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Internal combustion counterbalanced forklift trucks - Energy efficiency test methods

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard was proposed by China Machinery Industry Federation.

This Standard shall be under the jurisdiction of National Technical Committee of Auto Standardization (SAC/TC332).

Main drafting organizations of this Standard: Beijing Design Institute of Hoisting and Conveying Machinery, AND China Hoisting & Conveying Equipment Quality Supervision and Inspection Center.

Participating drafting organizations of this Standard: Anhui Heli Co., Ltd, Hangzhou Forklift Group Co., Ltd., Guangxi Liugong Machinery Co., Ltd., Linde (China) Forklift Truck Co., Ltd., Beijing Hyundai Construction Machinery Co., Ltd., Lonking (Shanghai) Forklift Co., Ltd., Dalian Forklift Co., Ltd, Toyota Industry (Kunshan) Co., Ltd., Shandong Shantui Machinery Co., Ltd. AND Xiamen XGMA Machinery Co., Ltd.

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This Standard is issued for the first time.

Internal combustion counterbalanced forklift trucks

- Energy efficiency test methods

1 Scope

This Standard specifies the energy efficiency test methods of internal combustion counterbalanced forklift.

This Standard is applicable to diesel-powered and gasoline-powered internal combustion counterbalanced forklifts. Other types of internal combustion counterbalanced forklifts (hereinafter referred to as "forklift") can refer to this Standard.

2 Normative references

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

GB/T 6104 Powered industrial trucks - Terminology

3 Terms and definitions

Terms and definitions as described in GB/T 6104 AND the following ones are applicable to this Standard.

3.1 Unit cycle fuel consumption

Fuel consumption of forklift when it completes a work cycle under specified test conditions.

3.2 Effective work

The work of forklift when it completes a work cycle on test load under specified test conditions.

3.3 Energy efficiency value

Effective work done by per unit of fuel consumption of forklift under specified

test conditions.

3.4 Standard laden condition

Forklift is loaded with test load, mast is vertical, the upper surface of fork arm's horizontal section is 300 mm from the ground (when rated lifting weight $Q \leq 10000$ kg) or 500 mm (when rated lifting weight $Q > 10000$ kg).

3.5 Traveling condition with standard laden

Under standard laden condition, mast travels under the maximum backward-tilt conditions.

4 Test conditions

4.1 Test load

Test load shall comply with the following provisions:

- a) Test load is a homogeneous cube of which its mass is 0.7 times of forklift rated lifting weight Q , its error is $\pm 1\%$, and side length is twice as long as the load center distance.
- b) In order to ensure that the side length of test load is twice as long as the load center distance, it shall be allowed to make the test load a cube of which the surrounding is homogeneous and the middle is hollow.

4.2 Requirements for test forklift

4.2.1 The test forklift shall comply with standard provisions of related products.

4.2.2 Before energy efficiency test starts, the forklift shall be refuelled with fuel, lubricating oil, hydraulic oil, coolant, etc. required by the test.

4.2.3 Fuel type of test forklift in energy efficiency test shall comply with requirements of forklift's instructions for use.

4.2.4 When carrying out energy efficiency test, air conditioner, lighting and other auxiliary devices which have nothing to do with forklift operation shall be turned off.

4.2.5 Forklift tire shall comply with the following provisions:

- a) Under unladen conditions, pneumatic tire pressure shall be consistent with specified value; pneumatic pressure error shall be less than $\pm 10\%$ of the

4.4.3 When carrying out energy efficiency test, forklift driver's weight shall be 80 kg. If it is less than 80 kg, weight shall be added to meet the requirements.

5 Fuel consumption test

5.1 Test methods

Fuel consumption shall be measured in fuel weighing method or flow meter method. When a dispute occurs, it shall adopt fuel weighing method as an arbitration method.

5.1.1 Fuel weighing method

Disconnect the power supply system of forklift. Connect test vessel in front of oil feed pump. Weigh fuel mass change in the test vessel before and after the test. Fuel mass consumption divided by fuel density equals to fuel consumption of test forklift.

5.1.2 Flow meter method

Disconnect the power supply system of forklift. Concatenate flow meter between fuel tank and fuel supply system of internal combustion engine. After the following operation cycle is completed, read the value of flow meter, that is the fuel consumption of test forklift.

5.2 Travel-path of forklift

In the test, the travel-path of forklift is shown in Figure 1. Forklift's turning radius $R=r+L_1$, where r is the design value of the minimum turning radius of test forklift; the lifting height of forklift at A and at B is $h=2000$ mm, AND the number of cycles n , travelling distance L_0 and L_1 are shown in Table 1.

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