
International Standard



789/5

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Agricultural tractors — Test procedures — Part 5: Partial power PTO — Non-mechanically transmitted power

Tracteurs agricoles — Méthodes d'essai — Partie 5: Puissance partielle de la prise de force (puissance transmise non mécaniquement)

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Descriptors : agricultural equipment, agricultural tractors, tests, power measurement, power take-off.

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 789/5 was developed by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, and was circulated to the member bodies in October 1982.

It has been approved by the member bodies of the following countries:

Australia	France	Spain
Austria	Iran	Sweden
Belgium	Italy	Switzerland
Bulgaria	Korea, Dem. P. Rep. of	Thailand
Czechoslovakia	New Zealand	Turkey
China	Poland	United Kingdom
Denmark	Portugal	USA
Egypt, Arab Rep. of	Romania	USSR
Finland	South Africa, Rep. of	

No member body expressed disapproval of the document.

Agricultural tractors — Test procedures —

Part 5: Partial power PTO — Non-mechanically transmitted power

0 Introduction

ISO 789 specifies test procedures for agricultural tractors. This part of ISO 789 deals with the partial power PTO (non-mechanically transmitted power). Other parts will be as follows:

Part 1: Power tests.

Part 2: Hydraulic power and lifting capacity.

Part 3: Turning ability.

Part 4: Exhaust smoke measurement.

Part 6: Centre of gravity.

Part 7: Power and torque of the drive wheels.

Part 8: Engine air cleaner.

1 Scope and field of application

This part of ISO 789 specifies test procedures for determining the power available for power take-off systems on agricultural tractors, of the wheeled, track laying or semi-track laying type, in which power transmission is accomplished by means other than a direct mechanical coupling between the engine and the PTO output shaft.

NOTE — For drawbar performance tests, see ISO 789/1. For specifications, see ISO 500.

2 References

ISO 500, *Agricultural tractors — Power take-off and drawbar — Specification*.

ISO 789/1, *Agricultural tractors — Test procedures — Part 1: Power tests*.

3 Definitions

For the purpose of this part of ISO 789, the following definitions apply:

3.1 non-mechanical drive system: A system which has a non-mechanical coupling between the engine and the power take-off. A fluid or electrical power transmission system is considered to be non-mechanical. A cooling component may be included.

3.2 deviation from rated PTO speed: This is the rotational frequency per unit of time (min^{-1}) of the PTO output shaft above or below the rated (standard) PTO rotational frequency of the system.

4 Permissible measurement tolerances

Measurements shall have the tolerances as given in clause 4 of ISO 789/1.

5 General requirements

5.1 Measurements

5.1.1 Temperature measurement

A means shall be provided for measuring the temperature(s) of any non-mechanical components which couple the engine to the PTO system.

5.1.2 Fuel consumption

See ISO 789/1.

5.2 Specifications

5.2.1 Tractor to be tested

The tractor tested shall conform to the specification in the test report and shall be used in accordance with the manufacturer's recommendations for normal operation.

5.2.2 Fuels and lubricants

See ISO 789/1.

5.2.3 Ancillary equipment

See ISO 789/1.

5.2.4 Ballasting and tyre pressures

See ISO 789/1.

5.3 Tractor preparation

5.3.1 Running-in and preliminary adjustments

The tractor shall be run-in prior to the test. For spark ignition engines fitted with a means for the operator to vary the ratio of the fuel/air mixture, the tests shall be carried out with the settings recommended for normal operation.

The adjustment of the carburettor or the injection pump shall conform to the manufacturer's specification.

The governor or the throttle shall be set to give maximum power at rated engine speed.

5.3.2 Operating conditions

See ISO 789/1.

6 Test procedures

6.1 Operate the system at rated power with the tractor speed control lever at maximum position for a period sufficient to establish stabilized conditions but not less than 2 h. The PTO system will be considered stable when two consecutive temperature readings taken 10 min apart do not differ by more than 1 °C.

6.2 Carry out maximum available PTO power test at engine rotational frequency in accordance with 6.1 for a period of 1 h. Record sufficient data as outlined in ISO 789/1 and calculate the deviations in 6.2.1 and 6.2.2.

6.2.1 Record the deviation in PTO rotational frequency (min^{-1}) above and below the rated (standard) PTO rotational frequency.

6.2.2 Record the deviation in (maximum and minimum) engine rotational frequency above and below the calculated average engine rotational frequency observed in 6.2.

6.2.3 Record the temperatures observed at the critical PTO system components.

6.3 Carry out a maximum power test at the PTO power level observed in 6.2 at the lowest engine rotational frequency which will maintain the maximum available power at the rated PTO rotational frequency for a period not less than 1 h. Record required data as outlined in 6.2.

6.4 Carry out a part (variable) load PTO power test at the engine rotational frequency determined under 6.3. The loading shall be imposed as follows:

6.4.1 85 % of torque at maximum power 20 min

6.4.2 Zero torque 20 min

6.4.3 One-half of 85 % of torque at maximum power 20 min

6.4.4 Maximum power 20 min

6.4.5 One-quarter of 85 % of torque at maximum power 20 min

6.4.6 Three-quarters of 85 % of torque at maximum power 20 min

Record data for each of the 20 min periods as outlined in 6.2.

7 Test report

7.1 Power take-off test

The test report shall be in accordance with the annex.

7.2 Abnormalities

Any observation of abnormality made during the test shall be reported.

NOTE — Data shall be considered irregular if they differ from those defined by the applicable International Standards for PTO operation.

Annex

Report form — PTO test

Power kW	Engine rotational frequency (calculated average) min ⁻¹	PTO rotational frequency (calculated average) min ⁻¹	Fuel consumption*			Temperature				Station barometer pressure kPa
			l/h	kg/kWh	kWh/l	PTO system** (critical)	Engine cooling medium °C	Wet bulb °C	Dry bulb °C	
Test a rated PTO rotational frequency (540 or 1 000 min ⁻¹) — Maximum speed control lever setting — 1 h										
Test a rated PTO rotational frequency (1 000 min ⁻¹) — Minimum speed control lever setting — 1 h										
Varying load test — Minimum speed control lever setting — 2 h										

* Relative density and temperature of fuel used should be noted, and be in accordance with the manufacturer's recommendations.

** Significant PTO system temperature to be identified and recorded.

Observed rotational frequency variation table

Load	Throttle setting	Engine rotational frequency variation min ⁻¹		PTO rotational frequency variation min ⁻¹	
		min.	max.	min.	max.
Full	Full				
Full	Minimum				
85 %	Minimum				
3/4 × 85 %	Minimum				
1/2 × 85 %	Minimum				
1/4 × 85 %	Minimum				

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