INTERNATIONAL STANDARD

**ISO 10987-2**

First edition
2017-08

# Earth-moving machinery — Sustainability —

## Part 2: Remanufacturing

*Engins de terrassement — Durabilité —*

*Partie 2: Réfection*



Reference number
ISO 10987-2:2017(E)



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

# Contents

Page

# 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 voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 127, *Earth-moving machinery*.

A list of all parts in the ISO 10987 series, published under the general title, *Earth-moving machinery — Sustainability*, can be found on the ISO website.



# Introduction

Sustainability has become a concern in relation to earth-moving machinery, as for so many other products. Customers buying the machines are requesting information that can be used to promote sustainability for their work projects. With the increased interest in sustainability, many organizations are preparing sustainability guidelines and manufacturers are providing general sustainability information.

Sustainability covers a wide range of areas related to social, environmental and economic considerations for the development, manufacturing, useful life and end-of-life phases for earth-moving machines.

Remanufacturing can result in the reuse of the end-of-life products and reduce the consumption of resources and environmental pollution. It can also result in energy savings and reduction of greenhouse gas emissions and other harmful substances. Remanufacturing has become an important part of recycling in a low-carbon economy. It is now one of the key aspects of sustainability and is expected to continue as such in the future. The utilization of used parts of earth-moving machines can reach 80 % or more of the part numbers.

Remanufacturing is performed by the original equipment manufacturer or its associates or by a formally authorized entity.

The development of International Standards on earth-moving machine remanufacturing can help remanufacturers to establish a common understanding about technical specifications for remanufacturing and thereby improve the quality of the remanufactured products.

The objectives of this document are to

— provide general guidance and requirements for remanufacturing of components of earth-moving machines,

— enhance the quality of remanufactured products,

— achieve the sustainable application of remanufactured products, and

— promote the conservation of social resources.

# Earth-moving machinery — Sustainability —

# Part 2: Remanufacturing

## 1 Scope

This document gives requirements for identification and labelling, applicable processes, and relevant information for remanufactured components for earth-moving machinery.

This document is applicable to remanufacturing for reuse of components on earth-moving machines as defined in ISO 6165. It can be used for all types of off-road machines.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 6165, *Earth-moving machinery — Basic types — Identification and terms and definitions*

ISO 10987, *Earth-moving machinery — Sustainability — Terminology, sustainability factors and reporting*

ISO 16714, *Earth-moving machinery — Recyclability and recoverability — Terminology and calculation method*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6165, ISO 10987 and ISO 16714, and the following apply.

NOTE Annex A provides additional general terms and definitions.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

**3.1**
**core**
component at the end of its useful service life that can be processed so that it can be reused

Note 1 to entry: A core has monetary value and is not waste.

**3.2**
**remanufacturing**
industrial process performed by the *original equipment manufacturer* (3.10) or its associates, or formally authorized entity, by which a previously sold, worn or non-functional component, known as a *core* (3.1), is returned to a "like new" or "better-than-new" condition from both a quality and a performance perspective

Note 1 to entry: This definition differs from that given in ISO 16714 or ISO 10987.



**3.3**
**remanufactured product**
component which completes the *remanufacturing process* (3.6), meets the remanufacturing requirements and is ready to be placed on the market once again

Note 1 to entry: See Annex A.

**3.4**
**remanufacturability**
attributes of the *core* (3.1) that determine if the core can be remanufactured, taking into account such factors as technology, economy, environment, safety and service

**3.5**
**design for remanufacturability**
design that enhances *remanufacturability* (3.4) during the initial product design stage

**3.6**
**remanufacturing process**
process for the *remanufacturing* (3.2) of the *core* (3.1)

Note 1 to entry: This process can include the take back, inspection, disassembly, *cleaning* (3.8), classification, assessment, reconditioning, repair, *reassembly* (3.9), testing and labelling and packaging.

**3.7**
**remanufacturer**
entity engaged in the production of remanufactured products

**3.8**
**cleaning**
process in which rust, burrs and various stains on the surfaces of a core and its parts and components are removed

**3.9**
**reassembly**
process in which remanufactured, directly useable and new parts are assembled into a *remanufactured product* (3.3)

**3.10**
**original equipment manufacturer**
**OEM**
original producer of the earth-moving machine or its components

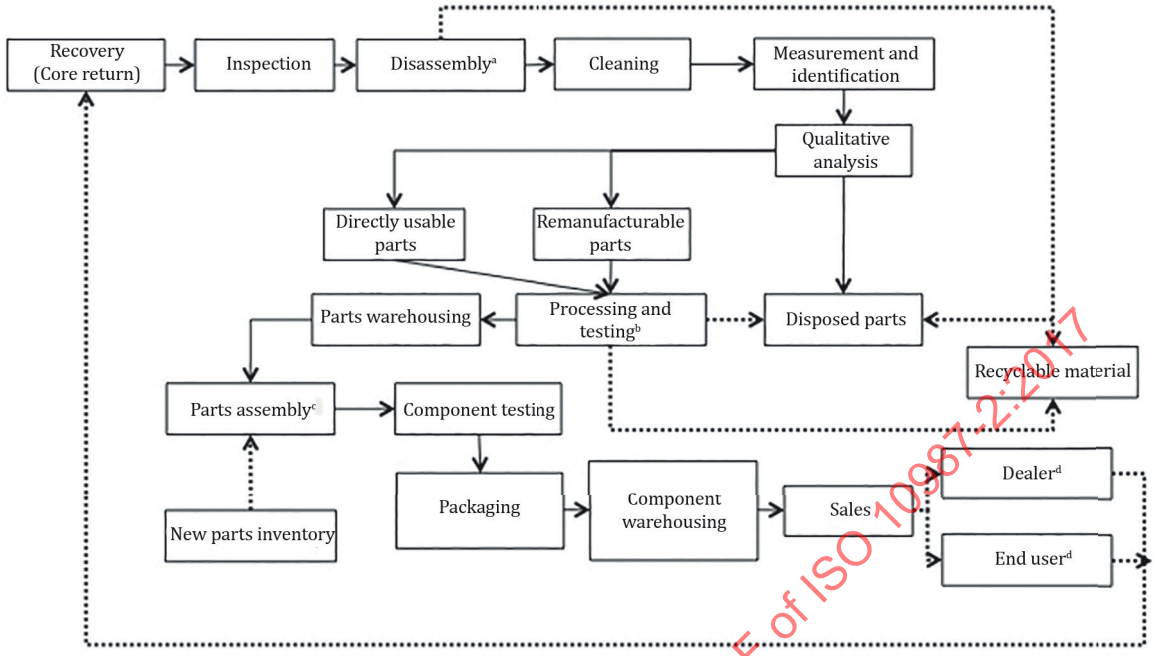
**3.11**
**recycling**
reprocessing in a production process of the waste materials for the original purpose or for other purposes, excluding processing as a means of generating energy

[SOURCE: ISO 16714:2008, 3.6]

**3.12**
**disassembly**
activity in which a core is dismantled into parts

## 4 Remanufacturing process

Figure 1 shows the earth-moving machine component remanufacturing process. More information on specific processes is provided in Annex B to Annex D.




a After core disassembly, the parts could become disposed parts or recyclable material.

b After remanufacturable parts are processed and tested, they are judged to determine whether to use the processed parts, to dispose of the parts or to recycle the materials.

c New parts can be added for the remanufacturing process.

d The remanufacturing process can be performed multiple times.

**Figure 1 — Earth-moving machine remanufacturing process**



## 5 Requirements

The remanufacturing process shall return the core to its “like new” or “better-than-new” condition from both quality and performance perspectives. The “like new” or “better-than-new” condition may include design for remanufacturing improvements that are compatible with the original design.

Remanufacturing is only performed by the original equipment manufacturer (OEM) or its associates or by a formally authorized entity.

The remanufacturer shall verify that all safety improvement programs have been completed.

The remanufacturer should determine if additional information is required for service (for example, a higher bolt torque) and shall provide a means to obtain the information.

## 6 Information

### 6.1 Product marking

The original product information shall be kept on the remanufactured product or the packaging.

Remanufactured components shall be identified as *remanufactured*.

The following information shall be provided on the remanufactured product or package:

— remanufacturer name and address;

— product name (for example, name, model, or style);

— part number of the remanufactured product, if applicable;

— serial number of the remanufactured product, if applicable;

— regulatory markings (for example, exhaust emission labelling requirements), if applicable;

— remanufactured date, if a date is required on the same new product;

— mass of remanufactured product, if applicable.

## 6.2 Additional labelling information

Local requirements can call for a specific sign, marking or label indicating that an item has been remanufactured. Annex E provides an example of such a label.



# Annex A
(informative)

# Additional terms and definitions

This annex presents additional general terms and definitions for remanufacturing. They are given for information only and are not included with the ISO terms and definitions on the OBP (see Clause 3).

**A.1**
**life cycle of remanufactured product**
whole process from the recovery and salvage of the core, sales and the use of remanufactured product, to the disposal again at the end of life of the remanufactured product

**A.2**
**remanufacturing management**
series of activities in which the whole life cycle of a remanufactured product is planned, organized and controlled

**A.3**
**remanufacturing techniques**
methods and processes used on the core

Note 1 to entry: When complete, the core is returned to the same or better condition for quality and performance as when it was first manufactured.

**A.4**
**upgrade remanufacturing**
remanufacturing mode in which the core, after going through technical transformation and partial replacement, has improved or enhanced quality or performance characteristics

**A.5**
**remanufacturing system**
various resources used in the remanufacturing process of the product

**A.6**
**remanufacturing logistics**
flow process of the product from the market to the remanufacturing place and again to the market

**A.7**
**remanufacturing rate**
proportion of the sum of quantities, masses and values of qualified remanufactured parts and components to the total quantity, total mass and total value of corresponding product, after a unit core is remanufactured and machined

Note 1 to entry: The three proportions are called quantity remanufacturing rate, mass remanufacturing rate and value.

**A.8**
**quality of remanufactured product**
degree to which the product fully meets the original manufacturer's requirements to qualify as a remanufactured product

**A.9**
**certificate of conformity for the remanufactured product**
documentation to indicate that remanufactured products comply with related technical standards

Note 1 to entry: There can be local requirements for the remanufacturer to consider.

**A.10**
**salvage**, verb
applying appropriate remanufacturing processes, techniques and methods to restore an end-of-life product to like-new or better-than-new condition

**A.11**
**recyclable material**
used parts that cannot be remanufactured based on current technical conditions or have no economic value for remanufacturing, but which can be recycled

**A.12**
**remanufacturable parts**
used parts whose quality characteristics can be recovered or improved after being remanufactured

**A.13**
**disposed parts**
used parts that cannot be directly used, remanufactured or recycled

**A.14**
**directly usable parts**
used parts which fall within the engineering specifications or require only minimal processing (such as cleaning) prior to reuse

# Annex B
(informative)

# Disassembly

## B.1 Disassembly process

This annex provides examples of process steps, disassembly methods, and general and environmental recommendations for earth-moving machine component remanufacturing.

The following are examples of and recommendations for steps in the disassembly process.

a) During the disassembly process, the operation should be in accordance with relevant requirements of the operation instructions.

b) A visual check should be made of seals and for possible breakage before disassembling, using specific containers to collect waste liquid.

c) An appropriate disassembly process should be developed and appropriate tools should be used to avoid any damage to the core or its components or risk to personal safety.

d) When an earth-moving machine core is disassembled, it should be disassembled into the smallest unit.

e) When disassembling fasteners, the order of disassembling should be noted so as to avoid damage of parts.

f) The disassembled parts should be visually inspected for surface conditions and initially judged for remanufacturability.

g) The disassembled parts should be segregated with special equipment to avoid damaging parts.

h) Solid and liquid waste should be handled to comply with the requirements of ISO 14001.

## B.2 Methods

Some example of disassembly methods are

a) general tools,

b) percussion method,

c) processing method,

d) isotonic,

e) temperature differential method,

f) special screw removal method,

g) pressure control method, and

h) pre-stress.

# Annex C
(informative)

# Cleaning

## C.1 General

This annex gives examples of steps in the cleaning process and general recommendations for their application in earth-moving machine component remanufacturing, as well as examples of cleaning methods. The types of cleaning concerned are

a) cleaning before disassembling,

b) cleaning after disassembling and before reassembly, and

c) cleaning before painting.

## C.2 Cleaning process

The following are examples of steps in the cleaning process.

a) Cleaning instructions should be formulated. Cleaning should be carried out strictly in accordance with the instructions.

b) The remanufacturing site should be kept clean.

c) Corrosion or damage should be avoided when washing and transferring parts. Corrosion and rust protection should be incorporated.

d) The core and disassembled parts should be thoroughly cleaned to remove residue on the internal and external surfaces of the core and disassembled parts.

e) Fire protection and ventilation should be provided when cleaning cores and disassembled parts.

f) Treatment for liquid and gas waste and disposal of solid waste should comply with ISO 14001.

## C.3 Methods

Some example of cleaning methods are

a) manual cleaning,

b) heat cleaning,

c) pressure cleaning,

d) blast cleaning or sandblast cleaning,

e) ultrasonic cleaning,

f) electrolytic cleaning,

g) chemical cleaning, and

h) comprehensive cleaning.