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

Part 2: Wear test

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

Partie 2: Essai d'usure



Reference number
ISO 5674-2:1992(E)

Foreword

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

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*

Part 1 cancels and replaces the first edition of ISO 5674, published in 1982.

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

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

Part 2: Wear test

1 Scope

This part of ISO 5674 specifies the requirements and the laboratory test method for determining the resistance against wear of guards for PTO drive-shafts as specified in ISO 5673.

If this wear test is to be carried out, it shall be undertaken on the same guard but before the strength test (in ISO 5674-1).

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*.

ISO 5674-1:1992, *Tractors and machinery for agriculture and forestry — Guards for power take-off (PTO) drive-shafts — Part 1: Strength test*.

3 Definitions

For the purposes of this part of ISO 5674, the definitions given in ISO 5674-1 and ISO 5673 apply.

4 Test conditions

4.1 The guard shall be taken from production and be within the tolerances shown on production drawings. The operating and maintenance instructions shall be complied with as described by the manufacturer. Non-rotating guards shall be restrained from rotating during the tests. Rotating guards shall not be restrained from rotating. The guard shall be tested in conjunction with a PTO drive-shaft of 1 m centreline closed length (as defined in ISO 5673) for which it is intended. The same guard shall be used throughout the test. The results obtained from a sample shall be presumed valid for guards of shorter and longer length.

4.2 The test shall be carried out at an ambient temperature between 5 °C and 35 °C, or at 50 °C ± 5 °C, as specified.

4.3 When the PTO drive-shaft guard is the rotating type, its rotational frequency shall be 1 000 min⁻¹.

5 Test equipment

5.1 The wear test equipment shall consist of a cabinet capable of holding the PTO drive-shaft and the rotating or non-rotating guard horizontal, and of rotating the PTO drive-shaft at a frequency of 1 000 min⁻¹. The equipment shall be such that it can be used for all PTO drive-shafts as specified in ISO 5673.

The size and shape of the cabinet shall be such that an even distribution of the spray of salt-water solution or dust is ensured. The upper parts shall be shaped so that drops of sprayed solution which ac-

accumulate on them do not fall onto the PTO drive-shaft guard.

5.2 When the tests require the use of water, the water shall be potable.

5.3 The dust shall consist of a mixture composed of equal parts, by mass, of organic and mineral dust.

5.3.1 The organic dust shall be ground lucerne with a maximum percentage of 12 % water and with a maximum particle size of 2 mm.

5.3.2 The mineral dust shall be a simple phosphated fertilizer. This product is obtained during the production of steel, by the treatment of steel or of phosphorous cast iron. It contains, as principal elements, the silicophosphates of calcium having the following characteristics:

minimum content:	12 % of P ₂ O ₅ total
other:	75 % at least of the P ₂ O ₅ total declared and shall be soluble in 2 % concentration of citric acid

Mesh opening of sieve mm	The fineness of grinding, after sifting min. % (m/m)
> 0,063	—
> 0,125	—
> 0,16	> 75
> 0,63	> 96

5.4 When using salt-water solution, it shall be prepared by dissolving sodium chloride in water to produce a concentration of 50 g/l ± 5 g/l. The sodium chloride shall be white and shall give a colourless solution in water. It shall be substantially free from copper and nickel, and shall not contain more than 0,1 % of sodium ionide and not more than 0,4 % of total impurities calculated for dry salt.

The solution shall be filtered before it is used in the test in order to remove any solid matter which might block the apparatus of the spraying device.

6 Wear test

During a complete test, the guard with shafts is operated for 290 h.

6.1 During operation in the test sequence described in 6.2, the shaft shall be rotated and, while rotating, shall be extended to its maximum length for 1 min of each 5 min cycle, and held at its minimum length for the other 4 min.

6.2 The test consists of the following four parts.

a) For 120 h, operate in alternating 24 h cycles at 50 °C and at ambient temperature, commencing with a cycle at 50 °C.

Immediately before commencing the next part of the test, immerse the PTO drive-shaft with guard in water (see 5.2), remove from the water and allow any water which may run off under gravity to do so.

b) For 120 h, operate at ambient temperature in an atmosphere containing 0,5 kg/m³ of dust as specified in 5.3.

c) For 2 h, operate at ambient temperature in an atomized solution of salt-water (see 5.4) sprayed at a rate of 72(l/h)/m². After the 2 h of operating, leave the PTO drive-shaft, with guard, stationary for 46 h.

d) For 48 h, operate at ambient temperature.

6.3 Before the start and at the end of the test described in 6.2, measure the running torque which needs to be applied to each guard tube in order to immobilize it while the shaft rotates at 1 000 m⁻¹.

7 Radial and axial loading tests

7.1 After completion of the wear test, the guarded PTO drive-shaft shall be subjected to a radial loading test at ambient temperature as described in ISO 5674-1:1992, sub-clause 5.3.

7.2 The guarded PTO drive-shaft shall also be subjected to an axial loading test at ambient temperature. With the PTO drive-shaft and guard stationary, apply an axial force of 1 000 N between each guard tube and the PTO drive-shaft. Apply the force in both directions.

7.3 After the loading tests in 7.1 and 7.2, note and record the condition of the guard, particularly concerning any wear, fractures, permanent deformations or detachment of components.

8 Requirements

The PTO drive-shaft guard is deemed to have passed the tests if:

- before and after the wear test, the torque required for the immobilization of any part of the non-rotating guard when the shaft rotates is not greater than 2,5 N·m;
- after the loading tests, the damage, if any, does not impair the general safety requirements imposed on the guard by the requirements of ISO 4254-1, and no holes have been caused by wear.

9 Test report

9.1 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) for non-rotating guards, the torque in newton metres, before the start and at the end of the wear test, needed to immobilize each guard tube when the shaft rotates (see 6.3);
- c) results of the loading tests (see 7.3);
- d) statement if the guard meets the requirements of clause 8.

9.2 A typical test report is shown in annex A.

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Annex A
(informative)

Form of test report (See clause 9)

Wear test of guards for PTO drive-shafts

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

closed: mm

Length of shaft

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