for test (including ballast):
Front: kg Rear: kg Total: kg
Description of ballast:

A.2 Track (tread) setting

Nominal		Actual front		Actual rear	
.....	mm		mm		mm
.....	mm		mm		mm

A.3 Drive wheels

☐ Two wheel ☐ Four wheel
☐ Other (describe):

A.4 Tyres and wheels

	Front	Rear
Tyre size:		
Singles or duals:		
Tyre pressure:	 kPa	 kPa

A.5 Steering equipment☐ Ackermann steer front axle☐ Articulated

Special equipment:

Type of steering

☐ Manual☐ Assisted☐ Servo☐ Other (describe):**A.6 Test surface**☐ Paved☐ Compacted soil**A.7 Steering effort and time to achieve 12 m turning radius at 10 km/h**

Tractor state	Steering effort N	Time s
With engine running left turn: right turn:		
Simulated tractor energy source failure left turn: right turn:		

Comments:

.....

Measured by:

Test location:

Test date: