

High density recording format on CD-R/RW disc system — HD-BURN format

The European Standard EN 62403:2006 has the status of a
British Standard

ICS 35.220.30

National foreword

This British Standard is the official English language version of EN 62403:2006. It is identical with IEC 62403:2005.

The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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 does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 30, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2006

© BSI 2006

ISBN 0 580 48416 5

Amendments issued since publication

Amd. No.	Date	Comments

**High density recording format on CD-R/RW disc system -
HD-BURN format
(IEC 62403:2005)**

Format d'enregistrement à haute densité
sur un système à disque CD-R/RW -
Format HD-BURN
(CEI 62403:2005)

Aufzeichnungsformat hoher Dichte
für CD-R/RW-Systeme -
HD-BURN-Format
(IEC 62403:2005)

This European Standard was approved by CENELEC on 2006-02-01. CENELEC 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 Central Secretariat or to any CENELEC 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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 62403:2005, prepared by technical area 7: Moderate data rate storage media, equipment and systems of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the formal vote and was approved by CENELEC as EN 62403 on 2006-02-01 without any modification.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2007-02-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2009-02-01

The International Electrotechnical Commission (IEC) and CENELEC draw attention to the fact that it is claimed that compliance with this document may involve the use of patents.

The IEC and CENELEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with the IEC. Information may be obtained from:

Sanyo Electric Co., Ltd.
5-5 Keihan-hondori 2-chome Moriguchi City, Osaka, 570-8677, Japan

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. IEC and CENELEC shall not be held responsible for identifying any or all such patent rights.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62403:2005 was approved by CENELEC as a European Standard without any modification.

CONTENTS

1	Scope	5
2	Normative references	5
3	Terms and definitions	6
4	Convention and notations	7
4.1	Representation of numbers	7
4.2	Names	8
5	List of acronyms	8
6	General requirements	9
6.1	Environment	9
6.2	Unrecorded disc	10
6.3	Recorded disc	10
7	Mechanical and physical characteristics	10
7.1	Mechanical parameters	10
7.2	Optical parameters	10
7.3	Recording parameters	10
8	Disc format	10
8.1	Track format	10
8.2	Data frame format	12
8.3	ECC block format	12
8.4	Recording frames	12
8.5	Physical sectors	12
8.6	Sector number	12
8.7	Format of the inner area	12
8.8	Format of the user data area	21
8.9	Format of the lead-out area	21
9	File system	21
	Annex A (normative) A standard disc	22
	Annex B (normative) ATIP synchronization rule	28
	Annex C (normative) General linking rules (ATIP)	29
	Annex ZA (normative) Normative references to international publications with their corresponding European publications	30
	Figure 1 – Track layout	11
	Figure 2 – Sector structure	11
	Figure 3 – PCA structure	12
	Figure 4 – Lead-in (PMD) data structure	13
	Figure 5 – Multi-session structure	13
	Figure 6 – Lead-in (PMD) data structure	14
	Figure A.1 – Read only optical pick up	22
	Figure A.2 – Recorder optical pick up	23
	Figure A.3 – Modulation amplitude and signal asymmetry	25
	Figure A.4 – General system diagram for jitter measurement	25

Figure A.5 – Write strategy pulse	26
Figure A.6 – Write strategy pulse for CD-RW disc	27
Figure B.1 – ATIP synchronization rule	28
Figure C.1 – Write start for general linking rules (ATIP)	29
Figure C.2 – Write stop for general linking rules (ATIP)	29
Table 1 – PMA padding data format	13
Table 2 – TPMA structure-1	14
Table 3 – TPMA structure-2	14
Table 4 – TPMA structure-3	15
Table 5 – Initial data of PMD lead-in of disc information	15
Table 6 – Write type	16
Table 7 – Link size	16
Table 8 – PMD-1	17
Table 9 – PMD-1 item detail	18
Table 10 – PMD lead-in start address	18
Table 11 – Media information	19
Table 12 – Point field	19
Table 13 – PMD-2	19
Table 14 – PMD-3	20
Table 15 – PMD-4	20
Table 16 – PSI	20
Table 17 – PMD lead-in start address	21
Table 18 – Media information	21

HIGH DENSITY RECORDING FORMAT ON CD-R/RW DISC SYSTEMS – HD-BURN FORMAT

1 Scope

This International Standard specifies the HD-BURN format applied to CD-R/RW discs. The HD-BURN system is capable of recording the information in double density compared to the conventional CD-R/RW disc. It enables the realization of products with high reliability, high speed and interchangeability, and is especially suitable for consumer applications with high cost-performance.

This document describes:

- the physical characteristics for the recording and playback;
- the track structure of a disc;
- the data structure in the track;
- logical format structure.

2 Normative references

The following references are indispensable for the application of this document. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60908, *Audio recording – Compact disc digital audio system*

ISO/IEC 16448:2002, *Information technology – 120 mm DVD – Read-only disk*

ISO/IEC 20563, *Information technology – 80 mm (1,23 Gbytes per side) and 120 mm (3,95 Gbytes per side) DVD-recordable disc (DVD-R)*

IEC 62291:2002, *Multimedia data storage – Application program interface for UDF based file systems*

ISO 9660:1988, *Volume and file structure of CD-ROM for Information Interchange*

ISO/IEC 13346-1:1995, *Information technology – Volume and file structure of write-once and rewritable media using non-sequential recording for information interchange – Part 1: General*

The Red Book: *Compact disk digital Audio System Description Version*, May 1999
Sony/Philips

The Orange Book part2: *Recordable compact disk systems, Part2 CD-R Version 3.1*,
Sony/Philips

The Orange Book part 3: *Recordable compact disk system, Part3 CD-RW Volume 3, Ultra-Speed Ver 1.0*

NOTE The Red book and Orange book can be obtained from Sony/Philips.

3 Terms and definitions

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

3.1

absolute time in pre-groove

ATIP

time-code information contained in the pre-groove with an additional modulation of the wobble

3.2

access guard area

AGA

preamble data area for reading the following ECC blocks

3.3

HD-BURN

high-density write system at CD-R/RW disc

3.4

land pre pit

LPP

pits embossed on the land during the manufacture of the disc substrate, which contain address information

3.5

multi-session

disc constituted by some sessions

3.6

non CD sector

sector, which has a different structure from the CD

3.7

physical sector number

PSN

serial number, which is allocated to physical sectors on the disc

3.8

pre-groove

guidance track in which clocking and time code information is stored by means of an FM modulated wobble

3.9

program memory data

PMD

information, which is described on the recording program of the disc, including information on each recording mode

3.10

program start information

PSI

start address of the first lead-in

3.11

Reed-Solomon product code

RSPC

method of an error correction code, which corrects errors by multiple bits

3.12

sector

smallest addressable part of a track in the information zone of a disc that can be accessed independently of other addressable parts

3.13

session

area on the disc consisting of lead-in area, program area and lead-out area

3.14

synchronization frame

group of 1488 channel bits, which is representing a synchronization pattern

3.15

temporary program memory area

TPMA

area, which is used for intermediate storage

3.16

track

path, which is followed by the focus of the optical beam during one revolution of the disc

4 Convention and notations

4.1 Representation of numbers

A measured value is rounded off to the least significant digit of the corresponding specified value. It implies that a specified value of 1,26 with a positive tolerance of +0,01, and a negative tolerance of –0,02 allows a range of measured values from 1,235 to 1,275.

- Letters and digits in parentheses represent numbers in hexadecimal notation.
- The setting of a bit is denoted by ZERO or ONE.
- Numbers in binary notation and bit combinations are represented by strings of 0 and 1.
- Numbers in binary notation and bit combinations are shown with the most significant bit to the left.
- Negative values of numbers in binary notation are given in Two's complement.
- In each field the data is recorded so that the most significant byte (byte 0) is recorded first. Within each byte the least significant bit is numbered 0 and is recorded first, the most significant bit (numbered 7 in an 8-bit byte) is recorded last. This order of recording applies also to the data input of the error detection and correction circuits and to their output.

4.2 Names

The names of entities, for example specific tracks, fields, etc., are given with a capital letter.

5 List of acronyms

ADB	Address Data Bit
ALPC	Auto Laser Power Control
ASYM	Asymmetry
BCD	Binary Coded Decimal
BP	Byte Position
BPF	Band Pass Filter
CD-R	Compact Disk Recordable
CD-RW	Compact Disk ReWritable
CDS	Codeword Digital Sum
CD-WO	Compact Disk Write Once
CLV	Constant Linear Velocity
CRC	Cyclic Redundancy Check
DCB	Data Channel Bit
DSV	Digital Sum Value
DVD	Digital Versatile Disc
ECC	Error Correction Code
EDC	Error Detection Code
HDB	High Density Burn (= HD-BURN)
HF	High Frequency
ID	Identification Data
IED	ID Error Detection code
LOS	Lead-out Start Address
LPF	Low-Pass Filter
LSB	Least Significant Byte
MSB	Most Significant Byte
NRZI	Non Return to Zero Inverted
OPC	Optimum Power Control
PAD	Padding
PCA	Power Calibration Area
PI	Parity of Inner-code
PMA	Program Memory Area
PO	Parity of Outer-code
PUH	Pick Up Head
R/W	Rewritable
RID	Recorder Identifier
RS	Reed-Solomon

6 General requirements

6.1 Environment

6.1.1 Testing environment

The test environment is the environment where the air immediately surrounding the disc has the following properties.

	For dimensional measurements	For other measurements
temperature:	23 °C ± 2 °C	15 °C ± 35 °C
relative humidity:	45 % to 55 %	45 % to 75 %
atmospheric pressure:	60 kPa to 106 kPa	60 kPa to 106 kPa

Unless otherwise stated, all tests and measurements shall be made in this test environment.

6.1.2 Operating environment

6.1.2.1 Recorded and unrecorded discs

This International Standard requires that an optical disc which meets all mandatory requirements of this International Standard in the specified test environment provides data interchange over the specified ranges of environmental parameters in the operating environment.

Discs used for data interchange shall be operated under the following conditions, when mounted in the drive supplied with voltage and measured on the outside surface of the disc. The disc exposed to storage conditions shall be conditioned in the operating environment for at least 2 h before operating.

temperature:	–25 °C to 70 °C
relative humidity:	3 % to 95 %
absolute humidity:	0,5 g/m ³ to 60,0 g/m ³
temperature gradient:	15 °C/h maximum
relative humidity gradient:	10 %/h maximum

There shall be no condensation of moisture on the disc.

6.1.2.2 Unrecorded disc environmental conditions during recording

The disc exposed to storage conditions shall be conditioned in the recording environment for at least 2 h before operating.

temperature:	–5 °C to 55 °C
relative humidity:	10 % to 95 %
absolute humidity:	0,5 g/m ³ to 30,0 g/m ³

There shall be no condensation of moisture on the disc.