INTERNATIONAL STANDARD ISO 3853

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Road vehicles — Caravans and light trailers — Towing brackets and coupling balls — Strength test

Véhicules routiers — Caravanes et remorques légères — Attelages à boule — Essais de résistance

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (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 set up 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 3853 was developed by Technical Committee ISO/TC 22, *Road vehicles*, and was circulated to the member bodies in April 1976.

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

Austria	India	Romania
Belgium	Iran	Spain
Brazil	Italy	Sweden
Chile	Japan	Switzerland
Czechoslovakia	Korea, Rep. of	Turkey
France	Netherlands	United Kingdom
Hungary	Poland	U.S.S.R.

The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia	South Africa, Rep. of
Canada	U.S.A.
Germany	

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Road vehicles — Caravans and light trailers — Towing brackets and coupling balls — Strength test

1 SCOPE

This International Standard lays down the strength requirements to be met by mechanical coupling devices between light trailers or caravans, and towing vehicles. Mechanical coupling devices may be of the following types :

— one-piece ball coupling;

— ball coupling comprising a number of parts which can be dismantled.

NOTE — The term "ball coupling" is used to designate a coupling device of which a "coupling ball" forms a part.

2 FIELD OF APPLICATION

This International Standard is applicable to towing brackets and coupling balls fitted to towing vehicles intended for the towing of caravans or light trailers of which the maximum total weight does not exceed 3,5 tonnes[1]. In the case where, exceptionally, the manufacturer of the towing vehicle authorizes the maximum permissible towed weight to be exceeded, the corresponding towing devices are not considered in this International Standard.

3 REFERENCES

ISO 1103, *Road vehicles — Caravans and light trailers — Coupling ball — Dimensional characteristics.*

ISO 1176, *Road vehicles — Weights — Vocabulary.*

4 GENERAL TEST REQUIREMENTS

4.1 The tests shall be carried out with coupling balls having dimensional characteristics complying with ISO 1103.

4.2 The strength tests described in this International Standard are dynamic tests to be performed on a test bed.

4.3 Strength test for towing device

4.3.1 *One-piece ball coupling*

4.3.1.1 MOUNTING ON TEST BED (see examples of mounting in annex A, example 1)

The complete towing device shall be rigidly mounted on the bed in a position geometrically identical with that intended when fitted to the type of vehicle for which this towing device is designed.

The fixing arrangements for the towing device on the test bed shall be those intended for its attachment to the towing vehicle.

4.3.1.2 ANCHORAGE POINTS

The relative positions of the anchorage points, for which the towing vehicle manufacturer shall provide all the necessary information to the towing device manufacturer, shall be copied on the test bed.

In cases where the towing device manufacturer cannot meet the requirements given by the towing vehicle manufacturer, he can choose the anchorage points which suit him provided that he accepts all responsibility resulting from this unrestricted choice, and in particular keeps to the maximum permissible towed weight specified normally by the towing vehicle manufacturer.

In all cases, the towing device shall be subjected to the dynamic test described below.

4.3.1.3 DESCRIPTION OF TEST METHOD

The assembly mounted on the test bed under the conditions defined in 4.3.1.1 and 4.3.1.2 shall be subjected to a test on an alternating stress tensile testing machine.

1) This value is chosen to include categories 01 and 02 of trailers according to the classification of vehicles given in document E/ECE/324/Rev. 1/Add. 12 of the Economic Commission for Europe of the United Nations. This document is entitled : *"Agreement concerning the adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipment and parts* — done at GENEVA on 20 March 1958 — Addendum 12 : Regulation 13 to be annexed to the Agreement : *Uniform provisions concerning the approval of vehicles with regard to braking".*

4.3.1.3.1 Direction of load application

The test load shall be an alternating force applied at an angle of $20 \pm 2^{\circ}$ relative to the horizontal in the longitudinal vertical median plane of the towing vehicle and passing through the centre of the coupling ball.

This angle is chosen in order to take account of the vertical static load.

4.3.1.3.2 Value of test load

The value of the test load to be applied in the direction specified in 4.3.1.3.1 shall be 0,5 D (in decanewtons[1]).

$$D = \frac{W_M \times W_R}{W_M + W_R}$$

where

W_M is the maximum manufacturer's total weight (towing vehicle) (see ISO 1176 – term 4.7.1);

W_R is the manufacturer's towed weight (see ISO 1176 – term 4.10.1).

4.3.1.3.3 Loading cycle and frequency

The value of the test load shall vary in an approximately sinusoidal manner from + 0,5 D to − 0,5 D for a number of cycles equal to 2×10^6.

The test shall be carried out by applying the load at a selected frequency, not exceeding 35 Hz.

4.3.2 *Ball coupling comprising parts which can be dismantled*

4.3.2.1 Ball couplings comprising parts which can be dismantled are principally as follows :

– towing device + ball (see annex A, example 2);

– towing device + ball on integral support, i.e. "one-piece" (see annex A, example 3);

– towing device + support + ball (see annex A, example 4).

4.3.2.2 These towing devices shall be tested under the conditions given in 4.3.1.

4.3.2.3 The test shall be carried out on a complete towing device but account will be taken only of the results relating to the part of the complete towing device included between the anchorage points and the fixing of the coupling ball support.

4.3.2.4 The strength tests on the support, and/or on the coupling ball, shall be carried out according to the requirements of 4.4.

4.4 Strength test on the ball and its support

4.4.1 *Mounting for test (see examples of mounting in annex A)*

The assembly of the support and the coupling ball shall be fixed rigidly on the test bed.

4.4.2 When specified, the dimensional characteristics of the mating surface of the ball support with the test bed or the towing bracket shall be those given in annex B. The two bolts used shall be of diameter M 16.

4.4.3 *Description of test method*

4.4.3.1 The assembly of the support and the coupling ball mounted according to the conditions specified in 4.4.1 shall be subjected to a test on an alternating stress tensile testing machine.

4.4.3.2 The test shall be carried out according to the requirements given in 4.3.1.3. In all cases, the weights of the towing vehicles and trailers to be considered for the test shall correspond to one or other of the two following categories :

category 1 : $W_M = 5\,000$ daN
$W_R = 3\,500$ daN

category 2 : $W_M = 22\,000$ daN
$W_R = 3\,500$ daN

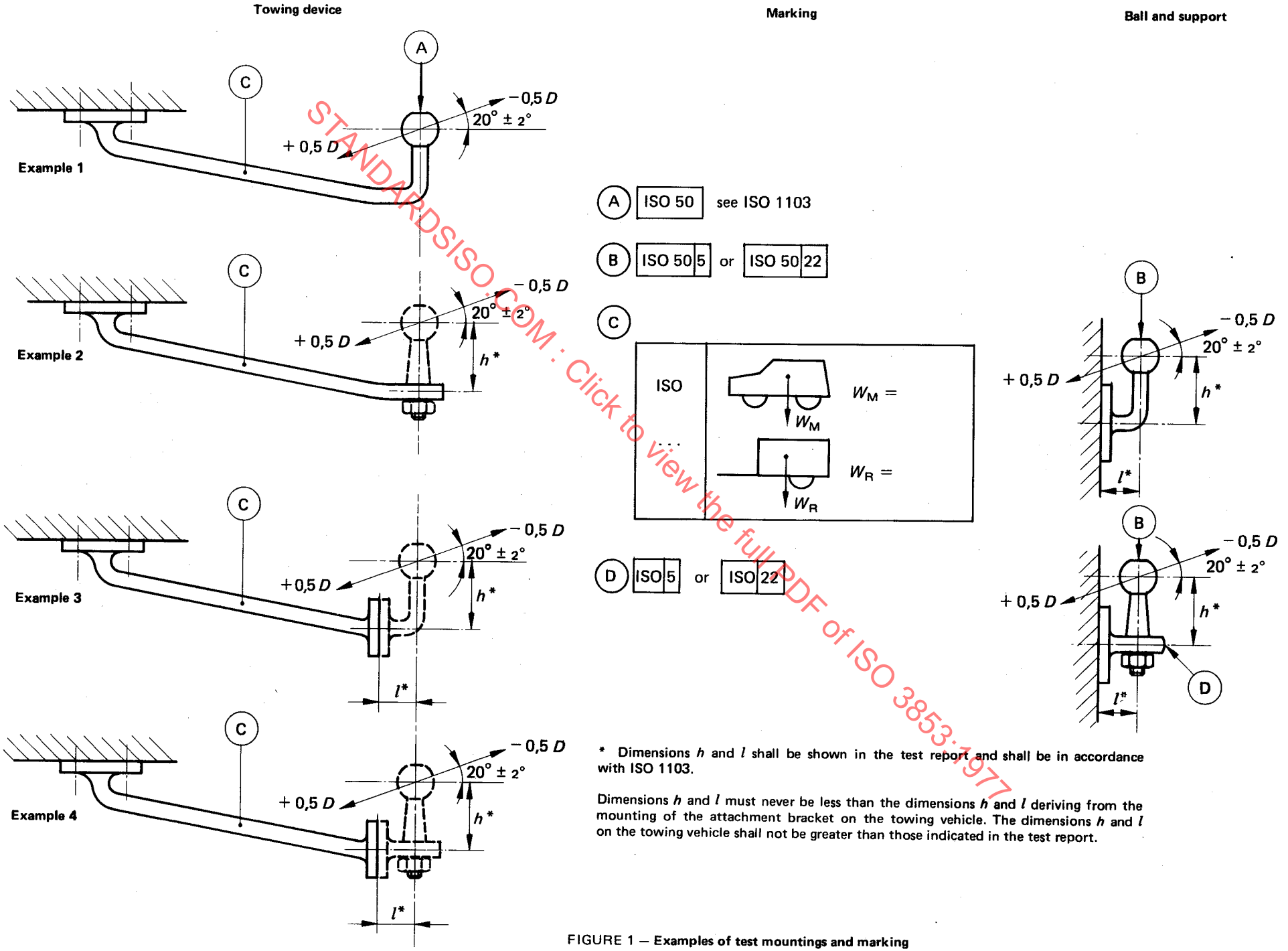
5 STRENGTH CRITERIA

For the duration of the tests carried out according to the requirements of this International Standard, the towing devices and their constituent parts (bracket, ball, support, fixings, etc.) shall not exhibit any permanent deformation or visible external deterioration and there shall be no breakage.

6 MARKING

Devices complying with 4.3 and 4.4, and identical to the type which was tested, shall carry the marking shown in annex A.

1) 1 daN $= \frac{1}{0{,}980\,665}$ kgf; i.e. 1 000 daN ≈ 1 tonne-force



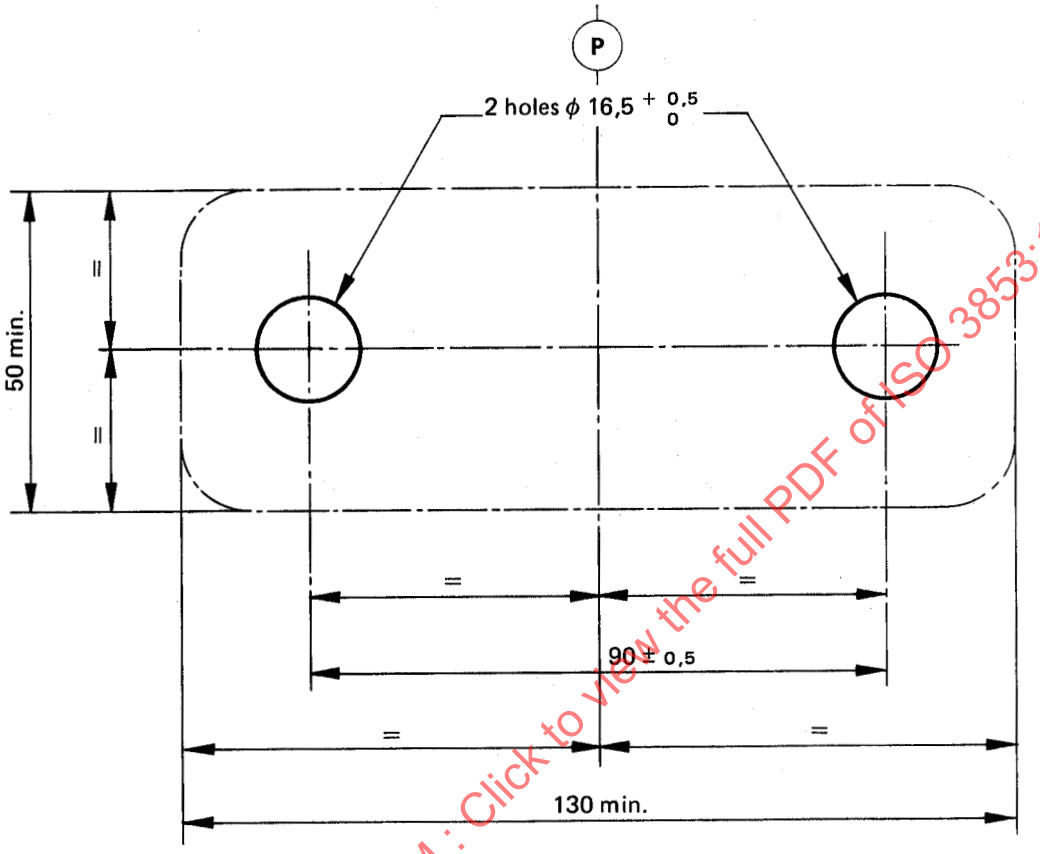
* Dimensions h and l shall be shown in the test report and shall be in accordance with ISO 1103.

Dimensions h and l must never be less than the dimensions h and l deriving from the mounting of the attachment bracket on the towing vehicle. The dimensions h and l on the towing vehicle shall not be greater than those indicated in the test report.

FIGURE 1 — Examples of test mountings and marking

ANNEX B

Dimensions in millimetres



P shall coincide with the median plane of the tractor vehicle.

FIGURE 2 — **Mating surface and fixing of ball support on towing device**