BS 8887-211:2012

BSI Standards Publication

# Design for manufacture, assembly, disassembly and end-of-life processing (MADE)

## Part 211: Specification for reworking and remarketing of computing hardware

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# Foreword

## Publishing information

This part of BS 8887 is published by BSI Standards Limited, under licence from The British Standards Institution and came into effect on 31 August 2012. It was prepared by Subcommittee TDW/4/7, *BS 8887 Design for MADE*, under the authority of Technical Committee TDW/4, *Technical product realization*. A list of organizations represented on this committee can be obtained on request to its secretary.

## Relationship with other publications

BS 8887 is published in several parts, including:

- *Part 1: General concepts, processes and requirements;*
- *Part 2: Terms and definitions;*
- *Part 220: The process of remanufacture – Specification;*
- *Part 240: Reconditioning.*

BS 8887-211 is intended to be read in conjunction with PAS 141, which deals with the processes for product or component recovery, for reuse from those product flows committed to the waste electrical and electronic equipment process.

## Information about this document

Documents numbered Part 1 to Part 99 are general MADE standards. Documents numbered Part 100 to Part 199 are related to manufacture and assembly. Documents numbered Part 200 to Part 299 are related to disassembly and end-of-life.

## Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

*Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.*

## Contractual and legal considerations

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# Introduction

The aim of this part of BS 8887 is to give IT sector remarketers the vocabulary and procedures needed to accurately define their products. This is needed because the industry sells a variety of used products under a number of different grades.

BS 8887-211 defines the following:

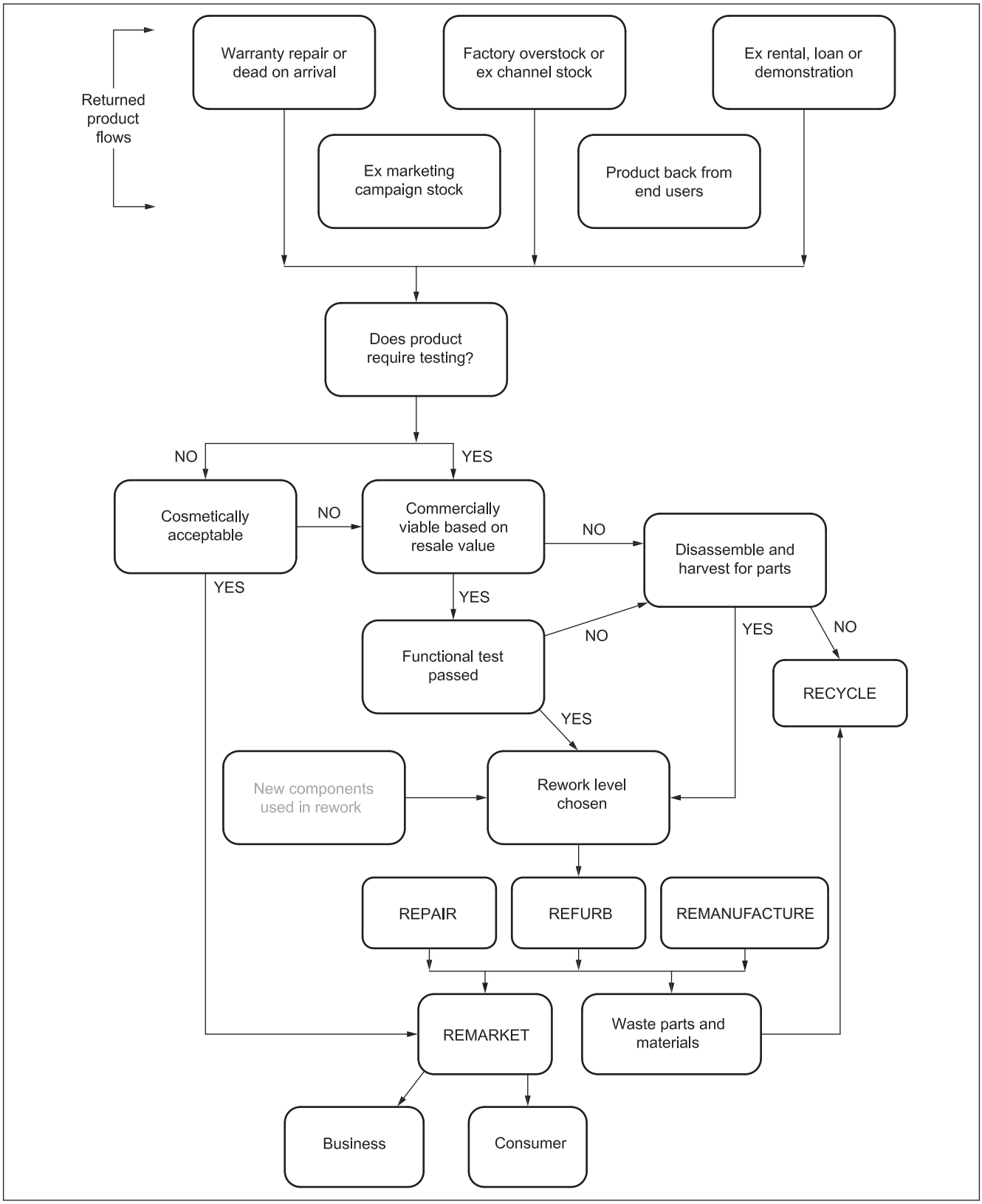
- remanufactured;
- refurbished;
- repaired;
- unopened product returns; and
- upgraded.

This enables the user to understand the processes undertaken by the reseller and the level of the final product's quality.

The term "remarketed product" is used in the computer hardware industry and refers to a product that cannot be sold as new, even when sold through the Original Equipment Manufacturer's (OEM) primary or standard channels to market. Some OEMs have specialist or dedicated channels to market their remarketed products. Within the computing hardware industry, the phrases remarket and resale are treated as synonymous.

Remarketed products range from being similar to a new product, having not been used and in original or unopened packaging, through to older products that have been used and are being sold to a second or third user in their lifecycle (see Figure 1). Market demand for such products is driven by the various benefits derived from the use of remarketed products (see Annex A), and market supply is satisfied through the various categories of product as described in Clause **4**.

Figure 1 **Remarketed product lifecycle**



# 1 Scope

This part of BS 8887 specifies the process for reworking and remarketing used computing hardware by the following categories of organizations.

a) OEMs (tier 1).

b) OEM-contracted and authorized service providers (tier 2).

c) Independent remarketing companies and service providers.

*NOTE 1 A remarketed product can also be sold direct by the original or current user to a new user, generally with no reworking, or assurances or warranty offered. Such arrangements are not within the scope of this part of BS 8887.*

*NOTE 2 There might be differences between each tier in the levels of expertise, capability and available resources, so the tier through which a used product is returned and processed can affect the category of remarketing and depth of reworking required.*

This part of BS 8887 is applicable to the reworking and remarketing of hardware and, where relevant, the operating system software and firmware, but does not apply to application software or personal productivity tools.

It is intended to be used in conjunction with BS 8887-1, BS 8887-2, BS 8887-220, BS 8887-240 and PAS 141.

# 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.

BS 8887-1, *Design for manufacture, assembly, disassembly and end-of-life processing (MADE) – Part 1: General concepts, process and requirements*

BS 8887-2, *Design for manufacture, assembly, disassembly and end-of-life processing (MADE) – Part 2: Terms and definitions*

BS 8887-220, *Design for manufacture, assembly, disassembly and end-of-life processing (MADE) – Part 220: The process of remanufacture – Specification*

BS 8887-240, *Design for manufacture, assembly, disassembly and end-of-life processing (MADE) – Part 240: Reconditioning*

PAS 141, *Reuse of used and waste electrical and electronic equipment (UEEE and WEEE) – Process management – Specification*

# 3 Terms and definitions

For the purposes of this British Standard, the terms and definitions given in BS 8887-1, BS 8887-2 and the following apply.

**3.1 component**
electrical or mechanical hardware part of a product or larger sub-assembly

**3.2 computing hardware**
computer system or peripheral manufactured for use, sale or lease, including the operating system but not necessarily any application software

*NOTE Such products include desktop PCs, laptops, servers, monitors, keyboards, printers, and storage or network devices.*

**3.3 demanufacture**
process of non-destructive product disassembly

*NOTE This activity takes place in a full production environment as part of an end-to-end dedicated remanufacturing or reprocessing process.*

**3.4 product**
complete and fully functional computing hardware system or peripheral

*NOTE To be viewed as synonymous with computing hardware.*

**3.5 refurbishment**
process of providing a clean repaired product that can be brought back to at least the operational condition from the original point of manufacture with minor or no cosmetic flaws

*NOTE Refurbishment is synonymous with reconditioning within the remarketing of computer equipment hardware.*

**3.6 remanufacturing**
process that brings a previously used product back to at least its original manufactured state, in an "as-new" condition both cosmetically and functionally

**3.7 remarket**
sell product that has previously been sold

*NOTE 1 To be viewed as synonymous with resale.*

*NOTE 2 Such products can be used or unused, but cannot be described as or offered as new; further explanation can be found in Clause **4**.*

**3.8 repair**
act of fixing or correcting an identified fault, defect or damage to return the product to a usable state

*NOTE For fault definitions, see **5.1.2**.*

**3.9 resale**
product sold for a second or subsequent time

**3.10 reuse**
use of a product for a further life of the same purpose beyond its initial life

**3.11 rework**
level of intervention that a product might receive

*NOTE This can be a process to remanufacture, recondition, refurbish or repair a product in order to make it usable again and/or saleable as a remarketed product.*

**3.12 upgrade**
enhancement or improvement of the product's performance by increasing function or capacity

*NOTE This may involve the substitution, replacement, or addition of hardware parts, firmware or software to extend the original capability.*

# 4 Categories of product flows into the reworking and remarketing process

Products for reworking and remarketing can originate from:

a) manufacturing overstock direct from the factory where a drop in market demand has resulted in excess inventory against current sales activity;

b) new, unopened and unused products returned from surplus inventory from distribution or reseller channel partners;

c) products used for demonstration or display models, including fairs and events, marketing campaigns, and evaluation by the trade or general press;

d) opened-box returns from business or consumer customers where:

   1) the product has been used for a short time by a customer, such as a proof-of-concept trial, comparison testing, a "try-and-buy" offer, a free loan to replace other failed products, or products that did not perform to specification or the required standard;

   2) the product was not used, e.g. an incorrect order or delivery, or remorse purchase;

   3) the end user/customer has changed their requirements and wants to purchase an alternative product, potentially without deploying the original ordered product;

e) defective product (non-working when first taken out of the box, known as "dead on arrival", or "DOA"), or a repair within the warranty period when returned to the OEM, or broken or damaged in transit, etc.;

f) used product from business users (end-of-lease returns, product traded-in against a new purchase, a repurchase from the end user independent of a new purchase, the open market, or product that has been rented out to the customer).

# 5 Rework procedure

## 5.1 Assessment of rework level required

**5.1.1** An initial commercial assessment, based on age, type, expected condition and market demand, shall be made to determine the likelihood of generating a product fit for remarketing. The aim of this assessment is to decide if further investigation of the computer hardware is justified. If the equipment fails this initial test, it shall be disposed of appropriately.

*NOTE 1 This assessment can be performed by a description provided by the supplier of the equipment and does not need to be rigorous at this stage.*

*NOTE 2 When disposing of electrical equipment, attention is drawn to the Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC [1].*

**5.1.2** If the initial assessment is passed, the product shall be submitted for testing and inspection (see Notes 1 and 2). When completed, a further commercial assessment shall be made on what rework is then undertaken (see Note 3).

*NOTE 1 The level of inspection should be tailored to the return channels of the product. For example, products from return categories Clause **4**, items a) and b) do not need to be tested if their legal seals are intact unless there is damage to the outer packaging, whereas products from categories Clause **4**, items e) and f) need a more robust inspection and testing procedure in place.*

*NOTE 2 Testing can include visual, performance and working examinations.*

*NOTE 3 The criteria for determining the rework to be undertaken can include the following.*

*a) Resale value: what can be achieved in the used computing hardware market, dependent upon the minimum or preferred level of rework required?*

*b) Product functionality: can it be repaired, and if so at what cost?*

*c) Product cosmetic condition: is it damaged beyond economic repair?*

*d) What the technology gap is to the latest production models: is it viable to upgrade?*

*e) Where the product is within the overall product-set technology lifecycle, can it be made suitable for reuse, or is the technology now too old and/or no demand exists?*

**5.1.3** The analysis shall be used to determine the level of rework undertaken. The potential return from remarketing shall be used as the main basis for this decision. Depending on this decision, some products can be disassembled for component reuse or recycling where there is no economic viability. Products that are economically viable shall undergo one of the procedures specified in **5.2**.

*NOTE Volume might have a bearing on the decision for rework for all tiers [see Scope, items a) to c)], as a large volume of product (for example, more than 1 000 units) might provide an alternative rework option. The cost of rework per unit might be unviable in terms of repair time or replacement parts, but within a large volume it might be possible to create usable units by component exchange. Thus, a certain number of units can be rendered unusable through parts removal, but the remainder are economically rebuilt from other donor products.*

## 5.2 Requirements for processes in preparing for remarketing

*NOTE 1 The process descriptions in this subclause are in addition and specific to the computing hardware industry.*

*NOTE 2 To ensure safe operation, attention is drawn to The Provision and Use of Work Equipment Regulations 1998 [2] and the Electricity at Work Regulations 1989 [3]. For example, portable appliance testing (PAT) should be performed on all products, with the exception of excess new or overstock.*

### 5.2.1 Excess new and unused returns

*NOTE Products that are unopened, meaning the legal seals are intact on the packaging, and whose outer packaging is not significantly damaged, may be sold on as excess or overstock. These products have generally been sourced as excess stock from an OEM supplier.*

Returned product that is unused, but whose packaging has been opened and is significantly damaged, shall undergo functional testing to ensure the product performs to specification. The product can be resold as an "unused return" when this test has been passed.

### 5.2.2 Repair

**5.2.2.1** An electrical or mechanical repair shall be carried out where appropriate to return a product back to a defined working state or performance. A cosmetic repair shall be undertaken to restore minor exterior surface damage and/or other blemishes (e.g. chip, crack, dent, scratch) back to a marketable appearance.

**5.2.2.2** A defined fault shall be repaired by an appropriately qualified technician. Replacement parts shall be of comparable performance and age to those being replaced so they are of a quality that does not result in premature failure of the product when in use.

**5.2.2.3** Testing (see Note 2 to **5.1.2**) shall be performed to ensure the computer equipment performs to a defined functional state, and that the repair has eliminated the identified defect.

**5.2.2.4** Resale of a repaired product shall clearly state the functionality of the unit, detailing any warranty offered.

*NOTE 1 Some repairs can include a newer or upgraded part or component to that which has failed (see **5.2.5**).*

*NOTE 2 Repair in this case is made before remarketing, and should not be confused with field repairs or warranty returns where the product is returned to the current user.*

*NOTE 3 For remarketed products, repairs are inherent activities in the more extensive refurbishment or remanufacturing activities detailed in **5.2.3** and **5.2.4**.*

### 5.2.3 Refurbishment/reconditioning

Refurbishment shall be performed in a factory environment with operational specifications, an appropriate tool set, cleaning solutions, solvents, paints and other surface treatment capabilities. The process of refurbishment shall be performed in accordance with BS 8887-240.

*NOTE In addition to BS 8887-240, upgrades can be incorporated during the refurbishment process.*

A refurbished product shall be accompanied by a limited warranty.

### 5.2.4 Remanufacturing

**5.2.4.1** Any remanufactured product shall be supplied with a new warranty of at least twelve months, matching that normally supplied when the product was originally manufactured and sold.

**5.2.4.2** The criteria set out in BS 8887-220 shall be used to perform the remanufacture. In addition, the following elements specific to computing hardware shall be performed:

a) upgrade to the latest engineering change levels available for that model/range;

b) rebuild of a new product with a new unique serial number, or suffix or prefix to the original serial number, to identify a rebuilt product; and

c) reset or readjust original factory settings.

*NOTE 1 New features and upgrades can be added to a remanufactured product so it equals or surpasses the technology level of the originally manufactured product. Thus, remanufactured products can be equivalent in terms of capability to the engineering levels of current production models.*

*NOTE 2 In general, the original identity of a product (including serial number) should be replaced in the remanufacturing process. However, in the case of larger computer servers, remanufactured products might retain their original serial number and identity because the volumes of such products are low.*

### 5.2.5 Upgrade

#### 5.2.5.1 Determining the need for upgrade

The need for upgrade shall be identified using appropriate criteria, such as:

a) prevention of fault occurrence, accomplished by warranty calls or field repairs including proactive field upgrades, based upon failure rates reported from the user that requires the repairs;

b) unavailability of the original specified component; and

c) commercial grounds to install an upgrade due to higher return on resale.

#### 5.2.5.2 Identification of components to be changed

The components used in the upgrade shall be superior to those being replaced, in terms of, for example:

a) capacity;

b) power; and

c) size.

The identified component upgrade shall be of comparable quality to that of the original component (for example, using the same manufacturer); and it shall not reduce the lifetime or performance of other components, or affect any warranty of the product unless a comparable one is offered in its place.

#### 5.2.5.3 Installation and testing

Installation and testing shall be performed by an appropriately qualified technician. Testing shall be undertaken to ensure that the upgrade component was installed correctly and has achieved the required enhancement in functionality.

#### 5.2.5.4 Customer description update

Any upgrade shall be appropriately documented, and the end user shall be informed of the difference from the original specifications.

*NOTE 1 An upgrade in this case is for remarketing purposes, general servicing or repairs in the field as requested by the customer, and is determined by the viability of upgrade as determined in accordance with* ***5.2.5.1****.*

*NOTE 2 An upgrade can either be a stand-alone operation before resale, or be performed during the remanufacture, refurbishment or repair of computer equipment.*

## 6 Remarketing

The remarketed computing hardware shall be packaged to a level that provides the same protection in transit as when the product was originally shipped as new. Documents shall accompany the remarketed computer hardware to provide:

a) an accurate technical description of the hardware;

b) operating software licence(s); and

c) warranty details.

# Annex A (informative) Benefits of remarketing computing hardware products

There are environmental and commercial benefits [see a) to d)] that the process of remarketing and reusing products provides, having been reworked to provide a further productive life.

a) Sustainability: The use of a product into a second or third user lifecycle extends the use of the raw materials, resources and energy used at the first point of manufacture.

b) Responsibility: The repair, refurbishment or remanufacture of a product provides no more than 20% of the $CO_2$ emissions compared to manufacturing a new product, and thus an OEM or specialist refurbisher demonstrates a responsible option for computing hardware usage by regenerating a usable product without the emissions impact of a newly manufactured version.

*NOTE User demand for responsible and sustainable goods and products is now extending into computing hardware, where previous-generation technology is sufficient to run existing software applications – supporting a concept of "Good Enough Computing".*

c) Commercial: The pricing of remarketed products is lower than that of new products, which is attractive to those customers who do not require the very latest in hardware capability, have a limited budget, and/or are seeking a more cost-effective option.

d) Technological: Software development cycles are now longer than hardware cycles, so the implementation of the latest technology might not necessarily enable a software program to run proportionately faster compared to the investment required to migrate to the newest products.

# Bibliography

**Non-standards publications**

[1] EUROPEAN COMMUNITIES. 2002/96/EC. European Parliament and of the Council of 27 January 2003 on waste electrical and electronic equipment (WEEE). Luxembourg: Office for Official Publications of the European Communities 2003 (see also: EUROPEAN COMMUNITIES. 2008/34/EC. European Parliament and of the Council Directive of 11 March 2008 amending Directive 2002/96/EC on waste electrical and electronic equipment (WEEE), as regards the implementing powers conferred on the Commission. Luxembourg: Office for Official Publications of the European Communities 2008).

[2] GREAT BRITAIN. *Safe use of work equipment – Provision and use of Work Equipment Regulations 1998*. London: TSO.

[3] GREAT BRITAIN. *The Electricity at Work Regulations 1989.* London: HMSO.

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