

INTERNATIONAL
STANDARD

ISO
8084

First edition
1993-12-15

**Machinery for forestry — Operator
protective structures — Laboratory tests
and performance requirements**

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*Machines forestières — Structures de protection de l'opérateur — Essais
de laboratoire et critères de performance*

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Reference number
ISO 8084:1993(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 8084 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 3, *Safety and comfort of the operator*.

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International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Machinery for forestry — Operator protective structures — Laboratory tests and performance requirements

1 Scope

This International Standard establishes a consistent, repeatable means of evaluating characteristics of an operator protective structure (OPS) under loading, and prescribes performance requirements for these structures under such loading in a representative test.

It applies to mobile forestry machines and equipment defined in ISO 6814.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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 3164:1992, *Earth-moving machinery — Laboratory evaluations of roll-over and falling-object protective structures — Specifications for deflection-limiting volume.*

ISO 6814:1983, *Machinery for forestry — Mobile and self-propelled machinery — Identification vocabulary.*

ISO 8082:—¹⁾, *Self-propelled machinery for forestry — Roll-over protective structures — Laboratory tests and performance requirements.*

1) To be published.

ISO 8083:1989, *Machinery for forestry — Falling-object protective structures — Laboratory tests and performance requirements.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 roll-over protective structure (ROPS): System of structural members whose primary purpose is to reduce the possibility of a seat-belted operator being crushed should the machine roll over. Structural members include any subframe, bracket, mounting, socket, bolt, pin, suspension or flexible shock absorber used to secure the system to the machine frame, but exclude mounting provisions that are integral with the machine frame.

3.2 deflection-limiting volume (DLV): That volume, related to the operator, which serves to set limits and deflections permissible when performing laboratory evaluations of ROPS, FOPS and OPS. The volume, an approximation, is based on the seated dimensions of the large operator. (See ISO 3164:1992, figure 1.)

3.3 falling-object protective structures (FOPS): System of structural members arranged in such a way as to provide operators with reasonable protection from falling objects, for example, trees, rocks. (See ISO 8083.)

3.4 operator protective structure (OPS): System of structural members arranged in such a way as to provide operators with reasonable protection from penetrating objects.

4 Laboratory tests

4.1 Apparatus

4.1.1 Material, equipment, and tie-down means, adequate to ensure that the OPS and its machine structure resist the applied force.

4.1.2 Apparatus necessary to push a test object into each surface tested, consisting of a 90 mm diameter steel spherical rod end. For testing various OPS materials, the test object is used as follows:

- a) for steel wire mesh, the test object alone is used;
- b) for grille bars, a steel-made interlayer of diameter 200 mm or 200 mm × 200 mm, edges rounded to R 13, is used;
- c) for glass or polycarbonate, a non-metallic pad, rubber or synthetic compound, is used. The pad shall be of homogeneous construction and uniform density, 20mm thick, 90 mm diameter and of 90 Sh A hardness.

4.1.3 Means of measuring the applied force.

4.1.4 Means of determining whether the OPS enters the DLV, during the test.

4.2 Preparation

4.2.1 The DLV and its location shall be in accordance with ISO 3164. The DLV shall be fixed firmly to the same part of the machine to which the operator's seat is secured, and shall remain there during the entire formal test period. On machines equipped with more than one seat position, the tests shall be conducted with the seat in the position that brings the DLV closest to the OPS for each surface tested.

4.2.2 Should the same structure be used for both tests, the OPS test procedure shall precede the ROPS loading. The removal of dents or replacement of the FOPS cover is permitted. (See 5.2.)

4.3 Test conditions

4.3.1 Measuring accuracy

The measuring accuracy given in table 1 shall be adhered to when conducting the test.

Table 1 — Measurement accuracy levels

Parameter	Tolerance
Measured dimensions	± 5 % of maximum deflection measured or ± 1 mm
Force measured	± 5 %
Durometer hardness	± 5 %

4.3.2 Machine or test bed condition

4.3.2.1 The OPS to be evaluated shall be attached to the machine structure as it would be in actual machine use. A complete machine is not required; however the portion to which the OPS is mounted shall be identical to the actual structure, and the vertical stiffness of the test bed shall be not less than that of an actual machine as described in 4.3.2.2.

4.3.2.2 If the OPS is mounted on a machine, the following stipulations apply:

- all detachable panels, not part of the OPS, which might be removed from an operating machine, shall be removed so that they do not contribute to the strength of the OPS;
- all suspension systems, including pneumatic tyres, shall be set at operating levels. Variable suspensions shall be in the "maximum stiffness" range.

4.4 Procedure

4.4.1 Apply force slowly (max. 5 mm/s) by the test object perpendicular to the exterior surface under test until the applied force reaches a value of 17 800 N. Sustain the applied force of 17 800 N for 1 min and then release it.

4.4.2 Apply loading to open mesh material or glazing so that the projection line of force is directed to the centre of such areas or to mesh opening.

4.4.3 If glazing material is used in conjunction with open mesh material or grille, the glazing material may be removed for the test. When the load is to be applied directly to the glazing material, a non-metallic

pad [see 4.1.2 c)] may be inserted between the test object and the glazed panel.

4.4.4 Apply loading to steel bar grilles with a force distributor [see 4.1.2 b)]. The load shall be distributed equally on as few bars as possible.

5 Performance requirements

5.1 The DLV as stated in ISO 3164 shall not be entered by any part of the OPS or the test object, and the major diameter of the test object shall not pass through the surface under test.

5.2 Where ROPS, FOPS and OPS are an integral structure, the OPS shall also meet the performance requirements for the appropriate ROPS as given in ISO 8082. Where a ROPS is not involved, a different structure may be used to support the OPS as long as the DLV is not violated in the test.

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UDC 630:631.3-788

Descriptors: agricultural machinery, forest equipment, operator protection, safety devices, specifications, performance evaluation, tests, performance tests, laboratory tests, accident prevention.

Price based on 3 pages
