127

INTERNATIONAL STANDARD

ISO 8643

First edition
1988-02-01

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Earth-moving machinery — Hydraulic excavator and backhoe loader boom lowering control device — Requirements and tests

Engins de terrassement — Dispositif de contrôle d'abaissement de la flèche des pelles et chargeuses-pelleteuses hydrauliques — Exigences et méthodes d'essai

Reference number
ISO 8643 : 1988 (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.

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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8643 was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Printed in Switzerland

Earth-moving machinery — Hydraulic excavator and backhoe loader boom lowering control device — Requirements and tests

0 Introduction

Where national regulations permit use of excavators or backhoe loaders for lifting operations, a failure in the hydraulic boom circuit may endanger persons under raised loads.

This risk can be reduced by applying a control device, which ensures controlled load lowering, in case of a hydraulic line failure or rupture in the boom circuit.

Test procedures are based on the special design characteristics of the hydraulic systems of hydraulic excavators and the backhoe part of backhoe loaders, and conditions of use.

1 Scope

This International Standard establishes uniform requirements and test procedures for boom lowering control devices fitted on boom lift cylinders to control the rate of drop in case of a hydraulic line failure or rupture.

2 Field of application

This International Standard applies to boom control lowering devices on hydraulic excavators and the backhoe part of backhoe loaders, when used for lifting of loads.

3 Reference

ISO 6165, *Earth-moving machinery — Basic types — Vocabulary.*

4 Definitions

4.1 boom control system: Hydraulic control valve(s) (including pilot and slave valves) used for raising and lowering of the boom.

4.2 rated lift capacity: Smaller of either the rated tipping capacity or the rated hydraulic lift capacity.

4.3 lift point: One point as defined by the manufacturer for purposes of lifting. It is defined by lift point height and lift point radius.

4.4 lift point height: Vertical distance from the lift point to the ground reference plane (GRP).

4.5 lift point radius: Horizontal distance from the lift point to the axis of rotation.

5 Requirements for lifting loads

5.1 For hydraulic excavators and the backhoe part of backhoe loaders used in lifting operations, a controlled lowering device shall be provided which prevents uncontrolled lowering of the boom in case of a hydraulic line failure or rupture.

5.2 Such control devices shall operate automatically while raising, holding and lowering loads. In case of line rupture during down movement, the increase in the initial lowering speed shall be less than 200 mm/s, measured at the load, whatever the height of the fall.

After the operator returns the control to the neutral position, the drop rate of the load shall not exceed 10 mm/s, allowable for internal leakage in the system.

5.3 The operation of the boom control lowering device shall not detract from the normal response of the machine and shall not, at any time, endanger the stability of the machine.

5.4 A relief valve to protect the cylinder may be fitted between the cylinder and the control device.

5.5 In case of a failure of the boom control system, or after a boom line rupture, lowering of the load shall be possible without endangering person(s) or the stability of the machine.

5.6 Except for tubes and fittings integrated into the cylinder assembly and supported at both ends, tubes and hoses shall not be used to connect

a) the lift cylinder to the control device;

b) the lift cylinder to the relief valve when it is in parallel with the control device.

Tubes and fittings integrated into the cylinder assembly shall have a minimum burst pressure of four times the relief valve pressure for that part of the system.

5.7 Signal lines for testing device(s) and equalizing lines between lift cylinders are permissible, if rupture of one of these lines results in oil leakage of not more than 10 l/min for each cylinder at approximately 40 to 50 °C oil temperature at the specified operating pressure.

6 Test method

6.1 Apparatus

6.1.1 Stop watch.

6.1.2 Measuring tape or scale.

6.1.3 Thermometer, measuring from 0 to 100 °C.

6.1.4 Measuring container, of 2 l capacity or **flowmeter.**

6.1.5 Collecting container, for hydraulic oil or alternatively oil return line to tank.

6.1.6 Test load, a mass (50 ± 10) % of the rated lift capacity at a specific lift point radius.

NOTE — Test methods ensuring equal results may be used, for example a level site near a vertical wall to which a paper is pinned to record the load displacement in the tube or hose rupture simulation test, where the load is fitted with a stylus.

6.2 Preparation for test

6.2.1 A failure-simulating device shall be installed in any connecting line the failure of which could cause the boom to lower. The tube for testing shall not increase the resistance of the connecting line.

Examples of such installations are

a) in the line between boom lift cylinder and control valve as shown in figure 1;

b) in the signal line between boom lift cylinder and testing device as shown in figure 2;

c) in the equalizing line between boom lift cylinders as shown in figure 3.

6.2.2 The complete hydraulic system shall be operated until the hydraulic oil temperature in the oil reservoir is approximately 40 to 50 °C. The hydraulic fluid shall be of the type and grade specified by the manufacturer.

6.3 Testing of control device

6.3.1 The test load shall be at the lift point radius which results in a moment equal to (50 ± 10) % of the moment developed by the rated lift capacity at a specific lift point radius.

6.3.2 The functions of boom raise and lower shall be smooth and at a reduced speed of max. 200 mm/s, measured at the test load.

6.3.3 The load shall be lowered and set down after each test in accordance with 5.5.

6.4 Testing of holding position

6.4.1 The test load shall be raised approximately 1 m above ground level, with the control valve(s) in neutral position.

6.4.2 The failure-simulating valve between lift cylinders and control valve shall be opened.

6.4.3 The total drop of the load during the initial 10 s shall be measured; it shall not exceed 100 mm.

6.5 Testing during raise function

6.5.1 The test load shall be lifted smoothly and continuously without shock (see 6.3.2).

6.5.2 The failure-simulating valve between the lift cylinder(s) and the control valve shall be opened.

6.5.3 The total drop of the load during the initial 10 s shall be measured; it shall not exceed 100 mm.

6.6 Testing during lowering function

6.6.1 The test load shall be lowered smoothly and continuously without shock (see 6.3.2).

6.6.2 The failure-simulating device between the lift cylinder(s) and the control valve shall be opened.

6.6.3 The increase in the lowering speed of the test load shall be less than 100 % increase of the initial speed. After the control is moved to the neutral position, the device shall be able to limit boom movement so that the total drop of the load during the initial 10 s of the test does not exceed 100 mm.

6.7 Testing of equalizing lines or signal lines

6.7.1 Testing shall be performed without load.

6.7.2 The boom shall be raised to its maximum lift height, and the control valve kept in the "lift" position.

6.7.3 The failure-simulating device shall be opened.

6.7.4 The oil leakage per cylinder shall not exceed 10 l/min.

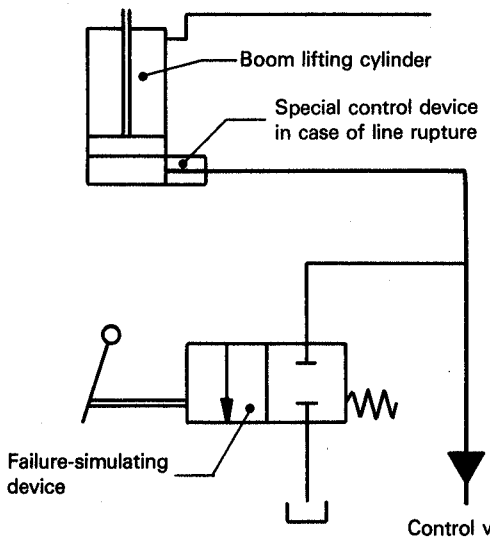

Figure 1

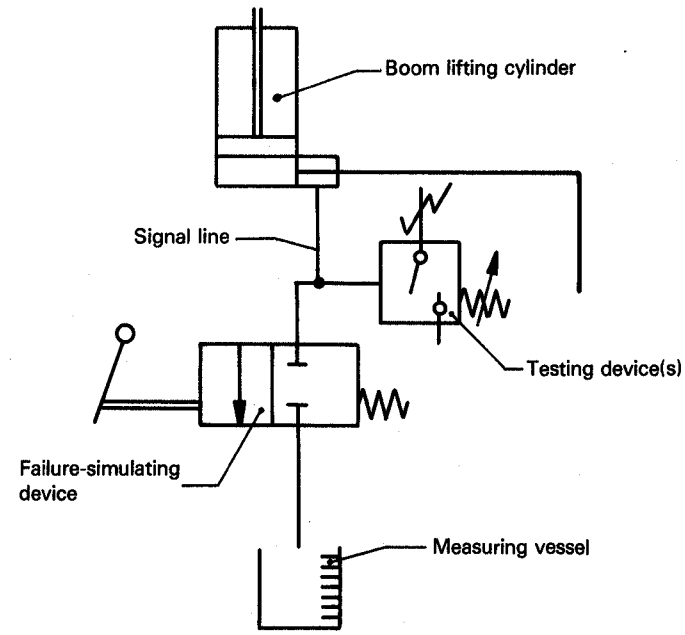

Figure 2

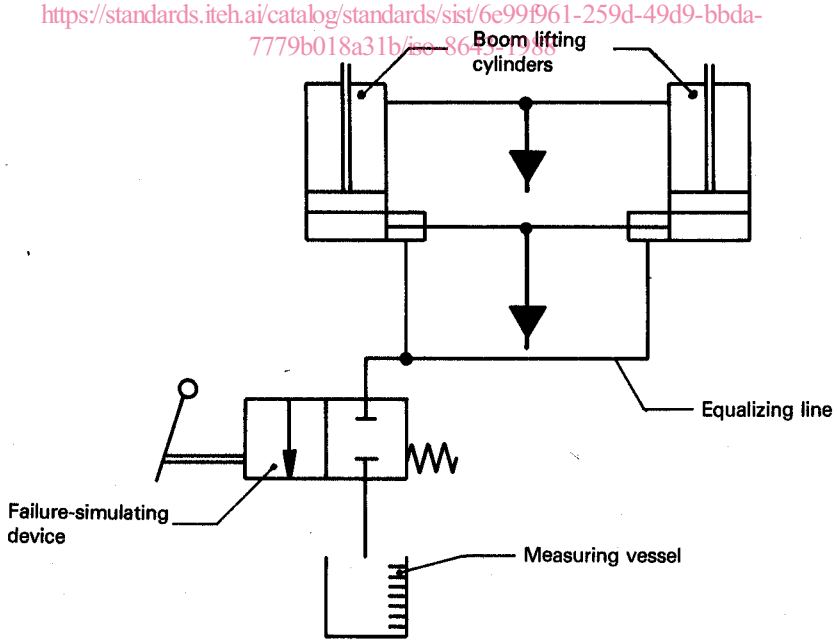

Figure 3

UDC 621.879.3

Descriptors: earth moving equipment, hydraulic excavators, loaders, hydraulic systems, safety devices, control devices, specifications, tests.

Price based on 3 pages