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Earth-moving machinery — Quick couplers — Safety

Engins de terrassement — Attaches rapides — Sécurité

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ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 127, *Earth-moving machinery*, Subcommittee SC 2, *Safety, ergonomics and general requirements*.

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Introduction

This International Standard specifies design criteria for quick couplers related to assisting the operator in ensuring that an attachment is located in the right position on the quick coupler and that the engagement system is fully activated. While preparing this International Standard, it was considered to what extent the state of the art allowed the further reduction of risks related to incomplete engagement procedures. In particular, it was considered carefully whether the use of sensors and associated control systems could be normatively required in order to ensure that those procedures were correctly completed. It was determined that the current state of the art did not allow such a requirement to be made. However, due to the continuing development of technology, this possibility will be reviewed by ISO/TC 127 periodically so that a revision to this International Standard can be initiated at the appropriate time. Nothing in this International Standard is to be taken as discouraging the development of new technologies and new technical measures to reduce or remove risk.

This International Standard is a type C standard as defined in ISO 12100.

The machinery concerned and the extent to which hazards, hazardous situations or hazardous events are covered are indicated in the scope of this International Standard.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards for machines that have been designed and built according to the provisions of this type-C standard.

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Earth-moving machinery — Quick couplers — Safety

1 Scope

This International Standard specifies safety requirements for quick couplers used on earth-moving machinery as defined in ISO 6165.

2 Normative references

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

ISO 6165, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 6750, *Earth-moving machinery — Operator's manual — Content and format*

ISO 9244, *Earth-moving machinery — Machine safety labels — General principles*

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 20474-1:2008, *Earth-moving machinery — Safety — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
quick coupler
device mounted on an earth-moving machine to allow the quick interchange of attachments

Note 1 to entry: Quick couplers are also commonly referred to under many different names, including "quick hitch" and "attachment bracket". For the purposes of this International Standard, only the term "quick coupler" is used.

3.1.1
powered quick coupler
quick coupler (3.1) where the movement of at least one part of the engagement and *locking system* (3.5) is actuated by a power source

EXAMPLE A hydraulic system or an electric motor.

3.1.2
manual quick coupler
quick coupler (3.1) where the movement of the engagement and *locking systems* (3.5) is actuated by human effort at the quick coupler itself

Note 1 to entry: Locking can be automatic as part of the manual process of engagement.

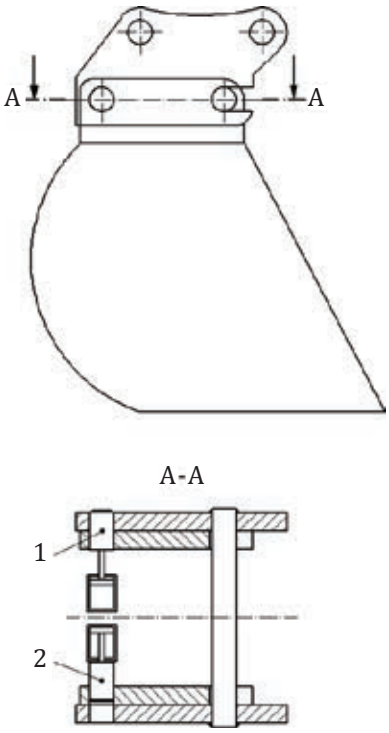
3.1.3
mixed quick coupler
quick coupler (3.1) where engagement and locking are carried out from the operator's station but disengagement is carried out by human effort at the quick coupler itself

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3.2
engagement system
mechanical system of the *quick coupler* (3.1) which engages with the attachment and retains the attachment in its *working position* (3.4)

3.2.1
form-locked engagement system
engagement system (3.2) which retains the attachment in the normal *working position* (3.4) by a system of at least two components that engage each other perpendicular to the *working forces* (3.3.1) such that the working forces do not tend to cause disengagement

EXAMPLE Pin in shear (see Figure 1).



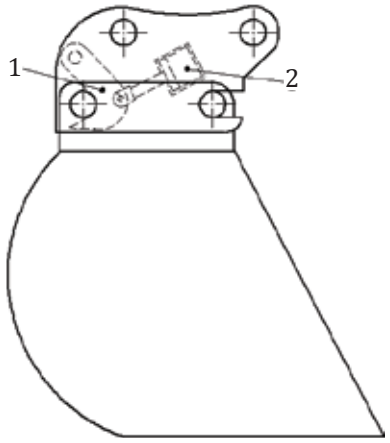
Key
1 engagement system in engaged position
2 engagement system in disengaged position

Figure 1 — Example of form-locked engagement system

3.2.2
force-locked engagement system
engagement system (3.2) whereby continued engagement is dependent on the continuous application of the *engagement force* (3.3.2) as the *working forces* (3.3.1) act in a direction to cause disengagement

Note 1 to entry: See Figure 2 for an example.

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Key

1 engagement system

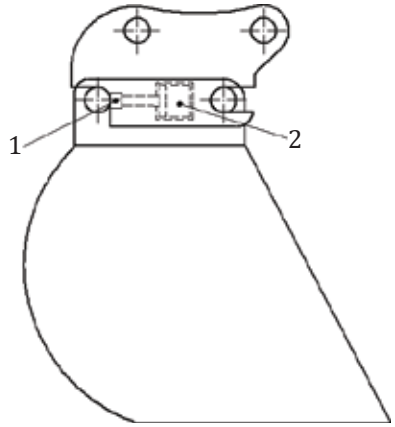
2 engagement force device

Figure 2 — Example of force-locked engagement system

3.2.3
friction system
engagement system (3.2) whereby engagement is dependent on a force generated only by friction

Note 1 to entry: Friction engagement systems are not permitted [see 4.1.2 b)].

Note 2 to entry: See Figure 3 for an example.



Key

1 engagement system

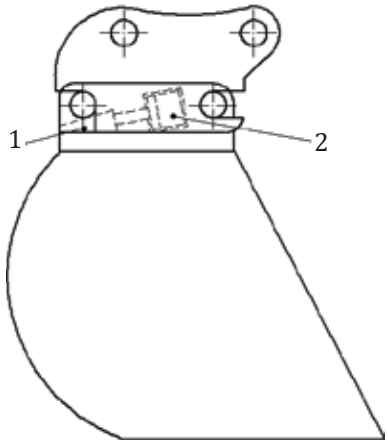
2 engagement force device

Figure 3 — Example of friction engagement system

3.2.4
wedge-type engagement system
engagement system (3.2) of at least two interconnecting parts which engage with one another in a wedge action whereby the combination of the wedge angle and the friction coefficient counteract the tendency of the *working forces* (3.3.1) to cause disengagement

Note 1 to entry: See Figures 4 and 5.

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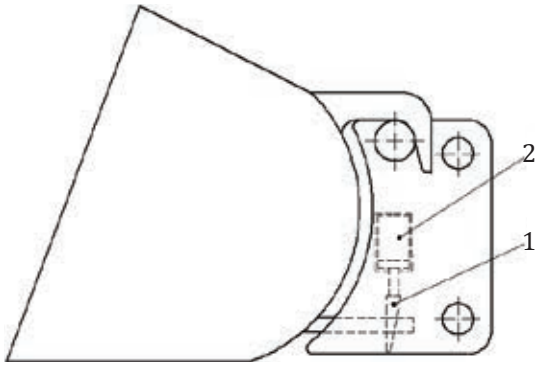


Key

1 engagement system (wedge)

2 engagement force device

Figure 4 — Example of wedge-type engagement system



Key

1 engagement system (wedge)

2 engagement force device

Figure 5 — Example of wedge-type engagement system on a loader

3.3 Forces

3.3.1
working forces

forces created by the working operations of the machine and attachments that act upon the *quick coupler* (3.1) during intended use and reasonably foreseeable misuse

3.3.2
engagement force

force that moves the *engagement system* (3.2) to the engaged position and, if the design requires, retains it in that position

Note 1 to entry: The engagement force can also be used for retention if the working force or additional forces (e.g. gravity) create a force tending to disengage the attachment (i.e. force-locked engagement systems, wedge-type engagement systems).

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3.4
working position
position on the *quick coupler* (3.1) in which the attachment is able to perform its intended function

3.5
locking system
system that ensures that the attachment is retained in its *working position* (3.4) if the *engagement force* (3.3.2) is lost, reduced or removed

3.6 Controls

3.6.1
separate control
control solely dedicated to the *quick coupler* (3.1) which is not integrated into, or mounted onto, any other machine control, and does not have any other function

Note 1 to entry: A switch mounted on a control joystick is not considered to be a separate control.

Note 2 to entry: A separate switch can be integrated into an instrument cluster or control panel.

3.6.2
integrated control
control used to engage or disengage the *quick coupler* (3.1) which is integrated into, or mounted onto, any other machine control, or a control which also has another function

EXAMPLE Switch on a joystick control, joystick used also for work equipment control.

3.6.3
initiating control
control that enables a *disengagement control* (3.6.4) to function

3.6.4
disengagement control
control which connects the disengagement actuator to its power supply

Note 1 to entry: In a system with integrated controls, the disengagement control is enabled by the initiating control.

3.6.5
hold-to-run
type of control device which initiates and maintains *quick coupler* (3.1) functions only as long as the manual control is actuated

[SOURCE: ISO 12100:2010, 3.28.3 — Modified]

4 Safety requirements and protective measures

4.1 Quick coupler

4.1.1 General

Quick couplers shall comply with the requirements of this clause. In addition, they shall be designed according to the principles of ISO 12100 for relevant hazards which are not dealt with by this International Standard.

Quick couplers shall have an engagement system and a locking system that meet the requirements of 4.1.2 and 4.1.3, respectively.

NOTE The process of coupling consists of several steps such as picking up, locating, engagement and locking. Depending on the design, some of these steps might be combined.

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