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Tractors and machinery for agriculture and forestry — Guards for power take-off (PTO) drive-shafts —

Part 1: Strength test

*Tracteurs et matériels agricoles et forestiers — Protecteurs d'arbres de
transmission à cardans de prise de force —*

Partie 1: Essai de résistance



Reference number
ISO 5674-1:1992(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 5674-1 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 2, *Common tests*.

This first edition of ISO 5674-1 cancels and replaces the first edition of ISO 5674:1982, of which it constitutes a technical revision.

ISO 5674 consists of the following parts, under the general title *Tractors and machinery for agriculture and forestry — Guards for power take-off (PTO) drive-shafts*:

- Part 1: *Strength test*
- Part 2: *Wear test*

Annex A of this part of ISO 5674 is for information only.

Tractors and machinery for agriculture and forestry — Guards for power take-off (PTO) drive-shafts —

Part 1: Strength test

1 Scope

This part of ISO 5674 specifies the test methods and requirements for determining the robustness and durability of guards for power take-off (PTO) drive-shafts as specified in ISO 5673.

Because such equipment is part of world-wide trade, which implies re-export of PTO drive-shafts to countries with extreme temperatures, a temperature of $-35\text{ }^{\circ}\text{C}$ has been specified for some tests.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 5674. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 5674 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 4254-1:1989, *Tractors and machinery for agriculture and forestry — Technical means for ensuring safety — Part 1: General*.

ISO 5673:1980, *Agricultural tractors — Power take-off drive shafts for machines and implements*.

3 Definitions

For the purposes of this part of ISO 5674, the following definitions apply.

3.1 PTO drive-shaft: Drive-shaft which meets the requirements of ISO 5673.

3.2 (shaft) closed length: (See ISO 5673:1980, subclause 4.1.)

3.3 (shaft) extended length: (See ISO 5673:1980, subclause 4.2.)

3.4 non-rotating PTO drive-shaft guard: PTO drive-shaft guard held stationary while the shaft is rotating.

3.5 rotating PTO drive-shaft guard: PTO drive-shaft guard which can rotate with the shaft except when it comes into contact with some other object.

4 Test conditions

4.1 The guard, which shall be taken from production and be within the tolerance shown on production drawings, shall be subjected to the appropriate tests given in 5.2 to 5.6 following the test sequence given.

The operating and maintenance instructions shall be complied with as described by the manufacturer. The guard shall be tested in conjunction with a PTO drive-shaft of 1 m closed length (3.2) for which it is intended. The same guard shall be used throughout the test. The results obtained from a sample shall be presumed to be valid for guards of shorter and longer length.

4.2 When the guard is made of plastics material, it is assumed to have been certified by the manufacturer to be resistant to UV-radiation.

4.3 Tests shall be carried out at an ambient temperature between $5\text{ }^{\circ}\text{C}$ and $35\text{ }^{\circ}\text{C}$, except as specified in 5.4 and 5.5.

4.4 Where a test procedure requires the shaft to be rotated, the rotational frequency shall be $1\,000\text{ min}^{-1}$.

5 Tests

5.1 General

After each test, note and record the condition of the guard with particular reference to any fractures, permanent deformation or detachments of components.

5.2 Axial loading test at ambient temperature

With the PTO drive-shaft and guard stationary, apply an axial force of 250 N between the cone and the tube in both directions. The force shall be gradually applied and then held for a minimum of 60 s. If the cones, or method of attaching them to the tubes, are not the same, each cone end shall be tested.

5.3 Radial loading test at ambient temperature

5.3.1 Support the guarded PTO drive-shaft in a horizontal, straight line by its usual end connections, extended to the maximum length recommended by the manufacturer.

5.3.2 Rotate the PTO drive-shaft and, using a smooth flat 100 mm wide wooden beam, apply a direct load of 500 N for 60 s at right-angles to the shaft guard at its mid-point.

To avoid excessive vibration, the wooden beam shall be supported by a 20 mm thick rubber backing of approximately A/20 Shore hardness (see figure 1).

When applying the load, care shall be taken to ensure that no impact load is applied.

5.3.3 Rotate the PTO drive-shaft and, using the wooden beam described in 5.3.2, apply a direct force of 500 N to the cone over the centre of the articulation of the universal joint, when in line with the PTO drive-shaft, for 60 s as shown in figure 1. The force shall be applied perpendicular to the PTO drive-shaft.

If the method of attachment of the guard to the shaft is not identical at each end, then test both ends.

5.3.4 Record whether any additional part of the shaft was exposed during or after the test.

5.4 Axial loading test at freezing temperature

5.4.1 Lower the temperature to $-35\text{ }^{\circ}\text{C}$ and maintain the PTO drive-shaft and guard at that temperature for 1 h.

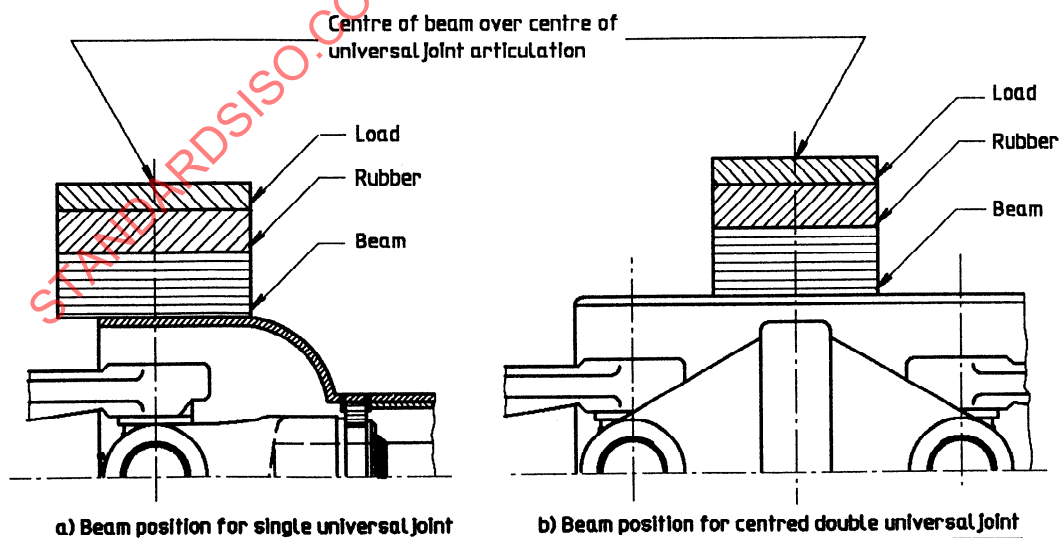


Figure 1 — Radial load test of cone

5.4.2 With the PTO drive-shaft and guard stationary and at $-35\text{ }^{\circ}\text{C}$, apply an axial force between the guard and the PTO drive-shaft in both directions. The force shall be:

- a) 2,5 kN if the inner diameter of the outer guard tube is less than or equal to 80 mm;
- b) 3,5 kN if the inner diameter of the outer guard tube is more than 80 mm.

The force shall be applied on the PTO shaft while the guard is held stationary.

If the method of attachment of the guard to the shaft is not the same at each end, each end shall be tested.

5.5 Impact test at freezing temperature

5.5.1 Support the PTO drive-shaft and guard in a horizontal straight line by their normal end connections, extended to the maximum length recommended by the manufacturer.

5.5.2 Maintain the PTO drive-shaft and guard at $-35\text{ }^{\circ}\text{C}$ for 1 h.

5.5.3 With the PTO drive-shaft and guard at $-35\text{ }^{\circ}\text{C}$, strike three blows as follows:

- a) one on the cone over the centre of articulation of the universal joint when in line with the PTO drive-shaft (the position of the end yoke being such that the face of the yoke is parallel to the contact face — see figure 2);
- b) one midway along on one of the tubes;
- c) one at the midpoint of the overlap of the tubes.

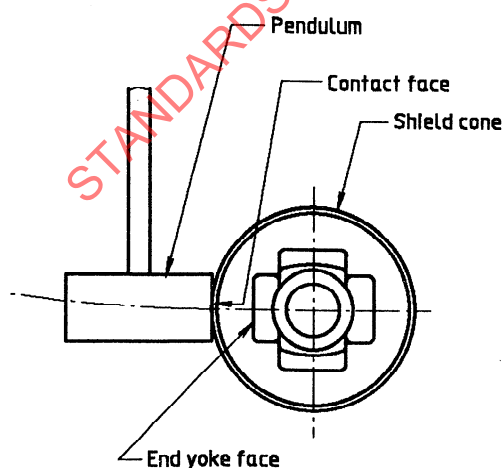


Figure 2 — Impact test

The blows shall be struck by using a pendulum, so that the impact energy is 98 J. The contact face shall be flat and have a diameter of 50 mm (see figure 2).

5.6 Restraining member test at ambient temperature

5.6.1 Apply a force of 400 N to each fitted restraining member. The force shall be applied perpendicular to, and in the same plane as the axis of the PTO drive-shaft.

5.6.2 Record any function failure of the restraining member or opening of the fixing hooks, and any fracture or cracks of the guard or detachment of the guard component.

6 Requirements

The PTO drive-shaft guard is deemed to have passed the tests if the damage (if any) does not impair the general safety requirements imposed on the guard by the requirements of ISO 4254-1.

A restraining member, where fitted, shall not show any permanent deformation impairing its function; there shall be no holes caused by wear during the test.

7 Test report

7.1 The test report shall include the following details:

- a) details of PTO drive-shaft guard, including identification marks for the guard and the PTO drive-shaft;
- b) condition of the guard after each test (see 5.1);
- c) results of axial loading test at ambient temperature (see 5.2);
- d) results of radial loading test at ambient temperature (see 5.3);
- e) results of axial loading test at freezing temperature (see 5.4);
- f) results of impact test at freezing temperature (see 5.5);
- g) results of restraining member test at ambient temperature (see 5.6), if applicable;
- h) statement if guard meets the requirements of clause 6.

7.2 A typical test report is shown in annex A.

Annex A (informative)

Form of test report (See clause 7)

Strength test of guards for PTO drive-shafts

Report on test of: power take-off drive-shaft guard
mounted on: power take-off drive-shaft

Length of shaft
closed: mm
extended: mm

Identification mark on shaft:
Guard: non-rotating/rotating (delete as applicable)
Identification mark on guard:

Cones

Material:
Length: mm
Maximum diameter: mm

Tubes

Material:

Dimensions	Outside diameter	Wall thickness	Length
outer tube	 mm	 mm	 mm
inner tube	 mm	 mm	 mm

Method of location on shaft:
 Type of bearings:
 Other features:

Axial loading test at ambient temperature

Ambient temperature: °C
 Did cones remain located on tubes? Yes/No (delete as applicable)
 Did guard remain functional? Yes/No (delete as applicable)
 Comments, if any:

Radial loading test at ambient temperature

Ambient temperature: °C
 Did guard remain stationary during the 60 s period for:
 non-rotating guards? Yes/No (delete as applicable)
 rotating guards? Yes/No (delete as applicable)
 Was any additional part of the shaft exposed during or after the test? Yes/No (delete as applicable)
 Did guard remain functional? Yes/No (delete as applicable)
 Comments, if any:

Axial loading test at freezing temperature

Freezing temperature: °C
 Did guard remain functional? Yes/No (delete as applicable)
 Did guard remain located on shaft? Yes/No (delete as applicable)
 Comments, if any:

Impact test at freezing temperature

Freezing temperature: °C
 Did guard remain functional? Yes/No (delete as applicable)

Comments, if any:
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Restraining member test

Ambient temperature: °C

Did restraining member remain functional? Yes/No (delete as applicable)

Comments, if any:
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Did the guard meet the requirements of ISO 5674-1? Yes/No (delete as applicable)

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