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Safety requirements for tractors

Part 4: Belt-drive wheeled tractors

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Foreword

All clauses of this Part are mandatory clauses, and serve as the basis for safety inspection and testing.

GB 18447 “Safety Requirements for Tractors” contains four parts:

- Part 1: Wheeled tractors;
- Part 2: Walking tractors;
- Part 3: Crawler tractors;
- Part 4: Belt-drive wheeled tractors.

This is Part 4 of GB18447.

Annex A to this Part is a normative annex.

This Part is proposed by China Machinery Industry Federation.

This Part is under the jurisdiction of the National Tractors Standardisation Technical Committee.

The unit responsible for drafting this Part is: National Tractor Quality Inspection Centre.

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This is the first version of this Part.

Introduction

This Part relates to the safety issues of belt-drive wheeled tractors.

Hazards concerned in this Part conform to those set out in GB/T 15706.1-2007.

Safety requirements for tractors

Part 4: Belt-drive wheeled tractors

1 Scope

This Part proposes the limitations regarding aspects of physical performances and expected use of belt-drive wheeled tractors. The stipulated safety requirements apply to hazards created in each stage of a machine's service as specified in Subsection 3.6 of GB/t 15706.1-2007.

This Part applies to belt-drive wheeled tractors (hereinafter referred to as "tractors") used in this country.

2 Normative references

The provisions of the following documents become provisions of this Part after being referenced in this Part of GB 18447. For dated reference documents, all later amendments (excluding corrigenda) and revised versions do not apply to this Part. However, the parties to the agreement are encouraged to study whether the latest version of these documents applies. For undated reference documents, the latest versions apply to this Part.

GB/T 3871.6 Agricultural tractors — Test procedures — Part 6: Determination of braking performance of vehicles for agriculture and forestry use (GB/T 3871.6-2006 • ISO 5697: 1982: IDT)

GB/T 3871.8 Agricultural tractors — Testing procedures — Part 8: Noise measurement (GB/T 3871.8-2006, OECD R5: 2002, MOD)

GB/T 3871.13 Agricultural tractors — Testing procedures — Part 13: Measurement of exhaust smoke (GB/T 3871.13-2006, ISO 789-4: 1986, MOD)

GB/T 4269.1 Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols (GB/T 4269.1-2000, idt. ISO 3767-1: 1991)

GB/T 4269.2 Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 2: Symbols for agricultural tractors and machinery (GB/T 4269.2-2000 • idt. ISO 3767-2: 1991)

GB 6376 Noise limitation for tractors

GB/T 9480 Tractors and machinery for agriculture and forestry, powered lawn

and garden equipment — Operators manuals — Content and presentation (GB/T 9480-2001, eqv. ISO 3600: 1996)

GB 9656 Safety glazing materials for road vehicles (GB 9656-2003, ECE R43: 2000, NEQ)

GB 10395.1-2001 Tractors and machinery for agriculture and forestry — Technical means for ensuring safety — Part 1: General principles (eqv. ISO 4254-1: 1989)

GB 10396 Tractors and machinery for agriculture and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles (GB 10396-2006, ISO 11684: 1995, MOD)

GB/T 10910 Agricultural wheeled tractors — Measurement of whole-body vibration of the operator (GB/T 10910-2004, ISO 5008: 2001, NEQ)

GB/T 13876 Agricultural wheeled tractors — Evaluation criteria of whole body vibration of the operator.

GB/T 15706.1-2007 Safety of machinery — Basic concept, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1: 2003, IDT)

GB/T 20948 Rear-view mirrors requirements for agricultural and forestry tractors

GB/T 20949 Recommendation for installation of lighting and light-signalling devices for wheeled agricultural and forestry tractors

GB/T xxxx.1 Strength test methods and approval conditions of wheeled agricultural and forestry tractors with narrow wheel span — Part 1: Front-located static test methods (GBT xxxx.1-200x• OECD Code 6: 2005• MOD)

GB/T xxxx.2 Strength test methods and approval conditions of wheeled agricultural and forestry tractors with narrow wheel span — Part 2: Front-located dynamic test methods (GBT xxxx.2-200x• OECD Code 6: 2005• MOD)

GB/T xxxx.3 Strength test methods and approval conditions of wheeled agricultural and forestry tractors with narrow wheel span — Part 3: Rear-located static test methods (GBT xxxx.3-200x• OECD Code 7: 2005• MOD)

GB/T xxxx.4 Strength test methods and approval conditions of wheeled agricultural and forestry tractors with narrow wheel span — Part 4: Rear-located dynamic test methods (GBT xxxx.4-200x• OECD Code 7: 2005• MOD)

JB/T 6701 Front illuminating lamps for tractors and CRVs

JB/T 8303 Agricultural tractors – Driver's seat belt (JB/T 8303-1999• eqv. ISO

3776: 1989)

3 List of hazards

The potential hazards in the running, operation and maintenance processes of tractors are shown in Table 1.

Table 1 List of hazards

Serial No	Hazard	Serial No	Hazard
1	Crashing hazard	7	Burning injury due to contact with heat source
2	Cutting hazard	8	Hazard caused by electrolyte leakage
3	Rotating parts without protective device	9	Insufficient lighting signal
4	Mechanical failure	10	Too much noise
5	Excessive exhaust smoke	11	Braking failure
6	Skidding on a bypass or other places	12	Hazards caused by incorrect operation

4 Safety requirements and/or measures and determinations

4.1 General requirements

4.1.1 In a tractor with a cab, a rider's seat can be provided. It should be secured firmly and its location should not affect the driver's operation. Moreover, the seat should not increase the external dimensions of the tractor. For tractors without a cab, it is forbidden to install a rider's seat at the rear mudguards.

4.1.2 The wheel hubs and rims of the tractor should have sufficient strength to guarantee that they will not be damaged during normal operation and maintenance.

4.1.3 A safety protection device should be located at the hydraulic system of the tractor to prevent overloading. The bursting pressure of the hydraulic circuit used in the hydraulic steering system should be able to endure at least 4 times normal working pressure of the system, whereas the bursting pressure of other hydraulic circuits should be able to endure at least 2.5 times of normal working pressure of the system. In addition, the endurable normal working pressure should be indicated on the circuit.

4.1.4 The electric circuit connection of the tractor should be correct and reliable. The leads should be tied in a bunch, neatly arranged, and fixed tightly. The joint should be firm and covered by an insulation sleeve. When a lead goes through a hole, an insulation sleeve should be attached thereto. The arrangement of hydraulic circuits and electric circuits of tractor should avoid rubbing and contacting with any heat

generating parts.

4.1.5 The front windscreen of the cab should be made of safety glass and should meet the requirements set out in GB 9656. The front windscreen should be equipped with a wiper, and the starting and ending positions of the wiper should not affect the driver's field of vision.

4.1.6 The installation of the fuel tank of the tractor should guarantee that there are no protrusions, sharp edges, or sharp angles. For tractors with a cab, the fuel pipeline and fuel port must be installed outside the cab. The structure of the fuel tank itself should meet the following requirements:

- a) when a pressure of 2 times the fuel tank working pressure or compressed air of no less than 30 kPa is injected to the fuel tank, there should be no leakage within 10 min;
- b) when the fuel tank is injected with 85% of its rated water capacity, the fuel tank cap is closed, and the tank turned upside down to make its fuel port face downwards, the leakage via the fuel tank cap and the air intake/exhaust device should not be over 30 g/min.

4.1.7 The maximum light-opaque smoke exhaust value of tractor should not be greater than 3.2 m^{-1} and should be measured according to the requirements set out in GB/T 3871.13.

4.1.8 The noise limit value in the tractor environment and at the driver's operating position should meet the requirements set out in GB 6376 and should be tested according to the requirements set out in GB/T 3871.8.

4.2 Safety protection

4.2.1 When a driver is operating or performing maintenance according to the operating manual of a product, protective and/or safety warning signs should indicate any hazards that may jeopardise the health and safety of the operator or any potentially hazardous places. Any exposed rotating parts prone to causing hazards should be equipped with protective devices, which should be fixed firmly and reliably, compression-resistant, without any sharp angles or acute edges. As to other exposed structural parts, there should be no such structural shapes as sharp angles or acute edges that would easily cause harm to the operator.

4.2.1.1 When the power output axle is out of operation, a safety protective case should be attached to it. When the power output axle is in use, it must be installed with a safe protective case.

4.2.1.2 Pedals, foot pedals and steps should be skid-proof and equipped with protruding edges or baffles, if necessary. Their dimensions should meet the requirements set out in subsection 10.1.3 of GB 10395.1-2001.

4.2.1.3 The starting jaw should be equipped with a protective edge, and the axle end should not protrude out of the protective edge.

4.2.1.4 The fan, pulley (including the pulley of flywheel) and flywheel should be equipped with protective edges.

4.2.2 The position and direction of the outlet of the exhaust pipe should be arranged in such way that the driver's or other drivers' exposure to hazardous gas and smog is minimised. The muffler and exhaust pipe should be equipped with thermo-insulation devices, and the reachable safe distance when going through the protective devices should meet the requirements set out in Subsection 7.1.5 of GB 10395.1-2001.

4.2.3 The arrangement of the battery should be placed so as to avoid any hazards to the driver caused by the electrolyte solution and its acidic mist.

4.2.4 The tractor should be able to be equipped with a safety frame and a safety belt. The strength of the safety frame should, at a minimum, meet the requirements of one of these test methods and acceptance conditions: GB/T xxxx.1, GB/T xxxx.2, GB/T xxxx.3, and GB/T xxxx.4. The strength of the safety belt should meet the requirements set out in JB/T 8303.

4.3 Braking performance

4.3.1 When using an on-board braking device on a 20% dry and hard slope way, the tractor should be able to stop reliably along the slope in both upward and downward directions. Tests should be carried out according to the requirements set out in GB/T 3871.6.

4.3.2 The average braking deceleration in the tests of tractor in cold status should not be below 2.5 m/s^2 . The test methods should meet the requirements set out in GB/T 3871.6.

4.4 Lighting and signal devices

4.4.1 The lighting signals and devices of the tractor should work accurately and reliably. A tractor should comprise at least two headlights, one working light, two braking lights, and two signal lights of direction turning in the front and at the rear respectively. Tractors with a cab should also comprise at least a ceiling light in the cab. The headlight should meet the requirements set out in JB/T 6701, and the colours of the signal light devices should meet the requirements set out in GB/T 20949.

4.4.2 The luminous intensity of the far field beam of each headlight of the tractor should not be less than 6000 candela.

4.4.3 When testing the irradiating position of the near field beam of the headlight of tractor, and when the headlight irradiates onto a screen 10 metres away, the centre of the beam from the ground should not be at a height greater than 0.7 times of the height of the installation centre of the headlight from the ground. As to the

requirements of the horizontal position, the offset to the right should not be over 350 mm, while an offset to the left is not permitted. The test of the irradiating position of the headlight beam should be performed according to the requirements set out in Annex A with the condition that the tractor is fully filled with fuel and water, but without added weight.

4.4.4 Each tractor should be equipped with non-adhered rear reflectors. Rear reflectors should be firmly connected to the tractor and should guarantee that when a headlight with the luminous intensity of 18000 candela is used at night to irradiate from 150m right behind, its reflective light can be recognised at the irradiating position.

4.4.5 A rear view mirror should be installed on the left and right sides respectively of tractors with cab, and at least one rear view mirror should be installed in tractors without a cab. The requirements for rear view mirrors should meet the requirements set out in GB/T 20948.

4.5 Signs for safe operation

When the operation directions of an operation device are not clear, they should be indicated by operational signs on or close to the operation device. The operation signs should meet the requirements set out in GB/T 4269.1 and GB/T 4269.2.

5 Information in use

5.1 A permanent trademark or factory mark should be attached to an obvious part on the external surface of the tractor's front body. A sign for identifying the model should be attached to an obvious part of the external surface of the tractor's body.

5.2 A permanent product label should be attached to each tractor. The label should include at least the following content:

- name and model number of tractor;
- rated power of engine (12-hour);
- serial number, and the month and year when delivered from the factory;
- name and address of manufacturer;
- standard numbers to be implemented by product.

5.3 Safety marks should be provided at the following dangerous positions as a minimum, and should meet the requirements set out in GB 10396:

- a) A safety mark prohibiting the riding on any position not designed for passenger, e.g. prohibiting the riding at the mudguards of tractor;
- b) A safety mark prohibiting any approaches when a suspension device is working;
- c) A safety mark indicating the power output axle being in use;
- d) A safety mark at the cover of a water tank.

5.4 The user of every tractor should be provided with a user manual with easy-to-understand contents. In the user manual, there should be the number of lubricant used by tractor. The content of the user manual should meet the requirements set out in GB/T 9480, and its safety items should include the following contents as a minimum:

- a) warnings of safe operation to avoid hazards;
- b) measures to be taken in case of emergency;
- c) prohibition requirements;
- d) description of safety marks.

Annex A
(Normative Annex)

Inspection methods for irradiating position of headlight beam

A.1 Screen method: Inspection on the screen

The site for inspection should be flat. A screen should be placed vertically on the site. Inspections should be conducted under the condition that the air pressure of the tyres of the inspected tractor is normal, and a driver sits in the tractor. Park the tractor in front of the screen, and make it vertical to the screen. Place the standard centre of the headlight 10 metres from the screen. Confirm the horizontal standard line on the screen to be at the same height H of the standard centre of headlight from the ground. Take the projected line of the vertical central plane of tractor on the screen as the standard to confirm the standard central position line between the left and right headlights. Measure the offset values of the horizontal and vertical irradiating positions of the left, right, far and near beams respectively.

A.2 Inspection by headlight tester

The inspected tractor should be aligned with the headlight tester at the specified distance (the use of aligning device is suggested). Measure from the display screen of the headlight tester the offset values of the horizontal and vertical irradiating positions of the left, right, far and near beams respectively.