BRITISH STANDARD

BS EN 1037:1995 +A1:2008

# Safety of machinery — Prevention of unexpected start-up

ICS 13.110

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

Document Sharing Hub
British Standards

Full document details: BS EN 1037:1995+A1:2008

# National foreword

This British Standard is the UK implementation of EN 1037:1995+A1:2008. It supersedes BS EN 1037:1995 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by ▌A1⟩ ⟨A1▌.

The UK participation in its preparation was entrusted to Technical Committee MCE/3, Safeguarding of machinery.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Board and comes into effect on 15th July 1996

© BSI 2008

ISBN 978 0 580 60506 2

**Amendments/corrigenda issued since publication**

| Date | Comments |
|---|---|
| 30 November 2008 | Implementation of CEN amendment A1:2008 and alignment of BSI and CEN publication dates |
| | |
| | |
| | |

Documents
Document Sharing Hub

Full document details: BS EN 1037:1995+A1:2008

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 1037:1995+A1

April 2008

ICS 13.110

Supersedes EN 1037:1995

English Version

## Safety of machinery - Prevention of unexpected start-up

Sécurité des machines - Prévention de la mise en marche intempestive

Sicherheit von Maschinen - Vermeidung von unerwartetem Anlauf

This European Standard was approved by CEN on 14 July 1995 and includes Amendment 1 approved by CEN on 18 March 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

© 2008 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN 1037:1995+A1:2008: E

Documents
Document Sharing Hub

Full document details: BS EN 1037:1995+A1:2008

# Contents

Page

Foreword ..... 3

Introduction ..... 4

1 Scope ..... 4

2 Normative references ..... 4

3 Definitions ..... 5

4 General ..... 6
4.1 Isolation and energy dissipation ..... 6
4.2 Other means to prevent unexpected [unintended] start-up ..... 6

5 Devices for isolation and energy dissipation ..... 6
5.1 Devices for isolation from power supplies ..... 6
5.2 Locking [securing] devices ..... 7
5.3 Devices for stored energy dissipation or restraint [containment] ..... 7
5.4 Verification ..... 8

6 Measures – other than isolation and energy dissipation – intended to prevent unexpected start-up ..... 9
6.1 Design strategy ..... 9
6.2 Measures intended to prevent accidental generation of start commands ..... 9
6.3 Measures intended to prevent accidental start commands resulting in an unexpected start-up ..... 10
6.4 Automatic monitoring of the category 2 stopped condition ..... 13

Annex A (informative) Examples of tasks which can require the presence of persons in danger zones ..... 14

Annex B (informative) Signalling, warning ..... 15

Annex ZA (informative) A1 Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC ..... 16

Annex ZB (informative) A1 Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC ..... 17

Bibliography ..... 18



Documents
Document Sharing Hub

Full document details: BS EN 1037:1995+A1:2008

## Foreword

This document (EN 1037:1995+A1:2008) has been prepared by Technical Committee CEN/TC 114 “Safety of machinery”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2008, and conflicting national standards shall be withdrawn at the latest by October 2008.

This document supersedes EN 1037:1995.

This document includes Amendment 1, approved by CEN on 2008-03-18.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ▌A1⟩ ⟨A1▌.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

▌A1⟩ For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1▌

The drafting was carried out by a working group of CEN/TC 114 (WG 9) with participation of experts from CENELEC/TC 44 X.

This standard is a type B1 standard in accordance with EN 414.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.



Documents
Document Sharing Hub
Full document details: BS EN 1037:1995+A1:2008

# Introduction

Keeping a machine in a stopped condition while persons are present in danger zones is one of the most important conditions of the safe use of machinery and hence one of the major aims of the machine designer and machine user.

In the past, the concepts of "operating machine" and "stopped machine" were generally unambiguous; a machine was:

— Operating when its movable elements, or some of them, were moving;

— Stopped when its movable elements were at rest.

Machine automation has made the relationship between "operating" and "moving" on the one hand, "stopped" and "at rest" on the other hand, more difficult to define. Automation has also increased the potential for unexpected start-up, and there are a significant number of accidents where machines, stopped for diagnostic work or corrective actions, started up unexpectedly.

Hazards other than mechanical hazards generated by movable elements (e.g. from a laser beam) also need to be taken into account.

The risk assessment relating to the presence of persons in a danger zone of a stopped machine needs to take into account the probability of an unexpected start-up of the hazard-generating machine elements.

This standard provides machine designers and technical committees in charge of preparing machinery safety standards with a survey of built-in measures intended to prevent unexpected start-up.

## 1 Scope

This standard specifies built-in safety measures aimed at preventing unexpected machine start-up (see 3.2) to allow safe human interventions in danger zones (see Annex A).

This standard applies to unexpected start-up from all types of energy source, i.e.:

— Power supply, e.g. electrical, hydraulic, pneumatic;

— Stored energy due to, e.g., gravity, compressed springs;

— External influences, e.g. from wind;

## 2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1:1991, *Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology.*



Documents
Document Sharing Hub
Full document details: BS EN 1037:1995+A1:2008

EN 292-2:1991, *Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications.*

prEN 1050[1)], *Safety of machinery – Principles for risk assessment.*

ENV 1070, *Safety of machinery – Terminology.*

EN 60204-1:1992, *Safety of machinery – Electrical equipment of machines – Part 1: General requirements.*

## 3 Definitions

For the purposes of this standard, the definitions given in ENV 1070 "Safety of machinery – Terminology" apply, together with the following:

**3.1**
**start-up (machine start-up)**
change from rest to motion of a machine or of one of its parts

NOTE The definition includes functions other than motion, e.g. switch-on of a laser beam

**3.2**
**unexpected [unintended] start-up**
any start-up caused by:

— a start command which is the result of a failure in, or an external influence on, the control system;

— a start command generated by inopportune action on a start control or other parts of the machine, as e.g. a sensor or a power control element;

— restoration of the power supply after an interruption;

— external/internal influences (gravity, wind, self-ignition in internal combustion engines…) on parts of the machine;

NOTE Automatic machine start-up during normal operation is not unintended, but can be considered to be unexpected from the point of view of the operator. Prevention of accidents in this case involves the use of safeguarding measures (see clause 4 of EN 292-2:1991)

**3.3**
**isolation and energy dissipation**
a procedure which consists of all the four following actions:

a) isolating [disconnecting, separating] the machine (or defined parts of the machine) from all power supplies;

b) if necessary (for instance in large machines or in installations), locking (or otherwise securing) all the isolating units in the isolating position;

c) dissipating or restraining [containing] any stored energy which may give rise to a hazard.

NOTE Energy may be stored in e.g.:

— Mechanical parts continuing to move through inertia;

1) Draft standard prepared by CEN/TC 114/WG 14



Documents
Document Sharing Hub
Full document details: BS EN 1037:1995+A1:2008