INTERNATIONAL STANDARD

ISO 18207

First edition
2006-10-01

Road vehicles — Trailers up to 3,5 t — Control of welded towing brackets for coupling ball after fatigue testing

Véhicules routiers — Remorques jusqu'à 3,5 t — Contrôle des supports de boule d'attelage mécanosoudés après essai de fatigue

Reference number
ISO 18207:2006(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 18207 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 4, *Caravans and light trailers*.

Introduction

Almost all of the towing brackets available on the European market are made of steel parts constructed by mechanical welding using semi-automatic machines. This process of welding is used for its good adaptation to mass production which generates welding defects that do not necessarily lead to cracking or fatigue ruptures during the test.

The uniqueness of control after fatigue testing thus leads to the detection of indications[1)] of which the origin, determining the outcome of the control, cannot be deduced with certainty:

— Welding defects which have not developed after the imposed $2\times,10^6$ cycles, thus deduced without seriousness;

— Fatigue cracks initiated during the test or defects of welding having started a process of cracking, constituting a crippling deterioration.

In the absence of data on the initial state of the product before fatigue test, the discrimination of these two types of indications can require long and expensive work (appropriate cutting up of the coupling for micrographic and/or microfractographic examination under a scanning electron microscope), which is not possible in a systematic way for economic reasons within the framework of these tests.

Hence, the requirement for a method of non-destructive tests acceptable in all cases without having to resort to these long and expensive examinations.

1) As defined in NF A 09-500 for control by penetrant testing or magnetic images, and in NF A 09-590 for control by magnetic particle testing. The often employed term “default” is used in the following text to designate these indications.

Road vehicles — Trailers up to 3,5 t — Control of welded towing brackets for coupling ball after fatigue testing

1 Scope

This International Standard defines a simplified and reliable check procedure of the mechanical coupling devices between light trailers, and towing vehicles, covered by ISO 3853 and European regulation (94/20/CE), which specify a dynamic test of mechanical resistance at the conclusion of which these devices should present neither fractures, splits, cracks, nor visible external deteriorations caused by the test.

This International Standard is applicable to all the components of the mechanical coupling devices whose failure can cause the fracture of the attachment, manufactured out of steel, forged steel or cast steel (i.e. generally in ferromagnetic materials).

In the case of use of other materials, the manufacturer will check their compatibility with the methods of non-destructive testing.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3853, *Road vehicles — Towing vehicle coupling device to tow caravans or light trailers — Mechanical strength test*

EN 473, *Non destructive testing — Qualification and certification of NDT personnel — General principles*

NF E 83-100, *Construction d'ensembles mécanosoudés — Techniques de soudage*

94/20/CE, *Directive 94/20/EC of the European Parliament and of the Council of 30 May 1994 relating to the mechanical coupling devices of motor vehicles and their trailers and their attachment to those vehicles*

3 Aim of controls and principles

The purpose of fatigue controls is to detect the defects caused by the fatigue resistance test (required by ISO 3853), i.e. to distinguish the evolutionary defects among all the possible defects (required by NF E 83-100) which do not necessarily affect the fatigue strength.

Controls consist of detecting, measuring, indexing and “charting” if needed, the indications before fatigue test then carrying out a new control after fatigue tests and comparing the results obtained.

4 Applicability of control

Control deals with all the components, all the welding, all the machining and all the parts of the coupling device whose failure can cause the rupture of the aforementioned.

5 Qualification of personnel

5.1 General

Controls are carried out by qualified personnel, in accordance with EN 473 or having an equivalent certification.

5.2 Magnetic particle testing

Control shall be carried out by qualified personnel, for example, in France: Level 2 of the “Comité Plurisectoriel de certification de la COFREND” (Confédération française pour les essais non destructifs [French confederation for non-destructive testing]). in magnetic particle testing.

5.3 Penetrant testing

Control shall be carried out by qualified personnel, for example in France: Level 2 of the “Comité Plurisectoriel de certification de la COFREND” in penetrant testing.

6 Choice of method

6.1 General

Among all the methods, magnetic particle testing and penetrant testing are the most widespread methods used for the non-destructive testing of towing accessories.

6.2 Magnetic particle inspection

This method is limited to ferromagnetic material and could be difficult to apply. This method does not need to remove the painting as cracks under the surface are visible and it is possible to perform a check test.

6.3 Penetrant testing

This method is simple to carry out without special equipment. The process requires the unit under investigation to be free from paint or other similar surface finishes.

7 Inspection of coupling devices

7.1 Control of the devices by magnetic particle testing

7.1.1 Magnetization

7.1.1.1 General information

Magnetization shall be adapted to the direction of the searched defects, the defects will be detected much better when their orientation is close to a direction perpendicular to the lines of inductions.

7.1.1.2 Method

Magnetization shall be performed using the passage of magnetic flux in the part along two perpendicular directions, the indicator used being a magnetic liquor coloured for examination in white light.

7.1.1.3 Value of magnetization

Magnetization shall be checked using a tangential field measuring device to Hall effect and shall be between 2 000 A/m and 4 000 A/m.

During control, the level of magnetization is checked using a standard test specimen.

7.1.2 Indicating products or contrasting agents

The detection of the defects shall be performed using black magnetic liquor made of magnetic particles suspended in a carrying liquid (non-aggressive to paint). The carrying liquid shall have a weak surface tension (good wetability) and shall not attack the surface to be examined. If the magnetic liquor is contained in a form other than aerosol, it shall be homogenized regularly and its concentration shall be checked at regular intervals.

7.1.3 Lighting

The luminous intensity on the surface of the examined part shall be higher than, or equal to 500 lx.

7.1.4 Procedure

7.1.4.1 Preparation of surfaces

The surface of the product shall be free from any trace of grease, dust, etc. Paint may remain in place.

7.1.4.2 Visual examination

Visual examination shall be carried out on the whole of the assembly with the naked eye or with a magnifying glass of maximum enlargement 6 when possible, under a luminous intensity at least equal to 500 lx.

7.1.4.3 Method of application of liquors

A fine coat of contrasting paint shall be applied to the control areas before magnetizing the part.

Simultaneously, a magnetic liquor shall be applied during magnetization, when the part is subjected to the action of the magnetic field for approximately 5 s.

7.1.4.4 Control of the operating conditions

The control of the operating conditions shall be made:

— either using magnetic particle testing samples; or

— using reference parts of the same type and having known surface defects.

7.1.4.5 Examination

Examined surface shall be covered uniformly with magnetic liquor and the magnetic images that it comprises shall not be modified before being examined.

In case of doubt, a complementary examination shall be carried out to ensure the nature of the images.

7.1.4.6 Demagnetization

The demagnetization of the controlled towing device is not necessary.

7.2 Control of the devices by penetrant testing

7.2.1 Products used

Products used include:

— solvent, grease-remover;

— coloured and pre-emulsified penetrating liquid, water-soluble; and

— revealing liquid containing solvent.

7.2.2 Preparation of surfaces

Examined surfaces shall be free from slag, paint, grease, etc.

Chemical, mechanical or chemical and mechanical cleaning may be necessary, in order to allow penetrating liquid to enter any discontinuity.

At the final stage of preliminary cleaning, careful drying shall be carried out, so that no cleaning product remains in discontinuities.

7.2.3 Application of the penetrating liquid

It may be applied using a brush or by spraying.

Subject to the manufacturer's instructions, impregnation shall be between 5 min and 60 min. The examination shall be carried out at a temperature ranging between 10 °C and 50 °C.

7.2.4 Elimination of the excess of penetrating liquid

Excess penetrating liquid is eliminated through:

a) Rinsing with water. By spraying or with a wet rag, the water pressure shall be less than 0,2 MPa and the temperature less than 50 °C.

b) Rinsing with solvent. The excess of penetrating liquid shall first be removed using a clean and fluff free rag. It shall be supplemented by cleaning with the aid of a rag slightly moistened with solvent. Any direct spray on the sections to be examined shall be prevented.

7.2.5 Drying

The surface to be examined shall be dried as soon as possible after removal of the excess penetrating liquid using one of the following methods:

— drying using a clean, dry and fluff free rag;

— evaporation with high temperature (using a hair dryer, providing an air flow at less than 80 °C), such that the temperature of the part to be examined shall remain less than 50 °C; or

— with oil-free compressed air (pressure less than 0,2 MPa).

7.2.6 Application of the revealing agent

Applied as soon as possible after the drying process, the revealing agent shall be deposited uniformly by spraying. This spraying shall be done such that the revealing agent is applied slightly wet on the surface to give a fine and uniform layer.

7.2.7 Duration of revelation — Examination

The duration of revelation shall be between 10 min and 30 min. However, to facilitate the characterization of the indications, a first examination shall be carried out immediately after the drying of the revealing liquid.

The final examination shall be carried out after the end of the duration of revelation.

7.2.8 Lighting — Conditions of observation

At the surface of the part to be controlled, the intensity of illumination shall be at least equal to 500 lx.

8 Evaluation of the indications or criteria of acceptance

All indications (linear or round) of which the dimensions are higher or equal to 2 mm shall be taken into account.

They can have two origins:

— crack having originated during the fatigue test; or

— crack having propagated during the fatigue test or having started from a pre-existing initiation.

In both cases, the defects are not acceptable.

9 Inspection report

The inspection report shall contain the following information:

— identification of the sample;

— reference to this International Standard (ISO 18207:2006);

— stage of examination in the range of control (inspection process);

— date of the examinations;

— type of surface preparation;

— control method, nature of the indicating products used;

— description and location of the significant faults (with diagram possibly);

— inspector's name, level and stamp.

All or part of the inspection report is included with the fatigue test report.